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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/182,373	10/25/2002	Andrew Peter Worsley	P07695US00/RFH	8561

23117   7590   01/09/2006

NIXON & VANDERHYE, PC
901 NORTH GLEBE ROAD, 11TH FLOOR
ARLINGTON, VA 22203

EXAMINER
KOPEC, MARK T

ART UNIT	PAPER NUMBER
1751	

DATE MAILED: 01/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/182,373	WORSLEY ET AL.
	Examiner	**Art Unit**	
	Mark Kopec	1751	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on _10/04/05 and 12/13/05_.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _1-20_ is/are pending in the application.

   4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) _1-20_ is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   a)☐ All   b)☐ Some * c)☐ None of:

   1. ☐ Certified copies of the priority documents have been received.

   2. ☐ Certified copies of the priority documents have been received in Application No. _____.

   3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

   * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

A request for continued examination under 37 CFR 1.114,

including the fee set forth in 37 CFR 1.17(e), was filed in this

application after final rejection. Since this application is

eligible for continued examination under 37 CFR 1.114, and the

fee set forth in 37 CFR 1.17(e) has been timely paid, the

finality of the previous Office action has been withdrawn

pursuant to 37 CFR 1.114. Applicant's submission filed on

10/04/05 has been entered.

The Supplemental Amendment filed 12/13/05 has also been

entered. Claims 1-20 are currently pending.

The IDS statements filed 10/04/05, 10/07/05 (corrected copy

of 10/04/05) and 12/14/05 have been considered. Initialed

copies accompany this action.

The listing of references in the specification (pages 91-

92) is not a proper information disclosure statement. 37

CFR 1.98(b) requires a list of all patents, publications, or

other information submitted for consideration by the Office, and

MPEP § 609.04(a) states, "the list may not be incorporated into

the specification but must be submitted in a separate paper."

Therefore, unless the references have been cited by the examiner

on form PTO-892, they have not been considered.

The text of those sections of Title 35, U.S. Code not

included in this action can be found in a prior Office action.

Claims 1-20 are rejected under 35 U.S.C. 101 because the

disclosed invention is inoperative and therefore lacks utility.

Claims 1-20 are rejected under 35 U.S.C. 112, first

paragraph, as containing subject matter which was not described

in the specification in such a way as to enable one skilled in

the art to which it pertains, or with which it is most nearly

connected, to make and/or use the invention.

These rejections are maintained for the reasons set forth

in the Rejection mailed 9/24/04 (pages 2-8).

It is noted that applicant has provided no additional

remarks regarding the amended or newly added claims. For

completeness, the examiner notes the following.

The amended claim language appears drawn to limitations

regarding electron flow through the body (upon which a force is

to be generated). Specifically, the claims now recite

language/limitations wherein a different relative mass of

electrons is developed throughout different parts of the body.

As stated in previous remarks, the terms appear to be

theoretical in nature and do not provide sufficient guidance or

description in conjunction with the specification to make and/or

use the instant invention, nor do such terms validate

applicant's incredible utility. The examiner respectfully

maintains that even if one were to assume the unproven,

disclosed theoretical calculations were plausible, modern

scientific apparatus are incapable of providing the means for

executing the claimed invention. The "technical examples"

section of the specification refer generally to apparatus such

as "untracentrifugational spindles", "supercooled jacket of

liquid Helium in a vacuum", "power source, motors and

refrigeration", and "means of a commutator device" (page 60).

The examiner respectfully submits that such devices, requiring

enormous forces and highly intricate measurements, have not been

realized by modern science. The instant specification is devoid

of direction and guidance necessary to enable the skilled

artisan to identify or produce "gravitrons". It is the

examiner's position that long and tedious trail and error would

await any person skilled in the art reading applicant's

specification and attempting to produce the claimed invention.

Additionally, the specification does not particularly identify

each of the elements required to produce machinery capable of

the claimed method or the relationship therebetween, nor did it

specify particular apparatus intended to carry out each

function. An adequate disclosure of a device may require

details of how complex components are constructed and perform

the desired function. The claim before the court in In re

Scarbrough, 500 F.2d 560, 182 USPQ 298 (CCPA 1974) was directed

to a system which comprised several component parts (e.g.,

computer, timing and control mechanism, A/D converter, etc.)

only by generic name and overall ultimate function. The court

concluded that there was not an enabling disclosure because the

specification did not describe how "complex elements known to

perform broadly recited functions in different systems would be

adaptable for use in Appellant's particular system with only a

reasonable amount of experimentation" and that "an unreasonable

amount of work would be required to arrive at the detailed

relationships appellant says that he has solved." 500 F.2d at

566, 182 USPQ at 302.

Claims 18-20 are rejected over applicant's admitted prior

art.

At page 56 of the instant application, applicant states,

"In these and other antigravity devices the use of equal and

opposite currents in a superconductor to produce anti-gravity

effects are disclosed" (lines 4-5).

To the extent that this disclosure (and the instant claims)

is operable/enabled, applicant's admission appears to meet each

of the claimed requirements. Specifically, the claims are drawn

to an "apparatus". The claims require 1) an electrically

conducting portion, 2) a motor for rotation, and 3) a commutator

for passing current through different portions of the body.

There is not claim requirement directed to differential current

of differential speed of electrons.

Applicant is required to furnish a model of the instant

invention. 35 U.S.C. 114. See also 37 CFR 1.91.

Applicant's remarks regarding the submission of a model are

noted.

As stated in MPEP 608.03:

> With the exception of cases involving perpetual
> motion, a model is not ordinarily required by the
> Office to demonstrate the *>operability< of a device.
> If *>operability< of a device is questioned, the
> applicant must establish it to the satisfaction of the
> examiner, but he or she may choose his or her own way
> of so doing.

Applicant is invited to contact the undersigned examiner in

order to discuss this requirement.

Any inquiry concerning this communication or earlier

communications from the examiner should be directed to Mark

Kopec whose telephone number is (571) 272-1319. The examiner

can normally be reached on Monday - Friday from 9:30 AM to 6:00

PM.

If attempts to reach the examiner by telephone are

unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta can

be reached on (571) 272-1316. The fax phone number for the

organization where this application or proceeding is assigned is

571-273-8300.

Information regarding the status of an application may be

obtained from the Patent Application Information Retrieval

(PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status

information for unpublished applications is available through

Private PAIR only. For more information about the PAIR system,

see http://pair-direct.uspto.gov. Should you have questions on

access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

Mark Kopec
Primary Examiner
Art Unit 1751

MK
December 22, 2005

PTO/SB/08a

INFORMATION DISCLOSURE CITATION	ATTY. DOCKET NO.	SERIAL NO.
	620-381	10/182,373
	APPLICANT	
	WORSLEY et al.	
(Use several sheets if necessary)	FILING DATE	TC/A.U.
	October 25, 2002	1751

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
/M/	6,731,324	05/2004	Levy	—		

FOREIGN PATENT DOCUMENTS

*EXAMINER INITIAL	DOCUMENT	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	NO
/M/	GB 2355599	03/2002	Great Britain	—			

OTHER DOCUMENTS (including Author, Title, Date, Pertinent pages, etc.)

*Examiner	/Mark/	Date Considered	12/20/05

Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to application.

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Sheet   1   of   1

INFORMATION DISCLOSURE CITATION	APPLN. NO. 10/182,373		ATTY. DKT. NO. 620-381		

APPLICANT

(Use several sheets if necessary)

WORSLEY et al.

FILING DATE
October 25, 2002

GROUP
1751

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
MW	6,960,975	11/2005	Volfson			

FOREIGN PATENT DOCUMENTS

	DOCUMENT	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	NO

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent pages, etc.)

*Examiner   _Ma Lh_   Date Considered   _12/20/05_

Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to application.

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-			
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
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	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Woods "Gravitation and High-Temperature Superconductors: The Current Position" (Paper HFGW-03-118) from http://www.americanantigravity.com/documents (No pub date given)
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims

Application No.	Applicant(s)
10/182,373	WORSLEY ET AL.

Examiner	Art Unit	
Mark Kopec	1751	

R	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
=	Allowed	+	Restricted	I	Interference	O	Objected

Final	Original	9/22/04	05/04/05	12/20/05
	(1)	R	R	R
	2	R		
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	4	R		
	(5)	R		
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	7	R		
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Search Notes		Application No. 10/182,373		Applicant(s) WORSLEY ET AL.	
		Examiner Mark Kopec		Art Unit 1751	

SEARCHED

Class	Subclass	Date	Examiner
505	164	9/18/2004	M.K.
252	500		
ABOVE TO DATE 5/2/05 m			
ABOVE TO DATE 12/20/05 m			
335	216	✓	✓
505	166	✓	✓

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner

SEARCH NOTES
(INCLUDING SEARCH STRATEGY)

	DATE	EXMR
Inv. Name Search	9/20/2004	M.K.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE   DEC 1 3 2005

In re Patent Application of	Confirmation No. 8561
WORSLEY et al.	Atty. Ref.: 620-381
Appl. No. 10/182,373	TC/A.U. 1751
Filed: October 25, 2002	Examiner: M.T. Kopec

For: METHOD AND APPARATUS FOR GENERATION OF A GRAVITATIONAL FORCE
ON A ROTATING BODY SUCH AS A SUPERCONDUCTOR

*   *   *   *   *   *   *   *   *   *   *

December 13, 2005

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

SUPPLEMENTAL AMENDMENT

Further to the Amendment filed October 4, 2005, please amend the above-

identified application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on

page 2.

Remarks/Arguments begin on page 8.

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AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1.   (Currently Amended)   A method of generating a <u>directed</u> gravitational force on a body, comprising steps of:

rotating said body about at least one axis; <u>and</u>

passing <s>a differential electron flow</s> <u>an electrical current</u> through different portions of said body while in rotation<s>, wherein said</s> <u>such that a</u> differential electron flow <s>is passed</s> <u>occurs</u> simultaneously through said body both in its direction of rotation and contrary to its direction of rotation [[to]]. <u>wherein electrons of high relativistic mass are produced in a portion of said body where said electron flow is coincident with the direction of rotation and electrons of low relativistic mass are simultaneously produced in a portion of said body where said electron flow is contrary to the direction of rotation, whereby said production within said body of high and low relativistic mass electrons, whose effective mass is altered by said rotation,</u> generate a directed gravitational force on said body.

2.   (Currently Amended)   A method <u>according to claim 1 wherein said</u> <s>of accelerating a</s> body <u>is accelerated in a controllable predetermined direction by controlling, at least in part, a direction of differential electron flow in said body.</u> <s>by generating a gravitational force acting upon it by the method of claim 1.</s>

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3.   (Currently Amended)   A method according to claim 1, wherein ~~electrical currents are passed simultaneously through~~ <u>said step of passing a differential</u> <u>electrical current through different portions of</u> said body in its direction of rotation and contrary to its direction of rotation <u>further includes super cooling at least said different</u> <u>portions prior to passing current through said portions</u>.

4.   (Currently Amended)   A method according to claim 1, wherein the body is [[a]] <u>at</u> least partly comprised of superconducting material <u>and further including a</u> <u>step of maintaining said body at a temperature sufficiently close to absolute zero such</u> <u>that superconducting properties of said superconducting material are maintained</u>.

5.   (Currently Amended)   ~~A device~~ <u>An apparatus</u> for generating a force sufficient to <u>cause an acceleration of said apparatus in a predetermined direction,</u> ~~accelerate a body, the device~~ comprising[[;]]<u>:</u>

~~the a body portion comprising in the form of~~ an electrically conducting <u>body</u> <u>portion</u> [[mass,]]<u>:</u>

<u>ultracentrifuge</u> means for rotating said [[mass]] <u>body portion;</u> and

<u>commutator</u> means for passing <u>an</u> electrical <u>current</u> ~~currents simultaneously~~ through said [[mass]] <u>body portion such that said current flows simultaneously both</u> in [[its]] <u>a</u> direction of rotation <u>of said body portion</u> and contrary to [[its]] <u>a</u> direction of rotation <u>of said body portion, wherein high and low relativistic mass electrons are</u> <u>produced by ultracentrifugational rotation of said body portion, said high and low</u>

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relativistic mass electrons causing a directed gravitational force on said body portion sufficient to accelerate said apparatus.

6.   (Currently Amended)   ~~A device~~ An apparatus according to claim 5, wherein the ~~mass is~~ body portion comprises a spherical hollow object[[,]] ~~cylindrical or consists of a dual co-rotating or counter-rotating disc~~.

7.   (Currently Amended)   ~~A device~~ An apparatus according to claim 5, wherein the [[mass]] body portion is cylindrical.

8.   (Currently Amended)   ~~A device~~ An apparatus according to claim 5, wherein the [[mass]] body portion consists of a disc.

9.   (Currently Amended)   ~~A device~~ An apparatus according to claim 5, wherein the ~~mass consists of~~ body portion comprises dual co-rotating or counter rotating discs.

10.   (Currently Amended)   ~~A device~~ An apparatus according to claim 5 wherein [[the]] said body portion comprises a superconducting material portion.

11.   (New)   A method for producing electrons of high relativistic mass in at least a portion of an object while simultaneously producing electrons of low relativistic mass in an opposite portion of said object, comprising:

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rotating the object about at least one axis passing through the object, the object being rotated at an angular velocity sufficient to induce a relativistic change in mass of at least some electrons comprising a current passing through at least a portion of the object; and

passing an electrical electron current simultaneously through separate first and second portions of said object that, due to rotation of said object, respectively move at least partially in a first direction which is contrary to a direction of current flow through said object and at least partially in a second direction to which is coincident with a direction of current flow through said object;

wherein a difference in relativistic electron mass is developed between electrons within said first and second portions of said object, said difference in electron mass resulting in a directed gravitational force upon said object.

12.   (New)   The method of claim 11 wherein the object comprises a superconductor.

13.   (New)   An apparatus for altering a relativistic mass of electrons within an object, comprising:

a conductive object;

a motor for rotating said object; and

a set of commutators, said commutators contacting the object so as to pass an electrical current equally through an upper portion and a lower portion of said object;

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wherein, when the object is rotated by the motor and an electrical current is passed through said upper and lower portions simultaneously in both a direction of rotation and a direction contrary to a direction of rotation of said object, electrons passing in the upper portion experience an increase in relativistic mass and electrons passing in the lower portion experience a decrease in relativistic mass.

14.   (New)   A method of generating a directed gravitational force upon an object comprising a superconducting material portion, comprising:

rotating at least said superconducting material portion of the object about a predetermined axis, said superconducting material portion being rotated at a velocity sufficient to alter an effective relativistic mass of an electron current flowing through said superconducting material portion; and.

passing a differential electron current flow through different portions of said object while in rotation, said differential electron current flow being passed simultaneously through said different portions of said superconducting material portion both coincident to its direction of rotation and contrary to its direction of rotation, wherein a difference in relativistic electron mass is developed between electrons within said different portions of said object, said difference in electron mass resulting in a directed gravitational force upon said object.

15.   (New)   The method of claim 14 wherein the object is caused to undergo an acceleration in a predetermined direction as a result of said directed gravitational force.

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16.   (New)   A method according to claim 14, wherein an ultracentrifuge is used to rotate the superconducting material portion.

17.   (New)   A method according to claim 14, wherein an effective mass of electrons flowing in a rotating superconducting material portion of the object is altered by said rotation.,

18.   (New)   An apparatus for generating a force sufficient to accelerate a body in a predetermined direction, comprising:

an electrically conducting portion;

a motor for rotating said electrically conducting portion; and

a commutator for passing electrical currents simultaneously through different portions of said electrically conducting mass both in a direction of rotation and contrary to a direction of rotation of said mass.

19.   (New)   An apparatus according to claim 18, wherein the electrically conducting mass is spherical in shape.

20.   (New)   A device according to claim 18, wherein the electrically conducting mass comprises a superconducting material.

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REMARKS/ARGUMENTS

Entry of these Remarks and reconsideration of all claims remaining of record is earnestly requested. Claims 1-20 are currently pending.

An Information Disclosure Statement is filed herewith. Acknowledgement of the reference listed therein is respectfully requested.

Claims 1-10 have been amended to more particularly point out and distinctly claim applicant's invention. New claims 11-20 have been added.

Also attached for the Examiner's convenience is a clean (unmarked) copy of the currently pending claims.

In view of Applicants' foregoing remarks, it is believed that the application is in condition for allowance. Favorable consideration and allowance of this application are respectfully solicited. If any small manner remains outstanding, the Examiner is encouraged to telephone Applicants' representative at the telephone number listed below or on the following page.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By:

William G. Niessen
Reg. No. 29,683

WGN:ap
901 North Glebe Road, 11th Floor
Arlington, VA 22203-1808
Telephone: (703) 816-4000
Facsimile: (703) 816-4100

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CLEAN COPY OF CLAIM AMENDMENTS FOR
U.S. PATENT APPLN. NO. 10/182,373; ATTY. DKT. 620-381

1.   A method of generating a directed gravitational force on a body, comprising steps of:

rotating said body about at least one axis; and

passing an electrical current through different portions of said body while in rotation such that a differential electron flow occurs simultaneously through said body both in its direction of rotation and contrary to its direction of rotation, wherein electrons of high relativistic mass are produced in a portion of said body where said electron flow is coincident with the direction of rotation and electrons of low relativistic mass are simultaneously produced in a portion of said body where said electron flow is contrary to the direction of rotation, whereby said production within said body of high and low relativistic mass electrons, whose effective mass is altered by said rotation, generate a directed gravitational force on said body.

2.   A method according to claim 1 wherein said body is accelerated in a controllable predetermined direction by controlling, at least in part, a direction of differential electron flow in said body.

3.   A method according to claim 1, wherein said step of passing a differential electrical current through different portions of said body in its direction of rotation and contrary to its direction of rotation further includes super cooling at least said different portions prior to passing current through said portions.

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CLEAN COPY OF CLAIM AMENDMENTS FOR
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4.   A method according to claim 1, wherein the body is at least partly comprised of superconducting material and further including a step of maintaining said body at a temperature sufficiently close to absolute zero such that superconducting properties of said superconducting material are maintained.

5.   An apparatus for generating a force sufficient to cause an acceleration of said apparatus in a predetermined direction, comprising:

an electrically conducting body portion;

ultracentrifuge means for rotating said body portion; and

commutator means for passing an electrical current through said body portion such that said current flows simultaneously both in a direction of rotation of said body portion and contrary to a direction of rotation of said body portion, wherein high and low relativistic mass electrons are produced by ultracentrifugational rotation of said body portion, said high and low relativistic mass electrons causing a directed gravitational force on said body portion sufficient to accelerate said apparatus.

6.   An apparatus according to claim 5, wherein the body portion comprises a spherical hollow object.

7.   An apparatus according to claim 5, wherein the body portion is cylindrical.

8.   An apparatus according to claim 5, wherein the body portion consists of a disc.

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PAGE 14/21 * RCVD AT 12/13/2005 4:03:40 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-6/24 * DNIS:2738300 * CSID:703 816 4100 * DURATION (mm-ss):04-14

CLEAN COPY OF CLAIM AMENDMENTS FOR
U.S. PATENT APPLN. NO. 10/182,373; ATTY. DKT. 620-381

9.   An apparatus according to claim 5, wherein the body portion comprises dual co-rotating or counter rotating discs.

10.   An apparatus according to claim 5 wherein said body portion comprises a superconducting material portion.

11.   A method for producing electrons of high relativistic mass in at least a portion of an object while simultaneously producing electrons of low relativistic mass in an opposite portion of said object, comprising:

rotating the object about at least one axis passing through the object, the object being rotated at an angular velocity sufficient to induce a relativistic change in mass of at least some electrons comprising a current passing through at least a portion of the object; and

passing an electrical electron current simultaneously through separate first and second portions of said object that, due to rotation of said object, respectively move at least partially in a first direction which is contrary to a direction of current flow through said object and at least partially in a second direction to which is coincident with a direction of current flow through said object;

wherein a difference in relativistic electron mass is developed between electrons within said first and second portions of said object, said difference in electron mass resulting in a directed gravitational force upon said object.

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12.   The method of claim 11 wherein the object comprises a superconductor.

13.   An apparatus for altering a relativistic mass of electrons within an object,

comprising:

       a conductive object;

       a motor for rotating said object; and

       a set of commutators, said commutators contacting the object so as to pass an

electrical current equally through an upper portion and a lower portion of said object;

       wherein, when the object is rotated by the motor and an electrical current is

passed through said upper and lower portions simultaneously in both a direction of

rotation and a direction contrary to a direction of rotation of said object, electrons

passing in the upper portion experience an increase in relativistic mass and electrons

passing in the lower portion experience a decrease in relativistic mass.

14.   A method of generating a directed gravitational force upon an object

comprising a superconducting material portion, comprising:

       rotating at least said superconducting material portion of the object about a

predetermined axis, said superconducting material portion being rotated at a velocity

sufficient to alter an effective relativistic mass of an electron current flowing through said

superconducting material portion; and

       passing a differential electron current flow through different portions of said

object while in rotation, said differential electron current flow being passed

simultaneously through said different portions of said superconducting material portion

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CLEAN COPY OF CLAIM AMENDMENTS FOR
U.S. PATENT APPLN. NO. 10/182,373; ATTY. DKT. 620-381

both coincident to its direction of rotation and contrary to its direction of rotation, wherein a difference in relativistic electron mass is developed between electrons within said different portions of said object, said difference in electron mass resulting in a directed gravitational force upon said object.

15.   The method of claim 14 wherein the object is caused to undergo an acceleration in a predetermined direction as a result of said directed gravitational force.

16.   A method according to claim 14, wherein an ultracentrifuge is used to rotate the superconducting material portion.

17.   A method according to claim 14, wherein an effective mass of electrons flowing in a rotating superconducting material portion of the object is altered by said rotation..

18.   An apparatus for generating a force sufficient to accelerate a body in a predetermined direction, comprising:

an electrically conducting portion;

a motor for rotating said electrically conducting portion; and

a commutator for passing electrical currents simultaneously through different portions of said electrically conducting mass both in a direction of rotation and contrary to a direction of rotation of said mass.

CLEAN COPY OF CLAIM AMENDMENTS FOR
U.S. PATENT APPLN. NO. 10/182,373; ATTY. DKT. 620-381

19.   An apparatus according to claim 18, wherein the electrically conducting

mass is spherical in shape.

20.   A device according to claim 18, wherein the electrically conducting mass

comprises a superconducting material.

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DEC 1 3 2005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of   Confirmation No.: 8561

WORSLEY et al.   Atty. Ref.: 620-381

Serial No. 10/182,373   TC/A.U.: 1751

Filed: October 25, 2002   Examiner: M.T. Kopec

For: METHOD AND APPARATUS FOR GENERATION OF A GRAVITATIONAL
FORCE ON A ROTATING BODY SUCH AS A SUPERCONDUCTOR

* * * * * * * * * * *

INFORMATION DISCLOSURE STATEMENT

December 13, 2005

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

As suggested by 37 C.F.R. 1.97, the undersigned attorney brings to the attention of the Patent and Trademark Office the document listed on the attached form PTO-1449.

☐ All listed documents are attached.

☒ Copies of U.S. Patent Publications are not required and are not attached.

☐ Listed foreign patent publications and other documents are enclosed.

☐ The listed documents were cited in the ISR and copies should have been supplied by WIPO directly to the US PTO. If copies are not timely received from WIPO, please telephone the undersigned so that copies can be timely supplied for the Examiner's consideration in this US National Phase Application.

This is not to be construed as a representation that a search has been made or that no better prior art exists, or that a reference is relevant merely because cited.

#1023008 v1 - 12/13/05 IDS

WORSLEY et al. – Appln. No. 10/182,373

The Examiner is requested to initial the attached form PTO-1449 and to return a copy of the initialed document to the undersigned as an indication that the attached document has been considered and made of record.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: _____
William G. Niessen
Reg. No. 29,683

WGN:ap
901 North Glebe Road, 11th Floor
Arlington, VA 22203-1808
Telephone: (703) 816-4000
Facsimile: (703) 816-4100

2

1023008

Sheet   1   of   1

INFORMATION DISCLOSURE CITATION	APPLN. NO.		ATTY. DKT. NO.	
	10/182,373		620-381	
	APPLICANT			
(Use several sheets if necessary)	WORSLEY et al.			
	FILING DATE		GROUP	
	October 25, 2002		1751	

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	6,960,975	11/2005	Volfson			

FOREIGN PATENT DOCUMENTS

	DOCUMENT	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	NO

OTHER DOCUMENTS (including Author, Title, Date, Pertinent pages, etc.)

*Examiner		Date Considered	

Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to application.

Form PTO-FB-A820 (Also PTO-1449)

Nixon &Vanderhye pc.
ATTORNEYS AT LAW

11TH FLOOR
901 NORTH GLEBE ROAD
ARLINGTON, VIRGINIA 22203-1808

TELEPHONE: (703) 816-4000
FACSIMILE: (703) 816-4100
WRITER'S DIRECT DIAL NUMBER:
(703) 816-

FACSIMILE COVER SHEET
PLEASE DELIVER IMMEDIATELY!!!!

Our Ref.:   10/182,373

Your Ref.: _____   Date: _____ December 13, 2005

To: **Examiner M.T. Kopec**

Firm: **U.S. Patent and Trademark Office**

Facsimile No.: **571-273-8300**

From: **William G. Niessen**

Number of Pages (including cover sheet): _____ 21

(IF YOU DO NOT RECEIVE ALL OF THE PAGES OR ENCOUNTER DIFFICULTIES IN TRANSMISSION,
PLEASE CONTACT US IMMEDIATELY AT (703-816-4000).

_____
FACSIMILE OPERATOR

ATTACHMENT/S:

SUPPLEMENTAL AMENDMENT;
IDS & clean copy of amended claims.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	Atty Dkt. 620-381
	C# M#
WORSLEY et al.	TC/A.U. 1751
Serial No. 10/182,373	Examiner: M.T. Kopec
Filed: October 25, 2002	Date: December 13, 2005

Title: METHOD AND APPARATUS FOR GENERATION OF A GRAVITATIONAL FORCE
ON A ROTATING BODY SUCH AS A SUPERCONDUCTOR

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

SUPPLEMENTAL AMENDMENT

This is a response/amendment/letter in the above-identified application and includes an attachment which is hereby incorporated by reference and the signature below serves as the signature to the attachment in the absence of any other signature thereon.

☐ **Correspondence Address Indication Form Attached.**

Fees are attached as calculated below:

Total effective claims after amendment   **20**   minus highest number
previously paid for   **20**   (at least 20) =   **0**   x $50.00 $0.00 (1202)/$0.00 (2202) $

Independent claims after amendment   **6**   minus highest number
previously paid for   **3**   (at least 3) =   **3**   x $200.00 $600.00 (1201)/$300.00 (2201) $ 600.00

If proper multiple dependent claims now added for first time, (ignore improper); add
$360.00 (1051)/$180.00 (2051) $

Petition is hereby made to extend the current due date so as to cover the filing date of this
paper and attachment(s)   One Month Extension $120.00 (1251)/$60.00 (2251)
Two Month Extensions $450.00 (1252)/$225.00 (2252)
Three Month Extensions $1020.00 (1253/$510.00 (2253)
Four Month Extensions $1590.00 (1254/$795.00 (2254)
Five Month Extensions $2160.00 (1255/$1080.00 (2255) $

Terminal disclaimer enclosed, add $130.00 (1814)/ $85.00 (2814) $

☐ Applicant claims "small entity" status.   ☐ Statement filed herewith

Rule 56 Information Disclosure Statement Filing Fee $180.00 (1806) $

Assignment Recording Fee $40.00 (8021) $

Other: **INFORMATION DISCLOSURE STATEMENT, FORM PTO-1449 AND CLEAN COPY OF THE** $
AMENDED CLAIMS

TOTAL FEE ENCLOSED $ 600.00

The Commissioner is hereby authorized to charge any <u>deficiency</u>, or credit any overpayment, in the fee(s) filed, or asserted to be filed, or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Account No. 14-1140. A <u>duplicate</u> copy of this sheet is attached.

901 North Glebe Road, 11th Floor   NIXON & VANDERHYE P.C.
Arlington, Virginia 22203-1808   By Atty: William G. Niessen, Reg. No. 29,683
Telephone: (703) 816-4000
Facsimile: (703) 816-4100
WGN:ap   Signature:

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	Atty Dkt. 620-381	**RECEIVED**
	C# M#	**CENTRAL FAX CENTER**
WORSLEY et al.	TC/A.U. 1751	
Serial No. 10/182,373	Examiner: M.T. Kopec	**DEC 1 3 2005**
Filed: October 25, 2002	Date: December 13, 2005	

Title: METHOD AND APPARATUS FOR GENERATION OF A GRAVITATIONAL FORCE
ON A ROTATING BODY SUCH AS A SUPERCONDUCTOR

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

SUPPLEMENTAL AMENDMENT

This is a response/amendment/letter in the above-identified application and includes an attachment which is hereby incorporated by reference and the signature below serves as the signature to the attachment in the absence of any other signature thereon.

☐ **Correspondence Address Indication Form Attached.**

Fees are attached as calculated below:

Total effective claims after amendment   **20**   minus highest number
previously paid for   **20**   (at least 20) =   **0**   x $50.00 $0.00 (1202)/$0.00 (2202) $

Independent claims after amendment   **6**   minus highest number
previously paid for   **3**   (at least 3) =   **3**   x $200.00 $600.00 (1201)/$300.00 (2201) $ 600.00

If proper multiple dependent claims now added for first time, (ignore improper); add
$360.00 (1051)/$180.00 (2051) $

Petition is hereby made to extend the current due date so as to cover the filing date of this
paper and attachment(s)   One Month Extension $120.00 (1251)/$60.00 (2251)
Two Month Extensions $450.00 (1252)/$225.00 (2252)
Three Month Extensions $1020.00 (1253/$510.00 (2253)
Four Month Extensions $1590.00 (1254/$795.00 (2254)
Five Month Extensions $2160.00 (1255/$1080.00 (2255) $

Terminal disclaimer enclosed, add $130.00 (1814)/ $65.00 (2814) $

☐ Applicant claims "small entity" status.   ☐ Statement filed herewith

Rule 56 Information Disclosure Statement Filing Fee $180.00 (1806) $

Assignment Recording Fee $40.00 (8021) $

Other: **INFORMATION DISCLOSURE STATEMENT, FORM PTO-1449 AND CLEAN COPY OF THE** $
AMENDED CLAIMS

TOTAL FEE ENCLOSED $ 600.00

The Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, in the fee(s) filed, or asserted to be filed, or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our Account No. 14-1140. A duplicate copy of this sheet is attached.

901 North Glebe Road, 11th Floor   NIXON & VANDERHYE P.C.
Arlington, Virginia 22203-1808   By Atty: William G. Niessen, Reg. No. 29,683
Telephone: (703) 816-4000
Facsimile: (703) 816-4100
WGN:ap   Signature

PTO/SB/121 (10-00)
Approved for use through 10/31/2002. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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CORRESPONDENCE ADDRESS INDICATION FORM

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Direct all correspondence to:

☒ **Customer Number:** **23117**

Place Customer
Number Bar
Label Here →

OR

Type Customer Number here

☐ Request for Customer Number (PTO/SB/125) submitted herewith.

in the following listed application(s) or patent(s):

Patent Number (if appropriate)	Application Number	Patent Date (if appropriate)	U.S. Filing Date
	10/182,373		October 25, 2002

		(check one)
Typed or Printed Name	William G. Niessen	☐ Applicant or Patentee
Signature	*[signature]*	☐ Assignee of record of the entire interest. Statement under 37 C.F.R. § 3.73(b) is enclosed. (Form PTO/SB/96)
Date	October 21, 2005	
Address of signer:	901 North Glebe Road, 11th Floor Arlington, VA 22203	☒ Attorney or Agent of record
		29,683 (Reg. No.)

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.*

☒ *Total of 1 forms are submitted.

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS: SEND TO: Assistant Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

1005716

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

WORSLEY et al.

Appln. No. 10/182,373

Filed: October 25, 2002

Confirmation No.: 8561

Atty. Ref.: 620-381

Group Art Unit: 1751

Examiner: M.T. Kopec

FOR: METHOD AND APPARATUS FOR GENERATION OF A GRAVITATIONAL FORCE ON A ROTATING BODY SUCH AS A SUPERCONDUCTOR

* * * * * * * * * * *

CORRECTED INFORMATION DISCLOSURE STATEMENT

October 7, 2005

U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

It now comes to Applicants' attention that the Information Disclosure Statement (IDS) filed on October 4, 2005 contains an inadvertent typographical error. Specifically, the statement beginning at the fourth paragraph stating that "The undersigned attorney of record hereby certifies under 37 C.F.R. §1.97(e) that each item of information referenced herein and attached hereto was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement" is in error and should be deleted. The references listed on the Form PTO-1449 were not first cited in a communication from a foreign patent office.

A corrected Information Disclosure Statement (IDS) is attached herewith. Applicants respectfully request that the attached IDS replace the IDS filed on October 4,

1001441

2005. If the Examiner has any questions, he is encouraged to contact the undersigned at the number listed below.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: _____
William G. Niessen
Reg. No. 29,683

901 North Glebe Road, 11th Floor
Arlington, VA 22203-1808
Telephone: (703) 816-4000
Facsimile: (703) 816-4100

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

WORSLEY et al.

Serial No. 10/182,373

Filed: October 25, 2002

Confirmation No.: 8651

Atty. Ref.: 620-381

TC/A.U.: 1751

Examiner: M.T. Kopec

For: METHOD AND APPARATUS FOR GENERATION OF A
GRAVITATIONAL FORCE ON A ROTATING BODY SUCH AS A
SUPERCONDUCTOR

* * * * * * * * * * * *

October 7, 2005

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

INFORMATION DISCLOSURE STATEMENT

As suggested by 37 C.F.R. 1.97, the undersigned attorney brings to the attention of the Patent and Trademark Office the documents listed on the attached form PTO-1449.

☐ All listed documents are attached.

☒ Copies of U.S. Patent Publications are not required and are not attached.

☒ Listed foreign patent publications and other documents are enclosed.

☐ The listed documents were cited in the ISR and copies should have been supplied by WIPO directly to the US PTO. If copies are not timely received from WIPO, please telephone the undersigned so that copies can be timely supplied for the Examiner's consideration in this US National Phase Application.

This is not to be construed as a representation that a search has been made or that no better prior art exists, or that a reference is relevant merely because cited.

999014

The Examiner is requested to initial the attached form PTO/SB/08a and to return a copy of the initialed document to the undersigned as an indication that the attached documents have been considered and made of record.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: _____
William G. Niessen
Reg. No. 29,683

WGN:ap
901 North Glebe Road, 11th Floor
Arlington, VA 22203-1808
Telephone: (703) 816-4000
Facsimile: (703) 816-4100

999014

INFORMATION DISCLOSURE CITATION	ATTY. DOCKET NO.	SERIAL NO.
	620-381	10/182,373

APPLICANT

WORSLEY et al.

FILING DATE	TC/A.U.
October 25, 2002	1751

(Use several sheets if necessary)

OIPE IAP
OCT 07 2005
PATENT & TRADEMARK OFFICE

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		6,731,324	05/2004	Levy			

FOREIGN PATENT DOCUMENTS

		DOCUMENT	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	NO
		GB 2355599	03/2002	Great Britain				

OTHER DOCUMENTS (including Author, Title, Date, Pertinent pages, etc.)

*Examiner		Date Considered	

Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to application.

999014

10182373

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2001

Applicant	Docket Number
	D07495US001RFH

CLAIMS AS FILED - PART I

TOTAL CLAIMS	(Column 1)	(Column 2)
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	2 minus 20=	*
INDEPENDENT CLAIMS	minus 3 =	*
MULTIPLE DEPENDENT CLAIM PRESENT		☐

	SMALL ENTITY TYPE ☐		OR	OTHER THAN SMALL ENTITY	
	RATE	FEE		RATE	FEE
BASIC FEE			OR	BASIC FEE	870
	X$ 9=		OR	X$18=	
	X42=		OR	X84=	
	+140=		OR	+280=	
TOTAL			OR	TOTAL	870

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

10/14/05

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	* 10	Minus	** 20	= 1
Independent	* 2	Minus	*** 3	= 1
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
	RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
	X$ 9=		OR	X$18=	
	X42=		OR	X84=	
	+140=		OR	+280=	
TOTAL ADDIT. FEE			OR	TOTAL ADDIT. FEE	

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
	RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
	X$ 9=		OR	X$18=	
	X42=		OR	X84=	
	+140=		OR	+280=	
TOTAL ADDIT. FEE			OR	TOTAL ADDIT. FEE	

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

			OR		
	RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
	X$ 9=		OR	X$18=	
	X42=		OR	X84=	
	+140=		OR	+280=	
TOTAL ADDIT. FEE			OR	TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

WORSLEY et al.

Appl. No. 10/182,373

Filed: October 25, 2002

Confirmation No. 8561

Atty. Ref.: 620-381

TC/A.U. 1751

Examiner: M.T. Kopec

For: METHOD AND APPARATUS FOR GENERATION OF A GRAVITATIONAL FORCE ON A ROTATING BODY SUCH AS A SUPERCONDUCTOR

* * * * * * * * * * *

October 4, 2005

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

AMENDMENT

Please amend the above-identified application as follows:

Amendments to the Title are reflected on page 2.

Amendments to the Claims are reflected on page 3.

Remarks/Arguments begin on page 5.

998821

AMENDMENTS TO THE TITLE:

Please replace the title with the following new title:

METHOD AND APPARATUS FOR GENERATION OF A GRAVITATIONAL

FORCE ON A ROTATING BODY SUCH AS A SUPERCONDUCTOR.

998821

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1.   (Currently Amended)   A method of generating a gravitational force on a body, comprising steps of:

rotating said body about at least one axis;

wherein a passing a differential electron flow through different portions of [[the]] said body while in rotation, is directed so as to wherein said differential electron flow is passed simultaneously pass through said body both in its direction of rotation and contrary to its direction of rotation to release generate a directed flow of gravitons gravitational force on said body.

2.   (Currently Amended)   A method of accelerating a body by generating a gravitational force acting upon it by the method of claim 1.

3.   (Previously Presented)   A method according to claim 1, wherein electrical currents are passed simultaneously through said body in its direction of rotation and contrary to its direction of rotation.

4.   (Currently Amended)   A method according to any one of claims claim 1, wherein the body is a least partly comprised of superconducting material.

- 3 -

998821

5.   (Previously Presented)   A device for generating a force sufficient to accelerate a body, the device comprising;

the body in the form of an electrically conducting mass, means for rotating said mass and means for passing electrical currents simultaneously through said mass in its direction of rotation and contrary to its direction of rotation.

6.   (Previously Presented)   A device according to claim 5, wherein the mass is spherical, cylindrical or consists of a dual co-rotating or counter rotating disc.

7.   (Previously Presented)   A device according to claim 5, wherein the mass is cylindrical.

8.   (Previously Presented)   A device according to claim 5, wherein the mass consists of a disc.

9.   (Previously Presented)   A device according to claim 5, wherein the mass consists of dual co-rotating or counter rotating discs.

10.   (New)   A device according to claim 5 wherein the body comprises a superconducting material portion.

998821

REMARKS/ARGUMENTS

Entry of these Remarks and reconsideration of all claims remaining of record is earnestly requested. Claims 1-9 are currently pending.

An Information Disclosure Statement is filed herewith. Acknowledgement of the references listed therein is respectfully requested. A copy of the UK reference is attached.

Claims 1, 2 and 4 have been amended to more distinctly claim and particularly point out Applicants' invention. New claim 10, dependent on claim 5, has been added.

Applicants respectfully request a personal or telephonic interview with the Examiner at a time and date that would be mutually convenient to further discuss any outstanding enablement issues of the claimed invention. Applicants respectfully request that the Examiner please contact Applicant's representative at the number listed below to arrange an interview prior to taking any further official action in the present case.

In view of Applicants' foregoing remarks, it is believed that the application is in condition for allowance. Favorable consideration and allowance of this application are respectfully solicited. If any small manner remains outstanding, the Examiner is encouraged to telephone Applicants' representative at the telephone number listed below or on the following page.

998821

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: _____
William G. Niessen
Reg. No. 29,683

WGN:ap
901 North Glebe Road, 11th Floor
Arlington, VA 22203-1808
Telephone: (703) 816-4000
Facsimile: (703) 816-4100

998821

Approved for use through 10/31/2002, OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

REQUEST
FOR
CONTINUED EXAMINATION (RCE)
TRANSMITTAL

OCT 0 4 2005

Address to:
Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	10/182,373
Filing Date	October 25, 2002
First Named Inventor	WORSLEY et al.
Group Art Unit	1751
Examiner Name	M.T. Kopec
Attorney Docket Number	620-381

This is a Request for Continued Examination (RCE) under 37 C.F.R. §1.114 of the above-identified application.

Request for continued Examination (RCE) practice under 37 C.F.R. § 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. Submission required under 37 C.F.R. § 1.114.

   a. ☐ Previously submitted (Note: Any previously filed unentered amendments will be entered unless applicant instructs otherwise. If applicant does not wish to have previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

      i. ☐ Consider the amendment(s)/reply under 37 C.F.R. § 1.116 previously filed on _____

      ii. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

      iii. ☐ Other _____

   b. ☒ **Enclosed**

      i. ☒ **Amendment/Reply**

      ii. ☐ Affidavit(s)/Declaration(s)

      iii. ☒ **Information Disclosure Statement along Form PTO-1449 and References**

      iv. ☐ Other _____

          10/05/2005 SZEWDIE1 00000046 10182373
          01 FC:1801   790.00 OP

2. Miscellaneous

   a. ☐ Suspension of action on the above-identified application is requested under 35 C.F.R. § 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 C.F.R. § 1.17(i) **required**)

   b. ☐ Other _____

3. Fees The RCE fee under 37 C.F.R. § 1.17(e) is required by 37 C.F.R. § 1.114 when the RCE is filed.

          10/05/2005 SZEWDIE1 00000046 10182373

   a. ☐ Applicant claims "small entity" status.

          02 FC:1252   450.00 OP

   b. ☒ Fees are attached as calculated below:

      i. ☒ **RCE fee required under 37 C.F.R. § 1.17(e)** $790.00 (1801)/$395.00 (2801) $ 790.00

      ii. ☒ **Petition is made to extend the due date TWO months (less___ months previously paid)** $ 450.00

      iii. ☐ Other _____ $

   c. ☐ Check in the amount of $ _____ enclosed.

   d. ☒ **Payment by credit card** (credit card payment form attached) in the amount of $ **1240.00**

   e. ☒ The Director is hereby authorized to charge any deficiency in the fee(s) filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm), to Deposit Account No. **14-1140**

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Name (Print Type)	William G. Niessen	Registration No. (Attorney/Agent)	29,683
Signature	*[signature]*	Date	October 4, 2005

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner For Patents, P.O. Box 1450, Alexandria, VA 22313-1450, or facsimile transmitted to the U.S. Patent and Trademark Office on:

Name (Print Type)	
Signature	Date

998802

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of   Confirmation No.: 8651

WORSLEY et al.   Atty. Ref.: 620-381

Serial No. 10/182,373   TC/A.U.: 1751

Filed: October 25, 2002   Examiner: M.T. Kopec

For: METHOD AND APPARATUS FOR GENERATION OF A
GRAVITATIONAL FORCE ON A ROTATING BODY SUCH AS A
SUPERCONDUCTOR

     * * * * * * * * * * *

October 4, 2005

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

INFORMATION DISCLOSURE STATEMENT

As suggested by 37 C.F.R. 1.97, the undersigned attorney brings to the attention of
the Patent and Trademark Office the documents listed on the attached form PTO-1449.

☐ All listed documents are attached.

☒ Copies of U.S. Patent Publications are not required and are not attached.

☒ Listed foreign patent publications and other documents are enclosed.

☐ The listed documents were cited in the ISR and copies should have been
supplied by WIPO directly to the US PTO. If copies are not timely received from WIPO,
please telephone the undersigned so that copies can be timely supplied for the Examiner's
consideration in this US National Phase Application.

This is not to be construed as a representation that a search has been made or that
no better prior art exists, or that a reference is relevant merely because cited.

The Examiner is requested to initial the attached form PTO/SB/08a and to return a
copy of the initialed document to the undersigned as an indication that the attached
documents have been considered and made of record.

The undersigned attorney of record hereby certifies under 37 C.F.R. §1.97(e) that
each item of information referenced herein and attached hereto was first cited in a

999014

communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement.

Respectfully submitted,

NIXON & VANDERHYE P.C.

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999014

INFORMATION DISCLOSURE CITATION	ATTY. DOCKET NO.	SERIAL NO.
	620-381	10/182,373

APPLICANT

WORSLEY et al.

FILING DATE	TC/A.U.
October 25, 2002	1751

(Use several sheets if necessary)

OIPE OCT 04 2005 PATENT & TRADEMARK OFFICE

U.S. PATENT DOCUMENTS

*EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
		6,731,324	05/2004	Levy			

FOREIGN PATENT DOCUMENTS

		DOCUMENT	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	NO
		GB 2355599	03/2002	Great Britain				

OTHER DOCUMENTS (including Author, Title, Date, Pertinent pages, etc.)

*Examiner		Date Considered	

Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to application.

999014

Requested Patent: GB2355599A

Title:

GENERATION OF A FORCE ON A ROTATING BODY SUCH AS A
SUPERCONDUCTOR ;

Abstracted Patent: GB2355599 ;

Publication Date: 2001-04-25 ;

Inventor(s):   WORSLEY ANDREW PETER (GB); TWIST PETER JOHN (GB) ;

Applicant(s):   WWK TRUST (GB) ;

Application Number: GB20000028721 20001124 ;

Priority Number(s):   GB20000002221 20000131 ;

IPC Classification: H02N11/00; H02N15/00 ;

Equivalents: ;

ABSTRACT:

A method for generating a force acting on a body, preferably made of superconducting material,
comprising the steps of rotating the body and causing an electron flow through the body
simultaneously in the direction of rotation and contrary to the direction of rotation, so that a flow
of gravitons are released. Preferably the body is spherical. The currents flow in one direction in
the upper hemisphere of the body and in the opposite direction in the lower half. In accordance
with the space-time lattice model, this will result in a greater release of gravitons in the upward
direction and a lesser release in the downward direction, which distorts space-time, impelling the
body upwards.

(12) **UK Patent Application** (19) **GB** (11) **2 355 599** (13) **A**

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(58) Field of Search
UK CL (Edition S) H2A ARV1
INT CL[7] H02N 11/00 15/00 15/04
Online: WPI, EPODOC, PAJ, INSPEC, COMPUTER,
Selected Internet sites

(54) Abstract Title
Generation of a force on a rotating body such as a superconductor

(57) A method for generating a force acting on a body, preferably made of superconducting material, comprising the steps of rotating the body and causing an electron flow through the body simultaneously in the direction of rotation and contrary to the direction of rotation, so that a flow of gravitons are released. Preferably the body is spherical. The currents flow in one direction in the upper hemisphere of the body and in the opposite direction in the lower half. In accordance with the space-time lattice model, this will result in a greater release of gravitons in the upward direction and a lesser release in the downward direction, which distorts space-time, impelling the body upwards.

B - Spherical Superconductor

Motor

Motor ← "A"

Vertical Rails

Supercooled Jacket

Commutator Device

y

x

Spherical Superconductor
Sphere = 0.25m external radius
Sphere = 0.20m internal radius

Figure 1 & 2
B = Superconductor

Fig. 1

Direction of Motion
y vector (vertical rails)

GB 2 355 599 A

Fig. 1

"A"

Motor

Commutator Device

B - Spherical Superconductor

Supercooled Jacket

Vertical Rails

Motor

Direction of Motion
y vector (vertical rails)

Figure 1 & 2
B = Superconductor

Spherical Superconductor
Sphere = 0.25m external radius
Sphere = 0.20m internal radius

A = Ultracentrifugational Axle
(rps 10,000 revs/sec)
B = Spherical Superconductor

Fig.2

TECHNICAL AND THEORETICAL SPECIFICATIONS
FOR WARP DRIVE TECHNOLOGY

FIELD OF THE INVENTION

The present invention relates to the use of technical drive systems which operate by the modification of gravitational fields. These drive systems do not depend on the emission of matter to create thrust, but create a change in the curvature of space-time, in accordance with general relativity. This allows travel by warping space-time, to produce an independent warp drive system.

THEORETICAL BACKGROUND OF THE INVENTION

The concept of gravity should be examined in the light of quantum gravity and in turn as a component of quantum physics itself. The fundamental minimal quantum of energy in quantum physics is Planck's constant; h. Thus in accordance with the energy equivalence formula $E=mc^2$, the fundamental minimum quantity of mass (m_q) can therefore be derived, from known constants by; $m_q=h/c^2$ (1). Taking this minimal mass, it is possible to show that the formation of all matter, the forces of nature and indeed space-time itself derive from this single quintessential quantity.

Thus if the number of quintessences in a system is; $n_q = m/m_q$: then the total Energy of the system is *more* logically given by, the energy of a single quintessence (h); directly multiplied by the number of quintessences (n_q) in that system, thus $E=hn_q=mc^2$ (1a).

Furthermore, this minimal mass, termed quintessence, can form the basis of the existence of a quantum gravitational field in the form of a space-time lattice, from which quantum gravity may be derived from first principles. Furthermore, the conglomeration of these quintessences also accounts for the formation of the elementary particles and the forces acting between them, as in superstring theory. This concept explains the formation of matter and the forces of nature on a quantum mechanical basis and directly explains the existence of wave particle duality. Thus as $n_q=m/m_q$; the frequency of light and matter (f) is determined, directly, from the number of constituent quintessences. This leads automatically to the fundamental equation, derived from (1), $f=n_q=E/h$, where n_q is the number of quintessences, which leads directly to the frequency of both light and matter. This in turn leads directly to a Universal wave equation for matter and light $\lambda=c/\beta n_q=hc/\beta E$ (2), where β is the *relative* directional velocity, v/c. As the momentum, $p= \beta E/c$, then this equation also gives the standard de-Broglie wave equation, $\lambda=h/p$ in agreement with current theory and experiments.[1]

1

Using the Universal wave equation, the standard equation for special relativity, $m'=m_0/(1-\beta^2)^{1/2}$, derives from first principles. Also from these observations, a modified Dirac wave equation may be derived, $E\psi=(-j\beta\cdot\nabla+\beta m)\psi$ (2a), the results of which have been recently verified by a paper in which the orbitals of electrons were experimentally directly visualised.[2] Moreover, a fundamental equation for general relativity can be formulated, where G is the gravitational constant and r_q is the given radius of quintessence; $G=9r_q^2c^4/\lambda\beta E$ (3), such that the Universal wave equation is in direct agreement with general relativity.[3] Thus special and general relativity and quantum mechanics can be unified.

From here it is possible to proceed in a number of ways; the geometric structure of the electron and the forces of Nature may be derived from first principles and in turn the structure of the quarks, including the top and bottom, otherwise known as truth and beauty can be seen. Moreover, the presence of a space-time lattice results in an understanding of quantum EPR effects. By allowing a theoretical flow of energy through the space-time lattice it can be shown that:

Energy is not bound by space-time

Thus logically accounting for phenomena such as entanglement and quantum tunnelling. Quintessence can also be used to explain, logically, the inner physics of a black hole, the missing mass of the Galaxy, the continuing expansion of the Universe, Guth's inflationary theory and the Big Bang. Hence, it is now possible to understand the Universe, including space-time, matter and the forces of nature from the radius, mass and vibration of a single quantity, quintessence.

With this understanding of space-time, matter and the forces of Nature, and in particular gravity, it is possible to demonstrate that the modification of gravitational fields, and in turn the warping of space-time, can be technically readily achieved.

Using standard equations for special relativity, $m'=m_0/(1-\beta^2)^{1/2}$, it can be demonstrated that by differentially increasing the velocity of electrons, by applying a differential current, their mass can be increased in a specific way. In turn by increasing the mass of electrons, by general relativity, the number of gravitons emitted from these electrons can be modulated. By multiplying this effect using an ultracentrifugational device the differential graviton emission can be manifestly amplified. This in turn, in accordance with general relativity, will cause a change in the curvature of space-time.

This effective warping of space-time does not, of necessity, imply superluminal velocities, but does allow the creation of warp drive systems, which do not depend on the creation of thrust by the ejection of material as used in current space technologies.

2

PART I
FUNDAMENTAL LAWS OF PHYSICS

Quintessential Mass

The quantum physical, minimum component of energy is Planck's constant; h. To define the minimal component of mass, using the standard energy equivalence formula; $E=mc^2$, such a minimal mass (m_q) would be required to have the value equivalent to; $m_q=h/c^2$ (1). The total mass of a system (m) would then be; $m = m_q n_q$, where n_q is the number of these minimal units. Thence, the total energy of a system can be derived from the minimal energy; h, multiplied by the number of these energy units (n_q). Thus as, $E=mc^2$, then also $E=m_q n_q c^2$ and substituting $m_q=h/c^2$, the energy equivalence formula has the more logical formulation; $E=hn_q$ (1a). Thus the energy of a system is equivalent to the minimal energy unit; h, multiplied by the number of those minimal energy units (n_q).

Taking this minimal mass/energy, it is possible to show that all matter, the forces of nature and space time can be constructed from this single quintessential quantity. Moreover, using this quantity the laws of physics can be derived from first principles. Thus, a priori, all components of the physical universe, including space-time, can be constructed from this minimal mass component, termed quintessence.

Wave Particle Duality

If the presence of quintessence accounts for the structure of matter and if matter itself forms from the number of quintessences, then the frequency of matter and thus wave particle duality directly arises from first principles. Specifically the wavelength of matter derives from the vibration of quintessence from which it is constituted. Thus the frequency (f) and in turn the wavelength of light and matter is directly equivalent to the number of quintessences contained within it. We find that the actual frequency of light can be directly derived from first principles from the effective mass of the photon (m_γ) and thus by the number of quintessences (n_q) it contains.

Thus for light conventionally:

$$f = E/h$$

and if $E = mc^2$, and $h = m_q.c^2$, then

$$f = m_\gamma c^2/m_q.c^2$$

and
$$f = m_\gamma/m_q = n_q$$

3

Thus $f = n_q$ (4)

Thus the formula for the frequency of light ($E = hf$) is now readily explained by the observation that the frequency is determined quite directly from the number of quintessences (n_q) within the photon.

The wavelength is thus also given by:

$$\lambda = c/f = m_q c/m_\gamma = h/p$$

We can now show that the frequency of matter also has the same derivation from quintessence, as has the frequency of light. The frequency of matter is again equivalent to the number of quintessences it contains. **Thus the wave particle duality of matter itself can be explained by its composition from quintessence.** The amount of quintessences contained within a electron sphere will depend on the number of quintessences constituting the electron and those passing through it as a result of its relative velocity β^2 (where $\beta = v/c$); effectively its relativistic momentum (p). The frequency will then be related to the total number of quintessences. Thus for matter,

$$f = \beta^2 n_q$$ (4a)

Thus it is possible to derive the conventional de Broglie wave equation for matter from first principles. Thus, as $\lambda = v/f$, we have:

$$\lambda = v/\beta^2 n_q$$ (5)

thus as $n_q = E/h$

$$\lambda = hc/\beta E$$ (2)

and as conventionally $\beta E/c = p$, then for matter:

$$\lambda = h/p$$

Provided that in the de Broglie equation, the momentum of the object is calculated using the relativistic mass, thus accounting for the total number of quintessences (n_q) in an object, this gives an accurate value for the wavelength of matter.[1]

Thus the wavelength of matter follows directly from its constitutents, quintessence. As matter is made of quintessence, similarly to light, its frequency depends on the number of quintessences (n_q) within it, travelling relative to the speed of light. Moreover, $\lambda = hc/\beta E$, underpins a fundamental relationship between wavelength and energy. Furthermore, this is mathematically the same as the term $\lambda = hv/\beta^2 E$, giving a relativistic expression for the the wavelength of matter, from which the relativistic equations may be directly derived (see Wave Particle Duality and Relativity).

Wave Equations

The derivation of wave particle duality from first principles also now allows the derivation of a modified wave equation for matter.

To derive his wave equation Shrödinger commenced with the de Broglie equation using momentum (p). For lower energies the momentum of an electron is conventionally derived from the kinetic energy of the electron and the mass of the electron m_0. Thus conventionally:

$$E_k = 1/2\ mv^{1/2} \quad \text{and} \quad p = m_0v$$

Thus
$$E_k = p^2/2m_0$$

then
$$p = (E_k.2m_0)^{1/2}$$

and conventionally, the de Broglie equation can also be written as:

$$\lambda = h/p = h/(E_k.2m_0)^{1/2}$$

In turn the Shrödinger wave equation directly derives from the square of the above classical non relativistic term for kinetic energy:

$$\lambda^2 = h^2/E_k.2m_0$$

thus
$$E_k = \frac{h^2}{2m} . \frac{1}{\lambda^2}$$

As $E = E_k + V$

then
$$E\psi = -\frac{h^2}{2m} . \frac{d^2\psi}{dx^2} + V\psi = jh. \frac{d\psi}{dt}$$

However, the Shrödinger equation, may be refined by taking into account relativity. Thus the true values for the energy are given by the relativistic momentum (p).

A fundamental relativistic wave equation for ψ, and its logical derivation may now be developed through the concept of quintessence as a fundamental constituent of matter.

The amount of quintessences in the electron is determined by the number of quintessences forming the electron at rest, plus the amount of quintessences passing through it due to its relativistic velocity, which will determine the relativistic momentum (p) of a particle.

The frequency of matter can now be readily calculated from first principles to give a more accurate result. Thus as matter is made of quintessence, similarly to light, its frequency is equal to the number of quintessences (n_q) within it. The wavelength will depend on its velocity travelling relative to the speed of light and thus multiplied by the relative velocity compared to c ($\beta = v/c$);

Hence for matter as previously shown:

$$\lambda = v/\beta^2 n_q = hc/\beta E \qquad (2)$$

And conventionally

$$E = (p^2c^2 + m_0^2c^4)^{1/2}$$

Using these equations, we can now, also, reformulate the Shrödinger wave equation, which has the advantage that relativity can be treated in a quantum mechanical way. Thus if the wave energy of matter is defined as:

$$E_\lambda = \beta(p^2c^2 + m_0^2c^4)^{1/2}/c^2$$

thus

$$E_\lambda = (\beta^2p^2/c^2 + \beta^2m_0^2)^{1/2}$$

which in complex space generalises to

$$E_\psi = (-j\beta\cdot\nabla + \beta m)_\psi \qquad (2a)$$

As the term $\alpha = e^2/hc.4\pi\varepsilon_0$; also represents the ground state ratio of the velocity of the electron to c. Thus $\alpha = \beta = v/c = 1/137$.

Thus, *also*
$$E_\psi = (-j\alpha\cdot\nabla + \beta m)_\psi$$

This is thus the standard relativistic equation that Dirac was able to construct from the Shrödinger wave equation. This relativistic equation can be derived from the modified wave equation (2). This takes into account the relative mass energy which the quintessential wave equation (2) contains.

Where importantly the term βm is the mass m, multiplied by the ratio of the relative velocity to light $\beta = v/c$, and the term α is also essentially the relative velocity of the electron.

6

The Dirac equation was an empirical formula which worked mathematically, nevertheless even Dirac admitted it was not logically understood. The importance of these equations (eq. 2, 2a) is that they show that the existence of quintessence allows the wave-particle duality of matter to be explained and mathematically derived from first principles, Thus the frequency of matter or even light is simply determined by the number of quintessences it contains.

Indeed, a recent publication in Nature has suggested that the direct visualisation of the orbitals of electrons shows that these are in very close agreement with theory. However, there is a significant departure from theory, in the interstitial molecular regions, suggesting that the higher velocities of the electrons obey the modified Dirac equation (2a).Thus these orbitals were in keeping with the modified Dirac equation, which itself may be derived from the wave equation above, $\lambda = hc/\beta E$ (eq. 2).[ref 2]

The Shrödinger wave equation will approximate to the correct values until v approaches c. Indeed the Shrödinger equation will give similar answers as that derived from equation (2a), under most experimental conditions.

However, equation 2 and its derivative (2a) may have advantages over standard Shrödinger theory with relativistic speeds. Furthermore, equation 2, conceptually shows that the wave particle duality of matter derives from the principle that the frequency of matter is directly equal to the number of quintessences it contains. Importantly it also mathematically allows relativity and quantum mechanics to be united.

With $v \cong c$, the modified Dirac equation (2a) will yield more accurate results, particularly compared with the Schrödinger equation. We also find that the equation $\lambda = hc/\beta E$ (2) is equivalent to the de Broglie wave equation, $\lambda = h/p$, provided we use the relativistic mass in the de Broglie equation. Given this, these equations yield accurate experimental results [ref 1].

Thus we find that the modified formulation of de Broglie wave equation $\lambda = hc/\beta E$ (eq. 2a) leads directly to a modified Dirac relativistic wave equation and is supported by recent experiments which measure the wavelength of matter and demonstrate the electron orbitals experimentally from these wave equations for matter [ref 1,2].

7

Wave particle Duality and Relativity

From here it is possible to proceed in several ways using the relativistic wave equation (2). It is apparent that the reintroduction of the term for relative velocity into the wave equations will enable the reintroduction of special relativity into quantum mechanics. In particular we should now be able to derive the term $(1-v^2/c^2)^{1/2}$ as a special case of quantum mechanics.

Thus if: $\qquad\qquad\qquad\qquad \lambda = hc/\beta E \qquad\qquad\qquad\qquad\qquad$ (2)

As $E=(p^2c^2 + m_0{}^2c^4)^{1/2}$, squaring

$$\lambda^2 = h^2c^2/\beta^2(p^2c^2 + m_0{}^2c4)$$

Conventionally $p^2c^2 = E^2v^2/c^2$

then $\qquad\qquad\qquad\qquad \lambda^2 = h^2c^2/\beta^2(E^2v^2/c^2 + m_0{}^2c^4)$

Thus as $\beta^2 = v^2/c^2$ and $m_0{}^2c^4 = E_0{}^2$, then:

$$\beta^4E^2 + \beta^2E_0{}^2 = h^2c^2/\lambda^2$$

hence

$$\beta^4E^2 = h^2c^2 \cdot \frac{1}{\lambda^2} - \beta^2m_0{}^2c^4$$

thus

$$\beta^2 = \frac{h^2c^2}{\beta^2E^2} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0{}^2c^4}{\beta^2E^2}$$

As $E^2 = {}^{\cdot}m^2c^4$

$$\beta^2 = \frac{h^2c^2}{\beta^2\,{}^{\cdot}m^2c^4} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0{}^2c^4}{\beta^2E^2}$$

Substituting $h = m_qc^2$

$$\beta^2 = \frac{m_0{}^2c^6}{\beta^2\,{}^{\cdot}m^2c^4} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0{}^2c^4}{\beta^2E^2}$$

As $m_q/{}^{\cdot}m = 1/n_q$ (eq. 2)

$$\beta^2 = \frac{c^2}{\beta^2n_q{}^2} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0{}^2c^4}{\beta^2E^2}$$

Thus if $f = \beta^2 n_q$ (eq. 7a);

$$\beta^2 = \frac{v^2}{f^2} \cdot \frac{1}{\lambda^2} - \frac{\beta^2 m_0^2 c^4 f^2}{\beta^2 E^2}$$

As $1/\lambda^2 = f^2/v^2$

$$\beta^2 = \frac{v^2}{f^2} \cdot \frac{f^2}{v^2} - \frac{\beta^2 m_0^2 c^4 f^2}{\beta^2 E^2}$$

Thus:

$$\beta^2 = 1 - \frac{\beta^2 m_0^2 c^4}{\beta^2 E^2}$$

As $E^2 = {'m}^2 c^4$

$$\beta^2 = 1 - \frac{m_0^2}{{'m}^2}$$

Hence

$$m_0/{'m} = (1 - \beta^2)^{1/2}$$

Thus

$${'m} = \frac{m_0}{\left[1 - \dfrac{v^2}{c^2}\right]^{1/2}}$$

Thus this derivation now allows relativity as a universal case of the quintessential wave nature of matter.

The original premises on which special relativity was based were: that the speed of light is a constant and that all observers are equal. As the speed of light has dimensions of length and time but not apparently of mass, the relativistic change in mass is not accounted for. Using quintessence logically and directly accounts for the relativistic mass changes.

Moreover, relativity can be derived from the de Broglie equation, and visa versa, directly, thus linking relativity and quantum mechanics by taking into account the existence of quintessence mass.

Hence, it is now possible to derive the relativistic equations for mass and in turn for space and time from the quintessential wave equation, thus deriving special relativity as a universal case of quantum mechanics and thus uniting special relativity and quantum mechanics. This now allows a further understanding of the nature of space-time.

9

The Space-time Lattice

The understanding of the true nature of space-time and how it is formulated in three dimensions of real space is crucial. To simply assume that space-time exists, and thence not to question the nature of that existence, denies a deeper understanding of the universe.

In order to understand the nature of space-time itself, at the quantum level a further look at the nature light and the photon is necessary. Since Einstein's description of light as a particle (the photon) and the description of the photoelectric effect, the standard picture of light as simply a wave can, no longer be applied. If light was to exist as a photon, it could not exist in one dimension, as ordinary waves do, it would need to be three dimensional, with the addition of time. Let us suppose, in this case, that a photon is a three dimensional helical ringlet of light, travelling in the x vector, and spinning around the x-axis. Conventionally this ringlet has a radius; $r=\lambda/2\pi$. The ringlet itself would be vibrating in the y and z vectors. The vectors x, y and z would represent the photon, the substance of which, would be travelling in the x direction and oscillating in the y and z vectors, which would represent oscillatory energy. This in turn would allow it to act as a wave, and create oscillatory electromagnetic fields.

It is important to re-examine **space-time** itself in this light, this would have one directional vector with two vector dimensions of energy, one of capacitance and one of electrical permeability, thus accounting for the well known constants of free space; the permittivity of free space (ϵ_0) and the permeability of free space (μ_0) respectively. The vector dimension of direction x, would be the direction of travel and those "quintessences" travelling in an outwardly direction would account for none other than the expansion of the universe. Three of these quintessences would naturally constitute three dimensional visible space-time. These constituents of space-time would interact with the generations of the other vector dimensions reciprocally. **Thus one quintessence would sweep out one vector of permeability and one vector of permittivity, through which the other two quintessences could travel, and vica versa, creating a three dimensional space-time lattice.**

The permittivity of free space, (ϵ_0) which is equivalent to capacitance, would as with capacitance plates, be determined by the effective separation between quintessences. The permeability of free space (μ_0) is in fact a force, measured as $4\pi \times 10^{-7}$ N A^{-2}, would result from the force produced by the vibration of quintessence and would be dependant on the density of quintessence. Hence these two parameters would be reciprocal and thus the product of these two would therefore be a constant, which is recognised as none other than the speed of light.

$$c = (\mu_0. \epsilon_0)^{-1/2}$$

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This space time lattice would in effect be created by quintessences travelling in all directions with a speed of c within the lattice. The quintessences of the space time latice would in effect produce a non-static ether. A non-static ether is fully compatible with special and general relativity. Indeed such an ether explains how space time can be curved as in general relativity. Furthermore, the existence of a non-static ether, was espoused by Einstein in his University of Leyden lecture on general relativity of 5th May 1920. In Einstein's own words;

"According to the general theory of relativity space without ether is unthinkable."[ref4]

Recent evidence from a number of sources now strongly support the presence of this non-static ether, in the form of quintessence. An editorial from a major journal states "combined with other observations such as those of distant Supernova, the QMAP results corroborate the prevailing theory of inflation with the twist that the Universe is only one third matter (both ordinary and dark) and two thirds quintessence, a form of energy possibly inherent in empty space".[refs 5,6,7]

If we take into account the existence of quintessence and as such a three dimensional space-time lattice, matter which is intrinsically made of contituents of charge would interact with this lattice to produce the effects of mass. Mass would be perceived as a result of matter (whose constituent particles appear to contain charge) interacting with this lattice directly due to the inhibition of motion by the lattice's electrical permeability and permittivity vectors, which would form the existence of complex space. These quintessences would in the direction in the y and z vectors produce small vibrations of the order of the Planck length (10^{-35} m), whilst passing through the vectors of permeability and permittivity, thus producing the effects of mass.

The vibration would endow quintessence itself a (non rest) mass (m_q) equivalent, to the minimal mass of:
$$m_q = h/c^2 = 7.373 \times 10^{-51} \text{ kg.sec} \qquad (1)$$

The presence and magnitude of Planck's constant (h) and especially the speed of light (c) is thus explained. Indeed, the speed of light $c = (\mu_0 . \varepsilon_0)^{-1/2}$ is not in itself a fundamental quantity.

As the energy equivalence formula is $E = mc^2$, the minimal mass of a single quintessence, would thus be the minimal mass, h/c^2, hence again:

$$m_q = h[\mu_0 . \varepsilon_0] = h/c^2 = 7.373 \times 10^{-51} \text{ kg.sec} \qquad (1b)$$

or $$m_q c^2 = h \qquad (1c)$$

It is postulated by general relativity that the shape of space time itself can be

altered, indeed the presence of the space time lattice now allows this to be altered by altering the density of quintessence. It is further clear that if quintessences underly the structure of the space-time lattice, they may also underly the structure of matter itself.

With regards a single quintessence, this passing through an energy vector of the space-time lattice would appear as a vibrating string. In a similar way to string theory, the conglomeration of these quintessences would produce the constituents of ordinary matter. Thus the general equation for the number of quintessences (n_q) in an object of mass (m) would be

$$m/m_q = n_q$$

The mass of the electron (m_e) for example, would be directly determined by the number of quintessences in the electron, multiplied by the mass of quintessence.

Quintessence and Complex Space

Quintessence is postulated to constitute the fundamental nature of space-time. Three quintessences each travelling in their respective x vectors at 90^0 to each other would create three dimensional real space-time. These quintessences would in the direction in their respective y and z vectors produce small vibrations of the order of the Planck length (10^{-35} m), this would create the vector dimensions of permeability and permittivity. The result would give space-time 9 dimensions of space as in superstring theory. However, unlike superstring theory the six hidden dimensions would not be "curled up so as to be so small as to be invisible" these six dimensions would be present in complex space. Thus, only three of these dimensions would represent ordinary three dimensional particulate space time i.e. three dimensional objects. The other six dimensions produced by the vibrations of quintessence would form complex space.

The mathematics of complex space, using imaginary $\sqrt{-1}$ or ($_j$) numbers, is assumed in the standard formulation of the Shrödinger wave equation. Thus the presence of complex space is an integral part of quantum mechanics. [ref 8]

$$-\frac{h^2}{2m} \cdot \frac{d^2\psi}{dx^2} + V\psi = {_j}h \cdot \frac{d\psi}{dt}$$

The mathematics of complex space is also an essential and integral part of the principles and application of modern electronic and control engineering. Indeed it has been well recognised for some time that each direction vector in electronic engineering can be associated with complex vectors. [ref 9]

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As this complex space consists of the vectors of permittivity and permeability it would only be "felt" by charged particles as in the electron. Nevertheless, as all particles are fundamentally composed of charged particles the effects of complex space would be felt by endowing these particles with mass and in turn kinetic energy.

In conventional complex space, a 2 dimensional Cartesian Argand diagram is mathematically used. However, in order to formulate the equations for particles a three dimensional Argand diagram is essential. This will have three dimensional vectors, one real vector and two imaginary vectors. Three of these diagrams will be required to fully describe the nature of particles, each with a real vector in the x, y and z vectors, respectively. Nevertheless, in the instance below the real vector is the x vector and the two imaginary vectors are given by ($_j$y, $_j$z)

Three Dimensional Argand Diagram

The beauty of a three dimensional Argand diagram is that the complex conjugate (i.e. the mirror image which confers mathematical reality on the coordinates) is formed by the value of the minus coordinate in the other complex vector dimension. Thus the complex conjugate of $(c_x^{1/2} + {}_jc_y^{1/2} + {}_jc_z^{1/2})$ is $(c_x^{1/2} + {}_{-j}c_y^{1/2} + {}_jc_z^{1/2})$. These two sums when multiplied thus give a real number solution.

Furthermore it is clear that nine dimensions of space time are necessary in the general relativistic equations. By including complex space we thereby create the nine dimensional spacial metrictensor and the metric energy tensor of matter necessary for computations for general relativity (see quantised general relativity pp 34-35). From here we can begin to understand the true structure of matter.

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Energy and the Space-time Lattice

The presence of numerous experimental data for quantum tunnelling [refs 10,11,12,13] and indeed the recent observations by Nicholas Gisin, on the entanglement of distant photons now returns us to EPR experiments.

Using the quintessential modification of the de Broglie wave equation, gives us an insight into these teleportation and EPR effects.
As

$$\lambda = hc/\beta E \qquad (2)$$

and
$$E = hn_q \qquad (1a)$$

then
$$\lambda = c/\beta n_q \qquad (2c)$$

Importantly, as indicated by equation (9d), energy having no quintessence; would have a wavelength of infinity. Specifically pure energy containing no quintessences, would have a lambda of infinity. According to quantum mechanics an infinite wavelength would result in the probability of that energy being anywhere. As energy itself has no electrical charge it would not be impeded by the permittivity and permeability of the three dimensional space-time lattice. Moreover, energy would not be detectable in three dimensional space-time, unless it interacted with matter, as in the EPR experiments. Indeed, energy is not observed when not bound to any form of mass or particle. Thus equation 9d, takes us to our original assertion

- Energy is not bound by the space-time lattice -

Thus, as the EPR experiments suggest the existence of energy separate from matter and thus separate from the three dimensional space-time lattice, it is interesting to find that experiment suggests the existence of free energy in a continuum separate from space time to produce the effects of quantum teleportation. [refs ,10,11,12,13]

This is not, however, teleportation across an additional dimension, this is a term to describe in partially familiar terms the dissociation of energy from the three dimensional space-time lattice. As time is inextricably linked to each dimension of space, the effects of energy would be inextricably linked to the events, such as the creation of virtual particles, we see interacting within space-time.

It is unlikely that observers have any direct day to day experience to explain quantum events. Nevertheless, quantum physics may have given us a window into the hitherto hidden workings of the Universe. Thereby, the mystery of the uniformity of the Universe, across distances which the speed of light could not apparently traverse,

is readily explained by the fact that the free energy contained in the Universe is not bound by the space-time lattice.

In the case of light, due to the exceedingly small masses involved, there would be relatively easy exchange of matter with free energy within a photon. This would make the photon the ideal experimental tool to look for energy which is not bound by matter and in turn energy which is not bound in space-time. Indeed, very recently Furusawa *et al.* have reported to have observed the transference of energy as photons from A to B, without those photons traversing space-time[ref 10]. This finding which has been supported using other experimental techniques[refs 11,12,13,], is very important as it suggests the existence of such a quantum continuum.

We have already seen strong experimental data using photons [ref 10], atomic spins and other data for quantum teleportation which have recently been published [refs,11,12,13], which support these findings. According to the above equations the teleportation would vary in a predictable fashion, as with photons, in line with the wavelength of the light used, relative to the size of vibration of quintessence. As regards matter, the results do confirm that the effect of quantum tunnelling is indeed dependant on the wavelength of matter and the size of that matter [ref 10].

Electron Structure

Understanding the electron is fundamental to the understanding of the elementary particles. The hidden nature of the electron may recently have been revealed through observations by Horst Stormer, Daniel Tsui and Robert Laughlin for which a Nobel prize has recently been awarded. They describe a quasi electron particle of charge 1/3e. This has been described on a quantum basis as a vortex of energy, bound as a quasi particle in one dimesion x, but not bound in the other two dimensions y and z, allowing dispersion in space-time as a vortex. What is more intriguing are the experimental conditions in which this occurs. First of all a two dimensional electron gas is created and held between two capacitance plates. A magnetic force is then applied in the remaining dimension, virtually creating a one dimensional passage through which only a quasi electron appears to be able to pass.[refs 15,16]

Given the presence of charge of 1/3 e, then three of these quasi electrons could form an entire electron in three dimensional visible space time. Nevertheless, each would have energy and hence a wave function which would be present in the other vectors. This electron could thus follow the probability functions as described by the Shrödinger wave equation for ψ (otherwise termed as "essence" by Shrödinger)

If the mass of the electron (m_e) is constituted from quintessence, using the formula:

$$m_e / m_q = n_q$$

Then an electron would be constituted from:

$$9.11 \times 10^{-31} \text{ kg} \div 7.373 \times 10^{-51} \text{ kg.sec} = 1.236 \times 10^{20} \text{ quintessences/sec.}$$

Thus taking into account the mass-energy content of quintessence (m_q) it is independantly possible to derive the magnitude of the charge of an electron (e) using the following equation.

$$e = [m_q \varepsilon_0 / 4/3\pi hc]^{1/2} = 1.61 \times 10^{-19} \text{ C}$$

This is in close agreement with the experimentally observed charge on the electron of 1.60×10^{-19} C.

Interestingly substituting $m_q = h/3c^2$ in the above equation we have:

$$e = [\varepsilon_0 / \ 3(4/3\pi c^3)]^{1/2} \qquad\qquad (6)$$

This can also be written as

$$e = \frac{\varepsilon_0}{[\ 3 \ (4/3\pi c^3) \ ]}^{1/2} \qquad\qquad (6a)$$

Equation (6) has a number of very special implications, if re-examined, firstly three of these quasi electron spheres appear to to be required to constitute the charge of the electron . More intriguingly, it indicates that the charge is related to the volume of a sphere with an apparent radius of c. Thirdly it indicates that the square of the charge of an electron (e) is proportional to the permittivity of free space (ε_0). The charge given from equation (3) is in close agreement with the measured charge of the electron. Furthermore a more exact value for the charge of the electron (to seven decimal places) can be deduced by taking into account the gravitational field of the Earth (see Gravity and the Charge of the Electron). Furthermore the charge of the electron (e) can now be derived from first principles. Thus, equation (3) corroborates the evidence that the electron is indeed composed of three quasi electrons in keeping with recent experimental findings.[ref 16]

The significance of the electron, composed of three spheres each with a radius of c, is not immediately clear, but can be understood if the frequency of rotation of the electron is taken into account. Thus if the diameter of the electron was approximately 10^{-19} m, then its spin would need to be $1/c.10^{-15}$m $\approx 10^6$ cycles/sec. Thus given a very high rotation rate an electron could have an effective radius of $1/c$ and still occupy subatomic sizes. Indeed these observations might be used to estimate the rate of rotation of the quasi electron and its size (see Appendix 1).

With regards a single quintessence, this passing through an energy vector of the space-time lattice would appear as a vibrating string. In a similar way to string theory, the conglomeration of these quintessences would produce the constituents of ordinary matter. The electron, for example, would be constituted from approximately 1.236×10^{20} quintessences.

The dimensions of the equation for the electron can be readily resolved by considering each of the three vector dimensions. The exact dimensions of the equation need to be considered in the light of the nature of space-time itself. These dimensional equations help explain the nature of matter. Indeed the equation for the electron may be necessary for the full understanding of gravity, this is also fully addressed (Appendix 1, Dimensional Equations)

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Complex Space and Electron Structure

The presence of complex space also now further explains the conformation of the the electron, and its formulation at the quantum level, and the presence of particles , anti-particles and their spin up and spin down characteristics.

Indeed the short form equation for the charge of the electron (-e) can now be rewritten as a metric tensor with three dimensions in real space and six in complex space.

Thus if three of the x, y and z vectors are in real space and six vectors in complex space, where c is the speed of light in the real space vector, $_jc$ is the speed of light in the complex vector and $_{-j}c$ is the complex conjugate of $_jc$, thus the electron can be mathematically represented by the equation:

$$-e = \varepsilon_{qe}/(4/3\pi)^{1/2} \quad \begin{array}{c} (c_x)^{1/2}.(jc_y)^{1/2}.(-jc_z)^{1/2} \\ + \quad + \quad + \\ (-jc_x)^{1/2}.(c_y)^{1/2}.(jc_z)^{1/2} \\ + \quad + \quad + \\ (jc_x)^{1/2}.(-jc_y)^{1/2}.(c_z)^{1/2} \end{array} \tag{7}$$

Which now elegantly gives the real number solution

$$e = \varepsilon_{qe}/3(4/3\pi c^3)^{1/2}$$

Where ε_{qe} is given as the permittivity of free space for a single quasi electron (see appendix 1). Equation 4 represents a "complex" tensor

Whilst the two dimensional Argand diagram has four quadrants, the three dimensional Argand diagram has eight cubic sectors. Two of these cubic sectors are diametric opposites and can represent "real" particulate objects. These have the primary coordinates x, y, -z ; as in the electron described above, and the -x, -y, z, with the real vector x now having a minus sign. These two "real" cubic sectors, therefore, mathematically represent particles and their anti-particles.

The mathematical presence of the two primary diagonal mirror images (x, y, -z and -x, -y, z) now allow the introduction of the concept of antiparticles. This extension of the maths into a three dimensional Argand diagram thus results in the automatic formulation of the maths of antiparticles. Thus the charge of the positron (⁺e) is formulated by the shortened form equation, where the real vectors now each have the minus sign, and therefore exist in the -x, -y, z sector of the three dimensional

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Argand diagram.

$$^+e = \varepsilon_{qe}/(4/3\pi)^{1/2} . \begin{array}{ccc} -C_x^{1/2} . & jC_y^{1/2} . & jC_z^{1/2} \\ jC_x^{1/2} . & -C_y^{1/2} . & -jC_z^{1/2} \\ jC_x^{1/2} . & jC_y^{1/2} . & -C_z^{1/2} \end{array} \qquad (8)$$

The three dimensional Argand diagram also accounts for chirality and indeed the up and down spin of the electron. There are two other "real" primary coordinates in the Argand diagram, these are themselves the partial mirror images of the above coordinates (i.e. x, -y, z and -x, y, -z). In particular the y axis is of the opposite sign, thus in particles the y axis is in the downward direction, to form down spin particles and in anti-particles in the up direction, to form the antiparticle The up spin electron is given by eq. 8 and hence the down spin electron (-e ↓))is given by the equation

$$-e |\downarrow\rangle = \varepsilon_{qe}/(4/3\pi)^{1/2} . \begin{array}{ccc} C_x^{1/2} . & jC_y^{1/2} . & jC_z^{1/2} \\ jC_x^{1/2} . & C_y^{1/2} . & -jC_z^{1/2} \\ jC_x^{1/2} . & jC_y^{1/2} . & C_z^{1/2} \end{array} \qquad (9)$$

Thus the three dimensioanl Argand diagram accounts directly for the presence of antiparticles and the spin up and spin down particles seen in nature. It also accounts for the necessity of the electron to form a square root spherical object, as complex space depends on $\sqrt{-1}$, otherwise known as j.

Electron Pairing and Superconductivity

As the quintessences making up the electron are in a square root conformation, each of these quasi electrons would have a tendancy to pair to form an entire sphere.

The square root sphere structure of electrons with up and down spins can now superimpose to produce a complete sphere of varying extents. This produces electron pairing as seen at the atomic and molecular levels. It also accounts for the Pauli exclusion principle. This pairing thus accounts for the reactivity of the valence electrons and the electron probability densities, which in turn accounts for the existence of chemistry. [ref 8]

Furthermore, it is possible to account directly for superconductivity from first principles. For if both the complex and real vectors of the electron combine completely, the product of an up and down spin electron form a perfect superimposed sphere with radius c, with a charge of 2.59×10^{-38} Coulombs, denoted

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by the formula:

$$e^2 = \frac{\varepsilon_0}{3\,(4/3\pi c^3)} = 2.59 \times 10^{-38}\,C \qquad (6b)$$

As with standard superconducting theory, superconductivity can be explained by the formation of "Cooper" electron pairs, where the electrons are forced to pair by the presence of positve crystal charge in particular formation, at supercooled temperatures. In addition the electron pair now forms a stable entity whose angular momentum cancels.[ref 8]

It additionally becomes clear that the charge of two seperate electrons (2e) is $3.2 \times 10^{-19}\,C$, but the charge of the combined electrons (e^2) is $2.59 \times 10^{-38}\,C$. This electron pair thus appears to have 19 orders of magnitude less charge than the electron and in turn 19 orders of magnitude less resistance. It is this effective reduction in charge and in turn resistance which may account for superconductivity. When observed directly any electrical interaction with the Cooper electron pair will, however, result in the release of the full charge of both electrons, so that the full electrical charge put in will be equal to that coming out of the apparatus.

The Fine Structure Constant

Intruiginly from our knowledge of the electron we can further define the term α, the fine structure constant; from the structure of the electron. Thus as the standard term $\alpha = e^2/hc.4\pi\varepsilon_0$; substituting the term $e^2 = \varepsilon_0/\,3(4/3\pi c^3)$ (eq.6) and $h = m_q c^2$ (eq.1) we find:

$$2\pi/\alpha = m_q[3(4/3\pi c^3)]^2$$

*or $\qquad\qquad 2\pi/\alpha = m_q e^4/\varepsilon_0^2$

For brevity we may represent the quasi electron stucture as $(4/3\pi c^3) = \Theta$; to signify its threefold symmetry, thus

$$2\pi/\alpha = m_q[3\Theta]^2 \qquad (10)$$

Indicating that the fine structure constant of the electron (α) is indeed related to its dimensional structure. Again taking into account the effects of gravity the fine structure constant can be derived from first principles to nine decimal places (see Gravity and the Charge of the Electron).

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Fundamental Forces and Particle Structure

In order to understand the fundamental forces and the nature of fundamental particles, an overview is required. Thus, there are three major forces; strong, electro-weak and gravity, each mediated by three force particles the gluon, photon and graviton respectively. These in turn, influence three types of particle, the quark, lepton, and by general relativity space-time itself. Each of these are composed of particles with multiples of charge of 1/3, which are themselves in three generations, and are present in three dimensions of real space. It is important that a comprehensive view of nature explains this threefold symmetry.

Using the Standard Model of particles, it is well accepted there exist quark particle charges of -1/3, -2/3 and +1/3 and +2/3 in quarks and anti-quarks. Given that each particle is made up of three quarks the presence of these fractional charges support the association of the fractional charges in this way to form three dimensional charged particles. In stable particles each of the three quarks would have a vector in one dimension, giving the three quarks together an existence in three dimensional visible space time. The particles that bind the quarks (gluons) are themselves required, in stable particles, to have three different colour charges, one colour in each dimension, for the particle to exist in three dimensional space-time. Furthermore, there are three generations of quarks (and indeed leptons).

The Standard Model (or a modification of this) and in particular the observation of quarks and indeed quasi electrons with fractional charge of 1/3 and 2/3 in both cases, indicates that particles are constituted from the equivalent of three of these quasi particles to form an electron and quarks to form baryons. In the normal three dimensions the energy would be carried by the particle, However, because each particle is constituted of three quasi particles and in each quasi particle or quark one visible dimension would be the direction vector, in the other two hidden dimensions of each vector the waves would carry energy. Thus each particle would be associated with vibration, which would account for wave particle duality and Heisenberg's uncertainty principle in three dimensional visible space-time.

These observations lead us directly to the previous postulate that the structure of the electron is composed of none other than three (root) spheres, and that this equation for the electron allows the determination of the charge of the electron from first principles, thus:

$$e = \frac{\varepsilon 0}{[\,3\,(\,4/3\pi c^3)\,]}^{1/2} \qquad (6)$$

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In addition the mass of the proton (m_p) can be directly calculated from the ratio of the mass (m_e) of the electron, given by the equation:

$$m_e/m_p = 5.45 \times 10^{-4} = 3(\pi/c^{1/2})$$ (11)

Strictly we should write, $m_e/(m_p + m_e) = 3\pi/c^{1/2}$; which is much more elegant.

Which now gives

$$m_e/m_p = 1/(c^{1/2}/3\pi - 1) = 5.4462 \times 10^{-3}$$

This is in very close agreement with the experimentally derived ratio of the proton to electron masses which is also; 5.4462×10^{-3}

Thus the correlation factor between theory and experiment has a maximum error <0.00001 [ref 17]

If we combine equation 3: $e = [\varepsilon_0/ 3(4/3\pi c^3)]^{1/2}$ and equation 13: $m_e/m_p = 3(\pi/c^{1/2})$ the positive charge of the proton (e_p) is given by:

$$e_p = [\varepsilon_0/3(4/3\pi c^3)]^{1/2} \times m_e.3(\pi/c^{1/2})/m_p = e$$ (12)

The stable nuclear proton conformation can thus be represented by the short form equation :

$$p = 3^*(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2})$$ (13)

This forms a stable 3 x 3 conformation as with the stable electron structure.

Importantly the term $(\pi/c^{1/2})$ is the 90° solution to the Shrödinger wave equation for an electron confined in a space with radius c! [ref 8]

Thus the standard equation for an electron confined in a one dimensional box is given by:

$$E\psi(x) = -\frac{h^2}{2m} \frac{d^2\psi(x)}{dx^2}$$

If the one dimensional box has a length 2L the quantum amplitude (A) can only be non zero between x = 0 and X = 2L and the standard solution for the amplitude is none other than:

$$A = (1/L^{1/2})$$

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Thus in one dimension the standard solution to the Shrödinger wave equation is:

$$\psi(x) = (\pi/L^{'12}) \sin x/L$$

Thus not only is the electron charge derived from the equation for three spheres each with a radius of c (eq. 3) ; but the proton mass and charge can also be derived from the standard solution to the Shrödinger wave equation for a an electron confined in a space of radius c! [ref 8]

The term $(\pi/c^{1/2})$ itself would thus most logically represent the gluon which is present in the proton. These gluons would bind the quasi electrons together to form the fundamental particles

The masses of all the known particles, including the up and down quarks, the W boson, the muon, charm, strange, the tauon, truth and beauty can thus also be derived from first principles in this fashion, and have the quasi electron as their basic constituent particle (see Appendix 1).

Thus the structure of the muon (μ) can also be derived from the ratio of the mass of the electron (m_e) and the mass of the muon (m_μ):

$$m_e/m_\mu = 4.7 \times 10^{-3} = \pi/c^{1/3}$$

Thus
$$\mu = \epsilon_0^{1/2}.m_e/ \, m_\mu. \; 3^{'}(4/3\pi c^3)^{1/2}.(\pi/c^{1/3})$$

Where the charge of the muon is in this equation equivalent to that of the electron e. In this case $(\pi/c^{1/3})$ can be considered to represent a specific high energy photon. Thus the structure of the muon, written in short form is:

$$\mu = 3^{'}(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}) \tag{14}$$

Moreover the structure of the tauon can be calculated from the ratio of the mass of the electron and that of the Tauon (1.79 Mev);

Thus
$$0.511 \text{ Mev}/1.79 \text{ Gev} = 2.85 \times 10^{-4}$$

$$m_e/m_\tau = (\pi/c)^{1/3}.(\pi/c)^{1/9} = 2.85 \times 10^{-4}$$

As the charge of the tauon is equivalent to the charge of the electron, hence the

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structure of the Tauon is given by the above equation

$$e_\tau = \varepsilon_{qe}.m_e / \ m_\tau.3^-(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} = e$$

This equation accurately predicts the charge -1; and mass of the Tauon (~1.78 Gev) [ref 1]. Thus the structure of the Tauon can in short form be given by the equation

$$\tau = \ ^-3(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (15)$$

Furthermore a more exact value for the mass of the muon and tauon can be deduced by taking into account the gravitational field of the Earth (see Gravity and the Charge of the Electron pg. 17) in a similar way to identifying the exact charge of the electron. In addition it may be necessary to take into account a possible mass value of the neutrino to arrive at a precisely accurate mass value of the muon and tauon. Nevertheless, the mathematical proof of these short form equations lies in the fact that they can very closely identify the charge and the masses of these particles, from first principles, as in equations (6, 13-27, see Appendix 1).

Overall the mathematical geometrical structure of all the particles can be derived from the quasi electron, which is in turn derived from quintessence. Thus, the short form particle structures can now be derived from first principles. This includes the quasi electron (qe) and electron (e), from which the quarks (u,d) and in turn the stable proton (p) and stable neutron (n) and alpha particle (α) respectively are derived. The general structure of the force carrying bosons the photon (g) and the gluon (γ) and the intermediate vector boson (W) can be given. It will also intriguingly be possible to derive, according to their generation, the structure of the strange (s) charm (c), beauty (b, or bottom) and truth (t or top) quarks directly from the structure of the muon (μ) and Tauon (τ) respectively.

Using the term $\Theta = (4/3\pi c^3)$, where, -/+ represents the charge of the quasi electron, we find:

1st Generation:

$$q_e = \ ^-\Theta^{1/2} \qquad (6c)$$

$$e = 3^-\Theta^{1/2} \qquad (6)$$

$$d = \ ^-\Theta^{1/2}.3(\pi/c^{1/2}) \qquad (16)$$

$$u = 2^+\Theta^{1/2}.3(\pi/c^{1/2}) \qquad (17)$$

$$s = \ ^-\Theta^{1/2}.3(\pi/c)^{1/2} \qquad (18)$$

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2nd Generation

$$\mu = 3^{-}\Theta^{1/2}.(\pi/c^{1/3}) \tag{14}$$

$$c = 2^{+}\Theta^{1/2}.(\pi/c^{1/3}).(\pi/c^{1/4}) \tag{19}$$

$$b = \,^{-}\Theta^{1/2}.(\pi/c^{1/9}).(\pi/c)^{1/4} \tag{20}$$

3rd Generation

$$\tau = 3^{-}\Theta^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \tag{15}$$

$$t = 2^{+}\Theta^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4} \tag{21}$$

Particle Gluons (g):

$$g_1 = (\pi/c^{1/2}) \tag{22}$$

$$g_2 = (\pi/c)^{1/2} \tag{22a}$$

$$g_3 = (\pi/c^{1/4}) \tag{22b}$$

$$g_4 = (\pi/c)^{1/4} \tag{22c}$$

Particle Photons (γ):

$$\gamma_1 = (\pi/c^{1/3}) \tag{23}$$

$$\gamma_2 = (\pi/c)^{1/3} \tag{23a}$$

$$\gamma_3 = (\pi/c^{1/9}) \tag{23b}$$

$$\gamma_4 = (\pi/c)^{1/9} \tag{23c}$$

Intermediate Vector Boson ($W^{+/-}$):

$$W^{+} = 3^{+}\Theta^{1/2}.2(\pi/c^{1/6})^6 \tag{24}$$

$$W^{-} = 3^{-}\Theta^{1/2}.2(\pi/c^{1/6})^6 \tag{25}$$

Stable* Proton:

$$p = 3^{+}\Theta^{1/2}.3(\pi/c^{1/2}) \tag{13}$$

Stable* Neutron:

$$n = \begin{array}{l} {}^{+}\Theta{\downarrow}^{1/2}.2(3\pi/c^{1/2}).\,^{-}\Theta{\uparrow}^{1/2} \\ {}^{+}\Theta{\downarrow}^{1/2}.2(3\pi/c^{1/2}).\,^{-}\Theta{\uparrow}^{1/2} \\ {}^{+}\Theta{\downarrow}^{1/2}.2(3\pi/c^{1/2}).\Theta^{-}{\uparrow}^{1/2} \end{array} \qquad (26)$$

Alpha particle (α):

$$\alpha = \begin{array}{l} [3^{+}\Theta]{\downarrow}^{1/2}.2(3\pi/c^{1/2}).\ [3^{-}\Theta]{\uparrow}^{1/2} \\ {}[3^{+}\Theta]{\uparrow}^{1/2}.2(3\pi/c^{1/2}).\ [3^{-}\Theta]{\downarrow}^{1/2} \\ {}[3^{-}\Theta]{\downarrow}^{1/2}.2(3\pi/c^{1/2}).\ [3^{+}\Theta]{\uparrow}^{1/2} \end{array} \qquad (27)$$

The mathematical proof for these structures and their decay mechanisms is lengthy and is thus fully contained in Appendix 1. All the particle structures are accurately mathematically defined by the masses of these particles. [ref 17]

The structure of these particles all contain the quasi electron and thus the metric tensor structure necessary in the formulation of the gravitational equations is sustained. The respective forces created by the gluon and the photon are important as they tell us the behaviour of matter and also lead to the likely structure of the graviton

*Stable nucleonic neutron and proton conformations differ slightly from the Standard Model , this is due to the sharing of quasi electron and quasi positron particles within the nucleus, which allows stabalisation of these particles by the formation of stable 3x3 structures. The Standard conformations which describe non-nucleonic neutrons and protons are additionally given in Appendix 1.

Particle Spin and Size

The significance of the electron, composed of three spheres each with a radius of 1/c, is not immediately clear, but can be understood if the frequency of rotation of the electron is also taken into account. Knowing the structure of the electron has led us to deduce its charge and thus may lead us estimate its size and spin. Thus these observations might be used to calculate the radius and rate of rotation of the electron.

Let us suppose, that nature is truly beautiful, and that the radius of the fundamental quasi electron is indeed 1/c, and in turn the radius was balanced by the velocity of rotation $2\pi/c$. This can be directly confirmed mathematically by taking into account the known spin of the electron, $h/4\pi$. Thus the actual spin of the electron may be calculated form the known energy of the spin.

The radius of the electron is not up till now known, but the radius of a quark has been estimated, and this is the radius derived from deep inelastic collisions of the proton. These estimates reveal a radius of approx. $r_p = 1.18 \times 10^{-15}$ m.[ref 13] This value may be used to assist in confirming the spin of the proton in revolutions per sec. (revs) and in turn the spin and size of the electron. Firstly we may proceed to estimate the spin of the proton. Thus as h = E.t (Joules x sec) and E.t = F.d.t (Joules x sec), then the spin;

$$h/4\pi = F.d.t \qquad\qquad (28)$$

As F = ma, where a = (revs. $2\pi)^2 r_{qu}$ and m = the mass of the proton, then

$$h/4\pi = m(revs.2\pi)^2 r_p.d.t$$

The actual distance (d) travelled in a circle of half integer spin in 1 second is: revs.πr_p, thus:

$$h/4\pi = m(revs.2\pi)^3 r_p^2/2$$

Hence:
$$revs = \sqrt[3]{[h/m(2\pi)^4 r_p^2]}$$

Taking the effective mass the proton as 1.6726×10^{-27} kg, then the rate of spin of the proton in revolutions/sec is:

$$revs = 5.65 \times 10^6 \text{ cycles/sec}$$

From the frequency of the specific rotation of the proton, given the half integer spin associated with the proton, we can thus mathematically confirm the relationship between the radius of a particle and its spin:

$$r_p \text{ x revs}/2 = 1/c \qquad\qquad (29)$$

Furthermore, the fundamental radius of 1/c seen in geometric structure the quasi electron, is also reflected in the rotation rate and radius for the proton, thus as above 1/c ÷ 1/2revs = 1.18×10^{-15} m. Moreover, this means the actual half integer velocity of rotation is none other than $2\pi/c$ in metres/sec. So that the particle is in harmonic balance.

Using the fundamental formula $h/4\pi$ = F.d.t, it is possible to obtain accurate estimates of the radius and spin rates of the electron, or indeed any particle, using

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the same principle of harmonic balance. Using the formula:

$$revs = \sqrt[3]{[h/m(2\pi)^4 r_e^2]}$$

It appears there are two unknowns, the radius if the electron and its revolution rate, however, in accordance with the equation, $r_p = 2/c.revs$, which gives the revolution rate of the proton, the same principle may also be used for the electron, by substituting $r_e = 2/c.revs$, such that:

$$revs = hc^2/4m_e(2\pi)^4 \qquad (30)$$

Taking the mass of the electron 9.109382×10^{-31} kg, the rate of revolution of the electron is:

$$revs = 1.048 \times 10^{10} \text{ cycles/sec}$$

Which gives a predicted radius of the electron as

$$r_e = 6.366 \times 10^{-19} \text{ m.}$$

So the half integer rotation velocity (revs.πr) is $2\pi/c$!, for the electron in keeping with the harmonic balance of the electron.

The same principle may be used to obtain an accurate estimate of the spin and radius of the muon, or any other particle. Using the above formula

$$revs = hc^2/4m_e(2\pi)^4 \qquad (31)$$

Then as the mass of the muon is 1.8823×10^{-28} kg then the revs of the muon $f_\mu=5.070 \times 10^7$ cycles/ sec and the radius (r_μ) is thus 1.316×10^{-16} m.
It is now possible to begin to explain how the muon and the other subatomic particles are formed. If a quasi electron is complexed with another structure the total geometric structure needs to maintain harmonic balance. So the frequency of rotation would need to match geometric sructure with which the quasi electron was complexed

Intriguingly we find asymptotic convergeance for the formulas for frequency and mass occurs, when the geometric structure complexed with the quasi electron has the structure represented by ($\pi/c^{1/3}$) [giving the frequency divided by two, because the single integer spin of the force carrying particles compares to a half integer spin for the muon] . So that

$$(f_\gamma 3\pi/2)^{1/3} = f_\mu$$

When the ratio of the masses of the electron (m_e) and muon (m_μ) are related, such

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that:

$$m_e (3\pi/c^{1/3}) = m_\mu$$

Indeed we find that (allowing for the neutrino) this ratio is very close to the actual ratio of the mass of the electron to the mass of the muon, determined experimentally.

Furthermore, we have seen that these geometric structures, representing harmonics of the speed of light, which either match the frequency or the amplitude of vibration of the quasi electron, mathematically define the masses of the particles and the fundamental forces of Nature.

Quantum General Relativity

Given the overall energy "complex" energy tensor structure of the electron and the metric tensor, assumed in general relativity, the quantum nature of gravity itself can now be explored. The spherical complex tensor for the electron and the positron (eq. 4,5,6) give the mathematical quantum structure and energy tensor for all the other particles (see appendix 2). Together with the time dimension these nine space dimensions account for the 10 parameters present in the metric tensor necessary to formulate the equations for gravity using Riemann geometry and thus forms the basis of quantum gravity. Intriguingly the metric tensor at each point in space time is required to consist of a collection of ten numbers, Consequently, ten dimensional space-time hypotheses, such as this or superstring theory, do automatically yield general relativity. [ref 3]

Furthermore, the mathematical representation of the graviton and the gravitational constant may be directly estimated from the knowledge of the mass and radius of quintessence. Thence, the force of the vibrations of quintessence lead directly to quantum gravity.

The radius of quintessence should be approximately in keeping with the Planck length estimate (r), which is conventionally derived from the standard dimensional equation:

$$r_q^2 \approx Gh/c^3 \qquad (32)$$

Given the nine spacial parameters present in the metric tensor, used in general relativity we find that the actual formula for r_q^2 is mathematically in agreement with theory when:

$$9r_q^2 = Gh/c^3 \qquad (33)$$

This again supports the 9 dimensional view of space and the size of the vibrations of quintessence can thus be estimated.

$$r_q = 1.35 \times 10^{-35} \, m \qquad (33a)$$

This value is in agreement with the Planck length. Indeed if the above equation is correct then we find that we can derive the standard equation for the general relativistic increase in radius, r', (eq. 34) directly from first principles and arrive at a more fundamental equation for quantum gravity. As

$$r' = G.M/3c^2 \qquad (34)$$

By substituting eq 33) into equation 34, a fundamental relationship between r' and M is obtained.

$$r'/3r_q^2 = GMc^3/Ghc^2 = Mc/h$$

And substituting the quintessential equation, $h = m_q c^2$ (eq. 1) then:

$$r'/3r_q^2 = M/m_q c = n_q/c \qquad (35)$$

Hence the ratio of the change in radius to that of the radius of quintessence squared, is proportional, by a factor of c, to the ratio of the mass M of an object to that of the mass of quintessence, effectively the number of quintessences. Thus the change in radius, r' due to gravitation, is related to none other than the ratio of the mass and radius of an object to the mass and the square of the radius of quintessence. Thus again the gravitational change in radius is directly related to the number of quintessences.

Naturally, this would be exactly what would be logically expected if quintessence, like the equation for the charge of the electron (eq. 6) forms from a root sphere. Thus the change in spacial radius of a normal sphere is dependant on the square of the quintessential radius.

This increase in apparent radius represents none other than the (gravitational) binding energy for quintessence.

The meaning of the above dimensional equation (33) might itself be further understood by substituting the mass of quintessence (where $m_q = h/c^2$) into the equation. Thus in nine dimensions the gravitational constant (G) may be more logically given as,

$$9(\pi r_q^2/m_q) = G\pi/c \qquad (36)$$

Where πr_q^2 is the cross sectional area of quintessence and m_q is the effective mass of quintessence, and thus $(\pi r_q^2/m_q)$ represents the effective mass per unit area which quintessence exerts. This equation reduces to:

$$9r_q^2/m_q = G/c \qquad (37)$$

From this we may derive the standard general relativistic relationship for the apparent change in radius (r') around a mass (M), from an understanding of the mass (m_q) and number (n_q) of qiuntessences. As $m_q = M/n_q$, then:

$$3r_q^2 = G.M/3c.n_q \qquad (38)$$

Then if

$$n_q = r'c/3r_q^2 \qquad (39)$$

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thus directly substituting for n_q in eq 38:

$$r' = G.M/3c^2 \qquad (34)$$

The importance of this is that the gravitational change in radius now logically derives from equation 36, which describes the gravitational force as resulting directly from the mass of quintessence exerted/per unit area of quintessence.

$$9(\pi r_q^2 /m_q) = G\pi/c \qquad (36)$$

Thus equation 34 is the conventional equation for the general relativistic increase in radius (r') in a gravitational field, which is here derived from the underlying nature of quintessence. Thus the gravitational constant is derived from the mass and radius of vibration squared of quintessence from first principles.

Indeed it is apparent that a more fundamental equation for gravitation now exists, for equation (39) is mathematically accurate and numerically agrees with eq. 34:

$$r'/3r_q^2 = n_q/c \qquad (39)$$

These equations may be readily mathematically verified. If in accordance with standard general relativity, the apparent increase in radius r' is:

$$r' = GM/3c^2 \qquad (34)$$

Then given that the mass of the Earth is 5.974×10^{24} kg;

$$r' = 1.478 \times 10^{-3} \text{ m}$$

Accordingly if $r' = 3r_q^2 n_q/c$; (eq.39). Given the number of quintessences (n_q) constituting the Earth is M_E/m_q, then

$$n_q = 5.9745 \times 10^{24} /7.3725 \times 10^{-51} = 8.104 \times 10^{74}$$

As $r_q^2 = 1.823 \times 10^{-70}$ (eq. 33a) then:

$$r' = 1.478 \times 10^{-3} \text{ m}$$

Thus equation 39 gives the same answer as the standard equation and may be understood on a logical basis. Indeed the meaning of c in the equation may be understood as it has been previously shown as being the basis for the radius of matter (eq. 6). Hence the general relativistic change in radius, r', is none other than the effective binding energy for quintessence.

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Quantum Gravity and Wave Particle Duality

Quantum gravity can now be readily linked with quantum mechanics, indeed any observations which are self consistent must be able to do so easily.

The frequency of light has been previously derived

$$f = E/h = n_q$$

Thus the formula for the frequency of light (E = hf) has previously been explained theoretically by the simple observation that the frequency is determined quite directly from the number of quintessences (n_q) within the photon. The same principle has also been shown to apply to matter.

Let us now follow these equations for matter by calculating the wavelength of a photon from the Gravitational constant as an example; and also **as a test** of these observations and to demonstrate that the gravitational equations can also apply to the quantum world.

If $\qquad\qquad n_q = r'c/3r_q^2 \qquad\qquad\qquad$ (39a)

where r' is the is the general relativistic increase in radius, and r_q is the radius of quintessence (eq. 33). Where f = n_q, substituting for n_q, then the frequency of the photon f_γ (where β = 1) is given by:

$$f_\gamma = r'c/3r_q^2$$

Uing the standard equation, $r' = GM/3c^2$ (eq. 34); we may substitute for r', thus we have:

$$f_\gamma = GM/9r_q^2c$$

Thus

$$f_\gamma = \frac{G}{9r_q^2c^3} \cdot m_\gamma c^2$$

and as $E = m_\gamma c^2$;

$$f_\gamma = \frac{GE}{9r_q^2c^3} \qquad\qquad (40)$$

Indeed as $9r_q^2 = Gh/c^3$, then

$$f_\gamma = E/h = n_q$$

It is possible to also demonstrate that the same relationship holds for the wave equation for matter. If we take the **relativistic wave energy of matter**, which has been previously derived,

$$f = \beta^2 n_q$$

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This includes the term for the number of quintessences flowing through the electron, in the complex vectors of space-time, to give the relativistic electron momentum (p) and a term for the rest mass, thus substituting into (40)

$$f_\gamma = \frac{GE}{9r_q^2 c^3} \qquad (40)$$

As $f = \beta^2 n_q$ <u>for matter</u> then the equation expands to:

$$f_m = \frac{G}{9r_q^2 c^3} \cdot \beta^2 E$$

As $\lambda = v/f$, then

$$\lambda = \frac{9r_q^2 c^3 v}{G \beta^2 E} \qquad (41)$$

Then the equation again reduces to:

$$G = \frac{9r_q^2 c^4}{\lambda \beta E} \qquad (3)$$

Equations 3, 40 and 41 are important as they show that the quantum wavelength of any particle of rest mass m can be derived from the gravitational constant G. Thus linking quantum mechanics to quantum gravity.

It is therefore important to confirm the numerical accuracy of the above equation (40). We can do this by comparing the result to the standard computation of the de Broglie equation, in a range where de Broglie itself is likely to be most accurate; which according to these observations is in the low energy range (see section on Wave Particle Duality).

If we take an electron with an energy of 0.1 KeV the wavelength is conventionally given (where the kinetic energy of the electron E_K is given by the product of the charge of the electron (C) and the potential applied eV = 0.1 Kev), by the standard equation:

$$\lambda = h/p = h/(E_k.2m_0)^{1/2}$$

thus

$$\lambda = 6.63 \times 10^{-34}/ [1.602 \times 10^{-19} \times 1 \times 10^2 \times 18.22 \times 10^{-31}]^{1/2}$$

hence

$$\lambda \cong 1.23 \times 10^{-10} \, m$$

Using

$$\lambda = \frac{9r_q^2 c^4}{G \beta E} \qquad (3a)$$

Where $E = \gamma m_0 c^2$

At 0.1 Kev, electron velocity is 6×10^6 m/sec, thus $\beta = 2 \times 10^{-2}$ and $\gamma = 1/(1 - v^2/c^2)^{1/2} = 1.0002$ Thus:

$$\lambda = \frac{9 \times 1.82 \times 10^{-70} \times 80.78 \times 10^{32}}{6.67 \times 10^{-11} \times \beta \times 1.0002 \times 9.11 \times 10^{-31} \times 8.998 \times 10^{16}}$$

$$\underline{\lambda = 1.21 \times 10^{-10} \text{ m}}$$

Divergence between the de Broglie equation and the above equation (2) occurs at intermediate and high energies where it is generally accepted that the standard de Broglie equation may be less accurate [ref 18]. The values for eq. 2 and de Broglie are compared to recent experiments, which demonstrate a relativistic curvilinear plot for wavelengths of matter in keeping with eq. 40.[ref1]

The de Broglie equation in the non-relativistic format yields a simple log/linear scale, which is not in keeping with relativity; whereas eq. 3 is dependant on relativity and mathematically accounts for both relativity in calculating the wavelength. Indeed recent experiment on quantum tunnelling through a wire mesh strongly suggests that the relationship between energy and wavelength is relativistically curvilinear.[ref 1]

Furthermore equation 3a suggests a fundamental relationship between energy (E), relative velocity (v/c = β), gravity (G) and the quantum wavelength (λ)

$$\lambda = \frac{9r_q^2 c^4}{G\beta E} \quad\quad (3a)$$

Indeed as $9r_q^2 = Gh/c^3$, then

$$\lambda = hc/\beta E \quad\quad (2)$$

Equation 2 is the very same as the Universal wave equation derived form first principles for the wavelength of light and matter, which allowed a relativistic solution to the equations for wave particle duality (see Wave Particle Duality). This now indicates that these quintessential equations are compatible with relativity, quantum mechanics and quantum gravity.

Graviton Structure

From these observations, if the value for the gravitational constant is substituted into the equation (35) we may now estimate the probable geomteric structure of the gravtion, which is the force particle mediating gravity by acting on quintessence. Thus the Gravitational constant has been previously derived from the vibration of quintessence by the equation:

$$G.(\pi/c) = 9(\pi r_q^2/m_q) \tag{36}$$

This is in accurate agreement with the value for G (6.67×10^{-11} N m^2 kg^{-2}). This suggests that the most probable mathematical representation of the graviton (φ), the third force carrying particle is

$$\varphi = (\pi/c). \tag{42}$$

Thus the gravitational constant (G) can be given by the mass and radius of quintessence and the structure of the graviton

$$G = 9\pi r_q^2/\varphi.m_q \tag{43}$$

This shows the gravitational force to be related to the fundamental radius of quintessence space time, and the graviton.

Quantised General Relativity

The classical general relativistic formula, as given by Einstein is:

$$R_{\mu v} - 1/2g_{\mu v}R = -\kappa T_{\mu v}$$

Where R is effectively the curvature of space-time, $R_{\mu v}$ denotes the contracted Riemann tensor of curvature and $T_{\mu v}$ is the "energy tensor" of matter.[ref 3]

If we substitute the energy tensor matrix of the electron (eq. 9) x time, for the energy tensor of matter $T_{\mu v}$; and the metric tensor of the space-time lattice x time for the contracted Riemann tensor we can arrive at the same solutions for general relativity.

Furthermore, in his published paper on General Relativity, Einstein [ref 3] defined the constant κ as:

$$\kappa = 8\pi G/c^2$$

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Therefore Einstein's equation should be written as

$$R_{\mu v} - 1/2 g_{\mu v} R = - \frac{8\pi G}{c^2} . T_{\mu v} \qquad (43)$$

Einstein himself was apparently not happy about the right hand component of the equation. However, we find that this part of the equation can now be explained and quantised by substituting the gravitational constant, $G = 9\pi r_q^2/\varphi.m_q$, (eq. 42a),

Giving:

$$R_{\mu v} - 1/2 g_{\mu v} R = - \frac{8\pi^2 . 9r_q^2}{\varphi.m_q.c^2} . T_{\mu v} \qquad (44)$$

By substituting $m_q.c^2 = h$, and further substituting $\hbar = h/2\pi$, we arrive at a quantised solution to Einstein's equations. Where A_q is the surface area of quintessence $(A_q = 4\pi r_q^2)$; φ is the graviton $[\varphi = (\pi/c)]$ and h is Planck's constant. thus:

$$R_{\mu v} - 1/2 g_{\mu v} R = - \frac{9A_q}{\varphi.\hbar} . T_{\mu v} \qquad (45)$$

The gravitational equation can now be further understood on a logical basis. The term $A_q = (4\pi r_q^2)$, where $(4\pi r_q^2)$ represents standard term for the surface area of a sphere of quintessence for the 9 space dimensions of the space time lattice, h is the energy content of quintessence x time and φ is the graviton, thus the right hand term now represents a true " metric energy tensor" of matter.

This leads directly to the standard solution to the field equations, for the general relativistic increase in radius r′ of an object, where A is the surface area of a sphere of a given mass M, such that

$$r' = \sqrt{(A/4\pi)} - r = GM/3c^2 \qquad (34)$$

Furthermore, although equation 45, gives the same solutions as Einstein's equation, which is essentially correct, the difference is that the equation is now dependant upon Planck's constant (h), and moreover the radius of quintessence, which now defines a quantised solution to the equations.

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Graviton Force Characteristics

Similar to the photon, the previously derived equation (42) for the graviton [φ = (π/c)] appears to also mathematically represent a helical ringlet of quintessence, but with a spin of 2. For the photon, taking the direction of motion as the x vector and its axis of spin also as the x vector, would account for the electromagnetic force and its attraction and repulsion characteristics. In the case of the gluon component (π/c$^{1/2}$), if the direction vector is x, then the axis of spin would be in the y vector, the same as quasi electrons, accounting for the particle binding characteristics of the gluon force. (see; Gluon structure and force characteristics. Appendix 2). In the case of the graviton, if the direction of motion was in the x vector, the graviton spin axis would be in the z vector thus, as will be demonstrated, accounting for the gravitational force.

The spin axis of the graviton can also be derived using the known characteristics of the electron. If an electron is travelling in the x direction, then its spin axis is determined by the by the sign of the $_{j}$y vector (up or down). This view is in agreement with conventional theory, which indicates that the electron spin is similar to a rotating planet orbiting the sun, (the electron even appears to have orbital precession). As the electron passes through the space-time lattice, this spin would generate the formation of gravitons. This would occur as a result of the ejection of the excess quintessence passing through the electron. As the electron spins, the ejection of these gravitons would occur at a tangent to the electron's direction of motion. The ejection of the gravitons would occur, similarly to the ejection of energy of a pulsar or quasar, through the equivalent of the north and south poles of the electron. Thus, propelling the graviton in the direction of the electrons y vector. The ejection of the graviton would re-orientate and impart a specific angular momentum to the gravitons which would thus end up spinning on its own z axis. If for instance the graviton is released from an up spin electron the graviton will be rotating clockwise and its leading edge will displace quintessence downwards. In turn this will provide an upwards force.

This picture accounts for Fleming's left hand rule, is logical and provides an explanation for the magnetic force around a wire. According, to the left hand rule if the direction of the current is in the x vector, the magnetic field is in the z vector, and the force is upwards, in the y vector, in accordance with the above model. Therefore, this particular spin axis and the structure of the graviton results in its force characteristics. As the graviton is very small compared to the electron and both have different rather rapid spin axis it is difficult for these to bind and interact. Nevertheless, because the graviton has a spin of 2, and as it spin axis is perpendicular to its direction of motion, in the z vector, it readily displaces space-time quintessence to produce gravity. Thus because the graviton is able to displace space-time, it is capable of escaping a black hole. How else could the effects of gravity be felt beyond a black hole?

With the above electron model of graviton production (see pp. 32), the nature of magnetism can be understood from first principles, Furthermore, the presence of a space-time lattice links relativity, and the forces of gravity with the electromagnetic and other forces of Nature. Indeed, evidence for these links may first date back to the 1820's, when Andre Ampere first defined the Amp. The force of attraction between two parallel wires 1 metre apart each carrying 1 Amp in a vacuum was defined as none other than the permeability of free space (2×10^{-7} N per metre of conductor). Thus conventionally the magnetic field strength around a long straight wire is given as:

$$B = \mu_0 I / 2\pi r$$

Where I is the current and μ_0 is the permeability of free space ($4\pi \times 10^{-7}$ N A^{-2}).

The attraction between two wires both carrying negative charge is, however, counterintuitive as negative charges should repel. A conventional explanation overcomes this by invoking the presence of a magnetic field which is created by the current by the production of virtual photons. Thus we appear to have an explanation for the effects of magnetism which involves virtual photons, however, these photons are not observed. More accurately, according to conventional special relativity the magnetic field is none other than the electric field viewed relativistically [ref 19].

A more satisfactory explanation, therefore, lies in the interaction between the electrons and the space time lattice. The moving electrons in the two wires interact with the lattice to produce gravitons; which are in phase when both streams of electrons are travelling in the same direction. The gravitonic waves interact constructively to disperse the space time lattice between the wires and induce an attractive force between the two wires, which produces in effect the permeability of free space. Thus this force results from the vibration of quintessence itself.

Conversly in two wires with current going in opposite directions the graviton waves are in anti-phase and would interact destructively between the wires. The gravitonic waves travelling radially outward from the wires would, however, disperse the lattice outside the two wires and produce apparent repulsion between the wires, which is exactly what is observed. These effects of electricity suggest that gravitons act as waves and that phase is important.

This effect is also seen with the north and south poles of ferromagnets. Nevertheless, with matter other than iron, cobalt or nickel, the graviton emission cannot be phased as the atoms are unable to align and magnets do not appear to exist with other materials.

In ordinary magnetic system the release of gravitons from the north pole would be

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exactly balanced by those released from the south pole of the magnet and hence there would be no nett force on the magnet until an external magnet or electrical current were applied.

Overall the magnitude of the forces in electrical systems where electrical conduction occurs are well defined by the permeability and permittivity of free space μ_0, and ε_0. Where v is the constant velocity of the charge and ε is the electric field produced by the charge.

$$B = [\mu_0.\varepsilon_0]v.\varepsilon$$

These observations suggest that **the forces of electricity which produce magnetism are indeed related to the permittivity and permeability of free space and that these quantities are exerted by an apparent vacuum. Thus the effects of magnetism could be explained by none other than the phased effects of gravitational waves on the space time lattice.**

Electromagnetism is of further interest to quantum gravity, particularly if we combine the standard equations, $B = \mu_0 I / 2\pi r$ and $B = [\mu_0.\varepsilon_0]v.\varepsilon$, substituting for B we have:

$$2\pi r = I/\varepsilon_0.v.\varepsilon \qquad (46)$$

Thus $2\pi r$ is proportional to the inverse of ε_0. Thus as space time is dispersed by gravitons the permittivity field will increase in the same way capacitance increases with separation of plates. Because of the inverse relationship between ε_0 and $2\pi r$, as ε_0 increases the circumference of a circle and the apparent ratio of π to r, will appear to diminish in accordance with general relativity. This not an actual diminution in the circumference of a circle but the effective reduction of the resistance to motion in a circular path in this field.

Incidentally, the above observations, also lead us directly to Shrödinger's formula for the average equilibrium distance (r) between an electron with charge (e) in orbit around a proton, which is conventionally given by:

$$r = n^2 4\pi\hbar^2\varepsilon_0/me^2$$

Where ε_0 is again the permittivity of free space, m is the mass of the electron and n is an orbital integer, h is Planck's constant and e is the charge of the electron. Furthermore if $e = [\varepsilon_0/ 3(4/3\pi c^3)]^{1/2}$ (eq.3); then the equation at n= 1,for the electron orbital radius elegantly simplifies to:

$$r = 4h^2c^3/m$$

Hence the orbital radius of the electron is related to spin of the electron (h) and its mass (m).

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Quantum Gravity and the Charge of the Electron

The equation for the charge of the electron (eq. 1) contains the term ε_0 (permittivity of free space) which according to these observations should vary in a gravitational field.

$$e = \frac{\varepsilon_0}{[\ 3\ (\ 4/3\pi c^3)\ ]}^{1/2} \qquad (3)$$

If we combine the standard equations, $B = \mu_0 I\ /\ 2\pi r$ and $B = [\mu_0.\varepsilon_0]v.\varepsilon$, substituting for B we have:

$$2\pi r = I/\varepsilon_0.v.\varepsilon \qquad (46)$$

Thus $2\pi r$ is proportional to the inverse of ε_0. Thus as space time is dispersed by gravitons the permittivity field will increase in the same way capacitance increases with separation of plates. Because of the inverse relationship between ε_0 and $2\pi r$, as ε_0 increases the circumferance of a circle and the apparent ratio of π to r, will appear to diminish in accordance with general relativity.

Thus ε_0 rises when space -time is dispersed by the gravitons that produce the gravitational field, This occurs in a similar way to the process by which capacitance increases with separation of plates in a capacitor.

Nevertheless, as c is a constant and as $c = [\mu_0\ .\varepsilon_0]^{-1/2}$, then if ε_0 rises then μ_0 falls. This is entirely consistent as μ_0, which represents the force that quintessence exerts, would be reduced if the quintessence space time lattice is dispersed.

Furthermore, as $\mu_0 = 4\pi \times 10^{-7}$ N A^{-2} ; then as μ_0 falls, then the appareent ration π to r, also falls in a gravitational field. This is largely the same as stating, as does general relativity, that the apparent radius r', rises in a gravitational field. So this view is consistent with general relativity.

Nevertheless, to derive an exact value for the charge of the electron we must account for gravity in the above equation. We will take the specific example of the Earth's gravitational field in order to obtain the exact value for the electron. If in accordance with standard general relativity, the apparent increase in radius r' is:

$$r' = GM/3c^2 \qquad (34)$$

Then given that the mass of the Earth is 5.9745×10^{24} kg; then

$$r' = 1.47864 \times 10^{-3} \text{ m}$$

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thus $\qquad$ $2\pi r' = 9.29057 \times 10^{-3}$

Which is the incremental factor by which ε_0 must increase in Earth's gravitational field. So to correct ε_0 to account for gravity, ε_0 must be divided by the incremental factor, $2\pi r'$. Similarly as effectively π decreases in a gravitational field, to correct π to account for gravity it must be multiplied by this incrememtal factor. So the equation for an electron in a zero gravtational field is:

$$e = \frac{\varepsilon_0}{[3\,(\,4/3\pi c^3)]}^{1/2} \div (1 + 2\pi r') = 1.6022 \times 10^{-19}\,C \qquad (3b)$$

This now gives the charge of the electron as measured in a zero gravitational field as 1.6022×10^{-19} C, which is the same as that measured on Earth. Notably these observations appear to suggest that the charge of the electron is the same irrespective of the gravitiational field.

Virtually unlimited degrees of accuracy for the charge of the electron and for the fine structure constant (α), may be achieved by taking into account 2nd and nth order gravitometric effects. Thus if we take into account the effect of gravity upon the radius of the Earth it is also important to take into account an effect a upon the instruments with which we measure quantities, this would be a second order gravitometric effect. Thus taking into account 2nd order effects (r"), we have a very small, but nevertheless relevant change, such that: $r'' = r'(1 + 2r')$. Thus $2\pi r'' = 9.3180486 \times 10^{-3}$, and thus:

$$e = \left[\frac{\varepsilon_0}{3(\,4/3\pi c^3)}\right]^{1/2} \div (1 + 2\pi r'') = 1.6021765 \times 10^{-19}\,C \qquad (3b)$$

This agrees exactly to the nearest 7 decimal places with the maximum accuracy of the experimental value for the charge of the electron.[ref 15] Furthermore by taking into account the nth order gravitometric effect, it is theoretically possible to predict accuracy for the charge of the electron to 3n decimal places. This mathematically accuracy confirms the structure of the electron from first principles and indeed the theoretical effects of gravity on the permittivity of free space (ε_0).

This returns us directly to the fine structure constant for the electron which is conventionally given by: $\alpha = e^2/\hbar c.4\pi\varepsilon_0$. If $e^2 = \varepsilon_0/3(4/3\pi c^3)$, accordingly the quintessential equation for α is structurally given by: $2\pi/\alpha = m_q[3\Theta]^2$ (where $\Theta = 4/3\pi c^3$; see The Structure of the Electron and Matter), we must now take into account the effects of gravity, as above, thus:

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$$\alpha = 2\pi/m_q[3\Theta]^2 \div (1 + 2\pi r'')^2 = 0.007297353$$

Where the gravitational term for the increase in radius r'' allows the mathematical derivation of α, and the above equation is in agreement with the conventional experimental value for α = 0.007297353 to the nearest 9 decimal places.[ref 15]

Hence the term $(1 + 2\pi r'')^2$ is in accordance with these observations for the effect of gravity on electromagnetic forces. To a maximum accuracy governed by current knowledge of the mass of the Earth and the Gravitational constant and thus the term for the gravitational increase in radius r'. These observations can also be used to accurately predict the magnetic moment of the electron (see Quantum Gravity and the Electron Magnetic Moment).

Thus the presence of the fine structure constant can now be further understood, by deriving the constant from first principles; specifically from the actual dimensional conformation for the charge of the electron: $e = [\varepsilon_0/ \ 3(4/3\pi c^3)]^{1/2}$ (eq. 6).

Overall the fine structure constant α (allowing for the term r' which is the general relativistic increase in the radius of the Earth due to gravitation) is given by none other than the formula for the mass of quintessence and from the structure of the electron, which can now be derived from first principles to seven decimal places or more.

Quantum Gravity and the Electron Magnetic Moment

The theoretical origin and nature of magnetism remains obscure in current electromagnetic theory. An explanation suggests these magnetic effects are produced by photons, although no photons have ever been observed. To get round this difficulty it is postulated by physics that magnetism results from "virtual" photons. However, Maxwell's equation for electromagnetism states that the photon has no nett magnetic effect.

$$\delta B_x/\delta x + \delta B_y/\delta y + \delta B_z/\delta z = 0$$

Thus magnetism could not, by the above standard equation, be derived from a photon real or virtual.

In addition observational data suggests that black holes have powerful magnetic fields and as in theory photons are unable to escape from black holes (except for small quantites in the form of Hawking radiation), it would be difficult to explain these magnetic fields on the basis of photon emission.

Einstein postulated that magnetism was merely due to special relativity [ref 17]. The postulate for the nature of magnetism in these current observations, states that the magnetic force results from relativity due to none other than the **phased** emission of gravitons (why postulate two invisible forces, magnetism and gravity, when one, the graviton, will do). This view as previously discussed (Quantum Gravity and Electromagnetism) is entirely compatible with standard relativity.[ref 19] Thus with the graviton origin of magnetism, the equation for the magnetic moment of the electron should have an expression in terms of quintessence and in turn the gravitational force and in particular the graviton.

The standard term for the magnetic moment of the Bohr Magneton (μB) is:

$$\mu B = eh/4\pi m_e$$

In standard quantum mechanics the Bohr Magneton, μB, however, needs to be corrected to agree with experiment. The "correction factor" is termed "ε"; where $\varepsilon = (\alpha/2\pi) - 0.328\alpha^2/\pi^2) = 0.001159641$. Thus theory reveals μ_e, the magnetic moment of the electron where:

$$\mu_e = (eh/4\pi m_e)[1 + (\alpha/2\pi) - 0.328\ \alpha^2/\pi^2)]$$

The conventional derivation of the term ε above, is given from the fine structure constant, $(\alpha/2\pi)$ which is theoretically consistent. However, a rather arbitary mathematical correction term; $0.328\ \alpha^2/\pi^2$ needs to be used in this standard equation. This appears ad hoc and needless to say, more accurate measurements show, the electron magnetic moment to the Bohr magneton ratio, $1+\varepsilon = 1.001159652$, which suggests the correction factor is indeed incorrect. Nevertheless, this correction factor is essential for "renormalisation" and thus for quantum mechanics to work.

Quantum gravity readily explains the discrepancy between the theoretical Bohr Magneton (μB) and the actual measured magnetic moment of the electron (μ_e). In accordance with the above chapter (Quantum Gravity and the Charge of the Electron)

Thus the significant mathematical discrepancies can be removed by accounting for the effects of quantum gravity.

Thus taking the charge of the electron (e), using the equation for the Bohr magneton and the effects of quantum gravity such that gravitational change in radius is r". The magnetic moment of the electron is given by:

$$\mu_e = (eh/4\pi m_e)(1+ [\alpha/2\pi \div (1+ r'')])$$

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This gives an electron magnetic moment to Bohr magneton ratio of 1.00115968. Thus the mathematical term for the magnetic moment of the electron is given, avoiding the arbitary and dubious term $0.328\ \alpha^2/\pi^2$ used in the standard equation, simply by accounting for quantum gravity.

It is now possible to unite the equations for gravity and magnetism by substituting the fundamental key equations of quantum gravity. Thus if: $h = 3m_q c^2$ (eq 1b) and $m_e = m_q.n_q$ (eq. 2). Then we can express the magnetic moment of any particle with the charge of the electron, including the proton, in terms of the number of quintessences (n_q) in that particle.

$$\mu B = ec^2/4/3\pi n_q \qquad (47)$$

Given that the postulated structure of the graviton is: $\varphi = \pi/c$ (eq. 42), then substituting we have

$$\mu B = 3ec/4\varphi n_q \qquad (48)$$

Showing that the equations for the magnetic moment are compatible with the gravitational equations given earlier. Principally, the quintessential equations now allow the determination of the magnetic moment of any charged object from the equation for the graviton and directly from the number of quintessences it contains. In conventional physics the magnetic moment of the electron requires a correction factor, $(1+ (\alpha/2\pi) - 0.328\ \alpha^2/\pi^2))$, to derive the correct experimental value. These observations herein, indicate that the correction factor is more logically $(1 + r'')$, where r'' is the general relativistic increase in radius around a gravitational body. This suggests that magnetism is not only affected by gravity, but can, as shown as above, be derived using the quantum gravitational equations.

Quantum Gravity and Special Relativity

Ordinary matter passing through the lattice would produce gravitons which would interact with space-time as described by general relativity. The quantity of gravitons would be determined by the apparent mass and in turn these would apparently curve space time. The geometry of this "curvature" is elegantly described by general relativity using Riemann geometry, specifically using metric tensors. Intriguingly the metric tensor is not a single number, but at each point in space time it is required to consist of a collection of ten numbers, Consequently, ten dimensional space-time hypotheses, such as this or superstring theory, may automatically yield general relativity. (see quantum general relativity p.36)

General relativity is indeed very elegant, nevertheless there was a logical step yet to answer. That is, how do gravitons shape space time? This can now be readily answerd

by considering the interaction of a three dimensional space time lattice with gravitons themselves to produce the effects of gravity. The effects of gravity are as such to compel a body in motion towards the gravitational object and to a much smaller extent visa versa. **This effect can only be produced if gravitons repel quintessence** (the constituents of the 3D lattice). Indeed, it has been stated that in order to explain cosmic inflation and the "flatness" of the Universe that quintessence must shun (or be shunned by) matter [ref 5,6.7].

In descriptive terms a body close to a large mass will have a tendency to move toward it because the three dimensional lattice would be less dense as it approached the surface of the large mass. Overall there would be less resistance to motion in the direction of the large mass, and the motion in this direction would be facilitated by the vibration of quintessence.

In general relativity the principle governing motion is **the geodesic of least distance, this can be re-expressed using similar equations using least action.** Furthermore, the concept of motion due to the vibrations of quintessence is more logically and experimentally compelling.

These observations can now be used to link general and special relativity. Thus as we approach the speed of light, the mass of an object travelling through the space-time lattice would approach infinity, directly because the number of quintessences paasing through a body would increase with increasing velocity, hence the equation:

$$m' = m_0 /(1 - v^2/c^2)^{1/2} \tag{50}$$

or
$$m' = m_0 /(1 - v^2[\mu_0 . \varepsilon_0])^{1/2} \tag{50a}$$

In turn this would generate increasing gravitons and accordingly this would explain the observed effects of special relativity. Time itself is due to passage through the space-time lattice, and where the space-time lattice is dispersed by gravitons, time and length are reduced with increasing velocity and hence increasing space-time lattice dispersion, similar to the way in which gravity alters space-time

As a result:
$$t' = t (1 - v^2/c^2)^{1/2}, \quad l' = l (1 - v^2/c^2)^{1/2}$$

Thus resulting in the effects of special relativity.

Quintessence and Black Holes

To address the relationship of the space-time lattice to gravity directly, it is important to discuss the concept of quintessence with regard to general relativitivistic equations. The standard general relativistic equation for the apparent increase in radius (r) due to the curvature of space time around a gravitational object, which has also been previously derived from first principles (eq. 36), is:

$$r' = G.M/3c^2 \qquad (34)$$

This can also thus be written as:

$$3r' = G.M[\mu_0 . \varepsilon_0] \qquad (51)$$

This standard equation, is in keeping with the above observations. Specifically, as the mass increases, ε_0 increases, in turn the radius will appear to increase (relative to π).

The above observations now allow us to examine the effects with regard to the interior of black holes themselves. The event horizon would represent a critical density for quintessence, in which light could not escape. The Schwarzschild radius would now be given by:

$$R_s = 2GM[\mu_0 . \varepsilon_0]$$

The event horizon will occur at the point at which there is less resistance to circular motion than motion in a straight or partially curved line. Given that π is proportional to $1/\varepsilon_0$. The event horizon should occur when the permittivity has increased by a factor of π.

Effectively because the permittivity of free space rises, π decreases. This is entirely in keeping with general relativity which predicts the effective change in the ratio of the radius to the circumference as given by the conventional equation, where r' , is again the apparent change in radius.

$$r' = G.M/3c^2$$

Hence π will effectively decrease as we approach the event horizon of a black hole, When π decreases to 1, the circular circumference is equal to the diameter and moreover, inside this limit it is shorter for light to travel in a circle. Thus light cannot escape the event horizon.

This can give us great insights into the workings of space-time, for flat Euclidean space the standard equation is:

$$e^{i\pi} = -1$$

In accordance with general relativity, the ratio of the radius to the circumference changes in a gravitational field, and effectively $\pi = 1$, at the event horizon, thus the boundary condition for the event horizon now has the direct equation:

$$e^{i}$$

Within a black hole as the permittivity of space increases by a factor of 2π an object within it will complete two rotations rather than travel in a straight line. In effect exceeding the speed of light by 2π. Hence, the condition for space-time is represented by the equation:

$$e^{i/2}$$

Thus an increase in the permittivity of free space by a minimum factor of π, to produce a black hole is estimated to result from an increase in mass by a factor of approx. 10^6 (the ratio of the mass of the earth and that of a putative black hole).

Continuing with the subject of a black hole, according to the model inside the black hole, the gravitons produced by the matter present would be in equilibrium with the density of the space-time lattice. Increasing the rate of rotation of the matter in the black hole for instance would thus increase the production of gravitons and its effective mass and increase the radius of the event horizon. A density gradient of the space-time lattice would continue to exist within the black hole. Progressively closer to the centre of a black hole matter itself would be increasingly compressed and the spherical structure of the quasi electron would be predicted to collapse. **This collapse would result in the formation of an exotic form of matter in the form of pure quintessence in a black hole.**

This pure quintessence would produce the **singularity** at the centre of the black hole, as all apparent space would be absent. The larger the black hole in terms of mass the more pure quintessence would exist at its core.

It is postulated that the big bang resulted from the explosion of such an immense black hole singularity, which was constituted from pure quintessence. Moreover, it is likely that in such a big bang some very small black holes might have prevailed and that these formed the seeds of the galaxies we see today.

In addition, Guth's inflation results directly from the observation that once electrons have formed from the primordial soup of quintessence, they emit gravitons which in turn repel space time, which would result in the cosmic inflationary cycle

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The formation of black holes, from quintessence, may represent a crucial step in understanding the mechanisms that underlay gravitational physics. Given the existence of black holes, with an event horizon, implies that the speed of light can effectively be exceeded by the warping of space-time. In this instance the space time lattice would be repelled by gravitons in such a way as to disperse space-time quintessence in a circular fashion. Similarly if we suppose that gravitons could be controlled and collimated in a single direction similar to a laser using photons, it would be possible to focus such a graviton beam ahead of an object. This in turn would dissipate the space-time lattice in front of that object, thereby allowing the theoretical potential for what is termed Warp drive.

Essentially, these are systems whose propulsion relies on warping space-time, as opposed to the ejection of material to provide thrust. This does not, of necessity, mean that superluminal velocities are produced, but that the drive is based on the warping of space-time in accordance with general relativity. However, it would in the future theoretically be possible for an object to achieve speeds greater than that of light, as superluminal velocities produced by the warping of space-time do not contravene special relativity.

After all, the observable Universe is estimated at more than 140 billion light years across, whilst its age is a mere 14 billion years old. Indeed according to the standard model, if the horizon distance is taken as the maximum distance which light could have travelled, then two points on opposite sides of the Universe are as far apart as ninety times the horizon distance, implying that space-time itself has far exceeded the speed of light.[20]

Overall, these observations explain the concept of mass the elementary particles and the forces of nature, including gravity, on a quantum basis. They can be used logically to explain the inner physics of a black hole, the missing mass in the Galaxy, the expansion of the Universe, the Big Bang and Guth's inflationary theory and equally quantum effects, from first principles. Foremostly, these observations allow a fundamental understanding of gravity, which in turn allows the technical construction of warp drive systems.

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PRIOR ART

Antigravity Systems

Recent research at NASA indicates that an antigravity device may be feasible. This research, however, has been undertaken at NASA without fundamental knowledge of the theoretical basis of quantum gravity. In these experiments the use of radio frequency (RF) pulses, such as in Nuclear Magnetic resonance, on rotating superconducting discs has been attempted, to produce antigravity effects.[ref 21]

However, radio frequency pulses are a weak form of electromagnetic radiation and are therefore unlikely to provide sufficient energy to produce measurable antigravity effects.

The warp drive technology described in this application is entirely different to previous prior art. The most important difference relates to the nature of the invention. In this application specifications are given for a direct drive system, as opposed to a gravity shield device, which other inventions claim. There is of course a vast difference as a shield device, merely reduces the force of gravity, but does not directly produce drive.

The references specifically relating to the shield effect are:

SCHNURER:	WO 98/23976	14 Nov 1996
MODANESE + SCHNURER:	arXiv:gr-qc/9612022 v4,	19 Feb 1998
PODKLETNOV:	arXiv:cond-mat/9701174 v3,	16 Sep.1997
PODKLETNOV + NIEMINEN:	Physica C, Vol 203, 441-444,	9 Sep. 1992

Other devices produce an attractive effect, as in an electromagnet magnet, which is again entirely different to the direct production of drive.

HOOPER   US3610971   15 Apr 1969

In these and other antigravity devices the use of equal and opposite currents in a superconductor to produce anti-gravity effects are disclosed, as in:

BETTELS   DE19832001   16 Jul 1988

In this application for Warp Drive technology, there is a differential current applied. Thus the differential speed of the electrons will, in accordance with relativity, produce differential mass, which will in turn result in a differential graviton release. Thus this invention is very different to previous disclosed inventions, as it is the differential graviton release, which produces the effective warping of space-time, to produce a direct warp drive system, which operates by the warping of space-time.

SUMMARY OF THE INVENTION.

Principles of Further Antigravity Systems

The theoretical understanding of quantum gravity allows the design of further elementary warp drive systems from first principles. It is unlikely that gravitons can be controlled in a precise way using current technology. Nevertheless, an understanding of three dimensional space-time and matter, does allow the design of these warp drive systems. That is, systems whose propulsion rely on warping space-time as opposed to the ejection of material to provide thrust.

With current technology this could be achieved by rotating intermediate sized superconducting masses at ultracentrifugational velocities. The release of gravitons could be controlled by differentially governing the electron flow through these masses with the use of powerful electric currents. In turn the differential direction of flow of gravitons would determine the direction of motion through the space time lattice.

In order to design a mechanism for elementary warp drive we may utilise either a normal conductive material or preferably a superconducting material. It may be possible to use any shape, such as a disc, cylinder or preferably a sphere. Such a sphere is rotated along its horizontal axis in a clockwise fashion at ultracentrifugal speeds. A differential current is then applied from left to right in such a way as to pass through the entire sphere in this direction.

The electric charge in the upper half of the sphere would be maximised. The electrons will have a vector in the left to right direction as the sphere spins clockwise. If a maximised current is applied to the sphere in the same direction this will result in a increase in the velocity of the electrons relative to the centre of gravity of the rotating object, due to the flow of current. In turn, according to the space-time lattice model, this will result in a increase in the relativistic mass if the electrons and in turn by general relativity an increase in the release of gravitons.

Conversley in the lower half of the sphere the electrons will have a vector of motion in the right to left direction due to the spin of the sphere. This will be relativistically slowed by the differential current applied in the same direction as the current above, and hence in the opposite direction to the direction of rotation. The charge can be separately applied and adjusted to ensure that the electrons are relativistically stationary relative to the centre of gravity. In turn this will minimize the relativistic mass and result in a decrease in the release of gravitons for the lower half of the sphere.

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The overall result will be a greater release of gravitons in the upward direction and a lesser release of gravitons in the downward direction. The effect will be enhanced by the use of a multi-phasic current simultaneously applied. This will result in the release of multi-phasic gravitons which will disperse space time above the sphere with increase in density below the sphere which will effectively reverse the effects of Earths gravity. Importantly this effect can also be produced with the use radio frequency pulses. This obviates the need for commutator devices. Nevertheless, the radio frequency pulses must be designed to produce a change in the spin of the particle to enhance the release of gravitons in the upward direction, and moreover with current technology theses RF pulses contain too little energy to effect a significant change in the gravitational field.

With the use of large currents the drift velocity of the electrons could be greatly increased. The use of superconducting devices would greatly enhance the efficiency of such systems as the electrical resistance is virtually eliminated. Thereby allowing large currents to be used with minimum total power output.

The technological crux of the device is to produce electrons of high speed and hence high relativistic mass in the top half of the sphere, whilst producing low speed and thus low mass electrons at the bottom of the sphere, in accordance with special relativity. The imbalance in the rotating sphere will be continuously present impelling the device upwards. In effect the differential current flow, will produce differential graviton production and in turn, by general relativity, the warping of space-time

TECHNICAL EXAMPLE 1

A small scale device, which produces warp thrust can be readily constructed using current technology.

This will require a sphere, cylinder or disc of superconducting material. A dual disc either co rotating or counter rotating could also be used, counter rotating discs have the advantage that the total angular momentum is effectively zero. Any of the superconductors may be used such as Ag_2F, C_8K or SnTe. However for their tensile strength and/or magnitude of critical current density (J_c), Nb_3Sn or Ag_2F is recommended. Normal conductive material may be used but due to electrical resistance the power required (see superconductivity theory pg. 9) would be in the order of 10^{19} times greater.

Taking a sphere of Nb_3Sn, made hollow to reduce the mass of the sphere, with an external radius 0.25m and an internal radius of 0.20m; the total volume of Nb_3Sn required would be 3.19×10^4 cm^3. As Nb_3Sn has a density of 7.86g/cm^3 the total mass of superconducting material would hence be 250 kg.

This sphere is required to be mounted upon two ultracentrifugational spindles which themselves are on the horizontal axis. The untracentrifugational spindles would be powered to rotate the sphere to produce an enhanced g force, as in a centrifuge..

The superconductive sphere would require a supercooloed jacket of liquid Helium, and would require to be in a vacuum. The power source, motors and refrigeration system should be placed outside the supercooled jacket. In addition these ancillary elements of the device may be either placed outside the system as a whole, or within it, if the device is designed as a self contained vehicle. The device may also be mounted upon vertical rails to experimentally demonstrate vertical lift. (See figs 1,2)

A high current needs to be applied, by means of a commutator device, to produce a current passing through the sphere. If the negative terminal were placed on the left of the sphere and the positive terminal on the right this would produce electrons flowing from left to right. The commutator device would be split to allow a smaller current to be applied to the lower half of the sphere.

The power expenditure for this is reduced by using a superconducting material. If the sphere were rotating from left to right i.e clockwise the drift velocity of the electrons would be advanced in the upper half of the sphere, and retarded in the lower half of the sphere by the differential current induced flow of the electrons.

According to relativity, as defined in the theoretical sections above, it is accepted that the mass of the electrons in the upper half, relative to the centre of gravity, of the sphere can thus be increased by using the standard relativistic formula:

$$m' = m_0 / (1 - v^2/c^2)^{1/2} \qquad\qquad (50)$$

Thus by inducing a relative drift velocity difference, the mass of the electrons at the top of the sphere can be increased, and the mass of the electrons at the bottom of the sphere can be reduced relative to the centre of gravity.

If the object is set to rotate, centrifugal forces can be used to increase this mass difference. This can be used to increase the net momentum of the object in the upwards direction, to produce upwards thrust.

Given that there are approximately 10^{23} per cm^3 free electrons in a niobium conductor then in the total sphere there will be approx. $10^{23} \times 3.19 \times 10^4 \, cm^3 = 3.19 \times 10^{27}$ free electrons in the sphere. If each electron weighs 9.11×10^{-31} kg; then the total mass of free electrons in the upper half of the sphere is 1.453 grammes.

If we take the maximum zero voltage current density (J_c) in Nb_3Sn or another suitable superconducting device as approximately 10×10^{14} Amps/m^2, the drift velocity in the electrons can be calculated. Given that the average surface area of the hollow sphere is approximately 350 cm^2 or $3.5 \times 10^{-2} \, m^2$, then the max current applicable is 3.5×10^{13} Amps. Thus the drift velocity of the electrons would be 6.3×10^6 m/sec. The velocity of the electrons in the upper part of the sphere would be advanced relative to the centre of gravity. The relative velocity to this centre would be equivalent to the velocity of the sphere plus the velocity of the electrons in the upper half.

If the drift velocity of the electrons in the lower half were separately, induced by the current so that these electrons were stationary relative to the centre of gravity, those in the lower half of the sphere would be relatively retarded. The current applied to the lower half of the sphere to make the lower electrons, relative to the centre of gravity, stationary (given a rotation rate of 3.14×10^4 revs/sec) would be 2.46×10^{11} Amps.

This differential current would allow the electrons to have a differential velocity and in turn a different mass relative to the centre of gravity. The relative velocity would be approximately 6.3×10^6 m/sec. Using the standard equation for relativity (50) would give a relative mass difference ratio of 2.21×10^{-4}.

The effective total mass difference between the upper and lower half of the sphere would thus be the mass of the electrons times the relative mass difference which is 1.45 grammes $\times 2.21 \times 10^{-4} = 3.2 \times 10^{-7}$ kg.

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Overall, as the acceleration due to gravity is 9.81m/sec^2; to produce upwards lift on a sphere of 250 kg in Earth's gravitational field would require a force of about 2,500N. In order to produce in excess of this force the acceleration produced by the ultracentrifuge device would need to be about $= 8.76 \times 10^9 \text{m/sec}^2$. Thus according to the formula $a = (\omega 2\pi r)^2/r$ (where the average radius, r of the device is 0.225 m) the rotation rate required would be 3.142×10^4 revs/sec or approximately 1,880,000 revs/min to produce sufficient acceleration to allow the device to completely self levitate. Thus as F = ma, then the force produced by the device is

$$3.2 \times 10^{-7} \text{kg} \times 8.76 \times 10^9 \text{ m/sec}^2 = 2,800 \text{ N}$$

A detectable anti-gravtiy effect could, however, be realised at much lower spin rates. Standard ultracentrifugation devices can rotate at 600,000 revs/min . Thus even at standard ultracentrifuge speeds the g forces produced would be sufficient to produce approximately 12.8% lift, using these anti-gravity techniques.

TECHNICAL EXAMPLE 2

For this example we will use a large scale device, which would therefore deliver sufficient thrust to power a vehicle beyond Earth's gravitational field. Under terrestial conditions the entire devise would be required to be encased in a liquid helium jacket, with an internal vacuum to reduce friction due to air. However, the latter two constraints need not be in place if the device is to be used in space as, very conveniently, space is both a vacuum, and when shielded from the rays of the sun the ambient temperature is less than that of liquid helium. Indeed the large mass of the supercondutor becomes less relevant as weightlessness exists in space, so that the size of the object may be increased substantially.

Taking a sphere of 1 meter in radius of a superconductive material. The volume is $4/3\pi r^3$ = 4.2 x 10^6 cm^3. If the high temperature superconductors are used such as YBa$_2$Cu$_3$O$_7$, or Nd$_{1.85}$Ce$_{0.15}$CuO$_4$, which are ceramic in nature, the specific density is approximately 3g/cm^3, Hence the total mass of the sphere would be approximately 12,600 kg or 12.6 metric tonnes. If the standard superconductors are used, for instance Nb$_3$Sn with a density of 7.86 g/cm^3 the sphere becomes heavier at 33 metric tonnes.

This sphere is required to be mounted upon two ultracentrifugational spindles which themselves are on the horizontal axis. The untracentrifugational spindles would be powered to rotate the sphere to produce an enhanced g force, as in a centrifuge. The sphere would need to be carefully constructed to be exactly balanced in all directions.

Nevertheless, a high current does still need to be applied, by means of a commutator device, to produce a current. If the negative terminal were placed on the left of the sphere and the positive terminal on the right this would produce electrons flowing from left to right. The power expenditure for this is reduced by using a superconducting material. If the sphere were rotating from left to right i.e clockwise the drift velocity of the electrons would be advanced in the upper half of the sphere, and retarded in the lower half of the sphere by the current induced flow of the electrons. The split commutator device allows a differential current to be applied to the upper and lower halves of the sphere respectively.

According to the model in the preceding sections this will result in an increase in the mass of the electrons in the upper sphere and hence an increase in graviton production in the upper half of the sphere. Indeed, this model is in agreement mathematically with general and special relativity.

Given that there are approximately 10^{23} per cm^3 free electrons in a copper conductor then in the total sphere there will be approx. 10^{23} x 4.2 x 10^6 = 4.2 x 10^{29} free electrons in the sphere. If each electron weighs 9.11 x 10^{-31} kg; then the total mass of free electrons in the upper part of the sphere is 0.191 kg.

If we take the maximum zero voltage current density (J_c) in Nb_3Sn, or another suitable superconducting device, as approximately 10 x 10^{14} Amps/m^2, the drift velocity in the electrons can be calculated. Given that the average surface area of the sphere is approximately 1.57 x m^2, then the max current applicable is 1.57 x 10^{15} Amps. Thus the drift velocity of the electrons would be 6.3 x 10^6 m/sec.

At the same time the current in the lower half of the sphere would be adjusted to retard the electrons so that they remain stationary relative to the centre of gravity. If the sphere were rotating at 2.6 X10^4 revs/sec this would require a current of 2.04 x 10^{13} Amps. This differential current would induce a differential velocity in the electrons and in turn a mass difference.

By inducing a difference of mass as little as one part in a thousand in these electrons we can achieve significant lift. Thus by the above equation if we induce a drift velocity of 6.3 x 10^6 m/sec (as in technical example 1), given that the velocity of the electrons in the upper part of the sphere would be advanced relative to the centre of gravity and those in the lower half of the sphere relatively stationary; then the relative velocity would be approximately 6.3 x 10^6 m/sec. Thus between the upper and lower half of the electrons we increase the relative mass of the electrons in the upper half by a factor of 2.21 x 10^{-4}, as in technical example 1.

Thus the difference in mass in the upper half of the sphere due to the moving electrons would be 0.191 kg x 2.21 x 10^{-4} = 4.22 x 10^{-5} kg., relative to the lower half electrons. This difference is enhanced by producing a centrifugal force by rotating the sphere.

If we rotate the large superconducting sphere at 2.6 x 10^4 revs/sec or 1,560,000 revs/min we can achieve accelerations of 1.33 x 10^{10} m/sec^2 (given an average radius of 0.5m) by the formula $a = (\omega 2\pi r)^2/r$.

Thus as F = ma, where m is the relative mass difference of the electrons the thrust produced in the device would be equivalent to:

$$4.22 \times 10^{-5} \text{ kg} \times 1.33 \times 10^{10} \text{ m/sec}^2 = 5.88 \times 10^5 \text{ N}$$

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Thus in Earth's gravitational field this force would be capable of levitating 60 metric tonnes.

The estimated current required to produce the drift velocity of the electrons for this effect would be approx. 1.57×10^{15} Amps. The power usage is given by; $P = I^2R$, under non-superconducting conditions, given that Niobium has a resistivity of 15.2×10^{-8} Ω/m the sphere would have a resistance of approximately 10^{-7} Ω. The power used by a non-superconducting device would thus be 2.46×10^{23} Watts. However, due to superconductivity, under standard theory, the device has zero resistance and would use no power[ref 8]. Nevertheless, if we wish to use the model described above for superconductivity (see superconductivity, page 6) there would be a practical power consumption which would nevertheless still be low. Thus the power consumption would be in the order of 1.6×10^{-19} less than the standard power usage, at 3.94×10^{4} Watts.

If Nb_3Sn is used to make the sphere the mass of the sphere would be 33 metric tonnes. If the mass of the ancillary ship were 27 metric tonnes, giving a total of 60 metric tonnes the acceleration produced would be 9.81 m/sec^2. This would be equivalent to the force of gravity on Earth. Thus an artificial gravitational field would be incidentally created which would be exactly equivalent to that on Earth. Thus the device could also be used for the production of artificial gravity.

APPENDIX 1

Particle Physics

In the overall picture, it is generally accepted that there are three major forces; strong, electro-weak and gravity, each mediated by three bosons the, gluon, photon and graviton. These in turn are known to influence three types of particle, the quark, lepton and by General Relativity, space-time itself . Each of these appear to be composed of three particles with multiples of charge of 1/3 and exist in three dimensions of space time, which are themselves in three generations.

The nature of particles thus, may be revealed by their structure which occurs generally in multiples of three. Three quarks in the case of baryons are neccessary to make up a particle such as the proton or neutron. The particles that bind the quarks (gluons) are themselves required, in stable particles, to have three different colour charges, one colour in each dimension, for the particle to exist in three dimensional space-time. Furthermore, there are three generations of leptons an indeed quarks.

Nevertheless, the Standard model itself appears unable to explain the existence of these three generations of particles or the fundamental properties of sub atomic particles. Furthermore, there appear now to be a total of 60 fundamental particles each with their own fundamental properties which are arbitarily defined to fit the data. Furthermore, the Standard model only partially explains the decay process of the each particle and it does not explain their masses accurately.

For instance the mass of the up (u), anti-up (_) down (d) and anti-down (_) quarks are currently estimated at 0.35 Gev each [ref 17] (although some controversy exists about about this basic value). The mass of the proton constituted of three quarks, uud, is 0.9383 Gev, which is only approximately equivalent to the total mass of the three quarks (1.05 Gev).

Furthermore, the very process by which the subatomic particles decay cannot be explained by the "fundamental" constituents, the quarks. Indeed the known hadron decay processes ultimately always end up producing either an electron or positron. Indeed the quarks have not been experimentally seen, suggesting that other particles may underlay their fundamental structure.

Electron Structure

Given the presence of a quasi electron with a charge of 1/3 e [ref 4,5], then three of the quasi electron vortices, as previously described [ref 5], could form an entire electron in three dimensional visible space time. Nevertheless, each would have energy and hence a wave function which would be present in the other vectors. This electron could thus follow the probability functions as described by the Shrödinger wave equation for ψ (otherwise termed as "essence" by Shrödinger).

It is of importance therefore to note that the charge of the electron (e) in Coulombs (C), (where ε_0 is the permittivity of free space), can be derived from first principles by the equation:

$$e = \frac{\varepsilon_0}{[\,3\,(\,4/3\pi c^3\,)\,]}^{1/2} = 1.61 \times 10^{-19}\ C \qquad (6)$$

Equation (1) has a number of special implications, which have been previously discussed (p 6)

The dimensions of the equation can be readily resolved by considering each of the three vector dimensions. The exact dimensions of the equation need to be considered in the light of the nature of space-time itself, and this is fully addressed on pages 82-84. These dimensional equations help explain the nature of matter. Indeed the equation for the electron may underly the structure of the subatomic particles and may be necessary for the full understanding of gravity.

Additionally, the square root sphere structure of the electron accounts for its 1/2 integer spin. This square root structure also forms the basis of the electron pair bonding. According to the above equation (6), the electron will tend to form a "complete" electron sphere, thereby explaining how the presence of pair bonding occurs.

Thus from the equation (3) for the square root structure of the single electron; it is clear that the product of two such spheres will tend to form a complete sphere, where:

$$e^2 = \varepsilon_0/3(4/3\pi c^3) \qquad (6b)$$

In addition, the equation for the quasi electron can be directly derived from eq. 1.

Thus in one dimension, a single quasi electron (q_e) with charge of 1/3e, can be mathematically represented, (where the permittivitty of free space for each quasi electron is $\varepsilon_{qe} = [\varepsilon_0/3^3]^{1/2}$, by the equation :

$$q_e = \varepsilon_{qe}/(4/3\pi c^3)^{1/2} = 1/3e \qquad (6c)$$

Thereby accounting for the experimental observation of the 1/3e charge of the quasi electron[ref 4,5]. Overall knowing the structure of the quasi electron may lead to the knowledge of the structures of the the other subatomic particles such as the quarks.

First Generation Quark Structure

From these observations we may now examine the derivation of the mathematical nature of the proton and in turn the structure of the quarks. Using the above equations (eq. 6) enables a far more accurate derivation of the mass of quarks from first principles.

To do so requires calculating the ratio of the mass of the electron (m_e = 0.511 Mev) to the mass of the proton (m_p = 938.3 Mev)

Thus $\qquad m_e/m_p = 0.511/938.3 = 5.44 \times 10^{-4}$

and $\qquad m_e/m_p = 5.44 \times 10^{-4} = (3\pi/c^{1/2})$

Intruigingly, the term $(3\pi/c^{1/2})$ mathematically determines the ratio of the mass of the electron (m_e) to the proton (m_p). Indeed it is this ratio that also leads to the mathemaical derivation of the structure of the quarks

Given the mass of the proton is; 938.3 Mev, then according to the Standard Model, as there are three quarks in the proton (uud) of virtually equal mass, then the effective mass of each quark would be more accurately given as 312.8 Mev.

Thence, the structure of the quarks can now be defined by the ratio of the masses of the quasi electron to the quark. If the mass of the quasi electron is given as one third the mass of the electron

$$m_{qe} = 0.511 \text{ Mev} \div 3 = 0.17033 \text{ Mev}$$

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Then the ratio of the mass of the down quark (d), to the quasi electron is:

$$0.17033 \text{ Mev} / 312.8 \text{ Mev} = 5.44 \times 10^{-4}$$

We also find that this same ratio of the mass of the quasi electron to the mass of the down quark (m_d) is mathematically equivalent to $3(\pi/c^{1/2})$, thus:

$$m_{qe}/m_d = 5.44 \times 10^{-4} = 3(\pi/c^{1/2})$$

From here the equation for the charge and structure of the down quark can be accurately defined by combining the equation for the structure of the quasi electron $q_e = \varepsilon_{qe}/(4/3\pi c^3)^{1/2}$ and the ratio of the masses of the quasi electron to the down quark (19); hence

$$d = \varepsilon_{qe}.m_d/m_{qe}.(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2})$$

Hence in short form

$$d = (4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \tag{16}$$

Giving the charge of the down quark as -1/3; and its estimated mass as 312.8 Mev.

Thus not only can the electron charge be derived from the equation for three spheres each with a radius of c (equation 3) ; but the mass, charge and internal structure of the down quark can also be derived from the term $3(\pi/c^{1/2})$.

Furthermore, the significance of the term $3(\pi/c^{1/2})$ in this equation, is revealed by the Shrödinger wave equation. Thus $(\pi/c^{1/2})$ is none other than the solution to the Shrödinger wave equation for the amplitude of an electron confined in a space with radius c [ref 6]. If c is the space defined by the equation for the structure of the quasi electron. Then the standard Shrödinger equation for an object confined in a space c is given by the following standard calculation [ref 8]:

$$E\psi(x) = -\frac{h^2}{2m} . \frac{d^2\psi(x)}{dx^2}$$

If one of the dimensions of space has a length 2L the amplitude can only be non zero between x = 0 and X = 2L and the standard solution for the amplitude can be determined by using the constant (A) where:

$$A = (1/L^{1/2})$$

Thus in one dimension the solution to the Shrödinger wave equation for the amplitude of oscillation is conventionally given by [ref 8] :

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$$\psi(x) = (\pi/L^{1/2}) \ \sin x/L$$

Substiuting L for c gives the one dimensional equation (when sin x/L = 1) as $\pi/c^{1/2}$. Thus at 90° to the dimensional confinement of the quasi electron, the standard solution to the Shrödinger wave equation yields an amplitude of $\pi/c^{1/2}$, which in three dimensions gives:

$$3(\pi/c^{1/2}) \qquad\qquad (22)$$

Thus the term $3(\pi/c^{1/2})$ is not only the ratio of the mass of the electron to the proton but is also none other than the standard solution to the Shrödinger wave equation for an object confined in a space c [ref 8].

From here the charge and structure of the up quark (u) can now be derived in a similar way to that of the up quark from the mass of two quasi positrons [m_{qp} = 2(0.170 Mev)] and the mass of the up quark (m_u) by the equation,

$$2m_{qP}/m_U = 2(5.44 \times 10^{-4}) = 2(3\pi/c^{1/2})$$

Thus:

$$u = \varepsilon_{qe} .2m_{qP}/m_u.2^*(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2})$$

Hence in short form

$$u = 2^*(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \qquad\qquad (17)$$

Giving the charge of the up quark as +2/3, and its mass as 312.8 Mev

Overall the mathematical structure of all the particles can be shown to be derived from the quasi electron. Thus, the first generation particle structures can now be derived from first principles. This includes the quasi electron (qe) and electron (e), from which the quarks (u,d) and in turn the proton (p) respectively are derived.

Thus the first generation of particles of the Standard model are given in short form as:

$$qe = \ ^{\cdot}(4/3\pi c^3)^{1/2} \qquad\qquad (6a)$$

$$e = 3^{\cdot}(4/3\pi c^3)^{1/2} \qquad\qquad (6)$$

$$d = \ ^{\cdot}(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \qquad\qquad (16)$$

$$u = 2^*(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \qquad\qquad (27)$$

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The respective force binding particle, the gluon, for the first generation of particles is thus given in short form as:

$$g = 3(\pi/c^{1/2})\qquad(22)$$

According to these equations, it is apparent that the down and up quarks appear be constituted from quasi electrons and three component gluons, and are themselves not fundamental particles.

Indeed, from these observations it is clear that the structure of the electron, may underly the structure of all the elementary particles and nucleons, as it forms a "perfect sphere" based on c. As will also be seen later, as this structure forms the basis of matter, it may itself underpin the theory of gravity. Furthermore, these obsevations will allow the mathematical estimation of the mass and size of the elementary particles, including the second and third generation particles

Second and Third Genration Lepton Structure

Thus the structure of the muon (μ) can also be derived from the ratio of the mass of the electron (m_e) and the mass of the muon (m_μ):

$$m_e/m_\mu = 4.7 \times 10^{-3} = \pi/c^{1/3}$$

Thus
$$\mu = \varepsilon_0^{1/2}.m_e/\ m_\mu. \ 3^{-}(4/3\pi c^3)^{1/2}.(\pi/c^{1/3})$$

Where the charge of the muon is in this equation equivalent to that of the electron e. In this case $(\pi/c^{1/3})$ can be considered to represent a specific high energy photon. Thus the structure of the muon, written in short form is:

$$\mu = 3^{-}(4/3\pi c^3)^{1/2}.(\pi/c^{1/3})\qquad(14)$$

Moreover the structure of the tauon can be calculated from the ratio of the mass of the electron and that of the Tauon (1.79 Mev);

Thus
$$0.511 \text{ Mev}/1.79 \text{ Gev} = 2.85 \times 10^{-4}$$

$$m_e/m_\tau = (\pi/c)^{1/3}.(\pi/c)^{1/9} = 2.85 \times 10^{-4}$$

As the charge of the tauon is equivalent to the charge of the electron, hence the structure of the Tauon is given by the above equation

$$e_\tau = \varepsilon_{qe}.m_e/\ m_\tau.3^{\cdot}(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} = e$$

This equation accurately predicts the charge -1; and mass of the Tauon (~1.78 Gev) [ref 14]. Thus the structure of the Tauon can in short form be given by the equation

$$\tau = {}^{\cdot}3(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (15)$$

Overall the mathematical structure of all the particles can be derived from the quasi electron. Thus, the particle structures can now be derived from first principles. This includes the quasi electron (qe) and electron (e), from which the quarks (u,d) and in turn the proton (p) respectively are derived. The general structure of the force carrying partilcles the photon (γ) and the gluon (g) can be given. It will also intriguingly be possible to derive the structure of the charm (c), beauty (b, or bottom) and truth (t or top) quarks directly from the sructure of the muon (μ) and Tauon (τ).

The calculations underlying these equations can further accurately reflect their measured values, particularly if the effects of gravity are taken into account (see Quantum Gravity and the Charge of the Electron.p 30). In addition the neutrino has not been included in the equation as its mass is considered to be very small. The mathematical proof of these short form equations nevertheless lies in the fact that they can closely identify the charge and the masses of these particles, from first principles, as in equations (6, 13-27). [ref 17]

Second and third generation Quark Structures

From here it is possible to derive the basic structure of the remaining quarks including the strange (s) quark.

Thus the ratio of the masses of the quasi electron (m_{qe} = 0.17033 Mev) and the strange quark (m_s = 0.555 Gev) are given by the equation:

$$m_{qe}/m_s = 0.17033\ Mev/\ 0.555\ Gev = 3.07 \times 10^{-4}$$

Furthermore the structure of the gluon in the strange particle, can now be

accurately derived by the term; $3(\pi/c)^{1/2}$,(n.b. change of brackets in the gluon term).

$$m_{qe}/m_s = 3.07 \times 10^{-4} = 3(\pi/c)^{1/2}$$

Thus the equation for the charge and structure of the strange quark (s) is:

$$s = \varepsilon_{qe}.m_{qe}/m_s \cdot (4/3\pi c^3)^{1/2}.3(\pi/c)^{1/2} \qquad (18)$$

This can be written in short form as:

$$s = (4/3\pi c^3)^{1/2}.3(\pi/c)^{1/2}$$

Giving the strange quark a charge of -1/3 and a mass of 0.555 Gev, in agreement with current estimates of its mass ~ 0.55 Gev [ref 14]. This again shows that strange quark is derived from a quasi electron and a gluon.

Thus given that the particle Ω^- is made of three strange quarks (sss) we may derive its mass as 3 x 0.555 Gev = 1.67 Gev, which is in accurate aggreement with its known mass of $\Omega^- = 1.67$ Gev [ref 17]

From here it is possible to define the structure of the other quarks, using the same first principles. As the charmed quark (c), beauty (b, otherwise termed bottom) and the truth (t, otherwise termed the top quark), clearly belong to the second and third generation of particles, they should be mathematically based on the formula for the second and third generation lepton particles, specifically the muon and tauon.

Indeed the charm derives from the second generation of particles and therefore mathematically does qappear to contain the basic muon structure, as given by the equation:

$$\mu = 3(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}) \qquad (14)$$

As before, the ratio of the masses of the quasi electron and that of the charm quark gives the equation from the structure of the charm (c).Thus the structure of charm can be determined from the ratio of the mass of two quasi electrons; $m_{qe} = 2(0.17033)$ Mev, and the mass of the charmed quark ($m_c = 1.518$ Gev)

Thus if: $\qquad 2m_{qe}/m_c = 2(0.17033 \text{ Mev})/1.518 \text{ Gev} = 2(1.122 \times 10^{-4})$

and $\qquad 2m_{qe}/m_c = 2(1.122 \times 10^{-4}) = 2(\pi/c^{1/3}).(\pi/c^{1/4})$

Then the structure of the charm quark (c) is:

$$c = \varepsilon_{qe}.2m_{qe}/m_c .2^+(4/3\pi c^3).^{1/2}(\pi/c^{1/3}).(\pi/c^{1/4})$$

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or in short form

$$c = 2^{*}(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}).(\pi/c^{1/4}) \qquad (19)$$

Thus the charmed quark has a charge of +2/3 and a mass of 1.518 Gev in accordance with the previous approximate estimate of its mass ~ 1.5 Gev. [ref 17] and is derived from a muon and a higher order gluon. This gluon itself $(\pi/c^{1/4})$, is the solution to the Shrödinger wave equation for the amplitude of an electron confined in a space of length $c^{1/2}$ [ref 8]. Thus this gluon now exactly matches the amplitude of the quasi electron.

Furthermore, from this we can deduce the mass of the particle the J/ψ, whose structure is predicted to consist of a charm and anticharm particle in orbit around each other, with a minimum mass (including orbital energy) of ~ 3.1 Gev.

From here we can in a similar fashion determine beauty (b). To be consistant, as beauty is a third generation quark it should be defined by the component structure of the Tauon. In this case, this is the smaller component of the Tauon, which is mathemtaically represented by:

$$3(4/3\pi c^3)^{1/2}.(\pi/c^{1/9})$$

Indeed the structure can again be determined by the ratio of the mass of the quasi electron electron (m_{qe}) to beauty (m_b). Such that the ratio can be given by the equation

$$m_{qe}/m_b = 3.673 \times 10^{-4} = (\pi/c^{1/9}).(\pi/c)^{1/2}$$

Thus the structure of beauty is given by the equation

$$b = \varepsilon_{qe}.m_{qe}/m_b .^{-}(4/3\pi c^3)^{1/2}.(\pi/c^{1/9}).(\pi/c)^{1/2}$$

To confirm this structure, the mass of the beauty quark can be given by the following calculation

$$m_{qe}/m_b = 3.673 \times 10^{-4} = 0.17033 \text{ Mev } /4.64 \text{ Gev}$$

and

$$m_{qe}/m_b = 3.673 \times 10^{-4} = (\pi/c^{1/9}).(\pi/c)^{1/2}$$

Thus the short form of beauty is:

$$b = (4/3\pi c^3)^{1/2}.(\pi/c^{1/9}).(\pi/c)^{1/2} \qquad (20)$$

Thus giving beauty a charge of -1/3, and a mass of 4.64Gev, which is in agreement with its current estimated mass of ~ 4.7 Gev [ref 17].

To complete the structure of the quarks, we can finally proceed to deduce the truth. As the top quark or truth (t) belongs to the third generation of quarks, it is also based on the structure of the Tauon. Thus mathematically the truth, primarily consists of the third generation, tauon.

$$\tau = 3(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (15)$$

The geometrical structure can be confirmed from the mathematical ratio of the mass of the electron to mass of truth (m_t), hence the equation for the top quark is given by the ratio of the mass of the electron to mass of the truth .

Thus as $\qquad m_t = 176$ Gev

and as $m_e = 0.511$ Mev

$$m_e/m_t = 0.511 \text{ Mev}/176 \text{ Gev} = 2.89 \times 10^{-6}$$

and

$$m_e/m_t = 2.89 \times 10^{-6} = (\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4}$$

As each quasi positron is associated with each of the gluon complexes, then the equation for truth is thus predicted by the equation:

$$t = 2(4/3\pi c^3)^{1/2+}.(\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4} \qquad (21)$$

Which gives the mass of the truth as 176 Gev and a charge of +2/3e. Which is in agreement with the known mass of the truth; 176 ± 12 Gev; the most accurate estimate of the mass of the truth quark being; 175.6 Gev. [ref 22]

Thus the basic structure of the truth, is that of a pair of quasi anti-tauons complexed with a gluon moiety which has an amplitude that, according to the Shrödinger wave equation (3), exactly matches the amplitude of the quasi electron [ref 8].

Mathematically the probability of arriving at all such tightly conformed equations (3, 16-30), the particles being related only to π and c and its specific powers, by chance would have odds of millions to one against.! Furthermore these mathematical structures are derived from none other than solutions to the Shrödinger wave

equation itself [ref 8].

Moerover, the structures of the second and third generation particles, the muon (μ), and charm (c); tauon (τ) and truth (t) quarks have a **notable symmetry**, with their masses and charges accurately given by the following short form equations:

$$\mu = 3^-(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}) \qquad (14)$$

$$c = 2^+(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}).(\pi/c^{1/4}) \qquad (19)$$

$$\tau = 3^-(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (15)$$

$$t = 2^+(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4} \qquad (21)$$

Hence, from these equations it can be deduced that the fundamental structure of the quasi electron probablistically underpins the mathematical structure of the fundamental particles, and that these structures are all related to one another either by complexing with a photon $[(\pi/c)^{1/3}]$ which matches the frequency of the quasi electron or a gluon $[(\pi/c^{1/4})]$ which according to the Shrödinger wave equation accurately matches the amplitude of the quasi electron. This explains the fundamental observations that final decay products of hadrons always lead to the production of an electron or positron and explains why quarks have not been individually seen.

Particle Decay and the Electroweak Force.

In order to corroborate the estimated quark structures these structures need to explain in detail the pattern of decay of the quarks themselves. We are thus required to explain particle decay from first principles including the structures which are formed in these decays, such as the mediator of the electro weak force; the Intermediate Vector Boson. To see if this is possible the decay of the truth (t, top quark) will be examined. According to experiment the truth quark splits into two particles, beauty (b, bottom quark) and the intermediate vector boson (W$^+$). It is apparent that the truth may yield beauty.[ref 22]

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Thus:

$$2^* (4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4} = t$$

$$\Rightarrow \quad (4/3\pi c^3)^{1/2}.(\pi/c^{1/9}).(\pi/c)^{1/2} \quad = b$$

Thus the two gluon structures, $(\pi/c)^{1/4}$; in the truth combine to form the more energetic gluon, $(\pi/c)^{1/2}$; present in beauty, thus:

$$2(\pi/c)^{1/4} \Rightarrow (\pi/c)^{1/4}.(\pi/c)^{1/4} \_ (\pi/c)^{1/2}$$

and the photon term, $(\pi/c)^{1/9}$; decays into the less energetic photon $(\pi/c^{1/9})$ present in beauty. Thus the structures in the truth account for the structures in beauty, and are produecd via the production of a quasi electron and quasi positron.

The remaining terms are thus 3 quasi positrons, two high energy photons and a remaining low energy photon

$$3^* (4/3\pi c^3)^{1/2}$$

and

$$2(\pi/c)^{1/3}$$

and

$$(\pi/c)^{1/9}$$

There is also a very considerable amount of energy remaining, the energy difference between beauty (b) and truth (t) being ~ 170 Gev.

This energy difference allows the transformation of the two high energy photons and the low energy photon to two intermediate vector photons, given by the equation.

$$2(\pi/c^{1/6})^6$$

This leads to the formation of the intermediate vector boson (W*), which is the mediator of the electroweak nuclear force.

$$W^* = 3^* (4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^6 \qquad (24)$$

which is also equivalent to

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$$W^+ = 3^+ (4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^3.(\pi/c^{1/6})^3$$

This probable structure for the (W⁺), can again be confirmed by the ratio of the mass of the electron to the intermediate vector boson (W⁺), with an estimated mass of 80 Gev [ref 17]. Thus the ratio of the masses is given by

$$m_e/m_{W^+} = 0.511 \text{ Mev}/ 80 \text{ Gev} = 6.4 \times 10^{-6}$$

and

$$m_e/m_{W^+} = 6.4 \times 10^{-6} = 2(\pi/c^{1/6})^6$$

Thus

$$W^+ = \varepsilon_{qe}.m_e/m_{W^+}.3^+(4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^6$$

thus in short form:

$$W^+ = 3^+ (4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^6$$

The true elegance of the structure of the intermediate vector boson can now be further explored. The W⁺ can be considered to represent a unification of the electromagnetic force and the weak force, in keeping with the theoretical predictions of Salam and Weinberg for the nature of the electroweak force. Thus, the intermediate vector photons can either decay leptonically or via gluons; as is demonstrated by the following interconversions.

$$W^+ = 3^+ (4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^6 \_ 3^+ (4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^3.(\pi/c^{1/6})^3$$

If we examine the further decay of the three dimensional photon structure, $(\pi/c^{1/6})^3$; we have:

$$(\pi/c^{1/6})^3 \Rightarrow [(\pi/c)^{1/6}]^3 \_ (\pi/c)^{1/2}$$

Where the term $(\pi/c)^{1/2}$ is none other than the term for a first generation gluon.

Thus the W⁺ can either decay leptonically or into first generation quarks where it can yield an up (u) and an anti-down quark (_), thus:

$$W^+ = 3^+ (4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^3.(\pi/c^{1/6})^3 \Rightarrow 3^+(4/3\pi c^3)^{1/2}.2[(\pi/c)^{1/6}]^3.[(\pi/c)^{1/6}]^3$$

And

$$3^+(4/3\pi c^3)^{1/2}.2[(\pi/c)^{1/6}]^3.[(\pi/c)^{1/6}]^3 \_ 3^+(4/3\pi c^3)^{1/2}.2(\pi/c)^{1/2}.(\pi/c)^{1/2}$$

thus W⁺ decays to:

$$2^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) = u$$

and

$$^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) = \_d$$

Leptonically the W⁺ decay yields the standard products including the positron the neutrino (v), and energy in the form of photons thus

$$W^+ = 3^+(4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^6 \_ 3^+(4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^2.(\pi/c^{1/6})^2.(\pi/c^{1/6})^2$$

and

$$3^+(4/3\pi c^3)^{1/2}.2[(\pi/c)^{1/6}]^2.[(\pi/c)^{1/6}]^2.[(\pi/c)^{1/6}]^2$$

$$\_ \quad 3^+(4/3\pi c^3)^{1/2}.2(\pi/c)^{1/3}.(\pi/c)^{1/3}.(\pi/c)^{1/3}$$

Thus W⁺ may also decay into the positron the neutrino (v), and energy in the form of photons thus:

$$3^+(4/3\pi c^3)^{1/2} = e^+$$
and

$$v$$
and

$$n(\pi/c)^{1/3}$$

Thus according to standard experimental observations the truth quark yields the beauty quark and the intermediate vector boson. In turn from these observations we may elegantly reveal the structure of truth and beauty and the intermediate vector boson and its decay pathways from first mathematical principles. [ref 18]

Gluon Structure and Force Characteristics

There are in the Standard model (or in this modification) three colour charges for the gluons and quarks, each of these represents each of three vectors x, y and z which can arise in different combinations. Thus the three gluon colours are required to be together (one in each dimension x, y and z) in baryons to form a three dimensional objects. There are also noted to be 8 gluons, these in turn gives rise to all the

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known baryons and mesons

The structure of these gluons have been previously mathematically identified, and this structure mathematically represents a helical ringlet. These are as previously given: $(\pi/c)^{1/2}$; $(\pi/c)^{1/4}$; $(\pi/c^{1/2})$; $(\pi/c^{1/4})$ [see eq. 25- 25c]

These four mathematical structures and their antigluons now readily account for the eight gluons known to exist, these in turn account for the structure of all the quarks as given by equations 3, 15-30, which in turn give rise to all the baryons and mesons as described by the Standard model.

Recent studies show that the proton conventionally consisting of the "fundamental" quarks (uud); can by bombardment with high energy electrons produce a Kaon which consists of an anti-up and a strange quark (s_). As the standard model predicts quarks are fundamental, the proton should not contain a strange quark. The conventional explanation for this resides in the proposal that the proton contains virtual strange particles. Indeed to explain these new observations each proton is now postulated by some physicists to contain 21 or more quarks, 3 of which are real and 18 or more which are required to be virtual! [ref 23].

In the revised Standard model presented here, the process by which a Kaon is produced is readily understood by the structural interconversion of the gluon in the up quark $(\pi/c^{1/2})$; to the gluon in the strange quark $(\pi/c)^{1/2}$,(n.b change of brackets)

Furthermore the most recent experiments on the internal structure of the proton has shown that gluons can seperate and recombine. This surprising recent observation actually arises from first principles when the mathemtatical structure of the gluon is understood. Thus mathematically the gluon structures may easily recombine and separate by the equation.[ref 24]

$$(\pi/c)^{1/2} = (\pi/c)^{1/4}.(\pi/c)^{1/4}$$

Hence this mathematical structure of the gluon allows the observed "recombination" and separation to occur in a way which is readily understood.

In addition, the structure of the gluons can be explained on the basis that these structures match the wave function of the quasi electron, thus the gluons match the amplitude of the electron as given by the Shrödinger wave equation.[ref 8]

Furthermore, the equations for the gluon present in the quark can explain their force characteristics. In the case of the gluon component $(\pi/c^{1/2})$; which mathematically represents a helical ringlet; if the direction vector is x, then the axis of spin would

need be 90° to this, in the y vector in order to match the amplitude of vibration of the quasi elelctron/ positron. Thus this spin vector is known to be the same as that of electrons. This would account for the particle binding characteristics of the gluon force to the quasi electron. Given that the gluon would mathematically require the same spin axis as that of the quasi electron or positron, the gluon would be strongly associated with these particles and the force required to part them would increase with distance, which explains the characteristics seen experimentally with the gluon force.

Moreover, as will be shown, the photonic component of the subatomic particles given in the above equations matches exactly the frequency of rotation of the electron.

Nucleon Structure

The mass (m_p) and the internal mathematical structure of the proton can now be directly calculated form the quarks. Thus the structure of the proton according to the Standard model derives the combination of 2 up quarks and one down quark (p = uud). As each quark has an estimated mass of 312.8 Mev (see eq. 13) then the proton (p) has in accordance with the Standard model a mass of 3 x 312.8 = 938.3 Mev and a charge of +1, and may be given by the mathematical structure of the up and down quarks according to eq. 16,17; and is thus given by:

$$p = \begin{array}{c} 2^{\cdot}(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \\ {}^{\cdot}(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \\ 2^{+}(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \end{array}$$

Which, gives the proton a net charge +1 and a mass of 938 Mev.

Fifteen component gluons are required to be present in the proton, three gluons associated with each quasi electron particle.

Therefore the structure of the proton can be mathematically derived by combining the structure of the quasi electrons and the term $(\pi/c^{1/2})$. Thus the structure of the neutron and indeed the overall structure of the nuclei can be determined.

Similarly the structure of the neutron is given by the Standard model (n = udd), which can be written in short form as:

$$n = \begin{array}{c} {}^{\cdot}(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \\ 2^{+}(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \\ {}^{\cdot}(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \end{array}$$

The mystery of the stability of the neutron may now be addressed. A neutron outside the nucleus has a half life of approximately 6 seconds. Inside the nucleus however, the stability of the neutron, provides the atom with its stability. The three dimensional structures described may now provide the clues to this stability.

The compostion of the quarks now logically explains the apparent "fluid" characteristics of the subatomic particles, and some free exchange of the quasi electrons and gluons would be expected to occur within a nucleus.

This would occur to to give the structures stability and this in turn would allow the decresed binding energies seen in these structures. As has been shown by the metric tensor structure of matter (eq. 4-6), the preferred conformation is a 3 x 3 structure.

This can be acheived by donating a quasi electron and a quasi positron along with three associated gluons each; from the proton structure to that of the neutron. The proton would then contain three positrons and a total of nine gluons

The stable nuclear proton conformation would now be :

$$p = 3^{+}(4/3\pi c^{3})^{1/2}.3(\pi/c^{1/2})$$ (13)

This can form a stable 3 x 3 conformation.

Thus the probable structure of the stable nucleonic neutron (n), would now contain a total of three quasi positrons and three quasi electrons along with their respective eighteen gluons and is represented by an equation, which also forms a 3 x 3 conformation:

$$n = \begin{array}{l} {}^{+}(4/3\pi c^{3})\!\downarrow^{1/2}.2(3\pi/c^{1/2}).\ ^{-}(4/3\pi c^{3})\!\uparrow^{1/2} \\ {}^{+}(4/3\pi c^{3})\!\downarrow^{1/2}.2(3\pi/c^{1/2}).\ ^{-}(4/3\pi c^{3})\!\uparrow^{1/2} \\ {}^{+}(4/3\pi c^{3})\!\downarrow^{1/2}.2(3\pi/c^{1/2}).\ ^{-}(4/3\pi c^{3})\!\uparrow^{1/2} \end{array}$$ (26)

Viewed in three dimensions the configuration will allow the positron components of the neutron to be placed interiorly and the electron components exteriorly, in keeping with experiments that suggest that the neutron core is positive an the exterior is negative. This polarised structure in turn will enable the neutron to bind the protons of the nucleus together.

Importantly it is now possible to derive the mathematical structure of the helium nucleus (α particle) containing two protons and two neutrons, along the same lines. The proposed basic conformation is again 3 x 3.

$$\alpha = \begin{array}{l} [3(4/3\pi c^3)]\downarrow^{1/2+}.2(3\pi/c^{1/2}).\ [3(4/3\pi c^3)]\uparrow^{1/2-} \\ [3(4/3\pi c^3)]\uparrow^{1/2+}.2(3\pi/c^{1/2}).\ [3(4/3\pi c^3)]\downarrow^{1/2+} \\ [3(4/3\pi c^3)]\downarrow^{1/2-}.2(3\pi/c^{1/2}).\ [3(4/3\pi c^3)]\uparrow^{1/2+} \end{array} \qquad (27)$$

This mathematical expression for the structure of the α particle allows the calculation of its binding energy from first principles! Each pair of particles is still associated with the equivalent of 18 gluons each, that is $3^{1/2}.2(3\pi/c^{1/2}).3^{1/2}$. However, the internal structure has altered, to effectivly reduce the number of quasi electrons. Thus as a result of triplet pairing, which has occurred in order to make up the helium nucleus, we are left with a reduced number quasi electrons.

Hence, the number of quasi electrons is reduced by a factor of 3 as a result each of the three pairings of the six quasi electron groups. This means the reduction in the equivalent number of quasi electron masses (including the electrical kinetic energy of the complex vectors) is effectively 3^3 x 6. Each of these weighs 1/3 the rest mass of the electron. The total energy therefore liberated is equivalent to 27 x 6 quasi electron masses (approximately 27.5 Mev). This agrees with the difference in mass between the constituent protons and neutrons and the rest mass of the helium nucleus, thus accounting for the binding energy of the helium nucleus.

This structure is also important for the understanding of the internal structure of atomic nucleii, The alpha particle appears to form a natural sphere as indicated by the metric tensor structure (see eq. 6-9). In turn the basic structure of atomic nucleii appear to form in multiples of alpha particles; the carbon atom for instance forms from three, separate, such helium nuclei spheres.

Furthermore knowledge, of the structure of the α particle may be of considerable importance in the understanding of nuclear fusion and the eventual harnessing of this technology.

Neutrino Structure

Whilst it has been possible to derive the structure of the fundamental particles form their known masses, the mass of the neutrino remains uncertain. However, recent evidence does support the contention that the neutrino does indeed have rest mass, which is a starting point.

If the neutrino does have rest mass this suggests it has a basic spherical structure like the electron, and will therefore be subject to relativistic changes in mass. Again experiment confirms this relativistic component.

It is also reasonably certain that whilst the neutrino mass is smaller than that of the electron, its size is also likely to be smaller, and on the basis of what is known of the radius of the electron (see Particle Spin and Size) the essential radius is also likely to be related to c.

Indeed as the electron radius is 1/c x 2/spin, where the intrinsic radius is 1/c. Then by deduction the neutrino radius is related to $1/c^2$. Thus the most likely equation for the neutrino is:

$$ev = \left[\frac{\varepsilon o}{3 \left[4/3\pi(c^2)^3 \right]} \right]^{1/2} = \left[\frac{\varepsilon o}{3 \left[4/3\pi c^6 \right)} \right]^{1/2} \quad (6d)$$

This of course endows the neutrino with a very small charge of: 9.71×10^{-32} C. (which reduces to 9.42×10^{-63} C, when the neutrino forms a Cooper neutrino pair) Nevertheless, if the neutrino has mass, like all other elementary particles we should not be surprised if it also has a charge. Furthermore we may use the above formula to estimate the neutrino mass itself.

Without concerning ourselves too much at this point about the exact origin of the nature of the mass of the electron (which *is* addressed in chap. Quintessence and Electron Structure). It is reasonable to postulate that, if the radius is related to $1/c^2$ then the number of quintessences in the neutrino will be equivalent to the square root of the number of quintessences in the electron. Indeed this means that the number of quintessences in the electron neutrino is 1.925×10^{10} quintessences. Knowing the mass of quintessence; 2.4575×10^{-51} kg, gives us the mass of the electron neutrino (with an estimated error range of: $x/\div 3$), as:

$$m_{ve} = 4.731 \times 10^{-41} \text{ kg} = 0.0000265 \text{ ev}$$

We may also deduce the masses of the mu neutrino and the tau neutrino from first principles. Interestingly we also know that the μυ and the ταυ neutrino can convert an electron to a muon or tauon respectively (if the neutrino has sufficient relativistic energy). So it is likely that the geometric elements present in the muon and tauon are

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also present in their respective neutrinos. Thus the short inverted form equations are given by:

$$v_\mu = 3^{-}(4/3\pi c^6)^{1/2}/(\pi/c^{1/3}) \qquad (6d)$$

$$v_\tau = 3^{-}(4/3\pi c^6)^{1/2}/(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (6d)$$

These mathematical suffixes are merely the same geometric components, which combine with the quasi electron to form the muon and tau. In the same way the ratio of the masses of the muon and tau to the electron, were deduced from first principles (see Fundamental Forces and Particle Structure) these equations predict the respective masses of these neutrinos (with an error range of x/÷ 3), as:

$$v_\mu = 0.00546 \text{ ev} \quad \text{and} \quad v_\tau = 0.0927 \text{ ev}$$

Indeed recent evidence from the super Kami0kande experiment supports these observations with regard the tau neutrino, and places its mass in the range 0.1- 0.03 ev.

Quintessence and Internal Electron Structure

The reason for the value for the mass of the electron, has till now remained a mystery. The internal structure of the electron is therefore of considerable importance as it may elucidate the underlying reason for the mass of the electron. In turn we may derive the mass of all the particles from first principles, as these themselves derive from the structure of the electron (see previous chapter; Fundamental Forces and Particle Structure). Additionally, it may also be possible to estimate the radius of quintessence, from the structure of the electron. Quintessence in turn is fundamental to the formulation of quantum gravity.

We may begin with the formula for the charge of the electron

$$e = \varepsilon_{qe}/3(4/3\pi c^3)^{1/2} \qquad (6)$$

This demonstrates a square root spherical structure. From here we may deduce the most logical internal structure of the quasi electron as derived from quintessence. Indeed if the quasi electron has a square root spherical structure, quintessence itself will most logically also have a square root sphere conformation.

The structure can be defined using the equation for the surface area of a sphere: $A=4\pi r^2$. Thus the total volume of a single outer layer of quintessence in the quasi electron will be the surface area of the quasi electron x the average diameter of quintessence [if quintessence is oscillating the average diameter is $(2r_q + 0)/2 = r_q$]. Taking r_{qe} as the radius of the quasi electron and r_q as the radius of quintessence,

given that there are three quasi electrons in the total electron, the volume of a single outer layer of quintessence (V) is:

$$V = (4\pi r_{qe}^2)^{1/2} \times (r_q/3)^{1/2}$$

If the volume of a single quintessence (V_q) is thus based on a square root sphere, then:

$$V_q = (4/3\pi r_q^3)^{1/2}$$

The total number of quintessences in a single outer layer will thus be the total volume divided by the volume of a single quintessence itself: V/V_q. Thus the number of quintessences (n_{sq}) in a single outer layer is:

$$n_{sq} = (4\pi r_{qe}^2)^{1/2} \times (r_q/3(4/3\pi r_q^3)^{1/2}$$

This very elegantly reduces to

$$n_{sq} = r_{qe}/r_q$$

To be further precise (after all quantum dynamics has to be elegant), the total number of quintessences in the electron will thus be determined by the number of quintessences in a single outer electron layer x the quantum amplitude. The quantum amplitude has been previously calculated using the standard Shrödinger wave equation (see Fundamental Forces and Particle Physics) and is given by ($c^{1/2}/\pi$). Taking the root mean square of the quantum amplitude, the number of quintessences (n_q) in the electron is:

$$n_q = r_{qe}/r_q \times \sqrt{2}(c^{1/2}/\pi).$$

As the radius of the quasi electron is estimated as, $r_{qe} = 6.4 \times 10^{-19}$ m. (see Particle spin and Size), and the number of quintessences in the electron is, $n_q = 1.235 \times 10^{20}$, this allows us to estimate the radius of quintessence itself:

$$r_q = r_{qe}/n_q \times \sqrt{2}(c^{1/2}/\pi).$$

$$r_q = 1.35 \times 10^{-35} m$$

This radius for quintessence is importantly, close to the estimated Planck length. Moreover if this does represent the true Planck length then the number of quintessences present in the electron and thus its mass, is explained.

Therefore, these observations postulate that the internal structure of the electron consists of a square root sphere, composed of a single outer layer of quintessence x the root mean square of the its quantum amplitude.

The electron is itself composed of quintessence with a velocity of c and has an intrinsic radius of $1/c$ x $1/spin$ in metres; and in accordance with its half integer spin $h/4\pi$; its spin velocity is $2\pi/c$ in metres/sec, (see Particle Spin and Size) which in vortex mechanics gives it the ideal harmonic balance with quintessence space time.

Thus given the surface area of the quasi electron in order to fill the outer layer allowing for the quantum amplitude of oscillation would require 1.235×10^{20} quintessences. The total number of quintessence required to fill the whole electron would thus be $n_q = 1.235 \times 10^{20}$. Overall the number of quintessences required to make up the electron can be verified from the internal structure of the electron and the radius of quintessence. Thus if r_q is equivalent to the given Planck length, then accordingly the number of quintessences in the electron is calculated as 1.235×10^{20}, which gives the mass of the electron $m_e = m_q \times n_q$, hence:

$$m_e = m_q \times n_q, = 9.10938 \text{ kg}$$

Intriguingly the derivation of the structure of the electron reflects the volume of an ordinary sphere

$$V = 4\pi r^2 \times r/3 = 4/3\pi r^3$$

This underpins a fundamental concept, mass determines the shape of space-time and in turn the shape determines the amount of mass within it.

It is important to have a working understanding of why the mass of the electron should be what it is from its basic structure. This understanding can now be derived from the radius of quintessence, which also corresponds with the Planck length.

Dimensional Equations for Quintessence

As $h = 3m_q c^2$ and the dimensions of h are $[ML^2T^{-2}.T]$ and those of c^2 are $[L^2.T^{-2}]$ the equational dimensions of quintessence are $[M][T]$, and the dimensions relating to the number of quintessences n_q is $[T^{-1}]$. Clearly therefore,

$$[M] = [M][T] \times [T^{-1}]$$

and overall

$$M = m_q \times n_q.$$

Dimensional Equations for the Electron

The dimensions of the equation for the electron, in the light of quintessence, can now be fully examined, if

$$e^2 = \frac{\varepsilon 0}{3 (4/3\pi c^3)} \qquad (6b)$$

Then taking the dimensions of the equation, e^2 is the charge $[q^2]$, in Coulombs; ε_0 is the permittivity of free space, in Capacitance $[C]$ per metre $[L]$; and $[c]$ is the speed of light, in $[L/T]$.

Thus the above equation using dimensions, is given by

$$[q^2] = \frac{[C]}{[L][c^3]}$$

In this case the velocity is given as the velocity of light c, then $L = c.T$; then

$$[q^2] = \frac{[C]}{[c^4][T]}$$

As $q^2 = C^2V^2$, where V is volts, then:

$$[C^2][V^2] = \frac{[C]}{[c^4][T]}$$

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and

$$[CV^2] = \frac{1}{[c^4][T]}$$

as $E = CV^2$, then

$$E = \frac{1}{[c^4][T]}$$

and as $E = mc^2$, then

$$mc^2 = \frac{1}{[c^4][T]}$$

and hence

$$m = \frac{1}{[c^6][T]}$$

The significance of this dimensional analysis, in the first instance, appears obscure. Nevertheless, it reveals the very nature of matter and energy. Thus the equation for the mass of a structure can be represented by $1/c^6$ which represents the six complex vectors of matter.

Interestingly, given it is known that $1/c^2 = [\mu_o.\varepsilon_0]$, then

$$m = [\mu_o.\varepsilon_0]^3/T$$

Where μ_o and ε_0 are again the permeability and permittivity of free space, quantities that are inherently caused by the vibration of quintessence. Thus mass itself is the result of the vibration of quintessence in the six complex vectors (each represented by the fundamental properties of quintessence μ_o or ε_0 .Hence, the equation for the quasi electron mathematically and geometrically forms the "perfect" three dimensional sphere with its mass accounted for by its six complex vectors.

Energy associated with this matter is in turn is also caused by the the vibration of quintessence (including that in the complex vectors, i) such that:

$$E = [\mu_o.\varepsilon_0]^2/T$$

The dimensions for the equation for energy can also be written as:

$$E = \frac{1}{c^3.L}$$

Which indicates that the energy of matter is again related to the dimensions of the structure of the electron $\varepsilon_0 /(4/3\pi c^3)$ and the permittivity of free space in capacitance per meter (C/L)

Overall the equation for the quasi electron and its dimensions, gives us the origin of

mass and energy. The equation for the electron then forms the key to the understanding of the nature of the relationship between matter and space-time.

Indeed we may now even derive Newton's second law of motion (F = ma, and thus the other fundamental laws of physics) from first principles to confirm the validity of the above.
If:

$$E = \frac{1}{[c^4.][T]}$$

Which is dimensionally equivalent to:

$$E = \frac{[T^3]}{[L^4]}$$

then as F = E/L:

$$F = \frac{[T^3]}{[L^5]}$$

and thus

$$F = \frac{[T^6]}{[L^6.T]} \cdot \frac{[L]}{[T^2]}$$

Substrituting for m from eq. 1g

$$m = \frac{[T^6]}{[L^6][T]}$$

Then   F = ma

Thus taking into account the whole of these observations enables the laws of motion and the equations for energy and mass and their equivalence to be derived from geometric first principles.

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Claims:

1. A method of generating a force acting on a body, wherein electron flow through the body in rotation is directed so as to simultaneously pass through said body in its direction of rotation and contrary to its direction of rotation so as to release a directed flow of gravitons.

2. A method of accelerating a body by generating a force acting on it by the method of claim 1.

3. A method according to claim 1 or 2, wherein electrical currents are passed simultaneously through said body in its direction of rotation and contrary to its direction of rotation.

4. A method according to any one of claims 1 to 3, wherein the body is at least partly of superconducting material.

5. A device for generating a force sufficient to accelerate a body the device comprising;
   the body in the form of an electrically conductive mass, means for rotating said mass and means for passing electrical currents simultaneously through said mass in its direction of rotation and contrary to its direction of rotation.

6. A device according to claim 5, wherein the mass is spherical.

Application No: GB 0028721.9

Examiner: Ben Micklewright

Claims searched: 1-6

Date of search: 14 March 2001

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): H2A (ARV1)

Int Cl (Ed.7): H02N (11/00 15/00 15/04)

Other: Online: WPI, EPODOC, PAJ, INSPEC, COMPUTER, Selected Internet sites

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	WO98/23976 A2 (SCHNURER) See whole document, e.g. the abstract and pages 4-8	1-6
Y	DE19832001 A1 (BETTELS) See whole document, e.g. the abstract	1-6
Y	US3610971 (HOOPER) See whole document	1-6
X,Y	arXiv:gr-qc/9612022 v4, 19 February 1998, G Modanese and J Schnurer, available via the Internet from the pre-print archives at http://xxx.soton.ac.uk	X,Y: 1-6
X,Y	arXiv:cond-mat/9701074 v3, 16 September 1997, available via the Internet from the pre-print archives at http://xxx.soton.ac.uk	X,Y: 1-6
X,Y	Physica C, vol. 203, 1992, pages 441-444, "A possibility of gravitational force shielding by bulk $YBa_2Cu_2O_{7-x}$ superconductor, E Podkletnov and R Nieminen	X,Y: 1-6
X	http://www.eskimo.com/~bilb/freenrgl/gravres2.html, 1 March 1996, "Electrogravitics Reference List", Robert Stirniman, See selected screen prints	1-6

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

An Executive Agency of the Department of Trade and Industry

PTO/SB/06 (12-04)
Approved for use through 7/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875   Effective December 8, 2004

Application or Docket Number 11/82373

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE ($)	FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	FEE ($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	150.00		N/A	300.00
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	$250		N/A	$500
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	$100		N/A	$200
TOTAL CLAIMS (37 CFR 1.16(i))	22 minus 20 =	2	X$ 25 =		OR	X$50 =	100.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =		X100 =			X200 =	
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			+180=			+360=	
			TOTAL			TOTAL	1100.00

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED – PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))		Minus	**	=	X$ 25 =		OR	X$50 =	
Independent (37 CFR 1.16(h))		Minus	***	=	X100 =		OR	X200 =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					+180=		OR	+360=	
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))		Minus	**	=	X$ 25 =		OR	X$50 =	
Independent (37 CFR 1.16(h))		Minus	***	=	X100 =		OR	X200 =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					+180=		OR	+360=	
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/182,373	10/25/2002	Andrew Peter Worsley	P07695US00/RFH	8561

881   7590   05/04/2005

STITES & HARBISON PLLC
1199 NORTH FAIRFAX STREET
SUITE 900
ALEXANDRIA, VA 22314

EXAMINER
KOPEC, MARK T

ART UNIT	PAPER NUMBER
1751	

DATE MAILED: 05/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 January 2005*.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

This action is responsive to applicant request for reconsideration filed 1/24/05. Claims 1-9 are currently pending.

The IDS (duplicate copy) filed 1/26/05 is acknowledged. Please note an initialed copy of the IDS was attached to the Office Action mailed 9/24/04.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-9 are rejected under 35 U.S.C. 101 because the disclosed invention is inoperative and therefore lacks utility.

Claims 1-9 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

These rejections are maintained for the reasons set forth in the Rejection mailed 9/24/04 (pages 2-8).

Applicant's discussion of the terms "warp drive", "graviton", "The Space-time Lattice", "Quintessence and Complex Space", "Energy and the Space-Time Lattice", and "Energy is not bound by the Space-Time Lattice" at pages 1-2 of the response is noted.

While these terms may appear in Encyclopedia Britannica or "physics circles", the examiner respectfully maintains that their use/reliance in the instant specification do not provide a standard for utility or enablement. The terms appear to be theoretical in nature and do not provide sufficient guidance or description in conjunction with the specification to make and/or use the instant invention, nor do such terms validate applicant's incredible utility.

Applicant's discussion of the enablement rejection is noted. The examiner respectfully maintains that even if one were to assume the unproven, disclosed theoretical calculations were plausible, modern scientific apparatus are incapable of providing the means for executing the claimed invention. The "technical examples" section of the specification refer generally to apparatus such as "untracentrifugational spindles", "supercooled jacket of liquid Helium in a vacuum", "power source, motors and refrigeration", and "means of a commutator device" (page 60). The examiner respectfully submits that such devices, requiring enormous forces and highly intricate measurements, have not been realized by modern science. The instant specification is devoid of direction and guidance necessary to enable the skilled artisan to identify or produce "gravitrons". It is the examiner's position that long and

tedious trail and error would await any person skilled in the
art reading applicant's specification and attempting to produce
the claimed invention. Additionally, the specification does not
particularly identify each of the elements required to produce
machinery capable of the claimed method or the relationship
therebetween, nor did it specify particular apparatus intended
to carry out each function. An adequate disclosure of a device
may require details of how complex components are constructed
and perform the desired function. The claim before the court in
In re Scarbrough, 500 F.2d 560, 182 USPQ 298 (CCPA 1974) was
directed to a system which comprised several component parts
(e.g., computer, timing and control mechanism, A/D converter,
etc.) only by generic name and overall ultimate function. The
court concluded that there was not an enabling disclosure
because the specification did not describe how "complex elements
known to perform broadly recited functions in different systems
would be adaptable for use in Appellant's particular system with
only a reasonable amount of experimentation" and that "an
unreasonable amount of work would be required to arrive at the
detailed relationships appellant says that he has solved." 500
F.2d at 566, 182 USPQ at 302.

Applicant is required to furnish a model of the instant
invention. 35 U.S.C. 114. See also 37 CFR 1.91.

Applicant's remarks regarding the submission of a model are noted.

As stated in MPEP 608.03:

> With the exception of cases involving perpetual motion, a model is not ordinarily required by the Office to demonstrate the *>operability< of a device. If *>operability< of a device is questioned, the applicant must establish it to the satisfaction of the examiner, but he or she may choose his or her own way of so doing.

Applicant is invited to contact the undersigned examiner in order to discuss this requirement.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Kopec whose telephone number is (571) 272-1319. The examiner can normally be reached on Monday - Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta can be reached on (571) 272-1316. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mark Kopec
Primary Examiner
Art Unit 1751

MK
May 02, 2005

Search Notes	Application No.	Applicant(s)
	10/182,373	WORSLEY ET AL.
	Examiner	Art Unit
	Mark Kopec	1751

SEARCHED

Class	Subclass	Date	Examiner
505	164	9/18/2004	M.K.
252	500		
ABOVE TO DATE 5/2/05 m			

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner

SEARCH NOTES
(INCLUDING SEARCH STRATEGY)

	DATE	EXMR
Inv. Name Search	9/20/2004	M.K.

Index of Claims

Application No.	10/182,373	
Applicant(s)	WORSLEY ET AL.	
Examiner	Mark Kopec	
Art Unit	1751	

√	Rejected	—	(Through numeral) Cancelled	N	Non-Elected
=	Allowed	+	Restricted	I	Interference

A	Appeal
O	Objected

Final	Original	9/22/04	05/02/05						Final	Original								Final	Original							
	1	R	R							51									101							
	2	R								52									102							
	3	R								53									103							
	4	R								54									104							
	5	R								55									105							
	6	R								56									106							
	7	R								57									107							
	8	R								58									108							
	9	R	R							59									109							
	10									60									110							
	11									61									111							
	12									62									112							
	13									63									113							
	14									64									114							
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	46									96									146							
	47									97									147							
	48									98									148							
	49									99									149							
	50									100									150							

	Application #	10/182,373
SUBMISSION OF	Confirmation #	8561
	Filing Date	10/25/2002
ATTACHMENTS TO REQUEST	First Inventor	WORSLEY
	Art Unit	1751
FOR RECONSIDERATION	Examiner	M. Kopec
	Docket #	P07695US00/RFH

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SIR:

It has come to the attention of undersigned that the attachments, referred to in the Request for Reconsideration filed on January 24, 2005, were not submitted with the "Request." Accordingly, those attachments are submitted.

Respectfully submitted,

Date: January 26, 2005

By: Ross F. Hunt, Jr.
Registration No.: 24,082

STITES & HARBISON PLC ⬧ 1199 North Fairfax St. ⬧ Suite 900 ⬧ Alexandria, VA 22314
TEL: 703-739-4900 ⬧ FAX: 703-739-9577 ⬧ EMAIL: iplaw@larsontaylor.com ⬧ CUSTOMER No. 000881

210LT:6020:9529:1:ALEXANDRIA
1/25/05

Substitute for Form 1449A/PTO	Application No.: 10/182,378
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Filing Date: July 29, 2002
	First Named Inventor: WORSLEY
	Group Art Unit: Unassigned
	Examiner Name: Unassigned
Sheet 1 of 1	Attorney Docket No.: P07695US00/RFH

Customized PTO/SB/08A 10-01

U.S. PATENT DOCUMENTS

Exam. Initial*	Document No. Number - Kind	Publication Date MM-DD-YYYY	Name Patentee or Applicant	Relevance Passages or Figures
	3,610,971	10-05-1971	Hooper	

FOREIGN PATENT DOCUMENTS

Exam. Initial*	DOCUMENT Country-Number-Kind	Publ. Date MM-DD-YYYY	Name Patentee or Applicant	Relevance Passages/Figures	Trans- lation
	WO 98/23976	06-04-1998	Schnurer		
	DE 19832001	07-16-1998	Bettels		

OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS

Exam. Initial	Author Name (in CAPS), Title of Article/Item, Date, Page(s), Volume-Issue No., Publisher, City and/or Country where published	Trans- lation
	MODANESE ET AL.; "Possible quantum gravity effects in a charged Bose condensate under variable e.m. field"; arXiv:gr-qc/9612022 v4, 19 February 1998	
	PODKLETNOV; "Weak gravitation shielding properties of composite bulk $Bya_2Cu_3O_7 \chi$ superconductor below 70 K under e.m. field"; arXiv:cond-mat/9701074 v3, 16 September 1997	
	PODKLETNOV ET AL.; "A possibility of gravitational force shielding by bulk $Yba_2Cu_3O_{7-\chi}$ superconductor"; Physica C, vol. 203, 1992, pages 441-444.	
	STIRNIMAN; "Electrogravitics Reference List"; http://www.eskimo.com/~bilb.freenrgl.gravres2.html; 1 March 1996	

Examiner Signature		Date Considered	

* Examiner: Initial if considered, whether or not citation is in conformance with MPEP §609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to the applicant.

Customized PTO/SB/21 (12-04)

JAN 24 2005

TRANSMITTAL FORM

(for all correspondence after initial filing)

Application #	10/182,373
Confirmation #	8561
Filing Date	10/25/2002
First Inventor	WORSLEY
Art Unit	1751
Examiner	M. Kopec
Docket #	P07695US00/RFH

Total number of pages in this submission =

ENCLOSURES *(check all that apply)*

X Fees calculated below
X Request for Reconsideration
   X including Attachment(s)
After Final Amendment/Reply
   including Attachment(s)
X Extension of Time Petition

.... Response to Missing Parts/Incomplete Appl.
.... Certified Copy of Priority Document(s)
.... Information Disclosure Statement
.... Drawing(s)
.... Terminal Disclaimer

FEES CALCULATION: For claims if required and/or other fees as shown below:

	NOW	Previously Paid For	Present Extra	Rate	$
TOTAL CLAIMS				X $ 50 =	
INDEP. CLAIMS				X $ 200 =	
			TOTAL OF ABOVE CLAIMS FEES =		0

Reduction by ½ for **small entity status** of applicant

	SUBTOTAL =	0
X Fee for extension of time (per attached Petition)		60.00
Other fee for		
	TOTAL OF ALL FEES =	**60.00**

X A CREDIT CARD PAYMENT FORM (PTO-2038) in the amount of $60.00 is enclosed.

X The Commissioner is authorized to charge any fee, additional fee or extension fee due in connection herewith to Deposit Account No. 12-0555:
(1) if no payment or an insufficient payment is enclosed and a fee is due in connection herewith; or
(2) if no petition for extension of time is enclosed but an EOT is required - and in this event, applicant hereby petitions under 37 CFR 1.136(a) for an extension of time of as many months as are required to render this submission timely.

Date: January 24, 2005

By: Ross F. Hunt, Jr.
Registration No.: 24,082

STITES & HARBISON PLLC ◆ 1199 North Fairfax St. ◆ Suite 900 ◆ Alexandria, VA 22314
TEL: 703-739-4900 ◆ FAX: 703-739-9577 ◆ Customer No. 00881

210LT:6020:9369:1:ALEXANDRIA

REQUEST FOR RECONSIDERATION	Application #	10/182,373
	Confirmation #	8561
	Filing Date	10/25/2002
	First Inventor	WORSLEY
	Art Unit	1751
	Examiner	M. Kopec
	Docket #	P07695US00/RFH

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

S I R:

Considering the matters raised in the Office Action in the same order as raised, applicants acknowledge that "the listing of references in the specification is not a proper information disclosure statement." To the extent that the listed references have not been cited by the Examiner on form PTO-892, applicants are considering whether to present a further Information Disclosure Statement citing some or all of these background references.

The Examiner has also contended that "the references cited in the Search Report 7/29/02 have been considered, but will not be listed on any patent resulting from this application because they were not provided on a separate list in compliance with 37 CFR 1.98(a)(1)." The Examiner has further stated that in order to have the references "printed on such resulting patent, a separate listing, preferably on a PTO-1449 form, must be filed within the set period for reply to this Office action." It is respectfully pointed out that the references listed in the Search Report have, indeed, been presented on a PTO-1449 form, on October 25, 2002. A copy of that form is submitted herewith.

Claims 1-9 have been rejected under 35 USC 101 because "the disclosed invention is inoperative and therefor lacks utility." This rejection is respectfully traversed.

Two of the key points raised by the Examine here concern the term "graviton" and the term "warp drive." The graviton is a well recognized and accepted mediator of gravitation in modern physics and derives from the principle of general relativity which

itself has been demonstrated in many experiments. The term appears in all standard encyclopedias including the Encyclopedia Britannica and is mentioned in at least four separate sections in Compton's Encyclopedia. A relevant portion of the Encyclopedia Britannica is submitted herewith. The existence of the graviton is termed "undiscovered" which simply means that its existence is expected by all theoretical/experimental results in physics but that gravitons are currently undetectable. In other words, science knows that gravitons exist but experimentation has not specifically established their existence.

With respect to the term "warp drive," although this term is used in science fiction to refer to faster than light propulsion, the present application makes it clear at, e.g., paragraph [0011] that "this effective warping of space-time does not, of necessity, imply superluminal [faster than light] velocities." The term "warp drive" in the scientific sense merely relates to the use of the warping of space-time in accordance with general relativity.

With respect to the other terms to which the Examiner has referred, viz., "the Space-time Lattice," "Quintessence and Complex Space," "Energy and the Space-Time Lattice," and "Energy is not bound by the Space-Time Lattice" these terms and topics are all conventionally used in physics circles. In this regard, on the physics archive "lattice and space-time" gave well in excess of 300 listings (see the attached document 4) while "quintessence" also gave well over 300 listings (see the companion document 5). Complex space is a conventional mathematical concept discussed in most advanced textbooks on mathematics. It has practical uses in engineering. In this regard, reference is made, e.g., to Complex Numbers, Mathematics for Engineers, W. Bolton; Longman Scientific and Technical 1995, one of the books referenced at page 46 of the instant application.

The Examiner has concluded that "[i]t is clear from known principles of physics that the instant methods/devices cannot exist according to conventional scientific theory." The Examiner has also stated that "[n]o assertions of gravitron/warp drive acceleration have been recognized or verified by the scientific community." These contentions are respectfully traversed. It is respectfully submitted that there is nothing in "known

principles of physics" that would dictate that "the instant method/devices cannot exist according to conventional scientific theory." In fact, the contrary is true in that the methods/devices are consistent with advanced scientific thought. Moreover, as discussed below, implementation of the device of the invention is well within the ambit of current commercially available technical devices.

Claims 1-9 have also been rejected under 35 USC 112, first paragraph, as "containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention." This rejection is respectfully traversed.

It is respectfully submitted that it would be within the skill of one of ordinary skill in the art to make and use the invention. The underlying technology here is well developed and, in this regard, the major technological elements of an exemplary device are ultra-fast rotors, super cooling and a commutator device. Ultra-centrifuge devices reaching 150,000 rpm are commercially available (as is demonstrated by the attached document 1 relating to ultra-centrifuges) and these commercial devices can reach rotational speeds up to 600,000 rpm. The specification provides for minimum rotational speeds of only 30,000 rpm (see, e.g., paragraphs [0416] and [0417]). Similarly, super-cooling devices are currently commercially available and are used in a number of diverse technologies such as MRI scanning and Maglev trains (see document 2 enclosed). Finally, industrial commutator devices are also readily commercially available (see document 3).

Considering this point further and referring to the specific factors referred to in In re Wand:

(1) The Breadth of the Claims

The Examiner contends that because "all of the claims relate to methods/device for generating force (on a body) by flow of gravitrons, and it has been shown hereinbefore with respect to the rejection under 35 U.S.C. 101 for inoperability that such cannot exist, the claims are not enabled." However, for the reasons set forth above, it is respectfully submitted that the inoperability of the present invention has not, in fact, been established.

Moreover, the documents (e.g., documents 1-3 that have just been discussed) demonstrate that the major components of a preferred embodiment of the device are not only conventional operable components but are also commercially available.

(2)   The Nature of the Invention

If general relativity, which is the current accepted theory for gravitation is correct, then gravitons also exist. Thus, scientific applications involving gravity follow from this, and these vary from the gravity experienced on earth to devices such as the gyroscope and devices such as the ultra-centrifuge, which operate and develop 500,000 g using this mechanism. Thus, it is respectfully submitted that the contention that "the nature of the invention is such that it would be startling if it were operative" is not well taken.

(3) The State of the Prior Art

In the prior art referenced in the instant application, there are anti-gravity devices that do, in fact, principally operate on superconductivity and charge flow in common with the present invention. The instant application sets forth in some detail as to how such devices may operate, and elevate the device to a point where a theoretical understanding of this operation is by conventional scientific means, i.e., using general relativity. The fact that there "appears to be no prior art showing methods/devices for generating force (on a body) by flow of gravitrons" is simply an acknowledgement of the unique nature of a key feature of the present invention.

(4) For the Level of One of Ordinary Skill in the Art

The Examiner contends that "[since] even the most highly skilled physicists would agree that according to conventional theory, the instant invention cannot be produced, the threshold of enablement is not met on pages 1-52 of the instant specification." It is respectfully submitted that the basic contention of the Examiner here is erroneous, i.e., there is no evidence that "the most highly skilled physicist" would agree that the instant invention "cannot be produced." Moreover, with respect to determining the level of ordinary skill in this art, the level of skill here would, of course, be quite high here. and this could be one of the problems here particularly with respect to assumptions as to what would or would not be agreed to by highly skilled physicist.

(5) The Level of Predictability in the Art

As indicated above, it is shown in supporting documents 1-3 that the methods/devices of the invention are based on commercially available technology and the existence of this technology demonstrates predictability. As set forth above, the documents submitted herewith demonstrate that "ultracentrafugational spindles" and the other technology specified are, in fact, commercially available. The Examiner has contended that "such devices, requiring enormous forces and highly intricate measurements, have not been realized by modern science." It is respectfully that such is not the case, as the documents demonstrate.

(7) The Existence of Working Examples and (8) The Quantity of Experimentation Need to Make or Use the Invention

Working examples have been described in the specification with respect to commercially available technologies as discussed above. In addition, as a relatively inexpensive and readily available technology to those who are studying gravitational mechanisms, there are recent technologies relating to the construction of large super-cooled spheres requiring far lower temperatures (0.068K) than those set forth in the application (temperatures of 4K), i.e., temperatures which are much more easily attainable (see document 7 enclosed herewith). The technical examples set forth in the application are within specifications and standard physical laws allowed by conventional physics.

Finally, with respect to the requirement that applicants furnish a model of the instant invention, it is respectfully submitted that this requirement is completely unreasonable. Many patented inventions are based on theoretical physics including the general theory of relativity. Moreover, a number of patents have been granted which involve gravitons. Further, the present invention has been patented in Great Britain, and a copy of the allowed claims, which basically correspond to the claims presented here, is enclosed. With all due respect, it is believed that the basic contentions of the Examiner here are based on faulty assumptions and given the admittedly daunting expense involved

in producing a model, it is simply not fair to require one here under the circumstances.

Allowance of the application in its present form is respectfully solicited.

Respectfully submitted,

Date: January 24, 2005

By: Ross F. Hunt, Jr.
Registration No.: 24,082

STITES & HARBISON PLC ◆ 1199 North Fairfax St. ◆ Suite 900 ◆ Alexandria, VA 22314
TEL: 703-739-4900 ◆ FAX: 703-739-9577 ◆ EMAIL: iplaw@larsontaylor.com ◆ CUSTOMER NO. 000881

PETITION FOR	Application #	10/182,373
	Confirmation #	8561
EXTENSION OF TIME	Filing Date	10/25/2002
	First Inventor	WORSLEY
UNDER 37 CFR 1.136(a)	Art Unit	1751
	Examiner	M. Kopec
	Docket #	P07695US00/RFH

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee under 37 CFR 1.17(a) are as follows.

☒ NOTE: Applicant claims small entity status.

No extension of time previously obtained.

	Time Period	Large Entity Fee	Small Entity Fee
☒	One month	☐ $ 120	☒ $ 60
☐	Two months	☐ $ 450	☐ $ 225
☐	Three months	☐ $ 1020	☐ $ 510
☐	Four months	☐ $ 1590	☐ $ 795
☐	Five months	☐ $ 2160	☐ $ 1080

☒ A CREDIT CARD PAYMENT FORM (PTO-2038) in the amount of $ is encl osed.

☒ The Commissioner is authorized to charge any fee or additional fee due in connection herewith to Deposit Account No. 12-0555:
(1) if no payment or an insufficient payment is enclosed and a fee is due in connection herewith; or
(2) if a further fee and petition for extension of time are required at this time - and in this event, applicant hereby petitions under 37 CFR 1.136(a) for any further extension of time of as many months as are required to render this submission timely.

Date: January 24, 2005

Signed By Name: Ross F. Hunt, Jr.
(Attorney of Record) Registration No.: 24,082

STITES & HARBISON PLLC ◆ 1199 North Fairfax St. ◆ Suite 900 ◆ Alexandria, VA 22314
TEL: 703-739-4900 ◆ FAX: 703-739-9577 ◆ CUSTOMER NO. 00881

01/26/2005 EAREGAY1 00000124 10182373

01 FC:2251   60.00 OP

210LT:6020:9368:1:ALEXANDRIA

Customized PTO/SB/22 (12-04)

PETITION FOR	Application #	10/182,373
	Confirmation #	8561
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Date: January 24, 2005

Signed By   Name: Ross F. Hunt, Jr.
(Attorney of Record)   Registration No.: 24,082

STITES & HARBISON PLLC ◆ 1199 North Fairfax St. ◆ Suite 900 ◆ Alexandria, VA 22314
TEL: 703-739-4900 ◆ FAX: 703-739-9577 ◆ CUSTOMER NO. 00881

01/26/2005 EAREGAY1 00000124 10182373

01 FC:2251   60.00 OP

210LT:6020:9368:1:ALEXANDRIA

Please find below and/or attached an Office communication concerning this application or proceeding.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____.
2a) ☐ This action is **FINAL.**   2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
   closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-9* is/are pending in the application.

   4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) *1-9* is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   a)☒ All b)☐ Some * c)☐ None of:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____.
   3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage
      application from the International Bureau (PCT Rule 17.2(a)).

   * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
   Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

This application is a 371 of PCT/GB01/00381 (filed

1/30/01). Claims 1-9 are pending.

The listing of references in the specification is not a

proper information disclosure statement. 37 CFR 1.98(b)

requires a list of all patents, publications, or other

information submitted for consideration by the Office, and MPEP

§ 609 A(1) states, "the list may not be incorporated into the

specification but must be submitted in a separate paper."

Therefore, unless the references have been cited by the examiner

on form PTO-892, they have not been considered.

The references cited in the Search Report 7/29/02 have been

considered, but will not be listed on any patent resulting from

this application because they were not provided on a separate

list in compliance with 37 CFR 1.98(a)(1). In order to have the

references printed on such resulting patent, a separate listing,

preferably on a PTO-1449 form, must be filed within the set

period for reply to this Office action.

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process,
machine, manufacture, or composition of matter, or any new
and useful improvement thereof, may obtain a patent
therefore, subject to the conditions and requirements of
this title.

Claims 1-9 are rejected under 35 U.S.C. 101 because the

disclosed invention is inoperative and therefore lacks utility.

All of the instant claims are drawn to methods/device for generating force (on a body) by flow of gravitrons. In the Abstract of the instant specification, applicant states:

> The present invention relates to the use of technical drive systems, which operate by the modification of gravitational fields. These drive systems do not depend on the emission of matter to create thrust but create a change in the curvature of space-time, in accordance with general relativity. This allows travel by warping space-time to produce an independent warp drive system.

Pages 12-18 of the instant specification set forth several aspects of proposed underlying theoretical physics including such topics as:

> "The Space-time Lattice",
> "Quintessence and Complex Space",
> "Energy and the Space-Time Lattice", and
> "Energy is not bound by the Space-Time Lattice".

The term "gravitron" refers to a hypothetical particle with zero charge and rest mass that is held to be the quantum of the gravitation field (Websters). Warp Drive appears to be a type of propulsion system capable of driving an object at speeds higher than the speed of light. It is clear from known principles of physics that the instant methods/devices cannot exist according to conventional scientific theory. No assertions of gravitron/warp drive acceleration have been recognized or verified by the scientific community.

Claims 1-9 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification does not enable one of ordinary skill in the art to make or use methods/devices for generating force (on a body) by flow of gravitrons, in that it would require undue experimentation to do so. Factors to be considered in determining whether a disclosure would require undue experimentation include, (1) the breadth of the claims, (2) the nature of the invention, (3) the state of the prior art, (4) the level of one of ordinary skill, (5) the level of predictability in the art, (6) the amount of direction provided by the inventor, (7) the existence of working examples and (8) the quantity of experimentation needed to make or use the invention based on the content of the disclosure. In re Wands, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988).

(1) the breadth of the claims

Sine all of the claims relate to methods/device for generating force (on a body) by flow of gravitrons, and it has been shown hereinbefore with respect to the rejection under 35 U.S.C. 101 for inoperability that such cannot exist, the claims

are not enabled. The question of whether a specification

provides an enabling disclosure under 35 U.S.C. §112, first

paragraph, and whether an application satisfies the utility

requirement of §101 are closely related. Process Control Corp.

v. HydReclaim Corp., 190 F.3d 1350, 1358, 52 USPQ2d 1029, 1034

(Fed. Cir. 1999). To satisfy the enablement requirement of 112,

first paragraph, a patent application must adequately disclose

the claimed invention so as to enable a person skilled in the

art to practice the invention at the time the application was

filed without undue experimentation. Enzo Biochem, Inc. v.

Calgene, Inc., 188 F.3d 1362, 1371-72, 52 USPQ2d 1129, 1136

(Fed. Cir. 1999). The utility requirement of §101 mandates that

the invention be operable to achieve useful results. Brooktree

Corp v. Advanced Micro Devices, Inc., 977 F.2d 1555, 1571, 24

USPQ2d 1401, 1412 (Fed. Cir. 1992). Thus, if the claims in an

application fail to meet the utility requirement because the

invention is inoperative, they also fail to meet the enablement

requirement because a person skill in the art cannot practice

the invention. Process Control, 190 F.3d at 1358, 52 USPQ2d at

1034.

   (2) the nature of the invention

   As stated above, the scientific community has held the

belief that methods/devices for generating force (on a body) by

flow of gravitrons has not been attained. Accordingly, the

nature of the invention is such that it would be startling if it

were operative, thus requiring greater detail and guidance than

that found in the instant specification to provide enablement.

(3) the state of the prior art

There appears to be no prior art showing methods/devices

for generating force (on a body) by flow of gravitrons.

(4) the level of one of ordinary skill

Since even the most highly skilled physicists would agree

that according to conventional theory, the instant invention

cannot be produced, the threshold of enablement is not met on

pages 1-92 of the instant specification.

(5) the level of predictability in the art

It would be most unpredictable that methods/devices for

generating force (on a body) by flow of gravitrons. See the

reasoning presented hereinbefore with respect to the rejection

under 35 U.S.C. 101 for inoperability.

(6) the amount of direction provided by the inventor

It is the examiner's position that applicant has not

provided sufficient guidance throughout the specification to

enable one of ordinary skill in the art to make and use the

instant invention.

Even if one were to assume the unproven, disclosed
theoretical calculations were plausible, modern scientific
apparatus are incapable of providing the means for executing the
claimed invention. The "technical examples" section of the
specification refer generally to apparatus such as
"untracentrifugational spindles", "supercooled jacket of liquid
Helium in a vacuum", "power source, motors and refrigeration",
and "means of a commutator device" (page 60). The examiner
respectfully submits that such devices, requiring enormous
forces and highly intricate measurements, have not been realized
by modern science. The instant specification is devoid of
direction and guidance necessary to enable the skilled artisan
to identify or produce "gravitrons". It is the examiner's
position that long and tedious trail and error would await any
person skilled in the art reading applicant's specification and
attempting to produce the claimed invention.

(7) the existence of working examples and (8) the quantity
of experimentation needed to make or use the invention

The quantum of proof required to establish enablement is
inextricably linked with the degree of unpredictability of the
relevant art.

The amount and type of examples necessary to support broad
claims increases as the predictability of the art decreases.

See <u>In re Fisher</u>, 166 USPQ 18, 24 and <u>In re Angstadt and</u>

<u>Griffen</u>, 190 USPQ 214, 218.   Claims broad enough to cover a

large number of compositions that do not exhibit the desired

properties fail to satisfy the requirements of 35 USC 112.   See

<u>In re Cook</u>, 169 USPQ 298, 302 and <u>Cosden Oil v. American</u>

<u>Hoechst</u>, 214 USPQ 244, 262.   Merely reciting a desired result

does not overcome this failure.   <u>In re Corkill</u>, 226 USPQ 1005,

1009.   Accordingly, there appears to be little factual or

theoretical basis for extending the scope of the claims much

beyond the proportions and materials actually demonstrated to

exhibit high temperature superconductivity.   A "patent is not a

hunting license.   It is not a reward for the search, but a

reward for its successful conclusion", <u>Brenner v. Manson</u>, 383 US

519, 148 USPQ 689.

In the instant specification, applicant has not

specifically disclosed any working example.   The disclosed

"Technical Examples" at pages 60-65 are merely theoretical in

nature.

35 U.S.C. 114   Models, specimens.

The Director may require the applicant to furnish a model of
convenient size to exhibit advantageously the several parts of his
invention.   When the invention relates to a composition of matter,
the Director may require the applicant to furnish specimens or
ingredients for the purpose of inspection or experiment. (Amended

Nov. 29, 1999, Public Law 106-113, sec. 1000(a)(9), 113 Stat. 1501A-582 (S. 1948 sec. 4732(a)(10)(A)).).

Applicant is required to furnish a model of the instant invention. See also 37 CFR 1.91.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Kopec whose telephone number is (571) 272-1319. The examiner can normally be reached on Monday - Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta can be reached on (571) 272-1316. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mark Kopec
Primary Examiner
Art Unit 1751

MK
September 22, 2004

Substitute for Form 1449A/PTO	Application No.: 10/182,373
INFORMATION DISCLOSURE STATEMENT BY APPLICANT Sheet 1 of 1	Filing Date: July 29, 2002 First Named Inventor: WORSLEY Group Art Unit: Unassigned Examiner Name: Unassigned Attorney Docket No.: P07695US00/RFH

U.S. PATENT DOCUMENTS

Exam. Initial*	Document No. Number - Kind	Publication Date MM-DD-YYYY	Name Patentee or Applicant	Relevance Passages or Figures
MK	3,610,971	10-05-1971	Hooper	

FOREIGN PATENT DOCUMENTS

Exam. Initial*	DOCUMENT Country-Number-Kind	Publ. Date MM-DD-YYYY	Name Patentee or Applicant	Relevance Passages/Figures	Trans-lation
MK	WO 98/23976	06-04-1998	Schnurer		
MK	DE 19832001	07-16-1998	Bettels		

OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS

Exam. Initial	Author Name (in CAPS), Title of Article/Item, Date, Page(s), Volume-Issue No., Publisher, City and/or Country where published	Trans-lation
MK	MODANESE ET AL.; "Possible quantum gravity effects in a charged Bose condensate under variable e.m. field"; arXiv:gr-qc/9612022 v4, 19 February 1998	
MK	PODKLETNOV; "Weak gravitation shielding properties of composite bulk $Bya_2Cu_3O_7$ χ superconductor below 70 K under e.m. field"; arXiv:cond-mat/9701074 v3, 16 September 1997	
MK	PODKLETNOV ET AL.; "A possibility of gravitational force shielding by bulk $Yba_2Cu_3O_{7-x}$ superconductor"; Physica C, vol. 203, 1992, pages 441-444.	
MK	STIRNIMAN; "Electrogravitics Reference List"; http://www.eskimo.com/~bilb.freenrgl.gravres2.html; 1 March 1996	

Examiner Signature	/MK/	Date Considered	9/21/04

* Examiner: Initial if considered, whether or not citation is in conformance with MPEP §609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to the applicant.

Index of Claims

Application No. 10/182,373	**Applicant(s)** WORSLEY ET AL.
Examiner Mark Kopec	**Art Unit** 1751

ℛ	Rejected	−	(Through numeral) Cancelled	N Non-Elected
=	Allowed	÷	Restricted	I Interference

A	Appeal
O	Objected

Claim (Final / Original)	Date 9/22/04	Claim (Final / Original)	Date	Claim (Final / Original)	Date
①	R	51		101	
2	R	52		102	
3	R	53		103	
4	R	54		104	
⑤	R	55		105	
6	R	56		106	
7	R	57		107	
8	R	58		108	
9	R	59		109	
10		60		110	
11		61		111	
12		62		112	
13		63		113	
14		64		114	
15		65		115	
16		66		116	
17		67		117	
18		68		118	
19		69		119	
20		70		120	
21		71		121	
22		72		122	
23		73		123	
24		74		124	
25		75		125	
26		76		126	
27		77		127	
28		78		128	
29		79		129	
30		80		130	
31		81		131	
32		82		132	
33		83		133	
34		84		134	
35		85		135	
36		86		136	
37		87		137	
38		88		138	
39		89		139	
40		90		140	
41		91		141	
42		92		142	
43		93		143	
44		94		144	
45		95		145	
46		96		146	
47		97		147	
48		98		148	
49		99		149	
50		100		150	

Search Notes	Application No.	Applicant(s)
(barcode)	10/182,373	WORSLEY ET AL.
	Examiner	**Art Unit**
	Mark Kopec	1751

SEARCHED

Class	Subclass	Date	Examiner
505	164	9/18/2004	M.K.
252	500	✓	✓

**SEARCH NOTES
(INCLUDING SEARCH STRATEGY)**

	DATE	EXMR
Inv. Name Search	9/20/2004	M.K.

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner

PALM INTRANET

Inventor Name Search Result

Your Search was:

Last Name = WORSLEY
First Name = ANDREW

Application#	Patent#	Status	Date Filed	Title	Inventor Name 2
10182373	Not Issued	030	10/25/2002	TECHNICAL AND THEORETICAL SPECIFICATIONS FOR WARP DRIVE TECHNOLOGY	WORSLEY, ANDREW PETER
09214314	6335323	150	03/04/1999	COMPOSITIONS FOR THE TREATMENT OF PERIPHERAL NEUROPATHIES CONTAINING ANTIDEPRESSANTS AND/OR MONOAMINE OXIDASE INHIBITORS AND/OR VITAMIN B12 AND/OR PRECURSORS OR INDUCERS OF A NEUROTRANSMITTER	WORSLEY , ANDREW PETER

Inventor Search Completed: No Records to Display.

Search Another: Inventor	Last Name	First Name	
	WORSLEY	ANDREW	Search

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PALM INTRANET

Inventor Name Search Result

Your Search was:

Last Name = TWIST
First Name = PETER

Application#	Patent#	Status	Date Filed	Title	Inventor Name 51
10675353	Not Issued	093	09/30/2003	PROCESSING OF PHOTOGRAPHIC MATERIAL	TWIST, PETER J.
10675003	Not Issued	041	09/30/2003	PROCESSING OF PHOTOGRAPHIC MATERIAL	TWIST, PETER J.
10367000	6692904	150	02/14/2003	PHOTOGRAPHIC WASH SOLUTION AND PROCESS	TWIST, PETER J.
10314662	Not Issued	061	12/09/2002	PROCESSING OF PHOTOGRAPHIC MATERIAL	TWIST, PETER J.
10182373	Not Issued	030	10/25/2002	TECHNICAL AND THEORETICAL SPECIFICATIONS FOR WARP DRIVE TECHNOLOGY	TWIST, PETER JOHN
10152869	6554506	150	05/22/2002	METHOD AND APPARATUS FOR PROCESSING PHOTOGRAPHIC MATERIAL	TWIST, PETER J.
10134324	6619861	150	04/29/2002	PROCESSING PHOTOGRAPHIC MATERIAL	TWIST, PETER J.
10057678	6508598	150	01/25/2002	METHOD AND SYSTEM FOR PROCESSING PHOTOGRAPHIC MATERIAL WHICH INCLUDES WATER RECOVERY FROM HUMID AIR FOR RE-USE IN THE PROCESSING	TWIST, PETER J.
10012673	6620578	150	10/30/2001	PROCESSING PHOTOGRAPHIC MATERIAL	TWIST, PETER J.
10011682	6537739	150	12/05/2001	PROCESSING PHOTOGRAPHIC MATERIAL	TWIST, PETER J.
09982463	Not Issued	161	10/18/2001	PHOTOGRAPHIC WASH SOLUTION AND PROCESS	TWIST, PETER J.
09973214	6517262	150	10/09/2001	PROCESSING PHOTOGRAPHIC MATERIAL	TWIST, PETER J.
09970238	Not	161	10/03/2001	PHOTOGRAPHIC BLEACH	TWIST, PETER J.

	Issued			COMPOSITION AND PROCESS	
09961529	6518001	150	09/24/2001	PROCESSING PHOTOGRAPHIC MATERIAL	TWIST, PETER J.
09920495	6505979	150	08/01/2001	PROCESSING PHOTOGRAPHIC MATERIAL	TWIST, PETER J.
09879773	6541191	150	06/12/2001	PHOTOGRAPHIC PROCESSING SOLUTIONS	TWIST, PETER JEFFERY
09856395	6554505	150	05/22/2001	METHOD AND APPARATUS FOR PROCESSING A PHOTOGRAPHIC MATERIAL	TWIST, PETER J.
09740225	6444416	150	12/19/2000	COLOR PHOTOGRAPHIC ELEMENT WITH IMPROVED DEVELOPABILITY	TWIST, PETER J.
09718042	6468721	150	11/20/2000	METHOD AND APPARATUS FOR PROCESSING PHOTOGRAPHIC MATERIAL	TWIST, PETER J.
09705660	6422769	150	11/03/2000	SYSTEM AND METHOD FOR PROCESSING PHOTOGRAPHIC MATERIAL WHICH INCLUDES WASH WATER RECOVERY	TWIST, PETER J.
09705502	6290404	150	11/03/2000	PROCESSING SYSTEM AND METHOD WHICH INCLUDES HEAT RECOVERY AND REUSE IN A PHOTOGRAPHIC PROCESSING MACHINE	TWIST, PETER J.
09705410	6383727	150	11/03/2000	METHOD AND SYSTEM FOR PROCESSING PHOTOGRAPHIC MATERIAL WHICH INCLUDES WATER RECOVERY FROM HUMID AIR FOR RE-USE IN THE PRICESSING	TWIST, PETER J.
09622637	6284444	150	08/18/2000	PROCESSING PHOTOGRAPHIC MATERIALS AND PROCESSING SYSTEM THEREFOR	TWIST, PETER J.
09602822	Not Issued	161	06/23/2000	PHOTOGRAPHIC PROCESSING SOLUTIONS	TWIST, PETER JEFFERY
09593985	6287026	150	06/14/2000	METHOD OF REPLENISHMENT FOR PROCESSING	TWIST, PETER J.
09464422	6305854	150	12/16/1999	RELATING TO PHOTOGRAPHIC PROCESSES	TWIST , PETER J.
09461145	6132941	150	12/14/1999	METHOD OF REPLENISHMENT FOR PROCESSING	TWIST , PETER J.
08985534	5837431	150	12/05/1997	PHOTOGRAPHIC DEVELOPER/AMPLIFIER COMPOSITIONS	TWIST , PETER JEFFREY

08970640	5932399	150	11/14/1997	NOVEL AUXILIARY DEVELOPING AGENTS, PHOTOGRAPHIC MATERIALS INCORPORATING THEM AND THE USE THEREOF	TWIST , PETER J.
08969988	5871891	150	11/13/1997	PROCESSING BOTH LOW AND HIGH SILVER PHOTOGRAPHIC MATERIALS IN A SEQUENTIAL MANNER IN A SINGLE PROCESSOR	TWIST , PETER J.
08911403	5738980	150	08/14/1997	PHOTOGRAPHIC DEVELOPER/AMPLIFIER COMPOSITIONS	TWIST , PETER J.
08865793	Not Issued	161	05/30/1997	PHOTOGRAPHIC PROCESSOR	TWIST, PETER J.
08713304	5686229	150	09/13/1996	METHOD OF PROCESSING A COLOR PHOTOGRAPHIC SILVER HALIDE MATERIAL	TWIST , PETER J.
08667200	5689753	150	06/20/1996	METHOD OF PHOTOGRAPHIC PROCESSING WITH SOLUTION REPLENISHMENT	TWIST , PETER J
08630196	5702873	150	04/10/1996	DEVELOPER SOLUTIONS CONTAINING THREE SEQUESTRANTS FOR METAL IONS	TWIST , PETER J.
08414882	Not Issued	163	03/31/1995	PHOTOGRAPHIC SILVER HALIDE COLOUR MATERIALS	TWIST , PETER J.
08185742	Not Issued	161	01/24/1994	METHOD OF PROCESSING PHOTOGRAPHIC SILVER HALIDE MATERIAL	TWIST , PETER J.
08162449	5358830	150	12/03/1993	METHOD OF PHOTOGRAPHIC PROCESSING	TWIST , PETER J.
07988933	5324624	150	03/11/1993	REDOX AMPLIFICATION METHOD OF FORMING A PHOTOGRAPHIC COLOR IMAGE	TWIST , PETER J.
07931056	5298932	150	08/17/1992	METHOD FOR REPLENISHING PHOTOGRAPHIC DEVELOPER SOLUTIONS	TWIST , PETER J.
07930669	5353084	150	10/02/1992	CHEMICAL REACTION SYSTEMS	TWIST , PETER J.
07914217	5264335	150	07/14/1992	PHOTOGRAPHIC SILVER HALIDE RECORDING MATERIAL	TWIST , PETER J.
07910115	5337112	150	07/21/1992	AUTOMATIC PROCESSING	TWIST , PETER J.

				DEVICES FOR PROCESSING PHOTOGRAPHIC MATERIALS	
07857921	Not Issued	163	06/18/1992	REPLENISHMENT SYSTEM FOR COLOUR PAPER DEVELOPER	TWIST , PETER J.
07856056	Not Issued	166	05/07/1992	LOW EFFLUENT REPLENISHMENT SYSTEM FOR COLOUR NEGATIVE DEVELOPERS	TWIST , PETER J.
07852230	5279930	150	05/29/1992	REPLENISHMENT SYSTEMS	TWIST , PETER J.
07839760	5260184	150	04/07/1992	METHOD OF FORMING A PHOTOGRAPHIC COLOUR IMAGE	TWIST , PETER J.
07597977	Not Issued	161	10/11/1990	METHOD AND APPARATUS FOR PROCESSING PHOTOGRAPHIC COLOR MATERIALS	TWIST , PETER J.
07313107	4983504	150	02/21/1989	METHOD AND APPARATUS FOR PROCESSING PHOTOGRAPHIC COLOR MATERIALS	TWIST , PETER J.
06594945	4482626	150	03/30/1984	PHOTOGRAPHIC COLOR DEVELOPER COMPOSITIONS	TWIST , PETER J.
06474772	Not Issued	166	03/14/1983	PHOTOGRAPHIC COLOR DEVELOPER COMPOSITIONS	TWIST , PETER J.

Search and Display More Records.

Search Another: Inventor

Last Name	First Name	
TWIST	PETER	Search

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SECOND STATUS INQUIRY	Application #	10/182,373
	Confirmation #	8561
	Filing Date	10/25/2002
	First Inventor	WORSLEY
	Art Unit	1751
	Examiner	Unassigned
	Docket #	P07695US00/RFH

Commissioner for Patents
Washington, D.C.

S I R:

A first Status Inquiry (copy attached) was filed on February 24, 2004. Since the PTO has not replied to that Status Inquiry, it is again respectfully requested that undersigned be advised of an approximate date of examination for the above-identified application.

Respectfully submitted,

Date: August 24, 2004

By: Ross F. Hunt, Jr.
Registration No.: 24,082

STITES & HARBISON, PLLC • 1199 North Fairfax St. • Suite 900 • Alexandria, VA 22314 • (703) 739-4900

1

STATUS INQUIRY	Application #	10/182,373
	Confirmation #	8561
	Filing Date	10/25/2002
	First Inventor	WORSLEY
	Art Unit	1751
	Examiner	Unassigned
	Docket #	P07695US00/RFH

Commissioner for Patents
Washington, D.C.

S I R:

Please advise undersigned attorney of an approximate date of examination for the above-identified application.

Respectfully submitted,

Date: February 24, 2004

By: Ross F. Hunt, Jr.
Registration No.: 24,082

STITES & HARBISON, PLLC • 1199 North Fairfax St. • Suite 900 • Alexandria, VA 22314 • (703) 739-4900

1

U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
10/182,373	Andrew Peter Worsley	P07695US00/RFH

INTERNATIONAL APPLICATION NO.	
PCT/GB01/00381	

I.A. FILING DATE	PRIORITY DATE
01/30/2001	01/31/2000

00881
LARSON & TAYLOR, PLC
1199 NORTH FAIRFAX STREET
SUITE 900
ALEXANDRIA, VA 22314

CONFIRMATION NO. 8561
371 ACCEPTANCE LETTER

OC000000009543867

Date Mailed: 02/21/2003

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.494 OR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as an Elected Office (37 CFR 1.495) , has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

10/25/2002	10/25/2002
DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS	DATE OF RECEIPT OF ALL 35 U.S.C. REQUIREMENTS

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** *The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363).* Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- U.S. Basic National Fee
- Assignee Statement
- Copy of references cited in ISR
- Copy of the International Application
- Copy of the International Search Report
- Information Disclosure Statements
- Oath or Declaration
- Preliminary Amendments

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

PAULETTE R KIDWELL
Telephone: (703) 305-3656

PART 3 - OFFICE COPY

FORM PCT/DO/EO/903 (371 Acceptance Notice)

DEP & REF refund
Room 307

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of: WORSLEY ET AL.   Patent

Serial No.: 10/182,373   Examiner: Unassigned

Filed: July 29, 2002   Art Unit: Unassigned

For: TECHNICAL AND THEORETICAL SPECIFICATIONS   Docket No.:

FOR WARP DRIVE ...   P07695US00/RFH

REQUEST FOR REFUND (SMALL ENTITY)

Honorable Commissioner for Patents
Washington, D.C.
S I R:

    A full fee was paid in the application within the preceding three months as follows:

    Amount of Fee: $ 130.00 $65

    Date Fee Paid: October 25, 2002

    Purpose of Fee: Surcharge for late Declaration.

    Applicant was and is entitled to small entity status. Therefore, pursuant to 37 CFR
1.28(a), it is requested that a 50% refund of the foregoing fee be credited to Deposit
Account No. 12-0555. It is further requested that counsel be advised of the credit and a
copy of this request is enclosed for this purpose.

<div align="right">Respectfully submitted,</div>

Date: January 24, 2003

By: Ross F. Hunt, Jr.
Reg. No.: 24,082

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DT06 Rec'd PCT/PTO 25 OCT 2002

Customized FORM PTO-1390   U.   RTMENT OF COMMERCE PATENT & TRADEMARK O
(REV. 12-2001)

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371	ATTORNEY DOCKET NO. P07695US00/RFH
	U.S. APPLICATION NO. *(If known. see 37CFR 1.5)* 10/182,373

INTERNATIONAL APPLICATION NO. PCT/GB01/00381	INTERNATIONAL FILING DATE 30 January 2001	PRIORITY DATE CLAIMED 31 January 2000

TITLE OF INVENTION: TECHNICAL AND THEORETICAL SPECIFICATIONS FOR WARP DRIVE ...

APPLICANT(S) FOR DO/EO/US: WORSLEY ET AL.

Applicant herewith submits to the US Designated/Elected Office (DO/EO/US) the following items and other information:

___ 1. This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.

X 2. This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 USC 371.

___ 3. This is an express request to begin national examination procedures (35 USC 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.

___ 4. The US has been elected by the expiration of 19 months from the priority date (Article 31).

___ 5. A **copy** of the International Application as filed (35 U.S.C. 371 (c)(2))
    a. is attached hereto (required only if not communicated by the International Bureau).
    b. has been communicated by the International Bureau.
    c. is not required, as the application was filed in the United States Receiving Office (RO/US).

___ 6. An English **translation** of the International Application as filed (35 U.S.C. 371(c)(2)).
    a. is attached hereto.
    b. has been previously submitted under 35 U.S.C. 154(d)(4).

___ 7. Amendments to the claims of the International Appln. under PCT Article 19 (35 USC 371 (c)(3))
    a. are attached hereto (required only if not communicated by the International Bureau).
    b. have been communicated by the International Bureau.
    c. have not been made; however, the time limit for making such amendments has NOT expired.
    d. have not been made and will not be made.

___ 8. An English translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

X 9. An **oath** or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).

___ 10. An English translation of the annexes to the Int'l Pre. Exam. Report under PCT Article 36 (35 USC 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

X 11. An **Information Disclosure Statement** under 37 C.F.R. 1.97 and 1.98.

X 12. An **Assignment** document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.

___ 13. A **First preliminary amendment**.

___ 14. A Second or Subsequent preliminary amendment.

___ 15. A substitute specification.

___ 16. A change of power of attorney and/or address letter.

___ 17. A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 & 35 USC 1.821-825.

___ 18. A second copy of the published international application under 35 USC 154(d)(4).

___ 19. A second copy of the English translation of the international application under 35 USC 154(d)(4).

X 20. Other items or information:
    X A copy of the Notification of Missing Requirements under 35 U.S.C. 371.

X In the event that a petition for extension of time is required to be submitted herewith, and in the event that a separate petition does not accompany this response, applicant hereby petitions under 37 CFR 1.136(a) for an extension of time of as many months as are required to render this submission timely. Any fee is authorized in 21(c).

Date: October 25, 2002

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U.S. APPLICATION NO. (I/k/a) 10/182,373	INTERNATIONAL APPLICATION NO. PCT/GB01/00381	ATTORNEY DOCKET NO. P07695US00/RFH

X 21. The f ll wing fees are submitted:	CALCULATIONS *PTO USE ONLY*

Basic National Fee (37 CFR 1.492 (a) (1)-(5):

____ Neither Int'l Prelim. Exam. Fee nor Int'l Search fee paid to USPTO	$1040	
____ Search Report has been prepared by the EPO or JPO	$ 890	
____ No Int'l Prelim. Ex. fee paid to USPTO but Int'l Search fee paid to USPTO	$ 740	
____ International preliminary examination fee paid to USPTPO	$ 710	
____ Int'l Prelim. Ex. Fee paid to USPTO & all claims satisfied PCT Art. 33(1)-(4)	$ 100	

ENTER APPROPRIATE BASIC FEE AMOUNT =	$	

X Surcharge of $130 for furnishing the oath or declaration later than ____ from the earliest claimed priority date (37 CFR 1.492(e)).	[ ] 20 mos. [ ] 30 mos. +	$ 130	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total Claims	6 - 20 =	0	X $18 =	$	
Independent Claims	2 - 03 =	0	X $84 =	$	
____ Multiple Dependent Claim(s) (if applicable)			+ $280 =	$	

TOTAL OF ABOVE CALCULATIONS =	$ 130	

____ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by ½.	-	$	

SUBTOTAL =	$ 130	

____ Processing fee of $130 for furnishing the **English translation** later than from the earliest claimed priority date (37 CFR 1.492(f)).	[ ] 20 mos. [ ] 30 mos. +	$	

TOTAL NATIONAL FEE =	$ 130	

X Fee for recording the enclosed **assignment** (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). $40 per property	+	$ 40	

10/29/2002 MKAYPAGH 00000026 10182373

TOTAL FEES ENCLOSED =	$ 170.00	

01 FC:1617   130.00 OP

Amount to be	Refunded	$
	Charged	$

X a. A **check** in the amount of $170.00 to cover the above fees is enclosed.

____ b. Please charge my Deposit Account No. 12-0555 in the amount of $ to cover the above fees.

X c. The Commissioner is hereby authorized to charge any additional fees which may be required, or credit overpayment to Deposit Account No. 12-0555.

Note: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO: At the address (below) of **CUSTOMER NO. 00881:** **LARSON & TAYLOR, PLC** **1199 NORTH FAIRFAX ST.** **SUITE 900** **ALEXANDRIA, VA 22314**	Signature: Name: Ross F. Hunt, Jr. Reg. No.: 24,082 Phone No.: 703-739-4900 Date: October 25, 2002

IN THE UN⬤D STATES PATENT AND TRADEM⬤K OFFICE

In re patent application of: WORSLEY ET AL.

Serial No.: 10/182,373	Examiner Unassigned
Filed: July 29, 2002	Art Unit Unassigned
For: TECHNICAL AND THEORETICAL SPECIFICATIONS	Docket # P07695US00/RFH

25 OCT 2002

FOR WARP DRIVE TECHNOLOGY

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
Washington, D.C. 20231
SIR:

This IDS is submitted herewith pursuant to 37 CFR. §1.97-1.98 and includes the following:

__X__ A listing of the references on PTO-1449.
__X__ A copy of references which have come to applicant's attention.
__X__ A copy of a corresponding foreign Search Report explaining the relevance of those references.
.... A separate explanation of relevance.

Please note the following particulars concerning the filing of this IDS:

__X__ This IDS is filed **within three months** of the filing date of a national application other than a CPA, or within three months of the date of entry into the national stage as set forth in 37 CFR. §1.491 in an international application, or before the mailing date of a first Office Action on the merits, or before the mailing of a first Office Action after the filing of a request for continued examination, whichever event occurs last.

.... This IDS is filed **after a first action**, but <u>before</u> a final action, allowance, or any other action which closes prosecution, **and**:
.... is accompanied by a check in the amount of $180.00 required by 37 CFR. §1.17(p).

Or

.... I hereby state that each item of information contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this IDS.

.... I hereby state that no item of information in this IDS herewith was cited in a communication from a foreign patent office in a counterpart foreign application, or, to my knowledge after making reasonable inquiry, was known to any individual designated in 37 CFR. §1.56(c) more than 3 months prior to the filing of this IDS.

.... An appropriate statement is attached.

.... This IDS is filed **after a final action or allowance**, but on/<u>before</u> payment of the issue fee, **and**:

.... is accompanied by a check in the amount of $180.00 required by 37 CFR. §1.17(p).

And

.... I hereby state that each item of information contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this IDS.

.... I hereby state that no item of information in this IDS herewith was cited in a communication from a foreign patent office in a counterpart foreign application, or, to my knowledge after making reasonable inquiry, was known to any individual designated in 37 CFR. §1.56(c) more than 3 months prior to the filing of this IDS.

.... An appropriate statement is attached.

.... This IDS is being filed pursuant to 37 CFR. §1.97(i), **for placement in the file**.

X If no check is enclosed and a fee is due in connection with this communication or if the check enclosed is insufficient, the Commissioner is authorized to charge any fee or additional fee due with this communication to Deposit Account No. 12-0555.

Respectfully submitted,

Date: October 25, 2002

By: Ross F. Hunt, Jr.
Registration No.: 24,082

LARSON & TAYLOR, PLC • 1199 North Fairfax St. • Suite 900 • Alexandria, VA 22314

Substitute for Form 1449A/PTO	Application No.: 10/182,373
INFORMATION DISCLOSURE STATEMENT BY APPLICANT Sheet 1 of 1	Filing Date: July 29, 2002 First Named Inventor: WORSLEY Group Art Unit: Unassigned Examiner Name: Unassigned Attorney Docket No.: P07695US00/RFH

U.S. PATENT DOCUMENTS

Exam. Initial*	Document No. Number - Kind	Publication Date MM-DD-YYYY	Name Patentee or Applicant	Relevance Passages or Figures
	3,610,971	10-05-1971	Hooper	

FOREIGN PATENT DOCUMENTS

Exam. Initial*	DOCUMENT Country-Number-Kind	Publ. Date MM-DD-YYYY	Name Patentee or Applicant	Relevance Passages/Figures	Trans-lation
	WO 98/23976	06-04-1998	Schnurer		
	DE 19832001	07-16-1998	Bettels		

OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS

Exam. Initial	Author Name (in CAPS), Title of Article/Item, Date, Page(s), Volume-Issue No., Publisher, City and/or Country where published	Trans-lation
	MODANESE ET AL.; "Possible quantum gravity effects in a charged Bose condensate under variable e.m. field"; arXiv:gr-qc/9612022 v4, 19 February 1998	
	PODKLETNOV; "Weak gravitation shielding properties of composite bulk $Bya_2Cu_3O_7 \chi$ superconductor below 70 K under e.m. field"; arXiv:cond-mat/9701074 v3, 16 September 1997	
	PODKLETNOV ET AL.; "A possibility of gravitational force shielding by bulk $Yba_2Cu_3O_{7-\chi}$ superconductor"; Physica C, vol. 203, 1992, pages 441-444.	
	STIRNIMAN; "Electrogravitics Reference List"; http://www.eskimo.com/~bilb.freenrgl.gravres2.html; 1 March 1996	

Examiner Signature		Date Considered	

* Examiner: Initial if considered, whether or not citation is in conformance with MPEP §609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to the applicant.

(51) International Patent Classification [6] :		(11) International Publication Number:	**WO 98/23976**
G01V	A2	(43) International Publication Date:	4 June 1998 (04.06.98)

(54) Title: IMPROVED APPARATUS AND METHOD FOR GRAVITATIONAL MODIFICATION

(57) Abstract

    A method and apparatus for gravitational modification is described. The prior art has discovered that a rotating high temperature ceramic superconductor cooled below 70 °K creates a gravitational "shielding" effect. The present invention substantially improves the prior art by, instead of rotating a superconductor material, holding the material fixed in a varying magnetic field to maximize the continuous variation of the distribution, location and configuration of circulating currents so as to continuously vary the sites of transition of the material between more stressed and less stressed conditions of circulating currents to produce a gravitational alteration effect which, in a superconductor corresponding to sites transitioning between superconducting and normal conducting states, produces an even more pronounced gravitational alteration effect.

IMPROVED APPARATUS AND METHOD FOR GRAVITATIONAL MODIFICATION

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority under 35 U.S.C. §
119(e) from U.S. Provisional Application No. 60/031,108,
filed November 14, 1996, by applicant John H. Schnurer
entitled IMPROVED APPARATUS AND METHOD FOR GRAVITY
MODIFICATION. The invention description contained in that
provisional application is incorporated by reference into
this description.

BACKGROUND OF THE INVENTION

Gravity shielding, often referred to as anti-gravity,
but probably more accurately referred to as a gravity
modification (or alteration) effect, has been long searched-
for. The prior art has long speculated that some of the as
yet not-well-understood effects of Einstein's General Theory
of Relativity might create a distortion in gravity of which
practical use might be made.

Classically gravity is defined as "The universal
attraction existing between all material bodies." To be
able to modify gravity is a valuable intellectual property.
There are theories regarding gravity, its mechanism of
behavior and its interrelationship with other forces.
Notable theorists include Einstein. The exact mechanism of
gravity and its position within a Unified Field Theory are
yet to be defined.

It is clear any modification or control of gravity is
important. The invention is not, per se, intended to address
the theoretical mechanism of gravity but instead addresses
the exploitation of modification of gravity and other effects
including but not limited to propulsion without reaction mass
and energy effects and conversions. The background art and
experimental physics work indicate a few fundamental and
germane concepts.

motion and the motion or lack of motion of the gyroscopic assembly as a whole.

The work of Rex Schlicher regarding his Non linear Electromagnetic Propulsion System and Method, U.S. Patent 5,142,861, teaches n asymmetrical antenna or array of conductors can cause thrust or propulsion under conditions of proper and appropriate excitation of electric currents. This work demonstrates a reduction to practice of propulsion without reaction mass.

There are several important aspects of this method which are germane to the history and background of gravity modification. These include but are not limited to the following. There is a commonality with the gyroscope and Dr. Podkletnov's work in that the path of forces form curves.

In the work of Schlicher electric and magnetic fields and again there are curves. Rapid changes are employed to allow the effect to obtain and rapid circulation of current in Schlicher's method is important to allow the effect to obtain. The effect can be realized at room temperature, at cryogenic temperature and with superconductors at cryogenic temperatures.

It is clear from the above that different realizations of the fundamental conditions listed can and do have effects on gravity and propulsion without reaction mass.

Any method which more effectively allows control or modification of gravity or propulsion without requirement or reaction mass is of great value.

All rocket and ion propulsion systems in use today for motion in space or for commercial applications such as satellite station keeping require reaction mass. Mass is expelled from the rocket nozzle and the rocket moves in the opposite direction. This is usually stated as "For every action there is an equal and opposite reaction."

still only an experimental setup, require a spinning superconductor material to produce gravitational shielding at the higher reported levels. While mechanically spinning apparatus can produce large-scale commercially practical results, as in large power plant turbines, mechanical apparatus are not as easily controlled or scaled-up as more purely electrical apparatus. Thus it is seen that there is a need for an improved apparatus and method for gravitational shielding which can produce higher levels of gravitational "shielding" and which eliminate the need for mechanically rotating parts.

The parameters under which the gravity shielding effect is seen, as reported by Podkletnov et al., are not well-understood. Thus it is also seen that there is a need for a better understanding of the parameters that must exist for the gravity shielding effect to maximally occur so that future apparatus and methods may be designed to control those parameters and enhance the gravity modification effect.

The term "mashing" is now introduced. All materials, superconductor, normalconductor, conductor, dielectric, semiconductor and mixed systems are, to a greater or lesser degree, affected by fields including but not limited to electric and magnetic fields. The materials exhibit a resistance to change in state, amplitude and disposition of the fields.

In general a local change will cause local effects and also effects in adjacent areas and in some cases local change will result in change in the whole body of the material. Very rapid changes of a certain combination of magnitude and rate of change and disposition will cause unusual and important effects to occur in many materials. A notable example is that of soliton effects. In general the more rapid the change the more strenuous is the resistance to change. The term "mashing" refers to the act of making the

can be achieved without mechanical rotation of the
superconductor material.

Another advantage of the present invention is that the
superconducting material can be any shape.

A further advantage of the present invention is that it
shows that liquid nitrogen can be used in place of the more
expensive and less readily available liquid helium.

SUMMARY OF THE INVENTION

The three unique discoveries of this invention are: (1)
a superconductor does not need to be rotated inside an
alternating (or varying) electromagnetic field, or a
relatively fixed levitating electromagnetic field, as taught
by Podkletnov et al., to produce a gravity-altering effect,
but that only a supercurrent need be first established inside
a superconductor (either simply by exposing a superconducting
material to a magnetic field or by actually passing a current
through the superconducting material by a direct electrical,
or ohmic, connection and the electromagnetic field created by
that supercurrent then be "mashed" by application of a
varying externally applied electromagnetic field; (2) the
gravity-altering effect occurs as the superconductor material
passes through or near to a transition state between
superconducting and non-superconducting; and, (3) both the
"mashing" of the first discovery and the transition states of
the second discovery can be achieved by a variety o f methods
to both initiate and control the gravity modification effect.

Accordingly, the present invention is directed to a
method for altering or modifying gravity, comprising the
steps of creating a circulating superconducting current
inside a superconducting material or non-superconducting
material, whereby the circulating superconducting current or
normal circulating current creates a magnetic field, and,
while the material passes through a transition state between
superconducting and non-superconducting, stressing the

entire assembly. Control pass elements 70 are marked A, B, and C.

DETAILED DESCRIPTION

FIG. 1 is a top view of the excitation assembly. An insulator 10 is a mechanical substrate to support magnetic field pole pieces 20.

This is the top view of an assembly for exciting Effect in an inexpensive sintered Type II YBCO. The circle is a disk of insulator 47 mm in diameter. The shaded areas are nickel-iron alloy magnetic pole pieces which are laminated and measure 7 mm by 7 mm and prior to shaping into right-angle pole pieces each lamination is 41 mm long and 0.17 mm thick. YBCO superconductor, to be called YBCO, is used and may be circular or of irregular shape. Instead of requiring mechanical rotation a field is produced which in effect rotates. This is done by sequentially actuating a nominal 3 electromagnets.

The electromagnets use permeable iron alloy core pieces which are shaped to have right angle and the winding is near the bend of knee of the pole piece.

In a reduction to practice the mashing fields were used as Synthetically rotated fields. A set of a nominal 3 pole pieces 20 was equally disposed about the circumference of a circular insulating spacer 10. The spacer 10 acts as a support of the pole pieces 20. The spacer in the reduction to practice is made out of wood and can be made out of other materials and still function. Each of the 3 pole pieces, number 20 of FIG. 1 and number 22 of FIG. 2 is connected to a circuit which can actuate the pole pieces or solenoids independently.

FIG. 2 shows a side view of the same assembly in FIG. 1. Only one of the three magnetic pole pieces 22 are shown in this drawing for the purposes of simplicity. The shaded

In our realization this is a benefit. The multiple "make-and-break" switching action produces wide band and high frequency excitation.

When the solenoid is energization is removed the reeds snap apart and there is a brief time interval of arcing or plasma between the contacts and this too is rich in high frequency components. An additional benefit is fields with abrupt rise and collapse times.

The mechanical make and break action is not required for effect but there is empirical evidence the abrupt establishment and collapse of the fields is affected by the material being excited.

There is a coupled system including but not limited to the YBCO and its fields and dynamic aspects of its fields, the fields established by the solenoidal windings, the coupling of the pole pieces to the YBCO and the reed switching action.

The new method is usable with both different shapes of YBCO, symmetrical and asymmetrical. In the work test weights or targets were used and the actions of the conditions above produced the Effect and the Effect scaled with weight.

An important discovery was made in that the Effect was able to manifest itself on the YBCO alone. This is due to the shallow penetration of fields into the YBCO. In non superconductors based methods the skin effect can be exploited to enable the shallow penetration.

FIG. 3 shows a representation of circulating currents within the YBCO. The top of the drawing shows three circulating sets. In actuality the circulation is many sets. Some aspects of the circulation are the tiny features of individual fluxoids and some aspects are macroscopic and, further, it is believed there are macroscopic currents and fields' behavior of many types.

Type II superconductors there are known to form a multitude of tiny vortex or spinning field areas. Larger changing and-or accelerating and decelerating and-or rotationally active areas can be present and are also known. Circulating currents are well known in non superconductors and important fields' effects occur in dielectric materials.

It is not required for a given material to be of a certain

specific shape to exhibit fields' motion which results in the Effect.

It is not required a given material or combination of materials to be solely superconducting or non superconducting. In fact in some cases of realizing the effect which have been reduced to practice it is desirable to have mixed SCE, or superconducting electrons and NCE or normalconducting electrons.

Effect is not specifically dependent on shape, not specifically dependent on material, and not specifically dependent on excitations, in other words the excitations can be realized as magnetic, electric, electromagnetic, charge and-or motion and-or combination or change in any of the above.

Prior Art is limited to certain materials. A reduction to practice which embraces aspects of all of the above can be realized in a single reduction to practice.

How it works:

The entire assembly is submerged in commonly available and relatively inexpensive liquid nitrogen. The temperature of boiling liquid nitrogen is 77K. Superconductors of the common YBCO sintered type used are superconducting above this temperature. This means that the liquid nitrogen is cold enough to allow SCE, or superconducting electrons to obtain.

is very great, both for establishment of field and collapse
of field. The use of very highly permeable nickel-iron alloy
enhances the effect.

The relays are driven by diode snubber protected power
MOSFET transistors and the transistor are controlled by
single chip digital IC decoded output counting circuit. The
counting circuit is clocked by the VCO or Voltage Controlled
Oscillator section of a phase locked loop IC. The counter
used is the common CMOS 4017 and the phase locked loop VCO,
or Voltage Controlled Oscillator, section is part of the
common CMOS 4046. Both are Integrated Circuits and cost less
than one dollar at the time of this writing. The transistors
are common Motorola P5N05 MOSFET types. Thus two ICs and
three transistors driving 3 relays comprise a fully isolated
and adjustable drive with rapid rise and fall times.

The relays provide an interruption which has components
in the frequency domain which are broad band and high
frequency. This is very important as many possible variables
are excited by this method. The "mashing" in this case is
quite abrupt. Equally important the macroscopic physical
location of the site of the mashing and transitional effects
rapidly leaps from one location to the next.

The counter causes each segment of the three pole pieces
to be energized in sequence. This creates what is known as
a "rotating magnetic field". The field does not, per se,
rotate but its position in space and time changes
rotationally. This concept and method was introduced by
Nikola Tesla and is in use to cause physical rotation in
millions of motors in use today. In its generic description
this would be called a 3 phase motor driver.

The superconductor does not have to be physically
rotated, but rather the fields' location are rotated. SCE
and NCE are present at the same time due to the choice of the

electromagnetic field created by the levitating
electromagnets, or coils.

The present invention includes the discovery that once a
supercurrent is established inside a superconducting
material, the electromagnetic field which imposed that
supercurrent can be removed and a varying external
electromagnetic field introduced to "mash" the
electromagnetic field created by the supercurrent and cause
the gravity-altering effect. Thus, Podkletnov et al.'s
apparatus and method can be substantially simplified by, for
example, making the superconductor material any shape,
holding the superconducting material fixed, eliminating the
driving solenoids, and then varying the timing of the current
variously delivered to the three levitating coils (which are
no longer needed for Meissner effect levitation) such that,
after a supercurrent is first introduced inside the
superconductor material, the varying electromagnetic field
created by the levitating coils mashes the electromagnetic
field created by the supercurrent inside the superconductor
material. Any conventional controller may be used to drive
the levitating coils in a sequential or non-sequential
pattern. The pattern need not be sequential so as to emulate
the effect of the spinning superconducting disk. Also, the
externally applied magnetic field may come from any source,
and is not limited to the three levitating coils taught by
Podkletnov et al.

The present invention also includes the discovery that
the gravity modification effect occurs as the superconducting
material transitions, or is in an intermediate state, between
superconducting and non-superconducting states and by change
in location of the intermediate state in scale of atomic
distances to micro and macro scales. Podkletnov et al.
achieved their results by cooling the superconductor material
with liquid helium vapor to reach a critical temperature of

superconduction electrons (SCE) for the effect to occur.
Podkletnov et al. achieve this by making a large HTC disk and
then intentionally converting a thin layer, roughly 1 mm to 2
mm of a 10 mm thick disk, to a largely non-superconducting
phase of the YBCO. This expensive and exacting fabrication
is not required. There are several ways, and combinations of
those ways, to achieve the required interaction of NCE and
SCE. One way is to allow the material to warm to near the Tc
temperature which results in some of the material being able
to support each of the two states, NCE and SCE. The warming
can be as a result of straight "mechanical" temperature
manipulation or, as what likely triggered the effect in the
Podkletnov et al. experiments, from local heating due to
induced fields or fields trapped in the material. Another
way is to raise the fields and/or supercurrents to force some
of the SCE sites to a NCE state. Another way is to allow a
material other than converted YBCO to be paired or mixed
with, or near to, the YBCO. A key realization is that no one
of these methods is required to produce a gravity
modification effect, nor even that a stressor be introduced
to force the superconductor material into a transition or
intermediate state, but only that such a transition or
intermediate state be created by any means and the location
of that transition be changed.

Although so far only YBCO, a Type II superconductor
material, has been shown to produce the observed gravity-
altering effect, other superconductor materials may also
work, including at higher temperatures. For example, bismuth
has been observed to act as a superconducting material at
near room temperatures. Because the effect appears to occur
near to or in a transition state between superconducting and
non-superconducting, there is reason to believe that the
effect can be produced at any temperature at which that
transition state may occur, even at higher temperatures than

variation of that could be based on the prior concept of superconductor pinning sites. Pining sites are intended to trap or localize 'vortices' or 'noise' in HTCs. In a multistructure superconductor disk, a next layer of NCE material can be intentionally made to cause or aggravate this "noise of many vortices." It could simply be a piece of brass or copper screen. This would then result in many closed loops of sharp or square topology, causing exaggerated fringe field effects at the corners. This induces many loops, or vortices of little circulating pools within the HTC. While not a condition desirable for power transmission, motors, electronic signal processing, etc., it appears to satisfy the unusual requirements for gravity modification. Further, a next layer may or may not be required to induce or convey or control such induced changes, or may be needed to establish an initial fields vortex action.

In newer work according to the teachings of the present invention, it appears that a simple scoring, a set of grooves, or even grid work or cross-hatching carved into a Type II HTC may be enough to create the effect, thereby eliminating the brass screen or supplementing it.

In other newer work, silver was added to the HTC, in an effort to provide NCE, as an alternative to the complex heating and fabrication of Podkletnov et al., and appears to work. Silver was chosen because it will not poison YBCO HTC, but any thin metal foil may work, particularly if there is an inter- or buffer layer between the HTC and the other material.

That the described invention includes creating complex fields to mimic the effect of a superconductor material rotating within a varying field, that is, a "mashing" field, does not mean that large field movements are required to modify gravity. It more likely indicates that such field

the supercurrent. Among other advantages, this allows the
disk to be held closer to the levitating magnets, or
alternatively, to the source of the electromagnetic
"mashing," than is shown in the prior art, thus increasing
the field in the disk and the amount of gravitational
shielding.

Referring now to the work of the honorable Dr. Eugene E.
Podkletnov, rotating or spinning superconductors, under
certain conditions and influenced by certain fields, cause
gravity alteration. The exact mechanism is still under
investigation. This is a clear example of interactions of
matter and fields.

Dr. Podkletnov's work requires large carefully balanced
disks or toroidal structures of a Type II superconductor of
Yttrium Barium Copper Oxide, to be called YBCO. The YBCO
disk or toroid is operated in a cryostat in the vapors of
liquid helium. This is a complex and expensive
requirement. The disk or toroid is cause to physically
rotate while being levitated by magnetic fields. At
certain rotational rates gravity above the disk or toroid
is reduced. Dr. Podkletnov has used the term "shielded" to
describe the effect. High frequency high power inductors are
the method used to rotate the disk or toroid. Other magnetic
field generating inductors are used to provide the
levitation and to control the rate of rotation by means of
braking when required.

The disk or toroid have two types of YBCO structure in
them. The orthorhombic, or simply "ortho" and the tetragonal
or "tetra". And exacting and clever method is used to make
the disk or toroid of high quality ortho YBCO. Ortho YBCO
is a superconductor at liquid nitrogen temperatures. Part of
the ortho structure is intentionally converted to the tetra
phase. This is intentional. Tetra YBCO is not a
superconductor at liquid nitrogen temperatures. Thus, within

science and the study of interactions of and interrelationships between these disciplines.

Empirical reduction to practice has revealed several important and unique aspects of realizing the effect. A catalog of the revelations follows but is in no way intended to be limiting:

Excitation fields can be used in steady state or a time variant manner.

Steady state fields were applied with permanent magnets to YBCO of different types including sintered, melt textures high performance articles, circular and irregular shapes and the YBCO types under various condition of distance, conditions of temperature and conditions of duration.

The effect occurred in several instances. The different YBCO types were exposed to different time variant fields including but not limited to reciprocal or "back and forth" fields.

In early work with YBCO as a gravity modification element the YBCO was subjected to time variant magnetic fields. The pole piece of the field generator was singular and fixed. The field did not per se rotate as in later versions but oscillated from one side of the pole piece to another. In effect this motion, then, can be described as "back and forth".

Having described the present invention in detail and by reference to preferred embodiments, it will be apparent that modifications and variations are possible without departing from the scope of the invention defined in the claims.

Fig. 1

2∅

1∅

Fig. 3

PCT

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: IMPROVED APPARATUS AND METHOD FOR GRAVITATIONAL MODIFICATION

(57) Abstract

The prior art has discovered that a rotating high temperature ceramic superconductor cooled below 70 °K creates a gravitational "shielding" effect. The present invention differs by instead of rotating a superconductor material the material is held fixed in a varying magnetic field to maximize the continuous variation of the distribution, location and configuration of the circulating currents so as to continuously vary the sites of transition of the material between more stressed and less stressed conditions of circulating currents to produce a gravitational alteration effect which, in a superconductor corresponding to sites transitioning between superconducting and normal conducting states, produces an even more pronounced gravitational alteration effect. The apparatus includes an excitation assembly in which an insulator (10) is a mechanical substrate to support magnetic field pole pieces (20).

A.	CLASSIFICATION OF SUBJECT MATTER

IPC(6)   : H01F 6/00
US CL   : 335/216

According to International Patent Classification (IPC) or to both national classification and IPC

B.	FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 335/216

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C.	DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,142,861 A (SCHLICHER ET AL.) 01 September 1992 (01/09/92), see entire document.	1-3
A	US 5,093,313 A (MINOVITCH) 03 March 1992 (03/03/92), col.14, line 67 - col.15, line 1.	1-3
A,T	US 5,698,623 A (JACOBS) 16 December 1997 (16/12/97), col.7, line 64 - col. 11, line 12.	1-3

☐ Further documents are listed in the continuation of Box C.   ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance		
"E"	earlier document published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)		
		"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09 MARCH 1998	1 5 MAY 1998

Name and mailing address of the ISA/US	Authorized officer
Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	TOM NOLAND
Facsimile No. (703) 305-3230	Telephone No. (703) 305-4766

Form PCT/ISA/210 (second sheet)(July 1992)*

BOX I. OBSERVATIONS WHERE CLAIMS WERE FOUND UNSEARCHABLE

1. Subject matter not required to be searched by this ISA, namely:

Claims 1-3 were not in compliance with PCT Article 6 in that they are not fully supported by the description in that although the description also describes a method for allegedly altering or modifying gravity by the use of a superconducting current such a method appears to have no conventional basis from commonly accepted and evidence supported laws of physics. Therein conventional theory is believed to suggest that gravitational fields are due to the presence of matter and there is no known relationship or effect due to electromagnetic effects of superconductors upon gravity per se although both gravitational and electromagnetic fields can act together in a given region. This is not the same as one altering the other however. Although Applicant on page 4 of the specification cites several articles, some unpublished, alleging to support gravitational force shielding by superconductors from the limited description thereof they do not appear to show that the existence of such a phenomena has been well established by repeated independent experimental evidence. Likewise the limited but unclaimed disclosure of similar speculations of such phenomena in the discussion following Example 7 in US patent no. 5,698,623, to be cited as background art, published after Applicant's filing date appear somewhat speculative. Even assuming that it can be shown that such superconductor effects can modify gravity the claims are still non-statutory because applicant is claiming only a theoretical effect without showing how in actual practice it would be carried out. There is no disclosure of how to actually maximize such a gravity modification as claimed except for avague instruction to induce and vary or change currents in the material. Specifics as to how such a change would be done and the manner of varying are not set forth.

BOX I. OBSERVATIONS WHERE CLAIMS WERE FOUND UNSEARCHABLE

2. Where no meaningful search could be carried out, specifically:

Since claims 1-3 appear to be claiming nonstatutory subject matter for the reasons above no meaningful search can be done since the common search tools are directed to searching statutory material. Additionally as set forth above it was unclear exactly what was to be searched since the details of how the methodswere accomplished were not disclosed or claimed.

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======  EPODO       ======
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TI   - Positive◯negative gravity field productio◯ forcing electron current
       flowing in superconductor, into spiral path with several narrowly
       adjacent windings

AB   - The method involves producing a positive or negative field of gravity
       through a movement of electrons which produces a levitation effect. The
       electrons of an electron current flowing in a superconductor, are forced
       into a spiral path with several narrowly adjacent windings. A rotation-
       symmetric body with at least one conductor in a superconductive condition,
       is forced into fast rotations, such that the electrons flow in this
       conductor. An Independent claim is provided for a corresponding
       arrangement for producing a field of gravity field.

PN   - DE19832001 A 20000120
AP   - DE19981032001 19980716
PR   - DE19981032001 19980716
PA   - BETTELS PETER (DE)
IN   - BETTELS PETER (DE)
EC   - H02N15/00
CT   - DE4418458 A1 [ ]
CTNP - [ ]   FALK, G. u. RÜPPEL, W.: Mechanik, Relativität, Gravitation,
       Springer-Verlag Berlin, Heidelberg New York 1973, S. 367-374
       u. S. 406-407;
       - [ ]   K]PFM]LLER, K.: Einführung in die theoretische
       Elektrotechnik, Springer-Verlag Berlin,Heidelberg New York
       1965, S. 49-54;
       - [ ]   BORMANN, R.: Supraleitung, Theorie und Anwendung Funkschau
       1972, H. 6, S. 173-175
DT   - *


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======    WPI      ======
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TI   - Positive or negative gravity field production by forcing electron current
       flowing in superconductor, into spiral path with several narrowly
       adjacent windings

AB   - DE19832001 NOVELTY - The method involves producing a positive or negative
       field of gravity through a movement of electrons which produces a
       levitation effect. The electrons of an electron current flowing in a
       superconductor, are forced into a spiral path with several narrowly
       adjacent windings. A rotation-symmetric body with at least one conductor
       in a superconductive condition, is forced into fast rotations, such that
       the electrons flow in this conductor.
       - DETAILED DESCRIPTION - An INDEPENDENT CLAIM is provided for a
       corresponding arrangement for producing a field of gravity field.
       - USE - Especially in industrial process for manufacture of certain
       products.
       - ADVANTAGE - Enables reduction of gravity at predetermined location to
       produce corresponding levitation effect.
       - DESCRIPTION OF DRAWING(S) - No drawing is supplied.
       - (Dwg.0/0)

PN   - DE19832001 A1 20000120 DW200016 H02N15/00 004pp
PR   - DE19981032001 19980716
PA   - (BETT-I) BETTELS P
IN   - BETTELS P
MC   - V02-E02X1 X12-C05
DC   - V02 X12
IC   - H02N15/00
AN   - 2000-172134 [16]

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gleich Anmelder

㊻ Entgegenhaltungen:

DE 44 18 458 A1
FALK, G. u. RUPPEL, W.: Mechanik, Relativität, Gravitation, Springer-Verlag Berlin, Heidelberg New York 1973, S. 367-374 u. S. 406-407;
KÜPFMÜLLER, K.: Einführung in die theoretische Elektrotechnik, Springer-Verlag Berlin,Heidelberg New York 1965, S. 49-54;
BORMANN, R.: Supraleitung, Theorie und Anwendung
Funkschau 1972, H. 6, S. 173-175;

Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

Prüfungsantrag gem. § 44 PatG ist gestellt

㊄ Verfahren und Anlage zur Erzeugung eines Gravitationsfeldes

㊗ Die Erfindung betrifft ein Verfahren und eine Anlage zur Erzeugung eines positiven oder negativen Gravitationsfeldes durch Bewegung von Elektronen für die Erzeugung von Levitationseffekten. Es ist die Aufgabe der Erfindung, Gravitation an bestimmten Orten zu vermindern, um hier Levitationseffekte zu erzeugen. Die Erfindung besteht darin, daß man einen Körper in Form eines spiralförmigen Leiters oder einen mit einem spiralförmigen Leiter versehenen Körper in Rotation versetzt, wobei der spiralförmige Leiter viele in Spiralform gelegte oder gewickelte Windungen aufweist, daß man dabei einen in supraleitendem Zustand befindlichen Leiter verwendet und daß man in diesem Leiter fließende Elektronen von einer äußeren Windung großen Durchmessers auf eine innere zentrale Windung kleineren Durchmessers über die dazwischen liegenden Windungen zwingt. Die Erfindung schafft oberhalb des rotierenden Körpers ein Gravitationsfeld, das niedriger als das Gravitationsfeld ohne den von einem Strom supraleitend durchflossenen rotierenden Leiter ist. Die Erfindung kombiniert die oben genannten Beobachtungen an rotierenden Körpern mit dem Satz vom Erhalt des Drehimpulses bei einer auf der rotierenden Scheibe befindlichen Masse, die von der äußeren Bahn größeren Durchmessers auf eine innere, kleinere Bahn gezwungen wird und welche sich durch zunehmende Bahngeschwindigkeit darstellt, obwohl die Winkelgeschwindigkeit konstant bleibt.

DE 198 32 001 A 1

Beschreibung

Die Erfindung betrifft ein Verfahren und eine Anlage zur Erzeugung eines positiven oder negativen Gravitationsfeldes durch Bewegung von Elektronen für die Erzeugung von Levitationseffekten.

Für manche industriellen Prozesse möchte man Gravitationskräfte bei der Herstellung bestimmter Produkte ausschließen, weil diese die Produktqualität vermindern. Bestimmte Verfahrensabläufe könnten einfacher ausgeführt werden, wenn es gelänge, die Gravitationskräfte zumindest in nennenswertem Umfang zu vermindern. Hierzu besteht bisher nur die Möglichkeit, mit Raumfahrzeugen in das Weltall zu fliegen, weil es hier Gravitationsfreiheit gibt. Das ist aber wegen der Kosten, wegen der Entfernung von allen irdischen Versorgungseinrichtungen, und wegen der geringen räumlichen Abmessungen solcher Raumfahrzeuge, sowie aus vielerlei anderen Gründen für industrielle Anwendungen nicht möglich, lediglich einige wenige Forschungsvorhaben können unter den hierzu erforderlichen Bedingungen ausgeführt werden. Aus diesem Grunde ist jede Möglichkeit der Minderung der Gravitationskräfte hier auf der Erde von hoher Bedeutung.

Nach dem heutigen Stand der Forschung werden über Supraleitern Verringerungen des darüber befindlichen Gravitationsfeldes von bis zu 2,5 Prozent beobachtet. Eine minimale Abnahme der Gravitation ist auch über schnell rotierenden Scheiben z. B. aus Keramik, bei Festplatten im Computer und über den Achsen von Elektromotoren zu beobachten. Alle diese rotierenden Körper sind, wie jeder andere Körper auch, aus irgendwelchen Molekülen aufgebaut, die ihrerseits aus Atomen gebaut sind, die einen Kern und diesen Atomkern umgebende Elektronen aufweisen. Rotiert der Körper, nehmen die Elektronen an der Rotation teil. Diese Beobachtungen an rotierenden Körpern bestätigen den Zusammenhang von Masse, Geschwindigkeit und Gravitation.

Die Erkenntnis dieses Zusammenhanges hat aber noch nicht dazu geführt, andere und wirkungsvollere Möglichkeiten der Verminderung der auf Körper wirkenden Gravitationskräfte aufzufinden.

Die Erfindung vermeidet die Nachteile des Standes der 4 Technik. Es ist die Aufgabe der Erfindung, Gravitation an bestimmten Orten zu vermindern, um hier Levitationseffekte zu erzeugen.

Die Erfindung besteht darin, daß man in einem Supraleiter fließende Elektronen eines Elektronenstromes in eine Spiralbahn mit einer Vielzahl nebeneinander liegender Windungen zwingt.

Zur Ausführung dieses Verfahrens gibt es mehrere Möglichkeiten:
Eine besteht darin, daß man einen rotationssymmetrisch aufgebauten Körper mit mindestens einem im supraleitenden Zustand befindlichen Leiter, der sich radial oder mit radialer Komponente von außen bis in Achsnähe erstreckt, in schnelle Rotation versetzt und in diesem Leiter die Elektronen fließen läßt. Obwohl sich die Elektronen auf radialen Bahnen, nämlich den radial im oder auf dem rotierenden Körper verlaufenden Leitern bewegen, liegt, hervorgerufen durch die schnelle Rotation des Körpers, ihr Weg auf einer Spiralbahn.

Eine andere Möglichkeit besteht darin, daß man die Elektronen in einem Körper in Form eines spiralförmigen Leiters oder einem mit spiralförmigen Leiter versehenen Körper fließen läßt, wobei der spiralförmige Leiter viele in Spiralform angeordnete Windungen aufweist, daß man dabei einen in supraleitendem Zustand befindlichen Leiter verwendet und daß man in diesem Leiter fließende Elektronen

von einer äußeren Windung großen Durchmessers auf eine innere zentrale Windung kleineren Durchmessers über die dazwischen liegenden Windungen zwingt.

Der hierdurch erreichte Effekt der Gravitationskraftverminderung läßt sich dadurch verstärken, daß man den aus einem spiralförmigen Leiter bestehenden oder mit einem spiralförmigen Leiter versehenen Körper in Rotation versetzt.

Die Erfindung schafft oberhalb des rotierenden Körpers ein Gravitationsfeld, das niedriger als das Gravitationsfeld ohne den von einem Strom supraleitend durchflossenen rotierenden Leiter ist. Die Erfindung kombiniert die oben genannten Beobachtungen an rotierenden Körpern mit dem Satz vom Erhalt des Drehimpulses bei einer auf der rotierenden Scheibe befindlichen Masse, die von der äußeren Bahn größeren Durchmessers auf eine innere, kleinere Bahn gezwungen wird und welche sich durch zunehmende Bahngeschwindigkeit darstellt, obwohl die Winkelgeschwindigkeit konstant bleibt.

Erreicht wird dies durch Stromtransport in dem besonders gestalteten, nämlich spiralförmigen Supraleiter. Der Stromtransport erfolgt ausschließlich durch die im Supraleiter widerstandslos beweglichen Elektronen, die innerhalb des Leiters vom äußeren Rand des Körpers spiralenartig zur Achse des Körpers geführt werden. Da die Elektronen negativ geladen sind, wandern sie vom Minus- zum Pluspol. Bei herkömmlichen metallischen Leitern breitet sich das elektrische Feld mit annähernder Lichtgeschwindigkeit aus, obwohl die Elektronen selbst sich nur mit 0,5 mm pro Sekunde bewegen. Nun hat Kupfer eine Belastbarkeit von ca. 120 Ampere pro cm 2 Querschnitt, bei Supraleitern werden 10 000 bis 20 000 Ampere pro cm² gemessen. D.h. die Elektronen haben eine ungleich höhere Beweglichkeit innerhalb des Supraleiters. Dieses ermöglicht die Beschleunigung der Elektronen. Wenn auf die rotierende Spirale nun eine möglichst geglättete Gleichspannung gegeben wird, dann befinden sich am äußeren Rand der Spirale Elektronen mit ihrer Masse, die dort eine kinetische Energie haben, die ihrer Bahngeschwindigkeit und ihrer Entfernung von der Drehachse entsprechen. Dieser Elektronenimpuls wird durch den Stromfluß und die Spiralform der Spirale auf immer kleiner werdende Rotationsradien gezwungen. Aufgrund des fehlenden Widerstandes des Spiralenmaterials ist eine höchstmögliche Beweglichkeit der Elektronen garantiert. Da den Elektronen aber durch die angelegte Spannung kinetische Energie zugeführt wird, die sie wiederum mangels Widerstand nicht in Wärme durch Reibung, sondern nur in Geschwindigkeit umwandeln können, werden die Elektronen in dem spiralförmigen Leiter ständig beschleunigt.

Entsprechend der Relativitätstheorie nimmt die relativistische Masse eines jeden Körpers mit steigender Geschwindigkeit zu. Diese Massezunahme wurde in Teilchenbeschleunigern gemessen und bestätigt. Da Gravitation immer proportional zur Masse auftritt, entsteht in der Spirale ein Gravitationsfeld, welches wiederum im direkten Bereich über ihr die Erdgravitation abschirmt.

Somit erbringt eine um eine Achse gewickelte Spirale, die aus einem supraleitendem Material besteht, von Strom durchflossen ist und die durch einen auf ihre Achse wirkenden Motor zum Rotieren gebracht wird, eine Abschirmung der Erdgravitation.

Durch die geometrische Führung der Elektronen auf der Spiralbahn werden Verhältnisse geschaffen, wie sie für Luftpartikel in einem Tornado auftreten. Die Supraleitung erlaubt den Elektronen einen Fluß mit sehr hoher Geschwindigkeit unter ständiger weiterer Beschleunigung. Es bildet sich eine Art von ortsfestem "Elektronen-Tornado" aus, der zu der erstrebten Veränderung des Gravitationsfeldes führt.

Das Spiralenmaterial muß elektrisch isoliert sein, entwe-

der durch Lack oder einer nicht leitenden Trennschicht. Es kann aus Draht oder einer Metallfolie bestehen. Wesentlich ist der nicht oder fast nicht vorhandene Widerstand des Spulendrahtes oder der Spulenfolie, welches z. B. durch Hochtemperatursupraleiter erreicht werden kann, die durch flüssigen Stickstoff unter ihre Sprungtemperatur, d. h. die Temperatur, die ihren Widerstand schlagartig abfallen läßt, gekühlt werden. Die Spirale hat zwei Enden über die eine Spannung geführt wird, das eine Ende befindet sich an der Achse, das andere am Spiralenrand. Der Stromfluß muß während der Rotation gewährleistet sein, entweder durch Schleifkontakte, oder reibungslos durch Lichtbögen auf kreisförmige Stromabnehmer, die die Spirale umgeben.

Über diese Kontakte wird eine Gleichspannung geführt, indem an der Achse der Pluspol und am äußeren Rand der Minuspol anliegt. Der Stromtransport erfolgt ausschließlich durch die Elektronen, die innerhalb des Leiters vom äußeren Rand spiralenartig zur Achse geführt werden. Da die Elektronen negativ geladen sind, wandern sie vom Minus- zum Pluspol, und somit von außen nach innen. Diese Spirale wird zum Rotieren um ihre Achse gebracht, und zwar entgegen der Richtung ihres Wicklungssinnes.

Die Form der Wicklung der Spirale kann eben wie ein Teller ausgeführt sein, indem man den Leiter in einer Ebene spiralförmig wickelt.

Die Form der Wicklung der Spirale kann auch konkav ausgebildet sein, indem man den Leiter auf einer Kegel- oder Kegelstumpffläche oder einer sonstigen gekrümmten rotationssymmetrischen Fläche spiralförmig wickelt.

Bei Verwendung einer supraleitenden Folienwicklung, bei der der Leitungsquerschnitt von der Achse hin zum äußeren Rand zunimmt, werden die Elektronen auf ihrem Weg zur Achse in einen kleineren Querschnitt gezwungen, so daß sich die Spannung erhöht (Tunnelung). Bei einem Spulenmaterial mit normalem Widerstand würde die Spule an dieser Stelle durchbrennen, da supraleitende Materialien aber eine Leitfähigkeit von 10 000 bis zu 20 000 Ampere pro cm^2 Querschnitt haben, ist dies ausgeschlossen. Der erhöhte Elektronenfluß, der bei Verengung des Querschnitts auftritt, kann sich aufgrund der Supraleitung nur in erhöhte Geschwindigkeit und nicht in Wärme umwandeln. Mit dieser Verengung des Querschnitts, der Tunnelung, hat man Wellen auf Werte schneller als Lichtgeschwindigkeit beschleunigt, obwohl die Lichtgeschwindigkeit bisher als die absolute Grenze aller Geschwindigkeiten betrachten wurde. Unter Bedingungen der Supraleitung ist das Verhalten von Elektronen der von Wellen im Tunnel annähernd analog.

Bei diesem Verfahren kann man die Winkelgeschwindigkeit des rotierenden Körpers konstant halten und dadurch eine zunehmende Bahngeschwindigkeit des Elektronenstromes erzeugen.

Man kann aber auch die Winkelgeschwindigkeit des rotierenden Körpers ändern und dadurch sich ändernde Gravitationskräfte erzeugen.

Man kann diese Effekte dadurch erzielen, daß man den Leiter in einer Ebene anordnet. Man kann den Leiter aber auch auf einer Kegel- oder Kegelstumpffläche oder einer sonstigen gekrümmten rotationssymmetrischen Fläche spiralförmig anordnen.

Die Anlage zur Erzeugung eines positiven oder negativen Gravitationsfeldes durch Bewegung von Elektronen in einem Körper für die Erzeugung von Levitationseffekten kann man in verschiedener Weise aufbauen und gestalten:

Eine Möglichkeit besteht darin, daß in einem rotationssymmetrisch aufgebauten Körper mindestens ein im supraleitenden Zustand befindlicher Leiter angeordnet ist, der sich radial oder mit radialer Komponente von außen bis in Achsnähe erstreckt, daß ein Antrieb für diesen Körper vor-

gesehen ist, der ihn in schnelle Rotation versetzt, und daß an die beiden Enden dieses Leiters eine Spannung angelegt ist.

Eine andere Möglichkeit besteht darin, daß der Körper die Form eines spiralförmigen Leiters hat oder mit einen spiralförmigen Leiter versehen ist, wobei der spiralförmige Leiter viele in Spiralform gelegte oder gewickelte Windungen aufweist, daß der Leiter in supraleitendem Zustand befindlich ist und daß an diesem Leiter eine Spannung angelegt ist, die einen Elektronenfluß von einer äußeren Windung großen Durchmessers dieses Leiters auf eine innere zentrale Bahn kleineren Durchmessers über die dazwischen liegenden Windungen erzwingt.

Dabei läßt sich der erzielte Effekt der Gravitationsverminderung noch dadurch erhöhen, daß ein Antrieb vorgesehen ist, der den Körper mit den Spiralbahnen in schnelle Rotation versetzt.

Es ist zweckmäßig, daß der rotierende Körper über Schleifkontakte oder reibungslos durch Lichtbögen auf kreisförmige Stromabnehmer, die die Spirale umgeben, an eine ortsfeste Stromquelle angeschlossen ist.

Der gewünschte Effekt der Verminderung der Gravitation wird erreicht, wenn die Spirale entgegen der Richtung ihres Wicklungssinnes um ihre Achse zum Rotieren gebracht ist.

Eine weitere Beschleunigung der Elektronen läßt sich dadurch erzielen, daß der Querschnitt des Leiters von einem Maximalwert an einer äußeren Windung auf einen Minimalwert an einer inneren zentral angeordneten Windung abnimmt.

Bei dieser Anlage kann die Winkelgeschwindigkeit des rotierenden Körpers konstant gehalten werden, wodurch eine zunehmende Geschwindigkeit des Elektronenstromes erzeugt ist.

Es kann aber auch die Winkelgeschwindigkeit des rotierenden Körpers veränderbar sein, wodurch sich ändernde Gravitationskräfte erzeugt sind.

Der Leiter kann in einer Ebene angeordnet sein, aber auch auf einer Kegel- oder Kegelstumpffläche oder einer sonstigen gekrümmten rotationssymmetrischen Fläche.

Der rotierende Körper kann über Schleifkontakte oder reibungslos durch Lichtbögen auf kreisförmige Stromabnehmer, die die Leiter umgeben, an eine ortsfeste Stromquelle angeschlossen sein.

Der Querschnitt des Leiters kann von einem Maximalwert am äußeren Rand des Körpers auf einen Minimalwert im Inneren abnehmen, wodurch eine weitere Beschleunigung der Elektronen erzielt wird.

Patentansprüche

1. Verfahren zur Erzeugung eines positiven oder negativen Gravitationsfeldes durch Bewegung von Elektronen für die Erzeugung von Levitationseffekten, **dadurch gekennzeichnet**, daß man in einem Supraleiter fließende Elektronen eines Elektronenstromes in eine Spiralbahn mit einer Vielzahl eng nebeneinander liegender Windungen zwingt.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß man einen rotationssymmetrisch aufgebauten Körper mit mindestens einem im supraleitenden Zustand befindlichen Leiter, der sich radial oder mit radialer Komponente von außen bis in Achsnähe erstreckt, in schnelle Rotation versetzt und in diesem Leiter die Elektronen fließen läßt.

3. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß man die Elektronen in einem Körper in Form eines spiralförmigen Leiters oder mit einem spiralförmigen Leiter fließen läßt, wobei der spiralförmige Leiter viele in Spiralform angeordnete Windungen auf-

weist,

daß man dabei einen in supraleitendem Zustand befind-
lichen Leiter verwendet

und daß man in diesem Leiter fließende Elektronen von
einer äußeren Windung großen Durchmessers auf eine
innere zentrale Windung kleineren Durchmessers über
die dazwischen liegenden Windungen zwingt.

4. Verfahren nach Anspruch 3, dadurch gekennzeich-
net, daß man den aus einem spiralförmigen Leiter be-
stehenden oder mit einem spiralförmigen Leiter verse-
henen Körper in Rotation versetzt.

5. Verfahren nach Anspruch 4, dadurch gekennzeich-
net, daß man die Winkelgeschwindigkeit des rotieren-
den Körpers konstant hält und dadurch eine zuneh-
mende Bahngeschwindigkeit des Elektronenstromes
erzeugt.

6. Verfahren nach Anspruch 4, dadurch gekennzeich-
net, daß man die Winkelgeschwindigkeit des rotieren-
den Körpers ändert und dadurch sich ändernde Gravita-
tionskräfte erzeugt.

7. Verfahren nach Anspruch 3, dadurch gekennzeich-
net, daß man den Leiter in einer Ebene spiralförmig an-
ordnet.

8. Verfahren nach Anspruch 1, dadurch gekennzeich-
net, daß man den Leiter auf einer Kegel- oder Kegel-
stumpffläche oder einer sonstigen gekrümmten rotati-
onssymmetrischen Fläche spiralförmig anordnet.

9. Anlage zur Erzeugung eines positiven oder negati-
ven Gravitationsfeldes durch Bewegung von Elektro-
nen in einem Körper für die Erzeugung von Levitati-
onseffekten, dadurch gekennzeichnet,

daß in einem rotationssymmetrisch aufgebauten Kör-
per mindestens ein im supraleitenden Zustand befindli-
chen Leiter angeordnet ist, der sich radial oder mit ra-
dialer Komponente von außen bis in Achsnähe er-
streckt,

daß ein Antrieb für diesen Körper vorgesehen ist, der
ihn in schnelle Rotation versetzt,

und daß an die beiden Enden dieses Leiters eine Span-
nung angelegt ist.

10. Anlage zur Erzeugung eines positiven oder negati-
ven Gravitationsfeldes durch Bewegung von Elektro-
nen in einem Körper für die Erzeugung von Levitati-
onseffekten, dadurch gekennzeichnet,

daß der Körper die Form eines spiralförmigen Leiters
hat oder mit einem spiralförmigen Leiter versehenen
ist,

wobei der spiralförmige Leiter viele in Spiralform ge-
legte oder gewickelte Windungen aufweist,

daß der Leiter in supraleitendem Zustand befindlich ist
und daß an diesem Leiter eine Spannung angelegt ist,
die einen Elektronenfluß von einer äußeren Windung
großen Durchmessers dieses Leiters auf eine innere
zentrale Bahn kleineren Durchmessers über die dazwi-
schen liegenden Windungen erzwingt.

11. Anlage nach Anspruch 10, dadurch gekennzeich-
net, daß ein Antrieb vorgesehen ist, der den Körper in
schnelle Rotation versetzt.

12. Anlage nach Anspruch 9 oder 10, dadurch gekenn-
zeichnet, daß die Winkelgeschwindigkeit des rotieren-
den Körpers konstant ist, wodurch eine zunehmende
Bahngeschwindigkeit des Elektronenstromes erzeugt
ist.

13. Anlage nach Anspruch 9 oder 10, dadurch gekenn-
zeichnet, daß die Winkelgeschwindigkeit des rotieren-
den Körpers veränderbar ist und dadurch sich ändernde
Gravitationskräfte erzeugt sind.

14. Anlage nach Anspruch 10, dadurch gekennzeich-

net, daß der spiralförmig angeordnete Leiter in einer
Ebene angeordnet ist.

15. Anlage nach Anspruch 10, dadurch gekennzeich-
net, daß der Leiter auf einer Kegel- oder Kegelstumpf-
fläche oder einer sonstigen gekrümmten rotationssym-
metrischen Fläche spiralförmig angeordnet ist.

16. Anlage nach Anspruch 9 oder 11, dadurch gekenn-
zeichnet, daß der rotierende Körper über Schleifkon-
takte oder reibungslos durch Lichtbögen auf kreisför-
mige Stromabnehmer, die die Leiter umgeben, an eine
ortsfeste Stromquelle angeschlossen ist.

17. Anlage nach Anspruch 11, dadurch gekennzeich-
net, daß die Spirale entgegen der Richtung ihrer Wick-
lung um ihre Achse zum Rotieren gebracht ist.

18. Anlage nach Anspruch 9 oder 11, dadurch gekenn-
zeichnet, daß der Querschnitt des Leiters von einem
Maximalwert am äußeren Rand des Körpers auf einen
Minimalwert im Inneren abnimmt.

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION	Docket No.	P07695US00/RFH
	1st Inventor	WORSLEY ET AL.
		COMPLETE IF KNOWN
___ Declaration Submitted **with** Initial Filing	Serial No.	10/182,373
___ Declaration Submitted **after** Initial Filing	Filing Date	July 29, 2002

As a below named inventor, I hereby declare that:
My residence, mailing address and citizenship are as stated below next to my name.
I believe I am the original and first inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

> Technical and theoretical specifications for warp drive technology

the specification of which:
___ is attached hereto
OR
_X_ was filed on 30 January 2001 as PCT International Application No. PCT/GB 01/00381,
and (if applicable) was amended on .

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment specifically referred to above.
I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim FOREIGN PRIORITY benefits under 35 USC 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's certificate(s), or 365(a) of any PCT internat'l application which designated at least one country other than the US, listed below and have also identified below by checking the box, any foreign application for patent, inventor's certificate(s), or any PCT internat'l application having a filing date before that of the application on which priority is claimed. (___ *ADDITIONAL APPLICATIONS IDENTIFIED ON ADDITIONAL INFORMATION SHEET*)
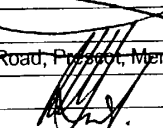
Prior Foreign Appl. No.	Country	Day/Month/Year Filed	Priority Not Claimed
0002221.0	GB	31/01/00	
0028721.9	GB	24/11/00	

As a named inventor, I hereby appoint the registered practitioners of **LARSON & TAYLOR, PLC** associated with **Customer Number 000881** to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith. Direct all correspondence to that Customer Number.

Direct all telephone calls to ,
at TEL (703) 739-4900 (Fax: 703-739-9577) e-mail:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 USC 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon. (___ *ADDITIONAL INVENTORS IDENTIFIED ON ADDITIONAL INFORMATION SHEET*)
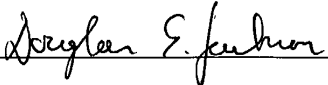
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SIGN AND DATE HERE Inventor's Signature		Date	

Customized FORM PTO-1390 (REV. 12-2001) U.S. DEPARTMENT OF COMMERCE PATENT & TRADEMARK OFFICE	ATTORNEY DOCKET NO. P07695US00/RFH
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371	U.S. APPLICATION NO. **10/182373**

INTERNATIONAL APPLICATION NO. PCT/GB01/00381	INTERNATIONAL FILING DATE 30 January 2001	PRIORITY DATE CLAIMED 31 January 2000

TITLE OF INVENTION: TECHNICAL AND THEORETICAL SPECIFICATIONS FOR WARP DRIVE ...

APPLICANT(S) FOR DO/EO/US: WORSLEY et al.

Applicant herewith submits to the US Designated/Elected Office (DO/EO/US) the following items and other information:

X 1. This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.

___ 2. This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 USC 371.

___ 3. This is an express request to begin national examination procedures (35 USC 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.

___ 4. The US has been elected by the expiration of 19 months from the priority date (Article 31).

X 5. A **copy** of the International Application as filed (35 U.S.C. 371 (c)(2))

     ___ a. is attached hereto (required only if not communicated by the International Bureau).

     X b. has been communicated by the International Bureau.

     ___ c. is not required, as the application was filed in the United States Receiving Office (RO/US).

___ 6. An English **translation** of the International Application as filed (35 U.S.C. 371(c)(2)).

     ___ a. is attached hereto.

     ___ b. has been previously submitted under 35 U.S.C. 154(d)(4).

___ 7. Amendments to the claims of the International Appln. under PCT Article 19 (35 USC 371 (c)(3))

     ___ a. are attached hereto (required only if not communicated by the International Bureau).

     ___ b. have been communicated by the International Bureau.

     ___ c. have not been made; however, the time limit for making such amendments has NOT expired.

     ___ d. have not been made and will not be made.

___ 8. An English translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

___ 9. An **oath** or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).

___ 10. An English translation of the annexes to the Int'l Pre. Exam. Report under PCT Article 36 (35 USC 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

___ 11. An **Information Disclosure Statement** under 37 C.F.R. 1.97 and 1.98.

___ 12. An **Assignment** document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.

X 13. A **First preliminary amendment.**

___ 14. A Second or Subsequent preliminary amendment.

___ 15. A substitute specification.

___ 16. A change of power of attorney and/or address letter.

___ 17. A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 & 35 USC 1.821-825.

___ 18. A second copy of the published international application under 35 USC 154(d)(4).

___ 19. A second copy of the English translation of the international application under 35 USC 154(d)(4).

___ 20. Other items or information:

     ___ A copy of the Notification of Missing Requirements under 35 U.S.C. 371.

X In the event that a petition for extension of time is required to be submitted herewith, and in the event that a separate petition does not accompany this response, applicant hereby petitions under 37 CFR 1.136(a) for an extension of time of as many months as are required to render this submission timely. Any fee is authorized in 21(c).

Date: 29 July 2002

LARSON & TAYLOR, PLC • 1199 North Fairfax St. • Suite 900 • Alexandria, VA 22314

U.S. APPLICATION NO. *(if known)* **10/182373**	INTERNATIONAL APPLICATION NO. PCT/GB01/00381	ATTORNEY DOCKET NO. P07695US00/RFH

X 21. The following fees are submitted:	CALCULATIONS *PTO USE ONLY*

Basic National Fee (37 CFR 1.492 (a) (1)-(5):

_____ Neither Int'l Prelim. Exam. fee nor Int'l Search fee paid to USPTO	$1040	
__X__ Search Report has been prepared by the EPO or JPO	$ 890	
_____ No Int'l Prelim. Ex. fee paid to USPTO but Int'l Search fee paid to USPTO	$ 740	
_____ International preliminary examination fee paid to USPTPO	$ 710	
_____ Int'l Prelim. Ex. fee paid to USPTO & all claims satisfied PCT Art. 33(1)-(4)	$ 100	

ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 890	
Surcharge of $130 for furnishing the oath or declaration later than [ ] 20 mos. from the earliest claimed priority date (37 CFR 1.492(e)). [ ] 30 mos. +	$	

CLAIMS	*NUMBER FILED*	*NUMBER EXTRA*	*RATE*		
Total Claims	6 - 20 =	0	X $18 =	$	
Independent Claims	2 - 03 =	0	X $84 =	$	
_____ Multiple Dependent Claim(s) (if applicable)			+ $280 =	$	

TOTAL OF ABOVE CALCULATIONS =	$ 890	
Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by ½. -	$	
SUBTOTAL =	$ 890	
Processing fee of **$130** for furnishing the **English translation** later than [ ] 20 mos. from the earliest claimed priority date (37 CFR 1.492(f)). [ ] 30 mos. +	$	
TOTAL NATIONAL FEE =	$ 890	
Fee for recording the enclosed **assignment** (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40** per property +	$	
TOTAL FEES ENCLOSED =	$ 890	

	Amount to be	Refunded	$
		Charged	$

X   a.   A check in the amount of $ 890.00 to cover the above fees is enclosed.

   b.   Please charge my Deposit Account No. 12-0555 in the amount of $ to cover the above fees.

X   c.   The Commissioner is hereby authorized to charge any additional fees which may be required, or credit overpayment to Deposit Account No. 12-0555.

Note: *Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.*

| SEND ALL CORRESPONDENCE TO:

   Ross F. Hunt, Jr.
At the address (below) of **CUSTOMER NO. 00881:**

   LARSON & TAYLOR, PLC
   1199 NORTH FAIRFAX ST.
   SUITE 900
   ALEXANDRIA, VA 22314 | Signature: *Douglas E. Jackson*

Name: Douglas E. Jackson

Reg. No.: 28,518

Phone No.: 703-739-4900

Date: 29 July 2002 |
|---|---|

TECHNICAL AND THEORETICAL SPECIFICATIONS

FOR WARP DRIVE TECHNOLOGY

1

FIELD OF THE INVENTION

The present invention relates to the use of technical drive systems which operate by the

modification of gravitational fields. These drive systems do not depend on the emission of

matter to create thrust, but create a change in the curvature of space-time, in accordance

with general relativity. This allows travel by warping space-time, to produce an independent

warp drive system.

THEORETICAL BACKGROUND OF THE INVENTION

The concept of gravity should be examined in the light of quantum gravity and in turn as a component of quantum physics itself. The fundamental minimal quantum of energy in quantum physics is Planck's constant; h. Thus in accordance with the energy equivalence formula $E=mc^2$, the fundamental minimum quantity of mass (m_q) can therefore be derived, from known constants by; $m_q=h/c^2$ (1). Taking this minimal mass, it is possible to show that the formation of all matter, the forces of nature and indeed space-time itself derive from this single quintessential quantity.

Thus if the number of quintessences in a system is; $n_q = m/m_q$: then the total Energy of the system is *more* logically given by, the energy of a single quintessence (h); directly multiplied by the number of quintessences (n_q) in that system, thus $E=hn_q=mc^2$ (1a).

Furthermore, this minimal mass, termed quintessence, can form the basis of the existence of a quantum gravitational field in the form of a space-time lattice, from which quantum gravity may be derived from first principles. Furthermore, the conglomeration of these quintessences also accounts for the formation of the elementary particles and the forces acting between them, as in superstring theory. This concept explains the formation of matter and the forces of nature on a quantum mechanical basis and directly explains the existence of wave particle duality. Thus as $n_q=m/m_q$; the frequency of light and matter (f) is determined, directly, from the number of constituent quintessences. This leads automatically to the fundamental equation, derived from (1), $f=n_q=E/h$, where n_q is the number of quintessences, which leads directly to the frequency of both light and matter. This in turn leads directly to a Universal wave equation for matter and light $\lambda=c/\beta n_q=hc/\beta E$ (2), where β is the *relative* directional velocity, v/c. As the momentum, $p= \beta E/c$, then this equation also gives the standard de-Broglie wave equation, $\lambda=h/p$ in agreement with current theory and experiments.[1]

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Using the Universal wave equation, the standard equation for special relativity, $m'=m_0/(1-\beta^2)^{1/2}$, derives from first principles. Also from these observations, a modified Dirac wave equation may be derived, $E\psi=(-j\beta\cdot\nabla+\beta m)\psi$ (2a), the results of which have been recently verified by a paper in which the orbitals of electrons were experimentally directly visualised.[2] Moreover, a fundamental equation for general relativity can be formulated, where G is the gravitational constant and r_q is the given radius of quintessence; $G=9r_q^2c^4/\lambda\beta E$ (3), such that the Universal wave equation is in direct agreement with general relativity.[3] Thus special and general relativity and quantum mechanics can be unified.

From here it is possible to proceed in a number of ways; the geometric structure of the electron and the forces of Nature may be derived from first principles and in turn the structure of the quarks, including the top and bottom, otherwise known as truth and beauty can be seen. Moreover, the presence of a space-time lattice results in an understanding of quantum EPR effects. By allowing a theoretical flow of energy through the space-time lattice it can be shown that:

Energy is not bound by space-time

Thus logically accounting for phenomena such as entanglement and quantum tunnelling. Quintessence can also be used to explain, logically, the inner physics of a black hole, the missing mass of the Galaxy, the continuing expansion of the Universe, Guth's inflationary theory and the Big Bang. Hence, it is now possible to understand the Universe, including space-time, matter and the forces of nature from the radius, mass and vibration of a single quantity, quintessence.

With this understanding of space-time, matter and the forces of Nature, and in particular gravity, it is possible to demonstrate that the modification of gravitational fields, and in turn the warping of space-time, can be technically readily achieved.

Using standard equations for special relativity, $m'=m_0/(1-\beta^2)^{1/2}$, it can be demonstrated that by differentially increasing the velocity of electrons, by applying a differential current, their mass can be increased in a specific way. In turn by increasing the mass of electrons, by general relativity, the number of gravitons emitted from these electrons can be modulated. By multiplying this effect using an ultracentrifugational device the differential graviton emission can be manifestly amplified. This in turn, in accordance with general relativity, will cause a change in the curvature of space-time.

This effective warping of space-time does not, of necessity, imply superluminal velocities, but does allow the creation of warp drive systems, which do not depend on the creation of thrust by the ejection of material as used in current space technologies.

4

PART I
FUNDAMENTAL LAWS OF PHYSICS

Quintessential Mass

The quantum physical, minimum component of energy is Planck's constant; h. To define the minimal component of mass, using the standard energy equivalence formula; $E=mc^2$, such a minimal mass (m_q) would be required to have the value equivalent to; $m_q=h/c^2$ (1). The total mass of a system (m) would then be; $m = m_q n_q$, where n_q is the number of these minimal units. Thence, the total energy of a system can be derived from the minimal energy; h, multiplied by the number of these energy units (n_q). Thus as, $E=mc^2$, then also $E=m_q n_q c^2$ and substituting $m_q=h/c^2$, the energy equivalence formula has the more logical formulation; $E=hn_q$ (1a). Thus the energy of a system is equivalent to the minimal energy unit; h, multiplied by the number of those minimal energy units (n_q).

Taking this minimal mass/energy, it is possible to show that all matter, the forces of nature and space time can be constructed from this single quintessential quantity. Moreover, using this quantity the laws of physics can be derived from first principles. Thus, a priori, all components of the physical universe, including space-time, can be constructed from this minimal mass component, termed quintessence.

Wave Particle Duality

If the presence of quintessence accounts for the structure of matter and if matter itself forms from the number of quintessences, then the frequency of matter and thus wave particle duality directly arises from first principles. Specifically the wavelength of matter derives from the vibration of quintessence from which it is constituted. Thus the frequency (f) and in turn the wavelength of light and matter is directly equivalent to the number of quintessences contained within it. We find that the actual frequency of light can be directly derived from first principles from the effective mass of the photon (m_γ) and thus by the number of quintessences (n_q) it contains.

Thus for light conventionally:

$$f = E/h$$

and if $E = mc^2$, and $h = m_q.c^2$, then

$$f = m_\gamma c^2/m_q.c^2$$

and $$f = m_\gamma/m_q = n_q$$

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Thus $f = n_q$ (4)

Thus the formula for the frequency of light ($E = hf$) is now readily explained by the observation that the frequency is determined quite directly from the number of quintessences (n_q) within the photon.

The wavelength is thus also given by:

$$\lambda = c/f = m_q c/m_\gamma = h/p$$

We can now show that the frequency of matter also has the same derivation from quintessence, as has the frequency of light. The frequency of matter is again equivalent to the number of quintessences it contains. **Thus the wave particle duality of matter itself can be explained by its composition from quintessence.** The amount of quintessences contained within a electron sphere will depend on the number of quintessences constituting the electron and those passing through it as a result of its relative velocity β^2 (where $\beta = v/c$); effectively its relativistic momentum (p). The frequency will then be related to the total number of quintessences. Thus for matter,

$$f = \beta^2 n_q$$ (4a)

Thus it is possible to derive the conventional de Broglie wave equation for matter from first principles. Thus, as $\lambda = v/f$, we have:

$$\lambda = v/\beta^2 n_q$$ (5)

thus as $n_q = E/h$

$$\lambda = hc/\beta E$$ (2)

and as conventionally $\beta E/c = p$, then for matter:

$$\lambda = h/p$$

Provided that in the de Broglie equation, the momentum of the object is calculated using the relativistic mass, thus accounting for the total number of quintessences (n_q) in an object, this gives an accurate value for the wavelength of matter.[1]

Thus the wavelength of matter follows directly from its constitutents, quintessence. As matter is made of quintessence, similarly to light, its frequency depends on the number of quintessences (n_q) within it, travelling relative to the speed of light. Moreover, $\lambda = hc/\beta E$, underpins a fundamental relationship between wavelength and energy. Furthermore, this is mathematically the same as the term $\lambda = hv/\beta^2 E$, giving a relativistic expression for the the wavelength of matter, from which the relativistic equations may be directly derived (see Wave Particle Duality and Relativity).

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Wave Equations

The derivation of wave particle duality from first principles also now allows the derivation of a modified wave equation for matter.

To derive his wave equation Shrödinger commenced with the de Broglie equation using momentum (p). For lower energies the momentum of an electron is conventionally derived from the kinetic energy of the electron and the mass of the electron m_0. Thus conventionally:

$$E_k = 1/2 \, mv^{1/2} \quad \text{and} \quad p = m_0 v$$

Thus
$$E_k = p^2/2m_0$$

then
$$p = (E_k.2m_0)^{1/2}$$

and conventionally, the de Broglie equation can also be written as:

$$\lambda = h/p = h/(E_k.2m_0)^{1/2}$$

In turn the Shrödinger wave equation directly derives from the square of the above classical non relativistic term for kinetic energy:

$$\lambda^2 = h^2/E_k.2m_0$$

thus
$$E_k = \frac{h^2}{2m} . \frac{1}{\lambda^2}$$

As $E = E_k + V$

then
$$E\psi = -\frac{h^2}{2m} . \frac{d^2\psi}{dx^2} + V\psi = jh. \frac{d\psi}{dt}$$

However, the Shrödinger equation, may be refined by taking into account relativity. Thus the true values for the energy are given by the relativistic momentum (p).

A fundamental relativistic wave equation for ψ, and its logical derivation may now be developed through the concept of quintessence as a fundamental constituent of matter.

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The amount of quintessences in the electron is determined by the number of quintessences forming the electron at rest, plus the amount of quintessences passing through it due to its relativistic velocity, which will determine the relativistic momentum (p) of a particle.

The frequency of matter can now be readily calculated from first principles to give a more accurate result. Thus as matter is made of quintessence, similarly to light, its frequency is equal to the number of quintessences (n_q) within it. The wavelength will depend on its velocity travelling relative to the speed of light and thus multiplied by the relative velocity compared to c (β = v/c);

Hence for matter as previously shown:

$$\lambda = v/\beta^2 n_q = hc/\beta E \qquad (2)$$

And conventionally

$$E = (p^2 c^2 + m_0^2 c^4)^{1/2}$$

Using these equations, we can now, also, reformulate the Shrödinger wave equation, which has the advantage that relativity can be treated in a quantum mechanical way. Thus if the wave energy of matter is defined as:

$$E_\lambda = \beta(p^2 c^2 + m_0^2 c^4)^{1/2}/c^2$$

thus

$$E_\lambda = (\beta^2 p^2/c^2 + \beta^2 m_0^2)^{1/2}$$

which in complex space generalises to

$$E_\psi = (-j\beta \cdot \nabla + \beta m)_\psi \qquad (2a)$$

As the term $\alpha = e^2/hc.4\pi\varepsilon_0$; also represents the ground state ratio of the velocity of the electron to c. Thus $\alpha = \beta$ = v/c = 1/137 .

Thus, *also* $E_\psi = (-j\alpha \cdot \nabla + \beta m)_\psi$

This is thus the standard relativistic equation that Dirac was able to construct from the Shrödinger wave equation. This relativistic equation can be derived from the modified wave equation (2). This takes into account the relative mass energy which the quintessential wave equation (2) contains.

Where importantly the term βm is the mass m, multiplied by the ratio of the relative velocity to light β = v/c, and the term α is also essentially the relative velocity of the electron.

The Dirac equation was an empirical formula which worked mathematically, nevertheless even Dirac admitted it was not logically understood. The importance of these equations (eq. 2, 2a) is that they show that the existence of **quintessence allows the wave-particle duality of matter to be explained and mathematically derived from first principles,** Thus the frequency of matter or even light is simply determined by the number of quintessences it contains.

Indeed, a recent publication in Nature has suggested that the direct visualisation of the orbitals of electrons shows that these are in very close agreement with theory. However, there is a significant departure from theory, in the interstitial molecular regions, suggesting that the higher velocities of the electrons obey the modified Dirac equation (2a).Thus these orbitals were in keeping with the modified Dirac equation, which itself may be derived from the wave equation above, $\lambda = hc/\beta E$ (eq. 2).[ref 2]

The Shrödinger wave equation will approximate to the correct values until v approaches c. Indeed the Shrödinger equation will give similar answers as that derived from equation (2a), under most experimental conditions.

However, equation 2 and its derivative (2a) may have advantages over standard Shrödinger theory with relativistic speeds. Furthermore, equation 2, conceptually shows that the wave particle duality of matter derives from the principle that the frequency of matter is directly equal to the number of quintessences it contains. Importantly it also mathematically allows relativity and quantum mechanics to be united.

With $v \cong c$, the modified Dirac equation (2a) will yield more accurate results, particularly compared with the Schrödinger equation. We also find that the equation $\lambda = hc/\beta E$ (2) is equivalent to the de Broglie wave equation, $\lambda = h/p$, provided we use the relativistic mass in the de Broglie equation. Given this, these equations yield accurate experimental results [ref 1].

Thus we find that the modified formulation of de Broglie wave equation $\lambda = hc/\beta E$ (eq. 2a) leads directly to a modified Dirac relativistic wave equation and is supported by recent experiments which measure the wavelength of matter and demonstrate the electron orbitals experimentally from these wave equations for matter [ref 1,2].

Wave particle Duality and Relativity

From here it is possible to proceed in several ways using the relativistic wave equation (2). It is apparent that the reintroduction of the term for relative velocity into the wave equations will enable the reintroduction of special relativity into quantum mechanics. In particular we should now be able to derive the term $(1-v^2/c^2)^{1/2}$ as a special case of quantum mechanics.

Thus if: $\qquad\qquad\qquad\qquad \lambda = hc/\beta E \qquad\qquad\qquad\qquad\qquad$ (2)

As $E=(p^2c^2 + m_0{}^2c^4)^{1/2}$, squaring

$$\lambda^2 = h^2c^2/\beta^2(p^2c^2 + m_0{}^2c4)$$

Conventionally $p^2c^2 = E^2v^2/c^2$

then $\qquad\qquad\qquad \lambda^2 = h^2c^2/\beta^2(E^2v^2/c^2 + m_0{}^2c^4)$

Thus as $\beta^2 = v^2/c^2$ and $m_0{}^2c^4 = E_0{}^2$, then:

$$\beta^4E^2 + \beta^2E_0{}^2 = h^2c^2/\lambda^2$$

hence

$$\beta^4E^2 = h^2c^2 \cdot \frac{1}{\lambda^2} - \beta^2m_0{}^2c^4$$

thus

$$\beta^2 = \frac{h^2c^2}{\beta^2E^2} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0{}^2c^4}{\beta^2E^2}$$

As $E^2 = 'm^2c^4$

$$\beta^2 = \frac{h^2c^2}{\beta^2{}'m^2c^4} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0{}^2c^4}{\beta^2E^2}$$

Substituting $h = m_qc^2$

$$\beta^2 = \frac{m_q{}^2c^6}{\beta^2{}'m^2c^4} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0{}^2c^4}{\beta^4E^2}$$

As $m_q/'m = 1/n_q$ (eq. 2)

$$\beta^2 = \frac{c^2}{\beta^2n_q{}^2} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0{}^2c^4}{\beta^2E^2}$$

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Thus if $f = \beta^2 n_q$ (eq. 7a);

$$\beta^2 = \frac{v^2}{f^2} \cdot \frac{1}{\lambda^2} - \frac{\beta^2 m_0^2 c^4 f^2}{\beta^2 E^2}$$

As $1/\lambda^2 = f^2/v^2$

$$\beta^2 = \frac{v^2}{f^2} \cdot \frac{f^2}{v^2} - \frac{\beta^2 m_0^2 c^4 f^2}{\beta^2 E^2}$$

Thus:

$$\beta^2 = 1 - \frac{\beta^2 m_0^2 c^4}{\beta^2 E^2}$$

As $E^2 = {}^, m^2 c^4$

$$\beta^2 = 1 - \frac{m_0^2}{{}^, m^2}$$

Hence

$$m_0/{}^, m = (1 - \beta^2)^{1/2}$$

Thus

$${}^, m = \frac{m_0}{\left[1 - \dfrac{v^2}{c^2}\right]^{1/2}}$$

Thus this derivation now allows relativity as a universal case of the quintessential wave nature of matter.

The original premises on which special relativity was based were: that the speed of light is a constant and that all observers are equal. As the speed of light has dimensions of length and time but not apparently of mass, the relativistic change in mass is not accounted for. Using quintessence logically and directly accounts for the relativistic mass changes.

Moreover, relativity can be derived from the de Broglie equation, and visa versa, directly, thus linking relativity and quantum mechanics by taking into account the existence of quintessence mass.

Hence, it is now possible to derive the relativistic equations for mass and in turn for space and time from the quintessential wave equation, **thus deriving special relativity as a universal case of quantum mechanics and thus uniting special relativity and quantum mechanics. This now allows a further understanding of the nature of space-time.**

11

The Space-time Lattice

The understanding of the true nature of space-time and how it is formulated in three dimensions of real space is crucial. To simply assume that space-time exists, and thence not to question the nature of that existence, denies a deeper understanding of the universe.

In order to understand the nature of space-time itself, at the quantum level a further look at the nature light and the photon is necessary. Since Einstein's description of light as a particle (the photon) and the description of the photoelectric effect, the standard picture of light as simply a wave can, no longer be applied. If light was to exist as a photon, it could not exist in one dimension, as ordinary waves do, it would need to be three dimensional, with the addition of time. Let us suppose, in this case, that a photon is a three dimensional helical ringlet of light, travelling in the x vector, and spinning around the x-axis. Conventionally this ringlet has a radius; $r=\lambda/2\pi$. The ringlet itself would be vibrating in the y and z vectors. The vectors x, y and z would represent the photon, the substance of which, would be travelling in the x direction and oscillating in the y and z vectors, which would represent oscillatory energy. This in turn would allow it to act as a wave, and create oscillatory electromagnetic fields.

It is important to re-examine **space-time** itself in this light, this would have one directional vector with two vector dimensions of energy, one of capacitance and one of electrical permeability, thus accounting for the well known constants of free space; the permittivity of free space (ε_0) and the permeability of free space (μ_0) respectively. The vector dimension of direction x, would be the direction of travel and those "quintessences" travelling in an outwardly direction would account for none other than the expansion of the universe. Three of these quintessences would naturally constitute three dimensional visible space-time. These constituents of space-time would interact with the generations of the other vector dimensions reciprocally. **Thus one quintessence would sweep out one vector of permeability and one vector of permittivity, through which the other two quintessences could travel, and vica versa, creating a three dimensional space-time lattice.**

The permittivity of free space, (ε_0) which is equivalent to capacitance, would as with capacitance plates, be determined by the effective separation between quintessences. The permeability of free space (μ_0) is in fact a force, measured as $4\pi \times 10^{-7}$ N A^{-2}, would result from the force produced by the vibration of quintessence and would be dependant on the density of quintessence. Hence these two parameters would be reciprocal and thus the product of these two would therefore be a constant, which is recognised as none other than the speed of light.

$$c = (\mu_0. \varepsilon_0)^{-1/2}$$

This space time lattice would in effect be created by quintessences travelling in all directions with a speed of c within the lattice. The quintessences of the space time latice would in effect produce a non-static ether. A non-static ether is fully compatible with special and general relativity. Indeed such an ether explains how space time can be curved as in general relativity. Furthermore, the existence of a non-static ether, was espoused by Einstein in his University of Leyden lecture on general relativity of 5th May 1920. In Einstein's own words;

"According to the general theory of relativity space without ether is unthinkable."[ref4]

Recent evidence from a number of sources now strongly support the presence of this non-static ether, in the form of quintessence. An editorial from a major journal states "combined with other observations such as those of distant Supernova, the QMAP results corroborate the prevailing theory of inflation with the twist that the Universe is only one third matter (both ordinary and dark) and two thirds quintessence, a form of energy possibly inherent in empty space".[refs 5,6,7]

If we take into account the existence of quintessence and as such a three dimensional space-time lattice, matter which is intrinsically made of contituents of charge would interact with this lattice to produce the effects of mass. Mass would be perceived as a result of matter (whose constituent particles appear to contain charge) interacting with this lattice directly due to the inhibition of motion by the lattice's electrical permeability and permittivity vectors, which would form the existence of complex space. These quintessences would in the direction in the y and z vectors produce small vibrations of the order of the Planck length (10^{-35} m), whilst passing through the vectors of permeability and permittivity, thus producing the effects of mass.

The vibration would endow quintessence itself a (non rest) mass (m_q) equivalent, to the minimal mass of:

$$m_q = h/c^2 = 7.373 \times 10^{-51} \text{ kg.sec} \qquad (1)$$

The presence and magnitude of Planck's constant (h) and especially the speed of light (c) is thus explained. Indeed, the speed of light $c = (\mu_0 . \varepsilon_0)^{-1/2}$ **is not in itself a fundamental quantity.**

As the energy equivalence formula is $E = mc^2$, the minimal mass of a single quintessence, would thus be the minimal mass, h/c^2, hence again:

$$m_q = h[\mu_0 . \varepsilon_0] = h/c^2 = 7.373 \times 10^{-51} \text{ kg.sec} \qquad (1b)$$

or $\qquad\qquad\qquad\qquad m_q c^2 = h \qquad\qquad\qquad\qquad (1c)$

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It is postulated by general relativity that the shape of space time itself can be altered, indeed the presence of the space time lattice now allows this to be altered by altering the density of quintessence. It is further clear that if quintessences underly the structure of the space-time lattice, they may also underly the structure of matter itself.

With regards a single quintessence, this passing through an energy vector of the space-time lattice would appear as a vibrating string. In a similar way to string theory, the conglomeration of these quintessences would produce the constituents of ordinary matter. Thus the general equation for the number of quintessences (n_q) in an object of mass (m) would be

$$m/m_q = n_q$$

The mass of the electron (m_e) for example, would be directly determined by the number of quintessences in the electron, multiplied by the mass of quintessence.

Quintessence and Complex Space

Quintessence is postulated to constitute the fundamental nature of space-time. Three quintessences each travelling in their respective x vectors at 90^0 to each other would create three dimensional real space-time. These quintessences would in the direction in their respective y and z vectors produce small vibrations of the order of the Planck length (10^{-35} m), this would create the vector dimensions of permeability and permittivity. The result would give space-time 9 dimensions of space as in superstring theory. However, unlike superstring theory the six hidden dimensions would not be "curled up so as to be so small as to be invisible" these six dimensions would be present in complex space. Thus, only three of these dimensions would represent ordinary three dimensional particulate space time i.e. three dimensional objects. The other six dimensions produced by the vibrations of quintessence would form complex space.
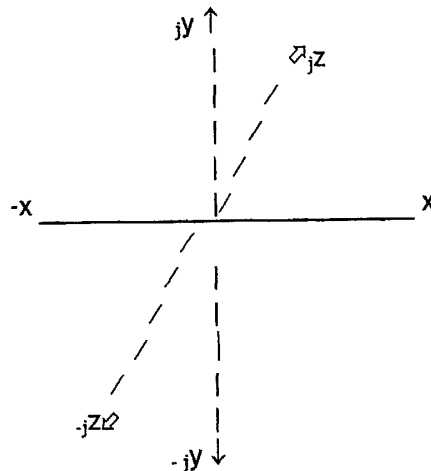
The mathematics of complex space, using imaginary $\sqrt{-1}$ or ($_j$) numbers, is assumed in the standard formulation of the Shrödinger wave equation. Thus the presence of complex space is an integral part of quantum mechanics. [ref 8]

$$-\frac{h^2}{2m} \cdot \frac{d^2\psi}{dx^2} + V\psi = {}_jh \cdot \frac{d\psi}{dt}$$

The mathematics of complex space is also an essential and integral part of the principles and application of modern electronic and control engineering. Indeed it has been well recognised for some time that each direction vector in electronic engineering can be associated with complex vectors. [ref 9]

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As this complex space consists of the vectors of permittivity and permeability it would only be "felt" by charged particles as in the electron. Nevertheless, as all particles are fundamentally composed of charged particles the effects of complex space would be felt by endowing these particles with mass and in turn kinetic energy.

In conventional complex space, a 2 dimensional Cartesian Argand diagram is mathematically used. However, in order to formulate the equations for particles a three dimensional Argand diagram is essential. This will have three dimensional vectors, one real vector and two imaginary vectors. Three of these diagrams will be required to fully describe the nature of particles, each with a real vector in the x, y and z vectors, respectively. Nevertheless, in the instance below the real vector is the x vector and the two imaginary vectors are given by (jy, jz)

$$jy \uparrow$$
$$\nearrow jz$$
$$-x \quad\rule{3cm}{0.4pt}\quad x$$
$$-jzϴ$$
$$-jy \downarrow$$

The Three Dimensional Argand Diagram

The beauty of a three dimensional Argand diagram is that the complex conjugate (i.e. the mirror image which confers mathematical reality on the coordinates) is formed by the value of the minus coordinate in the other complex vector dimension. Thus the complex conjugate of $(c_x^{1/2} + jc_y^{1/2} + .jc_z^{1/2})$ is $(c_x^{1/2} + .jc_y^{1/2} + jc_z^{1/2})$. These two sums when multiplied thus give a real number solution.

Furthermore it is clear that nine dimensions of space time are necessary in the general relativistic equations. By including complex space we thereby create the nine dimensional spacial metrictensor and the metric energy tensor of matter necessary for computations for general relativity (see quantised general relativity pp 34-35). From here we can begin to understand the true structure of matter.

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Energy and the Space-time Lattice

The presence of numerous experimental data for quantum tunnelling [refs 10,11,12,13] and indeed the recent observations by Nicholas Gisin, on the entanglement of distant photons now returns us to EPR experiments.

Using the quintessential modification of the de Broglie wave equation, gives us an insight into these teleportation and EPR effects.

As

$$\lambda = hc/\beta E \qquad (2)$$

and

$$E = hn_q \qquad (1a)$$

then

$$\lambda = c/\beta n_q \qquad (2b)$$

Importantly, as indicated by equation (2b), energy having no quintessence; would have a wavelength of infinity. Specifically pure energy containing no quintessences, would have a lambda of infinity. According to quantum mechanics an infinite wavelength would result in the probability of that energy being anywhere. As energy itself has no electrical charge it would not be impeded by the permittivity and permeability of the three dimensional space-time lattice. Moreover, energy would not be detectable in three dimensional space-time, unless it interacted with matter, as in the EPR experiments. Indeed, energy is not observed when not bound to any form of mass or particle. Thus equation 9d, takes us to our original assertion

- Energy is not bound by the space-time lattice -

Thus, as the EPR experiments suggest the existence of energy separate from matter and thus separate from the three dimensional space-time lattice, it is interesting to find that experiment suggests the existence of free energy in a continuum separate from space time to produce the effects of quantum teleportation. [refs ,10,11,12,13]

This is not, however, teleportation across an additional dimension, this is a term to describe in partially familiar terms the dissociation of energy from the three dimensional space-time lattice. As time is inextricably linked to each dimension of space, the effects of energy would be inextricably linked to the events, such as the creation of virtual particles, we see interacting within space-time.

It is unlikely that observers have any direct day to day experience to explain quantum events. Nevertheless, quantum physics may have given us a window into the hitherto hidden workings of the Universe. Thereby, the mystery of the uniformity of the

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Universe, across distances which the speed of light could not apparently traverse, is readily explained by the fact that the free energy contained in the Universe is not bound by the space-time lattice.

In the case of light, due to the exceedingly small masses involved, there would be relatively easy exchange of matter with free energy within a photon. This would make the photon the ideal experimental tool to look for energy which is not bound by matter and in turn energy which is not bound in space-time. Indeed, very recently Furusawa *et al.* have reported to have observed the transference of energy as photons from A to B, without those photons traversing space-time[ref 10]. This finding which has been supported using other experimental techniques[refs 11,12,13,], is very important as it suggests the existence of such a quantum continuum.

We have already seen strong experimental data using photons [ref 10], atomic spins and other data for quantum teleportation which have recently been published [refs,11,12,13], which support these findings. According to the above equations the teleportation would vary in a predictable fashion, as with photons, in line with the wavelength of the light used, relative to the size of vibration of quintessence. As regards matter, the results do confirm that the effect of quantum tunnelling is indeed dependant on the wavelength of matter and the size of that matter [ref 10].

PART II
PARTICLE PHYSICS

Electron Structure

Understanding the electron is fundamental to the understanding of the elementary particles. The hidden nature of the electron may recently have been revealed through observations by Horst Stormer, Daniel Tsui and Robert Laughlin for which a Nobel prize has recently been awarded. They describe a quasi electron particle of charge 1/3e. This has been described on a quantum basis as a vortex of energy, bound as a quasi particle in one dimesion x, but not bound in the other two dimensions y and z, allowing dispersion in space-time as a vortex. What is more intriguing are the experimental conditions in which this occurs. First of all a two dimensional electron gas is created and held between two capacitance plates. A magnetic force is then applied in the remaining dimension, virtually creating a one dimensional passage through which only a quasi electron appears to be able to pass.[refs 15,16]

Given the presence of charge of 1/3 e, then three of these quasi electrons could form an entire electron in three dimensional visible space time. Nevertheless, each would have energy and hence a wave function which would be present in the other vectors. This electron could thus follow the probability functions as described by the Shrödinger wave equation for ψ (otherwise termed as "essence" by Shrödinger)

If the mass of the electron (m_e) is constituted from quintessence, using the formula:

$$m_e/m_q = n_q$$

Then an electron would be constituted from:

$$9.11 \times 10^{-31} \text{ kg} \div 7.373 \times 10^{-51} \text{ kg.sec} = 1.236 \times 10^{20} \text{ quintessences/sec.}$$

Thus taking into account the mass-energy content of quintessence (m_q) it is independantly possible to derive the magnitude of the charge of an electron (e) using the following equation.

$$e = [m_q \varepsilon_0 / 4/3\pi hc]^{1/2} = 1.61 \times 10^{-19} \text{ C}$$

This is in close agreement with the experimentally observed charge on the electron of 1.602×10^{-19} C.

Interestingly substituting $m_q = h/3c^2$ in the above equation we have:

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$$e = [\varepsilon_0 / \ 3(4/3\pi c^3)]^{1/2} \qquad\qquad (6)$$

This can also be written as

$$e = \left[\frac{\varepsilon_0}{3 \ (4/3\pi c^3)} \right]^{1/2} \qquad\qquad (6a)$$

Equation (6) has a number of very special implications, if re-examined, firstly three of these quasi electron spheres appear to to be required to constitute the charge of the electron . More intriguingly, it indicates that the charge is related to the volume *of a sphere with an apparent radius of c*. Thirdly it indicates that the square of the charge of an electron (e) is proportional to the permittivity of free space (ε_0). The charge given from equation (3) is in close agreement with the measured charge of the electron. Furthermore a more **exact** value for the charge of the electron (to seven decimal places) can be deduced by taking into account the gravitational field of the Earth (see Gravity and the Charge of the Electron). Furthermore the charge of the electron (e) can now be derived from first principles. Thus, equation (3) corroborates the evidence that the electron is indeed composed of three quasi electrons in keeping with recent experimental findings.[ref 16]

The significance of the electron, composed of three spheres each with a radius of c, is not immediately clear, but can be understood if the frequency of rotation of the electron is taken into account. Thus if the diameter of the electron was approximately 10^{-19} m, then its spin would need to be $1/c.10^{-15}$m $\approx 10^6$ cycles/sec. Thus given a very high rotation rate an electron could have an effective radius of $1/c$ and still occupy subatomic sizes. Indeed these observations might be used to estimate the rate of rotation of the quasi electron and its size (see Appendix 1).

With regards a single quintessence, this passing through an energy vector of the space-time lattice would appear as a vibrating string. In a similar way to string theory, the conglomeration of these quintessences would produce the constituents of ordinary matter. The electron, for example, would be constituted from approximately 1.236×10^{20} quintessences.

The dimensions of the equation for the electron can be readily resolved by considering **each of the three vector dimensions**. The exact dimensions of the equation need to be considered in the light of the nature of space-time itself. These dimensional equations help explain the nature of matter. Indeed the equation for the electron may be necessary for the full understanding of gravity, this is also fully addressed (Appendix 1, Dimensional Equations)

Complex Space and Electron Structure

The presence of complex space also now further explains the conformation of the the electron, and its formulation at the quantum level, and the presence of particles , anti-particles and their spin up and spin down characteristics.

Indeed the short form equation for the charge of the electron (-e) can now be rewritten as a metric tensor with three dimensions in real space and six in complex space.

Thus if three of the x, y and z vectors are in real space and six vectors in complex space, where c is the speed of light in the real space vector, $_jc$ is the speed of light in the complex vector and $_{-j}c$ is the complex conjugate of $_jc$, thus the electron can be mathematically represented by the equation:

$$-e = \varepsilon_{qe}/(4/3\pi)^{1/2} \cdot \begin{array}{ccc} (c_x)^{1/2}.(jc_y)^{1/2}.(-jc_z)^{1/2} \\ + \quad + \quad + \\ (-jc_x)^{1/2}.(c_y)^{1/2}.(jc_z)^{1/2} \\ + \quad + \quad + \\ (jc_x)^{1/2}.(-jc_y)^{1/2}.(c_z)^{1/2} \end{array} \qquad (7)$$

Which now elegantly gives the real number solution

$$e = \varepsilon_{qe}/3(4/3\pi c^3)^{1/2}$$

Where ε_{qe} is given as the permittivity of free space for a single quasi electron (see appendix 1). Equation 4 represents a "complex" tensor

Whilst the two dimensional Argand diagram has four quadrants, the three dimensional Argand diagram has eight cubic sectors. Two of these cubic sectors are diametric opposites and can represent "real" particulate objects. These have the primary coordinates x, y, -z ; as in the electron described above, and the -x, -y, z, with the real vector x now having a minus sign. These two "real" cubic sectors, therefore, mathematically represent particles and their anti-particles.

The mathematical presence of the two primary diagonal mirror images (x, y, -z and -x, -y, z) now allow the introduction of the concept of antiparticles. This extension of the maths into a three dimensional Argand diagram thus results in the automatic formulation of the maths of antiparticles. Thus the charge of the positron (+e) is formulated by the shortened form equation, where the real vectors now each have the minus sign, and therefore exist in the -x, -y, z sector of the three dimensional Argand diagram.

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$$^+e = \varepsilon_{qe}/(4/3\pi)^{1/2}. \quad \begin{array}{ccc} -C_x^{1/2}. & -jC_y^{1/2}. & jC_z^{1/2} \\ jC_x^{1/2}. & -C_y^{1/2}. & -jC_z^{1/2} \\ -jC_x^{1/2}. & jC_y^{1/2}. & -C_z^{1/2} \end{array} \qquad (8)$$

The three dimensional Argand diagram also accounts for chirality and indeed the up and down spin of the electron. There are two other "real" primary coordinates in the Argand diagram, these are themselves the partial mirror images of the above coordinates (i.e. x, -y, z and -x, y, -z). In particular the y axis is of the opposite sign, thus in particles the y axis is in the downward direction, to form down spin particles and in anti-particles in the up direction, to form the antiparticle The up spin electron is given by eq. 8 and hence the down spin electron ($-e \,|\!\downarrow\rangle$)is given by the equation

$$-e\,|\!\downarrow\rangle = \quad \varepsilon_{qe}/(4/3\pi)^{1/2}. \begin{array}{ccc} C_x^{1/2}. & -jC_y^{1/2}. & jC_z^{1/2} \\ -jC_x^{1/2}. & C_y^{1/2}. & -jC_z^{1/2} \\ -jC_x^{1/2}. & jC_y^{1/2}. & C_z^{1/2} \end{array} \qquad (9)$$

Thus the three dimensioanl Argand diagram accounts directly for the presence of antiparticles and the spin up and spin down particles seen in nature. It also accounts for the necessity of the electron to form a square root spherical object, as complex space depends on $\sqrt{-1}$, otherwise known as j.

Electron Pairing and Superconductivity

As the quintessences making up the electron are in a square root conformation, each of these quasi electrons would have a tendancy to pair to form an entire sphere.

The square root sphere structure of electrons with up and down spins can now superimpose to produce a complete sphere of varying extents. This produces electron pairing as seen at the atomic and molecular levels. It also accounts for the Pauli exclusion principle. **This pairing thus accounts for the reactivity of the valence electrons** and the electron probability densities, which in turn accounts for the existence of chemistry. [ref 8]

Furthermore, it is possible to account directly for superconductivity from first principles. For if both the complex and real vectors of the electron combine completely, the product of an up and down spin electron form a perfect superimposed sphere with radius c, with a charge of 2.59×10^{-38} Coulombs, denoted by the formula:

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$$e^2 = \frac{\varepsilon_0}{3\left(4/3\pi c^3\right)} = 2.59 \times 10^{-38} \, C \qquad (6b)$$

As with standard superconducting theory, superconductivity can be explained by the formation of "Cooper" electron pairs, where the electrons are forced to pair by the presence of positve crystal charge in particular formation, at supercooled temperatures. In addition the electron pair now forms a stable entity whose angular momentum cancels.[ref 8]

It additionally becomes clear that the charge of two seperate electrons (2e) is 3.2×10^{-19} C, but the charge of the combined electrons (e^2) is 2.59×10^{-38} C. This electron pair thus appears to have 19 orders of magnitude less charge than the electron and in turn 19 orders of magnitude less resistance. It is this **effective reduction in charge and in turn resistance which may account for superconductivity.** When observed directly any electrical interaction with the Cooper electron pair will, however, result in the release of the full charge of both electrons, so that the full electrical charge put in will be equal to that coming out of the apparatus.

The Fine Structure Constant

Intruiginly from our knowledge of the electron we can further define the term α, the fine structure constant; from the structure of the electron. Thus as the standard term $\alpha = e^2/hc.4\pi\varepsilon_0$; substituting the term $e^2 = \varepsilon_0/ \, 3(4/3\pi c^3)$ (eq.6) and $h = m_q c^2$ (eq.1) we find:

$$2\pi/\alpha = m_q[3(4/3\pi c^3)]^2$$

*or $\qquad\qquad 2\pi/\alpha = m_q e^4/\varepsilon_0{}^2$

For brevity we may represent the quasi electron stucture as $(4/3\pi c^3) = \Theta$; to signify its threefold symmetry, thus

$$2\pi/\alpha = m_q[3\Theta]^2 \qquad\qquad (10)$$

Indicating that the fine structure constant of the electron (α) is indeed related to its dimensional structure. Again taking into account the effects of gravity the fine structure constant can be derived from first principles to nine decimal places (see Gravity and the Charge of the Electron).

Fundamental Forces and Particle Structure

In order to understand the fundamental forces and the nature of fundamental particles, an overview is required. Thus, there are three major forces; strong, electro-weak and gravity, each mediated by three force particles the gluon, photon and graviton respectively. These in turn, influence three types of particle, the quark, lepton, and by general relativity space-time itself. Each of these are composed of particles with multiples of charge of 1/3, which are themselves in three generations, and are present in three dimensions of real space. It is important that a comprehensive view of nature explains this threefold symmetry.

Using the Standard Model of particles, it is well accepted there exist quark particle charges of -1/3, -2/3 and +1/3 and +2/3 in quarks and anti-quarks. Given that each particle is made up of three quarks the presence of these fractional charges support the association of the fractional charges in this way to form three dimensional charged particles. In stable particles each of the three quarks would have a vector in one dimension, giving the three quarks together an existence in three dimensional visible space time. The particles that bind the quarks (gluons) are themselves required, in stable particles, to have three different colour charges, one colour in each dimension, for the particle to exist in three dimensional space-time. Furthermore, there are three generations of quarks (and indeed leptons).

The Standard Model (or a modification of this) and in particular the observation of quarks and indeed quasi electrons with fractional charge of 1/3 and 2/3 in both cases, indicates that particles are constituted from the equivalent of three of these quasi particles to form an electron and quarks to form baryons. In the normal three dimensions the energy would be carried by the particle, However, because each particle is constituted of three quasi particles and in each quasi particle or quark one visible dimension would be the direction vector, in the other two hidden dimensions of each vector the waves would carry energy. Thus each particle would be associated with vibration, which would account for wave particle duality and Heisenberg's uncertainty principle in three dimensional visible space-time.

These observations lead us directly to the previous postulate that the structure of the electron is composed of none other than three (root) spheres, and that this equation for the electron allows the determination of the charge of the electron from first principles, thus:

$$e = \frac{\varepsilon 0}{[\,3\,(\,4/3\pi c^3)\,]}^{1/2} \qquad\qquad (6)$$

In addition the mass of the proton (m_p) can be directly calculated from the ratio of the mass (m_e) of the electron, given by the equation:

$$m_e/m_p = 5.45 \times 10^{-4} = 3(\pi/c^{1/2}) \qquad (11)$$

Strictly we should write, $m_e/(m_{p+} m_e) = 3\pi/c^{1/2}$; which is much more elegant.

Which now gives

$$m_e/m_p = 1/(c^{1/2}/3\pi - 1) = 5.4462 \times 10^{-3}$$

This is in very close agreement with the experimentally derived ratio of the proton to electron masses which is also; 5.4462×10^{-3}

Thus the correlation factor between theory and experiment has a maximum error <0.00001 [ref 17]

If we combine equation 3: $e = [\varepsilon_0/ 3(4/3\pi c^3)]^{1/2}$ and equation 13: $m_e/m_p = 3(\pi/c^{1/2})$ the positive charge of the proton (e_p) is given by:

$$e_p = [\varepsilon_0/3(4/3\pi c^3)]^{1/2} \times m_e.3(\pi/c^{1/2})/m_p = e \qquad (12)$$

The stable nuclear proton conformation can thus be represented by the short form equation :

$$p = 3^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \qquad (13)$$

This forms a stable 3 x 3 conformation as with the stable electron structure.

Importantly the term $(\pi/c^{1/2})$ is the 90° solution to the Shrödinger wave equation for an electron confined in a space with radius c! [ref 8]

Thus the standard equation for an electron confined in a one dimensional box is given by:

$$E\psi(x) = -\frac{h^2}{2m} \frac{d^2 \psi(x)}{dx^2}$$

If the one dimensional box has a length 2L the quantum amplitude (A) can only be non zero between x = 0 and X = 2L and the standard solution for the amplitude is none other than:

$$A = (1/L^{1/2})$$

Thus in one dimension the standard solution to the Shrödinger wave equation is:

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$$\psi(x) = (\pi/L^{/12}) \sin x/L$$

Thus not only is the electron charge derived from the equation for three spheres each with a radius of **c** (eq. 3) ; but the proton mass and charge can also be derived from the standard solution to the Shrödinger wave equation for a an electron confined in a space of radius c! [ref 8]

The term $(\pi/c^{1/2})$ itself would thus most logically represent the gluon which is present in the proton. These gluons would bind the quasi electrons together to form the fundamental particles

The masses of all the known particles, including the up and down quarks, the W boson, the muon, charm, strange, the tauon, truth and beauty can thus also be derived from first principles in this fashion, and have the quasi electron as their basic constituent particle (see Appendix 1).

Thus the structure of the muon (μ) can also be derived from the ratio of the mass of the electron (m_e) and the mass of the muon (m_μ):

$$m_e/m_\mu = 4.7 \times 10^{-3} = \pi/c^{1/3}$$

Thus
$$\mu = \varepsilon_0^{1/2}.m_e/\, m_\mu.\, 3^{\cdot}(4/3\pi c^3)^{1/2}.(\pi/c^{1/3})$$

Where the charge of the muon is in this equation equivalent to that of the electron e. In this case $(\pi/c^{1/3})$ can be considered to represent a specific high energy photon. Thus the structure of the muon, written in short form is:

$$\mu = 3^{\cdot}(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}) \tag{14}$$

Moreover the structure of the tauon can be calculated from the ratio of the mass of the electron and that of the Tauon (1.79 Mev);

Thus 0.511 Mev$/1.79$ Gev $= 2.85 \times 10^{-4}$

$$m_e/m_\tau = (\pi/c)^{1/3}.(\pi/c)^{1/9} = 2.85 \times 10^{-4}$$

As the charge of the tauon is equivalent to the charge of the electron, hence the structure of the Tauon is given by the above equation

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$$e_\tau = \varepsilon_{qe}.m_e/\,m_\tau.3^-(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} = e$$

This equation accurately predicts the charge -1; and mass of the Tauon (~1.78 Gev) [ref 1]. Thus the structure of the Tauon can in short form be given by the equation

$$\tau = \,^-3(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad\qquad (15)$$

Furthermore a more exact value for the mass of the muon and tauon can be deduced by taking into account the gravitational field of the Earth (see Gravity and the Charge of the Electron pg. 17) in a similar way to identifying the exact charge of the electron. In addition it may be necessary to take into account a possible mass value of the neutrino to arrive at a precisely accurate mass value of the muon and tauon. Nevertheless, the mathematical proof of these short form equations lies in the fact that they can very closely identify the charge and the masses of these particles, from first principles, as in equations (6, 13-27, see Appendix 1).

Overall the mathematical geometrical structure of all the particles can be derived from the quasi electron, which is in turn derived from quintessence. Thus, the short form particle structures can now be derived from first principles. This includes the quasi electron (qe) and electron (e), from which the quarks (u,d) and in turn the stable proton (p) and stable neutron (n) and alpha particle (α) respectively are derived. The general structure of the force carrying bosons the photon (g) and the gluon (γ) and the intermediate vector boson (W) can be given. It will also intriguingly be possible to derive, according to their generation, the structure of the strange (s) charm (c), beauty (b, or bottom) and truth (t or top) quarks directly from the structure of the muon (μ) and Tauon (τ) respectively.

Using the term $\Theta = (4/3\pi c^3)$, where, $-/+$ represents the charge of the quasi electron, we find:

1st Generation:

$$q_e = \,^-\Theta^{1/2} \qquad\qquad (6c)$$

$$e = 3^-\Theta^{1/2} \qquad\qquad (6)$$

$$d = \,^-\Theta^{1/2}.3(\pi/c^{1/2}) \qquad\qquad (16)$$

$$u = 2^+\Theta^{1/2}.3(\pi/c^{1/2}) \qquad\qquad (17)$$

$$s = \,^-\Theta^{1/2}.3(\pi/c)^{1/2} \qquad\qquad (18)$$

2nd Generation

$$\mu = 3^{-}\Theta^{1/2}.(\pi/c^{1/3})$$ (14)

$$c = 2^{+}\Theta^{1/2}.(\pi/c^{1/3}).(\pi/c^{1/4})$$ (19)

$$b = {}^{-}\Theta^{1/2}.(\pi/c^{1/9}).(\pi/c)^{1/4}$$ (20)

3rd Generation

$$\tau = 3^{-}\Theta^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9}$$ (15)

$$t = 2^{+}\Theta^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4}$$ (21)

Particle Gluons (g):

$$g_1 = (\pi/c^{1/2})$$ (22)

$$g_2 = (\pi/c)^{1/2}$$ (22a)

$$g_3 = (\pi/c^{1/4})$$ (22b)

$$g_4 = (\pi/c)^{1/4}$$ (22c)

Particle Photons (γ):

$$\gamma_1 = (\pi/c^{1/3})$$ (23)

$$\gamma_2 = (\pi/c)^{1/3}$$ (23a)

$$\gamma_3 = (\pi/c^{1/9})$$ (23b)

$$\gamma_4 = (\pi/c)^{1/9}$$ (23c)

Intermediate Vector Boson (W$^{+/-}$):

$$W^{+} = 3^{+}\Theta^{1/2}.2(\pi/c^{1/6})^{6}$$ (24)

$$W^{-} = 3^{-}\Theta^{1/2}.2(\pi/c^{1/6})^{6}$$ (25)

Stable* Proton:

$$p = 3^{+}\Theta^{1/2}.3(\pi/c^{1/2})$$ (13)

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Stable* Neutron:

$$n = \begin{array}{l} {}^{+}\Theta\!\downarrow^{1/2}.2(3\pi/c^{1/2}).{}^{-}\Theta\!\uparrow^{1/2} \\ {}^{+}\Theta\!\downarrow^{1/2}.2(3\pi/c^{1/2}).{}^{-}\Theta\!\uparrow^{1/2} \\ {}^{+}\Theta\!\downarrow^{1/2}.2(3\pi/c^{1/2}).\Theta^{-}\!\uparrow^{1/2} \end{array} \qquad (26)$$

Alpha particle (α):

$$\alpha = \begin{array}{l} [3^{+}\Theta]\!\downarrow^{1/2}.2(3\pi/c^{1/2}).\ [3^{-}\Theta]\!\uparrow^{1/2} \\ {} [3^{-}\Theta]\!\uparrow^{1/2}.2(3\pi/c^{1/2}).\ [3^{+}\Theta]\!\downarrow^{1/2} \\ {} [3^{-}\Theta]\!\downarrow^{1/2}.2(3\pi/c^{1/2}).\ [3^{+}\Theta]\!\uparrow^{1/2} \end{array} \qquad (27)$$

The mathematical proof for these structures and their decay mechanisms is lengthy and is thus fully contained in Appendix 1. All the particle structures are accurately mathematically defined by the masses of these particles. [ref 17]

The structure of these particles all contain the quasi electron and thus the metric tensor structure necessary in the formulation of the gravitational equations is sustained. The respective forces created by the gluon and the photon are important as they tell us the behaviour of matter and also lead to the likely structure of the graviton

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*Stable nucleonic neutron and proton conformations differ slightly from the Standard Model , this is due to the sharing of quasi electron and quasi positron particles within the nucleus, which allows stabalisation of these particles by the formation of stable 3x3 structures. The Standard conformations which describe non-nucleonic neutrons and protons are additionally given in Appendix 1.

Particle Spin and Size

The significance of the electron, composed of three spheres each with a radius of 1/c, is not immediately clear, but can be understood if the frequency of rotation of the electron is also taken into account. Knowing the structure of the electron has led us to deduce its charge and thus may lead us estimate its size and spin. Thus these observations might be used to calculate the radius and rate of rotation of the electron.

Let us suppose, that nature is truly beautiful, and that **the radius of the fundamental quasi electron is indeed 1/c, and in turn the radius was balanced by the velocity of rotation $2\pi/c$. This can be directly confirmed mathematically by taking into account the known spin of the electron, $h/4\pi$.** Thus the actual spin of the electron may be calculated form the known energy of the spin.

The radius of the electron is not up till now known, but the radius of a quark has been estimated, and this is the radius derived from deep inelastic collisions of the proton. These estimates reveal a radius of approx. $r_p = 1.18 \times 10^{-15}$ m.[ref 13] This value may be used to assist in confirming the spin of the proton in revolutions per sec. (revs) and in turn the spin and size of the electron. Firstly we may proceed to estimate the spin of the proton. Thus as $h = E.t$ (Joules x sec) and $E.t = F.d.t$ (Joules x sec), then the spin;

$$h/4\pi = F.d.t \qquad\qquad (28)$$

As $F = ma$, where $a = (\text{revs. } 2\pi)^2 r_{qu}$ and $m = $ the mass of the proton, then

$$h/4\pi = m(\text{revs}.2\pi)^2 r_p.d.t$$

The actual distance (d) travelled in a circle of half integer spin in 1 second is: revs.πr_p, thus:

$$h/4\pi = m(\text{revs}.2\pi)^3 r_p^2/2$$

Hence: $$\text{revs} = \sqrt[3]{[h/m(2\pi)^4 r_p^2]}$$

Taking the effective mass the proton as 1.6726×10^{-27} kg, then the rate of spin of the proton in revolutions/sec is:

$$\text{revs} = 5.65 \times 10^6 \text{ cycles/sec}$$

From the frequency of the specific rotation of the proton, given the half integer spin associated with the proton, we can thus mathematically confirm the relationship between the radius of a particle and its spin:

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$$r_p \times revs/2 = 1/c \qquad (29)$$

Furthermore, the fundamental radius of 1/c seen in geometric structure the quasi electron, is also reflected in the rotation rate and radius for the proton, thus as above $1/c \div 1/2revs = 1.18 \times 10^{-15}$ m. Moreover, this means the actual half integer velocity of rotation is none other than $2\pi/c$ in metres/sec. So that the particle is in harmonic balance.

Using the fundamental formula $h/4\pi = F.d.t$, it is possible to obtain accurate estimates of the radius and spin rates of the electron, or indeed any particle, using the same principle of harmonic balance. Using the formula:

$$revs = \sqrt[3]{[h/m(2\pi)^4 r_e^2]}$$

It appears there are two unknowns, the radius if the electron and its revolution rate, however, in accordance with the equation, $r_p = 2/c.revs$, which gives the revolution rate of the proton, the same principle may also be used for the electron, by substituting $r_e = 2/c.revs$, such that:

$$revs = hc^2/4m_e(2\pi)^4 \qquad (30)$$

Taking the mass of the electron 9.109382×10^{-31} kg, the rate of revolution of the electron is:

$$revs = 1.048 \times 10^{10} \text{ cycles/sec}$$

Which gives a predicted radius of the electron as

$$r_e = 6.366 \times 10^{-19} \text{ m.}$$

So the half integer rotation velocity (revs.πr) is $2\pi/c$!, for the electron in keeping with the harmonic balance of the electron.

The same principle may be used to obtain an accurate estimate of the spin and radius of the muon, or any other particle. Using the above formula

$$revs = hc^2/4m_e(2\pi)^4 \qquad (31)$$

Then as the mass of the muon is 1.8823×10^{-28} kg then the revs of the muon $f_\mu = 5.070 \times 10^7$ cycles/ sec and the radius (r_μ) is thus 1.316×10^{-16} m.
It is now possible to begin to explain how the muon and the other subatomic particles are formed. If a quasi electron is complexed with another structure the total

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geometric structure needs to maintain harmonic balance. So the frequency of rotation would need to match geometric sructure with which the quasi electron was complexed

Intriguingly we find asymptotic convergeance for the formulas for frequency and mass occurs, when the geometric structure complexed with the quasi electron has the structure represented by $(\pi/c^{1/3})$ [giving the frequency divided by two, because the single integer spin of the force carrying particles compares to a half integer spin for the muon] . So that

$$(f_\gamma 3\pi/2)^{1/3} = f_\mu$$

When the ratio of the masses of the electron (m_e) and muon (m_μ) are related, such that:

$$m_e (3\pi/c^{1/3}) = m_\mu$$

Indeed we find that (allowing for the neutrino) this ratio is very close to the actual ratio of the mass of the electron to the mass of the muon, determined experimentally.

Furthermore, we have seen that these geometric structures, representing harmonics of the speed of light, which either match the frequency or the amplitude of vibration of the quasi electron, mathematically define the masses of the particles and the fundamental forces of Nature.

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Quantum General Relativity

Given the overall energy "complex" energy tensor structure of the electron and the metric tensor, assumed in general relativity, the quantum nature of gravity itself can now be explored. The spherical complex tensor for the electron and the positron (eq. 4,5,6) give the mathematical quantum structure and energy tensor for all the other particles (see appendix 2). Together with the time dimension these nine space dimensions account for the 10 parameters present in the metric tensor necessary to formulate the equations for gravity using Riemann geometry and thus forms the basis of quantum gravity. Intriguingly the metric tensor at each point in space time is required to consist of a collection of ten numbers, Consequently, ten dimensional space-time hypotheses, such as this or superstring theory, do automatically yield general relativity. [ref 3]

Furthermore, the mathematical representation of the graviton and the gravitational constant may be directly estimated from the knowledge of the mass and radius of quintessence. Thence, the force of the vibrations of quintessence lead directly to quantum gravity.

The radius of quintessence should be approximately in keeping with the Planck length estimate (r), which is conventionally derived from the standard dimensional equation:

$$r_q^2 \approx Gh/c^3 \tag{32}$$

Given the nine spacial parameters present in the metric tensor, used in general relativity we find that the actual formula for r_q^2 is mathematically in agreement with theory when:

$$9r_q^2 = Gh/c^3 \tag{33}$$

This again supports the 9 dimensional view of space and the size of the vibrations of quintessence can thus be estimated.

$$r_q = 1.35 \times 10^{-35} \, m \tag{33a}$$

This value is in agreement with the Planck length. Indeed if the above equation is correct then we find that we can derive the standard equation for the general relativistic increase in radius, r', (eq. 34) directly from first principles and arrive at a more fundamental equation for quantum gravity. As

$$r' = G.M/3c^2 \tag{34}$$

By substituting eq 33) into equation 34, a fundamental relationship between r' and M is obtained.

$$r'/3r_q^2 = GMc^3/Ghc^2 = Mc/h$$

And substituting the quintessential equation, $h = m_q c^2$ (eq. 1) then:

$$r'/3r_q^2 = M/m_q c = n_q/c \qquad (35)$$

Hence the ratio of the change in radius to that of the radius of quintessence squared, is proportional, by a factor of c, to the ratio of the mass M of an object to that of the mass of quintessence, effectively the number of quintessences. Thus the change in radius, r' due to gravitation, is related to none other than the ratio of the mass and radius of an object to the mass and the square of the radius of quintessence. Thus again the gravitational change in radius is directly related to the number of quintessences.

Naturally, this would be exactly what would be logically expected if quintessence, like the equation for the charge of the electron (eq. 6) forms from a root sphere. Thus the change in spacial radius of a normal sphere is dependant on the square of the quintessential radius.

This increase in apparent radius represents none other than the (gravitational) binding energy for quintessence.

The meaning of the above dimensional equation (33) might itself be further understood by substituting the mass of quintessence (where $m_q = h/c^2$) into the equation. Thus in nine dimensions the gravitational constant (G) may be more logically given as,

$$9(\pi r_q^2/m_q) = G\pi/c \qquad (36)$$

Where πr_q^2 is the cross sectional area of quintessence and m_q is the effective mass of quintessence, and thus $(\pi r_q^2/m_q)$ represents the effective mass per unit area which quintessence exerts. This equation reduces to:

$$9r_q^2/m_q = G/c \qquad (37)$$

From this we may derive the standard general relativistic relationship for the apparent change in radius (r') around a mass (M), from an understanding of the mass (m_q) and number (n_q) of qiuntessences. As $m_q = M/n_q$, then:

$$3r_q^2 = G.M/3c.n_q \qquad (38)$$

Then if

$$n_q = r'c/3r_q^2 \qquad (39)$$

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thus directly substituting for n_q in eq 38:

$$r' = G.M/3c^2 \qquad (34)$$

The importance of this is that the gravitational change in radius now logically derives from equation 36, which describes the gravitational force as resulting directly from the mass of quintessence exerted/per unit area of quintessence.

$$9(\pi r_q^2 / m_q) = G\pi/c \qquad (36)$$

Thus equation 34 is the conventional equation for the general relativistic increase in radius (r') in a gravitational field, which is here derived from the underlying nature of quintessence. Thus the gravitational constant is derived from the mass and radius of vibration squared of quintessence from first principles.

Indeed it is apparent that a more fundamental equation for gravitation now exists, for equation (39) is mathematically accurate and numerically agrees with eq. 34:

$$r'/3r_q^2 = n_q/c \qquad (39)$$

These equations may be readily mathematically verified. If in accordance with standard general relativity, the apparent increase in radius r' is:

$$r' = GM/3c^2 \qquad (34)$$

Then given that the mass of the Earth is 5.974×10^{24} kg;

$$r' = 1.478 \times 10^{-3} \text{ m}$$

Accordingly if $r' = 3r_q^2 n_q/c$; (eq.39). Given the number of quintessences (n_q) constituting the Earth is M_E/m_q, then

$$n_q = 5.9745 \times 10^{24} / 7.3725 \times 10^{-51} = 8.104 \times 10^{74}$$

As $r_q^2 = 1.823 \times 10^{-70}$ (eq. 33a) then:

$$r' = 1.478 \times 10^{-3} \text{ m}$$

Thus equation 39 gives the same answer as the standard equation and may be understood on a logical basis. Indeed the meaning of c in the equation may be understood as it has been previously shown as being the basis for the radius of matter (eq. 6). Hence the general relativistic change in radius, r', is none other than the effective binding energy for quintessence.

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Quantum Gravity and Wave Particle Duality

Quantum gravity can now be readily linked with quantum mechanics, indeed any observations which are self consistent must be able to do so easily.

The frequency of light has been previously derived

$$f = E/h = n_q$$

Thus the formula for the frequency of light ($E = hf$) has previously been explained theoretically by the simple observation that the frequency is determined quite directly from the number of quintessences (n_q) within the photon. The same principle has also been shown to apply to matter.

Let us now follow these equations for matter by calculating the wavelength of a photon from the Gravitational constant as an example; and also as a test of these observations and to demonstrate that the gravitational equations can also apply to the quantum world.

If $$n_q = r'c/3r_q^2 \qquad (39a)$$

where r' is the is the general relativistic increase in radius, and r_q is the radius of quintessence (eq. 33). Where $f = n_q$, substituting for n_q, then the frequency of the photon f_γ (where $\beta = 1$) is given by:

$$f_\gamma = r'c/3r_q^2$$

Uing the standard equation, $r' = GM/3c^2$ (eq. 34); we may substitute for r', thus we have:

$$f_\gamma = GM/9r_q^2c$$

Thus

$$f_\gamma = \frac{G}{9r_q^2c^3} \cdot m_\gamma c^2$$

and as $E = m_\gamma c^2$;

$$f_\gamma = \frac{GE}{9r_q^2c^3} \qquad (40)$$

Indeed as $9r_q^2 = Gh/c^3$, then

$$f_\gamma = E/h = n_q$$

It is possible to also demonstrate that the same relationship holds for the wave equation for matter. If we take the **relativistic wave energy of matter**, which has been previously derived,

$$f = \beta^2 n_q$$

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This includes the term for the number of quintessences flowing through the electron, in the complex vectors of space-time, to give the relativistic electron momentum (p) and a term for the rest mass, thus substituting into (40)

$$f_\gamma = \frac{GE}{9r_q{}^2c^3} \qquad (40)$$

As $f=\beta^2n_q$ <u>for matter</u> then the equation expands to:

$$f_m = \frac{G}{9r_q{}^2c^3} \cdot \beta^2 E$$

As $\lambda = v/f$, then

$$\lambda = \frac{9r_q{}^2c^3v}{G\,\beta^2E} \qquad (41)$$

Then the equation again reduces to:

$$G = \frac{9r_q{}^2c^4}{\lambda\beta E} \qquad (3)$$

Equations 3, 40 and 41 are important as they show that the quantum wavelength of any particle of rest mass m can be derived from the gravitational constant G. Thus linking quantum mechanics to quantum gravity.

It is therefore important to confirm the numerical accuracy of the above equation (40). We can do this by comparing the result to the standard computation of the de Broglie equation, in a range where de Broglie itself is likely to be most accurate; which according to these observations is in the low energy range (see section on Wave Particle Duality).

If we take an electron with an energy of 0.1 KeV the wavelength is conventionally given (where the kinetic energy of the electron E_K is given by the product of the charge of the electron (C) and the potential applied eV = 0.1 Kev), by the standard equation:

$$\lambda = h/p = h/(E_k.2m_0)^{1/2}$$

thus

$$\lambda = 6.63 \times 10^{-34}/\,[1.602 \times 10^{-19} \times 1 \times 10^2 \times 18.22 \times 10^{-31}]^{1/2}$$

hence

$$\lambda \cong 1.23 \times 10^{-10} \text{ m}$$

Using

$$\lambda = \frac{9r_q{}^2c^4}{G\,\beta\,E} \qquad (3a)$$

Where $E = \gamma m_0c^2$

At 0.1 Kev, electron velocity is 6×10^6 m/sec, thus $\beta = 2 \times 10^{-2}$ and $\gamma = 1/(1- v^2/c^2)^{1/2} =$ 1.0002 Thus:

$$\lambda = \frac{9 \times 1.82 \times 10^{-70} \times 80.78 \times 10^{32}}{6.67 \times 10^{-11} \times \beta \times 1.0002 \times 9.11 \times 10^{-31} \times 8.998 \times 10^{16}}$$

$$\underline{\lambda = 1.21 \times 10^{-10} \text{ m}}$$

Divergence between the de Broglie equation and the above equation (2) occurs at intermediate and high energies where it is generally accepted that the standard de Broglie equation may be less accurate [ref 18]. The values for eq. 2 and de Broglie are compared to recent experiments, which demonstrate a relativistic curvilinear plot for wavelengths of matter in keeping with eq. 40.[ref1]

The de Broglie equation in the non-relativistic format yields a simple log/linear scale, which is not in keeping with relativity; whereas eq. 3 is dependant on relativity and mathematically accounts for both relativity in calculating the wavelength. Indeed recent experiment on quantum tunnelling through a wire mesh strongly suggests that the relationship between energy and wavelength is relativistically curvilinear.[ref 1]

Furthermore equation 3a suggests a fundamental relationship between energy (E), relative velocity (v/c = β), gravity (G) and the quantum wavelength (λ)

$$\lambda = \frac{9r_q^2 c^4}{G\beta E} \qquad (3a)$$

Indeed as $9r_q^2 = Gh/c^3$, then

$$\lambda = hc/\beta E \qquad (2)$$

Equation 2 is the very same as the Universal wave equation derived form first principles for the wavelength of light and matter, which allowed a relativistic solution to the equations for wave particle duality (see Wave Particle Duality). This now indicates that **these quintessential equations are compatible with relativity, quantum mechanics and quantum gravity.**

Graviton Structure

From these observations, if the value for the gravitational constant is substituted into the equation (35) we may now estimate the probable geomteric structure of the gravtion, which is the force particle mediating gravity by acting on quintessence. Thus the Gravitational constant has been previously derived from the vibration of quintessence by the equation:

$$G.(\pi/c) = 9(\pi r_q^2/m_q) \tag{36}$$

This is in accurate agreement with the value for G (6.67×10^{-11} N m^2 kg^{-2}). This suggests that the most probable mathematical representation of the graviton (φ), the third force carrying particle is

$$\varphi = (\pi/c). \tag{42}$$

Thus the gravitational constant (G) can be given by the mass and radius of quintessence and the structure of the graviton

$$G = 9\pi r_q^2/\varphi.m_q \tag{43}$$

This shows the gravitational force to be related to the fundamental radius of quintessence space time, and the graviton.

Quantised General Relativity

The classical general relativistic formula, as given by Einstein is:

$$R_{\mu\nu} - 1/2g_{\mu\nu}R = -\kappa T_{\mu\nu}$$

Where R is effectively the curvature of space-time, $R_{\mu\nu}$ denotes the contracted Riemann tensor of curvature and $T_{\mu\nu}$ is the "energy tensor" of matter.[ref 3]

If we substitute the energy tensor matrix of the electron (eq. 9) x time, for the energy tensor of matter $T_{\mu\nu}$; and the metric tensor of the space-time lattice x time for the contracted Riemann tensor we can arrive at the same solutions for general relativity.

Furthermore, in his published paper on General Relativity, Einstein [ref 3] defined the constant κ as:

$$\kappa = 8\pi G/c^2$$

Therefore Einstein's equation should be written as

$$R_{\mu v} - 1/2g_{\mu v}R = -\frac{8\pi G}{c^2}.T_{\mu v} \qquad (43)$$

Einstein himself was apparently not happy about the right hand component of the equation. However, we find that this part of the equation can now be explained and quantised by substituting the gravitational constant, $G = 9\pi r_q^2/\varphi.m_q$, (eq. 42a),

Giving:

$$R_{\mu v} - 1/2g_{\mu v}R = -\frac{8\pi^2.9r_q^2}{\varphi.m_q.c^2}.T_{\mu v} \qquad (44)$$

By substituting $m_q.c^2 = h$, and further substituting $\hbar = h/2\pi$, we arrive at a quantised solution to Einstein's equations. Where A_q is the surface area of quintessence $(A_q=4\pi r_q^2)$; φ is the graviton $[\varphi = (\pi/c)]$ and h is Planck's constant. thus:

$$R_{\mu v} - 1/2g_{\mu v}R = -\frac{9A_q}{\varphi.\hbar}.T_{\mu v} \qquad (45)$$

The gravitational equation can now be further understood on a logical basis. The term $A_q=(4\pi r_q^2)$, where $(4\pi r_q^2)$ represents standard term for the surface area of a sphere of quintessence for the 9 space dimensions of the space time lattice, h is the energy content of quintessence x time and φ is the graviton, thus the right hand term now represents a true " metric energy tensor" of matter.

This leads directly to the standard solution to the field equations, for the general relativistic increase in radius r' of an object, where A is the surface area of a sphere of a given mass M, such that

$$r' = \sqrt{(A/4\pi)} - r = GM/3c^2 \qquad (34)$$

Furthermore, although equation 45, gives the same solutions as Einstein's equation, which is essentially correct, the difference is that the equation is now dependant upon Planck's constant (h), and moreover the radius of quintessence, which now defines a quantised solution to the equations.

Graviton Force Characteristics

Similar to the photon, the previously derived equation (42) for the graviton [φ = (π/c)] appears to also mathematically represent a helical ringlet of quintessence, but with a spin of 2. For the photon, taking the direction of motion as the x vector and its axis of spin also as the x vector, would account for the electromagnetic force and its attraction and repulsion characteristics. In the case of the gluon component ($\pi/c^{1/2}$), if the direction vector is x, then the axis of spin would be in the y vector, the same as quasi electrons, accounting for the particle binding characteristics of the gluon force. (see; Gluon structure and force characteristics. Appendix 2). In the case of the graviton, if the direction of motion was in the x vector, the graviton spin axis would be in the z vector thus, as will be demonstrated, accounting for the gravitational force.

The spin axis of the graviton can also be derived using the known characteristics of the electron. If an electron is travelling in the x direction, then its spin axis is determined by the by the sign of the ;y vector (up or down). This view is in agreement with conventional theory, which indicates that the electron spin is similar to a rotating planet orbiting the sun, (the electron even appears to have orbital precession). As the electron passes through the space-time lattice, this spin would generate the formation of gravitons. This would occur as a result of the ejection of the excess quintessence passing through the electron. As the electron spins, the ejection of these gravitons would occur at a tangent to the electron's direction of motion. The ejection of the gravitons would occur, similarly to the ejection of energy of a pulsar or quasar, through the equivalent of the north and south poles of the electron. Thus, propelling the graviton in the direction of the electrons y vector. The ejection of the graviton would re-orientate and impart a specific angular momentum to the gravitons which would thus end up spinning on its own z axis. If for instance the graviton is released from an up spin electron the graviton will be rotating clockwise and its leading edge will displace quintessence downwards. In turn this will provide an upwards force.

This picture accounts for Fleming's left hand rule, is logical and provides an explanation for the magnetic force around a wire. According, to the left hand rule if the direction of the current is in the x vector, the magnetic field is in the z vector, and the force is upwards, in the y vector, in accordance with the above model. Therefore, this particular spin axis and the structure of the graviton results in its force characteristics. As the graviton is very small compared to the electron and both have different rather rapid spin axis it is difficult for these to bind and interact. Nevertheless, because the graviton has a spin of 2, and as it spin axis is perpendicular to its direction of motion, in the z vector, it readily displaces space-time quintessence to produce gravity. Thus because the graviton is able to displace space-time, it is capable of escaping a black hole. How else could the effects of gravity be felt beyond a black hole?

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Quantum Gravity and Electromagnetism

With the above electron model of graviton production (see pp. 32), **the nature of magnetism can be understood from first principles,** Furthermore, the presence of a space-time lattice links relativity, and the forces of gravity with the electromagnetic and other forces of Nature. Indeed, evidence for these links may first date back to the 1820's, when Andre Ampere first defined the Amp. The force of attraction between two parallel wires 1 metre apart each carrying 1 Amp in a vacuum was defined as none other than the permeability of free space (2×10^{-7} N per metre of conductor). Thus conventionally the magnetic field strength around a long straight wire is given as:

$$B = \mu_0 I / 2\pi r$$

Where I is the current and μ_0 is the permeability of free space ($4\pi \times 10^{-7}$ N A^{-2}).

The attraction between two wires both carrying negative charge is, however, counterintuitive as negative charges should repel. A conventional explanation overcomes this by invoking the presence of a magnetic field which is created by the current by the production of virtual photons. Thus we appear to have an explanation for the effects of magnetism which involves virtual photons, however, these photons are not observed. More accurately, **according to conventional special relativity the magnetic field is none other than the electric field viewed relativistically** [ref 19].

A more satisfactory explanation, therefore, lies in the interaction between the electrons and the space time lattice. The moving electrons in the two wires interact with the lattice to produce gravitons; which are in phase when both streams of electrons are travelling in the same direction. The gravitonic waves interact constructively to disperse the space time lattice between the wires and induce an attractive force between the two wires, which produces in effect the permeability of free space. Thus this force results from the vibration of quintessence itself.

Conversly in two wires with current going in opposite directions the graviton waves are in anti-phase and would interact destructively between the wires. The gravitonic waves travelling radially outward from the wires would, however, disperse the lattice outside the two wires and produce apparent repulsion between the wires, which is exactly what is observed. These effects of electricity suggest that gravitons act as waves and that phase is important.

This effect is also seen with the north and south poles of ferromagnets. Nevertheless, with matter other than iron, cobalt or nickel, the graviton emission cannot be phased as the atoms are unable to align and magnets do not appear to exist with other materials.

In ordinary magnetic system the release of gravitons from the north pole would be

exactly balanced by those released from the south pole of the magnet and hence there would be no nett force on the magnet until an external magnet or electrical current were applied.

Overall the magnitude of the forces in electrical systems where electrical conduction occurs are well defined by the permeability and permittivity of free space μ_0, and ε_0. Where v is the constant velocity of the charge and ε is the electric field produced by the charge.

$$B = [\mu_0.\varepsilon_0]v.\varepsilon$$

These observations suggest that the forces of electricity which produce magnetism are indeed related to the permittivity and permeability of free space and that these quantities are exerted by an apparent vacuum. Thus the effects of magnetism could be explained by none other than the phased effects of gravitational waves on the space time lattice.

Electromagnetism is of further interest to quantum gravity, particularly if we combine the standard equations, $B = \mu_0 I/ 2\pi r$ and $B = [\mu_0.\varepsilon_0]v.\varepsilon$, substituting for B we have:

$$2\pi r = I/\varepsilon_0.v.\varepsilon \qquad (46)$$

Thus $2\pi r$ is proportional to the inverse of ε_0. Thus as space time is dispersed by gravitons the permittivity field will increase in the same way capacitance increases with separation of plates. Because of the inverse relationship between ε_0 and $2\pi r$, as ε_0 increases the circumference of a circle and the apparent ratio of π to r, will appear to diminish in accordance with general relativity. This not an actual diminution in the circumference of a circle but the effective reduction of the resistance to motion in a circular path in this field.

Incidentally, the above observations, also lead us directly to Shrödinger's formula for the average equilibrium distance (r) between an electron with charge (e) in orbit around a proton, which is conventionally given by:

$$r = n^2 4\pi\hbar^2\varepsilon_0/me^2$$

Where ε_0 is again the permittivity of free space, m is the mass of the electron and n is an orbital integer, h is Planck's constant and e is the charge of the electron. Furthermore if $e = [\varepsilon_0/ 3(4/3\pi c^3)]^{1/2}$ (eq.3); then the equation at n= 1,for the electron orbital radius elegantly simplifies to:

$$r = 4h^2c^3/m$$

Hence the orbital radius of the electron is related to spin of the electron (h) and its mass (m).

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Quantum Gravity and the Charge of the Electron

The equation for the charge of the electron (eq. 1) contains the term ε_0 (permittivity of free space) which according to these observations should vary in a gravitational field.

$$e = \left[\frac{\varepsilon_0}{3(4/3\pi c^3)} \right]^{1/2} \tag{6a}$$

If we combine the standard equations, $B = \mu_0 I / 2\pi r$ and $B = [\mu_0.\varepsilon_0]v.\varepsilon$, substituting for B we have:

$$2\pi r = I/\varepsilon_0.v.\varepsilon \tag{46}$$

Thus $2\pi r$ is proportional to the inverse of ε_0. Thus as space time is dispersed by gravitons the permittivity field will increase in the same way capacitance increases with separation of plates. Because of the inverse relationship between ε_0 and $2\pi r$, as ε_0 increases the circumferance of a circle and the apparent ratio of π to r, will appear to diminish in accordance with general relativity.

Thus ε_0 rises when space -time is dispersed by the gravitons that produce the gravitational field, This occurs in a similar way to the process by which capacitance increases with separation of plates in a capacitor.

Nevertheless, as c is a constant and as $c = [\mu_0.\varepsilon_0]^{-1/2}$, then if ε_0 rises then μ_0 falls. This is entirely consistent as μ_0, which represents the force that quintessence exerts, would be reduced if the quintessence space time lattice is dispersed.

Furthermore, as $\mu_0 = 4\pi \times 10^{-7}$ N A^{-2} ; then as μ_0 falls, then the appareent ration π to r, also falls in a gravitational field. This is largely the same as stating, as does general relativity, that the apparent radius r', rises in a gravitational field. So this view is consistent with general relativity.

Nevertheless, to derive an exact value for the charge of the electron we must account for gravity in the above equation. We will take the specific example of the Earth's gravitational field in order to obtain the exact value for the electron. If in accordance with standard general relativity, the apparent increase in radius r' is:

$$r' = GM/3c^2 \tag{34}$$

Then given that the mass of the Earth is 5.9745×10^{24} kg; then

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$$r' = 1.47864 \times 10^{-3} \text{ m}$$

thus $$2\pi r' = 9.29057 \times 10^{-3}$$

Which is the incremental factor by which ε_0 must increase in Earth's gravitational field. So to correct ε_0 to account for gravity, ε_0 must be divided by the incremental factor, $2\pi r'$. Similarly as effectively π decreases in a gravitational field, to correct π to account for gravity it must be multiplied by this incrememtal factor. So the equation for an electron in a zero gravtational field is:

$$e = \left[\frac{\varepsilon_0}{[3(4/3\pi c^3)]} \right]^{1/2} \div (1 + 2\pi r') = 1.6022 \times 10^{-19} \text{ C} \qquad (6b)$$

This now gives the charge of the electron as measured in a zero gravitational field as 1.6022×10^{-19} C, which is the same as that measured on Earth. Notably these observations appear to suggest that the charge of the electron is the same irrespective of the gravitiational field.

Virtually unlimited degrees of accuracy for the charge of the electron and for the fine structure constant (α), may be achieved by taking into account 2nd and nth order gravitometric effects. Thus if we take into account the effect of gravity upon the radius of the Earth it is also important to take into account an effect a upon the instruments with which we measure quantities, this would be a second order gravitometric effect. Thus taking into account 2nd order effects (r"), we have a very small, but nevertheless relevant change, such that: r" = r'(1+ 2r'). Thus $2\pi r''$ = 9.3180486×10^{-3}, and thus:

$$e = \left[\frac{\varepsilon_0}{3(4/3\pi c^3)} \right]^{1/2} \div (1 + 2\pi r'') = 1.6021765 \times 10^{-19} \text{ C} \qquad (6c)$$

This agrees exactly to the nearest 7 decimal places with the maximum accuracy of the experimental value for the charge of the electron.[ref 15] Furthermore by taking into account the nth order gravitometric effect, it is theoretically possible to predict accuracy for the charge of the electron to 3n decimal places. This mathematically accuracy confirms the structure of the electron from first principles and indeed the theoretical effects of gravity on the permittivity of free space (ε_0).

This returns us directly to the fine structure constant for the electron which is conventionally given by: $\alpha = e^2/\hbar c.4\pi\varepsilon_0$. If $e^2 = \varepsilon_0/3(4/3\pi c^3)$, accordingly the quintessential equation for α is structurally given by: $2\pi/\alpha = m_q[3\Theta]^2$ (where Θ = $4/3\pi c^3$; see The Structure of the Electron and Matter), we must now take into account the effects of gravity, as above, thus:

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$$\alpha = 2\pi / m_q [3\odot]^2 \div (1 + 2\pi r")^2 = 0.007297353$$

Where the gravitational term for the increase in radius r" allows the mathematical derivation of α, and the above equation is in agreement with the conventional experimental value for α = 0.007297353 to the nearest 9 decimal places.[ref 15]

Hence the term $(1 + 2\pi r")^2$ is in accordance with these observations for the effect of gravity on electromagnetic forces. To a maximum accuracy governed by current knowledge of the mass of the Earth and the Gravitational constant and thus the term for the gravitational increase in radius r'. These observations can also be used to accurately predict the magnetic moment of the electron (see Quantum Gravity and the Electron Magnetic Moment).

Thus the presence of the fine structure constant can now be further understood, by deriving the constant from first principles; specifically from the actual dimensional conformation for the charge of the electron: $e = [\varepsilon_0 / 3(4/3\pi c^3)]^{1/2}$ (eq. 6).

Overall the fine structure constant α (allowing for the term r' which is the general relativistic increase in the radius of the Earth due to gravitation) is given by none other than the formula for the mass of quintessence and from the structure of the electron, which can now be derived from first principles to seven decimal places or more.

Quantum Gravity and the Electron Magnetic Moment

The theoretical origin and nature of magnetism remains obscure in current electromagnetic theory. An explanation suggests these magnetic effects are produced by photons, although no photons have ever been observed. To get round this difficulty it is postulated by physics that magnetism results from "virtual" photons. However, Maxwell's equation for electromagnetism states that the photon has no nett magnetic effect.

$$\delta B_x / \delta x + \delta B_y / \delta y + \delta B_z / \delta z = 0$$

Thus magnetism could not, by the above standard equation, be derived from a photon real or virtual.

In addition observational data suggests that black holes have powerful magnetic fields and as in theory photons are unable to escape from black holes (except for small quantites in the form of Hawking radiation), it would be difficult to explain these magnetic fields on the basis of photon emission.

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Einstein postulated that magnetism was merely due to special relativity [ref 17]. The postulate for the nature of magnetism in these current observations, states that the magnetic force results from relativity due to none other than the **phased** emission of gravitons (why postulate two invisible forces, magnetism and gravity, when one, the graviton, will do). This view as previously discussed (Quantum Gravity and Electromagnetism) is entirely compatible with standard relativity.[ref 19] Thus with the graviton origin of magnetism, the equation for the magnetic moment of the electron should have an expression in terms of quintessence and in turn the gravitational force and in particular the graviton.

The standard term for the magnetic moment of the Bohr Magneton (μB) is:

$$\mu B = eh/4\pi m_e$$

In standard quantum mechanics the Bohr Magneton, μB, however, needs to be corrected to agree with experiment. The "correction factor" is termed "ε"; where $\varepsilon = (\alpha/2\pi) - 0.328\alpha^2/\pi^2) = 0.001159641$. Thus theory reveals μ_e, the magnetic moment of the electron where:

$$\mu_e = (eh/4\pi m_e)[1 + (\alpha/2\pi) - 0.328\,\alpha^2/\pi^2)]$$

The conventional derivation of the term ε above, is given from the fine structure constant, $(\alpha/2\pi)$ which is theoretically consistent. However, a rather arbitary mathematical correction term; $0.328\,\alpha^2/\pi^2$ needs to be used in this standard equation. This appears ad hoc and needless to say, more accurate measurements show , the electron magnetic moment to the Bohr magneton ratio, $1+ \varepsilon = 1.001159652$, which suggests the correction factor is indeed incorrect. Nevertheless, this correction factor is essential for "renormalisation" and thus for quantum mechanics to work.

Quantum gravity readily explains the discrepancy between the theoretical Bohr Magneton (μB) and the actual measured magnetic moment of the electron (μ_e). In accordance with the above chapter (Quantum Gravity and the Charge of the Electron)

Thus the significant mathematical discrepancies can be removed by accounting for the effects of quantum gravity.

Thus taking the charge of the electron (e), using the equation for the Bohr magneton and the effects of quantum gravity such that gravitational change in radius is r". The magnetic moment of the electron is given by:

$$\mu_e = (eh/4\pi m_e)(1 + [\alpha/2\pi \div (1 + r")])$$

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This gives an electron magnetic moment to Bohr magneton ratio of 1.00115968. Thus the mathematical term for the magnetic moment of the electron is given, avoiding the arbitary and dubious term 0.328 α^2/π^2 used in the standard equation, simply by accounting for quantum gravity.

It is now possible to unite the equations for gravity and magnetism by substituting the fundamental key equations of quantum gravity. Thus if: $h = 3m_q c^2$ (eq 1b) and $m_e = m_q.n_q$ (eq. 2). Then we can express the magnetic moment of any particle with the charge of the electron, including the proton, in terms of the number of quintessences (n_q) in that particle.

$$\mu B = ec^2/4/3\pi n_q \qquad (47)$$

Given that the postulated structure of the graviton is: $\varphi = \pi/c$ (eq. 42), then substituting we have

$$\mu B = 3ec/4\varphi n_q \qquad (48)$$

Showing that the equations for the magnetic moment are compatible with the gravitational equations given earlier. Principally, the quintessential equations now allow the determination of the magnetic moment of any charged object from the equation for the graviton and directly from the number of quintessences it contains. In conventional physics the magnetic moment of the electron requires a correction factor, $(1+ (\alpha/2\pi) - 0.328 \alpha^2/\pi^2))$, to derive the correct experimental value. These observations herein, indicate that the correction factor is more logically $(1 + r")$, where r" is the general relativistic increase in radius around a gravitational body. This suggests that magnetism is not only affected by gravity, but can, as shown as above, be derived using the quantum gravitational equations.

Quantum Gravity and Special Relativity

Ordinary matter passing through the lattice would produce gravitons which would interact with space-time as described by general relativity. The quantity of gravitons would be determined by the apparent mass and in turn these would apparently curve space time. The geometry of this "curvature" is elegantly described by general relativity using Riemann geometry, specifically using metric tensors. Intriguingly the metric tensor is not a single number, but at each point in space time it is required to consist of a collection of ten numbers, Consequently, ten dimensional space-time hypotheses, such as this or superstring theory, may automatically yield general relativity. (see quantum general relativity p.36)

General relativity is indeed very elegant, nevertheless there was a logical step yet to

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answer. That is, how do gravitons shape space time? This can now be readily answerd by considering the interaction of a three dimensional space time lattice with gravitons themselves to produce the effects of gravity. The effects of gravity are as such to compel a body in motion towards the gravitational object and to a much smaller extent visa versa. **This effect can only be produced if gravitons repel quintessence** (the constituents of the 3D lattice). Indeed, it has been stated that in order to explain cosmic inflation and the "flatness" of the Universe that quintessence must shun (or be shunned by) matter [ref 5,6.7].

In descriptive terms a body close to a large mass will have a tendency to move toward it because the three dimensional lattice would be less dense as it approached the surface of the large mass. Overall there would be less resistance to motion in the direction of the large mass, and the motion in this direction would be facilitated by the vibration of quintessence.

In general relativity the principle governing motion is **the geodesic of least distance, this can be re-expressed using similar equations using least action.** Furthermore, the concept of motion due to the vibrations of quintessence is more logically and experimentally compelling.

These observations can now be used to link general and special relativity. Thus as we approach the speed of light, the mass of an object travelling through the space-time lattice would approach infinity, directly because the number of quintessences passing through a body would increase with increasing velocity, hence the equation:

$$m' = m_0 / (1- v^2/c^2)^{1/2} \qquad\qquad (50)$$

or
$$m' = m_0 / (1- v^2[\mu_0 . \varepsilon_0])^{1/2} \qquad\qquad (50a)$$

In turn this would generate increasing gravitons and accordingly this would explain the observed effects of special relativity. Time itself is due to passage through the space-time lattice, and where the space-time lattice is dispersed by gravitons, time and length are reduced with increasing velocity and hence increasing space-time lattice dispersion, similar to the way in which gravity alters space-time

As a result:
$$t' = t (1- v^2/c^2)^{1/2}, \quad l' = l (1- v^2/c^2)^{1/2}$$

Thus resulting in the effects of special relativity.

Quintessence and Black Holes

To address the relationship of the space-time lattice to gravity directly, it is important to discuss the concept of quintessence with regard to general relativitivistic equations. The standard general relativistic equation for the apparent increase in radius (r) due to the curvature of space time around a gravitational object, which has also been previously derived from first principles (eq. 36), is:

$$r' = G.M/3c^2 \qquad (34)$$

This can also thus be written as:

$$3r' = G.M[\mu_0 . \varepsilon_0] \qquad (51)$$

This standard equation, is in keeping with the above observations. Specifically, as the mass increases, ε_0 increases, in turn the radius will appear to increase (relative to π).

The above observations now allow us to examine the effects with regard to the interior of black holes themselves. The event horizon would represent a critical density for quintessence, in which light could not escape. The Schwarzschild radius would now be given by:

$$R_s = 2GM[\mu_0 . \varepsilon_0]$$

The event horizon will occur at the point at which there is less resistance to circular motion than motion in a straight or partially curved line. Given that π is proportional to $1/\varepsilon_0$. The event horizon should occur when the permittivity has increased by a factor of π.

Effectively because the permittivity of free space rises, π decreases. This is entirely in keeping with general relativity which predicts the effective change in the ratio of the radius to the circumference as given by the conventional equation, where r' , is again the apparent change in radius.

$$r' = G.M/3c^2$$

Hence π will effectively decrease as we approach the event horizon of a black hole, When π decreases to 1, the circular circumference is equal to the diameter and moreover, inside this limit it is shorter for light to travel in a circle. Thus light cannot escape the event horizon.

This can give us great insights into the workings of space-time, for flat Euclidean space the standard equation is:

$$e^{i\pi} = -1$$

In accordance with general relativity, the ratio of the radius to the circumference changes in a gravitational field, and effectively $\pi = 1$, at the event horizon, thus the boundary condition for the shape of space-time at the event horizon now has the direct equation:

$$e^i$$

Within a black hole as the permittivity of space increases by a factor of 2π an object within it will complete two rotations rather than travel in a straight line. In effect exceeding the speed of light by 2π. Hence, the condition for space-time is represented by the equation:

$$e^{i/2}$$

Thus an increase in the permittivity of free space by a minimum factor of π, to produce a black hole is estimated to result from an increase in mass by a factor of approx. 10^6 (the ratio of the mass of the earth and that of a putative black hole).

Continuing with the subject of a black hole, according to the model inside the black hole, the gravitons produced by the matter present would be in equilibrium with the density of the space-time lattice. Increasing the rate of rotation of the matter in the black hole for instance would thus increase the production of gravitons and its effective mass and increase the radius of the event horizon. A density gradient of the space-time lattice would continue to exist within the black hole. Progressively closer to the centre of a black hole matter itself would be increasingly compressed and the spherical structure of the quasi electron would be predicted to collapse. **This collapse would result in the formation of an exotic form of matter in the form of pure quintessence in a black hole.**

This pure quintessence would produce the **singularity** at the centre of the black hole. The larger the black hole in terms of mass the more pure quintessence would exist at its core.

Quintessence and the Big Bang

Quintessence theory not only predicts the occurrence of the Big Bang, but allows a prediction for the value of the entire mass of the Universe, from first principles.

In accordance with quintessence theory the big bang resulted from the explosion of an immense black hole singularity, which was constituted from pure quintessence.

On the basis of quintessence, there will be a critical mass for Big Bang event; thus if entire space-time between quintessence is compacted so that no further quintessence can be accommodated, the addition of further quintessence would destabilise the immense black hole, resulting in the Big Bang.

It is possible to predict this critical mass, using the radius of quintessence as a benchmark. Given the nine spatial parameters present in the metric tensor, used in general relativity we find that the actual formula for the radius of quintessence; r_q^2, is mathematically in agreement with general relativistic theory when:

$$9r_q^2 = Gh/c^3 \qquad\qquad (33)$$

This again supports the 9 dimensional view of space (so crucial in superstring theory).

Moreover, the size of the vibrations of quintessence can thus be calculated as:

$$r_q = 1.35 \times 10^{-35}\,m \qquad\qquad (33a)$$

The volume of each quintessence is thus:

$$4/3\pi r_q^3 = 1.0306 \times 10^{-104}\,m^3. \qquad\qquad (33b)$$

So to be accommodated within unit volume of space time, with no intervening apparent space time, (given that each of 9 overlapping quintessences are required) would require approx.

$$9 \times 10^{104}\ quintessences$$

As the mass of quintessence is $m_q = h/c^2 = 7.373 \times 10^{-51}$ kg.sec (eq.1). Then the mass of of the Universe, to two decimal places, is:

$$1.18 \times 10^{53}\,kg \qquad\qquad (33c)$$

This is in close agreement with a recent estimate of the mass of the Universe from COBE and other satellite data, which estimates the mass to be 100 trillion trillion

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trillion trillion tonnes (10^{53} kg). [ref 20]

Moreover, the early formation of the galaxies can be readily explained, it is likely that in such a big bang some very small black holes might have prevailed and that these formed the seeds of the galaxies we see today.

The event horizon, calculated from the Schwartzschild radius, of such an immense black hole is ~ 10^{26} m, which would have allowed Guth's inflationary component to the early expansion of the Universe.

In addition, inflation may result directly from the observation that once electrons have formed from the primordial soup of quintessence, they emit gravitons which in turn repel space time, which might also result in another cosmic inflationary cycle.

Most importantly quintessence theory explains the Big Bang from first principles and and is capable of accurately predicting the mass of the Universe.

The Nature of Energy

Foremostly, these observations allow a fundamental understanding of energy. The quantum physical, minimum component of energy is Planck's constant; h. To define the minimal component of mass, using the standard energy equivalence formula; $E=mc^2$, such a minimal mass (m_q) would be required to have the value equivalent to; $m_q=h/c^2$ (1). The total mass of a system (m) would then be; $m = m_q n_q$, where n_q is the number of these minimal units. Thence, the total energy of a system can be derived from the minimal energy; h, multiplied by the number of these energy units (n_q). Thus as, $E=mc^2$, then also $E=m_q n_q c^2$ and substituting $m_q=h/c^2$, the energy equivalence formula has the more logical formulation;

$$E=hn_q \qquad\qquad (1a)$$

Thus the energy of a system is equivalent to the minimal energy unit; h, multiplied by the number of those minimal energy units (n_q).

This leads directly to a deeper understanding of wave particle duality and the wave nature of matter.

This is encapsulated by the quintessential energy formulae

As conventionally $\beta E/c = p$, then

$$\lambda = h/p = hc/\beta E \qquad\qquad (2)$$

and $\qquad\qquad E = hn_q \qquad\qquad (1a)$

then $\qquad\qquad \lambda = c/\beta n_q \qquad\qquad (2b)$

:

Importantly, as indicated by equation (2b), energy having no quintessence; would have a wavelength of infinity. Specifically pure energy containing no quintessences, would have a lambda of infinity. According to quantum mechanics an infinite wavelength would result in the probability of that energy being anywhere. As energy itself has no electrical charge it would not be impeded by the permittivity and permeability of the three dimensional space-time lattice. Moreover, energy would not be detectable in three dimensional space-time, unless it interacted with matter, as in the EPR experiments. Indeed, energy is not observed when not bound to any form of mass or particle.

Thus equation 2b, takes us to our original assertion regarding the existence of pure energy.

- Energy is not bound by the space-time lattice -

Thus, as the EPR experiments suggest the existence of energy separate from matter and thus separate from the three dimensional space-time lattice, it is interesting to find that experiment suggests the existence of free energy in a continuum separate from space time and matter to produce the effects of quantum teleportation.[refs ,10,11,12,13]

This is not, however, teleportation across an additional dimension, this is a term to describe in partially familiar terms the dissociation of energy from the three dimensional space-time lattice. As time is inextricably linked to each dimension of space, the effects of energy would be inextricably linked to the events, such as the creation of virtual particles, we see interacting within space-time.

It is unlikely that observers have any direct day to day experience to explain quantum events. Nevertheless, quintessence theory may have given us a window into the hitherto hidden workings of the Universe. Thereby, the mystery of the uniformity of the Universe, across distances which the speed of light could not apparently traverse, is readily explained by the fact that the free energy contained in the Universe is not bound by the space-time lattice.

In the case of light, due to the exceedingly small masses involved, there would be relatively easy exchange of matter with free energy within a photon. This would make the photon the ideal experimental tool to look for energy which is not bound by matter and in turn energy which is not bound in space-time. Indeed, very recently Furusawa *et al.* have reported to have observed the transference of energy as photons from A to B, without those photons traversing space-time[ref 10]. This finding which has been supported using other experimental techniques[refs 11,12,13,], is very important as it suggests the existence of such free energy.

Overall, quintessence theory gives an a priori explanation for the concept of mass, the elementary particles, the forces of nature and quantum effects. It can equally be used logically to explain the inner physics of a black hole, the missing mass in the Galaxy, the expansion of the Universe, Guth's inflationary theory and predicts the Big Bang, from first principles.

PRIOR ART

Antigravity Systems

Recent research at NASA indicates that an antigravity device may be feasible. This research, however, has been undertaken at NASA without fundamental knowledge of the theoretical basis of quantum gravity. In these experiments the use of radio frequency (RF) pulses, such as in Nuclear Magnetic resonance, on rotating superconducting discs has been attempted, to produce antigravity effects.[ref 21]

However, radio frequency pulses are a weak form of electromagnetic radiation and are therefore unlikely to provide sufficient energy to produce measurable antigravity effects.

The warp drive technology described in this application is entirely different to previous prior art. The most important difference relates to the nature of the invention. In this application specifications are given for a direct drive system, as opposed to a gravity shield device, which other inventions claim. There is of course a vast difference as a shield device, merely reduces the force of gravity, but does not directly produce drive.

The references specifically relating to the shield effect are:

SCHNURER:	WO 98/23976	14 Nov 1996
MODANESE + SCHNURER:	arXiv:gr-qc/9612022 v4, 19 Feb 1998	
PODKLETNOV:	arXiv:cond-mat/9701174 v3,	16 Sep.1997
PODKLETNOV + NIEMINEN:	Physica C, Vol 203, 441-444,	9 Sep. 1992

Other devices produce an attractive effect, as in an electromagnet magnet, which is again entirely different to the direct production of drive.

HOOPER   US3610971   15 Apr 1969   .

In these and other antigravity devices the use of equal and opposite currents in a superconductor to produce anti-gravity effects are disclosed, as in:

BETTELS   DE19832001   16 Jul 1988

In this application for Warp Drive technology, there is a differential current applied. Thus the differential speed of the electrons will, in accordance with relativity, produce differential mass, which will in turn result in a differential graviton release. Thus this invention is very different to previous disclosed inventions, as it is the differential graviton release, which produces the effective warping of space-time, to produce a direct warp drive system, which operates by the warping of space-time.

SUMMARY OF THE INVENTION.

Principles of Warp Drive Systems

The theoretical understanding of quantum gravity allows the design of warp drive systems from first principles. It is unlikely that gravitons can be controlled in a precise way using current technology. Nevertheless, an understanding of three dimensional space-time and matter, does allow the design of elementary **warp drive** systems. That is, systems whose propulsion rely on warping space-time as opposed to the ejection of material to provide thrust.

The background for these systems are already partially understood and quintessence theory allows their further development. For instance, the formation of black holes, represents a crucial step in understanding the mechanisms that underlay gravitational physics and in turn the warping of space-time. The existence of black holes, implies that the warping of space-time allows a powerful system for driving matter. In this instance the space-time lattice would be repelled by gravitons in such a way as to disperse space-time quintessence in a circular fashion, producing an event horizon. Similarly if we suppose that gravitons could be controlled and collimated in a single direction similar to a laser using photons, it would be possible to focus such a graviton beam ahead of an object. This in turn would dissipate the space-time lattice in front of that object, thereby allowing the theoretical potential for what is termed Warp drive.

Essentially, these are systems whose propulsion relies on warping space-time, as opposed to the ejection of material to provide thrust. This does not, of necessity, mean that superluminal velocities are produced, but that the drive is based on the warping of space-time in accordance with general relativity. However, it would in the future theoretically be possible for an object to achieve speeds greater than that of light, as superluminal velocities produced by the warping of space-time do not contravene general relativity.

Indeed according to the standard model, if the horizon distance is taken as the maximum distance which light could have travelled, then two points on opposite sides of the Universe are as far apart as ninety times the horizon distance, which indicates that components of the Universe themselves have effectively far exceeded the speed of light. [ref 20a]

With current technology warp drive systems (not of necessity superluminal) could be achieved by rotating intermediate sized superconducting masses at ultracentrifugational velocities. The release of gravitons could be controlled by differentially governing the electron flow through these masses with the use of powerful electric currents. In turn the differential direction of flow of gravitons would determine the direction of motion through the space time lattice.

In order to design a mechanism for elementary warp drive we may utilise either a normal conductive material or preferably a superconducting material, or a combination of both. It may be possible to use any shape, such as a disc, cylinder or preferably a sphere. It would also be possible to use dual counter rotating discs to minimize the net angular momentum of the system. In the case of a sphere, this is rotated along its horizontal axis in a clockwise fashion at ultracentrifugational speeds. A differential current is then applied from left to right in such a way as to pass through the entire sphere in this direction.

The electric charge in the upper half of the sphere would be maximised. The electrons will have a vector in the left to right direction as the sphere spins clockwise. If a maximised current is applied to the sphere in the same direction this will result in a increase in the velocity of the electrons relative to the centre of gravity of the rotating object, due to the flow of current. In turn, according special relativity and to the space-time lattice model, this will result in an increase in the relativistic mass if the electrons and in turn by general relativity an increase in the release of gravitons.

Conversley in the lower half of the sphere the electrons will have a vector of motion in the right to left direction due to the spin of the sphere. This will be relativistically slowed by the differential current applied in the same direction as the current above, and hence in the opposite direction to the direction of rotation. The charge can be separately applied and adjusted to ensure that the electrons are relativistically stationary relative to the centre of gravity. In turn this will minimize the relativistic mass and result in a decrease in the release of gravitons for the lower half of the sphere.

The overall result will be a greater release of gravitons in the upward direction and a lesser release of gravitons in the downward direction. The effect will be enhanced by the use of a multi-phasic current simultaneously applied. This will result in the release of multi-phasic gravitons which will disperse space time above the sphere with increase in density below the sphere which will effectively reverse the effects of Earths gravity. Importantly this effect can also be produced with the use radio frequency pulses. This obviates the need for commutator devices. Nevertheless, the radio frequency pulses must be designed to produce a change in the spin of the

particle to enhance the release of gravitons in the upward direction, and moreover with current technology theses RF pulses contain too little energy to effect a significant change in the gravitational field.

With the use of large currents the drift velocity of the electrons could be greatly increased. The use of superconducting devices would greatly enhance the efficiency of such systems as the electrical resistance is virtually eliminated. Thereby allowing large currents to be used with minimum total power output.

The technological crux of the device is to produce electrons of high speed and hence high relativistic mass in the top half of the sphere, whilst producing low speed and thus low mass electrons at the bottom of the sphere, in accordance with special relativity. The imbalance in the rotating sphere will be continuously present impelling the device upwards. In effect the differential current flow, will produce differential graviton production and in turn, by general relativity, the warping of space-time

TECHNICAL EXAMPLE 1

A small scale device, which produces warp thrust can be readily constructed using current technology.

This will require a sphere, cylinder or disc of superconducting material. A dual disc either co rotating or counter rotating could also be used, counter rotating discs have the advantage that the total angular momentum is effectively zero. Any of the superconductors may be used such as Ag_2F, C_8K or SnTe. However for their tensile strength and/or magnitude of critical current density (J_c), Nb_3Sn or Ag_2F is recommended. Normal conductive material may be used but due to electrical resistance the power required (see superconductivity theory pg. 9) would be in the order of 10^{19} times greater.

Taking a sphere of Nb_3Sn, made hollow to reduce the mass of the sphere, with an external radius 0.25m and an internal radius of 0.20m; the total volume of Nb_3Sn required would be 3.19×10^4 cm^3. As Nb_3Sn has a density of $7.86g/cm^3$ the total mass of superconducting material would hence be 250 kg.

This sphere is required to be mounted upon two ultracentrifugational spindles which themselves are on the horizontal axis. The untracentrifugational spindles would be powered to rotate the sphere to produce an enhanced g force, as in a centrifuge..

The superconductive sphere would require a supercooloed jacket of liquid Helium, and would require to be in a vacuum. The power source, motors and refrigeration system should be placed outside the supercooled jacket. In addition these ancillary elements of the device may be either placed outside the system as a whole, or within it, if the device is designed as a self contained vehicle. The device may also be mounted upon vertical rails to experimentally demonstrate vertical lift. (See figs 1,2)

A high current needs to be applied, by means of a commutator device, to produce a current passing through the sphere. If the negative terminal were placed on the left of the sphere and the positive terminal on the right this would produce electrons flowing from left to right. The commutator device would be split to allow a smaller current to be applied to the lower half of the sphere.

The power expenditure for this is reduced by using a superconducting material. If the sphere were rotating from left to right i.e clockwise the drift velocity of the electrons would be advanced in the upper half of the sphere, and retarded in the lower half of the sphere by the differential current induced flow of the electrons.

According to relativity, as defined in the theoretical sections above, it is accepted that the mass of the electrons in the upper half, relative to the centre of gravity, of the sphere can thus be increased by using the standard relativistic formula:

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$$m' = m_0 / (1 - v^2/c^2)^{1/2} \qquad\qquad (50)$$

Thus by inducing a relative drift velocity difference, the mass of the electrons at the top of the sphere can be increased, and the mass of the electrons at the bottom of the sphere can be reduced relative to the centre of gravity.

If the object is set to rotate, centrifugal forces can be used to increase this mass difference. This can be used to increase the net momentum of the object in the upwards direction, to produce upwards thrust.

Given that there are approximately 10^{23} per cm^3 free electrons in a niobium conductor then in the total sphere there will be approx. 10^{23} x 3.19 x 10^4 cm^3 = 3.19 x 10^{27} free electrons in the sphere. If each electron weighs 9.11 x 10^{-31} kg; then the total mass of free electrons in the upper half of the sphere is 1.453 grams.

If we take the maximum zero voltage current density (J_c) in Nb_3Sn or another suitable superconducting device as approximately 10 x 10^{14} Amps/m^2, the drift velocity in the electrons can be calculated. Given that the average surface area of the hollow sphere is approximately 350 cm^2 or 3.5 x 10^{-2} m^2, then the max current applicable is 3.5 x 10^{13} Amps. Thus the drift velocity of the electrons would be 6.3 x 10^6 m/sec. The velocity of the electrons in the upper part of the sphere would be advanced relative to the centre of gravity. The relative velocity to this centre would be equivalent to the velocity of the sphere plus the velocity of the electrons in the upper half.

If the drift velocity of the electrons in the lower half were separately, induced by the current so that these electrons were stationary relative to the centre of gravity, those in the lower half of the sphere would be relatively retarded. The current applied to the lower half of the sphere to make the lower electrons, relative to the centre of gravity, stationary (given a rotation rate of 3.14 x 10^4 revs/sec) would be 2.46 x10^{11} Amps.

This differential current would allow the electrons to have a differential velocity and in turn a different mass relative to the centre of gravity. The relative velocity would be approximately 6.3 x 10^6 m/sec. Using the standard equation for relativity (50) would give a relative mass difference ratio of 2.21 x 10^{-4}.

The effective total mass difference between the upper and lower half of the sphere would thus be the mass of the electrons times the relative mass difference which is 1.45 grammes x 2.21 x 10^{-4} = 3.2 x 10^{-7} kg.

Overall, as the acceleration due to gravity is 9.81m/sec^2 ; to produce upwards lift on a sphere of 250 kg in Earth's gravitational field would require a force of about 2,500N. In order to produce in excess of this force the acceleration produced by the ultracentrifuge device would need to be about $= 8.76 \times 10^9 \text{m/sec}^2$. Thus according to the formula $a = (\omega 2\pi r)^2/r$ (where the average radius, r of the device is 0.225 m) the rotation rate required would be 3.142×10^4 revs/sec or approximately 1,880,000 revs/min to produce sufficient acceleration to allow the device to completely self levitate. Thus as $F = ma$, then the force produced by the device is

$$3.2 \times 10^{-7} \text{ kg} \times 8.76 \times 10^9 \text{ m/sec}^2 = 2,800 \text{ N}$$

A detectable anti-gravtiy effect could, however, be realised at much lower spin rates. Standard ultracentrifugation devices can rotate at 600,000 revs/min. Thus even at standard ultracentrifuge speeds the g forces produced would be sufficient to produce approximately 12.8% lift, using these anti-gravity techniques.

TECHNICAL EXAMPLE 2

For this example we will use a large scale device, which would therefore deliver sufficient thrust to power a vehicle beyond Earth's gravitational field. Under terrestrial conditions the entire devise would be required to be encased in a liquid helium jacket, with an internal vacuum to reduce friction due to air. However, the latter two constraints need not be in place if the device is to be used in space as, very conveniently, space is both a vacuum, and when shielded from the rays of the sun the ambient temperature is less than that of liquid helium. Indeed the large mass of the superconductor becomes less relevant as weightlessness exists in space, so that the size of the object may be increased substantially.

Taking a sphere of 1 meter in radius of a superconductive material. The volume is $4/3\pi r^3$ = 4.2 x 10^6 cm^3. If the high temperature superconductors are used such as $YBa_2Cu_3O_7$, or $Nd_{1.85}Ce_{0.15}CuO_4$, which are ceramic in nature, the specific density is approximately 3g/cm^3, Hence the total mass of the sphere would be approximately 12,600 kg or 12.6 metric tonnes. If the standard superconductors are used, for instance Nb_3Sn with a density of 7.86 g/cm^3 the sphere becomes heavier at 33 metric tonnes.

This sphere is required to be mounted upon two ultracentrifugational spindles which themselves are on the horizontal axis. The untracentrifugational spindles would be powered to rotate the sphere to produce an enhanced g force, as in a centrifuge. The sphere would need to be carefully constructed to be exactly balanced in all directions.

Nevertheless, a high current does still need to be applied, by means of a commutator device, to produce a current. If the negative terminal were placed on the left of the sphere and the positive terminal on the right this would produce electrons flowing from left to right. The power expenditure for this is reduced by using a superconducting material. If the sphere were rotating from left to right i.e clockwise the drift velocity of the electrons would be advanced in the upper half of the sphere, and retarded in the lower half of the sphere by the current induced flow of the electrons. The split commutator device allows a differential current to be applied to the upper and lower halves of the sphere respectively.

According to the model in the preceding sections this will result in an increase in the mass of the electrons in the upper sphere and hence an increase in graviton production in the upper half of the sphere. Indeed, this model is in agreement mathematically with general and special relativity.

Given that there are approximately 10^{23} per cm^3 free electrons in a copper conductor then in the total sphere there will be approx. 10^{23} x 4.2 x 10^6 = 4.2 x 10^{29} free electrons in the sphere. If each electron weighs 9.11 x 10^{-31} kg; then the total mass of free electrons in the upper part of the sphere is 0.191 kg.

If we take the maximum zero voltage current density (J_c) in Nb_3Sn, or another suitable superconducting device, as approximately 10 x 10^{14} Amps/m^2, the drift velocity in the electrons can be calculated. Given that the average surface area of the sphere is approximately 1.57 x m^2, then the max current applicable is 1.57 x 10^{15} Amps. Thus the drift velocity of the electrons would be 6.3 x 10^6 m/sec.

At the same time the current in the lower half of the sphere would be adjusted to retard the electrons so that they remain stationary relative to the centre of gravity. If the sphere were rotating at 2.6 X10^4 revs/sec this would require a current of 2.04 x 10^{13} Amps. This differential current would induce a differential velocity in the electrons and in turn a mass difference.

By inducing a difference of mass as little as one part in a thousand in these electrons we can achieve significant lift. Thus by the above equation if we induce a drift velocity of 6.3 x 10^6 m/sec (as in technical example 1), given that the velocity of the electrons in the upper part of the sphere would be advanced relative to the centre of gravity and those in the lower half of the sphere relatively stationary; then the relative velocity would be approximately 6.3 x 10^6 m/sec. Thus between the upper and lower half of the electrons we increase the relative mass of the electrons in the upper half by a factor of 2.21 x 10^{-4}, as in technical example 1.

Thus the difference in mass in the upper half of the sphere due to the moving electrons would be 0.191 kg x 2.21 x 10^{-4} = 4.22 x 10^{-5} kg., relative to the lower half electrons. This difference is enhanced by producing a centrifugal force by rotating the sphere.

If we rotate the large superconducting sphere at 2.6 x 10^4 revs/sec or 1,560,000 revs/min we can achieve accelerations of 1.33 x 10^{10} m/sec^2 (given an average radius of 0.5m) by the formula $a = (\omega 2\pi r)^2/r$.

Thus as F = ma, where m is the relative mass difference of the electrons the thrust produced in the device would be equivalent to:

$$4.22 \times 10^{-5} \text{ kg} \times 1.33 \times 10^{10} \text{ m/sec}^2 = 5.88 \times 10^5 \text{ N}$$

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Thus in Earth's gravitational field this force would be capable of levitating 60 metric tonnes.

The estimated current required to produce the drift velocity of the electrons for this effect would be approx. 1.57×10^{15} Amps. The power usage is given by; $P = I^2R$, under non-superconducting conditions, given that Niobium has a resistivity of 15.2×10^{-8} Ω/m the sphere would have a resistance of approximately 10^{-7} Ω. The power used by a non-superconducting device would thus be 2.46×10^{23} Watts. However, due to superconductivity, under standard theory, the device has zero resistance and would use no power[ref 8]. Nevertheless, if we wish to use the model described above for superconductivity (see superconductivity, page 6) there would be a practical power consumption which would nevertheless still be low. Thus the power consumption would be in the order of 1.6×10^{-19} less than the standard power usage, at 3.94×10^4 Watts.

If Nb_3Sn is used to make the sphere the mass of the sphere would be 33 metric tonnes. If the mass of the ancillary ship were 27 metric tonnes, giving a total of 60 metric tonnes the acceleration produced would be 9.81 m/sec^2 . This would be equivalent to the force of gravity on Earth. Thus an artificial gravitational field would be incidentally created which would be exactly equivalent to that on Earth. Thus the device could also be used for the production of artificial gravity.

APPENDIX 1

Particle Physics

In the overall picture, it is generally accepted that there are three major forces; strong, electro-weak and gravity, each mediated by three bosons the, gluon, photon and graviton. These in turn are known to influence three types of particle, the quark, lepton and by General Relativity, space-time itself . Each of these appear to be composed of three particles with multiples of charge of 1/3 and exist in three dimensions of space time, which are themselves in three generations.

The nature of particles thus, may be revealed by their structure which occurs generally in multiples of three. Three quarks in the case of baryons are neccessary to make up a particle such as the proton or neutron. The particles that bind the quarks (gluons) are themselves required, in stable particles, to have three different colour charges, one colour in each dimension, for the particle to exist in three dimensional space-time. Furthermore, there are three generations of leptons an indeed quarks.

Nevertheless, the Standard model itself appears unable to explain the existence of these three generations of particles or the fundamental properties of sub atomic particles. Furthermore, there appear now to be a total of 60 fundamental particles each with their own fundamental properties which are arbitarily defined to fit the data. Furthermore, the Standard model only partially explains the decay process of the each particle and it does not explain their masses accurately.

For instance the mass of the up (u), anti-up (_) down (d) and anti-down (_) quarks are currently estimated at 0.35 Gev each [ref 17] (although some controversy exists about about this basic value). The mass of the proton constituted of three quarks, uud, is 0.9383 Gev, which is only approximately equivalent to the total mass of the three quarks (1.05 Gev).

Furthermore, the very process by which the subatomic particles decay cannot be explained by the "fundamental" constituents, the quarks. Indeed the known hadron decay processes ultimately <u>always</u> end up producing either an electron or positron. Indeed the quarks have not been experimentally seen, suggesting that other particles may underlay their fundamental structure.

Electron Structure

Given the presence of a quasi electron with a charge of $1/3$ e [ref 4,5], then three of the quasi electron vortices, as previously described [ref 5], could form an entire electron in three dimensional visible space time. Nevertheless, each would have energy and hence a wave function which would be present in the other vectors. This electron could thus follow the probability functions as described by the Shrödinger wave equation for ψ (otherwise termed as "essence" by Shrödinger).

It is of importance therefore to note that the charge of the electron (e) in Coulombs (C), (where ε_0 is the permittivity of free space), can be derived from first principles by the equation:

$$e = \left[\frac{\varepsilon_0}{3\,(4/3\pi c^3)} \right]^{1/2} = 1.61 \times 10^{-19}\ C \tag{6a}$$

Equation (1) has a number of special implications, which have been previously discussed (p 6)

The dimensions of the equation can be readily resolved by considering **each of the three vector dimensions**. The exact dimensions of the equation need to be considered in the light of the nature of space-time itself, and this is fully addressed on pages 82-84. These dimensional equations help explain the nature of matter. Indeed the equation for the electron may underly the structure of the subatomic particles and may be necessary for the full understanding of gravity.

Additionally, the square root sphere structure of the electron accounts for its $1/2$ integer spin. This square root structure also forms the basis of the electron pair bonding. According to the above equation (6), the electron will tend to form a "complete" electron sphere, thereby explaining how the presence of pair bonding occurs.

Thus from the equation (3) for the square root structure of the single electron; it is clear that the product of two such spheres will tend to form a complete sphere, where:

$$e^2 = \varepsilon_0/3(4/3\pi c^3) \tag{6b}$$

In addition, the equation for the quasi electron can be directly derived from eq. 1.

Thus in one dimension, a single quasi electron (q$_e$) with charge of 1/3e, can be mathematically represented, (where the permittivitty of free space for each quasi electron is $\varepsilon_{qe} = [\varepsilon_0/3^3]^{1/2}$, by the equation :

$$q_e = \varepsilon_{qe}/(4/3\pi c^3)^{1/2} = 1/3e \qquad (6c)$$

Thereby accounting for the experimental observation of the 1/3e charge of the quasi electron[ref 4,5]. Overall knowing the structure of the quasi electron may lead to the knowledge of the structures of the the other subatomic particles such as the quarks.

First Generation Quark Structure

From these observations we may now examine the derivation of the mathematical nature of the proton and in turn the structure of the quarks. Using the above equations (eq. 6) enables a far more accurate derivation of the mass of quarks from first principles.

To do so requires calculating the ratio of the mass of the electron (m$_e$ = 0.511 Mev) to the mass of the proton (m$_p$ = 938.3 Mev)

Thus $\qquad m_e/m_p = 0.511/938.3 = 5.44 \times 10^{-4}$

and $\qquad m_e/m_p = 5.44 \times 10^{-4} = (3\pi/c^{1/2})$

Intruigingly, the term $(3\pi/c^{1/2})$ mathematically determines the ratio of the mass of the electron (m$_e$) to the proton (m$_p$). Indeed it is this ratio that also leads to the mathemaical derivation of the structure of the quarks

Given the mass of the proton is; 938.3 Mev, then according to the Standard Model, as there are three quarks in the proton (uud) of virtually equal mass, then the effective mass of each quark would be more accurately given as 312.8 Mev.

Thence, the structure of the quarks can now be defined by the ratio of the masses of the quasi electron to the quark. If the mass of the quasi electron is given as one third the mass of the electron

$$m_{qe} = 0.511 \text{ Mev} \div 3 = 0.17033 \text{ Mev}$$

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Then the ratio of the mass of the down quark (d), to the quasi electron is:

$$0.17033 \text{ Mev}/ 312.8 \text{ Mev} = 5.44 \times 10^{-4}$$

We also find that this same ratio of the mass of the quasi electron to the mass of the down quark (m_d) is mathematically equivalent to $3(\pi/c^{1/2})$, thus:

$$m_{qe}/m_d = 5.44 \times 10^{-4} = 3(\pi/c^{1/2})$$

From here the equation for the charge and structure of the down quark can be accurately defined by combining the equation for the structure of the quasi electron $q_e = \varepsilon_{qe}/(4/3\pi c^3)^{1/2}$ and the ratio of the masses of the quasi electron to the down quark (19); hence

$$d = \varepsilon_{qe}.m_d/m_{qe}.(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2})$$

Hence in short form

$$d = (4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \tag{16}$$

Giving the charge of the down quark as -1/3; and its estimated mass as 312.8 Mev.

Thus not only can the electron charge be derived from the equation for three spheres each with a radius of c (equation 3) ; but the mass, charge and internal structure of the down quark can also be derived from the term $3(\pi/c^{1/2})$.

Furthermore, the significance of the term $3(\pi/c^{1/2})$ in this equation, is revealed by the Shrödinger wave equation. Thus $(\pi/c^{1/2})$ is none other than the solution to the Shrödinger wave equation for the amplitude of an electron confined in a space with radius c [ref 6]. If c is the space defined by the equation for the structure of the quasi electron. Then the standard Shrödinger equation for an object confined in a space c is given by the following standard calculation [ref 8]:

$$E\psi(x) = -\frac{h^2}{2m} \cdot \frac{d^2\psi(x)}{dx^2}$$

If one of the dimensions of space has a length 2L the amplitude can only be non zero between x = 0 and X = 2L and the standard solution for the amplitude can be determined by using the constant (A) where:

$$A = (1/L^{1/2})$$

Thus in one dimension the solution to the Shrödinger wave equation for the amplitude of oscillation is conventionally given by [ref 8] :

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$$\psi(x) = (\pi/L^{1/2}) \ \sin x/L$$

Substiuting L for c gives the one dimensional equation (when sin x/L = 1) as $\pi/c^{1/2}$. Thus at 90°to the dimensional confinement of the quasi electron, the standard solution to the Shrödinger wave equation yields an amplitude of $\pi/c^{1/2}$, which in three dimensions gives:

$$3(\pi/c^{1/2}) \tag{22}$$

Thus the term $3(\pi/c^{1/2})$ is not only the ratio of the mass of the electron to the proton but is also none other than the standard solution to the Shrödinger wave equation for an object confined in a space c [ref 8].

From here the charge and structure of the up quark (u) can now be derived in a similar way to that of the up quark from the mass of two quasi positrons [m_{qp} = 2(0.170 Mev)] and the mass of the up quark (m_u) by the equation,

$$2m_{qP}/m_U = \ 2(5.44 \times 10^{-4}) = 2(3\pi/c^{1/2})$$

Thus:

$$u = \varepsilon_{qe}.2m_{qP}/m_u.2^+(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2})$$

Hence in short form

$$u = 2^+(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \tag{17}$$

Giving the charge of the up quark as +2/3, and its mass as 312.8 Mev

Overall the mathematical structure of all the particles can be shown to be derived from the quasi electron. Thus, the first generation particle structures can now be derived from first principles. This includes the quasi electron (qe) and electron (e), from which the quarks (u,d) and in turn the proton (p) respectively are derived.

Thus the first generation of particles of the Standard model are given in short form as:

$$qe = \ ^-(4/3\pi c^3)^{1/2} \tag{6a}$$

$$e = 3^-(4/3\pi c^3)^{1/2} \tag{6}$$

$$d = \ ^-(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \tag{16}$$

$$u = 2^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \tag{27}$$

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The respective force binding particle, the gluon, for the first generation of particles is thus given in short form as:

$$g = 3(\pi/c^{1/2}) \qquad (22)$$

According to these equations, it is apparent that the down and up quarks appear be constituted from quasi electrons and three component gluons, and are themselves not fundamental particles.

Indeed, from these observations it is clear that the structure of the electron, may underly the structure of all the elementary particles and nucleons, as it forms a "perfect sphere" based on c. As will also be seen later, as this structure. forms the basis of matter, it may itself underpin the theory of gravity. Furthermore, these obsevations will allow the mathematical estimation of the mass and size of the elementary particles, including the second and third generation particles

Second and Third Genration Lepton Structure

Thus the structure of the muon (μ) can also be derived from the ratio of the mass of the electron (m_e) and the mass of the muon (m_μ):

$$m_e/m_\mu = 4.7 \times 10^{-3} = \pi/c^{1/3}$$

Thus
$$\mu = \varepsilon_0^{1/2}.m_e/\ m_\mu.\ 3^-(4/3\pi c^3)^{1/2}.(\pi/c^{1/3})$$

Where the charge of the muon is in this equation equivalent to that of the electron e. In this case ($\pi/c^{1/3}$) can be considered to represent a specific high energy photon. Thus the structure of the muon, written in short form is:

$$\mu = 3^-(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}) \qquad (14)$$

Moreover the structure of the tauon can be calculated from the ratio of the mass of the electron and that of the Tauon (1.79 Mev);

Thus
$$0.511\ Mev/1.79\ Gev = 2.85 \times 10^{-4}$$

$$m_e/m_\tau = (\pi/c)^{1/3}.(\pi/c)^{1/9} = 2.85 \times 10^{-4}$$

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As the charge of the tauon is equivalent to the charge of the electron, hence the structure of the Tauon is given by the above equation

$$e_\tau = \varepsilon_{qe}.m_e/\ m_\tau.3^-(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} = e$$

This equation accurately predicts the charge -1; and mass of the Tauon (~1.78 Gev) [ref 14]. Thus the structure of the Tauon can in short form be given by the equation

$$\tau = \ ^-3(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (15)$$

Overall the mathematical structure of all the particles can be derived from the quasi electron. Thus, the particle structures can now be derived from first principles. This includes the quasi electron (qe) and electron (e), from which the quarks (u,d) and in turn the proton (p) respectively are derived. The general structure of the force carrying partilcles the photon (γ) and the gluon (g) can be given. It will also intriguingly be possible to derive the structure of the charm (c), beauty (b, or bottom) and truth (t or top) quarks directly from the sructure of the muon (μ) and Tauon (τ).

The calculations underlying these equations can further accurately reflect their measured values, particularly if the effects of gravity are taken into account (see Quantum Gravity and the Charge of the Electron.p 30). In addition the neutrino has not been included in the equation as its mass is considered to be very small. The mathematical proof of these short form equations nevertheless lies in the fact that they can closely identify the charge and the masses of these particles, from first principles, as in equations (6, 13-27). [ref 17]

Second and third generation Quark Structures

From here it is possible to derive the basic structure of the remaining quarks including the strange (s) quark.

Thus the ratio of the masses of the quasi electron (m_{qe} = 0.17033 Mev) and the strange quark (m_s = 0.555 Gev) are given by the equation:

$$m_{qe}/m_s = 0.17033\ Mev/\ 0.555\ Gev = 3.07 \times 10^{-4}$$

Furthermore the structure of the gluon in the strange particle, can now be

accurately derived by the term; $3(\pi/c)^{1/2}$,(n.b. change of brackets in the gluon term).

$$m_{qe}/m_s = 3.07 \times 10^{-4} = 3(\pi/c)^{1/2}$$

Thus the equation for the charge and structure of the strange quark (s) is:

$$s = \varepsilon_{qe}.m_{qe}/m_s \ ^-(4/3\pi c^3)^{1/2}.3(\pi/c)^{1/2} \qquad (18)$$

This can be written in short form as:

$$s = \ ^-(4/3\pi c^3)^{1/2}.3(\pi/c)^{1/2}$$

Giving the strange quark a charge of -1/3 and a mass of 0.555 Gev, in agreement with current estimates of its mass ~ 0.55 Gev [ref 14]. This again shows that strange quark is derived from a quasi electron and a gluon.

Thus given that the particle Ω^- is made of three strange quarks (sss) we may derive its mass as 3 x 0.555 Gev = 1.67 Gev, which is in accurate aggreement with its known mass of $\Omega^- = 1.67$ Gev [ref 17]

From here it is possible to define the structure of the other quarks, using the same first principles. As the charmed quark (c), beauty (b, otherwise termed bottom) and the truth (t, otherwise termed the top quark), clearly belong to the second and third generation of particles, they should be mathematically based on the formula for the second and third generation lepton particles, specifically the muon and tauon.

Indeed the charm derives from the second generation of particles and therefore mathematically does qappear to contain the basic muon structure, as given by the equation:

$$\mu = 3(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}) \qquad (14)$$

As before, the ratio of the masses of the quasi electron and that of the charm quark gives the equation from the structure of the charm (c).Thus the structure of charm can be determined from the ratio of the mass of two quasi electrons; $m_{qe} = 2(0.17033)$ Mev, and the mass of the charmed quark $(m_c = 1.518$ Gev)

Thus if: $2m_{qe}/m_c = 2(0.17033 \text{ Mev})/1.518 \text{ Gev} = 2(1.122 \times 10^{-4})$

and $2m_{qe}/m_c = 2(1.122 \times 10^{-4}) = 2(\pi/c^{1/3}).(\pi/c^{1/4})$

Then the structure of the charm quark (c) is:

$$c = \varepsilon_{qe}.2m_{qe}/m_c.2^+(4/3\pi c^3).^{1/2}(\pi/c^{1/3}).(\pi/c^{1/4})$$

or in short form

$$c = 2^+(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}).(\pi/c^{1/4}) \qquad (19)$$

Thus the charmed quark has a charge of +2/3 and a mass of 1.518 Gev in accordance with the previous approximate estimate of its mass ~ 1.5 Gev. [ref 17] and is derived from a muon and a higher order gluon. This gluon itself $(\pi/c^{1/4})$, is the solution to the Shrödinger wave equation for the amplitude of an electron confined in a space of length $c^{1/2}$ [ref 8]. Thus this gluon now exactly matches the amplitude of the quasi electron.

Furthermore, from this we can deduce the mass of the particle the J/ψ, whose structure is predicted to consist of a charm and anticharm particle in orbit around each other, with a minimum mass (including orbital energy) of ~ 3.1 Gev.

From here we can in a similar fashion determine beauty (b). To be consistant, as beauty is a third generation quark it should be defined by the component structure of the Tauon. In this case, this is the smaller component of the Tauon, which is mathemtaically represented by:

$$3(4/3\pi c^3)^{1/2}.(\pi/c^{1/9})$$

Indeed the structure can again be determined by the ratio of the mass of the quasi electron electron (m_{qe}) to beauty (m_b). Such that the ratio can be given by the equation

$$m_{qe}/m_b = 3.673 \times 10^{-4} = (\pi/c^{1/9}).(\pi/c)^{1/2}$$

Thus the structure of beauty is given by the equation

$$b = \varepsilon_{qe}.m_{qe}/m_b \;.\;(4/3\pi c^3)^{1/2}.(\pi/c^{1/9}).(\pi/c)^{1/2}$$

To confirm this structure, the mass of the beauty quark can be given by the following calculation

$$m_{qe}/m_b = 3.673 \times 10^{-4} = 0.17033 \text{ Mev } /4.64 \text{ Gev}$$

and

$$m_{qe}/m_b = 3.673 \times 10^{-4} = (\pi/c^{1/9}).(\pi/c)^{1/2}$$

Thus the short form of beauty is:

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$$b = \bar{\ }(4/3\pi c^3)^{1/2}.(\pi/c^{1/9}).(\pi/c)^{1/2} \qquad (20)$$

Thus giving beauty a charge of -1/3, and a mass of 4.64Gev, which is in agreement with its current estimated mass of ~ 4.7 Gev [ref 17].

To complete the structure of the quarks, we can finally proceed to deduce the truth. As the top quark or truth (t) belongs to the third generation of quarks, it is also based on the structure of the Tauon. Thus mathematically the truth, primarily consists of the third generation, tauon.

$$\tau = 3(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (15)$$

The geometrical structure can be confirmed from the mathematical ratio of the mass of the electron to mass of truth (m_t), hence the equation for the top quark is given by the ratio of the mass of the electron to mass of the truth .

Thus   as m_t = 176 Gev

and as m_e = 0.511 Mev

$$m_e/m_t = 0.511 \text{ Mev}/176 \text{ Gev} = 2.89 \times 10^{-6}$$

and

$$m_e/m_t = 2.89 \times 10^{-6} = (\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4}$$

As each quasi positron is associated with each of the gluon complexes, then the equation for truth is thus predicted by the equation:

$$t = 2(4/3\pi c^3)^{1/2+}.(\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4} \qquad (21)$$

Which gives the mass of the truth as 176 Gev and a charge of +2/3e. Which is in agreement with the known mass of the truth; 176 ± 12 Gev; the most accurate estimate of the mass of the truth quark being; 175.6 Gev.[ref 22]

Thus the basic structure of the truth, is that of a pair of quasi anti-tauons complexed with a gluon moiety which has an amplitude that, according to the Shrödinger wave equation (3), exactly matches the amplitude of the quasi electron [ref 8].

Mathematically the probability of arriving at all such tightly conformed equations (3, 16-30), the particles being related only to π and c and its specific powers, **by chance would have odds of millions to one against.!** Furthermore these mathematical structures are derived from none other than solutions to the Shrödinger wave

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equation itself [ref 8].

Moerover, the structures of the second and third generation particles, the muon (μ), and charm (c); tauon (τ) and truth (t) quarks have a notable symmetry, with their masses and charges accurately given by the following short form equations:

$$\mu = 3^{-}(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}) \qquad (14)$$

$$c = 2^{+}(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}).(\pi/c^{1/4}) \qquad (19)$$

$$\tau = 3^{-}(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (15)$$

$$t = 2^{+}(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4} \qquad (21)$$

Hence, from these equations it can be deduced that the fundamental structure of the quasi electron probablistically underpins the mathematical structure of the fundamental particles, and that these structures are all related to one another either by complexing with a photon [$(\pi/c)^{1/3}$] which matches the frequency of the quasi electron or a gluon [$(\pi/c^{1/4})$] which according to the Shrödinger wave equation accurately matches the amplitude of the quasi electron. This explains the fundamental observations that final decay products of hadrons always lead to the production of an electron or positron and explains why quarks have not been individually seen.

Particle Decay and the Electroweak Force.

In order to corroborate the estimated quark structures these structures need to explain in detail the pattern of decay of the quarks themselves. We are thus required to explain particle decay from first principles including the structures which are formed in these decays, such as the mediator of the electro weak force; the Intermediate Vector Boson. To see if this is possible the decay of the truth (t, top quark) will be examined. According to experiment the truth quark splits into two particles, beauty (b, bottom quark) and the intermediate vector boson (W^{+}). It is apparent that the truth may yield beauty.[ref 22]

Thus:

$$2^{+} (4/3\pi c^{3})^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4} = t$$

$$\Rightarrow \quad \cdot(4/3\pi c^{3})^{1/2}.(\pi/c^{1/9}).(\pi/c)^{1/2} \quad = b$$

Thus the two gluon structures, $(\pi/c)^{1/4}$; in the truth combine to form the more energetic gluon, $(\pi/c)^{1/2}$; present in beauty, thus:

$$2(\pi/c)^{1/4} \Rightarrow (\pi/c)^{1/4}.(\pi/c)^{1/4} \_ (\pi/c)^{1/2}$$

and the photon term, $(\pi/c)^{1/9}$; decays into the less energetic photon $(\pi/c^{1/9})$ present in beauty. Thus the structures in the truth account for the structures in beauty, and are produecd via the production of a quasi electron and quasi positron.

The remaining terms are thus 3 quasi positrons, two high energy photons and a remaining low energy photon

$$3^{+} (4/3\pi c^{3})^{1/2}$$

and

$$2(\pi/c)^{1/3}$$

and

$$(\pi/c)^{1/9}$$

There is also a very considerable amount of energy remaining, the energy difference between beauty (b) and truth (t) being ~ 170 Gev.

This energy difference allows the transformation of the two high energy photons and the low energy photon to two intermediate vector photons, given by the equation.

$$2(\pi/c^{1/6})^{6}$$

This leads to the formation of the intermediate vector boson (W^{+}), which is the mediator of the electroweak nuclear force.

$$W^{+} = 3^{+} (4/3\pi c^{3})^{1/2}.2(\pi/c^{1/6})^{6} \qquad (24)$$

which is also equivalent to

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$$W^+ = 3^+ (4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^3.(\pi/c^{1/6})^3$$

This probable structure for the (W^+), can again be confirmed by the ratio of the mass of the electron to the intermediate vector boson (W^+), with an estimated mass of 80 Gev [ref 17]. Thus the ratio of the masses is given by

and

$$m_e/m_{W+} = 0.511 \text{ Mev}/ 80 \text{ Gev} = 6.4 \times 10^{-6}$$

Thus

$$m_e/m_{W+} = 6.4 \times 10^{-6} = 2(\pi/c^{1/6})^6$$

thus in short form:

$$W^+ = \varepsilon_{qe}.m_e/m_{W+}.3^+(4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^6$$

$$W^+ = 3^+ (4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^6$$

The true elegance of the structure of the intermediate vector boson can now be further explored. The W^+ can be considered to represent a unification of the electromagnetic force and the weak force, in keeping with the theoretical predictions of Salam and Weinberg for the nature of the electroweak force. Thus, the intermediate vector photons can either decay leptonically or via gluons; as is demonstrated by the following interconversions.

$$W^+ = 3^+ (4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^6 \_ 3^+ (4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^3.(\pi/c^{1/6})^3$$

If we examine the further decay of the three dimensional photon structure, $(\pi/c^{1/6})^3$; we have:

$$(\pi/c^{1/6})^3 \Rightarrow [(\pi/c)^{1/6}]^3 \_ (\pi/c)^{1/2}$$

Where the term $(\pi/c)^{1/2}$ is none other than the term for a first generation gluon.

Thus the W^+ can either decay leptonically or into first generation quarks where it can yield an up (u) and an anti-down quark (_), thus:

$$W^+ = 3^+ (4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^3.(\pi/c^{1/6})^3 \Rightarrow 3^+(4/3\pi c^3)^{1/2}.2[(\pi/c)^{1/6}]^3.[(\pi/c)^{1/6}]^3$$

And

$$3^+(4/3\pi c^3)^{1/2}.2[(\pi/c)^{1/6}]^3.[(\pi/c)^{1/6}]^3 \_ 3^+(4/3\pi c^3)^{1/2}.2(\pi/c)^{1/2}.(\pi/c)^{1/2}$$

thus W^+ decays to:

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$$\Rightarrow \qquad 2^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) = u$$

and

$$\Rightarrow \qquad {}^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) = \_d$$

Leptonically the W$^+$ decay yields the standard products including the positron the neutrino (v), and energy in the form of photons thus

$$W^+ = 3^+(4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^6 \_ 3^+(4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^2.(\pi/c^{1/6})^2.(\pi/c^{1/6})^2$$

and

$$\Rightarrow \qquad 3^+(4/3\pi c^3)^{1/2}.2[(\pi/c)^{1/6}]^2.[(\pi/c)^{1/6}]^2.[(\pi/c)^{1/6}]^2$$

$$\_ \qquad 3^+(4/3\pi c^3)^{1/2}.2(\pi/c)^{1/3}.(\pi/c)^{1/3}.(\pi/c)^{1/3}$$

Thus W$^+$ may also decay into the positron the neutrino (v), and energy in the form of photons thus:

$$\Rightarrow \qquad 3^+(4/3\pi c^3)^{1/2} = e^+$$
and

$$\Rightarrow \qquad v$$
and

$$n(\pi/c)^{1/3}$$

Thus according to standard experimental observations the truth quark yields the beauty quark and the intermediate vector boson. In turn from these observations we may elegantly reveal the structure of truth and beauty and the intermediate vector boson and its decay pathways from first mathematical principles. [ref 18]

Gluon Structure and Force Characteristics

There are in the Standard model (or in this modification) three colour charges for the gluons and quarks, each of these represents each of three vectors x, y and z which can arise in different combinations. Thus the three gluon colours are required to be together (one in each dimension x, y and z) in baryons to form a three dimensional objects. There are also noted to be 8 gluons, these in turn gives rise to all the

known baryons and mesons

The structure of these gluons have been previously mathematically identified, and this structure mathematically represents a helical ringlet. These are as previously given: $(\pi/c)^{1/2}$; $(\pi/c)^{1/4}$; $(\pi/c^{1/2})$; $(\pi/c^{1/4})$ [see eq. 25- 25c]

These four mathematical structures and their antigluons now readily account for the eight gluons known to exist, these in turn account for the structure of all the quarks as given by equations 3, 15-30, which in turn give rise to all the baryons and mesons as described by the Standard model.

Recent studies show that the proton conventionally consisting of the "fundamental" quarks (uud); can by bombardment with high energy electrons produce a Kaon which consists of an anti-up and a strange quark (s_). As the standard model predicts quarks are fundamental, the proton should not contain a strange quark. The conventional explanation for this resides in the proposal that the proton contains virtual strange particles. Indeed to explain these new observations each proton is now postulated by some physicists to contain 21 or more quarks, 3 of which are real and 18 or more which are required to be virtual! [ref 23].

In the revised Standard model presented here, the process by which a Kaon is produced is readily understood by the structural interconversion of the gluon in the up quark $(\pi/c^{1/2})$; to the gluon in the strange quark $(\pi/c)^{1/2}$, (n.b change of brackets)

Furthermore the most recent experiments on the internal structure of the proton has shown that gluons can seperate and recombine. This surprising recent observation actually arises from first principles when the mathemtatical structure of the gluon is understood. Thus mathematically the gluon structures may easily recombine and separate by the equation. [ref 24]

$$(\pi/c)^{1/2} \;=\; (\pi/c)^{1/4}.(\pi/c)^{1/4}$$

Hence this mathematical structure of the gluon allows the observed "recombination" and separation to occur in a way which is readily understood.

In addition, the structure of the gluons can be explained on the basis that these structures match the wave function of the quasi electron, thus the gluons match the amplitude of the electron as given by the Shrödinger wave equation. [ref 8]

Furthermore, the equations for the gluon present in the quark can explain their force characteristics. In the case of the gluon component $(\pi/c^{1/2})$; which mathematically represents a helical ringlet; if the direction vector is x, then the axis of spin would

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need be 90° to this, in the y vector in order to match the amplitude of vibration of the quasi elelctron/ positron. Thus this spin vector is known to be the same as that of electrons. This would account for the particle binding characteristics of the gluon force to the quasi electron. Given that the gluon would mathematically require the same spin axis as that of the quasi electron or positron, the gluon would be strongly associated with these particles and the force required to part them would increase with distance, which explains the characteristics seen experimentally with the gluon force.

Moreover, as will be shown, the photonic component of the subatomic particles given in the above equations matches exactly the frequency of rotation of the electron.

Nucleon Structure

The mass (m_p) and the internal mathematical structure of the proton can now be directly calculated form the quarks. Thus the structure of the proton according to the Standard model derives the combination of 2 up quarks and one down quark (p = uud). As each quark has an estimated mass of 312.8 Mev (see eq. 13) then the proton (p) has in accordance with the Standard model a mass of 3 x 312.8 = 938.3 Mev and a charge of +1, and may be given by the mathematical structure of the up and down quarks according to eq. 16,17; and is thus given by:

$$p = \begin{array}{l} 2^+(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \\ {}^-(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \\ 2^+(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \end{array}$$

Which, gives the proton a net charge +1 and a mass of 938 Mev.

Fifteen component gluons are required to be present in the proton, three gluons associated with each quasi electron particle.

Therefore the structure of the proton can be mathematically derived by combining the structure of the quasi electrons and the term ($\pi/c^{1/2}$). Thus the structure of the neutron and indeed the overall structure of the nuclei can be determined.

Similarly the structure of the neutron is given by the Standard model (n = udd), which can be written in short form as:

$$n = \begin{array}{l} {}^-(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \\ 2^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \\ {}^-(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \end{array}$$

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The mystery of the stability of the neutron may now be addressed. A neutron outside the nucleus has a half life of approximately 6 seconds. Inside the nucleus however, the stability of the neutron, provides the atom with its stability. The three dimensional structures described may now provide the clues to this stability.

The compostion of the quarks now logically explains the apparent "fluid" characteristics of the subatomic particles, and some free exchange of the quasi electrons and gluons would be expected to occur within a nucleus.

This would occur to to give the structures stability and this in turn would allow the decresed binding energies seen in these structures. As has been shown by the metric tensor structure of matter (eq. 4-6), the preferred conformation is a 3 x 3 structure.

This can be acheived by donating a quasi electron and a quasi positron along with three associated gluons each; from the proton structure to that of the neutron. The proton would then contain three positrons and a total of nine gluons

The stable nuclear proton conformation would now be :

$$p = 3^{+}(4/3\pi c^{3})^{1/2}.3(\pi/c^{1/2}) \hspace{2cm} (13)$$

This can form a stable 3 x 3 conformation.

Thus the probable structure of the stable nucleonic neutron (n), would now contain a total of three quasi positrons and three quasi electrons along with their respective eighteen gluons and is represented by an equation, which also forms a 3 x 3 conformation:

$$n = \begin{array}{l} ^{+}(4/3\pi c^{3})\downarrow^{1/2}.2(3\pi/c^{1/2}).\ ^{-}(4/3\pi c^{3})\uparrow^{1/2} \\ ^{+}(4/3\pi c^{3})\downarrow^{1/2}.2(3\pi/c^{1/2}).\ ^{-}(4/3\pi c^{3})\uparrow^{1/2} \\ ^{+}(4/3\pi c^{3})\downarrow^{1/2}.2(3\pi/c^{1/2}).\ ^{-}(4/3\pi c^{3})\uparrow^{1/2} \end{array} \hspace{1cm} (26)$$

Viewed in three dimensions the configuration will allow the positron components of the neutron to be placed interiorly and the electron components exteriorly, in keeping with experiments that suggest that the neutron core is positive an the exterior is negative. This polarised structure in turn will enable the neutron to bind the protons of the nucleus together.

Alpha Particle Structure

Importantly it is now possible to **derive the mathematical structure of the helium nucleus** (α particle) containing two protons and two neutrons, along the same lines. The proposed basic conformation is again 3 x 3.

$$\alpha = \begin{array}{l} [3(4/3\pi c^3)]\downarrow^{1/2+}.2(3\pi/c^{1/2}).\ [3(4/3\pi c^3)]\uparrow^{1/2-} \\ [3(4/3\pi c^3)]\uparrow^{1/2+}.2(3\pi/c^{1/2}).\ [3(4/3\pi c^3)]\downarrow^{1/2+} \\ [3(4/3\pi c^3)]\downarrow^{1/2-}.2(3\pi/c^{1/2}).\ [3(4/3\pi c^3)]\uparrow^{1/2+} \end{array} \qquad (27)$$

This mathematical expression for the structure of the α particle allows the calculation of its binding energy from first principles! Each pair of particles is still associated with the equivalent of 18 gluons each, that is $3^{1/2}.2(3\pi/c^{1/2}).3^{1/2}$. However, the internal structure has altered, to effectivly reduce the number of quasi electrons. Thus as a result of triplet pairing, which has occurred in order to make up the helium nucleus, we are left with a reduced number quasi electrons.

Hence, the number of quasi electrons is reduced by a factor of 3 as a result each of the three pairings of the six quasi electron groups. This means the reduction in the equivalent number of quasi electron masses (including the electrical kinetic energy of the complex vectors) is effectively 3^3 x 6. Each of these weighs 1/3 the rest mass of the electron. The total energy therefore liberated is equivalent to 27 x 6 quasi electron masses (approximately 27.5 Mev). This agrees with the difference in mass between the constituent protons and neutrons and the rest mass of the helium nucleus, thus accounting for the binding energy of the helium nucleus.

This structure is also important for the understanding of the internal structure of atomic nucleii, The alpha particle appears to form a natural sphere as indicated by the metric tensor structure (see eq. 6-9). In turn the basic structure of atomic nucleii appear to form in multiples of alpha particles; the carbon atom for instance forms from three, separate, such helium nuclei spheres.

Furthermore knowledge, of the structure of the α particle may be of considerable importance in the understanding **of nuclear fusion** and the eventual harnessing of this technology.

Neutrino Structure

Whilst it has been possible to derive the structure of the fundamental particles form their known masses, the mass of the neutrino remains uncertain. However, recent evidence does support the contention that the neutrino does indeed have rest mass, which is a starting point.

If the neutrino does have rest mass this suggests it has a basic spherical structure like the electron, and will therefore be subject to relativistic changes in mass. Again experiment confirms this relativistic component.

It is also reasonably certain that whilst the neutrino mass is smaller than that of the electron, its size is also likely to be smaller, and on the basis of what is known of the radius of the electron (see Particle Spin and Size) the essential radius is also likely to be related to c.

Indeed as the electron radius is 1/c x 2/spin, where the intrinsic radius is 1/c. Then by deduction the neutrino radius is related to $1/c^2$. Thus the most likely equation for the neutrino is:

$$e_\nu = \left[\frac{\varepsilon_0}{3\,[\,4/3\pi(c^2)^3\,]} \right]^{1/2} = \left[\frac{\varepsilon_0}{3\,[\,4/3\pi c^6)\,} \right]^{1/2} \quad \text{(6d)}$$

This of course endows the neutrino with a very small charge of: 9.71×10^{-32} C. (which reduces to 9.42×10^{-63} C, when the neutrino forms a Cooper neutrino pair) Nevertheless, if the neutrino has mass, like all other elementary particles we should not be surprised if it also has a charge. Furthermore we may use the above formula to estimate the neutrino mass itself.

Without concerning ourselves too much at this point about the exact origin of the nature of the mass of the electron (which is addressed in chap. Quintessence and Electron Structure). It is reasonable to postulate that, if the radius is related to $1/c^2$ then the number of quintessences in the neutrino will be equivalent to the square root of the number of quintessences in the electron. Indeed this means that the number of quintessences in the electron neutrino is 1.925×10^{10} quintessences. Knowing the mass of quintessence; 2.4575×10^{-51} kg, gives us the mass of the electron neutrino (with an estimated error range of: x/÷ 3), as:

$$m_{\nu e} = 4.731 \times 10^{-41} \text{ kg} = 0.0000265 \text{ ev}$$

We may also deduce the masses of the mu neutrino and the tau neutrino from first principles. Interestingly we also know that the μυ and the ταυ neutrino can convert an electron to a muon or tauon respectively (if the neutrino has sufficient relativistic energy). So it is likely that the geometric elements present in the muon and tauon are

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also present in their respective neutrinos. Thus the short inverted form equations are given by:

$$v_\mu = 3^{\cdot}(4/3\pi c^6)^{1/2}/(\pi/c^{1/3}) \qquad (6d)$$

$$v_\tau = 3^{\cdot}(4/3\pi c^6)^{1/2}/(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (6d)$$

These mathematical suffixes are merely the same geometric components, which combine with the quasi electron to form the muon and tau. In the same way the ratio of the masses of the muon and tau to the electron, were deduced from first principles (see Fundamental Forces and Particle Structure) these equations predict the respective masses of these neutrinos (with an error range of $x/\div 3$), as:

$$v_\mu = 0.00546 \text{ ev} \quad \text{and} \quad v_\tau = 0.0927 \text{ ev}$$

Indeed recent evidence from the super Kami0kande experiment supports these observations with regard the tau neutrino, and places its mass in the range 0.1- 0.03 ev.

Quintessence and Internal Electron Structure

The reason for the value for the mass of the electron, has till now remained a mystery. The internal structure of the electron is therefore of considerable importance as it may elucidate the underlying reason for the mass of the electron. In turn we may derive the mass of all the particles from first principles, as these themselves derive from the structure of the electron (see previous chapter; Fundamental Forces and Particle Structure). Additionally, it may also be possible to estimate the radius of quintessence, from the structure of the electron. Quintessence in turn is fundamental to the formulation of quantum gravity.

We may begin with the formula for the charge of the electron

$$e = \varepsilon_{qe}/3(4/3\pi c^3)^{1/2} \qquad (6)$$

This demonstrates a square root spherical structure. From here we may deduce the most logical internal structure of the quasi electron as derived from quintessence. Indeed if the quasi electron has a square root spherical structure, this needs to be accounted for when calculating the number of quintessence it contains to account for the square root sphere conformation of the electron.

The structure can be defined using the equation for the surface area of a sphere: $A=4\pi r^2$. Thus the total volume of a single outer layer of quintessence in the quasi electron will be the surface area of the quasi electron x the average diameter of quintessence [if quintessence is oscillating the average diameter is $(2r_q + 0)/2 = r_q$].

Taking r_e as the radius of the electron and r_q as the radius of quintessence, given that there are three quasi electrons in the total electron, the volume of a single outer layer of quintessence (V) is:

$$V = (4\pi r_e^2)^{1/2} \times (r_q/3)^{1/2}$$

Taking the volume of a single quintessence (V_q); based on a square root electron sphere, then:

$$V_q = (4/3\pi r_q^3)^{1/2}$$

The total number of quintessences in a single outer layer will thus be the total volume divided by the volume of a single quintessence itself: V/V_q. Thus the number of quintessences (n_q) in a single outer layer is:

$$n_q = (4\pi r_{qe}^2)^{1/2} \times (r_q/3(4/3\pi r_q^3)^{1/2}$$

This very elegantly reduces to

$$n_q = r_e/r_q$$

To be further precise (after all quantum dynamics has to be elegant), the total number of quintessences in the electron will thus be determined by the number of quintessences in a single outer electron layer x the quantum amplitude. The quantum amplitude has been previously calculated using the standard Shrödinger wave equation (see Fundamental Forces and Particle Physics) and is given by $(c^{1/2}/\pi)$. Taking the root mean square of the quantum amplitude, the number of quintessences (n_q) in the electron is:

$$n_q = r_e/r_q \times \sqrt{2}(c^{1/2}/\pi).$$

As the radius of the electron is estimated as, $r_e = 6.4 \times 10^{-19}$ m. (see Particle spin and Size), and the radius of quintessence is, $r_q = 1.35 \times 10^{-35}$ m, this allows us to estimate the number of quintessences in the electron itself using the above equation, thus:

$$n_q = 1.2355 \times 10^{20} \text{ m}$$

Thus, given that $m_q = 7.373 \times 10^{-51}$ kg, the mass of the electron is given by

$$m_e = m_q \times n_q, = 9.10938 \times 10^{-31} \text{ kg.}$$

Using the radius for quintessence (the estimated Planck length) then the number of quintessences present in the electron and thus its mass, is explained.

Therefore, these observations postulate that the internal structure of the electron consists of a square root sphere, composed of a single outer layer of quintessence x the root mean square of the its quantum amplitude.

The electron is itself composed of quintessence with a velocity of c and has an intrinsic radius of $1/c$ x $1/\text{spin}$ in metres; and in accordance with its half integer spin $h/4\pi$; its spin velocity is $2\pi/c$ in metres/sec, (see Particle Spin and Size) which in vortex mechanics gives it the ideal harmonic balance with quintessence space time.

Thus given the surface area of the quasi electron in order to fill the outer layer allowing for the quantum amplitude of oscillation would require 1.235×10^{20} quintessences. The total number of quintessence required to fill the whole electron would thus be $n_q = 1.235 \times 10^{20}$. Overall the number of quintessences required to make up the electron can be verified from the internal structure of the electron and the radius of quintessence. Thus if r_q is equivalent to the given Planck length, then accordingly the number of quintessences in the electron is calculated as 1.235×10^{20}, which gives the mass of the electron $m_e = m_q \times n_q$, hence again:

$$m_e = m_q \times n_q, = 9.10938 \times 10^{-31} \text{ kg.}$$

Intriguingly the derivation of the structure of the electron reflects the volume of an ordinary sphere

$$V = 4\pi r^2 \times r/3 = 4/3\pi r^3$$

This underpins a fundamental concept, mass determines the shape of space-time and in turn the shape determines the amount of mass within it.

It is important to have a working understanding of why the mass of the electron should be what it is from its basic structure. This understanding can now be derived from the radius of quintessence, which also corresponds with the Planck length.

Dimensional Equations for Quintessence

As $h = 3m_qc^2$ and the dimensions of h are $[ML^2T^{-2}.T]$ and those of c^2 are $[L^2.T^{-2}]$ the equational dimensions of quintessence are $[M][T]$, and the dimensions relating to the number of quintessences n_q is $[T^{-1}]$. Clearly therefore,

$$[M] = [M][T] \times [T^{-1}]$$

and overall

$$M = m_q \times n_q.$$

Dimensional Equations for the Electron

The dimensions of the equation for the electron, in the light of quintessence, can now be fully examined, if

$$e^2 = \frac{\varepsilon_0}{3\ (4/3\pi c^3)} \qquad (6b)$$

Then taking the dimensions of the equation, e^2 is the charge $[q^2]$, in Coulombs; ε_0 is the permittivity of free space, in Capacitance [C] per metre [L]; and **[c]** is the speed of light, in **[L/T]**.

Thus the above equation using dimensions, is given by

$$[q^2] = \frac{[C]}{[L][c^3]}$$

In this case the velocity is given as the velocity of light **c**, then **L = c.T** ; then

$$[q^2] = \frac{[C]}{[c^4][T]}$$

As $q^2 = C^2V^2$, where V is volts, then:

$$[C^2][V^2] = \frac{[C]}{[c^4][T]}$$

and

$$[CV^2] = \frac{1}{[c^4][T]}$$

as $E = CV^2$, then

$$E = \frac{1}{[c^4][T]}$$

and as $E = mc^2$, then

$$mc^2 = \frac{1}{[c^4][T]}$$

and hence

$$m = \frac{1}{[c^6][T]}$$

The significance of this dimensional analysis, in the first instance, appears obscure. Nevertheless, it reveals the very nature of matter and energy. Thus the equation for the mass of a structure can be represented by $1/c^6$ which represents the six complex vectors of matter.

Interestingly, given it is known that $1/c^2 = [\mu_o.\varepsilon_0]$, then

$$m = [\mu_o.\varepsilon_0]^3/T$$

Where $\mu_o.$ and ε_0 are again the permeability and permittivity of free space, quantities that are inherently caused by the vibration of quintessence. Thus mass itself is the result of the vibration of quintessence in the six complex vectors (each represented by the fundamental properties of quintessence μ_o or ε_0 .Hence, the equation for the quasi electron mathematically and geometrically forms the "perfect" three dimensional sphere with its mass accounted for by its six complex vectors.

Energy associated with this matter is in turn is also caused by the the vibration of quintessence (including that in the complex vectors, i) such that:

$$E = [\mu_o.\varepsilon_0]^2/T$$

The dimensions for the equation for energy can also be written as:

$$E = \frac{1}{c^3.L}$$

Which indicates that the energy of matter is again related to the dimensions of the structure of the electron ε_0 $/(4/3\pi c^3)$ and the permittivity of free space in capacitance per meter (C/L)

Overall the equation for the quasi electron and its dimensions, gives us the origin of

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mass and energy. The equation for the electron then forms the key to the understanding of the nature of the relationship between matter and space-time.

Indeed we may now even derive Newton's second law of motion (F = ma, and thus the other fundamental laws of physics) from first principles to confirm the validity of the above.

If:

$$E = \frac{1}{[c^4.][T]}$$

Which is dimensionally equivalent to:

$$E = \frac{[T^3]}{[L^4]}$$

then as F = E/L:

$$F = \frac{[T^3]}{[L^5]}$$

and thus

$$F = \frac{[T^6]}{[L^6.T]} \cdot \frac{[L]}{[T^2]}$$

Substituting for m from eq. 1g

$$m = \frac{[T^6]}{[L^6][T]}$$

Then   F = ma

Thus taking into account the whole of these observations enables the laws of motion and the equations for energy and mass and their equivalence to be derived from geometric first principles.

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Fig.1

Figure 1 & 2
B = Superconductor

Spherical Superconductor
Sphere = 0.25m external radius
Sphere = 0.20m internal radius

Direction of Motion
y vector (vertical rails)

A = Ultracentrifugational Axle
  (rps 10,000 revs/sec)
B = Spherical Superconductor

Fig.2

CLAIMS

1. A method of generating a force on a body, wherein a differential electron flow through the body in rotation is directed so as to simultaneously pass through said body in its direction of rotation and contrary to its direction of rotation to release a directed flow of gravitons.

2. A method of accelerating a body by generating a force acting upon it by the method of claim 1.

3. A method according to claim 1 or 2, wherein electrical currents are passed simultaneously through said body in its direction of rotation and contrary to its direction of rotation.

4. A method according to any one of claims 1 to 3, wherein the body is a least partly of superconducting material.

5. A device for generating a force sufficient to accelerate a body, the device comprising;
    the body in the form of an electrically conducting mass, means for rotating said mass and means for passing electrical currents simultaneously through said mass in its direction of rotation and contrary to its direction of rotation.

6. A device according to claim 5, wherein the mass is spherical, cylindrical or consists of a dual co-rotating or counter rotating disc.

7.   A device according to claim 5, wherein the mass is cylindrical.

8.   A device according to claim 5, wherein the mass consists of a disc.

9.   A device according to claim 5, wherein the mass consists of dual co-rotating
      or counter rotating discs.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(54) Title: TECHNICAL AND THEORETICAL SPECIFICATIONS FOR WARP DRIVE TECHNOLOGY

(57) Abstract: The present invention relates to the use of technical drive systems, which operate by the modification of gravitational fields. These drive systems do not depend on the emission of matter to create thrust but create a change in the curvature of space-time, in accordance with general relativity. This allows travel by warping space-time to produce an independent warp drive system. Differential electron flow through a body in rotation is directed so as to simultaneously pass through a said body in its direction of

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent

In re patent application of: WORSLEY et al.

Serial No.: NEW APPLICATION   Examiner:

Filed: July 29, 2002   Art Unit:

For: TECHNICAL AND THEORETICAL   Docket No.:
SEPCIFICATIONS FOR WARP DRIVE...   P07695US00/DEJ

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C.

S I R:

Prior to examination, please amend the above-identified application as follows.

IN THE CLAIMS:

A clean version of amended claims 3 and 4 is provided herewith in **Attachment A**. It will be noted that claims 3 and 4 have been amended relative to the previously provided version as shown by the marked up version thereof in **Attachment B** provided herewith.

REMARKS

By this Amendment, the claims have been rewritten to reduce the multiple dependencies.

Further and favorable action is solicited.

Respectfully submitted,

Date: 29 July 2002   By: _Douglas E. Jackson_
                     Douglas E. Jackson
                     Registration No. 28,518

LARSON & TAYLOR PLC
Transpotomac Plaza
1199 North Fairfax Street, Suite 900
Alexandria, Virginia 22314
(703) 739-4900

ATTACHMENT A

<u>Clean Replacement/New Claims</u>

Following herewith is a clean copy of each claim which replaces each previous claim having the same number.

      3.   (Amended) A method according to claim 1, wherein electrical currents are passed simultaneously through said body in its direction of rotation and contrary to its direction of rotation.

      4.   (Amended) A method according to claim 1, wherein the body is at least partly of superconducting material.

clean claims

ATTACHMENT B

Marked Up Replacement Claims

Following herewith is a marked up copy of each rewritten claim.

3. (Amended) A method according to claim 1 ~~or 2~~, wherein electrical currents are passed simultaneously through said body in its direction of rotation and contrary to its direction of rotation.

4. (Amended) A method according to ~~any one of claims 1 to 3~~ claim 1, wherein the body is at least partly of superconducting material.

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2001

Applicant / Docket Number: D0₉₈95US00/RFH

CLAIMS AS FILED - PART I

TOTAL CLAIMS	(Column 1)	(Column 2)
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	9/2 minus 20=	*
INDEPENDENT CLAIMS	minus 3 =	*
MULTIPLE DEPENDENT CLAIM PRESENT		☐

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐ OR OTHER THAN SMALL ENTITY

	RATE	FEE		RATE	FEE
BASIC FEE			OR	BASIC FEE	870
	X$ 9=		OR	X$18=	
	X42=		OR	X84=	
	+140=		OR	+280=	
TOTAL			OR	TOTAL	870

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

OTHER THAN SMALL ENTITY / SMALL ENTITY

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT C

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐				

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X42=		OR	X84=	
+140=		OR	+280=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

08/01/2002 GFREY1   00000115 10182373
01 FC:970   890.00 OP

PTO-1556
(5/87)

MULTIPLE DEPEND... CLAIM
FEE CALCULATION SHEET
(FOR USE WITH FORM PTO-875)

SERIAL NO.		FILING DATE
APPLICANT(S)		

CLAIMS

	AS FILED IND.	DEP.	AFTER 1st AMENDMENT IND.	DEP.	AFTER 2nd AMENDMENT IND.	DEP.
1						
2						
... through 50						
TOTAL IND.						
TOTAL DEP.						
TOTAL CLAIMS						

	* IND.	DEP.	* IND.	DEP.	* IND.	DEP.
51						
... through 100						
TOTAL IND.						
TOTAL DEP.						
TOTAL CLAIMS						

* MAY BE USED FOR ADDITIONAL CLAIMS OR AMENDMENTS

ORM PTO-1360 (REV. 3-78)

U.S. DEPARTMENT OF COMMERCE
Patent and Trademark Office

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 16 November 2001 (16.11.01)	
International application No. PCT/GB01/00381	**Applicant's or agent's file reference** HP5896014
International filing date (day/month/year) 30 January 2001 (30.01.01)	**Priority date** (day/month/year) 31 January 2000 (31.01.00)

Applicant

WORSLEY, Andrew, Peter et al

1. The designated Office is hereby notified of its election made:

    [X] in the demand filed with the International Preliminary Examining Authority on:

    28 August 2001 (28.08.01)

    [ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

    [ ] was not

    made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	**Authorized officer** Zakaria EL KHODARY
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

Form PCT/IB/331 (July 1992)

GB0100381

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference HP5896014	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)

International application No. PCT/GB01/00381	International filing date *(day/month/year)* 30/01/2001·	Priority date *(day/month/year)* 31/01/2000

International Patent Classification (IPC) or national classification and IPC
G21K1/00

Applicant

THE WWK TRUST et al.

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   I   ☒   Basis of the report

   II   ☐   Priority

   III   ☒   Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

   IV   ☐   Lack of unity of invention

   V   ☐   Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement

   VI   ☐   Certain documents cited

   VII   ☐   Certain defects in the international application

   VIII   ☐   Certain observations on the international application

Date of submission of the demand 28/08/2001	Date of completion of this report 15.03.2002
Name and mailing address of the international preliminary examining authority:))) European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Frisch, K Telephone No. +49 89 2399 2559

Form PCT/IPEA/409 (cover sheet) (January 1994)

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
    Description, pages:

    1-92   as originally filed

    Claims, No.:

    1-9   as originally filed

    Drawings, sheets:

    1/2-2/2   as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

    These elements were available or furnished to this Authority in the following language: , which is:

    ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

    ☐ the language of publication of the international application (under Rule 48.3(b)).

    ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

    ☐ contained in the international application in written form.

    ☐ filed together with the international application in computer readable form.

    ☐ furnished subsequently to this Authority in written form.

    ☐ furnished subsequently to this Authority in computer readable form.

    ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

    ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

    ☐ the description,   pages:

    ☐ the claims,   Nos.:

   ☐ the drawings,   sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

   ☒ the entire international application.

   ☐ claims Nos. .

because:

   ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (*specify*):

   ☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
   see separate sheet

   ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

   ☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

   ☐ the written form has not been furnished or does not comply with the standard.

   ☐ the computer readable form has not been furnished or does not comply with the standard.

Concerning Part III; No opinion relating to novelty or inventive step:

1. The claims are so unclear (Article 6 PCT) that their subject-matter cannot be understood and compared with the prior art. Hence, no examination as to novelty and inventive step (Articles 33.1-33.3 PCT) can be carried out.

Claim 1 defines a method partly in terms of a desired result to be obtained ("to release a directed flow of gravitons), not in terms of the essential method steps (i.e. actions) to be carried out in order to obtain this result (PCT Guidelines III, 4.7). Furthermore, the result to be achieved (releasing a "directed flow of gravitons") is not comprehensible to the skilled person. The skilled person would not know how to determine if a flow of gravitons has been released and would not know of any method step which would lead to a directed flow of gravitons. Indeed, the very existence of a "graviton" is unknown to the skilled person, this being still merely a hypothetical concept suggested in some of the present theories of physics. The description furthermore contains no information which would enable the skilled person to understand the claimed method in terms of everyday objects or actions. The skilled person therefore cannot determine the scope of this functionally defined method step. In claim 1 it is also not clear what is referred to as a "differential electron flow". The method of claim 1 is therefore not clear. The same applies to claims 2-4, which each include all the features of claim 1.

The present application (title; claim 1; pages 2 and 55-65 of description) is stated to relate to a "warp drive". No other kind of device is supported by the description (Article 6 PCT). This means that device claims 5-9 must be interpreted as relating exclusively to a "warp drive" having the function of emitting a directed flow of gravitons, even if these claims do not expressly mention any gravitons or "warp drive". It is therefore implied to be an essential feature of the claimed device that it has the property of emitting such a directed flow of gravitons, an essential feature which is not stated in claims 5-9. Claims 5-9 are not clear (Article 6 PCT), since they do not state this essential feature (PCT Guidelines, III-4.4), and since this feature is anyway completely obscure (see above). Claims 5-9 therefore also cannot be examined with respect to novelty and inventive step.

2.   Concerning industrial applicability (Article 33.4 PCT), the applicant has not provided any experimental evidence demonstrating that the claimed method or device may actually function as explained in the description (i.e. that they provide an antigravity or "warp drive" effect and emit a directed flow of gravitons). Since this is not a priori plausible - the applicant relies solely on theories not in general accepted in the scientific community - the claimed subject-matter is deemed not to be industrially applicable.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 01/00,381

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   G21K1/00   F03H1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7   G21K   F03H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category°	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 25 12 695 A (REUTER TECHNOLOGIE GMBH) 30 September 1976 (1976-09-30) claims 1,8	1,5
A	WO 95 32021 A (MILLS RANDELL L) 30 November 1995 (1995-11-30) abstract	1,5

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 April 2001	07/05/2001

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Hulne, S

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
DE 2512695	A	30-09-1976	NONE		
WO 9532021	A	30-11-1995	CA	2190828 A	30-11-1995
			EP	0760698 A	12-03-1997
			JP	10505395 T	26-05-1998

PRIORITY DOCUMENT

SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH RULE 17.1(a) OR (b)

The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

REC'D 26 MAR 2001

WIPO

PCT

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

GB01/381

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed

Dated 09 MAR 2001

Patents Form 1/77

Patents Act 1977
(Rule 16)

Request for grant of a patent
(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

1/77

The Patent Office

Cardiff Road
Newport
South Wales
NP10 8QQ

THE PATENT OFFICE
A
2 4 NOV 2000
LONDON

1. Your reference	HP/LP5894886
2. Patent application number *(The Patent Office will fill in this part)*	2 4 NOV 2000 **0028721.9**
3. Full name, address and postcode of the or of each applicant *(underline all surnames)*	THE WWK TRUST 225-235 High Street Beckenham Kent BR3 1BN
Patents ADP number *(if you know it)*	C80298852001
If the applicant is a corporate body, give the country/state of its incorporation	GB
4. Title of the invention	Technical and theoretical specifications for warp drive technology
5. Name of your agent *(if you have one)*	MEWBURN ELLIS
Address for service@ in the United Kingdom to which all correspondence should be sent *(including the postcode)*	YORK HOUSE 23 KINGSWAY LONDON WC2B 6HP
Patents ADP number *(if you know it)*	109006

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number	Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*
	GB	0002221.0	31/01/00

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application	Number of earlier application		Date of filing *(day / month /year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer "Yes" if:* *a) any applicant named in part 3 is not an inventor, or* *b) there is an inventor who is not named as an applicant, or* *c) any named applicant is a corporate body.* *See note (d))*	Yes

Patents Form 1/77

Patents Form 1/77

9. Enter the number of sheets for any of the
    following items you are filing with this form. Do
    not count copies of the same document

Continuation sheets of this form	No
Description	86
Claim(s)	1
Abstract	1
Drawing(s)	2

10. If you are also filing any of the following, state
    how many against each item

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	1
Request for preliminary examination and search *(Patents Form 9/77)*	1
Request for substantive examination *(Patents Form 10/77)*	1
Any other documents *(Please specify)*	Letter concerning early publication

11.

I/We request the grant of a patent on the basis of this application.

Signature	Date
Hugh Paget	24 November 2000

12. Name and daytime telephone number of person to contact in the United Kingdom

Hugh C. E. Paget   020 7240 4405

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed it it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

a) *If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.*

b) *Write your answers in capital letters using black ink or you may type them.*

c) *If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.*

d) *If you have answered 'Yes' Patents Form 7/77 will need to be filed.*

e) *Once you have filled in the form you must remember to sign and date it.*

f) *For details of the fee and ways to pay please contact the Patent Office.*

TECHNICAL AND THEORETICAL SPECIFICATIONS
FOR WARP DRIVE TECHNOLOGY

FIELD OF THE INVENTION

The present invention relates to the use of technical drive systems which operate by the modification of gravitational fields. These drive systems do not depend on the emission of matter to create thrust, but create a change in the curvature of space-time, in accordance with general relativity. This allows travel by warping space-time, to produce an independent warp drive system.

THEORETICAL BACKGROUND OF THE INVENTION

The concept of gravity should be examined in the light of quantum gravity and in turn as a component of quantum physics itself. The fundamental minimal quantum of energy in quantum physics is Planck's constant; h. Thus in accordance with the energy equivalence formula $E=mc^2$, the fundamental minimum quantity of mass (m_q) can therefore be derived, from known constants by; $m_q=h/c^2$ (1). Taking this minimal mass, it is possible to show that the formation of all matter, the forces of nature and indeed space-time itself derive from this single quintessential quantity.

Thus if the number of quintessences in a system is; $n_q = m/m_q$: then the total Energy of the system is *more* logically given by, the energy of a single quintessence (h); directly multiplied by the number of quintessences (n_q) in that system, thus $E=hn_q=mc^2$ (1a).

Furthermore, this minimal mass, termed quintessence, can form the basis of the existence of a quantum gravitational field in the form of a space-time lattice, from which quantum gravity may be derived from first principles. Furthermore, the conglomeration of these quintessences also accounts for the formation of the elementary particles and the forces acting between them, as in superstring theory. This concept explains the formation of matter and the forces of nature on a quantum mechanical basis and directly explains the existence of wave particle duality. Thus as $n_q=m/m_q$; the frequency of light and matter (f) is determined, directly, from the number of constituent quintessences. This leads automatically to the fundamental equation, derived from (1), $f=n_q=E/h$, where n_q is the number of quintessences, which leads directly to the frequency of both light and matter. This in turn leads directly to a Universal wave equation for matter and light $\lambda=c/\beta n_q=hc/\beta E$ (2), where β is the *relative* directional velocity, v/c. As the momentum, $p= \beta E/c$, then this equation also gives the standard de-Broglie wave equation, $\lambda=h/p$ in agreement with current theory and experiments.[1]

1

Using th Univ rsal wave quation, the standard equation for sp cial relativity, $m'=m_0/(1-\beta^2)^{1/2}$, deriv s from first principles. Also from these observations, a modified Dirac wave equation may be derived, $E\psi=(-j\beta\cdot\nabla+\beta m)\psi$ (2a), the results of which have been recently verified by a paper in which the orbitals of electrons were experimentally directly visualised.[2] Moreover, a fundamental equation for general relativity can be formulated, where G is the gravitational constant and r_q is the given radius of quintessence; $G=9r_q^2c^4/\lambda\beta E$ (3), such that the Universal wave equation is in direct agreement with general relativity.[3] Thus special and general relativity and quantum mechanics can be unified.

From here it is possible to proceed in a number of ways; the geometric structure of the electron and the forces of Nature may be derived from first principles and in turn th structure of the quarks, including the top and bottom, otherwise known as truth and beauty can be seen. Moreover, the presence of a space-time lattice results in an understanding of quantum EPR effects. By allowing a theoretical flow of energy through the space-time lattice it can be shown that:

Energy is not bound by space-time

Thus logically accounting for phenomena such as entanglement and quantum tunnelling. Quintessence can also be used to explain, logically, the inner physics of a black hole, the missing mass of the Galaxy, the continuing expansion of the Universe, Guth's inflationary theory and the Big Bang. Hence, it is now possible to understand the Universe, including space-time, matter and the forces of nature from the radius, mass and vibration of a single quantity, quintessence.

With this understanding of space-time, matter and the forces of Nature, and in particular gravity, it is possible to demonstrate that the modification of gravitational fields, and in turn the warping of space-time, can be technically readily achieved.

Using standard equations for special relativity, $m'=m_0/(1-\beta^2)^{1/2}$, it can be demonstrated that by differentially increasing the velocity of electrons, by applying a differential current, their mass can be increased in a specific way. In turn by increasing the mass of electrons, by general relativity, the number of gravitons emitted from these electrons can be modulated. By multiplying this effect using an ultracentrifugational device the differential graviton emission can be manifestly amplified. This in turn, in accordance with general relativity, will cause a change in the curvature of space-time.

This effective warping of space-time does not, of necessity, imply superluminal velocities, but does allow the creation of warp drive systems, which do not depend on the creation of thrust by the ejection of material as used in current space technologies.

2

PART I
FUNDAMENTAL LAWS OF PHYSICS

Quintessential Mass

The quantum physical, minimum component of energy is Planck's constant; h. To define the minimal component of mass, using the standard energy equivalence formula; $E=mc^2$, such a minimal mass (m_q) would be required to have the value equivalent to; $m_q=h/c^2$ (1). The total mass of a system (m) would then be; $m = m_q n_q$, where n_q is the number of these minimal units. Thence, the total energy of a system can be derived from the minimal energy; h, multiplied by the number of these energy units (n_q). Thus as, $E=mc^2$, then also $E=m_q n_q c^2$ and substituting $m_q=h/c^2$, the energy equivalence formula has the more logical formulation; $E=hn_q$ (1a). Thus the energy of a system is equivalent to the minimal energy unit; h, multiplied by the number of those minimal energy units (n_q).

Taking this minimal mass/energy, it is possible to show that all matter, the forces of nature and space time can be constructed from this single quintessential quantity. Moreover, using this quantity the laws of physics can be derived from first principles. Thus, a priori, all components of the physical universe, including space-time, can be constructed from this minimal mass component, termed quintessence.

Wave Particle Duality

If the presence of quintessence accounts for the structure of matter and if matter itself forms from the number of quintessences, then the frequency of matter and thus wave particle duality directly arises from first principles. Specifically the wavelength of matter derives from the vibration of quintessence from which it is constituted. Thus the frequency (f) and in turn the wavelength of light and matter is directly equivalent to the number of quintessences contained within it. We find that the actual frequency of light can be directly derived from first principles from the effective mass of the photon (m_γ) and thus by the number of quintessences (n_q) it contains.

Thus for light conventionally:

$$f = E/h$$

and if $E = mc^2$, and $h = m_q.c^2$, then

$$f = m_\gamma c^2/m_q.c^2$$

and

$$f = m_\gamma/m_q = n_q$$

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Thus
$$f = n_q \qquad (4)$$

Thus the formula for the frequency of light ($E = hf$) is now readily explained by the observation that the frequency is determined quite directly from the number of quintessences (n_q) within the photon.

The wavelength is thus also given by:

$$\lambda = c/f = m_q c/m_\gamma = h/p$$

We can now show that the frequency of matter also has the same derivation from quintessence, as has the frequency of light. The frequency of matter is again equivalent to the number of quintessences it contains. Thus the wave particle duality of matter itself can be explained by its composition from quintessence. The amount of quintessences contained within a electron sphere will depend on the number of quintessences constituting the electron and those passing through it as a result of its relative velocity β^2 (where $\beta = v/c$); effectively its relativistic momentum (p). The frequency will then be related to the total number of quintessences. Thus for matter,

$$f = \beta^2 n_q \qquad (4a)$$

Thus it is possible to derive the conventional de Broglie wave equation for matter from first principles. Thus, as $\lambda = v/f$, we have:

$$\lambda = v/\beta^2 n_q \qquad (5)$$

thus as $n_q = E/h$

$$\lambda = hc/\beta E \qquad (2)$$

and as conventionally $\beta E/c = p$, then for matter:

$$\lambda = h/p$$

Provided that in the de Broglie equation, the momentum of the object is calculated using the relativistic mass, thus accounting for the total number of quintessences (n_q) in an object, this gives an accurate value for the wavelength of matter.[1]

Thus the wavelength of matter follows directly from its constitutents, quintessence. As matter is made of quintessence, similarly to light, its frequency depends on the number of quintessences (n_q) within it, travelling relative to the speed of light. Moreover, $\lambda = hc/\beta E$, underpins a fundamental relationship between wavelength and energy. Furthermore, this is mathematically the same as the term $\lambda = hv/\beta^2 E$, giving a relativistic expression for the the wavelength of matter, from which the relativistic equations may be directly derived (see Wave Particle Duality and Relativity).

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The derivation of wave particle duality from first principles also now allows the derivation of a modified wave equation for matter.

To derive his wave equation Shrödinger commenced with the de Broglie equation using momentum (p). For lower energies the momentum of an electron is conventionally derived from the kinetic energy of the electron and the mass of the electron m_0. Thus conventionally:

$$E_k = 1/2 \, mv^{1/2} \quad \text{and} \quad p = m_0 v$$

Thus
$$E_k = p^2/2m_0$$

then
$$p = (E_k.2m_0)^{1/2}$$

and conventionally, the de Broglie equation can also be written as:

$$\lambda = h/p = h/(E_k.2m_0)^{1/2}$$

In turn the Shrödinger wave equation directly derives from the square of the above classical non relativistic term for kinetic energy:

$$\lambda^2 = h^2/E_k.2m_0$$

thus
$$E_k = \frac{h^2}{2m} \cdot \frac{1}{\lambda^2}$$

As $E = E_k + V$

then
$$E\psi = -\frac{h^2}{2m} \cdot \frac{d^2\psi}{dx^2} + V\psi = jh.\frac{d\psi}{dt}$$

However, the Shrödinger equation, may be refined by taking into account relativity. Thus the true values for the energy are given by the relativistic momentum (p).

A fundamental relativistic wave equation for ψ, and its logical derivation may now be developed through the concept of quintessence as a fundamental constituent of matter.

The amount of quintessences in the electron is determined by the number of quintessences forming the electron at rest, plus the amount of quintessences passing through it due to its relativistic velocity, which will determine the relativistic momentum (p) of a particle.

The frequency of matter can now be readily calculated from first principles to give a more accurate result. Thus as matter is made of quintessence, similarly to light, its frequency is equal to the number of quintessences (n_q) within it. The wavelength will depend on its velocity travelling relative to the speed of light and thus multiplied by the relative velocity compared to c ($\beta = v/c$);

Hence for matter as previously shown:

$$\lambda = v/\beta^2 n_q = hc/\beta E \qquad (2)$$

And conventionally

$$E = (p^2 c^2 + m_0{}^2 c^4)^{\frac{1}{2}}$$

Using these equations, we can now, also, reformulate the Shrödinger wave equation, which has the advantage that relativity can be treated in a quantum mechanical way. Thus if the wave energy of matter is defined as:

$$E_\lambda = \beta(p^2 c^2 + m_0{}^2 c^4)^{1/2}/c^2$$

thus

$$E_\lambda = (\beta^2 p^2/c^2 + \beta^2 m_0{}^2)^{1/2}$$

which in complex space generalises to

$$E_\psi = (-j\beta \cdot \nabla + \beta m)_\psi \qquad (2a)$$

As the term $\alpha = e^2/hc.4\pi\varepsilon_0$; also represents the ground-state ratio of the velocity of the electron to c. Thus $\alpha = \beta = v/c = 1/137$.

Thus, *also*

$$E_\psi = (-j\alpha \cdot \nabla + \beta m)_\psi$$

This is thus the standard relativistic equation that Dirac was able to construct from the Shrödinger wave equation. This relativistic equation can be derived from the modified wave equation (2). This takes into account the relative mass energy which the quintessential wave equation (2) contains.

Where importantly the term βm is the mass m, multiplied by the ratio of the relative velocity to light $\beta = v/c$, and the term α is also essentially the relative velocity of the electron.

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The Dirac equation was an empirical formula which worked mathematically, nevertheless even Dirac admitted it was not logically understood. The importance of these equations (eq. 2, 2a) is that they show that the existence of **quintessence allows the wave-particle duality of matter to be explained and mathematically derived from first principles,** Thus the frequency of matter or even light is simply determined by the number of quintessences it contains.

Indeed, a recent publication in Nature has suggested that the direct visualisation of the orbitals of electrons shows that these are in very close agreement with theory. However, there is a significant departure from theory, in the interstitial molecular regions, suggesting that the higher velocities of the electrons obey the modified Dirac equation (2a).Thus these orbitals were in keeping with the modified Dirac equation, which itself may be derived from the wave equation above, $\lambda = hc/\beta E$ (eq. 2). [ref 2]

The Shrödinger wave equation will approximate to the correct values until v approaches c. Indeed the Shrödinger equation will give similar answers as that derived from equation (2a), under most experimental conditions.

However, equation 2 and its derivative (2a) may have advantages over standard Shrödinger theory with relativistic speeds. Furthermore, equation 2, conceptually shows that the wave particle duality of matter derives from the principle that the frequency of matter is directly equal to the number of quintessences it contains. Importantly it also mathematically allows relativity and quantum mechanics to be united.

With $v \cong c$, the modified Dirac equation (2a) will yield more accurate results, particularly compared with the Schrödinger equation. We also find that the equation $\lambda = hc/\beta E$ (2) is equivalent to the de Broglie wave equation, $\lambda = h/p$, provided we use the relativistic mass in the de Broglie equation. Given this, these equations yield accurate experimental results [ref 1].

Thus we find that the modified formulation of de Broglie wave equation $\lambda = hc/\beta E$ (eq. 2a) leads directly to a modified Dirac relativistic wave equation and is supported by recent experiments which measure the wavelength of matter and demonstrate the electron orbitals experimentally from these wave equations for matter [ref 1,2].

From here it is possible to proceed in several ways using the relativistic wave equation (2). It is apparent that the reintroduction of the term for relative velocity into the wave equations will enable the reintroduction of special relativity into quantum mechanics. In particular we should now be able to derive the term $(1-v^2/c^2)^{1/2}$ as a special case of quantum mechanics.

Thus if:
$$\lambda = hc/\beta E \qquad\qquad (2)$$

As $E=(p^2c^2 + m_0{}^2c^4)^{1/2}$, squaring

$$\lambda^2 = h^2c^2/\beta^2(p^2c^2 + m_0{}^2c4)$$

Conventionally $p^2c^2 = E^2v^2/c^2$

then
$$\lambda^2 = h^2c^2/\beta^2(E^2v^2/c^2 + m_0{}^2c^4)$$

Thus as $\beta^2 = v^2/c^2$ and $m_0{}^2c^4 = E_0{}^2$, then:

$$\beta^4E^2 + \beta^2E_0{}^2 = h^2c^2/\lambda^2$$

hence
$$\beta^4E^2 = h^2c^2 \cdot \frac{1}{\lambda^2} - \beta^2m_0{}^2c^4$$

thus
$$\beta^2 = \frac{h^2c^2}{\beta^2E^2} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0{}^2c^4}{\beta^2E^2}$$

As $E^2 = m^2c^4$

$$\beta^2 = \frac{h^2c^2}{\beta^2 m^2c^4} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0{}^2c^4}{\beta^2E^2}$$

Substituting $h = m_q c^2$

$$\beta^2 = \frac{m_q{}^2c^6}{\beta^2 m^2c^4} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0{}^2c^4}{\beta^2E^2}$$

As $m_q/'m = 1/n_q$ (eq. 2)

$$\beta^2 = \frac{c^2}{\beta^2 n_q{}^2} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0{}^2c^4}{\beta^2E^2}$$

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Thus if $f = \beta^2 n_q$ (eq. 7a);

$$\beta^2 = \frac{v^2}{f^2} \cdot \frac{1}{\lambda^2} - \frac{\beta^2 m_0^2 c^4 f^2}{\beta^2 E^2}$$

As $1/\lambda^2 = f^2/v^2$

$$\beta^2 = \frac{v^2}{f^2} \cdot \frac{f^2}{v^2} - \frac{\beta^2 m_0^2 c^4 f^2}{\beta^2 E^2}$$

Thus:

$$\beta^2 = 1 - \frac{\beta^2 m_0^2 c^4}{\beta^2 E^2}$$

As $E^2 = {'m}^2 c^4$

$$\beta^2 = 1 - \frac{m_0^2}{{'m}^2}$$

Hence

$$m_0/{'m} = (1 - \beta^2)^{1/2}$$

Thus

$$'m = \frac{m_0}{\left[1 - \dfrac{v^2}{c^2}\right]^{1/2}}$$

Thus this derivation now allows relativity as a universal case of the quintessential wave nature of matter.

The original premises on which special relativity was based were: that the speed of light is a constant and that all observers are equal. As the speed of light has dimensions of length and time but not apparently of mass, the relativistic change in mass is not accounted for. Using quintessence logically and directly accounts for the relativistic mass changes.

Moreover, relativity can be derived from the de Broglie equation, and visa versa, directly, thus linking relativity and quantum mechanics by taking into account the existence of quintessence mass.

Hence, it is now possible to derive the relativistic equations for mass and in turn for space and time from the quintessential wave equation, thus deriving special relativity as a universal case of quantum mechanics and thus uniting special relativity and quantum mechanics. This now allows a further understanding of the nature of space-time.

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Th Space-time Lattice

The understanding of the true nature of space-time and how it is formulated in three dimensions of real space is crucial. To simply assume that space-time exists, and thence not to question the nature of that existence, denies a deeper understanding of the universe.

In order to understand the nature of space-time itself, at the quantum level a further look at the nature light and the photon is necessary. Since Einstein's description of light as a particle (the photon) and the description of the photoelectric effect, the standard picture of light as simply a wave can, no longer be applied. If light was to exist as a photon, it could not exist in one dimension, as ordinary waves do, it would need to be three dimensional, with the addition of time. Let us suppose, in this case, that a photon is a three dimensional helical ringlet of light, travelling in the x vector, and spinning around the x-axis. Conventionally this ringlet has a radius; $r=\lambda/2\pi$. The ringlet itself would be vibrating in the y and z vectors. The vectors x, y and z would represent the photon, the substance of which, would be travelling in the x direction and oscillating in the y and z vectors, which would represent oscillatory energy. This in turn would allow it to act as a wave, and create oscillatory electromagnetic fields.

It is important to re-examine **space-time** itself in this light, this would have one directional vector with two vector dimensions of energy, one of capacitance and one of electrical permeability, thus accounting for the well known constants of free space; the permittivity of free space (ε_0) and the permeability of free space (μ_0) respectively. The vector dimension of direction x, would be the direction of travel and those "quintessences" travelling in an outwardly direction would account for none other than the expansion of the universe. Three of these quintessences would naturally constitute three dimensional visible space-time. These constituents of space-time would interact with the generations of the other vector dimensions reciprocally. Thus one quintessence would sweep out one vector of permeability and one vector of permittivity, through which the other two quintessences could travel, and vica versa, creating a three dimensional space-time lattice.

The permittivity of free space, (ε_0) which is equivalent to capacitance, would as with capacitance plates, be determined by the effective separation between quintessences. The permeability of free space (μ_0) is in fact a force, measured as $4\pi \times 10^{-7}$ N A^{-2}, would result from the force produced by the vibration of quintessence and would be dependant on the density of quintessence. Hence these two parameters would be reciprocal and thus the product of these two would therefore be a constant, which is recognised as none other than the speed of light.

$$c = (\mu_0 . \varepsilon_0)^{-1/2}$$

This space time lattice would in effect be created by quintessences travelling in all directions with a speed of c within the lattice. The quintessences of the space time latice would in effect produce a non-static ether. A non-static ether is fully compatible with special and general relativity. Indeed such an ether explains how space time can be curved as in general relativity. Furthermore, the existence of a non-static ether, was espoused by Einstein in his University of Leyden lecture on general relativity of 5th May 1920. In Einstein's own words;

"According to the general theory of relativity space without ether is unthinkable."[ref4]

Recent evidence from a number of sources now strongly support the presence of this non-static ether, in the form of quintessence. An editorial from a major journal states "combined with other observations such as those of distant Supernova, the QMAP results corroborate the prevailing theory of inflation with the twist that the Universe is only one third matter (both ordinary and dark) and two thirds quintessence, a form of energy possibly inherent in empty space".[refs 5,6,7]

If we take into account the existence of quintessence and as such a three dimensional space-time lattice, matter which is intrinsically made of contituents of charge would interact with this lattice to produce the effects of mass. Mass would be perceived as a result of matter (whose constituent particles appear to contain charge) interacting with this lattice directly due to the inhibition of motion by the lattice's electrical permeability and permittivity vectors, which would form the existence of complex space. These quintessences would in the direction in the y and z vectors produce small vibrations of the order of the Planck length (10^{-35} m), whilst passing through the vectors of permeability and permittivity, thus producing the effects of mass.

The vibration would endow quintessence itself a (non rest) mass (m_q) equivalent, to the minimal mass of:

$$m_q = h/c^2 = 7.373 \times 10^{-51} \text{ kg.sec} \qquad (1)$$

The presence and magnitude of Planck's constant (h) and especially the speed of light (c) is thus explained. Indeed, the speed of light $c = (\mu_0. \varepsilon_0)^{-1/2}$ is not in itself a fundamental quantity.

As the energy equivalence formula is $E = mc^2$, the minimal mass of a single quintessence, would thus be the minimal mass, h/c^2, hence again:

$$m_q = h[\mu_0 . \varepsilon_0] = h/c^2 = 7.373 \times 10^{-51} \text{ kg.sec} \qquad (1b)$$

$$m_q c^2 = h \qquad (1c)$$

or

It is postulated by general relativity that the shape of space time itself can be

altered, indeed the presence of the space time lattice now allows this to be altered by altering the density of quintessence. It is further clear that if quintessences underly the structure of the space-time lattice, they may also underly the structure of matter itself.

With regards a single quintessence, this passing through an energy vector of the space-time lattice would appear as a vibrating string. In a similar way to string theory, the conglomeration of these quintessences would produce the constituents of ordinary matter. Thus the general equation for the number of quintessences (n_q) in an object of mass (m) would be

$$m/m_q = n_q$$

The mass of the electron (m_e) for example, would be directly determined by the number of quintessences in the electron, multiplied by the mass of quintessence.

Quintessence and Complex Space

Quintessence is postulated to constitute the fundamental nature of space-time. Three quintessences each travelling in their respective x vectors at 90^0 to each other would create three dimensional real space-time. These quintessences would in the direction in their respective y and z vectors produce small vibrations of the order of the Planck length (10^{-35} m), this would create the vector dimensions of permeability and permittivity. The result would give space-time 9 dimensions of space as in superstring theory. However, unlike superstring theory the six hidden dimensions would not be "curled up so as to be so small as to be invisible" these six dimensions would be present in complex space. Thus, only three of these dimensions would represent ordinary three dimensional particulate space time i.e. three dimensional objects. The other six dimensions produced by the vibrations of quintessence would form complex space.

The mathematics of complex space, using imaginary $\sqrt{-1}$ or (j) numbers, is assumed in the standard formulation of the Shrödinger wave equation. Thus the presence of complex space is an integral part of quantum mechanics. [ref 8]

$$- \frac{h^2}{2m} \cdot \frac{d^2 \psi}{dx^2} + V\psi = jh. \frac{d\psi}{dt}$$

The mathematics of complex space is also an essential and integral part of the principles and application of modern electronic and control engineering. Indeed it has been well recognised for some time that each direction vector in electronic engineering can be associated with complex vectors. [ref 9]

As this complex space consists of the vectors of permittivity and permeability it would only be "felt" by charged particles as in the electron. Nevertheless, as all particles are fundamentally composed of charged particles the effects of complex space would be felt by endowing these particles with mass and in turn kinetic energy.

In conventional complex space, a 2 dimensional Cartesian Argand diagram is mathematically used. However, in order to formulate the equations for particles a three dimensional Argand diagram is essential. This will have three dimensional vectors, one real vector and two imaginary vectors. Three of these diagrams will be required to fully describe the nature of particles, each with a real vector in the x, y and z vectors, respectively. Nevertheless, in the instance below the real vector is the x vector and the two imaginary vectors are given by (jy, jz)

Three Dimensional Argand Diagram

The beauty of a three dimensional Argand diagram is that the complex conjugate (i.e. the mirror image which confers mathematical reality on the coordinates) is formed by the value of the minus coordinate in the other complex vector dimension. Thus the complex conjugate of $(c_x^{1/2} + jc_y^{1/2} + -jc_z^{1/2})$ is $(c_x^{1/2} + -jc_y^{1/2} + jc_z^{1/2})$. These two sums when multiplied thus give a real number solution.

Furthermore it is clear that nine dimensions of space time are necessary in the general relativistic equations. By including complex space we thereby create the nine dimensional spacial metrictensor and the metric energy tensor of matter necessary for computations for general relativity (see quantised general relativity pp 34-35). From here we can begin to understand the true structure of matter.

The presence of numerous experimental data for quantum tunnelling [refs 10,11,12,13] and indeed the recent observations by Nicholas Gisin, on the entanglement of distant photons now returns us to EPR experiments.

Using the quintessential modification of the de Broglie wave equation, gives us an insight into these teleportation and EPR effects.

As

$$\lambda = hc/\beta E \qquad (2)$$

and

$$E = hn_q \qquad (1a)$$

then

$$\lambda = c/\beta n_q \qquad (2c)$$

Importantly, as indicated by equation (9d), energy having no quintessence; would have a wavelength of infinity. Specifically pure energy containing no quintessences, would have a lambda of infinity. According to quantum mechanics an infinite wavelength would result in the probability of that energy being anywhere. As energy itself has no electrical charge it would not be impeded by the permittivity and permeability of the three dimensional space-time lattice. Moreover, energy would not be detectable in three dimensional space-time, unless it interacted with matter, as in the EPR experiments. Indeed, energy is not observed when not bound to any form of mass or particle. Thus equation 9d, takes us to our original assertion

- Energy is not bound by the space-time lattice -

Thus, as the EPR experiments suggest the existence of energy separate from matter and thus separate from the three dimensional space-time lattice, it is interesting to find that experiment suggests the existence of free energy in a continuum separate from space time to produce the effects of quantum teleportation. [refs ,10,11,12,13]

This is not, however, teleportation across an additional dimension, this is a term to describe in partially familiar terms the dissociation of energy from the three dimensional space-time lattice. As time is inextricably linked to each dimension of space, the effects of energy would be inextricably linked to the events, such as the creation of virtual particles, we see interacting within space-time.

It is unlikely that observers have any direct day to day experience to explain quantum events. Nevertheless, quantum physics may have given us a window into the hitherto hidden workings of the Universe. Thereby, the mystery of the uniformity of the Universe, across distances which the speed of light could not apparently traverse,

is readily explained by the fact that the free energy contained in the Universe is not bound by the space-time lattice.

In the case of light, due to the exceedingly small masses involved, there would be relatively easy exchange of matter with free energy within a photon. This would make the photon the ideal experimental tool to look for energy which is not bound by matter and in turn energy which is not bound in space-time. Indeed, very recently Furusawa *et al.* have reported to have observed the transference of energy as photons from A to B, without those photons traversing space-time[ref 10]. This finding which has been supported using other experimental techniques[refs 11,12,13,], is very important as it suggests the existence of such a quantum continuum.

We have already seen strong experimental data using photons [ref 10], atomic spins and other data for quantum teleportation which have recently been published [refs,11,12,13], which support these findings. According to the above equations the teleportation would vary in a predictable fashion, as with photons, in line with the wavelength of the light used, relative to the size of vibration of quintessence. As regards matter, the results do confirm that the effect of quantum tunnelling is indeed dependant on the wavelength of matter and the size of that matter [ref 10].

Electron Structure

Understanding the electron is fundamental to the understanding of the elementary particles. The hidden nature of the electron may recently have been revealed through observations by Horst Stormer, Daniel Tsui and Robert Laughlin for which a Nobel prize has recently been awarded. They describe a quasi electron particle of charge 1/3e. This has been described on a quantum basis as a vortex of energy, bound as a quasi particle in one dimesion x, but not bound in the other two dimensions y and z, allowing dispersion in space-time as a vortex. What is more intriguing are the experimental conditions in which this occurs. First of all a two dimensional electron gas is created and held between two capacitance plates. A magnetic force is then applied in the remaining dimension, virtually creating a one dimensional passage through which only a quasi electron appears to be able to pass.[refs 15,16]

Given the presence of charge of 1/3 e, then three of these quasi electrons could form an entire electron in three dimensional visible space time. Nevertheless, each would have energy and hence a wave function which would be present in the other vectors. This electron could thus follow the probability functions as described by the Shrödinger wave equation for ψ (otherwise termed as "essence" by Shrödinger)

If the mass of the electron (m_e) is constituted from quintessence, using the formula:

$$m_e / m_q = n_q$$

Then an electron would be constituted from:

$$9.11 \times 10^{-31} \text{ kg} \div 7.373 \times 10^{-51} \text{ kg.sec} = 1.236 \times 10^{20} \text{ quintessences/sec.}$$

Thus taking into account the mass-energy content of quintessence (m_q) it is independantly possible to derive the magnitude of the charge of an electron (e) using the following equation.

$$e = [m_q \varepsilon_0 / 4/3\pi hc]^{1/2} = 1.61 \times 10^{-19} \text{ C}$$

This is in close agreement with the experimentally observed charge on the electron of 1.60×10^{-19} C.

Interestingly substituting $m_q = h/3c^2$ in the above equation we have:

$$e = [\varepsilon_0 / \ 3(4/3\pi c^3)]^{1/2} \qquad\qquad (6)$$

This can also be written as

$$e = \frac{\varepsilon_0}{[\ 3\ (\ 4/3\pi c^3)\ ]}^{1/2} \qquad\qquad (6a)$$

Equation (6) has a number of very special implications, if re-examined, firstly three of these quasi electron spheres appear to to be required to constitute the charge of the electron . More intriguingly, it indicates that the charge is related to the volume of a sphere with an apparent radius of c. Thirdly it indicates that the square of the charge of an electron (e) is proportional to the permittivity of free space (ε_0). The charge given from equation (3) is in close agreement with the measured charge of the electron. Furthermore a more exact value for the charge of the electron (to seven decimal places) can be deduced by taking into account the gravitational field of the Earth (see Gravity and the Charge of the Electron). Furthermore the charge of the electron (e) can now be derived from first principles. Thus, equation (3) corroborates the evidence that the electron is indeed composed of three quasi electrons in keeping with recent experimental findings.[ref 16]

The significance of the electron, composed of three spheres each with a radius of c, is not immediately clear, but can be understood if the frequency of rotation of the electron is taken into account. Thus if the diameter of the electron was approximately 10^{-19} m, then its spin would need to be $1/c.10^{-15}$m $\approx 10^6$ cycles/sec. Thus given a very high rotation rate an electron could have an effective radius of $1/c$ and still occupy subatomic sizes. Indeed these observations might be used to estimate the rate of rotation of the quasi electron and its size (see Appendix 1).

With regards a single quintessence, this passing through an energy vector of the space-time lattice would appear as a vibrating string. In a similar way to string theory, the conglomeration of these quintessences would produce the constituents of ordinary matter. The electron, for example, would be constituted from approximately 1.236×10^{20} quintessences.

The dimensions of the equation for the electron can be readily resolved by considering each of the three vector dimensions. The exact dimensions of the equation need to be considered in the light of the nature of space-time itself. These dimensional equations help explain the nature of matter. Indeed the equation for the electron may be necessary for the full understanding of gravity, this is also fully addressed (Appendix 1, Dimensional Equations)

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Complex Space and Electron Structure

The presence of complex space also now further explains the conformation of the the electron, and its formulation at the quantum level, and the presence of particles , anti-particles and their spin up and spin down characteristics.

Indeed the short form equation for the charge of the electron (-e) can now be rewritten as a metric tensor with three dimensions in real space and six in complex space.

Thus if three of the x, y and z vectors are in real space and six vectors in complex space, where c is the speed of light in the real space vector, jc is the speed of light in the complex vector and $\text{-}jc$ is the complex conjugate of jc, thus the electron can be mathematically represented by the equation:

$$-e = \varepsilon_{qe}/(4/3\pi)^{1/2} \begin{array}{ccc} (c_x)^{1/2}.(jc_y)^{1/2}.(-jc_z)^{1/2} \\ + \quad + \quad + \\ .(-jc_x)^{1/2}.(c_y)^{1/2}.(jc_z)^{1/2} \\ + \quad + \quad + \\ (jc_x)^{1/2}.(-jc_y)^{1/2}.(c_z)^{1/2} \end{array} \qquad (7)$$

Which now elegantly gives the real number solution

$$e = \varepsilon_{qe}/3(4/3\pi c^3)^{1/2}$$

Where ε_{qe} is given as the permittivity of free space for a single quasi electron (see appendix 1). Equation 4 represents a "complex" tensor

Whilst the two dimensional Argand diagram has four quadrants, the three dimensional Argand diagram has eight cubic sectors. Two of these cubic sectors are diametric opposites and can represent "real" particulate objects. These have the primary coordinates x, y, -z ; as in the electron described above, and the -x, -y, z, with the real vector x now having a minus sign. These two "real" cubic sectors, therefore, mathematically represent particles and their anti-particles.

The mathematical presence of the two primary diagonal mirror images (x, y, -z and -x, -y, z) now allow the introduction of the concept of antiparticles. This extension of the maths into a three dimensional Argand diagram thus results in the automatic formulation of the maths of antiparticles. Thus the charge of the positron (⁺e) is formulated by the shortened form equation, where the real vectors now each have the minus sign, and therefore exist in the -x, -y, z sector of the three dimensional

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Argand diagram.

$$^+e = \varepsilon_{qe}/(4/3\pi)^{1/2} \cdot \begin{vmatrix} -C_x^{1/2} \cdot -jC_y^{1/2} \cdot jC_z^{1/2} \\ jC_x^{1/2} \cdot -C_y^{1/2} \cdot -jC_z^{1/2} \\ -jC_x^{1/2} \cdot jC_y^{1/2} \cdot -C_z^{1/2} \end{vmatrix} \qquad (8)$$

The three dimensional Argand diagram also accounts for chirality and indeed the up and down spin of the electron. There are two other "real" primary coordinates in the Argand diagram, these are themselves the partial mirror images of the above coordinates (i.e. x, -y, z and -x, y, -z). In particular the y axis is of the opposite sign, thus in particles the y axis is in the downward direction, to form down spin particles and in anti-particles in the up direction, to form the antiparticle The up spin electron is given by eq. 8 and hence the down spin electron ($^-e \, |\downarrow\rangle$)is given by the equation

$$^-e \, |\downarrow\rangle = \varepsilon_{qe}/(4/3\pi)^{1/2} \cdot \begin{vmatrix} C_x^{1/2} \cdot -jC_y^{1/2} \cdot jC_z^{1/2} \\ jC_x^{1/2} \cdot C_y^{1/2} \cdot -jC_z^{1/2} \\ -jC_x^{1/2} \cdot jC_y^{1/2} \cdot C_z^{1/2} \end{vmatrix} \qquad (9)$$

Thus the three dimensioanl Argand diagram accounts directly for the presence of antiparticles and the spin up and spin down particles seen in nature. It also accounts for the necessity of the electron to form a square root spherical object, as complex space depends on $\sqrt{-1}$, otherwise known as j.

Electron Pairing and Superconductivity

As the quintessences making up the electron are in a square root conformation, each of these quasi electrons would have a tendancy to pair to form an entire sphere.

The square root sphere structure of electrons with up and down spins can now superimpose to produce a complete sphere of varying extents. This produces electron pairing as seen at the atomic and molecular levels. It also accounts for the Pauli exclusion principle. **This pairing thus accounts for the reactivity of the valence electrons and the electron** probability densities, which in turn accounts for the existence of chemistry. [ref 8]

Furthermore, it is possible to account directly for superconductivity from first principles. For if both the complex and real vectors of the electron combine completely, the product of an up and down spin electron form a perfect superimposed sphere with radius c, with a charge of 2.59×10^{-38} Coulombs, denoted

by the formula:

$$e^2 = \frac{\varepsilon_0}{3\,(4/3\pi c^3)} = 2.59 \times 10^{-38}\,C \qquad (6b)$$

As with standard superconducting theory, superconductivity can be explained by the formation of "Cooper" electron pairs, where the electrons are forced to pair by the presence of positve crystal charge in particular formation, at supercooled temperatures. In addition the electron pair now forms a stable entity whose angular momentum cancels.[ref 8]

It additionally becomes clear that the charge of two seperate electrons (2e) is $3.2 \times 10^{-19}\,C$, but the charge of the combined electrons (e^2) is $2.59 \times 10^{-38}\,C$. This electron pair thus appears to have 19 orders of magnitude less charge than the electron and in turn 19 orders of magnitude less resistance. It is this effective reduction in charge and in turn resistance which may account for superconductivity. When observed directly any electrical interaction with the Cooper electron pair will, however, result in the release of the full charge of both electrons, so that the full electrical charge put in will be equal to that coming out of the apparatus.

The Fine Structure Constant

Intruiginly from our knowledge of the electron we can further define the term α, the fine structure constant; from the structure of the electron. Thus as the standard term $\alpha = e^2/hc.4\pi\varepsilon_0$; substituting the term $e^2 = \varepsilon_0/\,3(4/3\pi c^3)$ (eq.6) and $h = m_q c^2$ (eq.1) we find:

$$2\pi/\alpha = m_q[3(4/3\pi c^3)]^2$$

*or

$$2\pi/\alpha = m_q e^4/\varepsilon_0{}^2$$

For brevity we may represent the quasi electron stucture as $(4/3\pi c^3) = \Theta$; to signify its threefold symmetry, thus

$$2\pi/\alpha = m_q[3\Theta]^2 \qquad (10)$$

Indicating that the fine structure constant of the electron (α) is indeed related to its dimensional structure. Again taking into account the effects of gravity the fine structure constant can be derived from first principles to nine decimal places (see Gravity and the Charge of the Electron).

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Fundamental Forc s and Particl Structure

In order to understand the fundamental forces and the nature of fundamental particles, an overview is required. Thus, there are three major forces; strong, electro-weak and gravity, each mediated by three force particles the gluon, photon and graviton respectively. These in turn, influence three types of particle, the quark, lepton, and by general relativity space-time itself. Each of these are composed of particles with multiples of charge of 1/3, which are themselves in three generations, and are present in three dimensions of real space. It is important that a comprehensive view of nature explains this threefold symmetry.

Using the Standard Model of particles, it is well accepted there exist quark particle charges of -1/3, -2/3 and +1/3 and +2/3 in quarks and anti-quarks. Given that each particle is made up of three quarks the presence of these fractional charges support the association of the fractional charges in this way to form three dimensional charged particles. In stable particles each of the three quarks would have a vector in one dimension, giving the three quarks together an existence in three dimensional visible space time. The particles that bind the quarks (gluons) are themselves required, in stable particles, to have three different colour charges, one colour in each dimension, for the particle to exist in three dimensional space-time. Furthermore, there are three generations of quarks (and indeed leptons).

The Standard Model (or a modification of this) and in particular the observation of quarks and indeed quasi electrons with fractional charge of 1/3 and 2/3 in both cases, indicates that particles are constituted from the equivalent of three of these quasi particles to form an electron and quarks to form baryons. In the normal three dimensions the energy would be carried by the particle, However, because each particle is constituted of three quasi particles and in each quasi particle or quark one visible dimension would be the direction vector, in the other two hidden dimensions of each vector the waves would carry energy. Thus each particle would be associated with vibration, which would account for wave particle duality and Heisenberg's uncertainty principle in three dimensional visible space-time.

These observations lead us directly to the previous postulate that the structure of the electron is composed of none other than three (root) spheres, and that this equation for the electron allows the determination of the charge of the electron from first principles, thus:

$$e = \frac{\varepsilon_0}{[\,3\,(\,4/3\pi c^3\,)\,]}^{1/2} \qquad (6)$$

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In addition the mass of the proton (m_p) can be directly calculated from the ratio of the mass (m_e) of the electron, given by the equation:

$$m_e/m_p = 5.45 \times 10^{-4} = 3(\pi/c^{1/2}) \qquad (11)$$

Strictly we should write, $m_e/(m_{p+}m_e) = 3\pi/c^{1/2}$; which is much more elegant.

Which now gives
$$m_e/m_p = 1/(c^{1/2}/3\pi -1) = 5.4462 \times 10^{-3}$$

This is in very close agreement with the experimentally derived ratio of the proton to electron masses which is also; 5.4462×10^{-3}

Thus the correlation factor between theory and experiment has a maximum error <0.00001 [ref 17]

If we combine equation 3: $e = [\varepsilon_0/ 3(4/3\pi c^3)]^{1/2}$ and equation 13: $m_e/m_p = 3(\pi/c^{1/2})$ the positive charge of the proton (e_p) is given by:

$$e_p = [\varepsilon_0/3(4/3\pi c^3)]^{1/2} \times m_e.3(\pi/c^{1/2})/m_p = e \qquad (12)$$

The stable nuclear proton conformation can thus be represented by the short form equation :
$$p = 3^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \qquad (13)$$

This forms a stable 3 x 3 conformation as with the stable electron structure.

Importantly the term $(\pi/c^{1/2})$ is the 90° solution to the Shrödinger wave equation for an electron confined in a space with radius c! [ref 8]

Thus the standard equation for an electron confined in a one dimensional box is given by:
$$E\psi(x) = - \frac{h^2}{2m}\frac{d^2\psi(x)}{dx^2}$$

If the one dimensional box has a length 2L the quantum amplitude (A) can only be non zero between $x = 0$ and $X = 2L$ and the standard solution for the amplitude is none other than:
$$A = (1/L^{1/2})$$

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Thus in one dimension the standard solution to the Shrödinger wave equation is:

$$\psi(x) = (\pi/L^{/12}) \sin x/L$$

Thus not only is the electron charge derived from the equation for three spheres each with a radius of c (eq. 3) ; but the proton mass and charge can also be derived from the standard solution to the Shrödinger wave equation for a an electron confined in a space of radius c! [ref 8]

The term $(\pi/c^{1/2})$ itself would thus most logically represent the gluon which is present in the proton. These gluons would bind the quasi electrons together to form the fundamental particles

The masses of all the known particles, including the up and down quarks, the W boson, the muon, charm, strange, the tauon, truth and beauty can thus also be derived from first principles in this fashion, and have the quasi electron as their basic constituent particle (see Appendix 1).

Thus the structure of the muon (μ) can also be derived from the ratio of the mass of the electron (m_e) and the mass of the muon (m_μ):

$$m_e/m_\mu = 4.7 \times 10^{-3} = \pi/c^{1/3}$$

Thus
$$\mu = \varepsilon_0^{1/2}.m_e/ m_\mu. \; 3^{\cdot}(4/3\pi c^3)^{1/2}.(\pi/c^{1/3})$$

Where the charge of the muon is in this equation equivalent to that of the electron e. In this case $(\pi/c^{1/3})$ can be considered to represent a specific high energy photon. Thus the structure of the muon, written in short form is:

$$\mu = 3^{\cdot}(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}) \tag{14}$$

Moreover the structure of the tauon can be calculated from the ratio of the mass of the electron and that of the Tauon (1.79 Mev);

Thus
$$0.511 \; Mev/1.79 \; Gev = 2.85 \times 10^{-4}$$

$$m_e/m_\tau = (\pi/c)^{1/3}.(\pi/c)^{1/9} = 2.85 \times 10^{-4}$$

As the charge of the tauon is equivalent to the charge of the electron, hence the

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structure of the Tauon is given by the above equation

$$e_\tau = \varepsilon_{qe}.m_e/\ m_\tau.3^-(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} = e$$

This equation accurately predicts the charge -1; and mass of the Tauon (~1.78 Gev) [ref 1]. Thus the structure of the Tauon can in short form be given by the equation

$$\tau = ^-3(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (15)$$

Furthermore a more exact value for the mass of the muon and tauon can be deduced by taking into account the gravitational field of the Earth (see Gravity and the Charge of the Electron pg. 17) in a similar way to identifying the exact charge of the electron. In addition it may be necessary to take into account a possible mass value of the neutrino to arrive at a precisely accurate mass value of the muon and tauon. Nevertheless, the mathematical proof of these short form equations lies in the fact that they can very closely identify the charge and the masses of these particles, from first principles, as in equations (6, 13-27, see Appendix 1).

Overall the mathematical geometrical structure of all the particles can be derived from the quasi electron, which is in turn derived from quintessence. Thus, the short form particle structures can now be derived from first principles. This includes the quasi electron (qe) and electron (e), from which the quarks (u,d) and in turn the stable proton (p) and stable neutron (n) and alpha particle (α) respectively are derived. The general structure of the force carrying bosons the photon (g) and the gluon (γ) and the intermediate vector boson (W) can be given. It will also intriguingly be possible to derive, according to their generation, the structure of the strange (s) charm (c), beauty (b, or bottom) and truth (t or top) quarks directly from the structure of the muon (μ) and Tauon (τ) respectively.

Using the term $\Theta = (4/3\pi c^3)$, where, -/+ represents the charge of the quasi electron, we find:

1st Generation:

$$q_e = ^-\Theta^{1/2} \qquad (6c)$$

$$e = 3^-\Theta^{1/2} \qquad (6)$$

$$d = ^-\Theta^{1/2}.3(\pi/c^{1/2}) \qquad (16)$$

$$u = 2^+\Theta^{1/2}.3(\pi/c^{1/2}) \qquad (17)$$

$$s = ^-\Theta^{1/2}.3(\pi/c)^{1/2} \qquad (18)$$

2nd Generation

$$\mu = 3^-\Theta^{1/2}.(\pi/c^{1/3}) \tag{14}$$

$$c = 2^+\Theta^{1/2}.(\pi/c^{1/3}).(\pi/c^{1/4}) \tag{19}$$

$$b = {}^-\Theta^{1/2}.(\pi/c^{1/9}).(\pi/c)^{1/4} \tag{20}$$

3rd Generation

$$\tau = 3^-\Theta^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \tag{15}$$

$$t = 2^+\Theta^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4} \tag{21}$$

Particle Gluons (g):

$$g_1 = (\pi/c^{1/2}) \tag{22}$$

$$g_2 = (\pi/c)^{1/2} \tag{22a}$$

$$g_3 = (\pi/c^{1/4}) \tag{22b}$$

$$g_4 = (\pi/c)^{1/4} \tag{22c}$$

Particle Photons (γ):

$$\gamma_1 = (\pi/c^{1/3}) \tag{23}$$

$$\gamma_2 = (\pi/c)^{1/3} \tag{23a}$$

$$\gamma_3 = (\pi/c^{1/9}) \tag{23b}$$

$$\gamma_4 = (\pi/c)^{1/9} \tag{23c}$$

Intermediate Vector Boson (W$^{+/-}$):

$$W^+ = 3^+\Theta^{1/2}.2(\pi/c^{1/6})^6 \tag{24}$$

$$W^- = 3^-\Theta^{1/2}.2(\pi/c^{1/6})^6 \tag{25}$$

Stable* Proton:

$$p = 3^+\Theta^{1/2}.3(\pi/c^{1/2}) \tag{13}$$

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Stable* Neutron:

$$n = \begin{array}{l} {}^{+}\Theta\!\downarrow^{1/2}.2(3\pi/c^{1/2}).\,{}^{-}\Theta\!\uparrow^{1/2} \\ {}^{+}\Theta\!\downarrow^{1/2}.2(3\pi/c^{1/2}).\,{}^{-}\Theta\!\uparrow^{1/2} \\ {}^{+}\Theta\!\downarrow^{1/2}.2(3\pi/c^{1/2}).\Theta^{-}\!\uparrow^{1/2} \end{array} \qquad (26)$$

Alpha particle (α):

$$\alpha = \begin{array}{l} [3^{+}\Theta]\!\downarrow^{1/2}.2(3\pi/c^{1/2}).\ [3^{-}\Theta]\!\uparrow^{1/2} \\ {} [3^{+}\Theta]\!\uparrow^{1/2}.2(3\pi/c^{1/2}).\ [3^{+}\Theta]\!\downarrow^{1/2} \\ {} [3^{-}\Theta]\!\downarrow^{1/2}.2(3\pi/c^{1/2}).\ [3^{+}\Theta]\!\uparrow^{1/2} \end{array} \qquad (27)$$

The mathematical proof for these structures and their decay mechanisms is lengthy and is thus fully contained in Appendix 1. All the particle structures are accurately mathematically defined by the masses of these particles. [ref 17]

The structure of these particles all contain the quasi electron and thus the metric tensor structure necessary in the formulation of the gravitational equations is sustained. The respective forces created by the gluon and the photon are important as they tell us the behaviour of matter and also lead to the likely structure of the graviton

*Stable nucleonic neutron and proton conformations differ slightly from the Standard Model , this is due to the sharing of quasi electron and quasi positron particles within the nucleus, which allows stabalisation of these particles by the formation of stable 3x3 structures. The Standard conformations which describe non-nucleonic neutrons and protons are additionally given in Appendix 1.

Particle Spin and Size

The significance of the electron, composed of three spheres each with a radius of $1/c$, is not immediately clear, but can be understood if the frequency of rotation of the electron is also taken into account. Knowing the structure of the electron has led us to deduce its charge and thus may lead us estimate its size and spin. Thus these observations might be used to calculate the radius and rate of rotation of the electron.

Let us suppose, that nature is truly beautiful, and that the radius of the fundamental quasi electron is indeed 1/c, and in turn the radius was balanced by the velocity of rotation $2\pi/c$. This can be directly confirmed mathematically by taking into account the known spin of the electron, $h/4\pi$. Thus the actual spin of the electron may be calculated form the known energy of the spin.

The radius of the electron is not up till now known, but the radius of a quark has been estimated, and this is the radius derived from deep inelastic collisions of the proton. These estimates reveal a radius of approx. $r_p = 1.18 \times 10^{-15}$ m.[ref 13] This value may be used to assist in confirming the spin of the proton in revolutions per sec. (revs) and in turn the spin and size of the electron. Firstly we may proceed to estimate the spin of the proton. Thus as $h = E.t$ (Joules x sec) and $E.t = F.d.t$ (Joules x sec), then the spin;

$$h/4\pi = F.d.t \qquad (28)$$

As $F = ma$, where $a = (\text{revs. } 2\pi)^2 r_{qu}$ and m = the mass of the proton, then

$$h/4\pi = m(\text{revs.}2\pi)^2 r_p.d.t$$

The actual distance (d) travelled in a circle of half integer spin in 1 second is: revs.πr_p, thus:

$$h/4\pi = m(\text{revs.}2\pi)^3 r_p^2/2$$

Hence:

$$\text{revs} = \sqrt[3]{[h/m(2\pi)^4 r_p^2]}$$

Taking the effective mass the proton as 1.6726×10^{-27} kg, then the rate of spin of the proton in revolutions/sec is:

$$\text{revs} = 5.65 \times 10^6 \text{ cycles/sec}$$

From the frequency of the specific rotation of the proton, given the half integer spin associated with the proton, we can thus mathematically confirm the relationship between the radius of a particle and its spin:

$$r_p \text{ x revs}/2 = 1/c \qquad (29)$$

Furthermore, the fundamental radius of 1/c seen in geometric structure the quasi electron, is also reflected in the rotation rate and radius for the proton, thus as above $1/c \div 1/2\text{revs} = 1.18 \times 10^{-15}$ m. Moreover, this means the actual half integer velocity of rotation is none other than $2\pi/c$ in metres/sec. So that the particle is in harmonic balance.

Using the fundamental formula $h/4\pi = F.d.t$, it is possible to obtain accurate estimates of the radius and spin rates of the electron, or indeed any particle, using

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the same principle of harmonic balance. Using the formula:

$$revs = \sqrt[3]{[h/m(2\pi)^4 r_e^2]}$$

It appears there are two unknowns, the radius if the electron and its revolution rate, however, in accordance with the equation, $r_p = 2/c.revs$, which gives the revolution rate of the proton, the same principle may also be used for the electron, by substituting $r_e = 2/c.revs$, such that:

$$revs = hc^2/4m_e(2\pi)^4 \qquad (30)$$

Taking the mass of the electron 9.109382×10^{-31} kg, the rate of revolution of the electron is:

$$revs = 1.048 \times 10^{10} \text{ cycles/sec}$$

Which gives a predicted radius of the electron as

$$r_e = 6.366 \times 10^{-19} \text{ m.}$$

So the half integer rotation velocity (revs.πr) is $2\pi/c$!, for the electron in keeping with the harmonic balance of the electron.

The same principle may be used to obtain an accurate estimate of the spin and radius of the muon, or any other particle. Using the above formula

$$revs = hc^2/4m_e(2\pi)^4 \qquad (31)$$

Then as the mass of the muon is 1.8823×10^{-28} kg then the revs of the muon $f_\mu = 5.070 \times 10^7$ cycles/ sec and the radius (r_μ) is thus 1.316×10^{-16} m.
It is now possible to begin to explain how the muon and the other subatomic particles are formed. If a quasi electron is complexed with another structure the total geometric structure needs to maintain harmonic balance. So the frequency of rotation would need to match geometric sructure with which the quasi electron was complexed

Intriguingly we find asymptotic convergeance for the formulas for frequency and mass occurs, when the geometric structure complexed with the quasi electron has the structure represented by $(\pi/c^{1/3})$ [giving the frequency divided by two, because the single integer spin of the force carrying particles compares to a half integer spin for the muon] . So that

$$(f_\gamma 3\pi/2)^{1/3} = f_\mu$$

When the ratio of the masses of the electron (m_e) and muon (m_μ) are related, such

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that:

$$m_e \, (3\pi/c^{1/3}) = m_\mu$$

Indeed we find that (allowing for the neutrino) this ratio is very close to the actual ratio of the mass of the electron to the mass of the muon, determined experimentally.

Furthermore, we have seen that these geometric structures, representing harmonics of the speed of light, which either match the frequency or the amplitude of vibration of the quasi electron, mathematically define the masses of the particles and the fundamental forces of Nature.

PART III
QUANTUM GRAVITY

Quantum G neral Relativity

Given the overall energy "complex" energy tensor structure of the electron and the metric tensor, assumed in general relativity, the quantum nature of gravity itself can now be explored. The spherical complex tensor for the electron and the positron (eq. 4,5,6) give the mathematical quantum structure and energy tensor for all the other particles (see appendix 2). Together with the time dimension these nine space dimensions account for the 10 parameters present in the metric tensor necessary to formulate the equations for gravity using Riemann geometry and thus forms the basis of quantum gravity. Intriguingly the metric tensor at each point in space time is required to consist of a collection of ten numbers, Consequently, ten dimensional space-time hypotheses, such as this or superstring theory, do automatically yield general relativity. [ref 3]

Furthermore, the mathematical representation of the graviton and the gravitational constant may be directly estimated from the knowledge of the mass and radius of quintessence. Thence, the force of the vibrations of quintessence lead directly to quantum gravity.

The radius of quintessence should be approximately in keeping with the Planck length estimate (r), which is conventionally derived from the standard dimensional equation:

$$r_q^2 \approx Gh/c^3 \qquad (32)$$

Given the nine spacial parameters present in the metric tensor, used in general relativity we find that the actual formula for r_q^2 is mathematically in agreement with theory when:

$$9r_q^2 = Gh/c^3 \qquad (33)$$

This again supports the 9 dimensional view of space and the size of the vibrations of quintessence can thus be estimated.

$$r_q = 1.35 \times 10^{-35} \, m \qquad (33a)$$

This value is in agreement with the Planck length. Indeed if the above equation is correct then we find that we can derive the standard equation for the general relativistic increase in radius, r', (eq. 34) directly from first principles and arrive at a more fundamental equation for quantum gravity. As

$$r' = G.M/3c^2 \qquad (34)$$

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By substituting eq 33) into equation 34, a fundamental relationship between r' and M is obtained.

$$r'/3r_q^2 = GMc^3/Ghc^2 = Mc/h$$

And substituting the quintessential equation, $h = m_q c^2$ (eq. 1) then:

$$r'/3r_q^2 = M/m_qc = n_q/c \qquad (35)$$

Hence the ratio of the change in radius to that of the radius of quintessence squared, is proportional, by a factor of c, to the ratio of the mass M of an object to that of the mass of quintessence, effectively the number of quintessences. Thus the change in radius, r' due to gravitation, is related to none other than the ratio of the mass and radius of an object to the mass and the square of the radius of quintessence. Thus again the gravitational change in radius is directly related to the number of quintessences.

Naturally, this would be exactly what would be logically expected if quintessence, like the equation for the charge of the electron (eq. 6) forms from a root sphere. Thus the change in spacial radius of a normal sphere is dependant on the square of the quintessential radius.

This increase in apparent radius represents none other than the (gravitational) binding energy for quintessence.

The meaning of the above dimensional equation (33) might itself be further understood by substituting the mass of quintessence (where $m_q = h/c^2$) into the equation. Thus in nine dimensions the gravitational constant (G) may be more logically given as,

$$9(\pi r_q^2 /m_q) = G\pi/c \qquad (36)$$

Where πr_q^2 is the cross sectional area of quintessence and m_q is the effective mass of quintessence, and thus $(\pi r_q^2/m_q)$ represents the effective mass per unit area which quintessence exerts. This equation reduces to:

$$9r_q^2 /m_q = G/c \qquad (37)$$

From this we may derive the standard general relativistic relationship for the apparent change in radius (r') around a mass (M), from an understanding of the mass (m_q) and number (n_q) of qiuntessences. As $m_q = M/n_q$, then:

$$3r_q^2 = G.M/3c.n_q \qquad (38)$$

Then if
$$n_q = r'c/3r_q^2 \qquad (39)$$

thus directly substituting for n_q in eq 38:

$$r^{\cdot} = G.M/3c^2 \qquad (34)$$

The importance of this is that the gravitational change in radius now logically derives from equation 36, which describes the gravitational force as resulting directly from the mass of quintessence exerted/per unit area of quintessence.

$$9(\pi r_q^2 /m_q) = G\pi/c \qquad (36)$$

Thus equation 34 is the conventional equation for the general relativistic increase in radius ($r^{\cdot}$) in a gravitational field, which is here derived from the underlying nature of quintessence. Thus the gravitational constant is derived from the mass and radius of vibration squared of quintessence from first principles.

Indeed it is apparent that a more fundamental equation for gravitation now exists, for equation (39) is mathematically accurate and numerically agrees with eq. 34:

$$r^{\cdot}/3r_q^2 = n_q/c \qquad (39)$$

These equations may be readily mathematically verified. If in accordance with standard general relativity, the apparent increase in radius $r^{\cdot}$ is:

$$r^{\cdot} = GM/3c^2 \qquad (34)$$

Then given that the mass of the Earth is 5.974×10^{24} kg;

$$r^{\cdot} = 1.478 \times 10^{-3} \text{ m}$$

Accordingly if $r^{\cdot} = 3r_q^2 n_q/c$; (eq.39). Given the number of quintessences (n_q) constituting the Earth is M_E/m_q, then

$$n_q = 5.9745 \times 10^{24} /7.3725 \times 10^{-51} = 8.104 \times 10^{74}$$

As $r_q^2 = 1.823 \times 10^{-70}$ (eq. 33a) then:

$$r^{\cdot} = 1.478 \times 10^{-3} \text{ m}$$

Thus equation 39 gives the same answer as the standard equation and may be understood on a logical basis. Indeed the meaning of c in the equation may be understood as it has been previously shown as being the basis for the radius of matter (eq. 6). Hence the general relativistic change in radius, $r^{\cdot}$, is none other than the effective binding energy for quintessence.

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Quantum Gravity and Wave Particle Duality

Quantum gravity can now be readily linked with quantum mechanics, indeed any observations which are self consistent must be able to do so easily.

The frequency of light has been previously derived

$$f = E/h = n_q$$

Thus the formula for the frequency of light ($E = hf$) has previously been explained theoretically by the simple observation that the frequency is determined quite directly from the number of quintessences (n_q) within the photon. The same principle has also been shown to apply to matter.

Let us now follow these equations for matter by calculating the wavelength of a photon from the Gravitational constant as an example; and also as a test of these observations and to demonstrate that the gravitational equations can also apply to the quantum world.

$$n_q = r'c/3r_q^2 \qquad (39a)$$

If

where r' is the is the general relativistic increase in radius, and r_q is the radius of quintessence (eq. 33). Where $f = n_q$, substituting for n_q, then the frequency of the photon f_γ (where $\beta = 1$) is given by:

$$f_\gamma = r'c/3r_q^2$$

Uing the standard equation, $r' = GM/3c^2$ (eq. 34); we may substitute for r', thus we have:

$$f_\gamma = GM/9r_q^2c$$

Thus

$$f_\gamma = \frac{G}{9r_q^2c^3} \cdot m_\gamma c^2$$

and as $E = m_\gamma c^2$;

$$f_\gamma = \frac{GE}{9r_q^2c^3} \qquad (40)$$

Indeed as $9r_q^2 = Gh/c^3$, then

$$f_\gamma = E/h = n_q$$

It is possible to also demonstrate that the same relationship holds for the wave equation for matter. If we take the relativistic wave energy of matter, which has been previously derived,

$$f = \beta^2 n_q$$

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This includes the term for the number of quintessences flowing through the electron, in the complex vectors of space-time, to give the relativistic electron momentum (p) and a term for the rest mass, thus substituting into (40)

$$f_\gamma = \frac{GE}{9r_q^2c^3} \qquad (40)$$

As $f=\beta^2 n_q$ <u>for matter</u> then the equation expands to:

$$f_m = \frac{G}{9r_q^2c^3}\cdot\beta^2E$$

As $\lambda = v/f$, then

$$\lambda = \frac{9r_q^2c^3v}{G\,\beta^2E} \qquad (41)$$

Then the equation again reduces to:

$$G = \frac{9r_q^2c^4}{\lambda\beta E} \qquad (3)$$

Equations 3, 40 and 41 are important as they show that the quantum wavelength of any particle of rest mass m can be derived from the gravitational constant G. Thus linking quantum mechanics to quantum gravity.

It is therefore important to confirm the numerical accuracy of the above equation (40). We can do this by comparing the result to the standard computation of the de Broglie equation, in a range where de Broglie itself is likely to be most accurate; which according to these observations is in the low energy range (see section on Wave Particle Duality).

If we take an electron with an energy of 0.1 KeV the wavelength is conventionally given (where the kinetic energy of the electron E_K is given by the product of the charge of the electron (C) and the potential applied eV = 0.1 Kev), by the standard equation:

$$\lambda = h/p = h/(E_k.2m_0)^{1/2}$$

thus

$$\lambda = 6.63 \times 10^{-34}/\,[1.602 \times 10^{-19} \times 1 \times 10^2 \times 18.22 \times 10^{-31}]^{1/2}$$

hence

$$\lambda \cong 1.23 \times 10^{-10}\ m$$

Using

$$\lambda = \frac{9r_q^2c^4}{G\,\beta\,E} \qquad (3a)$$

Where $E = \gamma m_0 c^2$

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At 0.1 Kev, electron velocity is 6×10^6 m/sec, thus $\beta = 2 \times 10^{-2}$ and $\gamma = 1/(1 - v^2/c^2)^{1/2} = 1.0002$ Thus:

$$\lambda = \frac{9 \times 1.82 \times 10^{-70} \times 80.78 \times 10^{32}}{6.67 \times 10^{-11} \times \beta \times 1.0002 \times 9.11 \times 10^{-31} \times 8.998 \times 10^{16}}$$

$$\lambda = \underline{1.21 \times 10^{-10} \text{ m}}$$

Divergence between the de Broglie equation and the above equation (2) occurs at intermediate and high energies where it is generally accepted that the standard de Broglie equation may be less accurate [ref 18]. The values for eq. 2 and de Broglie are compared to recent experiments, which demonstrate a relativistic curvilinear plot for wavelengths of matter in keeping with eq. 40.[ref1]

The de Broglie equation in the non-relativistic format yields a simple log/linear scale, which is not in keeping with relativity; whereas eq. 3 is dependant on relativity and mathematically accounts for both relativity in calculating the wavelength. Indeed recent experiment on quantum tunnelling through a wire mesh strongly suggests that the relationship between energy and wavelength is relativistically curvilinear.[ref 1]

Furthermore equation 3a suggests a fundamental relationship between energy (E), relative velocity ($v/c = \beta$), gravity (G) and the quantum wavelength (λ)

$$\lambda = \frac{9r_q^2 c^4}{G\beta E} \tag{3a}$$

Indeed as $9r_q^2 = Gh/c^3$, then

$$\lambda = hc/\beta E \tag{2}$$

Equation 2 is the very same as the Universal wave equation derived form first principles for the wavelength of light and matter, which allowed a relativistic solution to the equations for wave particle duality (see Wave Particle Duality). This now indicates that these quintessential equations are compatible with relativity, quantum mechanics and quantum gravity.

Graviton Structure

From these observations, if the value for the gravitational constant is substituted into the equation (35) we may now estimate the probable geomteric structure of the gravtion, which is the force particle mediating gravity by acting on quintessence. Thus the Gravitational constant has been previously derived from the vibration of quintessence by the equation:

$$G.(\pi/c) = 9(\pi r_q^2/m_q) \qquad (36)$$

This is in accurate agreement with the value for G (6.67×10^{-11} N m^2 kg^{-2}). This suggests that the most probable mathematical representation of the graviton (φ), the third force carrying particle is

$$\varphi = (\pi/c). \qquad (42)$$

Thus the gravitational constant (G) can be given by the mass and radius of quintessence and the structure of the graviton

$$G = 9\pi r_q^2/\varphi.m_q \qquad (43)$$

This shows the gravitational force to be related to the fundamental radius of quintessence space time, and the graviton.

Quantised General Relativity

The classical general relativistic formula, as given by Einstein is:

$$R_{\mu v} - 1/2g_{\mu v}R = -\kappa T_{\mu v}$$

Where R is effectively the curvature of space-time, $R_{\mu v}$ denotes the contracted Riemann tensor of curvature and $T_{\mu v}$ is the "energy tensor" of matter.[ref 3]

If we substitute the energy tensor matrix of the electron (eq. 9) x time, for the energy tensor of matter $T_{\mu v}$; and the metric tensor of the space-time lattice x time for the contracted Riemann tensor we can arrive at the same solutions for general relativity.

Furthermore, in his published paper on General Relativity, Einstein [ref 3] defined the constant κ as:

$$\kappa = 8\pi G/c^2$$

Therefore Einstein's equation should be written as

$$R_{\mu\nu} - 1/2g_{\mu\nu}R = -\frac{8\pi G}{c^2}.T_{\mu\nu} \qquad (43)$$

Einstein himself was apparently not happy about the right hand component of the equation. However, we find that this part of the equation can now be explained and quantised by substituting the gravitational constant, $G = 9\pi r_q^2/\varphi.m_q$, (eq. 42a),

Giving:

$$R_{\mu\nu} - 1/2g_{\mu\nu}R = -\frac{8\pi^2.9r_q^2}{\varphi.m_q.c^2}.T_{\mu\nu} \qquad (44)$$

By substituting $m_q.c^2 = h$, and further substituting $\hbar = h/2\pi$, we arrive at a quantised solution to Einstein's equations. Where A_q is the surface area of quintessence $(A_q=4\pi r_q^2)$; φ is the graviton $[\varphi = (\pi/c)]$ and h is Planck's constant. thus:

$$R_{\mu\nu} - 1/2g_{\mu\nu}R = -\frac{9A_q}{\varphi.\hbar}.T_{\mu\nu} \qquad (45)$$

The gravitational equation can now be further understood on a logical basis. The term $A_q=(4\pi r_q^2)$, where $(4\pi r_q^2)$ represents standard term for the surface area of a sphere of quintessence for the 9 space dimensions of the space time lattice, h is the energy content of quintessence x time and φ is the graviton, thus the right hand term now represents a true " metric energy tensor" of matter.

This leads directly to the standard solution to the field equations, for the general relativistic increase in radius r' of an object, where A is the surface area of a sphere of a given mass M, such that

$$r' = \sqrt{(A/4\pi)} - r = GM/3c^2 \qquad (34)$$

Furthermore, although equation 45, gives the same solutions as Einstein's equation, which is essentially correct, the difference is that the equation is now dependant upon Planck's constant (h), and moreover the radius of quintessence, which now defines a quantised solution to the equations.

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Graviton Forc Characteristics

Similar to the photon, the previously derived equation (42) for the graviton [φ = (π/c)] appears to also mathematically represent a helical ringlet of quintessence, but with a spin of 2. For the photon, taking the direction of motion as the x vector and its axis of spin also as the x vector, would account for the electromagnetic force and its attraction and repulsion characteristics. In the case of the gluon component $(\pi/c^{1/2})$, if the direction vector is x, then the axis of spin would be in the y vector, the same as quasi electrons, accounting for the particle binding characteristics of the gluon force. (see; Gluon structure and force characteristics. Appendix 2). In the case of the graviton, if the direction of motion was in the x vector, the graviton spin axis would be in the z vector thus, as will be demonstrated, accounting for the gravitational force.

The spin axis of the graviton can also be derived using the known characteristics of the electron. If an electron is travelling in the x direction, then its spin axis is determined by the by the sign of the ₁y vector (up or down). This view is in agreement with conventional theory, which indicates that the electron spin is similar to a rotating planet orbiting the sun, (the electron even appears to have orbital precession). As the electron passes through the space-time lattice, this spin would generate the formation of gravitons. This would occur as a result of the ejection of the excess quintessence passing through the electron. As the electron spins, the ejection of these gravitons would occur at a tangent to the electron's direction of motion. The ejection of the gravitons would occur, similarly to the ejection of energy of a pulsar or quasar, through the equivalent of the north and south poles of the electron. Thus, propelling the graviton in the direction of the electrons y vector. The ejection of the graviton would re-orientate and impart a specific angular momentum to the gravitons which would thus end up spinning on its own z axis. If for instance the graviton is released from an up spin electron the graviton will be rotating clockwise and its leading edge will displace quintessence downwards. In turn this will provide an upwards force.

This picture accounts for Fleming's left hand rule, is logical and provides an explanation for the magnetic force around a wire. According, to the left hand rule if the direction of the current is in the x vector, the magnetic field is in the z vector, and the force is upwards, in the y vector, in accordance with the above model. Therefore, this particular spin axis and the structure of the graviton results in its force characteristics. As the graviton is very small compared to the electron and both have different rather rapid spin axis it is difficult for these to bind and interact. Nevertheless, because the graviton has a spin of 2, and as it spin axis is perpendicular to its direction of motion, in the z vector, it readily displaces space-time quintessence to produce gravity. Thus because the graviton is able to displace space-time, it is capable of escaping a black hole. How else could the effects of gravity be felt beyond a black hole?

Quantum Gravity and Electromagnetism

With the above electron model of graviton production (see pp. 32), the natur of magn tism can be und rstood from first principles, Furthermore, the presence of a space-time lattice links relativity, and the forces of gravity with the electromagnetic and other forces of Nature. Indeed, evidence for these links may first date back to the 1820's, when Andre Ampere first defined the Amp. The force of attraction between two parallel wires 1 metre apart each carrying 1 Amp in a vacuum was defined as none other than the permeability of free space (2×10^{-7} N per metre of conductor). Thus conventionally the magnetic field strength around a long straight wire is given as:

$$B = \mu_0 I / 2\pi r$$

Where I is the current and μ_0 is the permeability of free space ($4\pi \times 10^{-7}$ N A^{-2}).

The attraction between two wires both carrying negative charge is, however, counterintuitive as negative charges should repel. A conventional explanation overcomes this by invoking the presence of a magnetic field which is created by the current by the production of virtual photons. Thus we appear to have an explanation for the effects of magnetism which involves virtual photons, however, these photons are not observed. More accurately, according to conventional special relativity the magnetic field is none other than the electric field viewed relativistically [ref 19].

A more satisfactory explanation, therefore, lies in the interaction between the electrons and the space time lattice. The moving electrons in the two wires interact with the lattice to produce gravitons; which are in phase when both streams of electrons are travelling in the same direction. The gravitonic waves interact constructively to disperse the space time lattice between the wires and induce an attractive force between the two wires, which produces in effect the permeability of free space. Thus this force results from the vibration of quintessence itself.

Conversly in two wires with current going in opposite directions the graviton waves are in anti-phase and would interact destructively between the wires. The gravitonic waves travelling radially outward from the wires would, however, disperse the lattice outside the two wires and produce apparent repulsion between the wires, which is exactly what is observed. These effects of electricity suggest that gravitons act as waves and that phase is important.

This effect is also seen with the north and south poles of ferromagnets. Nevertheless, with matter other than iron, cobalt or nickel, the graviton emission cannot be phased as the atoms are unable to align and magnets do not appear to exist with other materials.

In ordinary magnetic system the release of gravitons from the north pole would be

exactly balanced by those released from the south pole of the magnet and hence there would be no nett force on the magnet until an external magnet or electrical current were applied.

Overall the magnitude of the forces in electrical systems where electrical conduction occurs are well defined by the permeability and permittivity of free space μ_0, and ϵ_0. Where v is the constant velocity of the charge and ϵ is the electric field produced by the charge.

$$B = [\mu_0.\epsilon_0]v.\epsilon$$

These observations suggest that **the forces of electricity which produce magnetism are indeed related to the permittivity and permeability of free space and that these quantities are exerted by an apparent vacuum. Thus the effects of magnetism could be explained by none other than the phased effects of gravitational waves on the space time lattice.**

Electromagnetism is of further interest to quantum gravity, particularly if we combine the standard equations, $B = \mu_0 I / 2\pi r$ and $B = [\mu_0.\epsilon_0]v.\epsilon$, substituting for B we have:

$$2\pi r = I / \epsilon_0.v.\epsilon \qquad\qquad (46)$$

Thus $2\pi r$ is proportional to the inverse of ϵ_0. Thus as space time is dispersed by gravitons the permittivity field will increase in the same way capacitance increases with separation of plates. Because of the inverse relationship between ϵ_0 and $2\pi r$, as ϵ_0 increases the circumference of a circle and the apparent ratio of π to r, will appear to diminish in accordance with general relativity. This not an actual diminution in the circumference of a circle but the effective reduction of the resistance to motion in a circular path in this field.

Incidentally, the above observations, also lead us directly to Shrödinger's formula for the average equilibrium distance (r) between an electron with charge (e) in orbit around a proton, which is conventionally given by:

$$r = n^2 4\pi\hbar^2\epsilon_0 / me^2$$

Where ϵ_0 is again the permittivity of free space, m is the mass of the electron and n is an orbital integer, h is Planck's constant and e is the charge of the electron. Furthermore if $e = [\epsilon_0/ 3(4/3\pi c^3)]^{1/2}$ (eq.3); then the equation at n= 1, for the electron orbital radius elegantly simplifies to:

$$r = 4h^2c^3/m$$

Hence the orbital radius of the electron is related to spin of the electron (h) and its mass (m).

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Quantum Gravity and the Charge of the Electron

The equation for the charge of the electron (eq. 1) contains the term ε_0 (permittivity of free space) which according to these observations should vary in a gravitational field.

$$e = \frac{\varepsilon_0}{[\,3\,(\,4/3\pi c^3)\,]}^{1/2} \qquad (3)$$

If we combine the standard equations, $B = \mu_0 I / 2\pi r$ and $B = [\mu_0.\varepsilon_0]v.\varepsilon$, substituting for B we have:

$$2\pi r = I/\varepsilon_0.v.\varepsilon \qquad (46)$$

Thus $2\pi r$ is proportional to the inverse of ε_0. Thus as space time is dispersed by gravitons the permittivity field will increase in the same way capacitance increases with separation of plates. Because of the inverse relationship between ε_0 and $2\pi r$, as ε_0 increases the circumferance of a circle and the apparent ratio of π to r, will appear to diminish in accordance with general relativity.

Thus ε_0 rises when space -time is dispersed by the gravitons that produce the gravitational field, This occurs in a similar way to the process by which capacitance increases with separation of plates in a capacitor.

Nevertheless, as c is a constant and as $c = [\mu_0 .\varepsilon_0]^{-1/2}$, then if ε_0 rises then μ_0 falls. This is entirely consistent as μ_0, which represents the force that quintessence exerts, would be reduced if the quintessence space time lattice is dispersed.

Furthermore, as $\mu_0 = 4\pi \times 10^{-7}$ N A^{-2} ; then as μ_0 falls, then the appareent ration π to r, also falls in a gravitational field. This is largely the same as stating, as does general relativity, that the apparent radius r, rises in a gravitational field. So this view is consistent with general relativity.

Nevertheless, to derive an exact value for the charge of the electron we must account for gravity in the above equation. We will take the specific example of the Earth's gravitational field in order to obtain the exact value for the electron. If in accordance with standard general relativity, the apparent increase in radius r' is:

$$r' = GM/3c^2 \qquad (34)$$

Then given that the mass of the Earth is 5.9745 x 10^{24} kg; then

$$r' = 1.47864 \times 10^{-3} \text{ m}$$

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thus
$$2\pi r' = 9.29057 \times 10^{-3}$$

Which is the incremental factor by which ε_0 must increase in Earth's gravitational field. So to correct ε_0 to account for gravity, ε_0 must be divided by the incremental factor, $2\pi r'$. Similarly as effectively π decreases in a gravitational field, to correct π to account for gravity it must be multiplied by this incrememtal factor. So the equation for an electron in a zero gravtational field is:

$$e = \frac{\varepsilon_0}{[3(4/3\pi c^3)]}^{1/2} \div (1 + 2\pi r') = 1.6022 \times 10^{-19} C \quad (3b)$$

This now gives the charge of the electron as measured in a zero gravitational field as 1.6022×10^{-19} C, which is the same as that measured on Earth. Notably these observations appear to suggest that the charge of the electron is the same irrespective of the gravitiational field.

Virtually unlimited degrees of accuracy for the charge of the electron and for the fine structure constant (α), may be achieved by taking into account 2nd and nth order gravitometric effects. Thus if we take into account the effect of gravity upon the radius of the Earth it is also important to take into account an effect a upon the instruments with which we measure quantities, this would be a second order gravitometric effect. Thus taking into account 2nd order effects (r"), we have a very small, but nevertheless relevant change, such that: $r" = r'(1+ 2r')$. Thus $2\pi r" = 9.3180486 \times 10^{-3}$, and thus:

$$e = \left\lceil \frac{\varepsilon_0}{3(4/3\pi c^3)} \right\rceil^{1/2} \div (1 + 2\pi r") = 1.6021765 \times 10^{-19} C \quad (3b)$$

This agrees exactly to the nearest 7 decimal places with the maximum accuracy of the experimental value for the charge of the electron.[ref 15] Furthermore by taking into account the nth order gravitometric effect, it is theoretically possible to predict accuracy for the charge of the electron to 3n decimal places. This mathematically accuracy confirms the structure of the electron from first principles and indeed the theoretical effects of gravity on the permittivity of free space (ε_0).

This returns us directly to the fine structure constant for the electron which is conventionally given by: $\alpha = e^2/\hbar c.4\pi\varepsilon_0$. If $e^2 = \varepsilon_0/3(4/3\pi c^3)$, accordingly the quintessential equation for α is structurally given by: $2\pi/\alpha = m_q[3\Theta]^2$ (where $\Theta = 4/3\pi c^3$; see The Structure of the Electron and Matter), we must now take into account the effects of gravity, as above, thus:

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$$\alpha = 2\pi/m_q[3\Theta]^2 \div (1 + 2\pi r'')^2 = 0.007297353$$

Where the gravitational term for the increase in radius r" allows the mathematical derivation of α, and the above equation is in agreement with the conventional experimental value for $\alpha = 0.007297353$ to the nearest 9 decimal places.[ref 15]

Hence the term $(1 + 2\pi r'')^2$ is in accordance with these observations for the effect of gravity on electromagnetic forces. To a maximum accuracy governed by current knowledge of the mass of the Earth and the Gravitational constant and thus the term for the gravitational increase in radius r'. These observations can also be used to accurately predict the magnetic moment of the electron (see Quantum Gravity and the Electron Magnetic Moment).

Thus the presence of the fine structure constant can now be further understood, by deriving the constant from first principles; specifically from the actual dimensional conformation for the charge of the electron: $e = [\epsilon_0/ 3(4/3\pi c^3)]^{1/2}$ (eq. 6).

Overall the fine structure constant α (allowing for the term r' which is the general relativistic increase in the radius of the Earth due to gravitation) is given by none other than the formula for the mass of quintessence and from the structure of the electron, which can now be derived from first principles to seven decimal places or more.

Quantum Gravity and the Electron Magnetic Moment

The theoretical origin and nature of magnetism remains obscure in current electromagnetic theory. An explanation suggests these magnetic effects are produced by photons, although no photons have ever been observed. To get round this difficulty it is postulated by physics that magnetism results from "virtual" photons. However, Maxwell's equation for electromagnetism states that the photon has no nett magnetic effect.

$$\delta B_x /\delta x + \delta B_y /\delta y + \delta B_z /\delta z = 0$$

Thus magnetism could not, by the above standard equation, be derived from a photon real or virtual.

In addition observational data suggests that black holes have powerful magnetic fields and as in theory photons are unable to escape from black holes (except for small quantites in the form of Hawking radiation), it would be difficult to explain these magnetic fields on the basis of photon emission.

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Einstein postulated that magnetism was merely due to special relativity [ref 17]. The postulate for the nature of magnetism in these current observations, states that the magnetic force results from relativity due to none other than the **phased** emission of gravitons (why postulate two invisible forces, magnetism and gravity, when one, the graviton, will do). This view as previously discussed (Quantum Gravity and Electromagnetism) is entirely compatible with standard relativity. [ref 19] Thus with the graviton origin of magnetism, the equation for the magnetic moment of the electron should have an expression in terms of quintessence and in turn the gravitational force and in particular the graviton.

The standard term for the magnetic moment of the Bohr Magneton (μB) is:

$$\mu B = eh/4\pi m_e$$

In standard quantum mechanics the Bohr Magneton, μB, however, needs to be corrected to agree with experiment. The "correction factor" is termed "ε"; where $\varepsilon = (\alpha/2\pi) - 0.328\alpha^2/\pi^2) = 0.001159641$. Thus theory reveals μ_e, the magnetic moment of the electron where:

$$\mu_e = (eh/4\pi m_e)[1 + (\alpha/2\pi) - 0.328\ \alpha^2/\pi^2)]$$

The conventional derivation of the term ε above, is given from the fine structure constant, $(\alpha/2\pi)$ which is theoretically consistent. However, a rather arbitary mathematical correction term; $0.328\ \alpha^2/\pi^2$ needs to be used in this standard equation. This appears ad hoc and needless to say, more accurate measurements show , the electron magnetic moment to the Bohr magneton ratio, $1+ \varepsilon = 1.001159652$, which suggests the correction factor is indeed incorrect. Nevertheless, this correction factor is essential for "renormalisation" and thus for quantum mechanics to work.

Quantum gravity readily explains the discrepancy between the theoretical Bohr Magneton (μB) and the actual measured magnetic moment of the electron (μ_e). In accordance with the above chapter (Quantum Gravity and the Charge of the Electron)

Thus the significant mathematical discrepancies can be removed by accounting for the effects of quantum gravity.

Thus taking the charge of the electron (e), using the equation for the Bohr magneton and the effects of quantum gravity such that gravitational change in radius is r". The magnetic moment of the electron is given by:

$$\mu_e = (eh/4\pi m_e)(1+ [\alpha/2\pi \div(1+ r")])$$

This gives an electron magnetic moment to Bohr magneton ratio of 1.00115968. Thus the mathematical term for the magnetic moment of the electron is given, avoiding the arbitary and dubious term $0.328 \, \alpha^2/\pi^2$ used in the standard equation, simply by accounting for quantum gravity.

It is now possible to unite the equations for gravity and magnetism by substituting the fundamental key equations of quantum gravity. Thus if: $h = 3m_q c^2$ (eq 1b) and $m_e = m_q.n_q$ (eq. 2). Then we can express the magnetic moment of any particle with the charge of the electron, including the proton, in terms of the number of quintessences (n_q) in that particle.

$$\mu B = ec^2/4/3\pi n_q \qquad (47)$$

Given that the postulated structure of the graviton is: $\varphi = \pi/c$ (eq. 42), then substituting we have

$$\mu B = 3ec/4\varphi n_q \qquad (48)$$

Showing that the equations for the magnetic moment are compatible with the gravitational equations given earlier. Principally, the quintessential equations now allow the determination of the magnetic moment of any charged object from the equation for the graviton and directly from the number of quintessences it contains. In conventional physics the magnetic moment of the electron requires a correction factor, $(1 + (\alpha/2\pi) - 0.328 \, \alpha^2/\pi^2))$, to derive the correct experimental value. These observations herein, indicate that the correction factor is more logically $(1 + r'')$, where r'' is the general relativistic increase in radius around a gravitational body. This suggests that magnetism is not only affected by gravity, but can, as shown as above, be derived using the quantum gravitational equations.

Quantum Gravity and Special Relativity

Ordinary matter passing through the lattice would produce gravitons which would interact with space-time as described by general relativity. The quantity of gravitons would be determined by the apparent mass and in turn these would apparently curve space time. The geometry of this "curvature" is elegantly described by general relativity using Riemann geometry, specifically using metric tensors. Intriguingly the metric tensor is not a single number, but at each point in space time it is required to consist of a collection of ten numbers, Consequently, ten dimensional space-time hypotheses, such as this or superstring theory, may automatically yield general relativity. (see quantum general relativity p.36)

General relativity is indeed very elegant, nevertheless there was a logical step yet to answer. That is, how do gravitons shape space time? This can now be readily answerd

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by considering the interaction of a three dimensional space time lattice with gravitons themselves to produce the effects of gravity. The effects of gravity are as such to compel a body in motion towards the gravitational object and to a much smaller extent visa versa. **This effect can only b produced if gravitons repel quintessence** (the constituents of the 3D lattice). Indeed, it has been stated that in order to explain cosmic inflation and the "flatness" of the Universe that quintessence must shun (or be shunned by) matter [ref 5,6,7].

In descriptive terms a body close to a large mass will have a tendency to move toward it because the three dimensional lattice would be less dense as it approached the surface of the large mass. Overall there would be less resistance to motion in the direction of the large mass, and the motion in this direction would be facilitated by the vibration of quintessence.

In general relativity the principle governing motion is **the geodesic of least distance, this can be re-expressed using similar equations using least action.** Furthermore, the concept of motion due to the vibrations of quintessence is more logically and experimentally compelling.

These observations can now be used to link general and special relativity. Thus as we approach the speed of light, the mass of an object travelling through the space-time lattice would approach infinity, directly because the number of quintessences paasing through a body would increase with increasing velocity, hence the equation:

$$m' = m_0 / (1 - v^2/c^2)^{1/2} \qquad\qquad (50)$$

or
$$m' = m_0 / (1 - v^2[\mu_0 . \varepsilon_0])^{1/2} \qquad\qquad (50a)$$

In turn this would generate increasing gravitons and accordingly this would explain the observed effects of special relativity. Time itself is due to passage through the space-time lattice, and where the space-time lattice is dispersed by gravitons, time and length are reduced with increasing velocity and hence increasing space-time lattice dispersion, similar to the way in which gravity alters space-time

As a result:
$$t' = t (1 - v^2/c^2)^{1/2}, \quad l' = l (1 - v^2/c^2)^{1/2}$$

Thus resulting in the effects of special relativity.

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Quintessence and Black Hol s

To address the relationship of the space-time lattice to gravity directly, it is important to discuss the concept of quintessence with regard to general relativitivistic equations. The standard general relativistic equation for the apparent increase in radius (r) due to the curvature of space time around a gravitational object, which has also been previously derived from first principles (eq. 36), is:

$$r' = G.M/3c^2 \qquad (34)$$

This can also thus be written as:

$$3r' = G.M[\mu_0 . \varepsilon_0] \qquad (51)$$

This standard equation, is in keeping with the above observations. Specifically, as the mass increases, ε_0 increases, in turn the radius will appear to increase (relative to π).

The above observations now allow us to examine the effects with regard to the interior of black holes themselves. The event horizon would represent a critical density for quintessence, in which light could not escape. The Schwarzschild radius would now be given by:

$$R_s = 2GM[\mu_0 . \varepsilon_0]$$

The event horizon will occur at the point at which there is less resistance to circular motion than motion in a straight or partially curved line. Given that π is proportional to $1/\varepsilon_0$. The event horizon should occur when the permittivity has increased by a factor of π.

Effectively because the permittivity of free space rises, π decreases. This is entirely in keeping with general relativity which predicts the effective change in the ratio of the radius to the circumference as given by the conventional equation, where r', is again the apparent change in radius.

$$r' = G.M/3c^2$$

Hence π will effectively decrease as we approach the event horizon of a black hole, When π decreases to 1, the circular circumference is equal to the diameter and moreover, inside this limit it is shorter for light to travel in a circle. Thus light cannot escape the event horizon.

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This can give us great insights into the workings of space-time, for flat Euclidean space the standard equation is:

$$e^{i\pi} = -1$$

In accordance with general relativity, the ratio of the radius to the circumference changes in a gravitational field, and effectively $\pi = 1$, at the event horizon, thus the boundary condition for the event horizon now has the direct equation:

$$e^i$$

Within a black hole as the permittivity of space increases by a factor of 2π an object within it will complete two rotations rather than travel in a straight line. In effect exceeding the speed of light by 2π. Hence, the condition for space-time is represented by the equation:

$$e^{i/2}$$

Thus an increase in the permittivity of free space by a minimum factor of π, to produce a black hole is estimated to result from an increase in mass by a factor of approx. 10^6 (the ratio of the mass of the earth and that of a putative black hole).

Continuing with the subject of a black hole, according to the model inside the black hole, the gravitons produced by the matter present would be in equilibrium with the density of the space-time lattice. Increasing the rate of rotation of the matter in the black hole for instance would thus increase the production of gravitons and its effective mass and increase the radius of the event horizon. A density gradient of the space-time lattice would continue to exist within the black hole. Progressively closer to the centre of a black hole matter itself would be increasingly compressed and the spherical structure of the quasi electron would be predicted to collapse. **This collapse would result in the formation of an exotic form of matter in the form of pure quintessence in a black hole.**

This pure quintessence would produce the singularity at the centre of the black hole, as all apparent space would be absent. The larger the black hole in terms of mass the more pure quintessence would exist at its core.

It is postulated that the big bang resulted from the explosion of such an immense black hole singularity, which was constituted from pure quintessence. Moreover, it is likely that in such a big bang some very small black holes might have prevailed and that these formed the seeds of the galaxies we see today.

In addition, Guth's inflation results directly from the observation that once electrons have formed from the primordial soup of quintessence, they emit gravitons which in turn repel space time, which would result in the cosmic inflationary cycle

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The formation of black holes, from quintessence, may represent a crucial step in understanding the mechanisms that underlay gravitational physics. Given the existence of black holes, with an event horizon, implies that the speed of light can effectively be exceeded by the warping of space-time. In this instance the space time lattice would be repelled by gravitons in such a way as to disperse space-time quintessence in a circular fashion. Similarly if we suppose that gravitons could be controlled and collimated in a single direction similar to a laser using photons, it would be possible to focus such a graviton beam ahead of an object. This in turn would dissipate the space-time lattice in front of that object, thereby allowing the theoretical potential for what is termed Warp drive.

Essentially, these are systems whose propulsion relies on warping space-time, as opposed to the ejection of material to provide thrust. This does not, of necessity, mean that superluminal velocities are produced, but that the drive is based on the warping of space-time in accordance with general relativity. However, it would in the future theoretically be possible for an object to achieve speeds greater than that of light, as superluminal velocities produced by the warping of space-time do not contravene special relativity.

After all, the observable Universe is estimated at more than 140 billion light years across, whilst its age is a mere 14 billion years old. Indeed according to the standard model, if the horizon distance is taken as the maximum distance which light could have travelled, then two points on opposite sides of the Universe are as far apart as ninety times the horizon distance, implying that space-time itself has far exceeded the speed of light.[20]

Overall, these observations explain the concept of mass the elementary particles and the forces of nature, including gravity, on a quantum basis. They can be used logically to explain the inner physics of a black hole, the missing mass in the Galaxy, the expansion of the Universe, the Big Bang and Guth's inflationary theory and equally quantum effects, from first principles. Foremostly, these observations allow a fundamental understanding of gravity, which in turn allows the technical construction of warp drive systems.

Antigravity Syst ms

Recent research at NASA indicates that an antigravity device may be feasible. This research, however, has been undertaken at NASA without fundamental knowledge of the theoretical basis of quantum gravity. In these experiments the use of radio frequency (RF) pulses, such as in Nuclear Magnetic resonance, on rotating superconducting discs has been attempted, to produce antigravity effects.[ref 21]

However, radio frequency pulses are a weak form of electromagnetic radiation and are therefore unlikely to provide sufficient energy to produce measurable antigravity effects.

The warp drive technology described in this application is entirely different to previous prior art. The most important difference relates to the nature of the invention. In this application specifications are given for a direct drive system, as opposed to a gravity shield device, which other inventions claim. There is of course a vast difference as a shield device, merely reduces the force of gravity, but does not directly produce drive.

The references specifically relating to the shield effect are:

SCHNURER:	WO 98/23976	14 Nov 1996
MODANESE + SCHNURER:	arXiv:gr-qc/9612022 v4,	19 Feb 1998
PODKLETNOV:	arXiv:cond-mat/9701174 v3,	16 Sep.1997
PODKLETNOV + NIEMINEN:	Physica C, Vol 203, 441-444,	9 Sep. 1992

Other devices produce an attractive effect, as in an electromagnet magnet, which is again entirely different to the direct production of drive.

HOOPER   US3610971   15 Apr 1969

In these and other antigravity devices the use of equal and opposite currents in a superconductor to produce anti-gravity effects are disclosed, as in:

BETTELS   DE19832001   16 Jul 1988

In this application for Warp Drive technology, there is a differential current applied. Thus the differential speed of the electrons will, in accordance with relativity, produce differential mass, which will in turn result in a differential graviton release. Thus this invention is very different to previous disclosed inventions, as it is the differential graviton release, which produces the effective warping of space-time, to produce a direct warp drive system, which operates by the warping of space-time.

SUMMARY OF THE INVENTION.

Principles of Further Antigravity Systems

The theoretical understanding of quantum gravity allows the design of further elementary warp drive systems from first principles. It is unlikely that gravitons can be controlled in a precise way using current technology. Nevertheless, an understanding of three dimensional space-time and matter, does allow the design of these warp drive systems. That is, systems whose propulsion rely on warping space-time as opposed to the ejection of material to provide thrust.

With current technology this could be achieved by rotating intermediate sized superconducting masses at ultracentrifugational velocities. The release of gravitons could be controlled by differentially governing the electron flow through these masses with the use of powerful electric currents. In turn the differential direction of flow of gravitons would determine the direction of motion through the space time lattice.

In order to design a mechanism for elementary warp drive we may utilise either a normal conductive material or preferably a superconducting material. It may be possible to use any shape, such as a disc, cylinder or preferably a sphere. Such a sphere is rotated along its horizontal axis in a clockwise fashion at ultracentrifugational speeds. A differential current is then applied from left to right in such a way as to pass through the entire sphere in this direction.

The electric charge in the upper half of the sphere would be maximised. The electrons will have a vector in the left to right direction as the sphere spins clockwise. If a maximised current is applied to the sphere in the same direction this will result in a increase in the velocity of the electrons relative to the centre of gravity of the rotating object, due to the flow of current. In turn, according to the space-time lattice model, this will result in a increase in the relativistic mass if the electrons and in turn by general relativity an increase in the release of gravitons.

Conversley in the lower half of the sphere the electrons will have a vector of motion in the right to left direction due to the spin of the sphere. This will be relativistically slowed by the differential current applied in the same direction as the current above, and hence in the opposite direction to the direction of rotation. The charge can be separately applied and adjusted to ensure that the electrons are relativistically stationary relative to the centre of gravity. In turn this will minimize the relativistic mass and result in a decrease in the release of gravitons for the lower half of the sphere.

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The overall result will be a greater release of gravitons in the upward direction and a lesser release of gravitons in the downward direction. The effect will be enhanced by the use of a multi-phasic current simultaneously applied. This will result in the release of multi-phasic gravitons which will disperse space time above the sphere with increase in density below the sphere which will effectively reverse the effects of Earths gravity. Importantly this effect can also be produced with the use radio frequency pulses. This obviates the need for commutator devices. Nevertheless, the radio frequency pulses must be designed to produce a change in the spin of the particle to enhance the release of gravitons in the upward direction, and moreover with current technology theses RF pulses contain too little energy to effect a significant change in the gravitational field.

With the use of large currents the drift velocity of the electrons could be greatly increased. The use of superconducting devices would greatly enhance the efficiency of such systems as the electrical resistance is virtually eliminated. Thereby allowing large currents to be used with minimum total power output.

The technological crux of the device is to produce electrons of high speed and hence high relativistic mass in the top half of the sphere, whilst producing low speed and thus low mass electrons at the bottom of the sphere, in accordance with special relativity. The imbalance in the rotating sphere will be continuously present impelling the device upwards. In effect the differential current flow, will produce differential graviton production and in turn, by general relativity, the warping of space-time

TECHNICAL EXAMPLE 1

A small scale device, which produces warp thrust can be readily constructed using current technology.

This will require a sphere, cylinder or disc of superconducting material. A dual disc either co rotating or counter rotating could also be used, counter rotating discs have the advantage that the total angular momentum is effectively zero. Any of the superconductors may be used such as Ag_2F, C_8K or SnTe. However for their tensile strength and/or magnitude of critical current density (J_c), Nb_3Sn or Ag_2F is recommended. Normal conductive material may be used but due to electrical resistance the power required (see superconductivity theory pg. 9) would be in the order of 10^{19} times greater.

Taking a sphere of Nb_3Sn, made hollow to reduce the mass of the sphere, with an external radius 0.25m and an internal radius of 0.20m; the total volume of Nb_3Sn required would be 3.19×10^4 cm^3. As Nb_3Sn has a density of $7.86g/cm^3$ the total mass of superconducting material would hence be 250 kg.

This sphere is required to be mounted upon two ultracentrifugational spindles which themselves are on the horizontal axis. The untracentrifugational spindles would be powered to rotate the sphere to produce an enhanced g force, as in a centrifuge..

The superconductive sphere would require a supercooloed jacket of liquid Helium, and would require to be in a vacuum. The power source, motors and refrigeration system should be placed outside the supercooled jacket. In addition these ancillary elements of the device may be either placed outside the system as a whole, or within it, if the device is designed as a self contained vehicle. The device may also be mounted upon vertical rails to experimentally demonstrate vertical lift. (See figs 1,2)

A high current needs to be applied, by means of a commutator device, to produce a current passing through the sphere. If the negative terminal were placed on the left of the sphere and the positive terminal on the right this would produce electrons flowing from left to right. The commutator device would be split to allow a smaller current to be applied to the lower half of the sphere.

The power expenditure for this is reduced by using a superconducting material. If the sphere were rotating from left to right i.e clockwise the drift velocity of the electrons would be advanced in the upper half of the sphere, and retarded in the lower half of the sphere by the differential current induced flow of the electrons.

According to relativity, as defined in the theoretical sections above, it is accepted that the mass of the electrons in the upper half, relative to the centre of gravity, of the sphere can thus be increased by using the standard relativistic formula:

$$m' = m_0 / (1 - v^2/c^2)^{1/2} \qquad (50)$$

Thus by inducing a relative drift velocity difference, the mass of the electrons at the top of the sphere can be increased, and the mass of the electrons at the bottom of the sphere can be reduced relative to the centre of gravity.

If the object is set to rotate, centrifugal forces can be used to increase this mass difference. This can be used to increase the net momentum of the object in the upwards direction, to produce upwards thrust.

Given that there are approximately 10^{23} per cm^3 free electrons in a niobium conductor then in the total sphere there will be approx. $10^{23} \times 3.19 \times 10^4 \, cm^3 = 3.19 \times 10^{27}$ free electrons in the sphere. If each electron weighs 9.11×10^{-31} kg; then the total mass of free electrons in the upper half of the sphere is 1.453 grammes.

If we take the maximum zero voltage current density (J_c) in Nb_3Sn or another suitable superconducting device as approximately 10×10^{14} Amps/m^2, the drift velocity in the electrons can be calculated. Given that the average surface area of the hollow sphere is approximately 350 cm^2 or $3.5 \times 10^{-2} \, m^2$, then the max current applicable is 3.5×10^{13} Amps. Thus the drift velocity of the electrons would be 6.3×10^6 m/sec. The velocity of the electrons in the upper part of the sphere would be advanced relative to the centre of gravity. The relative velocity to this centre would be equivalent to the velocity of the sphere plus the velocity of the electrons in the upper half.

If the drift velocity of the electrons in the lower half were separately, induced by the current so that these electrons were stationary relative to the centre of gravity, those in the lower half of the sphere would be relatively retarded. The current applied to the lower half of the sphere to make the lower electrons, relative to the centre of gravity, stationary (given a rotation rate of 3.14×10^4 revs/sec) would be 2.46 $\times10^{11}$ Amps.

This differential current would allow the electrons to have a differential velocity and in turn a different mass relative to the centre of gravity. The relative velocity would be approximately 6.3×10^6 m/sec. Using the standard equation for relativity (50) would give a relative mass difference ratio of 2.21×10^{-4}.

The effective total mass difference between the upper and lower half of the sphere would thus be the mass of the electrons times the relative mass difference which is 1.45 grammes $\times 2.21 \times 10^{-4} = 3.2 \times 10^{-7}$ kg.

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Overall, as the acceleration due to gravity is 9.81m/sec^2; to produce upwards lift on a sphere of 250 kg in Earth's gravitational field would require a force of about 2,500N. In order to produce in excess of this force the acceleration produced by the ultracentrifuge device would need to be about $= 8.76 \times 10^9 \text{m/sec}^2$. Thus according to the formula $a = (\omega 2\pi r)^2/r$ (where the average radius, r of the device is 0.225 m) the rotation rate required would be 3.142×10^4 revs/sec or approximately 1,880,000 revs/min to produce sufficient acceleration to allow the device to completely self levitate. Thus as $F = ma$, then the force produced by the device is

$$3.2 \times 10^{-7} \text{kg} \times 8.76 \times 10^9 \text{ m/sec}^2 = 2,800 \text{ N}$$

A detectable anti-gravtiy effect could, however, be realised at much lower spin rates. Standard ultracentrifugation devices can rotate at 600,000 revs/min . Thus even at standard ultracentrifuge speeds the g forces produced would be sufficient to produce approximately 12.8% lift, using these anti-gravity techniques.

TECHNICAL EXAMPLE 2

For this example we will use a large scale device, which would therefore deliver sufficient thrust to power a vehicle beyond Earth's gravitational field. Under terrestial conditions the entire devise would be required to be encased in a liquid helium jacket, with an internal vacuum to reduce friction due to air. However, the latter two constraints need not be in place if the device is to be used in space as, very conveniently, space is both a vacuum, and when shielded from the rays of the sun the ambient temperature is less than that of liquid helium. Indeed the large mass of the supercondutor becomes less relevant as weightlessness exists in space, so that the size of the object may be increased substantially.

Taking a sphere of 1 meter in radius of a superconductive material. The volume is $4/3\pi r^3 = 4.2 \times 10^6$ cm^3. If the high temperature superconductors are used such as $YBa_2Cu_3O_7$, or $Nd_{1.85}Ce_{0.15}CuO_4$, which are ceramic in nature, the specific density is approximately 3g/cm^3, Hence the total mass of the sphere would be approximately 12,600 kg or 12.6 metric tonnes. If the standard superconductors are used, for instance Nb_3Sn with a density of 7.86 g/cm^3 the sphere becomes heavier at 33 metric tonnes.

This sphere is required to be mounted upon two ultracentrifugational spindles which themselves are on the horizontal axis. The untracentrifugational spindles would be powered to rotate the sphere to produce an enhanced g force, as in a centrifuge. The sphere would need to be carefully constructed to be exactly balanced in all directions.

Nevertheless, a high current does still need to be applied, by means of a commutator device, to produce a current. If the negative terminal were placed on the left of the sphere and the positive terminal on the right this would produce electrons flowing from left to right. The power expenditure for this is reduced by using a superconducting material. If the sphere were rotating from left to right i.e clockwise the drift velocity of the electrons would be advanced in the upper half of the sphere, and retarded in the lower half of the sphere by the current induced flow of the electrons. The split commutator device allows a differential current to be applied to the upper and lower halves of the sphere respectively.

According to the model in the preceding sections this will result in an increase in the mass of the electrons in the upper sphere and hence an increase in graviton production in the upper half of the sphere. Indeed, this model is in agreement mathematically with general and special relativity.

Given that there are approximately 10^{23} per cm^3 free electrons in a copper conductor then in the total sphere there will be approx. 10^{23} x 4.2 x 10^6 = 4.2 x 10^{29} free electrons in the sphere. If each electron weighs 9.11 x 10^{-31} kg; then the total mass of free electrons in the upper part of the sphere is 0.191 kg.

If we take the maximum zero voltage current density (J_c) in Nb$_3$Sn, or another suitable superconducting device, as approximately 10 x 10^{14} Amps/m^2, the drift velocity in the electrons can be calculated. Given that the average surface area of the sphere is approximately 1.57 x m^2, then the max current applicable is 1.57 x 10^{15} Amps. Thus the drift velocity of the electrons would be 6.3 x 10^6 m/sec.

At the same time the current in the lower half of the sphere would be adjusted to retard the electrons so that they remain stationary relative to the centre of gravity. If the sphere were rotating at 2.6 X10^4 revs/sec this would require a current of 2.04 x 10^{13} Amps. This differential current would induce a differential velocity in the electrons and in turn a mass difference.

By inducing a difference of mass as little as one part in a thousand in these electrons we can achieve significant lift. Thus by the above equation if we induce a drift velocity of 6.3 x 10^6 m/sec (as in technical example 1), given that the velocity of the electrons in the upper part of the sphere would be advanced relative to the centre of gravity and those in the lower half of the sphere relatively stationary; then the relative velocity would be approximately 6.3 x 10^6 m/sec. Thus between the upper and lower half of the electrons we increase the relative mass of the electrons in the upper half by a factor of 2.21 x 10^{-4}, as in technical example 1.

Thus the difference in mass in the upper half of the sphere due to the moving electrons would be 0.191 kg x 2.21 x 10^{-4} = 4.22 x 10^{-5} kg., relative to the lower half electrons. This difference is enhanced by producing a centrifugal force by rotating the sphere.

If we rotate the large superconducting sphere at 2.6 x 10^4 revs/sec or 1,560,000 revs/min we can achieve accelerations of 1.33 x 10^{10} m/sec^2 (given an average radius of 0.5m) by the formula $a = (\omega 2\pi r)^2/r$.

Thus as F = ma, where m is the relative mass difference of the electrons the thrust produced in the device would be equivalent to:

$$4.22 \times 10^{-5} \text{ kg} \times 1.33 \times 10^{10} \text{ m/sec}^2 = 5.88 \times 10^5 \text{ N}$$

Thus in Earth's gravitational field this force would be capable of levitating 60 metric tonnes.

The estimated current required to produce the drift velocity of the electrons for this effect would be approx. 1.57×10^{15} Amps. The power usage is given by; $P = I^2R$, under non-superconducting conditions, given that Niobium has a resistivity of 15.2×10^{-8} Ω/m the sphere would have a resistance of approximately 10^{-7} Ω. The power used by a non-superconducting device would thus be 2.46×10^{23} Watts. However, due to superconductivity, under standard theory, the device has zero resistance and would use no power[ref 8]. Nevertheless, if we wish to use the model described above for superconductivity (see superconductivity, page 6) there would be a practical power consumption which would nevertheless still be low. Thus the power consumption would be in the order of 1.6×10^{-19} less than the standard power usage, at 3.94×10^4 Watts.

If Nb_3Sn is used to make the sphere the mass of the sphere would be 33 metric tonnes. If the mass of the ancillary ship were 27 metric tonnes, giving a total of 60 metric tonnes the acceleration produced would be 9.81 m/sec^2 . This would be equivalent to the force of gravity on Earth. Thus an artificial gravitational field would be incidentally created which would be exactly equivalent to that on Earth. Thus the device could also be used for the production of artificial gravity.

APPENDIX 1

Particle Physics

In the overall picture, it is generally accepted that there are three major forces; strong, electro-weak and gravity, each mediated by three bosons the, gluon, photon and graviton. These in turn are known to influence three types of particle, the quark, lepton and by General Relativity, space-time itself . Each of these appear to be composed of three particles with multiples of charge of 1/3 and exist in three dimensions of space time, which are themselves in three generations.

The nature of particles thus, may be revealed by their structure which occurs generally in multiples of three. Three quarks in the case of baryons are neccessary to make up a particle such as the proton or neutron. The particles that bind the quarks (gluons) are themselves required, in stable particles, to have three different colour charges, one colour in each dimension, for the particle to exist in three dimensional space-time. Furthermore, there are three generations of leptons an indeed quarks.

Nevertheless, the Standard model itself appears unable to explain the existence of these three generations of particles or the fundamental properties of sub atomic particles. Furthermore, there appear now to be a total of 60 fundamental particles each with their own fundamental properties which are arbitarily defined to fit the data. Furthermore, the Standard model only partially explains the decay process of the each particle and it does not explain their masses accurately.

For instance the mass of the up (u), anti-up (_) down (d) and anti-down (_) quarks are currently estimated at 0.35 Gev each [ref 17] (although some controversy exists about about this basic value). The mass of the proton constituted of three quarks, uud, is 0.9383 Gev, which is only approximately equivalent to the total mass of the three quarks (1.05 Gev).

Furthermore, the very process by which the subatomic particles decay cannot be explained by the "fundamental" constituents, the quarks. Indeed the known hadron decay processes ultimately <u>always</u> end up producing either an electron or positron. Indeed the quarks have not been experimentally seen, suggesting that other particles may underlay their fundamental structure.

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Electron Structur

Given the presence of a quasi electron with a charge of $1/3 \, e$ [ref 4,5], then three of the quasi electron vortices, as previously described [ref 5], could form an entire electron in three dimensional visible space time. Nevertheless, each would have energy and hence a wave function which would be present in the other vectors. This electron could thus follow the probability functions as described by the Shrödinger wave equation for ψ (otherwise termed as "essence" by Shrödinger).

It is of importance therefore to note that the charge of the electron (e) in Coulombs (C), (where ε_0 is the permittivity of free space), can be derived from first principles by the equation:

$$e = \frac{\varepsilon_0}{[3(4/3\pi c^3)]}^{1/2} = 1.61 \times 10^{-19} \, C \qquad (6)$$

Equation (1) has a number of special implications, which have been previously discussed (p 6)

The dimensions of the equation can be readily resolved by considering **each of the three vector dimensions.** The exact dimensions of the equation need to be considered in the light of the nature of space-time itself, and this is fully addressed on pages 82-84. These dimensional equations help explain the nature of matter. Indeed the equation for the electron may underly the structure of the subatomic particles and may be necessary for the full understanding of gravity.

Additionally, the square root sphere structure of the electron accounts for its 1/2 integer spin. This square root structure also forms the basis of the electron pair bonding. According to the above equation (6), the electron will tend to form a "complete" electron sphere, thereby explaining how the presence of pair bonding occurs.

Thus from the equation (3) for the square root structure of the single electron; it is clear that the product of two such spheres will tend to form a complete sphere, where:

$$e^2 = \varepsilon_0/3(4/3\pi c^3) \qquad (6b)$$

In addition, the equation for the quasi electron can be directly derived from eq. 1.

Thus in one dimension, a single quasi electron (q_e) with charge of $1/3e$, can be mathematically represented, (where the permittivitty of free space for each quasi electron is $\varepsilon_{qe} = [\varepsilon_0/3^3]^{1/2}$, by the equation :

$$q_e = \varepsilon_{qe}/(4/3\pi c^3)^{1/2} = 1/3e \qquad (6c)$$

Thereby accounting for the experimental observation of the $1/3e$ charge of the quasi electron[ref 4,5]. Overall knowing the structure of the quasi electron may lead to the knowledge of the structures of the the other subatomic particles such as the quarks.

First Generation Quark Structure

From these observations we may now examine the derivation of the mathematical nature of the proton and in turn the structure of the quarks. Using the above equations (eq. 6) enables a far more accurate derivation of the mass of quarks from first principles.

To do so requires calculating the ratio of the mass of the electron ($m_e = 0.511$ Mev) to the mass of the proton ($m_p = 938.3$ Mev)

Thus
$$m_e/m_p = 0.511/938.3 = 5.44 \times 10^{-4}$$

and
$$m_e/m_p = 5.44 \times 10^{-4} = (3\pi/c^{1/2})$$

Intruigingly, the term $(3\pi/c^{1/2})$ mathematically determines the ratio of the mass of the electron (m_e) to the proton (m_p). Indeed it is this ratio that also leads to the mathemaical derivation of the structure of the quarks

Given the mass of the proton is; 938.3 Mev, then according to the Standard Model, as there are three quarks in the proton (uud) of virtually equal mass, then the effective mass of each quark would be more accurately given as 312.8 Mev.

Thence, the structure of the quarks can now be defined by the ratio of the masses of the quasi electron to the quark. If the mass of the quasi electron is given as one third the mass of the electron

$$m_{qe} = 0.511 \text{ Mev} \div 3 = 0.17033 \text{ Mev}$$

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Then the ratio of the mass of the down quark (d), to the quasi electron is:

$$0.17033 \text{ Mev}/ 312.8 \text{ Mev} = 5.44 \times 10^{-4}$$

We also find that this same ratio of the mass of the quasi electron to the mass of the down quark (m_d) is mathematically equivalent to $3(\pi/c^{1/2})$, thus:

$$m_{qe}/m_d = 5.44 \times 10^{-4} = 3(\pi/c^{1/2})$$

From here the equation for the charge and structure of the down quark can be accurately defined by combining the equation for the structure of the quasi electron $q_e = \varepsilon_{qe}/(4/3\pi c^3)^{1/2}$ and the ratio of the masses of the quasi electron to the down quark (19); hence

$$d = \varepsilon_{qe}.m_d/m_{qe}.(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2})$$

Hence in short form

$$d = (4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \qquad (16)$$

Giving the charge of the down quark as -1/3; and its estimated mass as 312.8 Mev.

Thus not only can the electron charge be derived from the equation for three spheres each with a radius of c (equation 3) ; but the mass, charge and internal structure of the down quark can also be derived from the term $3(\pi/c^{1/2})$.

Furthermore, the significance of the term $3(\pi/c^{1/2})$ in this equation, is revealed by the Shrödinger wave equation. Thus $(\pi/c^{1/2})$ is none other than the solution to the Shrödinger wave equation for the amplitude of an electron confined in a space with radius c [ref 6]. If c is the space defined by the equation for the structure of the quasi electron. Then the standard Shrödinger equation for an object confined in a space c is given by the following standard calculation [ref 8]:

$$E\psi(x) = - \frac{h^2}{2m} . \frac{d^2 \psi(x)}{dx^2}$$

If one of the dimensions of space has a length 2L the amplitude can only be non zero between x = 0 and X = 2L and the standard solution for the amplitude can be determined by using the constant (A) where:

$$A = (1/L^{1/2})$$

Thus in one dimension the solution to the Shrödinger wave equation for the amplitude of oscillation is conventionally given by [ref 8] :

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$$\psi(x) = (\pi/L^{1/2})\ \sin x/L$$

Substiuting L for c gives the one dimensional equation (when $\sin x/L = 1$) as $\pi/c^{1/2}$. Thus at 90°to the dimensional confinement of the quasi electron, the standard solution to the Shrödinger wave equation yields an amplitude of $\pi/c^{1/2}$, which in three dimensions gives:

$$3(\pi/c^{1/2}) \tag{22}$$

Thus the term $3(\pi/c^{1/2})$ is not only the ratio of the mass of the electron to the proton but is also none other than the standard solution to the Shrödinger wave equation for an object confined in a space c [ref 8].

From here the charge and structure of the up quark (u) can now be derived in a similar way to that of the up quark from the mass of two quasi positrons [$m_{qp} = 2(0.170\ \text{Mev})$] and the mass of the up quark (m_u) by the equation,

$$2m_{qP}/m_U = 2(5.44 \times 10^{-4}) = 2(3\pi/c^{1/2})$$

Thus:

$$u = \varepsilon_{qe}.2m_{qP}/m_u.2^*(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2})$$

Hence in short form

$$u = 2^*(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \tag{17}$$

Giving the charge of the up quark as +2/3, and its mass as 312.8 Mev

Overall the mathematical structure of all the particles can be shown to be derived from the quasi electron. Thus, the first generation particle structures can now be derived from first principles. This includes the quasi electron (qe) and electron (e), from which the quarks (u,d) and in turn the proton (p) respectively are derived.

Thus the first generation of particles of the Standard model are given in short form as:

$$qe = \ ^*(4/3\pi c^3)^{1/2} \tag{6a}$$

$$e = 3^*(4/3\pi c^3)^{1/2} \tag{6}$$

$$d = \ ^*(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \tag{16}$$

$$u = 2^*(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \tag{27}$$

The respective force binding particle, the gluon, for the first generation of particles is thus given in short form as:

$$g = 3(\pi/c^{1/2}) \qquad (22)$$

According to these equations, it is apparent that the down and up quarks appear be constituted from quasi electrons and three component gluons, and are themselves not fundamental particles.

Indeed, from these observations it is clear that the structure of the electron, may underly the structure of all the elementary particles and nucleons, as it forms a "perfect sphere" based on c. As will also be seen later, as this structure forms the basis of matter, it may itself underpin the theory of gravity. Furthermore, these obsevations will allow the mathematical estimation of the mass and size of the elementary particles, including the second and third generation particles

Second and Third Genration Lepton Structure

Thus the structure of the muon (μ) can also be derived from the ratio of the mass of the electron (m_e) and the mass of the muon (m_μ):

$$m_e/m_\mu = 4.7 \times 10^{-3} = \pi/c^{1/3}$$

Thus
$$\mu = \varepsilon_0^{1/2}.m_e/ m_\mu. \ 3^{-}(4/3\pi c^3)^{1/2}.(\pi/c^{1/3})$$

Where the charge of the muon is in this equation equivalent to that of the electron e. In this case ($\pi/c^{1/3}$) can be considered to represent a specific high energy photon. Thus the structure of the muon, written in short form is:

$$\mu = 3^{-}(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}) \qquad (14)$$

Moreover the structure of the tauon can be calculated from the ratio of the mass of the electron and that of the Tauon (1.79 Mev);

Thus
$$0.511 \ Mev/1.79 \ Gev = 2.85 \times 10^{-4}$$

$$m_e/m_\tau = (\pi/c)^{1/3}.(\pi/c)^{1/9} = 2.85 \times 10^{-4}$$

As the charge of the tauon is equivalent to the charge of the electron, hence the structure of the Tauon is given by the above equation

$$e_\tau = \varepsilon_{qe}.m_e/ m_\tau.3^-(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} = e$$

This equation accurately predicts the charge -1; and mass of the Tauon (~1.78 Gev) [ref 14]. Thus the structure of the Tauon can in short form be given by the equation

$$\tau = {}^-3(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (15)$$

Overall the mathematical structure of all the particles can be derived from the quasi electron. Thus, the particle structures can now be derived from first principles. This includes the quasi electron (qe) and electron (e), from which the quarks (u,d) and in turn the proton (p) respectively are derived. The general structure of the force carrying partilcles the photon (γ) and the gluon (g) can be given. It will also intriguingly be possible to derive the structure of the charm (c), beauty (b, or bottom) and truth (t or top) quarks directly from the sructure of the muon (μ) and Tauon (τ).

The calculations underlying these equations can further accurately reflect their measured values, particularly if the effects of gravity are taken into account (see Quantum Gravity and the Charge of the Electron.p 30). In addition the neutrino has not been included in the equation as its mass is considered to be very small. The mathematical proof of these short form equations nevertheless lies in the fact that they can closely identify the charge and the masses of these particles, from first principles, as in equations (6, 13-27). [ref 17]

Second and third generation Quark Structures

From here it is possible to derive the basic structure of the remaining quarks including the strange (s) quark.

Thus the ratio of the masses of the quasi electron (m_{qe} = 0.17033 Mev) and the strange quark (m_s = 0.555 Gev) are given by the equation:

$$m_{qe}/m_s = 0.17033 \text{ Mev}/ 0.555 \text{ Gev} = 3.07 \times 10^{-4}$$

Furthermore the structure of the gluon in the strange particle, can now be

accurately derived by the term; $3(\pi/c)^{1/2}$,(n.b. change of brackets in the gluon term).

$$m_{qe}/m_s = 3.07 \times 10^{-4} = 3(\pi/c)^{1/2}$$

Thus the equation for the charge and structure of the strange quark (s) is:

$$s = \varepsilon_{qe}.m_{qe}/m_s \cdot (4/3\pi c^3)^{1/2}.3(\pi/c)^{1/2} \qquad (18)$$

This can be written in short form as:

$$s = (4/3\pi c^3)^{1/2}.3(\pi/c)^{1/2}$$

Giving the strange quark a charge of -1/3 and a mass of 0.555 Gev, in agreement with current estimates of its mass ~ 0.55 Gev [ref 14]. This again shows that strange quark is derived from a quasi electron and a gluon.

Thus given that the particle Ω^- is made of three strange quarks (sss) we may derive its mass as 3 x 0.555 Gev = 1.67 Gev, which is in accurate aggreement with its known mass of Ω^- = 1.67 Gev [ref 17]

From here it is possible to define the structure of the other quarks, using the same first principles. As the charmed quark (c), beauty (b, otherwise termed bottom) and the truth (t, otherwise termed the top quark), clearly belong to the second and third generation of particles, they should be mathematically based on the formula for the second and third generation lepton particles, specifically the muon and tauon.

Indeed the charm derives from the second generation of particles and therefore mathematically does qappear to contain the basic muon structure, as given by the equation:

$$\mu = 3(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}) \qquad (14)$$

As before, the ratio of the masses of the quasi electron and that of the charm quark gives the equation from the structure of the charm (c). Thus the structure of charm can be determined from the ratio of the mass of two quasi electrons; m_{qe} = 2(0.17033) Mev, and the mass of the charmed quark (m_c = 1.518 Gev)

Thus if:
$$2m_{qe}/m_c = 2(0.17033 \text{ Mev})/1.518 \text{ Gev} = 2(1.122 \times 10^{-4})$$

and
$$2m_{qe}/m_c = 2(1.122 \times 10^{-4}) = 2(\pi/c^{1/3}).(\pi/c^{1/4})$$

Then the structure of the charm quark (c) is:

$$c = \varepsilon_{qe}.2m_{qe}/m_c.2^*(4/3\pi c^3).^{1/2}(\pi/c^{1/3}).(\pi/c^{1/4})$$

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or in short form

$$c = 2^*(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}).(\pi/c^{1/4}) \qquad (19)$$

Thus the charmed quark has a charge of +2/3 and a mass of 1.518 Gev in accordance with the previous approximate estimate of its mass ~ 1.5 Gev. [ref 17] and is derived from a muon and a higher order gluon. This gluon itself $(\pi/c^{1/4})$, is the solution to the Shrödinger wave equation for the amplitude of an electron confined in a space of length $c^{1/2}$ [ref 8]. Thus this gluon now exactly matches the amplitude of the quasi electron.

Furthermore, from this we can deduce the mass of the particle the J/ψ, whose structure is predicted to consist of a charm and anticharm particle in orbit around each other, with a minimum mass (including orbital energy) of ~ 3.1 Gev.

From here we can in a similar fashion determine beauty (b). To be consistant, as beauty is a third generation quark it should be defined by the component structure of the Tauon. In this case, this is the smaller component of the Tauon, which is mathemtaically represented by:

$$3(4/3\pi c^3)^{1/2}.(\pi/c^{1/9})$$

Indeed the structure can again be determined by the ratio of the mass of the quasi electron electron (m_{qe}) to beauty (m_b). Such that the ratio can be given by the equation

$$m_{qe}/m_b = 3.673 \times 10^{-4} = (\pi/c^{1/9}).(\pi/c)^{1/2}$$

Thus the structure of beauty is given by the equation

$$b = \varepsilon_{qe}.m_{qe}/m_b .(4/3\pi c^3)^{1/2}.(\pi/c^{1/9}).(\pi/c)^{1/2}$$

To confirm this structure, the mass of the beauty quark can be given by the following calculation

$$m_{qe}/m_b = 3.673 \times 10^{-4} = 0.17033 \text{ Mev } /4.64 \text{ Gev}$$

and

$$m_{qe}/m_b = 3.673 \times 10^{-4} = (\pi/c^{1/9}).(\pi/c)^{1/2}$$

Thus the short form of beauty is:

$$b = (4/3\pi c^3)^{1/2}.(\pi/c^{1/9}).(\pi/c)^{1/2} \qquad (20)$$

Thus giving beauty a charge of -1/3, and a mass of 4.64Gev, which is in agreement with its current estimated mass of ~ 4.7 Gev [ref 17].

To complete the structure of the quarks, we can finally proceed to deduce the truth. As the top quark or truth (t) belongs to the third generation of quarks, it is also based on the structure of the Tauon. Thus mathematically the truth, primarily consists of the third generation, tauon.

$$\tau = 3(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (15)$$

The geometrical structure can be confirmed from the mathematical ratio of the mass of the electron to mass of truth (m_t), hence the equation for the top quark is given by the ratio of the mass of the electron to mass of the truth .

Thus as $\qquad m_t = 176$ Gev

and as $m_e = 0.511$ Mev

$$m_e/m_t = 0.511 \text{ Mev}/176 \text{ Gev} = 2.89 \times 10^{-6}$$

and
$$m_e/m_t = 2.89 \times 10^{-6} = (\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4}$$

As each quasi positron is associated with each of the gluon complexes, then the equation for truth is thus predicted by the equation:

$$t = 2(4/3\pi c^3)^{1/2+}.(\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4} \qquad (21)$$

Which gives the mass of the truth as 176 Gev and a charge of +2/3e. Which is in agreement with the known mass of the truth; 176 ± 12 Gev; the most accurate estimate of the mass of the truth quark being; 175.6 Gev. [ref 22]

Thus the basic structure of the truth, is that of a pair of quasi anti-tauons complexed with a gluon moiety which has an amplitude that, according to the Shrödinger wave equation (3), exactly matches the amplitude of the quasi electron [ref 8].

Mathematically the probability of arriving at all such tightly conformed equations (3, 16-30), the particles being related only to π and c and its specific powers, by chance would have odds of millions to one against.! Furthermore these mathematical structures are derived from none other than solutions to the Shrödinger wave

equation itself [ref 8].

Moerover, the structures of the second and third generation particles, the muon (μ), and charm (c); tauon (τ) and truth (t) quarks have a notabl symmetry, with their masses and charges accurately given by the following short form equations:

$$\mu = 3^-(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}) \tag{14}$$

$$c = 2^+(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}).(\pi/c^{1/4}) \tag{19}$$

$$\tau = 3^-(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \tag{15}$$

$$t = 2^+(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4} \tag{21}$$

Hence, from these equations it can be deduced that the fundamental structure of the quasi electron probablistically underpins the mathematical structure of the fundamental particles, and that these structures are all related to one another either by complexing with a photon $[(\pi/c)^{1/3}]$ which matches the frequency of the quasi electron or a gluon $[(\pi/c^{1/4})]$ which according to the Shrödinger wave equation accurately matches the amplitude of the quasi electron. This explains the fundamental observations that final decay products of hadrons always lead to the production of an electron or positron and explains why quarks have not been individually seen.

Particle Decay and the Electroweak Force.

In order to corroborate the estimated quark structures these structures need to explain in detail the pattern of decay of the quarks themselves. We are thus required to explain particle decay from first principles including the structures which are formed in these decays, such as the mediator of the electro weak force; the Intermediate Vector Boson. To see if this is possible the decay of the truth (t, top quark) will be examined. According to experiment the truth quark splits into two particles, beauty (b, bottom quark) and the intermediate vector boson (W⁺). It is apparent that the truth may yield beauty.[ref 22]

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Thus:

$$2^+ (4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4} = t$$

$$\Rightarrow \quad (4/3\pi c^3)^{1/2}.(\pi/c^{1/9}).(\pi/c)^{1/2} \quad = b$$

Thus the two gluon structures, $(\pi/c)^{1/4}$; in the truth combine to form the more energetic gluon, $(\pi/c)^{1/2}$; present in beauty, thus:

$$2(\pi/c)^{1/4} \Rightarrow (\pi/c)^{1/4}.(\pi/c)^{1/4} \_ (\pi/c)^{1/2}$$

and the photon term, $(\pi/c)^{1/9}$; decays into the less energetic photon $(\pi/c^{1/9})$ present in beauty. Thus the structures in the truth account for the structures in beauty, and are produecd via the production of a quasi electron and quasi positron.

The remaining terms are thus 3 quasi positrons, two high energy photons and a remaining low energy photon

$$3^+ (4/3\pi c^3)^{1/2}$$

and

$$2(\pi/c)^{1/3}$$

and

$$(\pi/c)^{1/9}$$

There is also a very considerable amount of energy remaining, the energy difference between beauty (b) and truth (t) being ~ 170 Gev.

This energy difference allows the transformation of the two high energy photons and the low energy photon to two intermediate vector photons, given by the equation.

$$2(\pi/c^{1/6})^6$$

This leads to the formation of the intermediate vector boson (W⁺), which is the mediator of the electroweak nuclear force.

$$W^+ = 3^+ (4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^6 \tag{24}$$

which is also equivalent to

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$$W^+ = 3^+ (4/3\pi c^3)^{1/2} . 2(\pi/c^{1/6})^3 . (\pi/c^{1/6})^3$$

This probable structure for the (W$^+$), can again be confirmed by the ratio of the mass of the electron to the intermediate vector boson (W$^+$), with an estimated mass of 80 Gev [ref 17]. Thus the ratio of the masses is given by

$$m_e/m_{W^+} = 0.511 \text{ Mev}/ 80 \text{ Gev} = 6.4 \times 10^{-6}$$

and

$$m_e/m_{W^+} = 6.4 \times 10^{-6} = 2(\pi/c^{1/6})^6$$

Thus

$$W^+ = \varepsilon_{qe} . m_e/m_{W^+} . 3^+(4/3\pi c^3)^{1/2} . 2(\pi/c^{1/6})^6$$

thus in short form:

$$W^+ = 3^+ (4/3\pi c^3)^{1/2} . 2(\pi/c^{1/6})^6$$

The true elegance of the structure of the intermediate vector boson can now be further explored. The W$^+$ can be considered to represent a unification of the electromagnetic force and the weak force, in keeping with the theoretical predictions of Salam and Weinberg for the nature of the electroweak force. Thus, the intermediate vector photons can either decay leptonically or via gluons; as is demonstrated by the following interconversions.

$$W^+ = 3^+ (4/3\pi c^3)^{1/2} . 2(\pi/c^{1/6})^6 \_ 3^+ (4/3\pi c^3)^{1/2} . 2(\pi/c^{1/6})^3 . (\pi/c^{1/6})^3$$

If we examine the further decay of the three dimensional photon structure, $(\pi/c^{1/6})^3$; we have:

$$(\pi/c^{1/6})^3 \Rightarrow [(\pi/c)^{1/6}]^3 \_ (\pi/c)^{1/2}$$

Where the term $(\pi/c)^{1/2}$ is none other than the term for a first generation gluon.

Thus the W$^+$ can either decay leptonically or into first generation quarks where it can yield an up (u) and an anti-down quark (_), thus:

$$W^+ = 3^+ (4/3\pi c^3)^{1/2} . 2(\pi/c^{1/6})^3 . (\pi/c^{1/6})^3 \Rightarrow 3^+(4/3\pi c^3)^{1/2} . 2[(\pi/c)^{1/6}]^3 . [(\pi/c)^{1/6}]^3$$

And

$$3^+(4/3\pi c^3)^{1/2} . 2[(\pi/c)^{1/6}]^3 . [(\pi/c)^{1/6}]^3 \_ 3^+(4/3\pi c^3)^{1/2} . 2(\pi/c)^{1/2} . (\pi/c)^{1/2}$$

thus W$^+$ decays to:

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$$2^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) = u$$

and

$$^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) = \_d$$

Leptonically the W⁺ decay yields the standard products including the positron the neutrino (v), and energy in the form of photons thus

$$W^+ = 3^+(4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^6 \_ 3^+(4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^2.(\pi/c^{1/6})^2.(\pi/c^{1/6})^2$$

and

$$3^+(4/3\pi c^3)^{1/2}.2[(\pi/c)^{1/6}]^2.[(\pi/c)^{1/6}]^2.[(\pi/c)^{1/6}]^2$$

$$3^+(4/3\pi c^3)^{1/2}.2(\pi/c)^{1/3}.(\pi/c)^{1/3}.(\pi/c)^{1/3}$$

Thus W⁺ may also decay into the positron the neutrino (v), and energy in the form of photons thus:

$$3^+(4/3\pi c^3)^{1/2} = e^+$$

and

$$v$$

and

$$n(\pi/c)^{1/3}$$

Thus according to standard experimental observations the truth quark yields the beauty quark and the intermediate vector boson. In turn from these observations we may elegantly reveal the structure of truth and beauty and the intermediate vector boson and its decay pathways from first mathematical principles. (ref 18)

Gluon Structure and Force Characteristics

There are in the Standard model (or in this modification) three colour charges for the gluons and quarks, each of these represents each of three vectors x, y and z which can arise in different combinations. Thus the three gluon colours are required to be together (one in each dimension x, y and z) in baryons to form a three dimensional objects. There are also noted to be 8 gluons, these in turn gives rise to all the

known baryons and mesons

The structure of these gluons have been previously mathematically identified, and this structure mathematically represents a helical ringlet. These are as previously given: $(\pi/c)^{1/2}$; $(\pi/c)^{1/4}$; $(\pi/c^{1/2})$; $(\pi/c^{1/4})$ [see eq. 25- 25c]

These four mathematical structures and their antigluons now readily account for the eight gluons known to exist, these in turn account for the structure of all the quarks as given by equations 3, 15-30, which in turn give rise to all the baryons and mesons as described by the Standard model.

Recent studies show that the proton conventionally consisting of the "fundamental" quarks (uud); can by bombardment with high energy electrons produce a Kaon which consists of an anti-up and a strange quark (s_). As the standard model predicts quarks are fundamental, the proton should not contain a strange quark. The conventional explanation for this resides in the proposal that the proton contains virtual strange particles. Indeed to explain these new observations each proton is now postulated by some physicists to contain 21 or more quarks, 3 of which are real and 18 or more which are required to be virtual! [ref 23].

In the revised Standard model presented here, the process by which a Kaon is produced is readily understood by the structural interconversion of the gluon in the up quark $(\pi/c^{1/2})$; to the gluon in the strange quark $(\pi/c)^{1/2}$,(n.b change of brackets)

Furthermore the most recent experiments on the internal structure of the proton has shown that gluons can seperate and recombine. This surprising recent observation actually arises from first principles when the mathemtatical structure of the gluon is understood. Thus mathematically the gluon structures may easily recombine and separate by the equation.[ref 24]

$$(\pi/c)^{1/2} \;=\; (\pi/c)^{1/4}.(\pi/c)^{1/4}$$

Hence this mathematical structure of the gluon allows the observed "recombination" and separation to occur in a way which is readily understood.

In addition, the structure of the gluons can be explained on the basis that these structures match the wave function of the quasi electron, thus the gluons match the amplitude of the electron as given by the Shrödinger wave equation.[ref 8]

Furthermore, the equations for the gluon present in the quark can explain their force characteristics. In the case of the gluon component $(\pi/c^{1/2})$; which mathematically represents a helical ringlet; if the direction vector is x, then the axis of spin would

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need be 90° to this, in the y vector in order to match the amplitude of vibration of the quasi elelctron/ positron. Thus this spin vector is known to be the same as that of electrons. This would account for the particle binding characteristics of the gluon force to the quasi electron. Given that the gluon would mathematically require the same spin axis as that of the quasi electron or positron, the gluon would be strongly associated with these particles and the force required to part them would increase with distance, which explains the characteristics seen experimentally with the gluon force.

Moreover, as will be shown, the photonic component of the subatomic particles given in the above equations matches exactly the frequency of rotation of the electron.

Nucleon Structure

The mass (m_p) and the internal mathematical structure of the proton can now be directly calculated form the quarks. Thus the structure of the proton according to the Standard model derives the combination of 2 up quarks and one down quark (p = uud). As each quark has an estimated mass of 312.8 Mev (see eq. 13) then the proton (p) has in accordance with the Standard model a mass of 3 x 312.8 = 938.3 Mev and a charge of +1, and may be given by the mathematical structure of the up and down quarks according to eq. 16,17; and is thus given by:

$$p = \begin{array}{l} 2^+(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \\ {}^-(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \\ 2^+(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \end{array}$$

Which, gives the proton a net charge +1 and a mass of 938 Mev.

Fifteen component gluons are required to be present in the proton, three gluons associated with each quasi electron particle.

Therefore the structure of the proton can be mathematically derived by combining the structure of the quasi electrons and the term $(\pi/c^{1/2})$. Thus the structure of the neutron and indeed the overall structure of the nuclei can be determined.

Similarly the structure of the neutron is given by the Standard model (n = udd), which can be written in short form as:

$$n = \begin{array}{l} {}^-(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \\ 2^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \\ {}^-(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \end{array}$$

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The mystery of the stability of the neutron may now be addressed. A neutron outside the nucleus has a half life of approximately 6 seconds. Inside the nucleus however, the stability of the neutron, provides the atom with its stability. The three dimensional structures described may now provide the clues to this stability.

The compostion of the quarks now logically explains the apparent "fluid" characteristics of the subatomic particles, and some free exchange of the quasi electrons and gluons would be expected to occur within a nucleus.

This would occur to to give the structures stability and this in turn would allow the decresed binding energies seen in these structures. As has been shown by the metric tensor structure of matter (eq. 4-6), the preferred conformation is a 3 x 3 structure.

This can be acheived by donating a quasi electron and a quasi positron along with three associated gluons each; from the proton structure to that of the neutron. The proton would then contain three positrons and a total of nine gluons

The stable nuclear proton conformation would now be :

$$p = 3^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \tag{13}$$

This can form a stable 3 x 3 conformation.

Thus the probable structure of the stable nucleonic neutron (n), would now contain a total of three quasi positrons and three quasi electrons along with their respective eighteen gluons and is represented by an equation, which also forms a 3 x 3 conformation:

$$n = \begin{array}{c} ^+(4/3\pi c^3)\downarrow^{1/2}.2(3\pi/c^{1/2}).^-(4/3\pi c^3)\uparrow^{1/2} \\ ^+(4/3\pi c^3)\downarrow^{1/2}.2(3\pi/c^{1/2}).^-(4/3\pi c^3)\uparrow^{1/2} \\ ^+(4/3\pi c^3)\downarrow^{1/2}.2(3\pi/c^{1/2}).^-(4/3\pi c^3)\uparrow^{1/2} \end{array} \tag{26}$$

Viewed in three dimensions the configuration will allow the positron components of the neutron to be placed interiorly and the electron components exteriorly, in keeping with experiments that suggest that the neutron core is positive an the exterior is negative. This polarised structure in turn will enable the neutron to bind the protons of the nucleus together.

Alpha Particle Structure

Importantly it is now possible to **derive the mathematical structure of the helium nucleus** (α particle) containing two protons and two neutrons, along the same lines. The proposed basic conformation is again 3 x 3.

$$\alpha = \begin{array}{l} [3(4/3\pi c^3)]\downarrow^{1/2+}.2(3\pi/c^{1/2}).\ [3(4/3\pi c^3)]\uparrow^{1/2-} \\ [3(4/3\pi c^3)]\uparrow^{1/2+}.2(3\pi/c^{1/2}).\ [3(4/3\pi c^3)]\downarrow^{1/2+} \\ [3(4/3\pi c^3)]\downarrow^{1/2-}.2(3\pi/c^{1/2}).\ [3(4/3\pi c^3)]\uparrow^{1/2+} \end{array} \qquad (27)$$

This mathematical expression for the structure of the α particle allows the calculation of its **binding energy from first principles!** Each pair of particles is still associated with the equivalent of 18 gluons each, that is $3^{1/2}.2(3\pi/c^{1/2}).3^{1/2}$. However, the internal structure has altered, to effectivly reduce the number of quasi electrons. Thus as a result of triplet pairing, which has occurred in order to make up the helium nucleus, we are left with a reduced number quasi electrons.

Hence, the number of quasi electrons is reduced by a factor of 3 as a result each of the three pairings of the six quasi electron groups. This means the reduction in the equivalent number of quasi electron masses (including the electrical kinetic energy of the complex vectors) is effectively 3^3 x 6. Each of these weighs 1/3 the rest mass of the electron. The total energy therefore liberated is equivalent to 27 x 6 quasi electron masses (approximately 27.5 Mev). This agrees with the difference in mass between the constituent protons and neutrons and the rest mass of the helium nucleus, thus accounting for the binding energy of the helium nucleus.

This structure is also important for the understanding of the internal structure of atomic nucleii, The alpha particle appears to form a natural sphere as indicated by the metric tensor structure (see eq. 6-9). In turn the basic structure of atomic nucleii appear to form in multiples of alpha particles; the carbon atom for instance forms from three, separate, such helium nuclei spheres.

Furthermore knowledge, of the structure of the α particle may be of considerable importance in the understanding of **nuclear fusion** and the eventual harnessing of this technology.

Neutrino Structure

Whilst it has been possible to derive the structure of the fundamental particles form their known masses, the mass of the neutrino remains uncertain. However, recent evidence does support the contention that the neutrino does indeed have rest mass, which is a starting point.

If the neutrino does have rest mass this suggests it has a basic spherical structure like the electron, and will therefore be subject to relativistic changes in mass. Again experiment confirms this relativistic component.

It is also reasonably certain that whilst the neutrino mass is smaller than that of the electron, its size is also likely to be smaller, and on the basis of what is known of the radius of the electron (see Particle Spin and Size) the essential radius is also likely to be related to c.

Indeed as the electron radius is 1/c x 2/spin, where the intrinsic radius is 1/c. Then by deduction the neutrino radius is related to $1/c^2$. Thus the most likely equation for the neutrino is:

$$ev = \left[\frac{\varepsilon 0}{3 \left[4/3\pi(c^2)^3 \right]} \right]^{1/2} = \left[\frac{\varepsilon 0}{3 \left[4/3\pi c^6 \right)} \right]^{1/2} \quad (6d)$$

This of course endows the neutrino with a very small charge of: 9.71×10^{-32} C. (which reduces to 9.42×10^{-63} C, when the neutrino forms a Cooper neutrino pair) Nevertheless, if the neutrino has mass, like all other elementary particles we should not be surprised if it also has a charge. Furthermore we may use the above formula to estimate the neutrino mass itself.

Without concerning ourselves too much at this point about the exact origin of the nature of the mass of the electron (which *is* addressed in chap. Quintessence and Electron Structure). It is reasonable to postulate that, if the radius is related to $1/c^2$ then the number of quintessences in the neutrino will be equivalent to the square root of the number of quintessences in the electron. Indeed this means that the number of quintessences in the electron neutrino is 1.925×10^{10} quintessences. Knowing the mass of quintessence; 2.4575×10^{-51} kg, gives us the mass of the electron neutrino (with an estimated error range of: x/÷ 3), as:

$$m_{ve} = 4.731 \times 10^{-41} \text{ kg} = 0.0000265 \text{ ev}$$

We may also deduce the masses of the mu neutrino and the tau neutrino from first principles. Interestingly we also know that the μυ and the ταυ neutrino can convert an electron to a muon or tauon respectively (if the neutrino has sufficient relativistic energy). So it is likely that the geometric elements present in the muon and tauon are

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also present in their respective neutrinos. Thus the short inverted form equations are given by:

$$v_\mu = 3^-(4/3\pi c^6)^{1/2}/(\pi/c^{1/3})$$ (6d)

$$v_\tau = 3^-(4/3\pi c^6)^{1/2}/(\pi/c)^{1/3}.(\pi/c)^{1/9}$$ (6d)

These mathematical suffixes are merely the same geometric components, which combine with the quasi electron to form the muon and tau. In the same way the ratio of the masses of the muon and tau to the electron, were deduced from first principles (see Fundamental Forces and Particle Structure) these equations predict the respective masses of these neutrinos (with an error range of x/÷ 3), as:

$$v_\mu = 0.00546 \text{ ev} \quad \text{and} \quad v_\tau = 0.0927 \text{ ev}$$

Indeed recent evidence from the super Kami0kande experiment supports these observations with regard the tau neutrino, and places its mass in the range 0.1- 0.03 ev.

Quintessence and Internal Electron Structure

The reason for the value for the mass of the electron, has till now remained a mystery. The internal structure of the electron is therefore of considerable importance as it may elucidate the underlying reason for the mass of the electron. In turn we may derive the mass of all the particles from first principles, as these themselves derive from the structure of the electron (see previous chapter; Fundamental Forces and Particle Structure). Additionally, it may also be possible to estimate the radius of quintessence, from the structure of the electron. Quintessence in turn is fundamental to the formulation of quantum gravity.

We may begin with the formula for the charge of the electron

$$e = \varepsilon_{qe}/3(4/3\pi c^3)^{1/2}$$ (6)

This demonstrates a square root spherical structure. From here we may deduce the most logical internal structure of the quasi electron as derived from quintessence. Indeed if the quasi electron has a square root spherical structure, quintessence itself will most logically also have a square root sphere conformation.

The structure can be defined using the equation for the surface area of a sphere: $A=4\pi r^2$. Thus the total volume of a single outer layer of quintessence in the quasi electron will be the surface area of the quasi electron x the average diameter of quintessence [if quintessence is oscillating the average diameter is $(2r_q + 0)/2 = r_q$]. Taking r_{qe} as the radius of the quasi electron and r_q as the radius of quintessence,

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given that there are three quasi electrons in the total electron, the volume of a single outer layer of quintessence (V) is:

$$V = (4\pi r_{qe}^2)^{1/2} \times (r_q/3)^{1/2}$$

If the volume of a single quintessence (V_q) is thus based on a square root sphere, then:

$$V_q = (4/3\pi r_q^3)^{1/2}$$

The total number of quintessences in a single outer layer will thus be the total volume divided by the volume of a single quintessence itself: V/V_q. Thus the number of quintessences (n_{sq}) in a single outer layer is:

$$n_{sq} = (4\pi r_{qe}^2)^{1/2} \times (r_q/3(4/3\pi r_q^3)^{1/2}$$

This very elegantly reduces to

$$n_{sq} = r_{qe}/r_q$$

To be further precise (after all quantum dynamics has to be elegant), the total number of quintessences in the electron will thus be determined by the number of quintessences in a single outer electron layer x the quantum amplitude. The quantum amplitude has been previously calculated using the standard Shrödinger wave equation (see Fundamental Forces and Particle Physics) and is given by ($c^{1/2}/\pi$). Taking the root mean square of the quantum amplitude, the number of quintessences (n_q) in the electron is:

$$n_q = r_{qe}/r_q \times \sqrt{2}(c^{1/2}/\pi).$$

As the radius of the quasi electron is estimated as, $r_{qe} = 6.4 \times 10^{-19}$ m. (see Particle spin and Size), and the number of quintessences in the electron is, $n_q = 1.235 \times 10^{20}$, this allows us to estimate the radius of quintessence itself:

$$r_q = r_{qe}/n_q \times \sqrt{2}(c^{1/2}/\pi).$$

$$r_q = 1.35 \times 10^{-35} m$$

This radius for quintessence is importantly, close to the estimated Planck length. Moreover if this does represent the true Planck length then the number of quintessences present in the electron and thus its mass, is explained.

Therefore, these observations postulate that the internal structure of the electron consists of a square root sphere, composed of a single outer layer of quintessence x the root mean square of the its quantum amplitude.

The electron is itself composed of quintessence with a velocity of c and has an intrinsic radius of $1/c \times 1/spin$ in metres; and in accordance with its half integer spin $h/4\pi$; its spin velocity is $2\pi/c$ in metres/sec, (see Particle Spin and Size) which in vortex mechanics gives it the ideal harmonic balance with quintessence space time.

Thus given the surface area of the quasi electron in order to fill the outer layer allowing for the quantum amplitude of oscillation would require 1.235×10^{20} quintessences. The total number of quintessence required to fill the whole electron would thus be $n_q = 1.235 \times 10^{20}$. Overall the number of quintessences required to make up the electron can be verified from the internal structure of the electron and the radius of quintessence. Thus if r_q is equivalent to the given Planck length, then accordingly the number of quintessences in the electron is calculated as 1.235×10^{20}, which gives the mass of the electron $m_e = m_q \times n_q$, hence:

$$m_e = m_q \times n_q, = 9.10938 \text{ kg}$$

Intriguingly the derivation of the structure of the electron reflects the volume of an ordinary sphere

$$V = 4\pi r^2 \times r/3 = 4/3\pi r^3$$

This underpins a fundamental concept, mass determines the shape of space-time and in turn the shape determines the amount of mass within it.

It is important to have a working understanding of why the mass of the electron should be what it is from its basic structure. This understanding can now be derived from the radius of quintessence, which also corresponds with the Planck length.

Dimensional Equations for Quintessence

As $h = 3m_q c^2$ and the dimensions of h are $[ML^2T^{-2}.T]$ and those of c^2 are $[L^2.T^{-2}]$ the equational dimensions of quintessence are $[M][T]$, and the dimensions relating to the number of quintessences n_q is $[T^{-1}]$. Clearly therefore,

$$[M] = [M][T] \times [T^{-1}]$$

and overall

$$M = m_q \times n_q.$$

Dimensional Equations for the Electron

The dimensions of the equation for the electron, in the light of quintessence, can now be fully examined, if

$$e^2 = \frac{\varepsilon_0}{3 \left(4/3\pi c^3 \right)} \qquad (6b)$$

Then taking the dimensions of the equation, e^2 is the charge $[q^2]$, in Coulombs; ε_0 is the permittivity of free space, in Capacitance $[C]$ per metre $[L]$; and $[c]$ is the speed of light, in $[L/T]$.

Thus the above equation using dimensions, is given by

$$[q^2] = \frac{[C]}{[L][c^3]}$$

In this case the velocity is given as the velocity of light c, then $L = c.T$; then

$$[q^2] = \frac{[C]}{[c^4][T]}$$

As $q^2 = C^2 V^2$, where V is volts, then:

$$[C^2][V^2] = \frac{[C]}{[c^4][T]}$$

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and

$$[CV^2] = \frac{1}{[c^4][T]}$$

as $E = CV^2$, then

$$E = \frac{1}{[c^4][T]}$$

and as $E = mc^2$, then

$$mc^2 = \frac{1}{[c^4][T]}$$

and hence

$$m = \frac{1}{[c^6][T]}$$

The significance of this dimensional analysis, in the first instance, appears obscure. Nevertheless, it reveals the very nature of matter and energy. Thus the equation for the mass of a structure can be represented by $1/c^6$ which represents the six complex vectors of matter.

Interestingly, given it is known that $1/c^2 = [\mu_o.\varepsilon_0]$, then

$$m = [\mu_o.\varepsilon_0]^3/T$$

Where $\mu_o.$ and ε_0 are again the permeability and permittivity of free space, quantities that are inherently caused by the vibration of quintessence. Thus mass itself is the result of the vibration of quintessence in the six complex vectors (each represented by the fundamental properties of quintessence μ_o or ε_0 .Hence, the equation for the quasi electron mathematically and geometrically forms the "perfect" three dimensional sphere with its mass accounted for by its six complex vectors.

Energy associated with this matter is in turn is also caused by the the vibration of quintessence (including that in the complex vectors, i) such that:

$$E = [\mu_o.\varepsilon_0]^2/T$$

The dimensions for the equation for energy can also be written as:

$$E = \frac{1}{c^3.L}$$

Which indicates that the energy of matter is again related to the dimensions of the structure of the electron $\varepsilon_0 /(4/3\pi c^3)$ and the permittivity of free space in capacitance per meter (C/L)
Overall the equation for the quasi electron and its dimensions, gives us the origin of

mass and energy. The equation for the electron then forms the key to the understanding of the nature of the relationship between matter and space-time.

Indeed we may now even derive Newton's second law of motion (F = ma, and thus the other fundamental laws of physics) from first principles to confirm the validity of the above.

If:

$$E = \frac{1}{[c^4.][T]}$$

Which is dimensionally equivalent to:

$$E = \frac{[T^3]}{[L^4]}$$

then as F = E/L:

$$F = \frac{[T^3]}{[L^5]}$$

and thus

$$F = \frac{[T^6]}{[L^6.T]} \cdot \frac{[L]}{[T^2]}$$

Substrituting for m from eq. 1g

$$m = \frac{[T^6]}{[L^6][T]}$$

Then

$$F = ma$$

Thus taking into account the whole of these observations enables the laws of motion and the equations for energy and mass and their equivalence to be derived from geometric first principles.

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Claims:

1.   A method of generating a force acting on a body, wherein electron flow through the body in rotation is directed so as to simultaneously pass through said body in its direction of rotation and contrary to its direction of rotation so as to release a directed flow of gravitons.

2.   A method of accelerating a body by generating a force acting on it by the method of claim 1.

3.   A method according to claim 1 or 2, wherein electrical currents are passed simultaneously through said body in its direction of rotation and contrary to its direction of rotation.

4.   A method according to any one of claims 1 to 3, wherein the body is at least partly of superconducting material.

5.   A device for generating a force sufficient to accelerate a body the device comprising;
       the body in the form of an electrically conductive mass, means for rotating said mass and means for passing electrical currents simultaneously through said mass in its direction of rotation and contrary to its direction of rotation.

6.   A device according to claim 5, wherein the mass is spherical.

TECHNICAL AND THEORETICAL SPECIFICATIONS

FOR WARP DRIVE TECHNOLOGY

ABSTRACT

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The present invention relates to the use of
technical drive systems which operate by the modification
of gravitational fields. These drive systems do not

10 depend on the emission of matter to create thrust, but
create a change in the curvature of space-time, in
accordance with general relativity. This allows travel
by warping space-time, to produce an independent warp
drive system. Electron flow through a body in rotation

15 is directed so as to simultaneously pass through said
body in its direction of rotation and contrary to its
direction of rotation so as to release a directed flow of
gravitons.

FIG. 1

"A"

x

y

Motor

B - Spherical
Superconductor

Commutator
Device

Supercooled
Jacket

Vertical
Rails

Motor

Direction of Motion
y vector (vertical rails)

Figure 1 & 2

Superconductor

Spherical Superconductor

radius

FIG. 2

Commutator
Device

VIEW ON "A"

A = Ultracentrifugational Axle
      (rps 10,000 revs/sec)
B = Spherical Superconductor

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TECHNICAL AND THEORETICAL SPECIFICATIONS FOR AN ANTI-GRAVITY DEVICE

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TECHNICAL AND THEORETICAL SPECIFICATIONS
FOR AN ANTI-GRAVITY DEVICE

FIELD OF THE INVENTION

The present invention relates to the technical modification of gravitational fields, whose presence is postulated by general relativity, to produce an independant anti-gravity device which allows travel through gravitational fields, with or without the aid of concomitant ejection of material for propulsion.

THEORETICAL BACKGROUND OF THE INVENTION

The fundamental concept of antigravity should be examined in the light of quantum gravity and in turn as a component of quantum physics itself. Following recent quantum EPR experiments by Nicolas Gisin in Switzerland, showing that the spin of an electron is determinant upon the observation of the spin of its positron partner and that this effect occurs instantaneously and at a distance, the theoretical predictions of quantum mechanics appear to date to be confirmed. The mathematical predictions of quantum electrodynamics have also proved accurate. The logical basis behind quantum mechanical events and their significance to quantum gravity has been hitherto obscure.

In addition the fundamental links behind quantum physics and gravity have not been previously elucidated on a theoretical basis. Understanding these and their links with special and in particular general relativity may allow us greater insights into gravity itself. To do this it is first important to understand the nature of light. It is generally accepted that electromagnetic radiation (ER) may be best described as a wave travelling along a vector x with electric and magentic fields at perpendicular axes y and z. This would be an example of a one dimensional vector with the wave functions acting in the other two vector dimensions. The characteristics of these wave vectors is that they are oscillatory, i.e. not tightly bound to a particular straight path in space-time. The energy associated with the electromagnetic radiation, $E = hf$, is proportional to the frequency of the oscillations, this in turn implies that the energy associated with these oscillations is not bound by space-time.

This principle is similar to Heisenberg's uncertainty principle, that we cannot determine the exact position and momentum at a given instant:

$$\Delta x \ \times \ \Delta p = h/4\pi$$

Indeed as h (Planck's constant) is equivalent to Energy x time, and p is momentum with x as the space coordinate, Heisenberg's principle, read the other way, itself also implies that energy is not precisely bound by space, time or matter.

This gives us the principal premise underlying the concept of quantum physics, specifically:

- Energy is not bound by space-time -

This concept joined with Maxwell's equations for free space can now be used to assist in explaining space-time, matter and the forces of nature. For the magnetic field of a photon we have:

$$\delta B_x/\delta x + \delta B_y/\delta y + \delta B_z/\delta z = 0$$

Indicating that the photon has no nett magnetic effect, although a temporary displacement in the field does occur. Indeed, Maxwell's counterpart to this equation may reflect the nature of electricity.

$$\delta E_x/\delta x + \delta E_y/\delta y + \delta E_z/\delta z = 4\pi\rho = 3(4/3\pi\rho)$$

This equation is important to the understanding of the nature of the electrical component of electromagnetic waves and in turn the fundamental nature of the electrical component of the elemenatry particles.

Furthermore Maxwell's equation for the speed of light **(c), indicates that the speed of light is not itself a fundamental quantity,** but is determined by two apparently more fundamental quantities, specifically the permittivity of free space (ϵ_0) and the permeability of free space (μ_0) such that

$$c = (\mu_0 \epsilon_0)^{-1/2}$$

That a vacuum can contain values for permittivity and indeed permeability (and that these account for none other than the speed of light) may have profound implications for the nature of the vacuum and thus space-time itself. These observations may, therefore, lead to a greater understanding of space-time and quantum gravity; and in turn matter and the forces of Nature.

Overall, there appear to be three major forces; strong, electro-weak and gravity, each mediated by three force particles the gluon, photon and graviton. These in turn, influence three types of particle, the quark, lepton, and by General Relativity space-time itself. Each of these are composed of particles with multiples of charge of 1/3 and are in three dimensions of space time, which are themselves in three generations. It is important that a comprehensive view of Nature explains this threefold symmetry.

2

The Space-time Lattice

Following these observations, in order to understand the nature of space-time itself at the quantum level a further look at the nature light and the photon is necessary. Since Einstein's description of light as a particle (the photon) and the description of the photoelectric effect, the standard picture of light as simply a wave can, no longer be applied. If light was to exist as a photon, it could not exist in one dimension, it would need to be three dimensional, with the addition of time. Let us suppose, in this case, that a photon is a three dimensional helical ringlet of light travelling in the x vector, and spinning round the x-axis. This ringlet itself would be vibrating in the y and z vectors. The vectors x, y and z would represent a ringlet of light, the photon, the substance of which, would be oscilllating in the y and z vectors which would represent oscillatory energy, and in turn would allow it to act as a wave, and create oscillatory electromagnetic fields.

It is important to re-examine **space-time** itself in this light, this would have one directional vector with two vector dimensions of energy, one of capacitance and one of electrical permeability, thus accounting for the well known constants of free space; the permittivity of free space (ϵ_0) and the permeability of free space (μ_0) respectively. The vector dimension of direction x, would be the direction of travel and those "quintessences" travelling in an outwardly direction would account for none other than the expansion of the universe. Three of these quintessences would naturally constitute three dimensional visible space-time. These constituents of space-time would interact with the generations of the other vector dimensions reciprocally. **Thus one quintessence would sweep out one vector of permeability and one vector of permittivity, through which the other two quintessences could travel, and vica versa, creating a three dimensional space-time lattice.**

The permittivity of free space, (ϵ_0) which is equivalent to capacitance, would as with capacitance plates, be determined by the effective separation between quintessences. The permeability of free space (μ_0) is in fact a force, measured as $4\pi \times 10^{-7}$ N A^{-2}, would result from the force produced by the vibration of quintessence and would be dependant on the density of quintessence. Hence these two parameters would be reciprocal and thus the product of these two would therefore be a constant, which is recognised as none other than the speed of light.

$$c = (\mu_0 . \epsilon_0)^{-1/2}$$

This space time lattice would in effect be created by quintessences travelling in all directions with an rms speed of c within the lattice. The quintessences of the space time latice would in effect produce a non-static ether. A non-static ether is fully compatible with special and general relativity. Indeed such an ether explains how space time can be curved as in general relativity. Furthermore, the existence of a non-static ether, was espoused by Einstein in his University of Leyden lecture on general relativity of 5th May 1920. In Einstein's own words; "According to the general theory of relativity space without ether is unthinkable."[ref 1]

3

Recent evidence from a number of sources now strongly support the presence of this non-static ether, in the form of quintessence. An editorial from a major journal states "combined with other observations such as those of distant Supernova, the QMAP results corroborate the prevailing theory of inflation with the twist that the Universe is only one third matter (both ordinary and dark) and two thirds quintessence, a form of energy possibly inherent in empty space".[refs 1a,2,3]

If we take into account the existence of quintessence and as such a three dimensional space-time lattice, matter which is intrinsically made of contituents of charge would interact with this lattice to produce the effects of mass. Mass would be perceived as a result of matter (whose constituent particles appear to contain charge) interacting with this lattice directly due to the inhibition of motion by the lattice's electrical permeability and permittivity vectors.These quintessences would in the direction in the y and z vectors produce small vibrations of the order of the Planck length (10^{-35} m), whilst passing through the vectors of permeability and permittivity.

This vibration would endow quintessence itself a (non rest) mass (m_q) equivalent, to the minimal mass of:
$$m_q = h/3c^2 = 2.458 \times 10^{-51} \text{ kg.sec} \qquad (1)$$

The presence and magnitude of Planck's constant (h) and especially the speed of light (c) is thus explained. Indeed, the speed of light $c = (\mu_0 \, \epsilon_0)^{-1/2}$ **is not in itself a fundamental quantity.**

As the energy equivalence formula $E = hf$, applies to three dimensions, the minimal mass of a single quintessence (m_q), would, in one dimension, thus be one third of the visible three dimensional minimal mass, h/c^2, hence again:

$$m_q = h[\mu_0 \, . \epsilon_0]/3 = h/3c^2 = 2.458 \times 10^{-51} \text{ kg.sec} \qquad (1a)$$

or
$$3m_q c^2 = h \qquad (1b)$$

It is postulated by general relativity that the shape of space-time itself can be altered, indeed the presence of the space time lattice now allows this to be altered by altering the density of quintessence. It is further clear that if quintessences underly the structure of the space-time lattice, they may also underly the structure of matter itself.

With regards a single quintessence, this passing through an energy vector of the space-time lattice would appear as a vibrating string. In a similar way to string theory, the conglomeration of these quintessences would produce the constituents of ordinary matter. Thus the general equation for the number of quintessences (n_q) in an object of mass (m) would be
$$m/m_q = n_q \qquad (2)$$

The mass of the electron (m_e) for example, would be directly determined by the number of quintessences in the electron, multiplied by the mass of quintessence (m_q).

Electron Structure

Understanding the electron is fundamental to the understanding of the elementary particles. The hidden nature of the electron may recently have been revealed through observations by Horst Stormer, Daniel Tsui and Robert Laughlin for which a Nobel prize has recently been awarded. They describe a quasi electron particle of charge 1/3e. This has been described on a quantum basis as a vortex of energy, bound as a quasi particle in one dimesion x, but not bound in the other two dimensions y and z, allowing dispersion in space-time as a vortex. What is more intriguing are the experimental conditions in which this occurs. First of all a two dimensional electron gas is created and held between two capacitance plates. A magnetic force is then applied in the remaining dimension, virtually creating a one dimensional passage through which only a quasi electron appears to be able to pass.[refs 4,5]

Given the presence of charge of 1/3 e, then three of these quasi electrons could form an entire electron in three dimensional visible space time. Nevertheless, each would have energy and hence a wave function which would be present in the other vectors. This electron could thus follow the probability functions as described by the Shrödinger wave equation for ψ (otherwise termed as "essence" by Shrödinger)

If the mass of the electron (m_e) is constituted from quintessence, using the formula:

$$m_e/m_q = n_q \qquad (2)$$

Then an electron would be constituted from:

$$9.11 \times 10^{-31} \text{ kg} \div 2.458 \times 10^{-51} \text{ kg.sec} = 3.70 \times 10^{20} \text{ quintessences/sec.}$$

Thus taking into account the mass-energy content of quintessence (m_q) it is independantly possible to derive the magnitude of the charge of an electron (e) using the following equation.

$$e = [m_q \epsilon_0 / 4/3\pi hc]^{1/2} = 1.61 \times 10^{-19} C$$

This is in close agreement with the experimentally observed charge on the electron of 1.60×10^{-19} C.

Interestingly substituting $m_q = h/3c^2$ in the above equation we have:

$$e = [\epsilon_0 / 3(4/3\pi c^3)]^{1/2} \qquad (3)$$

This can also be written as

$$e = \left[\frac{\epsilon_0}{3(4/3\pi c^3)} \right]^{1/2} \qquad (3a)$$

Equation (3) has a number of very special implications, if re-examined, firstly three of these quasi electron spheres appear to to be required to constitute the charge of

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the electron . More intriguingly, it indicates that the charge is related to the volume of a sphere with an apparent radius of c. Thirdly it indicates that the square of the charge of an electron (e) is proportional to the permittivity of free space (ϵ_0). The charge given from equation (3) is in close agreement with the measured charge of the electron. Furthermore an **exact** value for the charge of the electron can be deduced by taking into account the gravitational field of the Earth (see Gravity and the Charge of the Electron). Furthermore the charge of the electron (e) can now be derived from first principles. Thus, equation (3) corroborates the evidence that the electron is indeed composed of three quasi electrons in keeeping with recent experimental findings.[ref 5]

The significance of the electron, composed of three spheres each with a radius of c, is not immediately clear, but can be understood if the frequency of rotation of the electron is taken into account. Thus if the diameter of the electron was approximately 10^{-15} m, then its spin would need to be $c/10^{-15}$ m $\approx 10^{23}$ cycles/sec. Thus given a very high rotation rate an electron could have an effective radius of c and still occupy subatomic sizes. Indeed these observations might be used to estimate the rate of rotation of the quasi electron and its size (see Appendix 1).

With regards a single quintessence, this passing through an energy vector of the space-time lattice would appear as a vibrating string. In a similar way to string theory, the conglomeration of these quintessences would produce the constituents of ordinary matter. The electron, for example, would be constituted from approximately 3.7×10^{20} quintessences.

The dimensions of the equation for the electron can be readily resolved by considering **each of the three vector dimensions**. The exact dimensions of the equation need to be considered in the light of the nature of space-time itself. These dimensional equations help explain the nature of matter. Indeed the equation for the electron may be necessary for the full understanding of gravity, this is also fully addressed (Appendix 1, Dimensional Equations)

Intruiginly from our knowledge of the electron we can further define the term α, the fine structure constant; from the structure of the electron. Thus as the standard term $\alpha = e^2/\hbar c.4\pi\epsilon_0$; substituting the term $e^2 = \epsilon_0/3(4/3\pi c^3)$ (eq.3) and $h = 3m_q c^2$ (eq.1) we find:

$$2\pi/\alpha = 3m_q[3(4/3\pi c^3)]^2$$

or

$$2\pi/\alpha = 3m_q e^4/\epsilon_0^2$$

For brevity we may represent the quasi electron stucture as $(4/3\pi c^3) = \Xi$; to signify its threefold symmetry, thus

$$2\pi/\alpha = 3m_q[3\Xi]^2$$

Indicating that the fine structure constant of the electron (α) is indeed related to its dimensional structure.

Quintessence is postulated to constitute the fundamental nature of space-time. Three quintessences each travelling in their respective x vectors at 90^0 to each other would create three dimensional real space-time. These quintessences would in the direction in their respective y and z vectors produce small vibrations of the order of the Planck length (10^{-35} m), this would create the vector dimensions of permeability and permittivity. The result would give space-time 9 dimensions of space as in superstring theory. However, unlike superstring theory the six hidden dimensions would not be "curled up so as to be so small as to be invisible" these six dimensions would be present in complex space. Thus, only three of these dimensions would represent ordinary three dimensional particulate space time i.e. three dimensional objects. The other six dimensions produced by the vibrations of quintessence would **form complex space.**

The mathematics of complex space, using imaginary $\sqrt{-1}$ or ($_j$) numbers, is assumed in the standard formulation of the Shrödinger wave equation. Thus the presence of complex space is an integral part of quantum mechanics. [ref 6]

$$-\frac{\hbar^2}{2m} \cdot \frac{d^2\psi}{dx^2} + V\psi = {_j}\hbar \cdot \frac{d\psi}{dt}$$

The mathematics of complex space is also an essential and integral part of the principles and application of modern electronic and control engineering. Indeed it has been well recognised for some time that each direction vector in electronic engineering can be associated with complex vectors. [ref 7]

As this complex space consists of the vectors of permittivity and permeability it would only be "felt" by charged particles as in the electron. Nevertheless, as all particles are fundamentally composed of charged particles the effects of complex space would be felt by endowing these particles with mass and in turn kinetic energy.

In conventional complex space, a 2 dimensional Cartesian Argand diagram is mathematically used. However, in order to formulate the equations for particles a three dimensional Argand diagram is essential. This will have three dimensional vectors, one real vector and two imaginary vectors. Three of these diagrams will be required to fully describe the nature of particles, each with a real vector in the x, y and z vectors, respectively. Nevertheless, in the instance below the real vector is the x vector and the two imaginary vectors are given by ($_j$y, $_j$z)

Three Dimensional Argand Diagram

The beauty of a three dimensional Argand diagram is that the complex conjugate (i.e. the mirror image which confers mathematical reality on the coordinates) is formed by the value of the minus coordinate in the other complex vector dimension. Thus the complex conjugate of $(c_x^{1/2} + {}_jc_y + {}_{-j}c_z)$ is $(c_x^{1/2} + {}_{-j}c_y + {}_jc_z)$. These two sums when multiplied thus give a real number solution.

Furthermore it is clear that nine dimensions of space time are necessary in the general relativistic equations. By including complex space we thereby create the nine dimensional spacial metric tensor and the metric energy tensor of matter necessary for computations for general relativity (see quantised general relativity pp 34-35).

Complex Space and Electron Structure

The presence of complex space also now further explains the conformation of the the electron, and its formulation at the quantum level, and the presence of particles, anti-particles and their spin up and spin down characteristics.

Indeed the short form equation for the charge of the electron (-e) can now be rewritten as a metric tensor with three dimensions in real space and six in complex space.

Thus if three of the x, y and z vectors are in real space and six vectors in complex space, where c is the speed of light in the real space vector, ${}_jc$ is the speed of light in the complex vector and ${}_{-j}c$ is the complex conjugate of ${}_jc$, thus the electron can be mathematically represented by the equation:

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$$-e = \epsilon_{qe}/(4/3\pi)^{1/2} . \begin{array}{ccc} (c_x)^{1/2} . & (jc_y) & .(-jc_z) \\ + & + & + \\ (-jc_x) & .(c_y)^{1/2}. & (jc_z) \\ + & + & + \\ (jc_x) & .(-jc_y) & .(c_z)^{1/2} \end{array} \qquad (4)$$

Which now gives the real number solution

$$e = \epsilon_{qe}/3(4/3\pi c^3)^{1/2}$$

Where ϵ_{qe} is given as the permittivity of free space for a single quasi electron (see appendix 1).

Whilst the two dimensional Argand diagram has four quadrants, the three dimensional Argand diagram has eight cubic sectors. Two of these cubic sectors are diametric opposites and can represent "real" particulate objects. These have the primary coordinates x, y, -z ; as in the electron described above, and the -x, -y, z, with the real vector x now having a minus sign. These two "real" cubic sectors, therefore, mathematically represent particles and their anti-particles.

The mathematical presence of the two primary diagonal mirror images (x, y, -z and -x, -y, z) now allow the introduction of the concept of antiparticles. This extension of the maths into a three dimensional Argand diagram thus results in the automatic formulation of the maths of antiparticles. Thus the charge of the positron (^+e) is formulated by the shortened form equation, where the real vectors now each have the minus sign, and therefore exist in the -x, -y, z sector of the three dimensional Argand diagram.

$$+e = \epsilon_{qe}/(4/3\pi)^{1/2}. \begin{array}{ccc} -c_x^{1/2} & _{-j}c_y. & _{j}c_z \\ _{j}c_x . & -c_y^{1/2} . & _{-j}c_z \\ _{-j}c_x. & _{j}c_y . & -c_z^{1/2} \end{array} \qquad (5)$$

The three dimensional Argand diagram also accounts for chirality and indeed the up and down spin of the electron. There are two other "real" primary coordinates in the Argand diagram, these are themselves the partial mirror images of the above coordinates (i.e. x, -y, z and -x, y, -z). In particular the y axis is of the opposite sign, thus in particles the y axis is in the downward direction, to form down spin particles and in anti-particles in the up direction, to form the antiparticle The up spin electron is given by eq. 8 and hence the down spin electron (-e ↓↓⟩)is given by the equation

$$-e |↓↓⟩ = \epsilon_{qe}/(4/3\pi)^{1/2}. \begin{array}{ccc} c_x^{1/2} . & _{-j}c_y & _{j}c_z \\ _{j}c_x. & c_y^{1/2} . & _{-j}c_z \\ _{-j}c_x . & _{j}c_y. & c_z^{1/2} \end{array} \qquad (6)$$

Thus the three dimensioanl Argand diagram accounts directly for the presence of antiparticles and the spin up and spin down particles seen in nature. It also accounts for the necessity of the electron to form a square root spherical object, as complex space depends on $\sqrt{-1}$, otherwise known as j.

Electron Pairing and Superconductivity

As the quintessences making up the electron are in a square root conformation, each of these quasi electrons would have a tendancy to pair to form an entire sphere.

The square root sphere structure of electrons with up and down spins can now superimpose to produce a complete sphere of varying extents. This produces electron pairing as seen at the atomic and molecular levels. It also accounts for the Pauli exclusion principle. **This pairing thus accounts for the reactivity of the valence electrons** and the electron probability densities, which in turn accounts for the existence of chemistry. [ref 6]

Furthermore, it is possible to account directly for superconductivity from first principles. For if both the complex and real vectors of the electron combine completely, the product of an up and down spin electron form a perfect superimposed sphere with radius c, with a charge of 2.59×10^{-38} Coulombs, denoted by the formula:

$$e^2 = \frac{\epsilon_0}{3 \left(4/3\pi c^3 \right)} = 2.59 \times 10^{-38} \, C \qquad (3b)$$

As with standard superconducting theory, superconductivity can be explained by the formation of "Cooper" electron pairs, where the electrons are forced to pair by the presence of positve crystal charge in particular formation, at supercooled temperatures. In addition the electron pair now forms a stable entity whose angular momentum cancels.[ref 6]

It additionally becomes clear that the charge of two seperate electrons (2e) is 3.2×10^{-19} C, but the charge of the combined electrons (e^2) is 2.59×10^{-38} C. This electron pair thus appears to have 19 orders of magnitude less charge than the electron and in turn 19 orders of magnitude less resistance. **It is this effective reduction in charge and in turn resistance which may account for superconductivity.** When observed directly any electrical interaction with the Cooper electron pair will, however, result in the release of the full charge of both electrons, so that the full electrical charge put in will be equal to that coming out of the apparatus.

Wave Particle Duality

If the presence of quintessence accounts for the structure of matter and if matter itself forms from the number of quintessences (which are in units of t^{-1}) then the frequency of matter and thus wave particle duality directly arises from first principles. Specifically the wavelength of matter derives from the vibration of quintessence from which it is constituted. Thus the frequency (f) and in turn **the wavelength of light and matter is directly equivalent to the number of quintessences contained within it**. We find that the actual frequency of light can be exactly derived from first principles from the effective mass of the photon (m_γ) and thus by the number of quintessences (n_q) it contains:

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Thus for light:

$$f = E/h$$

and if $E = mc^2$, and $h = 3m_q.c^2$, then

$$f = m_Y c^2/ 3m_q.c^2$$

thus

$$f = m_Y/3m_q = n_q/3$$

and

$$f = E/h = n_q/3 \qquad (7)$$

Thus the formula for the frequency of light ($E = hf$) is now readily explained by the observation that the frequency is determined quite directly from the number of quintessences (n_q) within the photon.

The wavelength is thus also given by:

$$\lambda = c/f = 3m_q c/m_Y = h/p \qquad (8)$$

We can now show that the frequency of matter also has the same derivation from quintessence, as has the frequency of light. The frequency of matter is again equivalent to the number of quintessences it contains. **Thus the wave particle duality of matter itself can be explained by its composition from quintessence.** The amount of quintessences contained within a electron sphere will depend on the number of quintessences constituting the electron **and** those passing through it as a result of its relative velocity; effectively its momentum (p). The frequency will then be equivalent to the total number of quintessences times the relative velocity v compared to the velocity of light. So that if $v/c = \beta$, then

$$f = \beta n_q/3 = \beta E/h \qquad (7a)$$

Thus using the conventional de Broglie wave equation for matter, only gives an estimate of wavelength for matter as it only accounts for the momentum of the object and not the relativistic mass.

$$\lambda = h/p$$

The momentum (p) of an electron is conventionally derived from the electrical kinetic energy of the electron and the mass of the electron m_0. If:

$$E_k = 1/2\, mv^{1/2} \quad \text{and} \quad p = m_0 v$$

Thus

$$E_k = p^2/2m_0$$

then

$$p = (E_k.2m_0)^{1/2}$$

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and conventionally the de Broglie equation can also be written as:

$$\lambda = h/p = h/(E_k.2m_0)^{1/2}$$

In turn the Shrödinger wave equation simply derives from the square of the above classical non relativistic term for kinetic energy:

$$\lambda^2 = h^2/E_k.2m_0$$

thus
$$E_k = \frac{h^2}{2m} \cdot \frac{1}{\lambda^2}$$

As $E = E_k + V$

then
$$E\psi = -\frac{\hbar^2}{2m} \cdot \frac{d^2\psi}{dx^2} + V\psi = j\hbar \cdot \frac{d\psi}{dt}$$

However, the de Broglie equation and in turn the Shrödinger equation, may be refined by taking into account relativity. Thus the true values for the energy are given by the relativistic momentum (p) **and** the relativistic rest mass energy.

A fundamental relativistic wave equation for λ, and its logical derivation may now be developed through the concept of quintessence as a fundamental constituent of matter.

The amount of quintessences in the electron is determined by the number of quintessences forming the electron at rest, ($m/m_q = n_q = 3mc^2/h$) plus the amount of quintessences passing through it, which will determine the (electrical) momentum (p) of a partilcle.

The frequency of matter can now be readily calculated from first principles to give a more accurate result. Thus as matter is made of quintessence, similarly to light, its frequency depends on the number of quintessences (n_q) within it travelling relative to the speed of light and thus multiplied by the relative velocity compared to **c** ($\beta = v/c$);

Hence for matter:
$$f = \beta n_q/3 = \beta E/h \qquad (7a)$$

As convetionally
$$E = (p^2c^2 + m_0{}^2c^4)^{1/2}$$

then
$$f = \beta(p^2c^2 + m_0{}^2c^4)^{1/2}/h$$

Thus if $\lambda = c/f$, where c is the velocity of the constituent quintessences, then

$$\lambda = hc/\beta(p^2c^2 + m_0{}^2c^4)^{1/2} \qquad (9)$$

or
$$\lambda = hc/\beta E \qquad (9a)$$

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which is the same as:

$$\lambda = hv/\beta^2 E \qquad (9b)$$

Where v is the relative velocity. Thus when v is very close to the speed of light c, then the eqution can be contracted to

$$\lambda = hc/E \qquad (9c)$$

Thus the wavelength of matter follows directly from its constitutents, quintessence. As matter is made of quintessence, similarly to light, its frequency depends on the number of quintessences (n_q) within it, travelling relative to the speed of light. Moreover, $\lambda = hc/\beta E$, underpins a fundamental relationship between wavelength and energy. Furthermore, this is mathematically the same as the term $\lambda = hv/\beta^2 E$, giving a relativistic expression for the the wavelength of matter, from which the relativistic equations may be directly derived (see Wave Particle Duality and Relativity).

These equations explain on a logical basis such phenomena as the wavelength of particles. It also explains the formation of laser light and Einstein Bose condensates. Indeed for photons or atoms of the same frequency, and the same relative velocity, **the relative wavelength will be 0, hence these photons or atoms will occupy the same quantum state,** which allows them to form laser light or matter condensates.

We can now, also, reformulate the Shrödinger wave equation, which has the advantage that relativity can be treated in a quantum mechanical way. Thus if the wave energy of matter is defined as

$$E_\lambda = \beta(p^2 c^2 + m_0^2 c^4)^{1/2} \qquad (9\beta)$$

thus

$$E_\lambda = (\beta^2 p^2 c^2 + \beta^2 m_0^2 c^4)^{1/2}$$

which in complex space reduces to

$$E_\psi = (-j\beta\cdot\nabla + \beta m)_\psi$$

As the term $\alpha = e^2/\hbar c.4\pi\epsilon_0$; also represents the ground state ratio of the velocity of the electron to c. Thus $\alpha = \beta = v/c = 1/137$.

Thus, *also*

$$E_\psi = (-j\alpha\cdot\nabla + \beta m)_\psi$$

This is thus the standard relativistic equation that Dirac was able to construct from the Shrödinger probability equation. This relativistic equation can be derived from the modified wave equation (9). This takes into account the relative mass energy which the quintessential wave equation (9) contains.

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Where importantly the term βm is the mass m, multiplied by the ratio of the relative velocity to light $\beta = v/c$, and the term α is also essentially the relative velocity of the electron. The above is an empirical formula which works mathematically, nevertheless even Dirac admitted it was not logically understood.

The importance of these equations (eq. 9a,b,c, β) is that they show that the existence of **quintessence allows the wave-particle duality of matter to be explained and mathematically derived from first principles,** Thus the frequency of matter or even light is simply determined by the number of quintessences it contains and their proportional relative velocity, v/c

Indeed, a recent publication in Nature has suggested that the direct visualisation of the orbitals of electrons shows that these are in very close agreement with theory. These orbitals were in keeping with the Dirac equation, which itself may be derived from the modified wave equation above $\lambda = hc/\beta E$ (eq. 9).[ref 8]

Indeed the results of recent experiments support the modified wave equation (9). In these experiments it has been shown that by reducing the temperature and thus the energy and velocity of the particles of the neutral Fermi gas ^{3}He, in the Kelvin range, that their average wavelength can be controlled. Using gaseous ^{3}He it has been shown that by decreasing the temperature of the gas, there was an apparent increase in wavelength of the gas. **Furthermore, this increase in wavelength demonstrated a relativistic curvilinear plot in keeping with equation 9.** [ref 9].

For a full numerical analysis of the the relationship between velocity and the wavelength for these equations see Appendix 1. Briefly analysing the equations mathematically, the rest mass $(\beta^2 m_0^2 c^4)$ component of the modified wave equation (9) is only significantly greater than the electrical momentum (p), at energies of about 1 Kev or below. Therefore with conventional higher accelerator energies the rest mass component is not relavent, thus the equation reduces to:

$$\lambda = hc/\beta(p^2.c^2)^{1/2}$$

Near to the speed of light, this can be approximated by the standard de Broglie equation thus:

$$\lambda = h/p$$

Thus near to the speed of current accelerators, where v approaches **c**, therefore, the de Broglie wave equation will give an answer which accurately approximates to equation (9) above; but otherwise equation(9) represents the true equation for the wavelength, derived from first principles, from which the de Broglie equation can be derived as a general case.

Unlike the de Broglie equation the Shrödinger wave equation will approximate to the correct values untill v approaches c. Indeed the Shrödinger equation will give virtually the same answers as that derived from equation (9), under most experimental conditions.

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Thus equation 9 and its derivative may have advantages over standard Shrödinger theory with relativistic speeds. Furthermore, equation 9, conceptually shows that the wave particle duality of matter derives from the principle that the frequency of matter emanates directly from the number of quintessences it contains. Importantly it also mathematically allows relativity and quantum mechanics to be united.

With $v \ll c$, the modified equation (9) will yield more accurate results, particularly with the de Broglie equation. Near to the speed of current accelerators, therefore, the de Broglie wave equation will give almost the same result as equation (9), but the modified equation will clearly give a more accurate estimate at intermediate speeds.

Thus we find that the modified de Broglie wave equation $\lambda = hc/\beta E$ (eq. 9a) leads directly to the Dirac relativistic wave equation and is supported by recent experimental evidence which demonstrate a relativistic curvilinear relationship for the wave equations for matter[ref9].

Wave particle Duality and Relativity

From here it is possible to proceed in several ways using the relativistic wave equation (9). It is apparent that the reintroduction of the term for relative velocity into the wave equations will enable the reintroduction of special relativity into quantum mechanics. In particular we should now be able to derive the term $(1 - v^2/c^2)^{1/2}$ as a special case of quantum mechanics.

Thus if:
$$\lambda = hv/\beta^2 E \qquad (9b)$$

Squaring
$$\lambda^2 = h^2v^2/\beta^4(p^2c^2 + m_0^2c4)$$

Which is equivalent to:
$$\lambda^2 = h^2c^2/\beta^2(p^2c^2 + m_0^2c4)$$

Conventionally $p^2c^2 = (E^2v^2/c^2)$

then
$$\lambda^2 = h^2c^2/\beta^2(E^2v^2/c^2 + m_0^2c^4)$$

Thus as $\beta^2 = v^2/c^2$ and $m_0^2c^4 = E_0^2$, then:

$$\beta^4E^2 + \beta^2E_0^2 = h^2c^2/\lambda^2 \qquad (10)$$

It is possible to derive a further term for the total energy E and the rest energy E_0. from h^2c^2/λ^2. Thus as conventionally:

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$$E^2 = p^2c^2 + E_0^2$$

hence

$$p^2c^2 = E^2 - E_0^2$$

substituting for p^2c^2 into:

$$h^2c^2/\lambda^2 = \beta^2 p^2 c^2 + \beta^2 E_0^2$$

it follows that

$$h^2c^2/\lambda^2 = \beta^2 E^2 - \beta^2 E_0^2 + \beta^2 E_0^2 \qquad (11)$$

Substituting for h^2c^2/λ^2, in eqs. 10 and 11;

$$\beta^4 E^2 + \beta^2 E_0^2 = \beta^2 E^2 - \beta^2 E_0^2 + \beta^2 E_0^2$$

Subtracting $\beta^2 E_0^2$

$$\beta^4 E^2 = \beta^2 E^2 - \beta^2 E_0^2$$

Dividing by β^2

$$\beta^2 E^2 = E^2 - E_0^2$$

Dividing by E^2

$$\beta^2 = 1 - E_0^2/E^2$$

As $E_0 = m_0 c^2$ and $E = {}'mc^2$, then

$$m_0/{}'m = (1 - \beta^2)^{1/2}$$

Thus

$$'m = \frac{m_0}{\left[1 - \dfrac{v^2}{c^2}\right]^{1/2}}$$

Hence, it is now possible to derive the relativistic equations for mass and in turn for space and time from the quintessential wave equation, **thus deriving relativity as a special case of quantum mechanics and thus uniting relativity and quantum mechanics.**

For further proof we might be able to now derive the term $(1 - v^2/c^2)^{1/2}$ as a general case of wave mechanics. This general case is, naturally, when an object has no electrical potential (V) applied, as in the electrically neutral macroscopic world. Thus starting from eq. 10

$$\beta^4 E^2 + \beta^2 E_0^2 = h^2c^2/\lambda^2 \qquad (10)$$

hence

$$\beta^4 E^2 = h^2c^2 \cdot \frac{1}{\lambda^2} - \beta^2 m_0^2 c^4$$

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thus

$$\beta^2 = \frac{h^2c^2}{\beta^2E^2} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0^2c^4}{\beta^2E^2}$$

As $E^2 = {}'m^2c^4$

$$\beta^2 = \frac{h^2c^2}{\beta^2\,'m^2c^4} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0^2c^4}{\beta^2E^2}$$

Substituting $h = 3m_qc^2$

$$\beta^2 = \frac{9m_q^2c^6}{\beta^2\,'m^2c^4} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0^2c^4}{\beta^2E^2}$$

As $m_q/m = n_q$ (eq. 2)

$$\beta^2 = \frac{9c^2}{\beta^2 n_q^2} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0^2c^4}{\beta^2E^2}$$

Thus if $f = \beta n_q/3$ (eq. 7a);

$$\beta^2 = \frac{c^2}{f^2} \cdot \frac{1}{\lambda^2} - \frac{\beta^2m_0^2c^4f^2}{\beta^2E^2}$$

As $1/\lambda^2 = f^2/c^2$

$$\beta^2 = \frac{c^2}{f^2} \cdot \frac{f^2}{c^2} - \frac{\beta^2m_0^2c^4f^2}{\beta^2E^2}$$

Thus:

$$\beta^2 = 1 - \frac{\beta^2m_0^2c^4}{\beta^2E^2}$$

As $E^2 = {}'m^2c^4$

$$\beta^2 = 1 - \frac{m_0^2}{'m^2}$$

Hence

$$m_0/'m = (1 - \beta^2)^{1/2}$$

Thus

$$'m = \frac{m_0}{\left[1 - \frac{v^2}{c^2}\right]^{1/2}}$$

Thus this derivation now allows relativity as a universal case of the quintessential wave nature of matter.

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Energy and the Space-time Lattice

The presence of numerous experimental data for quantum tunnelling [refs 9,10,11,12,13] and indeed the recent observations by Nicholas Gisin, on the spin of the electron now returns us to the EPR experiment in the initial paragraphs. In recent experiments it has been shown that by reducing the temperature and thus the energy and velocity of the particles of the neutral Fermi gas ^{3}He, in the Kelvin range, that their average wavelength can be controlled. Using gaseous ^{3}He it has been shown that by decreasing the temperature of the gas, there was an apparent increase in wavelength of the gas. **Furthermore, this increase in wavelength reduced the ability of helium to quantum tunnel through an experimental quantum wire mesh**[ref 9].

Using the quintessential modification of the de Broglie wave equation, (substituting $h = 3m_q c^2$) gives us an insight into these EPR effects. As

$$\lambda = hc/\beta E \qquad (9a)$$

then
$$\lambda = 3m_q c^3/\beta E \qquad (9d)$$

Importantly, as indicated by equation (9d), energy not directly linked to any form of mass or quintessence would have a lambda of zero. Specifically pure energy containing no quintessences, would have a lambda of zero. As energy itself has no electrical charge it would not be impeded by the permittivity and permeability of the three-dimensional-space-time-lattice. Moreover as the wavelength of energy would be infinitely smaller than the radius of quintessence this free energy would not interact with the space-time lattice and thus would not be detectable in three dimensional space-time, unless it interacted with matter, as in the EPR experiments. Indeed, energy is not observed when not bound to any form of mass or particle. Thus equation 9d, takes us to our original assertion

- Energy is not bound by the space-time lattice -

Thus, as the EPR experiments suggest the existence of energy separate from matter and thus separate from the three dimensional space-time lattice, it is interesting to find that experiment suggests the existence of free energy in a continuum separate from space time to produce the effects of quantum teleportation [refs 9,10,11,12,13]

This is not, however, teleportation across an additional dimension, this is a term to describe in partially familiar terms the dissociation of energy from the three dimensional space-time lattice. As time is inextricably linked to each dimension of space, the effects of energy would be inextricably linked to the events, such as the creation of virtual particles, we see interacting within space-time.

It is unlikely that observers have any direct day to day experience to explain quantum

events. Nevertheless, quantum physics may have given us a window into the hithereto hidden workings of the Universe. Thereby, the mystery of the uniformity of the Universe, across distances which the speed of light could not apparently traverse, is readily explained by the fact that the free energy contained in the Universe is not bound by the space-time lattice.

In the case of light, due to the exceedingly small masses involved, there would be relatively easy exchange of matter with free energy within a photon. This would make the photon the ideal experimental tool to look for energy which is not bound by matter and in turn energy which is not bound in space-time. Indeed, very recently Furusawa *et al.* have reported to have observed the transference of energy as photons from A to B, without those photons traversing space-time[ref 10]. This finding which has been supported using other experimental techniques[refs 11,12,13,], is very important as it suggests the existence of such a quantum continuum. The observations made in this letter predict that the smaller the wavelength of the photon used in this experiment, the greater the degree of teleportation.

We have already seen strong experimental data using photons [ref 11], atomic spins and other data for quantum teleportation which have recently been published [refs, 12,13], which support these findings. According to the above equations the teleportation would vary in an predictable fashion, as with photons, in line with the wavelength of the light used, relative to the size of vibration of quintessence. As regards matter, the results do suggest that the effect of quantum tunelling is indeed dependant on the wavelength of matter and the size of that matter [ref 10].

Fundamental Forces and Particle Structure

Overall, there appear to be three major forces; strong, electro-weak and gravity, each mediated by three force particles the gluon, photon and graviton. These in turn, influence three types of particle, the quark, lepton, and by General Relativity space-time itself. Each of these are composed of particles with multiples of charge of 1/3 and are in three dimensions of space time, which are themselves in three generations.

The presence of quintessence in spcae time and the constitution of matter from this quintessence can now be used to explaiɴ the fundamental forces of Nature and the fundamental particles.

Using the Standard Model of particles, it is well accepted there exist quark particle charges of -1/3, -2/3 and +1/3 and +2/3 in quarks and anti-quarks. Given that each particle is made up of three quarks the presence of these fractional charges support the association of the fractional charges in this way to form three dimensional charged particles. In stable particles each of the three quarks would have a vector in one dimension, giving the three quarks together an existence in three dimensional visible

space time. The particles that bind the quarks (gluons) are themselves required, in stable particles, to have three different colour charges, one colour in each dimension, for the particle to exist in three dimensional space-time. Furthermore, there are three generations of quarks (and indeed leptons).

The Standard Model (or a modification of this) and in particular the observation of quarks and indeed quasi electrons with fractional charge of 1/3 and 2/3 in both cases, indicates that particles are constituted from the equivalent of three of these quasi particles to form an electron and quarks to form baryons. In the normal three dimensions the energy would be carried by the particle, However, because each particle is constituted of three quasi particles and in each quasi particle or quark one visible dimension would be the direction vector, in the other two hidden dimensions of each vector the waves would carry energy. Thus each particle would be associated with vibration, which would account for wave particle duality and Heisenberg's uncertainty principle in three dimensional visible space-time.

These observations lead us directly to the previous postulate that the structure of the electron is composed of none other than three (root) spheres, and that this equation for the electron allows the determination of the charge of the electron from first principles, thus:

$$e = \left[\frac{\epsilon_0}{3(4/3\pi c^3)} \right]^{1/2} \qquad (3)$$

In addition the mass of the proton (m_p) can be directly calculated from the ratio of the mass (m_e) of the electron and is given by the equation:

$$m_e/m_p = 5.45 \times 10^{-4} = 3(\pi/c^{1/2}) \qquad (13)$$

Thus if we combine equation 3: $e = [\epsilon_0/3(4/3\pi c^3)]^{1/2}$ and equation 13: $m_e/m_p = 3(\pi/c^{1/2})$ the positive charge of the proton (e_p) is given by:

$$e_p = [\epsilon_0/3(4/3\pi c^3)]^{1/2} \times m_e.3(\pi/c^{1/2})/m_p \qquad (14)$$

The stable nuclear proton conformation can thus be represented by the short form equation :

$$p = 3^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \qquad (15)$$

This forms a stable 3 x 3 conformation as with the stable electron structure.

Importantly the term $3(\pi/c^{1/2})$ is the standard solution to the Shrödinger wave equation for an electron confined in a space with radius c! [ref 6]

Thus the standard equation for an electron confined in a one dimensional box is given by:

$$E\psi(x) = -\frac{\hbar^2}{2m}\frac{d^2\psi(x)}{dx^2}$$

If the one dimensional box has a length 2L the quantum amplitude (A) can only be non zero between x = 0 and X = 2L and the standard solution for the amplitude is none other than:

$$A = (1/L^{1/2})$$

Thus in one dimension the standard solution to the Shrödinger wave equation is:

$$\psi(x) = (\pi/L'^{12}) \sin x/L$$

Thus not only is the electron charge derived from the equation for three spheres each with a radius of c (eq. 3) ; but the proton mass and charge can also be derived from the standard solution to the Shrödinger wave equation for a an electron confined in a space of radius c! [ref 6]

The term $(\pi/c^{1/2})$ itself would thus most logically represent the gluon which is present in the proton. These gluons would bind the quasi electrons together to form the fundamental particles

The masses of all the known particles, **including the up and down quarks, the W boson, the muon, charm, strange, the tauon, truth and beauty** can thus also be derived from first principles in this fashion, and have the quasi electron as their basic constituent particle (see Appendix 1).

Thus the structure of the muon (μ) can also be derived from the ratio of the mass of the electron (m_e) and the mass of the muon (m_μ):

$$m_e/m_\mu = 4.7 \times 10^{-3} = \pi/c^{1/3}$$

Thus
$$\mu = \epsilon_0^{1/2}.m_e/ m_\mu. \ 3^{-}(4/3\pi c^3)^{1/2}.(\pi/c^{1/3})$$

Where the charge of the muon is in this equation equivalent to that of the electron e. In this case $(\pi/c^{1/3})$ can be considered to represent a specific high energy photon. Thus the structure of the muon, written in short form is:

$$\mu = 3^{-}(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}) \qquad (16)$$

Moreover the structure of the tauon can be calculated from the ratio of the mass of the electron and that of the Tauon (1.79 Mev);

Thus 　　　　　$0.511 \text{ Mev}/1.79 \text{ Gev} = 2.85 \times 10^{-4}$

$$m_e/m_\tau = (\pi/c)^{1/3}.(\pi/c)^{1/9} = 2.85 \times 10^{-4} \qquad (17)$$

As the charge of the tauon is equivalent to the charge of the electron, hence the structure of the Tauon is given by the above equation

$$e_\tau = \epsilon_{qe}.m_e/ \ m_\tau.3^-(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} = e$$

This equation accurately predicts the charge -1; and mass of the Tauon (~1.78 Gev) [ref 1]. Thus the structure of the Tauon can in short form be given by the equation

$$\tau = \ ^-3(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (18)$$

Furthermore a more exact value for the mass of the muon and tauon can be deduced by taking into account the gravitational field of the Earth (see Gravity and the Charge of the Electron pg. 17) in a similar way to identifying the exact charge of the electron. In addition it may be necessary to take into account a possible mass value of the neutrino to arrive at a precisely accurate mass value of the muon and tauon. Nevertheless, the mathematical proof of these short form equations lies in the fact that they can very closely identify the charge and the masses of these particles, from first principles, as in equations (3, 15-30, see Appendix 1).

Overall the mathematical geometrical structure of all the particles can be derived from the quasi electron, which is in turn derived from quintessence. Thus, the short form particle structures can now be derived from first principles. This includes the quasi-electron (qe) and electron (e), from which the quarks (u,d) and in turn the stable proton (p) and stable neutron (n) and alpha particle (α) respectively are derived. The general structure of the force carrying bosons the photon (g) and the gluon (γ) and the intermediate vector boson (W) can be given. It will also intriguingly be possible to derive, according to their generation, the structure of the strange (s) charm (c), beauty (b, or bottom) and truth (t or top) quarks directly from the structure of the muon (μ) and Tauon (τ) respectively.

Using the term $\Xi = (4/3\pi c^3)$, where, -/+ represents the charge of the quasi electron, we find:

1st Generation:

$$q_e = \ ^-\Xi^{1/2} \qquad (3a)$$

$$e = 3^-\Xi^{1/2} \qquad (3)$$

$$d = \ ^-\Xi^{1/2}.3(\pi/c^{1/2}) \qquad (19)$$

$$u = 2^+\Xi^{1/2}.3(\pi/c^{1/2}) \qquad (20)$$

$$s = \ ^-\Xi^{1/2}.3(\pi/c)^{1/2} \qquad (21)$$

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2nd Generation

$$\mu = 3^- \Xi^{1/2} . (\pi/c^{1/3}) \tag{16}$$

$$c = 2^+ \Xi^{1/2} . (\pi/c^{1/3}) . (\pi/c^{1/4}) \tag{22}$$

$$b = {}^- \Xi^{1/2} . (\pi/c^{1/9}) . (\pi/c)^{1/4} \tag{23}$$

3rd Generation

$$\tau = 3^- \Xi^{1/2} . (\pi/c)^{1/3} . (\pi/c)^{1/9} \tag{18}$$

$$t = 2^+ \Xi^{1/2} . (\pi/c)^{1/3} . (\pi/c)^{1/9} . (\pi/c)^{1/4} \tag{24}$$

Particle Gluons (g):

$$g_1 = (\pi/c^{1/2}) \tag{25}$$

$$g_2 = (\pi/c)^{1/2} \tag{25a}$$

$$g_3 = (\pi/c^{1/4}) \tag{25b}$$

$$g_4 = (\pi/c)^{1/4} \tag{25c}$$

Particle Photons (γ):

$$\gamma_1 = (\pi/c^{1/3}) \tag{26}$$

$$\gamma_2 = (\pi/c)^{1/3} \tag{26a}$$

$$\gamma_3 = (\pi/c^{1/9}) \tag{26b}$$

$$\gamma_4 = (\pi/c)^{1/9} \tag{26c}$$

Intermediate Vector Boson ($W^{+/-}$):

$$W^+ = 3^+ \Xi^{1/2} . 2(\pi/c^{1/6})^6 \tag{27}$$

$$W^- = 3^- \Xi^{1/2} . 2(\pi/c^{1/6})^6 \tag{28}$$

Stable* Proton:

$$p = 3^+ \Xi^{1/2} . 3(\pi/c^{1/2}) \tag{15}$$

Stable* Neutron:

$$n = \begin{matrix} {}^+\Xi\!\downarrow^{1/2} . 2(3\pi/c^{1/2}) . \Xi\!\uparrow^{1/2} \\ {}^+\Xi\!\downarrow^{1/2} . 2(3\pi/c^{1/2}) . \Xi\!\uparrow^{1/2} \\ {}^+\Xi\!\downarrow^{1/2} . 2(3\pi/c^{1/2}) . \Xi\!\uparrow^{1/2} \end{matrix} \tag{29}$$

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Alpha particle (α):

$$\alpha = \begin{array}{c} [3^+\Xi]\downarrow^{1/2}.2(3\pi/c^{1/2}).\ [3^-\Xi]\uparrow^{1/2} \\ [3^+\Xi]\uparrow^{1/2}.2(3\pi/c^{1/2}).\ [3^+\Xi]\downarrow^{1/2} \\ [3^-\Xi]\downarrow^{1/2}.2(3\pi/c^{1/2}).\ [3^+\Xi]\uparrow^{1/2} \end{array} \qquad (30)$$

The mathematical proof for these structures and their decay mechanisms is lengthy and is thus fully contained in Appendix 1. All the particle structures are accurately mathematically defined by the masses of these particles. [ref 14]

The structure of these particles all contain the quasi electron and thus the metric tensor structure necessary in the formulation of the gravitational equations is sustained. The respective forces created by the gluon and the photon are important as they tell us the behaviour of matter and also lead to the likely structure of the graviton

* Stable nucleonic neutron and proton conformations differ slightly from the Standard Model, this is due to the sharing of quasi electron and quasi positron particles within the nucleus, which allows stabalisation of these particles by the formation of stable 3x3 structures. The Standard conformations which describe non-nucleonic neutrons and protons are additionally given in Appendix 1.

Photon frequency and Quark Size

The significance of the electron, composed of three spheres each with a radius of c, is not immediately clear, but can be understood if the frequency of rotation of the electron is taken into account. Knowing the structure of the electron has led us to deduce its charge and thus may lead us estimate its size and spin. Thus if the diameter of the electron was approximately 10^{-15} m, then its spin would need to be $c/10^{-15}$m $\approx 10^{23}$ cycles/sec. Thus these observations might be used to calculate the rate of rotation of the electron.

Let us suppose, that nature is truly beautiful, and that **the frequency of the photon asssociated with the electron in the muon exactly matches the underlying frequency of spin of the electron**, then the actual spin of the electron may be inferred from the frequency of the specific photon associated with each electron present in the muon. There are three such photons present in the muon. Thus the mass (m_γ) equivalent of the specific photons $3(\pi/c^{1/3})$ in the muon (eq. 16) is given by:

$$3m_\gamma = 3[(m_\mu - m_e)/m_e]\, m_e = 5.76 \times 10^{-28} \text{ kg}$$

Thus as $E = mc^2 = hf$, then the frequency (f_γ) of the photon is given by: $f_\gamma = mc^2/h = 7.81 \times 10^{22}$ cycles/sec. As there are three quasi electrons in the electron, the estimated radius of the quasi electron is $c/f \div 3$.

Giving the radius of the quasi electron (r_{qe}) as:

$$r_{qe} = 1.28 \times 10^{-15}\,m$$

This is also intriguingly the experimental "core" size of the proton, effectively the size at which deep inelastic scattering is known to occur in the proton when bombarded with electrons. This represents the radius of a quasi electron when constrained in a particle by gluons such as in a proton and is essentailly the radius of the quark.

The equation for the the photon, appears to mathematically represent a helical ringlet as with the gluon. For the photon, however this must match the frequency of rotation of the electron, to form a fundamental particle.

Quintessence and Internal Electron Structure

The internal structure of the electron is important for a number of reasons, in particular because it indicates the size of quintessence, which then leads us directly to quantum gravity. Taking into account the origin of the electron's structure from quintessence, it is possible to deduce the mass and three dimensional internal structure of the electron from first principles. As the electron is composed of quintessence this leads to the calculation for the radius of quintessence which is in turn fundamental to knowing the effect of gravity upon space -time If the effective radius of the quasi electron is r_{qe}, the surface area (A) of a conventional sphere would be given by:

$$A = 4\pi r_{qe}^2$$

However, the equation for the quasi electron is the square root of that of a sphere as has been previously shown by the basic equation for the charge and three dimensional structure of the electron (eq 3)

$$e = \left[\frac{\epsilon 0}{3\,(4/3\pi c^3)} \right]^{1/2} \qquad (3)$$

Thus in one dimension, a single quasi electron (q_e) with charge of 1/3e, can be mathematically represented by the short form equation :

$$q_e = (4/3\pi c^3)^{1/2} = 1/3e \qquad (3a)$$

This square root sphere structure, is of considerable importance as it appears to underly the structure of all particles (as described in the particle physics section Appendix 1, eqs. 3,15-30).

From here we can deduce the most logical model for the quasi electron structure, as

derived from quintessence, in three dimensions. Let us suppose, for example, that the quasi electron "square root" sphere were composed of 10 outer layers of quintessence. If we take the outermost layer as the reference layer going at **c**, then each of the successive inner layers would be travelling at less than **c**. Equally if we take the innermost layer as the reference layer travelling at **c** then each of the outer layers of quintessence would be required to travel in excess of the speed of light; these propositions are clearly disallowed.

This is in keeping with the original string theory, proposed by Yoichiro Nambu, that the ends of the proposed strings were required to be rotating (or whipping round) at the speed of light **c**, in order for the string theory to be compatible with general relativity. In the equation for the quasi electron (3a) this is clearly embodied in the formula for its structure.

The most logical and ideal model for a quasi electron, therefore, is a square root sphere with a single outer layer of quintessence in which all the quintessences can then exactly equal the speed of **c**. Indeed if the electron is based on the square root structure, then quintessence itself which constitutes the quasi electron, will most logically also have a square root sphere structure.

Thus the total volume of all the quintessences in the electron will be the square root of the standard formula for the surface area of a sphere, multiplied by the square root of the radius of a single layer of quintessence as below; where r_{qe} is the radius of the quasi electron and r_q is the radius of quintessence:

$$V = (4\pi r_{qe}^2)^{1/2} \times r_q^{1/2}$$

If the volume of a single quintessence is given by the square root structure

$$(4/3\pi r_q^3)^{1/2}$$

The total number of quintessences in the quasi electron will be equal to the total volume of all the quintessence divided by the the volume of a single quintessence itself.

$$n_q = (4\pi r_{qe}^2)^{1/2} \times r_q^{1/2} \div (4/3\pi r_q^3)^{1/2} \qquad (31)$$

For ease of calculation this is of course equivalent to equation 10 as given below, by squaring both sides of the equation:

$$4\pi r_{qe}^2 \times r_q \div 4/3\pi r_q^3 = n_q^2$$

To be further precise there are three quasi electrons which make up the full structure of the electron. These three quasi electrons would be superimposed and thus will all need to be interdigitated in the radius of a single outer layer of quintessence, in the final electron, so that the quinterssences can all be travelling at the speed of light **c**. Hence, the formula for the number of quintessences of the quasi electron allowing for

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the square root structure is:

$$4\pi r_{qe}^2 \times r_q/3^{1/2} \div 4/3\pi r_q^3 = n_q^2$$

Using the standard correction for the packing of spheres $\pi/3$, the formula for n_q is:

$$4\pi r_{qe}^2 \times r_q/\pi^{1/2} \div 4/3\pi r_q^3 = n_q^2 \qquad (32)$$

As the radius of the quasi electron and the internal radius of the proton components are experimentally estimated at $r_{qe} = 1.28 \times 10^{-15}$ [ref 6] (also see Photon Frequency and Quark Size); then the surface area of the quasi electron; $A = 4\pi r_{qe}^2 = 2.06 \times 10^{-29}$ and the number of quintessences within the quasi electron is $n_q^2 = (1.23 \times 10^{20})^2$; accordingly the radius of vibration of quintessence (r_q) is given by:

$$r_q^2 = 4\pi r_{qe}^2 \div (n_q^2.\pi^{1/2}.4/3\pi) = 1.82 \times 10^{-70} \text{ m}$$

and

$$r_q = 1.35 \times 10^{-35} \text{ m.} \qquad (33)$$

The radius r_q is close to the estimated Planck length and overall the above calculation would suggest that the structure of the quasi electron consists of a (root) **sphere which is fromed by a single outer layer of quintessence.** Three of these spheres superimposed are required to form the three dimensional structure of the electron with real vectors in the x, y and z directions.

Intruiginly, the equation for the structure of the quasi electron from quintessence, reflects the equation for the geometry of space itself, So the root sphere structure of the electron $r_q = r/3$. With a normal sphere the volume of a sphere (V) is given by:

$$V = A \times r/3 = 4/3\pi r^3$$

Given the surface area of the quasi electron, in order to fill the volume of the single layer of quintessene around the outer quasi electron would require 1.23×10^{20} quintessences. The total number of quintessences required within the whole electron would therefore be three times this, $m_q \times 3n_q$. The mass of the electron can be confirmed from the number of quintessences required to make up the electron which is in turn, determined by the very shape of the quasi electron. Thus:

$$m_e = m_q \times 3n_{q.qe} = 9.11 \times 10^{-31} \text{ kg.}$$

This underpins a fundamental concept, that the mass determines the shape of space-time and in turn the shape of space-time determines the mass within it.

Although it is possible to directly calculate the mass of the electron from the number of quintessences and the mass of quintessences therein, it is important to have a fundamental knowledge of why the mass of the electron should be what it is from its basic structure. Furthermore, knowledge of the radius of quintessence is essential to derive the equations for quantum gravity from first principles.

Given the overall metric tensor structure of matter, assumed in general relativity, the quantum nature of gravity itself can now be explored. The spherical metric tensor for the electron and the positron (eq. 4,5,6) give the mathematical quantum structure and metric tensor for all the other particles (see appendix 1). Together with the time dimension these nine dimensions account for the 10 dimensional metric tensor necessary to formulate the equations for gravity using Riemann geometry and thus forms the basis of quantum gravity. Intriguingly the metric tensor at each point in space time it is required to consist of a collection of ten numbers, Consequently, ten dimensional space-time hypotheses, such as this or superstring theory, may automatically yield general relativity.

Furthermore, the mathematical representation of the graviton and the gravitational constant can be directly estimated from the knowledge of the mass and radius of quintessence. Thence, the force of the vibrations of quintessence lead directly to quantum gravity. The size of these vibrations has previously been estimated from first principles (see eq. 33).

$$r_q^2 = 1.82 \times 10^{-70} \, m \qquad (33)$$

This value is approximately in keeping with the Planck length estimate (r), which is conventionally derived from the standard dimensional equation:

$$r_q^2 \approx Gh/c^3$$

However, as space is nine dimensional we find that the actual formula is mathematically in agreement with theory when:

$$9r_q^2 = Gh/c^3 \qquad (34)$$

The meaning of the above dimensional equation might be further understood by substituting the mass of quintessence (where $3m_q = h/c^2$) into the equation. Thus in three real dimensions the gravitational constant (G) may be more logically given as,

$$3(\pi r_q^2/m_q) = G\pi/c \qquad (35)$$

Where πr_q^2 is the cross sectional area of quintessence and m_q is the effective mass of quintessence, and thus $3(\pi r_q^2/m_q)$ represents the effective force per unit area which quintessence exerts. This equation reduces to:

$$3(r_q^2/m_q) = G/c \qquad (36)$$

From this we may derive the standard general relativistic relationship for the apparent change in radius (r') around a mass (M), from an understanding of the mass (m_q) and number (n_q) of qiuntessences. As $m_q = M/n_q$,

then:

$$r_q^2 = G.M/3c.n_q \qquad (37)$$

If the dimensions of r_q are [L] and that of n_q are $[T^{-1}]$. Given that $r_q \times n_q = [L][T^{-1}]$ have the dimensions of velocity, the most logical velocity is that of **c**. In fact the relationship below is numerically accurate

$$r'c/r_q^2 = n_q$$

thus substituting for n_q:

$$r' = G.M/3c^2 \qquad (38)$$

Equation 38 is the conventional equation for the general relativistic increase in radius (r') in a gravitational field, which is here derived from the underlying nature of quintessence. Thus the gravitational constant is derived from the mass and radius of vibration squared of quintessence.

Indeed it is apparent that a more fundamental equation for gravitation now exists, for equation (39) is mathematically accurate:

$$r'c/r_q^2 = n_q \qquad (39)$$

These equations may be readily mathematically verified. If in accordance with standard general relativity, the apparent increase in radius r' is:

$$r' = GM/3c^2 \qquad (38)$$

Then given that the mass of the Earth is 5.94×10^{24} kg;

$$r' = 1.47 \times 10^{-3} \text{ m}$$

Accordingly if $r'c/r_q^2 = n_q$ (eq.39)

then
$$r' = n_q r_q^2/c \qquad (39a)$$

Given the number of quintessences (n_q) constituting the Earth is M_E/m_q, then

$$n_q = 5.94 \times 10^{24}/2.458 \times 10^{-51} = 2.415 \times 10^{75}$$

As $r_q^2 = 1.82 \times 10^{-70}$ (eq. 33) then:

$$r' = 1.47 \times 10^{-3} \text{ m}$$

Thus equation 39 gives the same answer as the standard equation and may be understood on a logical basis. Indeed the meaning of **c** in the equation may be

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understood as it has been previously shown as being the basis for the radius of matter (eq. 3).

Hence as $n_q = M/m_q$

$$r'c/r_q^2 = M/m_q \qquad (40)$$

Hence the ratio of the change in radius to that of the radius of quintessence squared, is proportional the ratio of the mass M of an object to that of the mass of quintessence, or

$$r'/r_q^2 = M/m_q.c \qquad (41)$$

Thus the change in radius, r' due to gravitation, is related to none other than the ratio of the mass and radius of an object to the mass and radius of quintessence.

Quantum Gravity and Wave Particle Duality

Quantum gravity can now be readily linked with quantum mechanics, indeed any observations which are self consistent must be able to do so easily.

The frequency of matter or light has been previously derived

$$f = \beta E/h = \beta n_q/3 \qquad (7a)$$

Thus the formula for the frequency of light (E = hf) has previously been explained theoretically by the simple observation that the frequency is determined quite directly from the number of quintessences (n_q) within the photon. The same priniple has also been shown to apply to matter.

Let us now follow these equations for matter by calculating the wavelength of a photon from the Gravitational constant as an example; and also as a test of these observations and to demonstrate that the gravitational equations can also apply to the quantum world.

As $$n_q = r'c/r_q^2 \qquad (39)$$

where r' is the is the general relativistic increase in radius, and r_q is the radius of quintessence (eq. 33). Substituing for n_q, then the frequency of the photon f_γ (where $\beta = 1$) is given by:

$$f_\gamma = r'c/3r_q^2$$

Uing the standard equation, $r' = GM/3c^2$ (eq. 38); we may substitute for r', thus we have:

$$f_\gamma = GM/9r_q^2c$$

thus

$$f_\gamma = \frac{G}{9r_q^2c^3} \cdot m_\gamma c^2$$

and as $E = m_\gamma c^2$;

$$f_\gamma = \frac{GE}{9r_q^2c^3}$$

It is possible to also demonstrate that the same relationship holds for the wave equation for matter. If we take the **relativistic wave energy of matter,** which has been previously derived:

$$E_\lambda = \beta E$$

or

$$E_\lambda = \beta(p^2c^2 + m_0^2c^4)^{1/2} \qquad (9\beta)$$

This includes the term for the number of quintessences flowing through the electron, in the complex vectors of space-time, to give the relativistic electron momentum (p) and a term for the rest mass, thus

$$f_m = \frac{G}{9r_q^2c^3} \cdot \beta \, [m_0^2c^4 + p^2c^2]^{1/2}$$

As $\lambda = c/f$, then

$$\lambda = \frac{9r_q^2c^4}{G \, \beta[m_0^2c^4 + p^2c^2]^{1/2}} \qquad (39c)$$

As $\beta[m_0^2c^4 + p^2c^2]^{1/2} = \beta E$ then the equation reduces to:

$$\lambda = \frac{9r_q^2c^4}{G\beta E} \qquad (39d)$$

Equations 39c and 39d are of considerable importance as they show that the quantum wavelength of any particle of rest mass m can be derived from the gravitational constant G. Thus linking quantum mechanics to quantum gravity.

It is therefore important to confirm the numerical accuracy of the above equation (39c). We can do this by comparing the result to the standard de Broglie equation, in a range where de Broglie itself is likely to be most accurate; which according to these observations is in the high energy range (see section on Wave Particle Duality).

If we take an electron with an enegy of 5 GeV the wavelength is conventionally given (where the kinetic energy of the electron E_K is given by the product of the charge of the electron (C) and the potential applied eV), by the standard equation:

$$\lambda = h/p = h/(E_k.2m_0)^{1/2}$$

thus

$$\lambda = 6.63 \times 10^{-34} / \, [1.602 \times 10^{-19} \times 5 \times 10^9 \times 18.22 \times 10^{-31}]^{1/2}$$

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hence $\lambda = 1.73 \times 10^{-14}$ m

Using

$$\lambda = \frac{9r_q{}^2c^4}{G\,\beta[m_0{}^2c^4 + p^2c^2]^{1/2}} \qquad (39c)$$

thus

$$\lambda = \frac{9 \times 1.82 \times 10^{-70} \times 80.78 \times 10^{32}}{6.67\times10^{-11}\times\beta[8.299\times10^{-61}\times80.78\times10^{32}+1.602\times10^{-19}\times5\times10^{9}\times18.22\times10^{-31}\times8.998\times10^{16}]^{1/2}}$$

where $\beta = 0.99999995$

$$\lambda = \frac{1.32 \times 10^{-35}}{6.67 \times 10^{-11}\times \beta[6.70 \times 10^{-27} + 1.31 \times 10^{-22}]^{1/2}}$$

thus $\lambda = 1.73 \times 10^{-14}$ m

Divergeance between the de Broglie equation and the above equation (39c) occurs at intermediate energies where it is generally accepted that the de Broglie equation may be less accurate [ref 14a]. The values for eq. 39c and de Broglie are compared to recent experiments, which demonstrate a relativistic curvilinear plot for wavelengths of matter in keeping with eq. 39c, see Appendix 1.[ref 9]

The de Broglie equation yields a simple log/linear scale, which is not in keeping with relativity; whereas eq. 39c is dependant on relativity and mathematically accounts for both relativity in calculating the wavelength. Indeed recent experiment on quantum tunnelling through a wire mesh strongly suggests that the relationship between energy and wavelength is relativistically curvilinear.[ref 9] (see also Appendix 1, Equations for Quantum Wave Mechanics)

Furthermore equation 39d suggests a fundamental relationship between energy (E), relative velocity (v/c = β), gravity (G) and the quantum wavelength (λ)

$$\lambda = \frac{9r_q{}^2c^4}{G\beta E} \qquad (39d)$$

Indeed as $9r_q{}^2 = Gh/c^3$, then

$$\lambda = hc/\beta E \qquad (9a)$$

Equation 9a is the very same as the equation derived form first principles for the wavelength of matter, which allowed a relativistic solution to the equations for wave particle duality (see Wave Particle Duality). This now indicates that **these quintessential equations are compatible with relativity, quantum mechanics and quantum gravity.**

Graviton Structure

From these observations, if the value for the gravitational constant is substituted into the equation (35) we may now estimate the probable geomteric structure of the gravtion, which is the force particle mediating gravity by acting on quintessence. Thus the Gravitational constant has been previously derived from the vibration of quintessence by the equation:

$$G.(\pi/c) = 3(\pi r_q{}^2/m_q) \qquad (35)$$

This is in accurate agreement with the value for G (6.67 x 10^{-11} N m^2 kg^{-2}). This suggests that the most probable mathematical representation of the graviton (ϕ), the third force carying particle is

$$\phi = (\pi/c). \qquad (42)$$

Thus the gravitational constant (G) can be given by the mass and radius of quintessence and the structure of the graviton

$$G = 3\pi r_q{}^2/\phi.m_q \qquad (43)$$

This shows the gravitational force to be related to the fundamental radius of quintessence space time, and the graviton.

Quantised General Relativity

The classical general relativistic formula, as given by Einstein

$$R_{\mu\nu} - 1/2g_{\mu\nu}R = -\kappa T_{\mu\nu}$$

can now be better understood by ascribing the $\mu\nu$ subscript of any vector as the complex vector components, which are present both in the structure of space time quintessence, and present in the electron (eq 3). Thus R is effectively the curvature of space-time, $R_{\mu\nu}$ denotes the contracted Riemann tensor of curvature and $T_{\mu\nu}$ is the "energy tensor" of matter.[ref 15]

In his published paper on General Relativity, Einstein[ref 15] defined the constant κ as:

$$\kappa = 8\pi G/c^2$$

Therefore Einstein's equation may equally be written as

$$R_{\mu\nu} - 1/2g_{\mu\nu}R = -\frac{8\pi G.T_{\mu\nu}}{c^2} \qquad (43)$$

Einstein himself was apparently not happy about the right hand component of the equation. However, we find that this part of the equation can now be quantised by substituting the gravitational constant, $G = 3\pi r_q{}^2/\phi.m_q$, (eq. 14b), giving:

$$R_{\mu\nu} - \tfrac{1}{2}g_{\mu\nu}R = -\frac{8\pi \; 3\pi r_q{}^2}{\phi.m_q.c^2}.T_{\mu\nu} \qquad (44)$$

By substituting $3m_q.c^2 = h$, and further substituting $\hbar = h/2\pi$ we arrive at a quantised solution to Einstein's equations. Where r_q is the radius of quintessence, ϕ is the graviton [$\phi = (\pi/c)$] and h is Planck's constant. thus:

$$R_{\mu\nu} - \tfrac{1}{2}g_{\mu\nu}R = -\frac{9(4\pi r_q{}^2).T_{\mu\nu}}{\phi.\hbar} \qquad (45)$$

The gravitational equation can now be understood on a logical basis. The term $9(4\pi r_q{}^2)$ represents the surface area of quintessence for the 9 space dimensions of the space time lattice, $\hbar$ is the energy content of quintessence x time and ϕ is the graviton.

Furthermore, although this formula gives the same solutions as Einstein's equation, which is essentially correct, the difference is that the equation is now dependant upon Planck's constant (h), which now defines a quantised solution to the equations.

Graviton Force Characteristics

Silmilar to the photon, the previously derived equation (42) for the graviton [$\phi = (\pi/c)$] appears to also mathematically represent a helical ringlet of quintessence, but with a spin of 2. For the photon, taking the direction of motion as the x vector and its axis of spin also as the x vector, would account for the electromagnetic force and its attraction and repulsion characteristics. In the case of the gluon component ($\pi/c^{1/2}$), if the direction vector is x, then the axis of spin would be in the y vector, the same as quasi electrons, accounting for the particle binding characteristics of the gluon force. (see; Gluon structure and force characteristics. Appendix 1)

In the case of the graviton, if the direction of motion was in the x vector, the graviton spin axis would be in the z vector thus, as will be demonstrated, accounting for the gravitational force.

The spin axis of the graviton can also be derived using the known characteristics of the electron. If an electron is travelling in the x direction, then its spin axis is determined by the by the sign of the y vector (up or down). This view is in agreement with conventional theory, which indicates that the electron spin is similar to a rotating

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current by the production of virtual photons. Thus we appear to have an explanation for the effects of magnetism which involves virtual photons, however, these photons are not observed. More accurately, **according to conventional special relativity the magnetic field is none other than the electric field viewed relativistically** [ref 16].

A more satisfactory explanation, therefore, lies in the interaction between the electrons and the space time lattice. The moving electrons in the two wires interact with the lattice to produce gravitons; which are in phase when both streams of electrons are travelling in the same direction. The gravitonic waves interact constructively to disperse the space time lattice between the wires and induce an attractive force between the two wires, which is the permeability of free space. Thus this force results from the vibration of quintessence itself.

Conversly in two wires with current going in opposite directions the graviton waves are in anti-phase and would interact destructively between the wires. The gravitonic waves travelling radially outward from the wires would, however, disperse the lattice outside the two wires and produce apparent repulsion between the wires, which is exactly what is observed. These effects of electricity suggest that gravitons act as waves and that phase may be important.

This effect is also seen with the north and south poles of ferromagnets. Nevertheless, with matter other than iron, cobalt or nickel, the graviton emission cannot be phased as the atoms are unable to align and magnets do not appear to exist with other materials.

In ordinary magnetic system the release of gravitons from the north pole would be exactly balanced by those released from the south pole of the magnet and hence there would be no nett force on the magnet until an external magenet or electrical current were applied.

Overall the magnitude of the forces in electrical systems where electrical conduction occurs are well defined by the permeability and permittivity of free space μ_0, and ϵ_0. Where v is the constant velocity of the charge and ϵ is the electric field produced by the charge.

$$B = [\mu_o.\epsilon_0]v.\epsilon$$

These observations suggest that **the forces of electricity which produce magnetism are indeed none other than the phased effects of gravitational waves on the space time lattice.**

Electromagentism is of further interest to quantum gravity, particularly if we combine the standard equations, $B = \mu_0 I / 2\pi r$ and $B = [\mu_o.\epsilon_0]v.\epsilon$, substituting for B we have:

$$2\pi r = I/\epsilon_0.v.\epsilon \qquad\qquad (46)$$

Thus $2\pi r$ is proportional to the inverse of ϵ_0. Thus as space time is dispersed by

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is consistent with general relativity.

Nevertheless, to derive an exact value for the charge of the electron we must account for gravity in the above equation. We will take the specific example of the Earth's gravitational field in order to obtain the exact value for the electron. If in accordance with standard general relativity, the apparent increase in radius r' is:

$$r' = GM/3c^2 \tag{38}$$

Then given that the mass of the Earth is 5.94×10^{24} kg; then

$$r' = 1.468 \times 10^{-3} \text{ m}$$

thus
$$2\pi r' = 9.22 \times 10^{-3}$$

Which is the factor by which ϵ_0 must increase in Earth's gravtiational field. So to correct ϵ_0 to account for gravity, ϵ_0 must be divided by the incremental factor, $2\pi r'$.

Similarly as effectively π decreases in a gravitational field, to correct π to account for gravity it must be multiplied by this incrememtal factor. So the equation for an electron in a zero gravtational field is:

$$e = \left| \frac{\epsilon_0}{3\left(4/3\pi c^3\right)} \right|^{1/2} \div (1 + 2\pi r') = 1.602 \times 10^{-19} \text{C} \tag{3b}$$

This now gives the charge of the electron as measured in a zero gravitational field as 1.602×10^{-19} C, which is the same as that measured on Earth. Notably these observations appear to suggest that the charge of the electron is the same irrespective of the gravitiational field.

Quantum Gravity and the Magnetic Moment of the Electron

The theoretical origin and nature of magentism remains obscure in electromagnetic theory. The postulate for the nature of magnetism in these observations, states that the magentic force results from none other than the emission of gravitons. This view as previously discussed is compatible with standard relativity.[ref 17]

An alternate explanation suggests these magnetic effects are produced by virtual photons, however, Maxwell's equation for electromagnetism states that the photon has **no** nett magnetic effect.

$$\delta B_x/\delta x + \delta B_y/\delta y + \delta B_z/\delta z = 0$$

Thus the equation for the magnetic moment of the electron could not, by the above standard equation, be derived from a photon virtual or real. In keeping with the graviton origin of magnetism, the equation for the magnetic moment of the electron

should have an expression in terms of quintessence and in turn the gravitational force and in particular the graviton.

The standard term for the magnetic moment of the electron (μB) is:

$$\mu B = eh/4\pi m_e$$

It is now possible to unite the equations for gravity and magnetism by substituting the fundamental key equations of quantum gravity.Thus if:

$$h = 3m_q c^2 \tag{1b}$$

and

$$m_e = m_q . n_q \tag{2}$$

Then we can express the magnetic moment of any particle with the charge of the electron, including the proton, in terms of the number of quintessences in that particle.

$$\mu B = ec^2/4/3\pi n_q \tag{47}$$

Given that the probable structure of the graviton is: $\phi = \pi/c$ (eq. 42) then substituting we have

$$\mu B = 3ec/4\phi n_q \tag{48}$$

or

$$\mu B = ec/4/3\phi n_q \tag{49}$$

Showing that the equations for the magnetic moment are compatible with the gravitational equations given earlier. Principally, the quintessential equations now allow the determination of the magnetic moment of any charged object directly from the number of quintessences it contains.

Quantum Gravity and Special Relativity

Ordinary matter passing through the lattice would produce gravitons which would interact with space-time as described by general relativity. The quantity of gravitons would be determined by the apparent mass and in turn these would apparently curve space time. The geometry of this "curvature" is elegantly described by general relativity using Riemann geometry, specifically using metric tensors. Intriguingly the metric tensor is not a single number, but at each point in space time it is required to consist of a collection of ten numbers, Consequently, ten dimensional space-time hypotheses, such as this or superstring theory, may automatically yield general relativity. (see quantum general relativity p.27)

General relativity is indeed very elegant, nevertheless there was a logical step yet to answer. That is, how do gravitons shape space time? This can now be readily

answerd by considering the interaction of a three dimensional space time lattice with gravitons themselves to produce the effects of gravity. The effects of gravity are as such to compel a body in motion towards the gravitational object and to a much smaller extent vica versa. **This effect can only be produced if gravitons repel quintessence** (the constituents of the 3D lattice). Indeed, it has been stated that in order to explain cosmic inflation and the "flatness" of the Universe that quintessence must shun (or be shuned by) matter [ref 2].

In descriptive terms a body close to a large mass will have a tendancy to move toward it because the three dimensional lattice would be less dense as it approached the surface of the large mass. Overall there would be less resistance to motion in the direction of the large mass, and the motion in this direction would be facilitated by the vibration of quintessence.

In general relativity the principle governing motion is **the geodesic of least distance, this can be re-expressed using similar equations using least action.** Furthermore, the concept of motion due to the vibrations of quintessence is more logically and experimentally compelling.

These observations can now be used to link general and special relativity. Thus as we approach the speed of light, the mass of an object travelling through the space-time lattice would approach infinity, by the equation:

$$m' = m_0 / (1 - v^2/c^2)^{1/2} \qquad (50)$$

or
$$m' = m_0 / (1 - v^2[\mu_0 . \epsilon_0])^{1/2} \qquad (50a)$$

In turn this would generate increasing gravitons and accordingly this would explain the observed effects of special relativity. Time itself is due to passage through the space-time lattice, and where the space-time lattice is dispersed by gravitons, time and length are reduced with increasing velocity and hence increasing space-time lattice dispersion, similar to the way in which gravity alters space-time As a result:

$$t' = t (1 - v^2/c^2)^{1/2}, \quad l' = l (1 - v^2/c^2)^{1/2}$$

Thus resulting in the effects of special relativity.

Quintessence and Black Holes

To address the relationship of the space-time lattice to gravity directly, it is important to discuss the concept of quintessence with regard to general relativitivistic equations. The standard general relativistic equation for the apparent increase in radius (r) due to the curvature of space time around a gravitational object, which has been previously derived from first principles (eq. 14a), is:

$$r' = G.M/3c^2 \qquad (38)$$

This can also thus be written as:

$$r = G.M[\mu_0 . \epsilon_0]/3 \qquad (51)$$

This standard equation, is in keeping with the above observations. Specifically as the mass increases, ϵ_0 increases, in turn the radius willl appear to increase (relative to π).

The above observations now allow us to examine the effects with regard to the interior of black holes themselves. The event horizon would represent a critical density for quintessence, in which light could not escape. The Schwarzschild radius would now be given by:

$$R_s = 2GM[\mu_0 . \epsilon_0]$$

The event horizon will occur at the point at which there is less resistance to circular motion than motion in a straight or partially curved line. Given that $2\pi r$ is proportional to $1/\epsilon_0$. The event horizon should occur when the permittivity has increased by a factor of π. As the permittivity of space increases by a factor of 2π an object within a black hole will complete two rotations rather than travel in a straight line. In effect exceeding the speed of light by 2π.

Thus an increase in the permittivity of free space by a factor of π is estimated to result from an increase in mass by a factor of approx. 10^6 (the ratio of the mass of the earth and that of a putative black hole).

Continuing with the subject of a black hole, according to the the model inside the black hole, the gravitons produced by the matter present would be in equilibrium with the density of the space-time lattice. Increasing the rate of rotation of the matter in the black hole for instance would thus increase the production of gravitons and its effective mass and increase the radius of the event horizon. A density gradient of the space time lattice would continue to exist within the black hole. Progressively closer to the centre of a black hole matter itself would be increasingly compressed and the spherical sructure of the quasi-electron would be predicted to collapse. **This collapse would result in the formation of an exotic form of matter in the form of pure quintessence in a black hole.**

This pure quintessence would produce the **singularity** at the centre of the black hole, as all apparent space would be absent. The larger the black hole in terms of mass the more pure quintessence would exist at its core.

Indeed the formation of black holes, from quintessence, may represent a crucial step in understanding the mechanisms that underly gravitational physics. Given the existence of black holes, with an event horizon, implies that the speed of light can effectively be exceeded by the the warping of space-time. In this instance the space time lattice would be repelled by gravitons in such a way as to disperse space-time quintessence in a circular fashion. Similarly if we suppose that gravitons could be controlled and collimated in a single direction similar to a laser using photons, it would be possible to focus such a graviton beam ahead of an object. This in turn would dissipate the space-time lattice in front of that object, thereby allowing the theoretical

potential for what is commonly termed Warp drive. That is, systems whose propulsion rely on warping space-time as opposed to the ejection of material to provide thrust. Furthermore it would theoretically enable that object to also achieve speeds greater than that of light.

These observations explain the elementary particles, the concept of mass and the forces of nature, including gravity, on a quantum basis. They can be used logically to explain the inner physics of a black hole, the missing mass in the Galaxy, the expansion of the Universe, the Big Bang and Guth's inflationary theory and the EPR effects, from first principles. Foremostly, these observations allow a funadamental understabnding of gravity which in turn allows the technical construction of an antigravity device.

PRIOR ART

Antigravity Systems

Recent research at NASA indicates that an antigravity device may be feasible. This research, however, has been undertaken at NASA without fundamental knowledge of the theoretical basis of quantum gravity. In these experiments the use of radio frequency (RF) pulses, such as in Nuclear Magnetic resonance, on rotating superconducting discs has been attempted, to produce antigravity effects.[ref 17]

However, radio frequency pulses are a weak form of electromagnetic radiation and are therefore unlikely to provide sufficient energy to produce measurable antigravity effects.

SUMMARY OF THE INVENTION.

Further Antigravity Systems

The theoretical understanding of quantum gravity allows the design of further elementary antigravity systems from first principles. It is unlikely that gravitons can be controlled in a precise way using current technology. Nevertheless, an understanding of three dimensional space time and matter, does allow the design of these antigravity systems. That is, systems whose propulsion rely on warping space-time as opposed to the ejection of material to provide thrust.

With current technology this could be acheived by rotating intermediate sized superconducting masses at ultracentrifugational velocities. The release of gravitons could be controlled by directionally governing the electron flow through these masses with the use of powerful electric currents. In turn the direction of flow of gravitons would determine the direction of motion through the space time lattice.

In order to design a mechanism for elementary antigravity drive we may utilise either a normal conductive material or preferably a superconducting material. It may be possilble to use any shape, such as a disc, cylinder or preferably a sphere. Such a sphere is rotated along its horizontal axis in a clockwise fashion at ultracentrifugational speeds. A current is then applied from left to right in such a way as to pass through

the entire sphere in this direction. In the upper half of the sphere the electrons have a vector in the left to right direction as the sphere spins clockwise. If a current is applied to the sphere in the same direction this will result in a increase in the relative velocity of the electrons due to the flow of current. In turn, according to the space time lattice model, this will result in a increase in the release of gravitons. Conversley in the lower half of the sphere the electrons will have a vector of motion in the the right to left direction and this will be relativistically slowed by the current applied in the opposite direction. In turn this will result in a decrease in the release of gravitons for the lower half of the sphere.

The overall result will be a greater release of gravitons in the upward direction and a lesser release of gravitons in the downward direction. The effect will be enhanced by the use of a multiphasic current simultaneously applied. This will result in the release of multi phasic gravitons which will disperse space time above the sphere with increase in density below the shere which will effectively reverse the effects of Earths gravity. Importantly this effect can also be produced with the use radio frequency pulses. This obviates the need for commutator devices. Nevertheless, the radio frequency pulses must be designed to produce a change in the spin of the particle to enhance the release of gravitons in the upward direction, and moreover with current technology theses RF pulses contain too little energy to effect a significant change in the gravitational field.

With the use of large currents the drift velocity of the electrons could be greatly increased. The use of superconducting devices would greatly enhance the efficiency of such systems as the electrical resistance is virtually eliminated. Thereby allowing large currents to be used with minimum total power output.

TECHNICAL EXAMPLE 1

A small scale device, which produces antigravity thrust can be readily constructed using current technology.

This will require a sphere, disc or cylinder or similar shape of superconducting material. Any of the superconductors may be used such as Ag_2F, C_8K or $SnTe$. However for its tensile strength and magnitude of critical current density (J_c), Nb_3Sn is recommended. Normal conductive material may be used but the electrical power required (see superconductivity theory pg. 9) would be in the order of 10^{19} times greater.

Taking a sphere of Nb_3Sn, made hollow to reduce the mass of the sphere, with an external radius 0.25m and an internal radius of 0.20m; the total volume of Nb_3Sn required would be 3.19×10^4 cm³. As Nb_3Sn has a density of 7.86g/cm³ the total mass of superconducting material would hence be 250 kg.

This sphere is required to be mounted upon two ultracentrifugational spindles which themselves are on the horizontal axis. The untracentrifugational spindles would be

powered to rotate the sphere to produce an enhanced g force, as in a centrifuge..

The superconductive sphere would require a supercooloed jacket of liquid Helium, and would require to be in a vacuum. The power scource, motors and refrigeration system should be placed outside the supercooled jacket. In addtion these ancillary elements of the device may be either placed outside the system as a whole, or within it, if the device is designed as a self contained vehicle. The device may also be mounted upon vertical rails to experimentally demonstrate vertical lift. (See figs 1,2)

A high current needs to be applied, by means of a commutator device, to produce a current passing through the sphere. If the negative terminal were placed on the left of the sphere and the positive terminal on the right this would produce electrons flowing from left to right. The power expenditure for this is reduced by using a superconducting material. If the sphere were rotating from left to right i.e clockwise the drift velocity of the electrons would be advanced in the upper half of the sphere, and retarded in the lower half of the sphere by the current induced flow of the electrons.

According to relativity, as defined in the theoretical sections above, it is accepted that the relative mass of the electrons in the upper half of the sphere can thus be increased by using the standard relativistic formula:

$$m' = m_0 /(1 - v^2/c^2)^{1/2} \qquad (50)$$

Thus by inducing a relative drift velocity difference, the mass of the electrons at the top of the sphere can be increased relative to the mass of the electrons at the bottom of the sphere. If the object is set to rotate, centrifugal forces can be used to increase this mass difference. This can be used to increase the nett momentum of the object in the upwards direction, to produce upwards thrust.

Given that there are approximately 10^{23} per cm^3 free electrons in a niobium conductor then in the total sphere there will be approx. 10^{23} x 3.19 x 10^4 cm^3 = 3.19 x 10^{27} free electrons in the sphere. If each electron weighs 9.11 x 10^{-31} kg; then the total mass of free electrons in the upper part of the sphere is 1.5 grammes.

If we take the maximum zero voltage current density (J_c) in Nb_3Sn or another suitable superconducting device as approximately 10 x 10^{14} Amps/m^2, the drift velocity in the electrons can be calculated. Given that the average surface area of the hollow sphere is approximately 350 cm^2 or 3.5 x 10^{-2} m^2, then the max current applicable is 3.5 x 10^{13} Amps. Thus the drift velocity of the electrons would be 6.3 x 10^6 m/sec. The velocity of the electrons in the upper part of the sphere would be advanced relative to the centre of gravity. The relative velocity to this centre would be equivalent to the velocity of the sphere plus the velocity of the electrons in the upper half. If the the drift velocity of the electrons in the lower half were separately, induced by the current

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so that these electrons were stationary relative to the centre of gravity those in the lower half of the sphere relatively would be relatively retarded. The relative velocity would be approximately 6.3×10^6 m/sec. Using the standard equation for relativity (50) would give a relative mass difference ratio of 2.21×10^{-4}.

The effective total mass difference between the upper and lower half of the sphere would thus be the mass of the electrons times the relative mass difference which is 1.5 grammes $\times 2.21 \times 10^{-4} = 3.31 \times 10^{-7}$ kg.

Overall, as the acceleration due to gravity is 9.81 m/sec^2 ; to produce upwards lift on a sphere of 250 kg in Earth's gravitational field would require a force of about 2,500N. In order to produce this force the acceleration produced by the ultracentrifuge device would need to be; $a = 8.76 \times 10^9$ m/sec^2. Thus according to the formula $a = (\omega 2\pi r)^2/r$ (where the average radius, r of the device is 0.225 m) the rotation rate required would be 3.142×10^4 revs/sec or approximately 1,880,000 revs/min to produce sufficient acceleration to allow the device to completely self levitate. Thus as $F = ma$, then the force produced by the device is

$$3.31 \times 10^{-7} \text{ kg} \times 8.76 \times 10^9 \text{ m/sec}^2 = 2,500 \text{ N}$$

A detectable anti-gravtiy effect could, however, be realised at much lower spin rates. Standard ultracentrifugation devices can rotate at 600,000 revs/min . Thus even at standard ultracentrifuge speeds the g forces produced would be sufficient to produce approximately 12.8% lift, using these anti-gravity techniques.

TECHNICAL EXAMPLE 2

For this example we will use a large scale device, which would therefore deliver sufficient thrust to power a vehicle beyond Earth's gravitational field. Under terrestial conditions the entire devise would be required to be encased in a liquid helium jacket, with an internal vacuum to reduce friction due to air. However, the latter two contraints need not be in place if the device is to be used in space as, very conveniently, space is both a vacuum, and when shielded from the rays of the sun the ambient temperature is less than that of liquid helium. Indeed the large mass of the supercondutor becomes less relavent as weightlessness exists in space, so that the size of the object may be increased substantially.

Taking a sphere of 1 meter in radius of a superconductive material. The volume is $4/3\pi r^3 = 4.2 \times 10^6$ cm^3. If the high temperature superconductors are used such as $YBa_2Cu_3O_7$, or $Nd_{1.85}Ce_{0.15}CuO_4$, which are ceramic in nature, the specific density is approximately 3g/cm^3, Hence the total mass of the sphere would be approximately 12,600 kg or 12.6 metric tonnes. If the standard superconductors are used, for instance Nb_3Sn with a density of 7.86 g/cm^3 the sphere becomes heavier at 33 metric tonnes.

This sphere is required to be mounted upon two ultracentrifugational spindles which hemselves are on the horizontal axis. The untracentrifugational spindles would be powered to rotate the sphere to produce an enhanced g force, as in a centrifuge. The sphere would need to be carefully constructed to be exactly balanced in all directions.

Nevertheless, a high current does still need to be applied, by means of a commutator device, to produce a current. If the negative terminal were placed on the left of the sphere and the positive terminal on the right this would produce electrons flowing from left to right. The power expenditure for this is reduced by using a superconducting material. If the sphere were rotating from left to right i.e clockwise the drift velocity of the electrons would be advanced in the upper half of the sphere, and retarded in the lower half of the sphere by the current induced flow of the electrons.

According to the model in the preceding sections this will result in an increase in the graviton production in the upper half of the sphere. Indeed, this model is in agreement mathematically with general and special relativity.

Given that there are approximately 10^{23} per cm^3 free electrons in a copper conductor then in the total sphere there will be approx. $10^{23} \times 4.2 \times 10^6 = 4.2 \times 10^{29}$ free electrons in the sphere. If each electron weighs 9.11×10^{-31} kg; then the total mass of free electrons in the upper part of the sphere is 0.191 kg.

If we take the maximum zero voltage current density (J_c) in Nb_3Sn, or another suitable superconducting device, as approximately 10×10^{14} Amps/m^2, the drift velocity in the electrons can be calculated. Given that the average surface area of the sphere is approximately $1.57 \times$ m^2, then the max current applicable is 1.57×10^{15} Amps. Thus the drift velocity of the electrons would be 6.3×10^6 m/sec.

By inducing a difference of mass as little as one part in a thousand in these electrons we can achieve significant lift. Thus by the above equation if we induce a drift velocity of 6.3×10^6 m/sec (as in technical example 1), given that the velocity of the electrons in the upper part of the sphere would be advanced relative to the centre of gravity and those in the lower half of the sphere relatively stationary; then the relative velocity would be approximately 6.3×10^6 m/sec. Thus between the upper and lower half of the elctrons we increase the relative mass of the elctrons in the upper half by a factor of 2.21×10^{-4}, by the above equation 1.

Thus the difference in mass in the upper half of the sphere due to the moving electrons would be 0.191 kg $\times 2.21 \times 10^{-4}$ = 4.22×10^{-5} kg., relative to the lower half electrons. This difference is enhanced by producing a centrifugal force by rotating the sphere.
If we rotate the large superconducting sphere at 1,560,000 revs/min we can achieve accelerations of 1.33×10^{10} m/sec^2 (given an average radius of 0.5m) by the formula $a = (\omega 2\pi r)^2/r$.

Thus as $F = ma$, where m is the relative mass difference of the electrons the thrust produced in the device would be equivalent to:

$$4.22 \times 10^{-5} \text{ kg} \times 1.33 \times 10^{10} \text{ m/sec}^2 = 5.88 \times 10^5 \text{ N}$$

Thus in Earth's gravitational field this force would be capable of levitating 60 metric tonnes.

The estimated current required to produce the drift velocity of the electrons for this effect would be approx. 1.57×10^{15} Amps. The power usage is given by; $P = I^2R$, under non-superconducting conditions, given that Niobium has a resistivity of 15.2×10^{-8} Ω/m the sphere would have a resistance of approximately 10^{-7} Ω.The power used by a non-superconducting device would thus be 2.46×10^{23} Watts. However, due to superconductivity, under standard theory, the device has zero resistance and would use no power[ref 6]. Nevertheless, if we wish to use the model described above for superconduction (see superconductivity, page 6) there would be a practical power consumption which would nevertheless still be low. Thus the power consumption would be in the order of 1.6×10^{-19} less than the standard power usage, at 3.94×10^4 Watts.

If Nb_3Sn is used to make the sphere the mass of the sphere would be 33 metric tonnes. If the mass of the ancillary ship were 27 metric tonnes, giving a total of 60 metric tonnes the accelaration produced would be 9.81 m/sec^2 . This would be

equivalent to the the force of gravity on Earth. Thus an artificial gravitational field would be incidentally created which would be exactly equivalent to that on Earth. Thus the device could also be used for the production of artificial gravity.

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APPENDIX 1

Particle Physics

In the overall picture, it is generally accepted that there are three major forces; strong, electro-weak and gravity, each mediated by three bosons the, gluon, photon and graviton. These in turn are known to influence three types of particle, the quark, lepton and by General Relativity, space-time itself . Each of these appear to be composed of three particles with multiples of charge of 1/3 and exist in three dimensions of space time, which are themselves in three generations.

The nature of particles thus, may be revealed by their structure which occurs generally in multiples of three. Three quarks in the case of baryons are neccessary to make up a particle such as the proton or neutron. The particles that bind the quarks (gluons) are themselves required, in stable particles, to have three different colour charges, one colour in each dimension, for the particle to exist in three dimensional space-time. Furthermore, there are three generations of leptons an indeed quarks.

Nevertheless, the Standard model itself appears unable to explain the existence of these three generations of particles or the fundamental properties of sub atomic particles. Furthermore, there appear now to be a total of 60 fundamental particles each with their own fundamental properties which are arbitarily defined to fit the data. Furthermore, the Standard model only partially explains the decay process of the each particle and it does not explain their masses accurately.

For instance the mass of the up (u), anti-up ($\bar{u}$) down (d) and anti-down ($\bar{d}$) quarks are currently estimated at 0.35 Gev each [ref 14] (although some controversy exists about about this basic value). The mass of the proton constituted of three quarks, uud, is 0.9383 Gev, which is only approximately equivalent to the total mass of the three quarks (1.05 Gev).

Furthermore, the very process by which the subatomic particles decay cannot be explained by the "fundamental" constituents, the quarks. Indeed the known hadron decay processes ultimately <u>always</u> end up producing either an electron or positron. Indeed the quarks have not been experimentally seen, suggesting that other particles may underly their fundamental structure.

Electron Structure

Given the presence of a quasi electron with a charge of 1/3 e [ref 4,5], then three of the quasi electron vortices, as previously described [ref 5], could form an entire electron in three dimensional visible space time. Nevertheless, each would have energy and hence a wave function which would be present in the other vectors. This electron could thus follow the probability functions as described by the Shrödinger wave equation for ψ (otherwise termed as "essence" by Shrödinger).

It is of importance therefore to note that the charge of the electron (e) in Coulombs (C), (where ϵ_0 is the permittivity of free space), can be derived from first principles by the equation:

$$e = \left[\frac{\epsilon o}{3\,(\,4/3\pi c^3)} \right]^{1/2} \quad = 1.61 \times 10^{-19} \text{ C} \qquad (3)$$

Equation (1) has a number of special implications, which have been previously discussed (p 6)

The dimensions of the equation can be readily resolved by considering **each of the three vector dimensions**. The exact dimensions of the equation need to be considered in the light of the nature of space-time itself, and this is fully addressed on pages 67-68. These dimensional equations help explain the nature of matter. Indeed the equation for the electron may underly the structure of the subatomic particles and may be necessary for the full understanding of gravity.

Additionally, the square root sphere structure of the electron accounts for its 1/2 integer spin. This square root structure also forms the basis of the electron pair bonding. According to the above equation (3), the electron will tend to form a "complete" electron sphere, thereby explaining how the presence of pair bonding occurs.

Thus from the equation (3) for the square root structure of the single electron; it is clear that the product of two such spheres will tend to form a complete sphere, where:

$$e^2 = \epsilon_0/3(4/3\pi c^3) \qquad (3b)$$

In addition, the equation for the quasi electron can be directly derived from eq. 1. Thus in one dimension, a single quasi electron (q_e) with charge of 1/3e, can be mathematically represented, (where the permittivitty of free space for each quasi electron is $\epsilon_{qe} = [\epsilon_0/3^3]^{1/2}$, by the equation :

$$q_e = \epsilon_{qe}/(4/3\pi c^3)^{1/2} \quad = 1/3e \qquad (3c)$$

Thereby accounting for the experimental observation of the 1/3e charge of the quasi electron[ref 4,5]. Overall knowing the structure of the quasi electron may lead to the knowledge of the structures of the the other subatomic particles such as the quarks.

First Generation Quark Structure

From these observations we may now examine the derivation of the mathematical nature of the proton and in turn the structure of the quarks. Using the above equations (eq. 1,2) enables a far more accurate derivation of the mass of quarks from first principles.

To do so requires calculating the ratio of the mass of the electron (m_e = 0.511 Mev) to the mass of the proton (m_p = 938.3 Mev)

Thus $\quad\quad\quad\quad\quad\quad m_e/m_p = 0.511/938.3 = 5.44 \times 10^{-4}$

and $\quad\quad\quad\quad\quad\quad m_e/m_p = 5.44 \times 10^{-4} = (3\pi/c^{1/2})$

Intruigingly, the term $(3\pi/c^{1/2})$ mathematically determines the ratio of the mass of the electron (m_e) to the proton (m_p). Indeed it is this ratio that also leads to the mathemaical derivation of the structure of the quarks

Given the mass of the proton is; 938.3 Mev, then according to the Standard Model, as there are three quarks in the proton (uud) of virtually equal mass, then the effective mass of each quark would be more accurately given as 312.8 Mev.

Thence, the structure of the quarks can now be defined by the ratio of the masses of the quasi electron to the quark. If the mass of the quasi electron is given as one third the mass of the electron

$$m_{qe} = 0.511 \text{ Mev} \div 3 = 0.17033 \text{ Mev}$$

Then the ratio of the mass of the down quark (d), to the quasi electron is:

$$0.17033 \text{ Mev}/ 312.8 \text{ Mev} = 5.44 \times 10^{-4}$$

We also find that this same ratio of the mass of the quasi electron to the mass of the down quark (m_d) is mathematically equivalent to $3(\pi/c^{1/2})$, thus:

$$m_{qe}/m_d = 5.44 \times 10^{-4} = 3(\pi/c^{1/2}) \quad\quad\quad (25)$$

From here the equation for the charge and structure of the down quark can be accurately defined by combining the equation for the structure of the quasi electron $q_e = \epsilon_{qe}/(4/3\pi c^3)^{1/2}$ and the ratio of the masses of the quasi electron to the down

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quark (19); hence

$$d = \epsilon_{qe}.m_d/m_{qe}.(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2})$$

Hence in short form

$$d = (4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \tag{19}$$

Giving the charge of the down quark as -1/3; and its estimated mass as 312.8 Mev.

Thus not only can the electron charge be derived from the equation for three spheres each with a radius of c (equation 3) ; but the mass, charge and internal structure of the down quark can also be derived from the term $3(\pi/c^{1/2})$.

Furthermore, the significance of the term $3(\pi/c^{1/2})$ in this equation, is revealed by the Shrödinger wave equation. Thus $(\pi/c^{1/2})$ **is none other than the solution to the Shrödinger wave equation for the amplitude of an electron confined in a space with radius c** [ref 6]. If **c** is the space defined by the equation for the structure of the quasi electron. Then the standard Shrödinger equation for an object confined in a space **c** is given by the following standard calculation [ref 6]:

$$E\psi(x) = -\frac{\hbar^2}{2m} \cdot \frac{d^2\psi(x)}{dx^2}$$

If one of the dimensions of space has a length 2L the amplitude can only be non zero between x = 0 and X = 2L and the standard solution for the amplitude can be determined by using the constant (A) where:

$$A = (1/L^{1/2})$$

Thus in one dimension the solution to the Shrödinger wave equation for the amplitude of oscillation is conventionally given by [ref 6] :

$$\psi(x) = (\pi/L^{1/2}) \; \sin x/L$$

Substiuting L for **c** gives the one dimensional equation (when sin x/L = 1) as $\pi/c^{1/2}$. Thus at 90° to the dimensional confinement of the quasi electron, the standard solution to the Shrödinger wave equation yields an amplitude of $\pi/c^{1/2}$, which in three dimensions gives:

$$3(\pi/c^{1/2}) \tag{25}$$

Thus the term $3(\pi/c^{1/2})$ is not only the ratio of the mass of the electron to the proton but is also none other than the standard solution to the Shrödinger wave equation for an object confined in a space **c** [ref 6].

From here the charge and structure of the up quark (u) can now be derived in a

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similar way to that of the up quark from the mass of two quasi positrons [$m_{qp} = 2(0.170$ Mev)] and the mass of the up quark (m_u) by the equation,

$$2m_{qp}/m_u = 2(5.44 \times 10^{-4}) = 2(3\pi/c^{1/2})$$

Thus:

$$u = \epsilon_{qe}.2m_{qp}/m_u.2^+(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2})$$

Hence in short form

$$u = 2^+(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \tag{20}$$

Giving the charge of the up quark as +2/3, and its mass as 312.8 Mev

Overall the mathematical structure of all the particles can be shown to be derived from the quasi electron. Thus, the first generation particle structures can now be derived from first principles. This includes the quasi electron (qe) and electron (e), from which the quarks (u,d) and in turn the proton (p) respectively are derived.

Thus the first generation of particles of the Standard model are given in short form as:

$$qe = {}^-(4/3\pi c^3)^{1/2} \tag{3a}$$

$$e = 3^-(4/3\pi c^3)^{1/2} \tag{3}$$

$$d = {}^-(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \tag{19}$$

$$u = 2^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \tag{20}$$

The respective force binding particle, the gluon, for the first generation of particles is thus given in short form as:

$$g = 3(\pi/c^{1/2}) \tag{25}$$

According to these equations, it is apparent that the down and up quarks appear be constituted from quasi electrons and three component gluons, and are themselves not fundamental particles.

Indeed, from these observations it is clear that the structure of the electron, may underly the structure of all the elementary particles and nucleons, as it forms a "perfect sphere" based on c. As will also be seen later, as this structure forms the basis of matter, it may itself underpin the theory of gravity. Furthermore, these obsevations will allow the mathematical estimation of the mass and size of the elementary particles, including the second and third generation particles

Second and Third Genration Lepton Structure

Thus the structure of the muon (μ) can also be derived from the ratio of the mass of the electron (m_e) and the mass of the muon (m_μ):

$$m_e/m_\mu = 4.7 \times 10^{-3} = \pi/c^{1/3}$$

Thus

$$\mu = \epsilon_0^{1/2}.m_e/ m_\mu. \; 3^-(4/3\pi c^3)^{1/2}.(\pi/c^{1/3})$$

Where the charge of the muon is in this equation equivalent to that of the electron e. In this case ($\pi/c^{1/3}$) can be considered to represent a specific high energy photon. Thus the structure of the muon, written in short form is:

$$\mu = 3^-(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}) \qquad (16)$$

Moreover the structure of the tauon can be calculated from the ratio of the mass of the electron and that of the Tauon (1.79 Mev);

Thus

$$0.511 \text{ Mev}/1.79 \text{ Gev} = 2.85 \times 10^{-4}$$

$$m_e/m_\tau = (\pi/c)^{1/3}.(\pi/c)^{1/9} = 2.85 \times 10^{-4}$$

As the charge of the tauon is equivalent to the charge of the electron, hence the structure of the Tauon is given by the above equation

$$e_\tau = \epsilon_{qe}.m_e/ m_\tau.3^-(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} = e$$

This equation accurately predicts the charge -1; and mass of the Tauon (~1.78 Gev) (ref 14). Thus the structure of the Tauon can in short form be given by the equation

$$\tau = 3(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (18)$$

Overall the mathematical structure of all the particles can be derived from the quasi electron. Thus, the particle structures can now be derived from first principles. This includes the quasi electron (qe) and electron (e), from which the quarks (u,d) and in turn the proton (p) respectively are derived. The general structure of the force carrying partilcles the photon (γ) and the gluon (g) can be given. It will also intriguingly be possible to derive the structure of the charm (c), beauty (b, or bottom) and truth (t or top) quarks directly from the sructure of the muon (μ) and Tauon (τ).

The calculations underlying these equations can further accurately reflect their measured values, particularly if the effects of gravity are taken into account (see Quantum Gravity and the Charge of the Electron.p 30). In addition the neutrino has not been included in the equation as its mass is considered to be very small. The

mathematical proof of these short form equations nevertheless lies in the fact that they can closely identify the charge and the masses of these particles, from first principles, as in equations (3, 15-30). [ref 14]

Second and third generation Quark Structures

From here it is possible to derive the basic structure of the remaining quarks including the strange (s) quark.

Thus the ratio of the masses of the quasi electron ($m_{qe} = 0.17033$ Mev) and the strange quark ($m_s = 0.555$ Gev) are given by the equation:

$$m_{qe}/m_s = 0.17033 \text{ Mev}/ 0.555 \text{ Gev} = 3.07 \times 10^{-4}$$

Furthermore the structure of the gluon in the strange particle, can now be accurately derived by the term; $3(\pi/c)^{1/2}$,(n.b. change of brackets in the gluon term).

$$m_{qe}/m_s = 3.07 \times 10^{-4} = 3(\pi/c)^{1/2}$$

Thus the equation for the charge and structure of the strange quark (s) is:

$$s = \epsilon_{qe.}m_{qe}/m_s \cdot (4/3\pi c^3)^{1/2}.3(\pi/c)^{1/2} \qquad (21)$$

This can be written in short form as:

$$s = (4/3\pi c^3)^{1/2}.3(\pi/c)^{1/2}$$

Giving the strange quark a charge of -1/3 and a mass of 0.555 Gev, in agreement with current estimates of its mass ~ 0.55 Gev [ref 14]. This again shows that strange quark is derived from a quasi electron and a gluon.

Thus given that the particle Ω- is made of three strange quarks (sss) we may derive its mass as 3 x 0.555 Gev = 1.67 Gev, which is in accurate aggreement with its known mass of Ω- = 1.67 Gev [ref 14]

From here it is possible to define the structure of the other quarks, using the same first principles. As the charmed quark (c), beauty (b, otherwise termed bottom) and the truth (t, otherwise termed the top quark), clearly belong to the second and third generation of particles, they should be mathematically based on the formula for the second and third generation lepton particles, specifically the muon and tauon.

Indeed the charm derives from the second generation of particles and therefore mathematically does qappear to contain the basic muon structure, as given by the equation:

$$\mu = 3(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}) \qquad (16)$$

As before, the ratio of the masses of the quasi electron and that of the charm quark gives the equation from the structure of the charm (c).Thus the structure of charm can be determined from the ratio of the mass of two quasi electrons; $m_{qe} = 2(0.17033)$ Mev, and the mass of the charmed quark ($m_c = 1.518$ Gev)

Thus if: $2m_{qe}/m_c = 2(0.17033$ Mev$)/1.518$ Gev $= 2(1.122 \times 10^{-4})$

and $2m_{qe}/m_c = 2(1.122 \times 10^{-4})= 2(\pi/c^{1/3}).(\pi/c^{1/4})$

Then the structure of the charm quark (c) is:

$$c = \epsilon_{qe}.2m_{qe}/m_c.2^+(4/3\pi c^3).^{1/2}(\pi/c^{1/3}).(\pi/c^{1/4})$$

or in short form

$$c = 2^+(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}).(\pi/c^{1/4}) \qquad (22)$$

Thus the charmed quark has a charge of +2/3 and a mass of 1.518 Gev in accordance with the previous approximate estimate of its mass ~ 1.5 Gev. [ref 14] and is derived from a muon and a higher order gluon. This gluon itself $(\pi/c^{1/4})$, is the solution to the Shrödinger wave equation for the amplitude of an electron confined in a space of length $c^{1/2}$ [ref 6]. Thus this gluon now exactly matches the amplitude of the quasi electron.

Furthermore, from this we can deduce the mass of the particle the J/ψ, whose structure is predicted to consist of a charm and anticharm particle in orbit around each other, with a minimum mass (including orbital energy) of ~ 3.1 Gev.

From here we can in a similar fashion determine beauty (b). To be consistant, as beauty is a third generation quark it should be defined by the component structure of the Tauon. In this case, this is the smaller component of the Tauon, which is mathemtaically represented by:

$$3(4/3\pi c^3)^{1/2}.(\pi/c^{1/9})$$

Indeed the structure can again be determined by the ratio of the mass of the quasi electron electron (m_{qe}) to beauty (m_b). Such that the ratio can be given by the equation

$$m_{qe}/m_b = 3.673 \times 10^{-4} = (\pi/c^{1/9}).(\pi/c)^{1/2}$$

Thus the structure of beauty is given by the equation

$$b = \epsilon_{qe}.m_{qe}/m_b.(4/3\pi c^3)^{1/2}.(\pi/c^{1/9}).(\pi/c)^{1/2}$$

To confirm this structure, the mass of the beauty quark can be given by the following calculation

$$m_{qe}/m_b = 3.673 \times 10^{-4} = 0.17033 \text{ Mev} /4.64 \text{ Gev}$$

and

$$m_{qe}/m_b = 3.673 \times 10^{-4} = (\pi/c^{1/9}).(\pi/c)^{1/2}$$

Thus the short form of beauty is:

$$b = (4/3\pi c^3)^{1/2}.(\pi/c^{1/9}).(\pi/c)^{1/2} \qquad (23)$$

Thus giving beauty a charge of -1/3, and a mass of 4.64Gev, which is in agreement with its current estimated mass of ~ 4.7 Gev [ref 14].

To complete the structure of the quarks, we can finally proceed to deduce the truth. As the top quark or truth (t) belongs to the third generation of quarks, it is also based on the structure of the Tauon. Thus mathematically the truth, primarily consists of the third generation, tauon.

$$\tau = 3(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (18)$$

The geometrical structure can be confirmed from the mathematical ratio of the mass of the electron to mass of truth (m_t), hence the equation for the top quark is given by the ratio of the mass of the electron to mass of the truth .

Thus as $m_t = 176$ Gev

and as $m_e = 0.511$ Mev

$$m_e/m_t = 0.511 \text{ Mev}/176 \text{ Gev} = 2.89 \times 10^{-6}$$

and

$$m_e/m_t = 2.89 \times 10^{-6} = (\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4}$$

As each quasi positron is associated with each of the gluon complexes, then the equation for truth is thus predicted by the equation:

$$t = 2(4/3\pi c^3)^{1/2+}.(\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4} \qquad (24)$$

Which gives the mass of the truth as 176 Gev and a charge of +2/3e. Which is in agreement with the known mass of the truth; 176 ± 12 Gev; the most accurate estimate of the mass of the truth quark being; 175.6 Gev. [ref 18]

Thus the basic structure of the truth, is that of a pair of quasi anti-tauons complexed with a gluon moiety which has an amplitude that, according to the Shrödinger wave equation (3), exactly matches the amplitude of the quasi electron [ref 6].

Mathematically the probability of arriving at all such tightly conformed equations (3, 16-30), the particles being related only to π and c and its specific powers, **by chance would have odds of millions to one against.**! Furthermore these mathematical structures are derived from none other than solutions to the Shrödinger wave equation itself [ref 6].

Moerover, the structures of the second and third generation particles, the muon (μ), and charm (c); tauon (τ) and truth (t) quarks have a **notable symmetry,** with their masses and charges accurately given by the following short form equations:

$$\mu = 3^-(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}) \qquad (16)$$

$$c = 2^+(4/3\pi c^3)^{1/2}.(\pi/c^{1/3}).(\pi/c^{1/4}) \qquad (22)$$

$$\tau = 3^-(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9} \qquad (18)$$

$$t = 2^+(4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4} \qquad (24)$$

Hence, from these equations it can be deduced that the fundamental structure of the quasi electron probablistically underpins the mathematical structure of the fundamental particles, and that these structures are all related to one another either by complexing with a photon $[(\pi/c)^{1/3}]$ which matches the frequency of the quasi electron or a gluon $[(\pi/c^{1/4})]$ which according to the Shrödinger wave equation accurately matches the amplitude of the quasi electron. This explains the fundamental observations that final decay products of hadrons always lead to the production of an electron or positron and explains why quarks have not been individually seen.

Particle Decay and the Electroweak Force.

In order to corroborate the estimated quark structures these structures need to explain in detail the pattern of decay of the quarks themselves. We are thus required to explain particle decay from first principles including the structures which are formed in these decays, such as the mediator of the electro weak force; the Intermediate Vector Boson. To see if this is possible the decay of the truth (t, top quark) will be examined. According to experiment the truth quark splits into two particles, beauty (b, bottom quark) and the intermediate vector boson (W+). It is apparent that the truth may yield beauty.[ref 18]

Thus:

$$2^+ (4/3\pi c^3)^{1/2}.(\pi/c)^{1/3}.(\pi/c)^{1/9}.(\pi/c)^{1/4} = t$$

$$\Rightarrow \quad (4/3\pi c^3)^{1/2}.(\pi/c^{1/9}).(\pi/c)^{1/2} \quad = b$$

Thus the two gluon structures, $(\pi/c)^{1/4}$; in the truth combine to form the more energetic gluon,$(\pi/c)^{1/2}$; present in beauty, thus:

$$2(\pi/c)^{1/4} \Rightarrow (\pi/c)^{1/4}.(\pi/c)^{1/4} = (\pi/c)^{1/2}$$

and the photon term,$(\pi/c)^{1/9}$; decays into the less energetic photon $(\pi/c^{1/9})$ present in beauty. Thus the structures in the truth account for the structures in beauty, and are produecd via the production of a quasi electron and quasi positron.

The remaining terms are thus 3 quasi positrons, two high energy photons and a remaining low energy photon

$$3^+ (4/3\pi c^3)^{1/2}$$

and

$$2(\pi/c)^{1/3}$$

and

$$(\pi/c)^{1/9}$$

There is also a very considerable amount of energy remaining, the energy difference between beauty (b) and truth (t) being ~ 170 Gev.

This energy difference allows the transformation of the two high energy photons and the low energy photon to two intermediate vector photons, given by the equation.

$$2(\pi/c^{1/6})^6$$

This leads to the formation of the intermediate vector boson (W$^+$), which is the mediator of the electroweak nuclear force.

$$W^+ = 3^+ (4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^6 \qquad (27)$$

which is also equivalent to

$$W^+ = 3^+ (4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^3.(\pi/c^{1/6})^3$$

This probable structure for the (W$^+$), can again be confirmed by the ratio of the mass of the electron to the intermediate vector boson (W$^+$), with an estimated mass of 80

$$m_e/m_{W+} = 0.511 \text{ Mev}/ 80 \text{ Gev} = 6.4 \times 10^{-6}$$

and

$$m_e/m_{W+} = 6.4 \times 10^{-6} = 2(\pi/c^{1/6})^6$$

Thus

$$W^+ = \epsilon_{qe}.m_e/m_{W+}.3^+(4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^6$$

thus in short form:

$$W^+ = 3^+(4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^6$$

The true elegance of the structure of the intermediate vector boson can now be further explored. The W^+ can be considered to represent a unification of the electromagnetic force and the weak force, in keeping with the theoretical predictions of Salam and Weinberg for the nature of the electroweak force. Thus, the intermediate vector photons can either decay leptonically or via gluons; as is demonstrated by the following interconversions.

$$W^+ = 3^+(4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^6 \rightleftharpoons 3^+(4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^3.(\pi/c^{1/6})^3$$

If we examine the further decay of the three dimensional photon structure, $(\pi/c^{1/6})^3$; we have:

$$(\pi/c^{1/6})^3 \rightarrow [(\pi/c)^{1/6}]^3 \rightleftharpoons (\pi/c)^{1/2}$$

Where the term $(\pi/c)^{1/2}$ is none other than the term for a first generation gluon.

Thus the W^+ can either decay leptonically or into first generation quarks where it can yield an up (u) and an anti-down quark (d), thus:

$$W^+ = 3^+(4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^3.(\pi/c^{1/6})^3 \Rightarrow 3^+(4/3\pi c^3)^{1/2}.2[(\pi/c)^{1/6}]^3.[(\pi/c)^{1/6}]^3$$

And

$$3^+(4/3\pi c^3)^{1/2}.2[(\pi/c)^{1/6}]^3.[(\pi/c)^{1/6}]^3 \rightleftharpoons 3^+(4/3\pi c^3)^{1/2}.2(\pi/c)^{1/2}.(\pi/c)^{1/2}$$

thus W^+ decays to:

$$\Rightarrow \quad 2^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) = u$$

and

$$\Rightarrow \quad {}^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) = \bar{d}$$

Leptonically the W^+ decay yields the standard products including the positron the neutrino (v), and energy in the form of photons thus

$$W^+ = 3^+ (4/3\pi c^3)^{1/2} . 2(\pi/c^{1/6})^6 \approx 3^+(4/3\pi c^3)^{1/2}.2(\pi/c^{1/6})^2.(\pi/c^{1/6})^2.(\pi/c^{1/6})^2$$

and

$$\Rightarrow \qquad 3^+(4/3\pi c^3)^{1/2}.2[(\pi/c)^{1/6}]^2.[(\pi/c)^{1/6}]^2.[(\pi/c)^{1/6}]^2$$

$$\approx \qquad 3^+(4/3\pi c^3)^{1/2}.2(\pi/c)^{1/3}.(\pi/c)^{1/3}.(\pi/c)^{1/3}$$

Thus W^+ may also decay into the positron the neutrino (v), and energy in the form of photons thus:

$\Rightarrow$
and
$$3^+(4/3\pi c^3)^{1/2} = e^+$$

$\Rightarrow$
$$v$$

and
$$n(\pi/c)^{1/3}$$

Thus according to standard experimental observations the truth quark yields the beauty quark and the intermediate vector boson. In turn from these observations we may elegantly reveal the structure of truth and beauty and the intermediate vector boson and its decay pathways from first mathematical principles. [ref 18]

Gluon Structure and Force Characteristics

There are in the Standard model (or in this modification) three colour charges for the gluons and quarks, each of these represents each of three vectors x, y and z which can arise in different combinations. Thus the three gluon colours are required to be together (one in each dimension x, y and z) in baryons to form a three dimensional objects. There are also noted to be 8 gluons, these in turn gives rise to all the known baryons and mesons

The structure of these gluons have been previously mathematically identified, and this structure mathematically represents a helical ringlet. These are as previously given: $(\pi/c)^{1/2}$; $(\pi/c)^{1/4}$; $(\pi/c^{1/2})$; $(\pi/c^{1/4})$ [see eq. 25- 25c]

These four mathematical structures and their antigluons now readily account for the eight gluons known to exist, these in turn account for the structure of all the quarks as given by equations 3, 15-30, which in turn give rise to all the baryons and mesons as described by the Standard model.

Recent studies show that the proton conventionally consisting of the "fundamental" quarks (uud); can by bombardment with high energy electrons produce a Kaon which

consists of an anti-up and a strange quark ($s\bar{u}$). As the standard model predicts quarks are fundamental, the proton should not contain a strange quark. The conventional explanation for this resides in the proposal that the proton contains virtual strange particles. Indeed to explain these new observations each proton is now postulated by some physicists to contain 21 or more quarks, 3 of which are real and 18 or more which are required to be virtual! [ref 19].

In the revised Standard model presented here, the process by which a Kaon is produced is readily understood by the structural interconversion of the gluon in the up quark $(\pi/c^{1/2})$; to the gluon in the strange quark $(\pi/c)^{1/2}$,(n.b change of brackets)

Furthermore the most recent experiments on the internal structure of the proton has shown that gluons can seperate and recombine. This surprising recent observation actually arises from first principles when the mathemtatical structure of the gluon is understood. Thus mathematically the gluon structures may easily recombine and separate by the equation.[ref 20]

$$(\pi/c)^{1/2} \ = \ (\pi/c)^{1/4}.(\pi/c)^{1/4}$$

Hence this mathematical structure of the gluon allows the observed "recombination" and separation to occur in a way which is readily understood.

In addition, the structure of the gluons can be explained on the basis that these structures match the wave function of the quasi electron, thus the gluons match the amplitude of the electron as given by the Shrödinger wave equation.[ref 6]

Furthermore, the equations for the gluon present in the quark can explain their force characteristics. In the case of the gluon component $(\pi/c^{1/2})$; which mathematically represents a helical ringlet; if the direction vector is x, then the axis of spin would need be 90° to this, in the y vector in order to match the amplitude of vibration of the quasi elelctron/ positron. Thus this spin vector is known to be the same as that of electrons. This would account for the particle binding characteristics of the gluon force to the quasi electron. Given that the gluon would mathematically require the same spin axis as that of the quasi electron or positron, the gluon would be strongly associated with these particles and the force required to part them would increase with distance, which explains the characteristics seen experimentally with the gluon force.

Moreover, as will be shown, the photonic component of the subatomic particles given in the above equations matches exactly the frequency of rotation of the electron.

Nucleon Structure

The mass (m_p) and the internal mathematical structure of the proton can now be directly calculated form the quarks. Thus the structure of the proton according to the Standard model derives the combination of 2 up quarks and one down quark (p =

uud). As each quark has an estimated mass of 312.8 Mev (see eq. 3,4) then the proton (p) has in accordance with the Standard model a mass of 3 x 312.8 = 938.3 Mev and a charge of +1, and may be given by the mathematical structure of the up and down quarks according to eq. 19,20; and is thus given by:

$$p = \begin{array}{c} 2^+(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \\ ^-(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \\ 2^+(4/3\pi c^3)^{1/2}.(3\pi/c^{1/2}) \end{array}$$

Which, gives the proton a net charge +1 and a mass of 938 Mev.

Fifteen component gluons are required to be present in the proton, three gluons associated with each quasi electron particle.

Therefore the structure of the proton can be mathematically derived by combining the structure of the quasi electrons and the term $(\pi/c^{1/2})$. Thus the structure of the neutron and indeed the overall structure of the nuclei can be determined.

Similarly the structure of the neutron is given by the Standard model (n = udd), which can be written in short form as:

$$n = \begin{array}{c} ^-(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \\ 2^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \\ ^-(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \end{array}$$

The mystery of the stability of the neutron may now be addressed. A neutron outside the nucleus has a half life of approximately 6 seconds. Inside the nucleus however, the stability of the neutron, provides the atom with its stability. The three dimensional structures described may now provide the clues to this stability.

The compostion of the quarks now logically explains the apparent "fluid" characteristics of the subatomic particles, and some free exchange of the quasi electrons and gluons would be expected to occur within a nucleus.

This would occur to to give the structures stability and this in turn would allow the decresed binding energies seen in these structures. As has been shown by the metric tensor structure of matter (eq. 4-6), the preferred conformation is a 3 x 3 structure.

This can be acheived by donating a quasi electron and a quasi positron along with three associated gluons each; from the proton structure to that of the neutron. The proton would then contain three positrons and a total of nine gluons

The stable nuclear proton conformation would now be :

$$p = 3^+(4/3\pi c^3)^{1/2}.3(\pi/c^{1/2}) \qquad (15)$$

This can form a stable 3 x 3 conformation.

Thus the probable structure of the stable nucleonic neutron (n), would now contain a total of three quasi positrons and three quasi electrons along with their respective eighteen gluons and is represented by an equation, which also forms a 3 x 3 conformation:

$$n = \begin{matrix} {}^{+}(4/3\pi c^3)\downarrow^{1/2}.2(3\pi/c^{1/2}).{}^{-}(4/3\pi c^3)\uparrow^{1/2} \\ {}^{+}(4/3\pi c^3)\downarrow^{1/2}.2(3\pi/c^{1/2}).{}^{-}(4/3\pi c^3)\uparrow^{1/2} \\ {}^{+}(4/3\pi c^3)\downarrow^{1/2}.2(3\pi/c^{1/2}).{}^{-}(4/3\pi c^3)\uparrow^{1/2} \end{matrix} \qquad (29)$$

Viewed in three dimensions the configuration will allow the positron components of the neutron to be placed interiorly and the electron components exteriorly, in keeping with experiments that suggest that the neutron core is positive an the exterior is negative. This polarised structure in turn will enable the neutron to bind the protons of the nucleus together.

Alpha Particle Structure

Importantly it is now possible to **derive the mathematical structure of the helium nucleus** (α particle) containing two protons and two neutrons, along the same lines. The proposed basic conformation is again 3 x 3.

$$\alpha = \begin{matrix} [3(4/3\pi c^3)]\downarrow^{1/2+}.2(3\pi/c^{1/2}). \ [3(4/3\pi c^3)]\uparrow^{1/2-} \\ [3(4/3\pi c^3)]\uparrow^{1/2+}.2(3\pi/c^{1/2}). \ [3(4/3\pi c^3)]\downarrow^{1/2+} \\ [3(4/3\pi c^3)]\downarrow^{1/2-}.2(3\pi/c^{1/2}).[3(4/3\pi c^3)]\uparrow^{1/2+} \end{matrix} \qquad (30)$$

This mathematical expression for the structure of the α particle allows the **calculation of its binding energy from first principles!** Each pair of particles is still associated with the equivalent of 18 gluons each, that is $3^{1/2}.2(3\pi/c^{1/2}).3^{1/2}$. However, the internal structure has altered, to effectivly reduce the number of quasi electrons. Thus as a result of triplet pairing, which has occurred in order to make up the helium nucleus, we are left with a reduced number quasi electrons.

Hence, the number of quasi electrons is reduced by a factor of 3 as a result each of the three pairings of the six quasi electron groups. This means the reduction in the equivalent number of quasi electron masses (including the electrical kinetic energy of the complex vectors) is effectively 3^3 x 6. Each of these weighs 1/3 the rest mass of the electron. The total energy therefore liberated is equivalent to 27 x 6 quasi electron masses (approximately 27.5 Mev). This agrees with the difference in mass between the constituent protons and neutrons and the rest mass of the helium nucleus, thus accounting for the binding energy of the helium nucleus.

This structure is also important for the understanding of the internal structure of atomic nucleii, The alpha particle appears to form a natural sphere as indicated by the metric

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tensor structure (see eq. 4-6). In turn the basic structure of atomic nucleii appear to form in multiples of alpha particles; the carbon atom for instance forms from three, separate, such helium nuclei spheres.[ref 21]

Furthermore knowledge, of the structure of the α particle may be of considerable importance in the understanding **of nuclear fusion** and the eventual harnessing of this technology.

Dimensional Equations for Quintessence

As $h = 3m_q c^2$ and the dimensions of h are $[ML^2T^{-2}.T]$ and those of c^2 are $[L^2.T^{-2}]$ the equational dimensions of quintessence are $[M][T]$, and the dimensions relating to the number of quintessences n_q is $[T^{-1}]$. Clearly therefore,

$$[M] = [M][T] \times [T^{-1}]$$

and overall

$$M = m_q \times n_q.$$

Dimensional Equations for the Electron

The dimensions of the equation for the electron, in the light of quintessence, can now be fully examined, if

$$e^2 = \frac{\epsilon 0}{3 \left(4/3\pi c^3 \right)} \qquad (3b)$$

Then taking the dimensions of the equation, e^2 is the charge $[q^2]$, in Coulombs; ϵ_0 is the permittivity of free space, in Capacitance **[C]** per metre **[L]**; and **[c]** is the speed of light, in **[L/T]**.

Thus the above equation using dimensions, is given by

$$[q^2] = \frac{[C]}{[L][c^3]}$$

In this case the velocity is given as the velocity of light c, then **L = c.T** ; then

$$[q^2] = \frac{[C]}{[c^4][T]}$$

As $q^2 = C^2V^2$, where V is volts, then:

$$[C^2][V^2] = \frac{[C]}{[c^4][T]}$$

and

$$[CV^2] = \frac{1}{[c^4][T]} \qquad (3d)$$

as $E = CV^2$, then

$$E = \frac{1}{[c^4][T]} \qquad (3e)$$

and as $E = mc^2$, then

$$mc^2 = \frac{1}{[c^4][T]} \qquad (3f)$$

and hence

$$m = \frac{1}{[c^6][T]} \qquad (3g)$$

The significance of this dimensional analysis, in the first instance, appears obscure. Nevertheless, it reveals the very nature of matter and energy. Thus the equation for the mass of a structure can be represented by $1/c^6$ **which represents the six c mplex vectors of matter.**

Interestingly, given it is **known** that $1/c^2 = [\mu_o.\epsilon_0]$, then

$$m = [\mu_o.\epsilon_0]^3/T \qquad (3h)$$

Where $\mu_o.$ **and** ϵ_0 are again the permeability and permittivity of free space, quantities that are inherently caused by the vibration of quintessence. Thus mass itself is the result of the vibration of quintessence in the six complex vectors (each represented by the fundamental properties of quintessence μ_o **or** ϵ_0 .Hence, the equation for the quasi electron mathematically and geometrically forms the "perfect" three dimensional sphere with its mass accounted for by its six complex vectors.

Energy associated with this matter is in turn is also caused by the the vibration of quintessence (including that in the complex vectors, i) such that:

$$E = [\mu_o.\epsilon_0]^2/T \qquad (3i)$$

The dimensions for the equation for energy can also be written as:

$$E = \frac{1}{c^3.L}$$

Which indicates that the energy of matter is again related to the dimensions of the structure of the electron $\epsilon_0/(4/3\pi c^3)$ and the permittivity of free space in capacitance per meter **(C/L)**

Overall the equation for the quasi electron and its dimensions, gives us the origin of mass and energy. The equation for the electron then forms the key to the understanding of the nature of the relationship between matter and space-time.

Indeed we may now even derive Newton's second law of motion (F = ma, and thus the other fundamental laws of physics) from first principles to confirm the validity of the above.

If:

$$E = \frac{1}{[c^4 .][T]} \qquad (3e)$$

Which is dimensionally equivalent to:

$$E = \frac{[T^3]}{[L^4]}$$

then as F = E/L:

$$F = \frac{[T^3]}{[L^5]}$$

and thus

$$F = \frac{[T^6]}{[L^6 .T]} \cdot \frac{[L]}{[T^2]}$$

Substrituting for **m** from eq. 1g

$$m = \frac{[T^6]}{[L^6][T]}$$

Then

$$F = ma$$

Thus taking into account the whole of these observations enables the laws of motion and the equations for energy and mass and their equivalence to be derived from geometric first principles.

Equations for Quantum Wave mMechanics

A direct comparison of the standard wave equation, $\lambda = h/p$ versus the relativistic wave equation $\lambda = hv/\beta^2 E = hc/\beta E$, where v is the relativistic velocity.

5 GeV	$\lambda = h/p = 1.73 \times 10^{-14}$ m	$\lambda = hv/\beta^2 E = 1.73 \times 10^{-14}$ m
15 MeV;	$\lambda = h/p = 3.17 \times 10^{-13}$ m;	$\lambda = hv/\beta^2 E = 3.14 \times 10^{-13}$ m
5 MeV	$\lambda = h/p = 5.79 \times 10^{-13}$ m;	$\lambda = hv/\beta^2 E = 5.42 \times 10^{-13}$ m
0.5 MeV	$\lambda = h/p = 1.73 \times 10^{-12}$ m;	$\lambda = hv/\beta^2 E = 1.41 \times 10^{-12}$ m
0.1 KeV	$\lambda = h/p = 1.23 \times 10^{-10}$ m;	$\lambda = hv/\beta^2 E = 1.21 \times 10^{-10}$ m

The standard wave equation shows a simple log/linear scale, whereas the equation $\lambda = hv/\beta^2 E$ gives a relativistic curvilinear plot in keeping with recent experiments.[ref 9]

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CLAIMS

1.   A method of generating a force acting on a body,
wherein electron flow through a rotating mass is directed
so as to release a directed flow of gravitons.

5

2.   A method of accelerating a body by generating a
force acting on it by the method of claim 1.

3.   A method according to claim 1 or 2, wherein
10   electrical currents are passed simultaneously through
said mass in its direction of rotation and contrary to
its direction of rotation.

4.   A method according to any one of claims 1 to 3,
15   wherein the mass is at least partly of superconducting
material.

5.   A device for generating a force sufficient to
accelerate a body, comprising an electrically conductive
20   mass, means for rotating the mass and means for passing
electrical currents simultaneously through said mass in
its direction of rotation and contrary to its direction
of rotation.

25   6.   A device according to claim 5, wherein the mass is
spherical.

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FIG. 1

"A"

Motor

Motor

B - Spherical
Superconductor

Vertical
Rails

Supercooled
Jacket

Commutator
Device

x

y

Spherical Superconductor
Sphere = 0.25m external radius
Sphere = 0.20 m internal radius

Figure 1 & 2
B = Superconductor

Direction of Motion
y v⬤or (vertical rails)

FIG. 2

++

Commutator
Device

−−

VIEW ON "A"

A = Ultracentrifugational Axle
   (rps 10,000 revs/sec)
B = Spherical Superconductor

PCT SB 01/50301

J.R.L-T

⑪ # Offenlegungsschrift 25 12 695

㊸ Bezeichnung: Vorrichtung zur Veränderung der auf eine diskrete Masse wirkenden Raumzeit-Geometrie

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Vorrichtung zur Veränderung der auf eine diskrete Masse wirkenden Raumzeit-Geometrie

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Die Erfindung betrifft eine Vorrichtung zur Veränderung der auf eine diskrete Masse wirkenden Raumzeit-Geometrie, z.B. in Form von Materie oder dem relativistischen Massenäquivalent von Energie, wodurch eine auf diese Materie bezogene zusätzliche gravitative Kraftwirkung verursacht wird ("kinetobarischer Effekt").

Mit den inzwischen allgemein anerkannten physikalischen Denkgrundlagen Einsteins aus seiner Gravitationstheorie (der "Allgemeinen Relativitätstheorie", 1915), nämlich der Beschreibung der Gravitation durch eine von Masse ausgelöste Nahwirkung der örtlichen geometrischen Struktur der Raumzeit auf Masse kann man einen Effekt ableiten, welcher durch Einwirkung einer zusätzlichen Energie auf Masse eine zusätzliche gravi-

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ORIGINAL INSPECTED

tative Wirkung auf diese Masse begründet. Die Gravitation
wird formalmathematisch als Veränderung der örtlichen "Raum-
zeit-Krümmung" bzw. der "Raumzeit-Geometrie" bezeichnet. Das
Konzept "Raumzeit-Welt" bzw. "Raumzeit" wurde von Minkowski
1908 postuliert und mathematisch begründet. Dementsprechend
wird die Geometrie der Raumzeit-Welt durch die Verteilung
der Massen in Abhängigkeit von der Massendichte eingestellt.
Der Begriff "Raumzeit" enthält folglich die Bedeutung eines
dynamischen Vorganges wegen des zwangsläufigen Ablaufes der
Zeit und der von Einstein postulierten mechanischen Wechsel-
beziehung von Raumzeit und Masse. Die Raumzeit-Krümmung ver-
ursacht formal eine mechanische Nahwirkung zwischen örtlicher
geometrischer Struktur der Raumzeit und Masse und damit die
auf die Masse wirkende Gravitationskraft.

Wenn es gelingt, die Geometrie der Raumzeit bzw. die Raumzeit-
Geometrie einer zugeordneten Masse nicht nur durch Masse,
sondern durch eine andere Energieform, nachfolgend als Wand-
lungsenergie bezeichnet, zu verändern, dann erhält man eine ver-
änderte gravitative Wirkung bzw. eine neue gravitative Kraft,
die nachfolgend als kinetobarische Wirkung bzw. kinetobarische
Kraft bezeichnet wird.

Der Erfindung liegt die Aufgabe zugrunde, eine Vorrichtung
zu schaffen, mit der die gravitative Eigenschaft der Raum-
zeit in Bezug auf diskrete Masse geändert werden kann bzw.
mit der die Raumzeit-Geometrie in Bezug auf eine diskrete
Masse verändert oder eine kinetobarische Wirkung ausgelöst
werden kann.

Diese Aufgabe wird erfindungsgemäss dadurch gelöst, dass die
orthogonal oder etwa orthogonal verlaufenden Felder eines
elektrischen und eines vorzugsweise gleichphasig erregten
magnetischen Elementarstrahlers in deren Nahbereich so über-
lagert werden, dass die Wanderfelder und die sich davon ab-
lösenden primären Wirbelfelder des einen Elementarstrahlers

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jeweils antiparallel zu den sekundären Wirbelfeldern des
anderen Elementarstrahlers orientiert sind, und dass die
durch die Überlagerung der orthogonalen Felder der Elementar-
strahler entstehende Wandlungsenergie von innen oder von aussen
auf Materie einwirkt.

Bei einer vorteilhaften Ausgestaltung der Erfindung ist vor-
gesehen, dass die Wanderfelder leitungsgebunden sind, wobei
eine Vielzahl von Doppelleitungen Verwendung finden können.

Durch die Massnahmen der Erfindung lässt sich durch die Wir-
kung im Nahbereich der magnetischen und der elektrischen Ele-
mentarstrahler die Wandlungsenergie erzeugen, welche durch
die antiparallele Überlagerung der Wanderfelder und der Wir-
belfelder die magnetischen sowie die elektrischen Eigenschaf-
ten verloren hat, jedoch nach den Impuls- und Energieerhal-
tungssätzen die dynamischen Eigenschaften der ursprünglichen
dynamischen elektromagnetischen Energie weiterhin besitzt.
Diese Eigenschaften sind der relativistische mechanische
Impuls und der Energieinhalt, die bewirken, dass die beein -
flusste Masse mit der Raumzeit eine mechanische Wechselwir-
kung eingeht. Es entsteht ein Kraftvektor, der die kinetoba-
rische Wirkung beschreibt, welche so lange wirksam ist, bis
die Veränderung der Raumzeit-Krümmung abgeklungen, d.h. bis
die durch das Potential beschriebene Energie durch die Ver-
krümmung der Raumzeit aufgebraucht ist. Die Zeitdauer der
veränderten Raumzeit-Krümmung entspricht der Abklingzeit der
kinetobarischen Wirkung und ist um Grössenordnungen länger
als der die kinetobarische Wirkung auslösende Energieimpuls.

Zur Schaffung einer möglichst wandlungsgünstigen relativen
Phasenlage der elektrischen und magnetischen Wanderfelder
zueinander ist nach einer weiteren Ausgestaltung der Erfin-
dung vorgesehen, dass die Leiter jeweils mit einem rechen-
artigen Gitter umgeben sind, um die elektrischen und die
magnetischen Wanderfelder gleichzeitig und gleichphasig

einzuspeisen. Damit ein möglichst grosser Anteil der Materie
von der Wandlungsenergie beeinflusst wird, ist ferner vorge-
sehen, dass die die Wanderfelder führenden Leiter eine mög-
lichst grosse Oberfläche aufweisen. Auch ist durch ein Ver-
kleinern der Impulsdauer der Wandlungsenergie bzw. bei Er-
höhung der Frequenz bei Sinuseinspeisung eine wesentliche
Verbesserung der Wirksamkeit zu erreichen.

Besonders günstige Ausgestaltungen der Erfindung ergeben sich
dadurch, dass der eine oder der andere oder beide Elementar-
strahler ganz oder teilweise durch den Strom durch einen
diskreten oder verteilten Wirkwiderstand gebildet werden.
Es lässt sich jedoch auch nach einer weiteren Ausgestaltung
der Erfindung die Wirkung eines oder beider Elementarstrah-
ler ganz oder teilweise durch den Verschiebe- und gegebenen-
falls Polarisationsstrom mittels Wanderfeldern in einem Di-
elektrikum erzeugen.

Die kinetobarische Wirkung kann in unterschiedlicher Weise
Anwendung finden, wobei sie in akkumulierter Form als Antrieb
und/oder Auftrieb und/oder zur Steuerung für Fahrzeuge all-
gemein und im speziellen für Schiffe, Flugzeuge, Flug- und
Raumkörper Verwendung finden kann. Der Vorteil der Erfindung
besteht u.a. darin, dass sich eine elegante, kostenniedrige
Möglichkeit einer Energiequelle bietet, wobei der verschwen-
derische Umweg über die primär als Wärme zur Verfügung ste-
hende Energie herkömmlicher Energieträger vermieden wird.
Vergleiche mit herkömmlichen Methoden zur Energiegewinnung
zeigen, dass ein kinetobarisches Antriebsgerät mit weniger
als 1/10 der Energie bei gleicher Antriebsleistung auskommt.
Daher kann aufgrund einer sehr günstigen Energiebilanz bei
der Verwendung der erfindungsgemässen Vorrichtung als Antrieb
der Treibstoffverbrauch drastisch gemindert und eine Umwelt-
verschmutzung vermieden werden. Die Relation zwischen einge-
leiteter Energie und abgegebener Energie der durch die Wand-
lungsenergie beeinflussten Materie liegt aufgrund mathema-

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tischer physikalischer Abschätzungen zwischen 10^1 und über 10^8. Durch Messungen wurden bisher Relationen im Bereich von 10^4 bis 10^5 festgestellt und nachgewiesen, wobei jedoch darauf hinzuweisen ist, dass die Relationen sich nach den Parametern der zur Erzeugung der kinetobarischen Wirkung benutzten Vorrichtungen richten. Bei der Verwendung der kinetobarischen Wirkung als Antrieb ist auch auf den Vorteil hinzuweisen, der sich aus der Geräuschlosigkeit ergibt. Die Tatsache, dass die kinetische Energie aufgrund der kinetobarischen Wirkung wesentlich grösser als die zugeführte elektromagnetische Energie ist, erklärt sich aus der Tatsache, dass durch die in die Materie eingeleitete Wandlungsenergie diese Materie mit der Raumzeit in Wechselbeziehung tritt und diese Raumzeit während der Zeitdauer der Veränderung der Raumzeit-Krümmung auf die Materie einwirkt. Die Energie stammt somit aus dem zwangsläufigen Ablauf der Raumzeit und somit nicht aus der Wandlungsenergie, die nur als auslösendes Moment wirkt.

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Die Merkmale und Vorteile der Erfindung ergeben sich auch
aus der nachfolgenden Beschreibung von Ausführungsbeispielen
in Verbindung mit den Ansprüchen und der Zeichnung. Es zeigen:

Fig. 1   in schematischer Darstellung ein Wandler zur Erläute-
          rung der Wirkungsweise der Erfindung;

Fig. 2   eine Erläuterung der im Nahbereich der Primärstrah-
          ler ablaufenden elektrischen und magnetischen Vor-
          gänge;

Fig. 3   einen Wandler in einfacher Ausführungsform in Zuord-
          nung zu Ansteuerungsimpulsen und zu dem Verlauf der
          Impulsenergie über die Ansteuerungsleitungen und den
          Leiter des Wandlers;

Fig. 4   eine Darstellung des Verlaufes des elektrischen Feldes
          und des Verschiebe- sowie Polarisationsstromes am
          offenen Ende der Leiter des Wandlers in Abhängigkeit
          von der Laufzeit;

Fig. 5   eine weitere Ausführungsform eines Wandlers;

Fig. 6   eine dritte Ausführungsform eines Wandlers.

Die kinetobarische Wirkung beruht auf einem grundsätzlich neuen physikalischen Phänomen, welches in Materie gezielt mittels der Vorrichtung gemäss der Erfindung, nachfolgend auch Wandler genannt, ausgelöst werden kann, wobei in diesen Wandler elektromagnetische Energieimpulse zur Auslösung eingespeist werden. Die Einspeisung der elektromagnetischen Energieimpulse erfolgt über die Elementarstrahler, wobei die dynamische elektromagnetische Energie im Wandler durch physikalische Massnahmen derart beeinflusst wird, dass eine neuartige Energieform entsteht, nämlich die Wandlungsenergie. Diese Wandlungsenergie besitzt keine . elektromagnetischen, sondern dynamische, mechanische Eigenschaften. Die Wandlungsenergie ändert, wie bereits erwähnt, in Wechselwirkung mit der Materie deren gravitative (also mechanische) Kopplung an die Raumzeit derart, dass die Raumzeit eine dynamische Kraft auf die Materie ausübt, deren räumliche Richtung relativ zum ursprünglichen Inertialsystem parallel zum vorausgehenden Fluss der Wandlungsenergie orientiert ist. Die Abklingzeit der kinetobarischen Wirkung ist um Grössenordnungen länger als die Auslöseimpulse, so dass die Wirkungen einer grossen Anzahl von Auslöseimpulsen zu einer technisch brauchbaren Kraftwirkung akkumuliert werden können. Diese von der Raumzeit ausgeübte Kraft bewirkt, dass die Materie ihren Schwerpunkt relativ zu dem ursprünglichen Inertialsystem verschiebt, weil der Schwerpunktsatz durch die Ankopplung an die Raumzeit-Welt nicht anwendbar ist.

Nachfolgend wird eine allgemeine Beschreibung der Ableitung der Wandlungsenergie aus elektromagnetischen Auslöseimpulsen in einem Wandler gegeben. Dieser Wandler umfasst gemäss Fig. 1 in schematischer Form einen Leiterkreis, der aus Bandleitern besteht und mit einem Dielektrikum als Materie, im vorliegenden Fall Wasser, zusammenwirkt. Der Leiterkreis hat einen Wellenwiderstand R_z. Die Einspeisung in die Bandleiter erfolgt am einen Ende.

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Um nun in einem solchen Wandler die Wandlungsenergie auszulösen, muss Energie als Auslöseimpuls eingeleitet werden. Hierfür findet ein elektromagnetischer Auslöseimpuls Verwendung, da die elektromagnetische Energie sich mit im jeweiligen Dielektrikum gültiger Lichtgeschwindigkeit ausbreitet und diese Ausbreitungsgeschwindigkeit notwendig ist, damit die von dem Auslöseimpuls abgeleitete Wandlungsenergie an die Raumzeit angekoppelt werden kann. Ferner ist es notwendig, dass der elektromagnetische Auslöseimpuls "wandlungsorientiert" ist, d.h. dass die von den Elementarstrahlern abgegebenen Wanderfelder eine solche Orientierung aufweisen, dass sie bei der späteren Überlagerung die Wandlungsenergie entstehen lassen können.

Der wandlungsorientierte elektromagnetische Auslöseimpuls erzeugt am Leiterkreis ein elektrisches Wanderfeld $\mathscr{E}$. Gleichzeitig erzeugt ein zwischen den Punkten M und N, welche einen Elementardipol kennzeichnen können, fliessender Strom ein magnetisches Feld $\mathscr{H}$, dessen Feldlinien den Strom i umgeben. Die Ausbreitungsrichtung des elektrischen Wanderfeldes sowie des magnetischen Wanderfeldes ist in Fig. 1 durch den mit Ausbreitungsrichtung benannten Pfeil gekennzeichnet. Entsprechendes gilt für die Darstellung gemäss Fig. 2, in welcher die beiden Wanderfelder und die sich daraus ablösenden Wirbelfelder symbolisch in ihrer Abhängigkeit zusammen mit der Ausbreitungsrichtung der Wanderfelder dargestellt sind.

Durch den elektromagnetischen Auslöseimpuls wird ein elektrischer Impuls für das elektrische Wanderfeld und ein magnetischer Impuls für das magnetische Wanderfeld mit einer Impulsdauer $T/2$ erzeugt, wobei sich sowohl der elektrische Impuls als auch der magnetische Impuls über die Zeitdauer $T = T/2$ erstrecken und bei $T/2$ ihre volle Amplitude haben. Wenn zwischen beiden Impulsen keine Phasenverschiebung besteht, ergibt sich ein optimaler Wirkungsgrad.

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Die beiden Wanderfelder sind während der Anstiegszeit der
elektrischen und magnetischen Impulse an die Leiter L des
Leiterkreises gebunden, bis sie ihre Höchstamplitude bei $\pi/2$
erreichen. Die Wanderfelder haben ihren Ursprung in der La-
dungsverteilung auf den Leitern L und in dem Strom des Ele-
mentardipols M-N. Die über die Leiter sich ausbreitenden elek-
trischen und magnetischen Wanderfelder haben vom Zeitpunkt
$\pi/2$ an eine abnehmende Amplitude. Vom selben Zeitpunkt an
bilden sich aus dem elektrischen Wanderfeld einerseits und
dem magnetischen Wanderfeld andererseits primäre und sekun-
däre Wirbelfelder, die nicht mehr leitungsgebunden sind und
in Fig. 2 symbolisch mit Richtungsangaben wiedergegeben sind.
Die Fig. 2 zeigt ferner, dass das sekundäre elektrische Wir-
belfeld antiparallel zu dem primären elektrischen Wirbelfeld
und dem elektrischen Wanderfeld steht, und dass andererseits
das sekundäre magnetische Wirbelfeld antiparallel zu dem
primären magnetischen Wirbelfeld und dem magnetischen Wander-
feld verläuft.

Es sei bemerkt, dass die primären und sekundären Wirbelfelder
untereinander nicht durch die Induktionsgesetzmässigkeit ver-
knüpft sind, sondern separate, selbständige Felder darstellen.
Diese Felder überlagern sich in nascenti, so dass aufgrund
der antiparallelen Ausrichtung die Feldeigenschaften verloren
gehen und nur noch der dynamische relativistische Impuls bzw.
der Energie-Inhalt der elektromagnetischen Energie übrigbleibt
aufgrund der ursprünglichen dynamischen Eigenschaften der Fel-
der. Diese mechanische Impulsenergie ohne elektromagnetische
Eigenschaften stellt die eingangs erwähnte Wandlungsenergie
dar.

Diese Wandlungsenergie verändert die quantitative Kopplung
der vorhandenen Materie mit der Raumzeit durch die auf diese
Materie bezogene Veränderung der örtlichen Raumzeit-Geometrie.
Im vorliegenden Fall handelt es sich gemäss Fig. 1 bei der
Materie um das als Dielektrikum wirksame Wasser und das

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Leitungssystem. Wie bereits eingangs erwähnt, entspricht
dieser Änderung der Raumzeit-Geometrie eine gravitative
Kraftwirkung, die so lange anhält, bis die aus der Wand-
lungsenergie stammende dynamische Energie durch das Abklin-
gen der Veränderung der Raumzeit-Geometrie verbraucht ist.
Die Wandlungsenergie bewirkt also, dass für eine begrenzte
Zeitdauer die beeinflusste Materie auf sich selbst bezogen
örtlich eine andere Raumzeit-Geometrie hat, so dass die Welt-
linie dieser beeinflussten Materie relativ zu anderen Körpern
anders ist. Die sich dadurch ergebende kinetobarische Wirkung
stellt sich als mechanischer Impuls und als mechanische Ener-
gie, oder, wenn die Energie auf die Masse der beeinflussten
Materie bezogen ist, als Potential dar. In der Wechselwirkung
mit der Raumzeit ergibt sich daraus ein mechanischer Impuls-
gewinn im ursprünglichen Inertialsystem, der durch mittlere
Kraft x Zeit bestimmt ist, wobei "Zeit" die Zeitdauer kenn-
zeichnet, während welcher die Veränderung der Raumzeit-
Geometrie abklingt. Dieser mechanische Impuls aus Kraft x Zeit
kann im ursprünglichen Inertialsystem in Bewegungsenergie
umgesetzt werden.

Anhand der Fig. 3 wird ein Wandler und seine Wirkungsweise
beschrieben. Der Wandler 10 umfasst ein nicht leitendes Ge-
häuse 11, z.B. aus Kunststoff, das mit Wasser (Dielektrizi-
tätskonstante von etwa 80) gefüllt ist, dem durch Zugabe eines
Elektrolyten eine gewisse Leitfähigkeit gegeben wird. In dem
Wasser sind zwei Parallelleiter 12 angeordnet, die in ihrer
Länge auf die halbe Wellenlänge der Laufzeitfrequenz aufgrund
der verwendeten Impulsdauer der Auslöseimpulse von etwa
2,25 Nanosekunden bei einer Laufzeitfrequenz von etwa 240 MHz
abgestimmt sind. Der Abstand der Parallelleiter ist im Ver-
hältnis zur Leiterlänge aus durch den Wirkungsfaktor beding-
ten Gründen kleiner und kann z.B. bei der verwendeten Impuls-
dauer in der Grössenordnung von 2 cm liegen. Die Ansteuerung
des Wandlers 10 mit Impulsen der genannten Impulsdauer erfolgt

über Kondensatoren 13 und 14 sowie über weitere Parallel-
leiter 15 von einem Impulsgenerator aus. Dieser Impulsgene-
rator kann entsprechend einem Impulserzeuger aufgebaut sein,
der Gegenstand einer gleichzeitig eingereichten Patentanmel-
dung Akz:..................... ist. Die Ankopplungsleitung
ist auf eine Viertel Wellenlänge einer formalen Frequenz
f_W = Laufzeitfrequenz abgestimmt, deren halbe Periode gleich
der Impulsdauer des Auslöseimpulses ist. Die Ankopplungs-
leitung ist in den Punkten AB an einen Schwingungskreis im
Impulsgenerator 20 angekoppelt. Der Impulsgenerator ist so
ausgelegt, dass ein Auslöseimpuls jeweils in einem Tastver-
hältnis 1:5 auftritt, wie dies aus Fig. 3 hervorgeht. Durch
die Parallelleiter 15 wird eine Impedanztransformation zwi-
schen dem Impulsgenerator und dem Wandler vorgenommen. Die
Länge der Parallelleiter 15 ist etwa 24 cm für die angegebene
Laufzeitfrequenz bei einer Leitungsimpedanz von etwa 600 Ohm.
Die Kondensatoren 13 und 14 liegen in der Grössenordnung von
etwa 1 pF bis etwa 3 pF, wobei jedoch die Kapazitätswerte
etwas kleiner gewählt werden als für eine optimale Anpassung
zwischen den Parallelleitern 15 und dem Wandler 10 notwendig
ist. Diese Fehlanpassung dient dem Zweck, eine Reflexion der
von dem Wandler in Richtung Parallelleiter 15 laufenden
Schwingungsenergie zu bewirken. Die Resonanzfrequenz des
Parallelleiters 12 ist etwa gleich der Laufzeitfrequenz f_W
der oben erwähnten "formalen Frequenz" von 240 MHz.

Der Auslöseimpuls wird in Abständen von 2,5 oder auch 5,0
bzw. 7,5 Perioden der Laufzeitfrequenz f_W eingespeist und
hat die Zeitdauer einer halben Periode bzw. $T/2$. Durch diese
Einspeisung entsteht im Wandler eine gedämpfte Schwingung.
Wie aus Fig. 3 hervorgeht, benötigt der Auslöseimpuls eine
Laufzeit von $T/4$ auf den Parallelleitern 15 bis zum Errei-
chen der Kondensatoren 13 und 14. Nach dem Einkoppeln des
Auslöseimpulses in den Wandler wandert dieser als Wander-
welle bis zum offenen Ende der Parallelleiter 12 und wird
dort nach einer Laufzeit von $T/2$ reflektiert. Die an diese

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Reflexion anschliessende Halbperiode mit einer Laufzeit von $T/2$ wird als Wandlungsphase bezeichnet, da sich infolge der Leitfähigkeits-, Verschiebe- und Polarisationsströme sowie des elektrischen Feldes nunmehr die anhand von Fig. 2 erläuterten primären und sekundären Wirbelfelder abschnüren. Die Richtung des Energieflusses während der Wandlungsphase ist von dem offenen Ende der Parallelleiter 12 in Richtung auf den Eingang des Wandlers gerichtet.

Die Wandlungsphase beginnt gemäss Fig. 3 zum Zeitpunkt $3T/4$ und umfasst jeweils ein kurzes Zeitelement t_w, während welchem im Nahwirkungsbereich der Wanderfelder und der entstehenden primären und sekundären Wirbelfelder die Beeinflussung des Wassers und der Leitungen 12 zur Auslösung der kinetobarischen Wirkung stattfindet. Mit der Ausbreitung der am offenen Ende des Leiterpaares 12 reflektierten Felder wandert dieses Zeitelement durch den Wandler in Richtung auf die Kondensatoren 13 und 14 und wandert von dort aus mit den reflektierten Feldern wieder zurück. Diese Reflexion an den Kondensatoren 13 und 14 ist in Fig. 3 gestrichelt eingezeichnet und beginnt zum Zeitpunkt $5T/4$. Diese an den Kondensatoren 13 und 14 reflektierte Wandlungsphase ist in ihrer kinetobarischen Wirkung wesentlich geringer und überlagert sich der in ihrer Wirkung grösseren gegenläufigen Wandlungsphase, so dass die vom offenen Ende der Leiter zum Eingang des Wandlers sich schiebende Wandlungsphase in ihrer Wirkung wohl geschwächt, jedoch bezüglich ihrer Wirkungsrichtung erhalten bleibt.

Die am offenen Ende des Leiterpaares 12 einsetzende Wandlungsphase wird von dem elektrischen Feld und der davon abhängigen Spannung sowie den Leitfähigkeits-, Verschiebe- und Polarisationsströmen in Verbindung mit dem Leiterstrom und dem davon abhängigen Wanderfeld und magnetischen Feld ausgelöst. Dabei laufen während des Zeitelementes t_w die in Fig. 2 erläuterten Verhältnisse ab.

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Wenn man davon ausgeht, dass gemäss Fig. 3 während der Zeit
0 und $T/2$ ein Auslöseimpuls in die Parallelleiter 15 einge-
speist wird, dann durchläuft dieser Auslöseimpuls während
der Zeit $T/4$ bis $3T/4$ die Koppelkondensatoren 13 und 14 und
tritt in den Wandler ein. Während der Zeit $3T/4$ bis $5T/4$
erreicht diese Impulsenergie das offene Ende des Leiterpaares
12 im Wandler 10. Für dieses Zeitintervall $3T/4$ bis $5T/4$ sind
in Fig. 4 der Verlauf des Verschiebe- und Polarisationsstromes
di_ε und des Leitfähigkeitsstromes di_σ dargestellt. Diese Kur-
ven sind in Fig. 4 gestrichelt eingetragen. Die Summe der
Verschiebe-, Polarisations- und Leitfähigkeitsströme ist durch
die Kurve C und der Verlauf der elektrischen Feldstärke durch
die Kurve D angedeutet. Dem Maximum des Auslöseimpulses zum
Zeitpunkt T entspricht das Maximum der Kurve D. Mit dem Beginn
der Reflexion der das Maximum durchlaufenden Feldstärke be-
ginnt das Zeitelement t_w für die Wandlungsphase. Dieses Zeit-
element t_w hat eine Breite, welche dem Abstand zwischen dem
Maximum der Kurve D und der Kurve C entspricht und bestimmt
sich aus der Phasenverschiebung infolge der Leitfähigkeit.
Während dieses Zeitelementes t_w entsteht aus den Leitfähig-
keits- und Verschiebeströmen ein magnetisches Feld, das in
seiner Orientierung und in seiner Lage zu den Leitern dem
magnetischen Feld $\mathfrak{H}$ gemäss Fig. 1 entspricht. Dieses magne-
tische Feld entspricht dem magnetischen Wanderfeld gemäss
Fig. 2 und wirkt mit dem als elektrisches Wanderfeld wirk-
samen elektrischen Feld $\mathfrak{E}$, dessen Verlauf durch die Kurve D
gekennzeichnet ist, zusammen. Im Nahwirkungsbereich der Wan-
derfelder erzeugenden Elementarstrahler läuft nun die bereits
vorausstehend beschriebene Entstehung von primären und sekun-
dären Wirbelfeldern ab, aus denen sich durch gegenseitige
Beeinflussung die ebenfalls erläuterte Wandlungsenergie bil-
det. Diese Wandlungsenergie tritt mit den Leitungen und dem
Wasser in Wechselbeziehung und lässt die kinetobarische Wir-
kung entstehen.

Die in Fig. 5 dargestellte Ausführungsform der Erfindung
umfasst einen Wandler 30, bei dem in einem Gehäuse 31 zwei

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$\lambda/4$-Leitungen angeordnet sind. Das Gehäuse 31 ist mit Wasser
mit einer Dielektrizitätskonstante von etwa 80 gefüllt. Die
$\lambda/4$-Leitungen sind über Koppelkondensatoren 33 an einen
$\lambda/8$-Dipol 34 angeschlossen. Dieser Dipol ist mit einer An-
steuerungsstufe 35 verbunden. Ausserhalb des Gehäuses 31 ist
etwa parallel liegend zu dem gekrümmten $\lambda/8$-Dipol ein mit
Dämpfungsgliedern 36 belasteter Dipol 40 angeordnet, der mit
einer Ansteuerungsstufe 37 in Verbindung steht. Von einem
Taktgeber 38 werden Ansteuerungsimpulse geliefert, die einer
Phasentrennstufe 39 zugeführt werden. In der Phasentrennstufe
wird eine Phasendrehung in der Weise vorgenommen, dass zwi-
schen den aus der Spannung und dem Strom ableitbaren elek-
trischen und magnetischen Feldern eine Phasenverschiebung von
0° besteht. Diese Spannungen und Ströme werden den Ansteue-
rungsstufen 35 und 37 zugeführt, in denen die für die Ansteu-
erung des Wandlers erforderlichen Impulsfolgen oder auch ein
entsprechender Sinus erzeugt werden. Von der Ansteuerungs-
stufe 35 aus wird ein dem elektrischen Feld zugeordneter Aus-
löseimpuls dem Dipol 34 zugeführt und gleichzeitig von der
Ansteuerungsstufe 37 aus ein dem magnetischen Feld zugeord-
neter Auslöseimpuls an den mit den Dämpfungsgliedern 36 ver-
sehenen Dipol 46 angelegt. Der in dem Dipol 40 fliessende
Verschiebestrom erzeugt das magnetische Wanderfeld, wogegen
der in dem Dipol 34 fliessende Verschiebestrom das elektrische
Wanderfeld erzeugt. Von diesen Wanderfeldern schnüren sich
im Bereich der Dipole die Wirbelfelder gemäss Fig. 2 ab. Diese
Wanderfelder laufen auch über die $\lambda/4$-Leiter zum offenen
Leitungsende und können dabei noch den Effekt vergrössern.
Die Wirbelfelder gehen in nascenti mit den Wanderfeldern eine
Wechselbeziehung ein und lassen die Wandlungsenergie entste-
hen, welche ihrerseits mit der Materie der Leitung und dem
Wasser in Wechselbeziehung tritt und die kinetobarische Wir-
kung auslöst.

In Fig. 6 ist schematisch eine weitere Ausführungsform eines
Wandlers dargestellt. Dieser Wandler 50 umfasst ein Gehäus 51,

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in dem zwei parallel verlaufende Plattenleiter 52 und 53
angeordnet sind. Zwischen diesen Plattenleitern sind gabel-
artig aufgebaute Parallelleiter 54 und 55 vorgesehen. Von
einem der Impulserzeugung dienenden Sägezahngenerator - dieser
Impulsgenerator ist Gegenstand der erwähnten gleichzeitig
eingereichten Patentanmeldung - aus werden über Ankopplungs-
leitungen die Plattenleiter und Parallelleiter angesteuert.
Die Ansteuerung erfolgt über Laufzeitglieder derart, dass die
über die Anschlusspunkte A und A' sowie B und B' angelegten
Ansteuerungssignale beim Erreichen der Koppelkondensatoren
56 und 57 bzw. 58 und 59 eine Laufzeitverschiebung von $\tau/2$
ergeben. Unter diesen Voraussetzungen kann die Ansteuerung
an den Anschlusspunkten A und A' bzw. B und B' gleichphasig
erfolgen. Diese Art der Ansteuerung bewirkt, dass durch die
relative Phasenlage der Ansteuerungssignale ein elektrisches
Wanderfeld und ein durch die Verschiebe- und Polarisations-
ströme (wenn ε grösser 1 ist) erzeugtes magnetisches Wander-
feld in der vorausstehend beschriebenen Weise wandlungsorien-
tiert sind. Die Wandlungsenergie entsteht primär am offenen
Ende der Plattenleiter bzw. Parallelleiter, so dass sich die
aus der Wechselbeziehung mit der Materie Wasser und Leiter
ergebende kinetobarische Wirkung einstellt, die vom freien
Ende der Leiter in Richtung der Ankopplungskondensatoren 56
bis 59 orientiert ist. Durch eine Reflexion an diesen Konden-
satoren entsteht auch eine entgegengesetzt gerichtete kleine
kinetobarische Wirkung, die der ersteren entgegengerichtet
ist und diese etwas verringert.

Vorausstehend wurde bereits erwähnt, dass sich durch das An-
legen einer Impulsfolge von Auslöseimpulsen eine Akkumulation
der kinetobarischen Wirkung erzielen lässt. Dies leitet sich
davon ab, dass die Abklingzeit der kinetobarischen Wirkung
um Grössenordnungen länger als die Impulsdauer der Auslöse-
impulse ist. Durch die Überlagerung der Einzeleffekte während
der Abklingzeit können sich durch eine sehr grosse Anzahl von

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Auslöseimpulsen kinetobarische Wirkungen zu technisch brauchbaren Grössen akkumulieren.

Aufgrund dieser Akkumulationserscheinung wächst die kinetobarische Wirkung beim Einschalten der Auslöseimpulse zunächst an, bis sie einen Sättigungspunkt erreicht haben, der sich bei einer Grösse einstellt, bei der der Abbau der Wirkung durch die Abklingzeit gleich dem Aufbau der Wirkung durch neue angelegte Auslöseimpulse ist. Es lässt sich zeigen, dass sich, je grösser die Energie des Auslöseimpulses ist, der die kinetobarische Wirkung beschreibende Impuls aus Kraft x Zeit in der Weise verändert, dass der Kraftvektor zunimmt, jedoch die Abklingzeit kleiner wird. Mit den derzeit verwirklichten Wandlern lassen sich Kraftwirkungen bis zur Grössenordnung von 1 kp erzielen, jedoch ist es nur eine Frage der Ausgestaltung der Wandler und der HF-Generatoren, um diese Werte um Grössenordnungen zu vergrössern. Der Kraftvektor ist ohne besondere weitere Einwirkungen raumstabil und behält die bei der Erzeugung der kinetobarischen Wirkung aus der räumlichen Lage des Wandlers sich ableitende Richtung bei.

Der durch die Erfindung bewirkte kinetobarische Effekt lässt sich überall dort einsetzen, wo Kräfte zur Anwendung kommen, insbesondere jedoch für Antriebe, da wegen des erwähnten hohen Wirkungsgrades eine drastische Verminderung des Treibstoffverbrauches möglich ist. Da sich durch den kinetobarischen Effekt eine reine Kraft ergibt, sind derartige Antriebe äusserst umweltfreundlich, da sie keine Verschmutzung mit sich bringen. Dabei sind Antriebe für die Raumfahrt besonders ins Auge zu fassen, da durch geeignete Ausgestaltung der Raumfahrzeugzelle diese als Wandler wirksam sein kann. Der Brennstoffbedarf verringert sich auf einen Bruchteil des Brennstoffbedarfes von Raumschiffen, die nach dem Newton'schen

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Prinzip angetrieben werden, wobei trotz des geringeren Brennstoffbedarfes in der Raumfahrt selbst noch wesentlich höhere Geschwindigkeiten erzielbar sind.

<u>P a t e n t a n s p r ü c h e</u>

1. Vorrichtung zur Veränderung der auf eine diskrete Masse
    wirkenden Raumzeit-Geometrie zur Erzeugung einer verän-
    derten gravitativen Wirkung, dadurch g e k e n n -
    z e i c h n e t, dass die orthogonal oder etwa ortho-
    gonal verlaufenden Felder eines elektrischen und eines
    vorzugsweise gleichphasig erregten magnetischen Elemen-
    tarstrahlers in deren Nahbereich so überlagert werden,
    dass die Wanderfelder und die sich davon ablösenden
    primären Wirbelfelder des einen Elementarstrahlers
    jeweils antiparallel zu den sekundären Wirbelfeldern
    des anderen Elementarstrahlers orientiert sind, und
    dass die durch die Überlagerung der orthogonalen Felder
    der Elementarstrahler entstehende Wandlungsenergie von
    innen oder von aussen auf Materie einwirkt.

2. Vorrichtung nach Anspruch 1, dadurch g e k e n n -
    z e i c h n e t, dass die Wanderfelder leitungsgebun-
    den sind.

3. Vorrichtung nach Anspruch 2, dadurch g e k e n n -
    z e i c h n e t, dass eine Vielzahl von Doppelleitungen
    Verwendung findet.

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4. Vorrichtung nach Anspruch 2 oder 3, dadurch g e - k e n n z e i c h n e t, dass die Leiter jeweils mit einem rechenartigen Gitter umgeben sind, um die elektrischen und magnetischen Wanderfelder gleichzeitig und gleichphasig einzuspeisen.

5. Vorrichtung nach einem oder mehreren der Ansprüche 2 bis 4, dadurch g e k e n n z e i c h n e t, dass die die Wanderfelder führenden Leiter eine möglichst grosse Oberfläche aufweisen.

6. Vorrichtung nach einem oder mehreren der Ansprüche 1 bis 5, dadurch g e k e n n z e i c h n e t, dass der eine oder der andere oder beide Elementarstrahler ganz oder teilweise durch den Strom durch einen diskreten oder verteilten Wirkwiderstand gebildet werden.

7. Vorrichtung nach einem oder mehreren der Ansprüche 1 bis 5, dadurch g e k e n n z e i c h n e t, dass die Wirkung eines oder beider Elementarstrahler ganz oder teilweise mittels Verschiebe- und Polarisations- und gegebenenfalls Leitfähigkeitsströmen in einem Dielektrikum erzeugt wird.

8. Vorrichtung nach einem oder mehreren der Ansprüche 1 bis 7, dadurch g e k e n n z e i c h n e t, dass sie zum Antrieb und/oder Auftrieb und/oder zur Steuerung für Fahrzeuge, Schiffe, Flugzeuge sowie Flug- und Raumflugkörper Verwendung findet.

-.-.-.-.-.-.-.-.-.-.-

Fig. 1

Fig. 2

$f_0 = 240\,MHz$

Wandler

13   12   10

~2cm

15

12

14   B   A H_2O $\varepsilon \approx 80$ 11

20   +V

$\lambda/4\ (Luft)$ $\lambda/2\ (H_2O)$

~24cm   ~7cm

$f_w = 240\,MHz$

Laufzeit

8π 7π 6π 5π 4π 3π 2π π

3,5t   2t   t

$\lambda/2\ (f_w)$

Fig. 3

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Fig. 4

Fig. 5

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Fig. 6

(54) Title: APPARATUS AND METHOD FOR PROVIDING AN ANTIGRAVITATIONAL FORCE

(57) Abstract

A method for producing an antigravitational force comprises an electron source (100) including electrons (113), an electron guide (109) for forming the electrons (113) to be negative curvature; the gravitation body (113) is comprised of matter of positive curvature where opposite curvatures provide a mutually repulsive antigravitational force. The electrons (113) are given negative curvature of an electron beam (113) from atoms such that negatively curved electrons (113) emerge. The emerging beam of negatively curved electrons (113) experience an antigravitational force. The antigravitational force of the electron beam (113) is transferred to a negative charged plate (121).

APPARATUS AND METHOD FOR PROVIDING AN ANTIGRAVITATIONAL FORCE

BACKGROUND OF THE INVENTION

10   1. Field of the Invention:

This invention relates to methods and apparatus for providing repulsion, in particular methods and apparatus for providing antigravitational repulsive forces adapted to provide propulsion and levitation.

15   2. Description of the Related Art

The attractive gravitational force has been the subject of investigation for centuries. Traditionally, gravitational attraction has been investigated in the field of astrophysics applying a large scale perspective of cosmological spacetime, as distinguished from currently
20   held theories of atomic and subatomic structure. However, gravity originates on the atomic scale. The atomic theory of gravity is derived in the Gravity Section and the Forces Section [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)]. The basis of atomic
25   gravity is the effect of the curvature of fundamental particle which are spatially two dimensional on the curvature of spacetime according to the Theory of General Relativity.

In Newtonian gravitation, the mutual attraction between two particles of masses m_1 and m_2 separated by a distance r is

30
$$F = G \frac{m_1 \, m_2}{r^2} \qquad (1)$$

where G is the gravitational constant, its value being 6.67×10^{-11} $Nm^2 \, kg^{-2}$. Although Newton's theory gives a correct quantitative description of the gravitational force, the most elementary feature of gravitation is still not well defined. Which feature of gravitation is

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then the most important, if we were to consider the most fundamental? By comparing Newton's second law,

$$F = ma \qquad (2)$$

with his law of gravitation, we can describe the motion of a freely
5   falling object by using the following equation:

$$m_i \vec{a} = m_g \frac{GM_\oplus}{r^3} \vec{r} \qquad (3)$$

where m_i and m_g represent respectively the object's inertial mass (inversely proportional to acceleration) and the gravitational mass (directly proportional to gravitational force), $M_\oplus$ is the gravitational
10   mass of the Earth, and r is the position vector of the object taken from the center of the Earth. The above equation can be rewritten as

$$a = \frac{m_g}{m_i} \left(\frac{GM_\oplus}{r^2} \right) \qquad (4)$$

Extensive experimentation dating from Galileo's Pisa experiment to the present has shown that irrespective of the object chosen, the
15   acceleration of an object produced by the gravitational force is the same, which from Eq. (4) implies that the value of m_g/m_i should be the same for all objects. In other words, we have

$$m_g/m_i = \text{universal constant.} \qquad (5)$$

The equivalence of the gravitational mass and the inertial mass-the
20   fractional deviation of Eq. (5) from a constant is experimentally confirmed to less 1×10^{-11} [Adelberger, E.G., Stubbs, C.W., Heckel, B.R., Su, Y., Swanson, H.E., Smith, G., Gundlach, J.H., Physical Review D, Vol. 42, No. 10, (1990), pp. 3267-3292]. In physics, the discovery of a universal constant often leads to the development of an entirely new
25   theory. From the universal constancy of the velocity of light c, the special theory of relativity was derived; and from Planck's constant h, the quantum theory was deduced. Therefore, the universal constant m_g/m_i should be the key to the gravitational problem. The theoretical difficulty with Newtonian gravitation is to explain just why
30   relation, Eq. (5), exists implicitly in Newton's theory as a separate law of nature besides Eqs. (1) and (2). Furthermore, discrepancies between certain astronomical observations and predictions based on Newtonian celestial mechanics exist, and they could not be reconciled

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until the development of Einstein's Theory of General Relativity which can be transformed to Newtonian gravitation on the scale in which Newton's theory holds.

5   As a result of the erroneous assumptions and incomplete or erroneous models and theories, the development of useful or functional systems and structures requiring an accurate understanding of atomic structure and the nature of gravity on the atomic scale have been inhibited. On a cosmological scale, the Theory of General Relativity is correct experimentally; however, it is incompatible with the current

10   atomic theory of quantum mechanics. And, the Schrodinger equation upon which quantum mechanics is based does not explain the phenomenon of gravity and, in fact, predicts infinite gravitational fields in empty vacuum. Thus, advances in development of propulsion systems which function according to gravitational forces on the atomic scale are

15   prohibited.

SUMMARY OF THE INVENTION
Overview of the Novel Theoretical Basis
While the inventive methods and apparatus described in detail

20   further below may be practiced as described, the following discussion of a novel theoretical basis of the invention is provided for additional understanding.

       A novel atomic theory is disclosed in my previous U. S. Patent application entitled "Apparatus and Method for Providing an

25   Antigravitational Force" , Serial No. 368,246 filed on June 14, 1989 which is incorporated herein by this reference. The novel atomic theory is further disclosed in The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992); The Grand Unified Theory, Mills, R. and Farrell, J., Science Press, Ephrata,

30   PA, (1990); Mills, R., Kneizys, S., Fusion Technology., Vol. 210, (1991), pp. 65-81; R. Mills, W. Good, and R. Shaubach, Fusion Technology, Vol. 25, 103 (1994), and in my previous U.S. patent applications entitled "Energy/Matter Conversion Methods and Structures", Serial No. 08/107,357 filed on August 16, 1993, which is a continuation-in-part

35   application of "Energy/Matter Conversion Methods and Structures", Serial

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No. 08/075,102 filed on June 11, 1993, which is a continuation-in-part
application of Serial No. 07/626,496 filed on December 12,1990 which is
a continuation-in-part application of Serial No. 07/345,628 filed April 28,
1989 which is a continuation-in-part application of Serial No. 07/341,733
5   filed April 21, 1989 which are incorporated herein by this reference.
On a cosmological scale, the Theory of General Relativity is
correct experimentally; however, it is based on a flawed dynamic
formulation of Galileo's law. Einstein took as the basis to derive his
gravitational field equations a certain kinematical consequence of that
10 law which he called the "Principle of Equivalence" which does not
provide a quantum gravitational theory. Furthermore, General
Relativity is a partial theory in that it deals with matter on
cosmological scale, but not an atomic scale. All gravitating bodies are
composed of matter and are collections of atoms which are composed
15 of fundamental particles such as electrons, which are leptons, and
quarks which make up protons and neutrons. Gravity originates from
the fundamental particles.
The effects of gravity preclude the existence of inertial frames
in a large region, and only local inertial frames, between which
20 relationships are determined by gravity are possible. In short, the
effects of gravity are only in the determination of the local inertial
frames. The frames depend on gravity and the frames describe the
spacetime background of the motion of matter; therefore, differing
from other kinds of forces, gravity which influences the motion of
25 matter by determining the properties of spacetime is itself described
by the metric of spacetime. It is demonstrated that gravity arises
from the two spatial dimensional mass density functions of the
fundamental particles that makes up all matter of the universe.
It is demonstrated in the One Electron Atom Section [The
30 Unification of Spacetime, the Forces, Matter, and Energy, Mills, R.,
Technomic Publishing Company, Lancaster, PA, (1992)] that a bound
electron is a two-dimensional spherical shell—an orbitsphere.
Euclidean plane geometry asserts that (in a plane) the sum of the
angles of a triangle equals 180°. In fact, this is the definition of a flat
35 surface. For a triangle on an orbitsphere the sum of the angles is

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greater than 180°, and the orbitsphere has *positive curvature*. For some surfaces the sum of the angles of a triangle is less than 180°; these are said to have *negative curvature*.

sum of angles of a triangle	type of surface
> 180°	positive curvature
= 180°	flat
< 180°	negative curvature

The measure of Gaussian curvature, k, at a point on a two dimensional surface is

$$k = \frac{1}{r_1 r_2} \qquad (6)$$

the inverse product of the radius of the maximum and minimum circles, r_1 and r_2, which fit the surface at the point, and the radii are normal to the surface at the point. By a theorem of Euler, these two circles lie in orthogonal planes. For a sphere, the radii of the two circles of curvature are the same at every point and equivalent to the radius of a great circle of the sphere. Thus, the sphere is a surface of constant curvature;

$$k = \frac{1}{r^2} \qquad (7)$$

at every point. In case of positive curvature of which the sphere is an example, the circles fall on the same side of the surface, but when the circles are on opposite sides, the curve has negative curvature. A saddle, a cantenoid, and a pseudosphere are negatively curved. The general equation of a saddle is

$$z = \frac{x^2}{a^2} - \frac{y^2}{b^2} \qquad (8)$$

The curvature of the surface of Eq. (8) is

$$k = \frac{-1}{4a^2b^2} \left[\frac{x^2}{a^4} + \frac{y^2}{b^4} + \frac{1}{4} \right]^{-2} \tag{9}$$

A pseudosphere is constructed by revolving the tractrix about it asymptote. For the tractrix, the length of any tangent measured from the point of tangency to the x-axis is equal to the height R of the curve
5 from its asymptote-in this case the x-axis. The pseudosphere is a surface of constant negative curvature. The curvature, k

$$k = \frac{-1}{r_1 r_2} = \frac{-1}{R^2} \tag{10}$$

given by the product of the two principal curvatures on opposite sides of the surface is equal to the inverse of R squared at every point
10 where R is the equitangent. R is also known as the radius of the pseudosphere.

General Relativity, Special Relativity, and Maxwell's Equations are valid on any scale. The origin of the fundamental particles is determined by the combination of these laws. And, the fields of
15 fundamental particles are according to these laws. It is shown in the Lepton Section, the Neutron and Proton Production Section, and the Quark Section [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)] that the masses and charges of the fundamental particles are
20 determined by the equations of the transition state orbitsphere where the nonradiative boundary condition must hold given that the vectors of this condition are contravariant due to General Relativistic effects. Mass causes spacetime to become curved; consequently, proper time and coordinate are not the same. The masses of fundamental particle
25 are derived from the relationship between these two times in the Lepton Section and the Neutron and Proton Production Section [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)].

All matter is comprised of fundamental particles, and all
30 fundamental particles exists as mass confined to two spatial dimensions. The surface is positively curved in the case of a particle as an orbitsphere, or the surface is negatively curved in the case of an electron as a pseudosphere (hereafter called a pseudoelectron). The

effect of this "local" curvature on the non-local spacetime is to cause it to be Riemannian or hyperbolic as opposed to Euclidean which is manifest as a gravitational field or an antigravitational field, respectively. Thus, the spacetime is curved with constant spherical

5   curvature in the case of an orbitsphere, or spacetime is curved with constant hyperbolic curvature in the case of a pseudoelectron. Thus, given that fundamental particles are two dimensional in nature and that the gravitational and inertial masses are equivalent, General Relativity is a quantum theory of gravitation which is valid on any

10 scale. With these provisions the unified theory of gravitation is derived by first establishing a metric.

A space in which the curvature tensor has the following form:

$$R_{\mu\nu,\alpha\beta} = K \cdot (g_{\nu\alpha} g_{\mu\beta} - g_{\mu\alpha} g_{\nu\beta}) \tag{11}$$

15 is called a space of constant curvature, it is a four-dimensional generalization of Lobachevsky space. The constant K is called the constant of curvature. *The curvature of spacetime will be shown to result from a discontinuity of matter confined to two spatial dimensions. This is the property of all matter including matter as an*

20 *orbitsphere.* Consider an isolated orbitsphere of radius r_n, and radial distances, r, from its center. *For r less than r_n, there is no mass; thus, spacetime is flat or Euclidean.* The curvature tensor applies to all space of the inertial frame considered; thus, for r less than r_n, $K = 0$. At $r = r_n$ there exists a discontinuity of mass of the orbitsphere.

25 This results in a discontinuity of the curvature tensor for radial distances greater than or equal to r_n. The discontinuity gives rise to a boundary value problem of Einstein's gravitational field equations which equate the properties of matter with the curvature of spacetime. The derivation of the gravitational radius of the

30 orbitsphere and infinitesimal spatial and temporal displacements in spacetime which is curved by the presence of the orbitsphere follows from the corresponding derivations for the transition state orbitsphere given in the Gravity Section [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing

35 Company, Lancaster, PA, (1992)].

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In the theory of General Relativity, Einstein's field equations give the relationship whereby matter determines the curvature of spacetime which is the origin of gravity. The definitive form of the equations are as follows:

5
$$R_{\mu\nu} - \frac{1}{2} g_{\alpha\beta} \; R = \frac{-8\pi G}{c^4} T_{\mu\nu} \tag{12}$$

where $R_{\mu\nu} = g_{\alpha\beta} \; R_{\mu\nu}$, $R = g_{\alpha\beta} R_{\mu\nu}$, the left-half of Eq. (12) is Einstein's Tensor, and $T_{\mu\nu}$ is the stress-energy-momentum tensor. Einstein derived Eq. (12) starting with the assumption of the local equivalence of accelerated and gravitational inertial reference frames.

10   However, this assumption leads to conflicts with Special Relativity. The correct basis to derive Eq. (12) is the principle of the equivalence of the inertial and gravitational mass [Fock, V., The Theory of Space, Time, and Gravitation, The MacMillan Company, (1964)] provided by the orbitsphere model and the principle that all particles including

15   light follow geodesics.

The Schwarzschild metric is the solution of the boundary value problem of Einstein's gravitational field equations applied to an orbitsphere, where a discontinuity in mass is equated with a discontinuity of the curvature of spacetime.

20   The gravitational radius, α_g or r_g, of an orbitsphere of mass m is

$$\alpha_g = r_g = \frac{Gm}{c^2} \tag{13}$$

where G is the Newtonian gravitational constant. The gravitational radius of an orbitsphere can be derived by substituting

$\mu = \dfrac{m}{4\pi r_n} \, \delta(r - r_n)$ for μ in Eq. (57.38) of Fock [Fock, V., The Theory of

25   Space, Time, and Gravitation, The MacMillan Company, (1964)] where m is the mass of the orbitsphere. The solution of Einstein's gravitational equations for the infinitesimal spatial [Fock, V., The Theory of Space, Time, and Gravitation, The MacMillan Company, (1964)], ds^2, and temporal displacement [Fong , L. Z., and Ruffini, R.,

30   Basic Concepts in Relativistic Astrophysics, World Scientific, (1983)], $d\tau^2$, corresponding to the orbitsphere are:

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$$ds^2 = c^2 \left[\frac{r - \frac{Gm_0}{c^2}}{r + \frac{Gm_0}{c^2}} \right] dt^2 - \left[\frac{r + \frac{Gm_0}{c^2}}{r - \frac{Gm_0}{c^2}} \right] dr^2 - \left(r + \frac{Gm_0}{c^2} \right)^2 (d\theta^2 + \sin^2\theta d\varphi^2) \qquad (14)$$

$$d\tau^2 = \left(1 - \frac{2Gm_0}{c^2 r} \right) dt^2 - \frac{1}{c^2} \left[\left(\frac{dr^2}{1 - \frac{2Gm_0}{c^2 r}} \right) + r^2 d\theta^2 + r^2 \sin^2\theta d\varphi^2 \right] \qquad (15)$$

5   where r is the orbitsphere radius and m_0 is the orbitsphere mass.

For $\frac{r_g}{r} \ll 1$, the gravitational force on an object of mass m due to an

orbitsphere of mass m_0 is

$$F = \frac{Gm_0 m}{r^2} \qquad (16)$$

where G is the Newtonian gravitational constant.

10   The solution of the gravitational field equations given in Fock
[Fock, V., The Theory of Space, Time, and Gravitation, The MacMillan
Company, (1964)] permits a result corresponding to a gravitational
radius of the opposite sign. The field equation solutions, Eqs. (14) and
(15), for a positive value for α of Eq. (13) and Eq. (57.37) of Fock

15 [Fock, V., The Theory of Space, Time, and Gravitation, The MacMillan
Company, (1964)] correspond to positive curvature. And, field
equation solutions exist for a negative value for α of Eq. (13) and Eq.
(57.37) of Fock [Fock, V., The Theory of Space, Time, and Gravitation,
The MacMillan Company, (1964)] which correspond to negative

20 curvature. Thus, antigravity can be created by forcing matter into
negative curvature. A fundamental particle with negative curvature
would experience a central but repulsive force with a gravitating body
comprised of matter of positive curvature.

25   <u>Antigravity Device.</u>
      In Einstein's Theory of General Relativity, the origin of gravity is
the curvature of spacetime by matter. On the atomic scale, the
curvature, K, of ordinary matter is given by $\frac{1}{r_n^2}$, where r_n is the
radius of the radial delta function (for an electron, the radius of the

orbitsphere). It is this local, positive curvature of the electron that causes gravity. [It is worth noting that all ordinary matter, comprised of leptons and quarks, has positive curvature.]

5   In the Detailed Description of the Invention Section, a free electron is shown to be a two-dimensional plane wave—a flat surface. Because the gravitational mass depends on the positive curvature of a particle, a free electron has inertial mass but not gravitational mass. Thus, a free electron is *not* gravitationally attracted to ordinary matter. Furthermore, it is possible to give the electron negative
10   curvature and, therefore, cause antigravity.

Antigravity Methods and Means

     The present invention of a propulsion and levitation device comprises a source of matter, a means to form the matter into
15   negative curvature, and a means to produce a force on the negatively curved matter where the force balances the repulsive gravitational force between the negatively curved matter and a gravitating body. In response to the force balance, the matter of negative curvature moves at constant velocity to produce useful work against the
20   gravitational field of the gravitating body. The constant velocity including zero velocity, provides that the current density function of negative curvature which is a solution to the three-dimensional wave equation does not possess spacetime Fourier components synchronous with waves traveling at the speed of light. Therefore, it does not
25   radiative.

     In one embodiment the antigravity propulsion and levitation means comprises a means to inject particles, such as electrons, as plane waves, which serve as the matter, and further includes a guide of the plane waves. Negative curvature of the injected and guided
30   matter is effected by applying a force on the matter. The applied force is provided by one or more of an electric field, a magnetic field, or an electromagnetic field. A second force on the negatively curved matter is applied in the direction of the gravitational force. This second force is provided by one or more of an electric field, a
35   magnetic field or an electromagnetic field. In a preferred

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embodiment, the force in the gravitational direction is equal to the repulsive, antigravity force which develops between the gravitating body and the matter due to the negative curvature of the guided matter. The repulsive force of the gravitating body is then

5   transferred to the guide (source of the second force) which further transfers the force to the attached structure to be accelerated or levitated.

In a preferred embodiment of a propulsive device, a vehicle to be accelerated comprises an antigravity levitating device and a

10   flywheel which rotates about its axis. The antigravity force provides pure radial acceleration when the vehicle's gravitational forces are equally exceeded. An imbalance of central force applied to the vehicle will cause it to tilt. By virtue of the angular momentum of the spinning flywheel a tangential acceleration is produced which

15   conserves angular momentum. Then high acceleration and velocity are provided by accelerating the structure along a hyperbolic path around a gravitating body such that the structure is accelerated to high velocity.

20   Preferred Embodiment of the Antigravity Device.

It is possible to give electrons negative curvature by elastically scattering electrons of an electron beam from atoms such that negatively curved electrons (pseudoelectrons) emerge. The emerging beam of negatively curved electrons experience an antigravitational

25   force, and (on the Earth) the beam will tend to move upward (away from the Earth). To use this invention for propulsion or levitation, the antigravitational force of the electron beam is transferred to a negatively charged plate. The Coulombic repulsion between the beam of electrons and the negatively charged plate causes the plate (and

30   anything connected to the plate) to lift.

BRIEF DESCRIPTION OF THE FIGURES

These and further features of the present invention will be better understood by reading the following Detailed Description of the

35   Invention taken together with the Drawing, wherein:

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FIGURE 1 is a two-dimensional graph showing the cross-section of the magnetic potential and the corresponding magnetic field lines (arrows) at a point along the channel of guiding and field generating means of FIGURE 7;

5   FIGURE 2 is a three-dimensional graph which shows the magnitude of the electric force in the z direction due to the electric potential function, xyz and the magnitude of the magnetic force in the z direction due to the magnetic potential function, xy where the electron beam propagates in the z direction;

10   FIGURE 3 is the saddle-shaped two-dimensional electron mass density function that propagates along the channel of the electron guide means of FIGURE 7;

FIGURE 4 is the front view of the magnitude of the mass density function in the plane of a free electron;

15   FIGURE 5 is the side view of a free electron along the axis of propagation;

FIGURE 6 is a pseudoelectron having a pseudospherical-shaped mass density function;

FIGURE 7 is a drawing of a system of the antigravity propulsion

20   and levitation means according to one embodiment of the present invention;

FIGURE 8 is a schematic of the forces of gravitation, antigravitation, and angular momentum acting on a vehicle according to one embodiment of the present invention;

25   FIGURE 9 is a drawing of an experimental apparatus according to one embodiment of the present invention to produce electrons of negative curvature with concomitant production of antigravity forces;

FIGURE 10 is a drawing which shows the distribution of negative curvature and antigravitational forces in a relativistic electron beam

30   following a pass through a quadrapole magnetic triplet of the apparatus of FIGURE 9; and

FIGURE 11 is a block diagram of an antigavitational propulsion device powered by a HECTER system according to one embodiment of the present invention.

35   FIGURE 12 is a drawing of the preferred embodiment of an antigravity device which produces pseudoelelectrons via the elastic

scattering of electrons from neutral atoms where the radius of the electron and the radius of the atom are equal.

DETAILED DESCRIPTION OF THE INVENTION

5

Electron in Free Space.

The radius of an orbitsphere increases with the absorption of electromagnetic energy [Clark, D., "Very large hydrogen atoms in interstellar space", Journal of Chemical Education, 68, No. 6, (1991), pp.
10   454-455]. Upon ionization, the radius of the spherical shell, orbitsphere, goes to infinity as is the case with a spherical wavefront of light emitted from a symmetrical source. The ionized electron is a plane wave that propagates as a wavefront with the de Broglie wave length, $\lambda = h/p$ where the size of the electron is the de Broglie
15   wavelength. Analogously, as the radius of a spherical wavefront of. light goes to infinity its propagation is given by the plane wave equation:

$$E = E_0 e^{-jk_z z} \tag{17}$$

Light and electrons display identical propagation and diffraction
20   behavior. (This is expected because an electron is created from a photon as derived in the Pair Production Section [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)]). Electrons behave as two dimensional wavefronts with the de Broglie wave length, $\lambda = h/p$, in
25   double-slit experiments (Davisson-Germer experiment) [Matteucci, G., "Electron wavelike behavior: a historical and experimental introduction", Am. J. Phys., 58, No. 12, (1990), pp. 1143-1147]. The plane wave nature of free electrons is demonstrated in the Derivation of Electron Scattering by Helium Section [The Unification of Spacetime,
30   the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)]. (The proton and neutron also demonstrate interference patterns during diffraction because they are locally two dimensional having the de Broglie wavelength.)

As r goes to infinity the electron becomes ionized and is a plane
35   wave with the de Broglie wavelength. The ionized electron traveling

14

at constant velocity is nonradiative and is two dimensional surface having a total charge of e and a total mass of m_e. The solution of the spacetime charge density function of the ionized electron is solved as a boundary value problem as described previously for the bound
5 electron in the One Electron Atom Section [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)]. The ionized electron is the projection of the orbitsphere into a plane that linearly propagates along on axis perpendicular to the plane. A solution of the spacetime
10 charge density function is sought which is a solution of the Classical Wave Equation (Eq. (1.1) of Mills [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)]) and which possesses no spacetime Fourier components synchronous with waves traveling at the speed of light.
15   The ionized electron is the projection of the orbitsphere into the x-y plane of Cartesian coordinates that propagates linearly along the z axis. The mass density function, $a(r,\theta,z)$, of the electron with linear velocity along the z axis of v_z given by Eq. (1.47) of Mills [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R.,
20 Technomic Publishing Company, Lancaster, PA, (1992)]

$$v_z = \frac{\hbar}{m_e r_0}. \tag{18}$$

and which possesses time harmonic charge motion in the x-y plane is given by the projection into the x-y plane of the convolution, *, of a plane with an orbitsphere. The convolution is
25
$$\pi(z) * \delta(r - r_0) = \sqrt{r_0^2 - z^2}\, \delta(r - \sqrt{r_0^2 - z^2}) \tag{19}$$

The projection of Eq.(19) into the x-y plane is

$$a(r,\theta,z) = \pi\left(\frac{r}{2r_0}\right) \sqrt{r_0^2 - r^2}\, \delta(z) \tag{20}$$

where $a(r,\theta,z)$ is given in cylindrical coordinates, the plane wave, represented by $\pi(z)$, is given in Cartesian coordinates with the
30 propagation direction along the z axis, the orbitsphere function is given in spherical coordinates, and the function, $\pi\left(\frac{r}{2r_0}\right)$ represents a

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two dimensional disk of radius r_0. The total mass is m_e. Thus, Eq. (20) must be normalized.

$$m_e = A \int_0^{2\pi} \int_{-\infty}^{\tilde{}} \sqrt{r_0{}^2 - r^2} \; r \, dr d\theta \qquad (21)$$

$$A = \frac{m_e}{\frac{2}{3}\pi r_0{}^3} \qquad (22)$$

5 The mass density function of a free electron is a two dimensional disk having the mass density distribution in the x-y (r) plane

$$a(r,\theta,z) = \frac{m_e}{\frac{2}{3}\pi r_0{}^3} \; \pi \left(\frac{r}{2r_0}\right) \sqrt{r_0{}^2 - r^2} \; \delta(z) \qquad (23)$$

and charge density distribution, $c(r,\theta,z)$, in the x-y plane

$$c(r,\theta,z) = \frac{e}{\frac{2}{3}\pi r_0{}^3} \; \pi \left(\frac{r}{2r_0}\right) \sqrt{r_0{}^2 - r^2} \; \delta(z) \qquad (24)$$

10 where $c(r,\theta,z)$ is given in cylindrical coordinates. The front view of the magnitude of the mass density function in the plane of a free electron is shown in FIGURE 4; the side view of a free electron along the axis of propagation is shown in FIGURE 5.

This surface has an electric field equivalent to a point charge at
15 the origin along the z axis as shown in the Electric Field of the Free Electron Section. The current density function is the product of the charge density function times the angular velocity density function. The charge density function of the free electron is given by Eq. (24). The angular velocity of the orbitsphere is given by Eq. (1.55) of Mills
20 [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)] is

$$\omega = \frac{\hbar}{m_e r^2} \; . \qquad (25)$$

During ionization of the electron, the total angular momentum must be conserved. The current density function of a free electron
25 propagating with velocity v_z along the z axis is given by the vector projections of the current into x-y plane for $r = r_0$ to $r = \infty$ which corresponds to the ionization of the electron initially bound as an orbitsphere of radius $r = r_0$. The current density function, $i(r,\theta,z,t)$, is

the projection into the x-y plane of the integral of the product of the projections of the charge of the orbitsphere (Eq. (24)) times the angular momenta as a function of the radius r of the ionizing orbitsphere (Eq. (25)) for r = r_0 to r = ∞. The integral is

$$5 \quad \int \omega \pi(z)^* \delta(r - r_0) dr = \frac{e}{\frac{2}{3}\pi r_0{}^3} \int_{r_0}^{\infty} \frac{\hbar}{m_e r^2} \sqrt{r_0{}^2 - z^2} \, \delta(r - \sqrt{r_0{}^2 - z^2}) \, dr \qquad (26)$$

The projection of Eq.(26) into the x-y plane is

$$i(r,\theta,z,t) = \pi\left(\frac{r}{2r_0}\right) \frac{e}{\frac{4}{3}\pi r_0{}^3} \frac{\hbar}{m_e\sqrt{r_0{}^2 - r^2}} \exp(-i\omega t)\delta(z - v_z t) \qquad (27)$$

The factor of $\frac{1}{2}$ in Eq. (27) arises from the vector projection of the angular momentum of the orbitsphere into the x-y plane as follows

10 from Eqs. (1.68 - 1.71) and FIGURES 1.3 and 1.4 of Mills [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)]. The angular momentum, L, is given by

$$L = m_e r^2 \omega \qquad (28)$$

15 Substitution of m_e for e in Eq. (27) followed by substitution into Eq. (28) gives the angular momentum density function, L

$$L = \pi\left(\frac{r}{2r_0}\right) \frac{m_e}{\frac{4}{3}\pi r_0{}^3} \frac{\hbar}{m_e\sqrt{r_0{}^2 - r^2}} r^2 \qquad (29)$$

The total angular momentum of the free electron is given by integration over the two dimensional disk having the angular

20 momentum density given by Eq. (29).

$$L = \int_0^{2\pi r_0} \int_0^{} \pi\left(\frac{r}{2r_0}\right) \frac{m_e}{\frac{4}{3}\pi r_0{}^3} \frac{\hbar}{m_e\sqrt{r_0{}^2 - r^2}} r^2 \, r \, dr d\theta \qquad (30)$$

$$L = \hbar \qquad (31)$$

Eq. (30) is in agreement with Eq. (1.125) of Mills [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic

25 Publishing Company, Lancaster, PA, (1992)]; thus, angular momentum is conserved. The four dimensional spacetime charge density function of the free electron that propagates along the z axis with velocity given by Eq. (18) corresponding to r = r_0 is given by substitution of Eq. (18) into Eq. (27)

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$$i(r,\theta,z,t) = \pi \left(\frac{r}{2r_0}\right) \frac{e}{\frac{4}{3}\pi r_0^3} \frac{\hbar}{m_e\sqrt{r_0^2-r^2}} \exp(-i\omega t)\delta(z - \frac{\hbar}{m_e r_0} t) \qquad (32)$$

The spacetime Fourier Transform of Eq. (32) is [Bracewell, R. N., _The Fourier Transform and Its Applications_, McGraw-Hill Book Company, New York, (1978), pp. 248-249]

$$\frac{e}{\frac{4}{3}\pi r_0^3} \frac{\hbar}{m_e} \text{sinc}(2\pi s r_0) \frac{1}{4\pi} [\delta(\omega - \omega_0) + \delta(\omega + \omega_0)]e^{-jk_z r_0} \qquad (33)$$

The condition for nonradiation of a charge density function is that the spacetime Fourier transform of the charge density function must not possess waves synchronous with waves traveling at the speed of light, that is synchronous with $\frac{\omega n}{c}$ or synchronous with

$\frac{\omega n}{c}\sqrt{\frac{\varepsilon}{\varepsilon_0}}$ where ε is the dielectric constant of the medium. The Fourier transform of the free electron is given by Eq. (33). Consider the radial and time parts of the Fourier transform:

$$\text{sinc} 2s r_0 \frac{1}{4\pi} [\delta(\omega - \omega_0) + \delta(\omega + \omega_0)] = \frac{\sin 2\pi s r_0}{2\pi s r_0} \frac{1}{4\pi} [\delta(\omega - \omega_0) + \delta(\omega + \omega_0)]; \qquad (34)$$

For time harmonic motion corresponding to the electron parameters ω_0 and s_0,

$$2\pi r_0 = \lambda_0 \qquad (35)$$

Thus,

$$r_0 = \frac{\lambda_0}{2\pi} \qquad (36)$$

For the current circle in the x-y plane of radius r_0 with the mass of the current circle distributed over a total of 2π radians,

$$s_0 = \frac{2\pi}{\lambda_0} \qquad (37)$$

Thus, the argument of the sin function of the sinc function is

$$2\pi \frac{2\pi}{\lambda_0} \frac{\lambda_0}{2\pi} = 2\pi \qquad (38)$$

Substitution of 2π into the sinc function results in the vanishing of the entire Fourier Transform of the charge density function. Thus,

18

spacetime harmonics of $\dfrac{\omega_n}{c} = k$ or $\dfrac{\omega_n}{c}\sqrt{\dfrac{\epsilon}{\epsilon_0}} = k$ do not exist.
Radiation due to charge motion does not occur in any medium when
this boundary condition is met.

It follows from Eq. (18) and Eq. (35) that the wavelength of the
free electron is

$$\lambda_0 = \frac{h}{m_e v_z} = 2\pi r_0 \qquad (39)$$

which is the de Broglie wavelength.

The free electron is a two dimensional disk with a charge
distribution given by Eq. (24) having a radius r_0 given by Eq. (39).
This distribution is a minimal energy surface. An attractive magnetic
force exists between current circles in the x-y plane. The force
balance equation is given by equating the centrifugal and centripetal
magnetic electrodynamic force as given in the Two Electron Atom
Section [The Unification of Spacetime, the Forces, Matter, and Energy,
Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)]. The
magnetic field, B, of each current loop of current, i, is

$$B = \frac{\mu_0 i}{2\pi r} \qquad (40)$$

The force balance between the Lorentzian Force and the centrifugal
force is

$$m v \omega = \frac{1}{2} e v B \qquad (41)$$

Substitution of Eq. (40) and

$$i = e \frac{\omega}{2\pi} \qquad (42)$$

into Eq. (41) gives

$$\omega = \left[\frac{e^2 \mu_0}{2 m_e r}\right] \frac{\omega}{(2\pi)^2} \qquad (43)$$

According to invariance of charge under Gauss's Integral Law, the
relativistic correction for current, i, and the charge, e, is 2π, and it
follows from that Eq. (3.6) and Eq. (3.15) of Mills [The Unification of
Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic
Publishing Company, Lancaster, PA, (1992)] that the term in brackets

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is factored out as the relativistic correction for the electrodynamic force between current loops. Thus, from Eq. (43),

$$\omega = \omega$$

And, the electron is in force balance.

5   Furthermore, the free electron possesses a total charge e, a total mass m_e, and a total angular momentum of $\hbar$. The magnetic moment is given by Eq. (15.27) of Mills [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)]; thus,

$$\mu_B = \frac{e\hbar}{2m_e} = 9.274 \times 10^{-24} \text{ JT}^{-1} \qquad (45)$$

which is the Bohr magneton. Conservation of angular momentum with the linking of the magnetic flux quantum gives rise to the spin quantum number, m_s, and the fluxon g factor which is the same as given previously in the Electron g Factor Section [The Unification of
15   Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)].

The free electron possesses current in the x-y plane given by Eq. (32), the current along the z axis follows from Eq. (1.54) of Mills [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R.,
20   Technomic Publishing Company, Lancaster, PA, (1992)] and Eqs. (18), and (42)

$$i = e\frac{\omega}{2\pi} = \frac{e\hbar}{2\pi m_e r_0^2} . \qquad (46)$$

The energy of interaction of the magnetic moment of a Bohr magneton of the free electron with the applied magnetic field is minimized. The
25   total angular momentum vector of magnitude $\hbar$ precesses about the z axis, the axis of the magnetic field, at an angle of $\frac{\pi}{4}$ which results in a projection of $\sqrt{\frac{3}{4}}$ $\hbar$ onto the z axis, and the equivalent distribution of angular momentum as that given is FIGURE 1.4 of Mills [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R.,
30   Technomic Publishing Company, Lancaster, PA, (1992)]. The precessing free electron comprising a two dimensional disk sweeps

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out a sphere in space relative to the free electron's inertial frame. And, magnetic flux is linked by the electron in units of the magnetic flux quantum with conservation of angular momentum as in the case of the orbitsphere as the projection of the angular momentum along

5   the magnetic field axis of $\sqrt{\frac{3}{4}}$ ħ reverses direction. The energy, E

total, of the spin flip transition corresponding to the $m_s = \frac{1}{2}$ quantum number is given by Eq. (1.146) of Mills [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)].

10
$$E_{total} = g \, \mu_B \, B \tag{47}$$

Electric Field of a Free Electron.

The electric potential of a free electron is given by Poisson's Equation for a charge density function, $\rho(r^{-\prime})$

15
$$\Phi(r) = \int \frac{\rho(r^{-\prime}) dv'}{4\pi\varepsilon_0 |r - r'|} \tag{48}$$

and the charge density function of the electron, Eq. (24)

$$\Phi(x_0, y_0, z_0) = \frac{e}{\frac{2}{3}\pi r_0{}^3} \frac{1}{4\pi\varepsilon_0} \int_{-r_0}^{r_0} \int_{-r_0}^{r_0} \frac{\sqrt{r_0{}^2 - x^2 - y^2} \, dx \, dy}{\sqrt{(x_0 - x)^2 + (y_0 - y)^2 + z_0{}^2}} \tag{49}$$

For $x_0 = y_0 = 0; r = z_0,$

20
$$\Phi(r) = \frac{e}{4\pi\varepsilon_0 r} \tag{50}$$

For $r = \sqrt{x_0{}^2 + y_0{}^2 + z_0{}^2} \gg r_0,$

$$\Phi(r) = \frac{e}{4\pi\varepsilon_0 r} \tag{51}$$

Eqs. (50) and (51) are equivalent to the potential of a point charge at

25   the origin. The electric field, ε, is the gradient of the electric potential given by Eqs. (49-51)

$$\varepsilon = -\nabla\Phi \tag{52}$$

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Pseudoelectrons.

The elastic electron scattering in the far field is given by the
Fourier Transform of the aperture function as described in Derivation
of Electron Scattering by Helium Section [The Unification of Spacetime,
the Forces, Matter, and Energy, Mills, R., Technomic Publishing
Company, Lancaster, PA, (1992)]. The convolution of a uniform plane
wave with on orbitsphere of radius z_0 is given by Eq. (4.43) and Eq.
(4.44) of Mills [The Unification of Spacetime, the Forces, Matter, and
Energy, Mills, R., Technomic Publishing Company, Lancaster, PA,
(1992)].

A(r), the aperture distribution function, for the scattering of an
incident plane wave by the He atom is given by the convolution of the
plane wave function with the two electron orbitsphere Dirac delta
function of radius = 0.567 a_0 and charge/mass density of

$\dfrac{2}{4\pi(0.567\ a_0)^2}$. For radial units in terms of a_0

$$a(r,\theta,z) = \pi(z)^* \frac{2}{4\pi(0.567\ a_0)^2}[\delta(r - 0.567\ a_0)] \qquad (53)$$

where $a(r,\theta,z)$ is given in cylindrical coordinates, the plane wave,
represented by $\pi(z)$, is given in Cartesian coordinates with the
propagation direction along the z axis, and the orbitsphere function is
given in spherical coordinates.

$$a(r,\theta,z) = \frac{2}{4\pi(0.567\ a_0)^2}\sqrt{(0.567a_0)^2-z^2}\ \ \delta(r - \sqrt{(0.567a_0)^2-z^2}) \qquad (54)$$

The convolution of the charge density equation of a free electron
given by Eq. (24) with an orbitsphere of radius z_0 follows from Eq.
(24) and Eq. (54)

$$a(r,\theta,z) = \sqrt{r_0^2-r^2}\ \sqrt{z_0^2-z^2}\ \delta(r - \sqrt{z_0^2-z^2}) \qquad (55)$$

Substitution of Eq. (55) into Eq. (4.45) of Mills [The Unification of
Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic
Publishing Company, Lancaster, PA, (1992)] gives

$$F(s) = \frac{1}{z_0^2} \int_{-z_0}^{z_0} \sqrt{r_0^2-(z_0^2-z^2)}(z_0^2-z^2)\ J_0(s\sqrt{z_0^2-z^2}))e^{-iwz}dz \qquad (56)$$

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Substitution $\dfrac{z}{z_0}$ = -cosθ into Eq. (56) gives

$$F(s) = \int_0^\pi \sqrt{r_0^2 - z_0^2 \sin^2\theta} \; \sin^3\theta \; J_0(sz_0\sin\theta)e^{iz_0w\cos\theta}d\theta \qquad (57)$$

when $r_0 = z_0$, Eq. (57) becomes

5
$$F(s) = z_0 \int_0^\pi \cos\theta\sin^3\theta \; J_0(sz_0\sin\theta)e^{iz_0w\cos\theta}d\theta \qquad (58)$$

The function of the scattered electron in the far field is given by the Fourier Transform integral. Eq. (57). Eq. (57) is equivalent to the Fourier Transform integral of cosθ times the Fourier Transform integral given by of Eq. (4.47) of Mills [The Unification of Spacetime,

10 the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)] with the result given by Eq. (4.50) of Mills [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)]. A very important theorem of Fourier analysis states that the Fourier

15 Transform of a product is the convolution of the individual Fourier Transforms. Thus, given that

$$z = z_0 \cos\theta \qquad (59)$$

and the Fourier Transform of cosθ is

$$\frac{[\delta(\theta - \theta_0) + \delta(\theta + \theta_0)]}{2} \qquad (60)$$

20 The Fourier Transform integral, Eq. (57), is the convolution of Eq. (4.50) of Mills [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)] and Eq. (60). And, the result of this convolution is the mass density function of each electron having a de Broglie wavelength

25 given by

$$\lambda_0 = \frac{h}{m_e v_z} = 2\pi r_0 \qquad (61)$$

where r_0 is the radius of the free electron in the z plane, the plane perpendicular to its direction of propagation. The velocity of each electron follows from Eq. (61)

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$$v_z = \frac{h}{m_e \lambda_o} = \frac{h}{m_e 2\pi r_o} = \frac{\hbar}{m_e r_o} \tag{62}$$

For the special case that Eqs. (61) and (62) are satisfied, the mass density function of the electron which is elastically scattered by an atom having a radius of z_o is a pseudosphere. The magnetic field of the current density function of the pseudospherical electron (pseudoelectron) provides the force balance of the centrifugal force of the mass density function as was the case for the free electron. Pseudoelectrons can be focussed into a beam by electric and/or magnetic fields to form a pseudoelectron beam. A pseudoelectron having a pseudospherical-shaped mass density function is shown in FIGURE 6.

In a preferred embodiment, the neutral atoms of the neutral atom beam comprises helium, and the velocity of the free electrons of the electron beam is

$$v_z = \frac{\hbar}{m_e r_o} = 3.858361 \times 10^6 \text{ m/s} \tag{63}$$

where $r_o = 0.567 \, a_o = 3.000434 \times 10^{-11}$ m

In another preferred embodiment, the each atom of the neutral atomic beam comprises hydrogen atom H ($\frac{1}{n}$; $r_o = \frac{a_o}{n}$; n is an integer) as described in my previous U.S. Patent Application #08/075,102 entitled "Energy/Matter Conversion Methods and Structures" filed on June 11,1993 and my previous U.S. Patent Application #08/107,357 entitled "Energy/Matter Conversion Methods and Structures" filed on August 16,1993 which are incorporated herein by reference. The velocity of each electron of the free electron beam is

$$v_z = \frac{\hbar}{m_e r_o} = 2.187691 \times 10^6 \text{ m/s} \tag{64}$$

where $r_o = \frac{a_o}{n} = \frac{5.29177 \times 10^{-11} \text{ m}}{n}$

For a nonrelativistic electron of velocity v_z, the kinetic energy, E_T, is

$$E_T = \frac{1}{2} m_e v_z^2 \tag{65}$$

In the case of helium with the substitution of Eq. (63) into Eq. (65),

$$E_T = 42.3 \text{ eV} \hspace{4cm} (66)$$

In the case of hydrogen with the substitution of Eq. (64) into Eq. (65),

$$E_T = n^2 13.6 \text{ eV} \hspace{4cm} (67)$$

5   Antigravity Device.

Antigravity can be created by forcing matter into negative curvature. A fundamental particle with negative curvature would experience a central but repulsive force with a gravitating body comprised of matter of positive curvature. The antigravity force is

10   the basis of a propulsive means. The propulsive means comprises a source of fundamental particles such as electrons (which are leptons) where the fundamental particles are forced to be plane waves of matter by the absorption of energy. For example, a bound electron is ionized to a plane wave by the absorption of the ionization energy.

15   The plane waves of matter are accelerated and formed (or warped) into negative curvature by one or more of an electric field, a magnetic field or an electromagnetic field such as a laser beam applied parallel or transversely to the plane wave of matter or such as an evanescent field produced by a totally internally refracted electromagnetic wave

20   traveling in a fiberoptic cable.

The antigravity force which arises is transferred to the source means of the fields and is further transferred to the structure to be accelerated or levitated due to the latter means rigid attachment to the structure.

25   Further according to the present invention, negatively curved matter is created by ionizing fundamental particles to become plane waves. The ionization energy can be provided by applying a large potential to or by heating or irradiating a cathode. In the latter case, photocathodes irradiated with continuous wave or pulsed lasers can

30   generate very bright, high current density beams of electrons. Photocathodes, thermionic cathodes, and cold cathodes are described by Orttinger, P., et al., Nuclear Instruments and Methods in Physics Research, A272, 264-267 (1988) and Sheffield, R., et al., ibid, 222-226 which are incorporated herein by reference. The resulting plane

35   waves are caused to propagate through space and to acquire negative

curvature by traversing a selected field as created by a field source means. The field source means provides one or more of an electric field, a magnetic field, or an electromagnetic field. The resulting current density function is three-dimensional (two spatial dimensions plus time) and is a solution to the three-dimensional wave equation that follows:

$$(\nabla^2 - \frac{1}{V^2} \frac{\delta^2}{\delta t^2}) A(x, y, z, t) = 0 \tag{68}$$

Furthermore, the negatively curved fundamental particle including an electron propagates through space and is decelerated by the antigravity force with a gravitating body and is accelerated by the propagation force provided by the source means. The resulting negative curvature which arises from the forces acting on the matter is such that its spacetime Fourier transform does not possess waves synchronous with those traveling at the speed of light.

Matter of negative curvature which moves at constant velocity has a spacetime Fourier transform which does not possess Fourier components synchronous with waves traveling at the speed of light. Consider the mass density function which travels in the z direction

$$\delta [z - f(x) \, g(y) - K(t)] \tag{69}$$

where

$$K(t) = vt \tag{70}$$

and where the velocity v is a constant. The spacetime Fourier transform is given as follows:

$$F(k_x) \, G(k_y) \, \delta (w - k \cdot \bar{v}) \tag{71}$$

where $F(k_x)$ and $G(k_y)$ is the Fourier transform of $f(x)$ and $g(y)$, respectively. The only nonzero Fourier components are for

$$k = \frac{w}{v \cos\theta} > \frac{w}{c} \tag{72}$$

where θ is the angle between $\bar{v}$ and $\bar{k}$. Thus, the spacetime Fourier transform has no components synchronous with waves at the speed of light; therefore, the particle is nonradiative. For example, the Fourier transform of the current density function

$$\delta [z - x(z) \, y(z) - v_z t] \tag{73}$$

is given as follows:

$$\frac{\pi/2}{k_z} e^{-k_x k_y/k_z} \delta(w - k \cdot \bar{v}) \tag{74}$$

which has no components synchronous with waves traveling at the speed of light; thus, it is nonradiative.

5　　　In a further embodiment the mass density function is given by Eq. (73) where v_z is constant velocity in the z direction at force balance. The mass density function is produced by a quadrapole electric field at infinity or a quadrapole magnetic field at infinity, and a constant force of equal magnitude and opposite direction of the

10　antigravity force; thus, the matter of negative curvature moves with constant velocity v_z.

THE EMBODIMENT

In one embodiment according to the present invention, the apparatus for providing the antigravitational force comprises a means

15　to inject electron plane waves and a guide means to guide the propagation of the plane waves. Acceleration and forming negative curvature is effected in the propagating guided electrons by application of one or more of an electric field, a magnetic field, or an electromagnetic field by a field source means. A repulsive force of

20　interaction is created between the propagating electrons of negative curvature and the gravitational field of a gravitating body which comprises matter of positive curvature where the field source means provides an equal and opposite force to the repulsive force. Thus, the interactive force is transferred to the field source and the guide which

25　further transfers the force to the attached structure to be accelerated.

In the embodiment, the antigravity means shown schematically in FIGURE 7 comprises an electron beam source 100, and an electron accelerator module 101, such as an electron gun, an electron storage ring, a radiofrequency linac, an introduction linac, an electrostatic

30　accelerator, or a microtron. The beam is focused by focusing means 112, such as a magnetic or electrostatic lens, a solenoid, a quadrapole magnet, or a laser beam. The electron beam 113, is directed into a channel of electron guide 109, by beam directing means 102 and 103, such as dipole magnets. Channel 109, comprises a field generating

means to produce a constant electric or magnetic force in the direction opposite to direction of the antigravity force. For example, given that the antigravity force is negative z directed as shown in FIGURE 7, the field generating means 109, provides a constant z directed electric

5   force due to a constant electric field in the negative z direction via a linear potential provided by grid electrodes 108 and 128; given that the antigravity force is positive y directed as shown in FIGURE 7, the field generating means 109, provides a constant negative y directed electric force due to a constant electric field in the negative y direction

10   via a linear potential provided by the top electrode 120, and bottom electrode 121, of field generating means 109. Given that the antigravity force is positive y directed, the field generating means 109, provides a constant negative y directed magnetic force due to a constant dipole magnetic field in the x direction for an electron beam

15   traveling in the z direction.

In one embodiment the field generating means 109, further provides an electric or magnetic field at infinity which warps the electrons of the electron beam 113, into negative curvature to produce the antigravitational force with a gravitating body. In a further

20   embodiment the electric potential of the warping electric field is given as follows:

$$xyz + cp \qquad (75)$$

where c is a constant and p is either x, y, or, z and is the direction opposite the force of antigravitation; so, the corresponding electric

25   force on the electron is opposite the antigravitational force as described previously. The electric field is given by the negative of the gradient of the potential. The electric warping force in the z direction is shown in FIGURE 2. In a further embodiment the magnetic potential of the warping field is given as follows:

30   $$xy + cp \qquad (76)$$

where c is a constant and p is either x, y, or z so that the corresponding constant dipole magnetic field produces a constant magnetic force in the direction opposite to the force of antigravity as described previously. The potential function and field lines are shown

35   in FIGURE 1. The magnetic field is given by the negative gradient of

the potential. The z directed warping force on an electric plane wave propagating in the positive z direction is shown in FIGURE 2.

The electric and magnetic warping fields force the electron plane wave into negative curvature given as follows:

$$\delta [z - x(z) \, y(z) - v_z t] \tag{77}$$

5

This mass density function is shown schematically in FIGURE 3.

The velocity, v, of the electron is a constant due to the equality of the constant electric or magnetic force and the antigravitational force which arises as an interaction between the gravitating body and

10 the electron of negative curvature. The constant force provides constant levitation or propagation work against the gravitational field of the gravitating body as the fundamental particle including an electron propagates along the channel of the guide means and field producing means 109. The resulting work is transferred to the means

15 to be propelled or levitated via its attachment to field producing means 109.

The constant electric or magnetic force is variable until force balance with the antigravitational force is achieved. In the absence of force balance, the electrons will be accelerated and the emittance of

20 the beam will increase. Also, the accelerated electrons will radiate; thus, the drop in emittance and/or the absence of radiation is the signal that force balance is achieved. The emittance and/or radiation is detected by sensor means 130, such as a photomultiplier tube, and the signal is used in a feedback mode by analyzer-controller 140

25 which varies the constant electric or magnetic force by controlling the potential or dipole magnets of (field producing) means 109 to control force balance to maximize antigravitational work.

In another embodiment the negative curvature of the electrons of the electron beam 113 is produced by the absorption of photons

30 provided by a photon source 105, such as a high intensity photon source, such as a laser. The laser radiation can be confined to a resonator cavity by mirrors 106 and 107.

In a further embodiment, electrons from the electron beam 113 are warped into negative curvature by inelastic scattering with

35 photons from the photon source 105. The laser radiation or the

resonator cavity is oriented relative to the propagation direction of the electron plane wave such that the inelastic scattering cross section of the electron with the photon to yield negatively curved electrons is maximized for radiation of a given multipolarity. For example, given

5   (that) the direction of propagation of the beam 113 is in the z direction of FIGURE 7, and the radiation is of multipolarity M1 (magnetic quadrapole radiation) or E2 (electric quadrapole radiation), then the preferred orientation of the laser radiation or resonator cavity is along the given the direction of propagation of the beam 113,

10   the z direction. In this case the cross section to yield saddle-shaped electrons is maximized.

Following the propagation through field generating means 109 in which antigravity work is extracted from the beam 113, the beam 113, is directed by beam directing apparatus 104, such as a dipole

15   magnet into electron-beam dump 110.

In a further embodiment, the beam dump 110 is replaced by a means to recover the remaining energy of the beam 113 such as a means to recirculate the beam or recover its energy by electrostatic deceleration or deceleration in a radio frequency-excited linear

20   accelerator structure. These means are described by Feldman, D. W., et al., Nuclear Instruments and Methods in Physics Research, A259, 26-30 (1987) which is incorporated by reference.

The present invention comprises high current and high energy beams and related systems of free electron lasers. Such systems are

25   described in the following references which are incorporated herein by reference:

Nuclear Instruments and Methods in Physics Research, A272, (1,2), 1-616 (1988)

Nuclear Instruments and Methods in Physics Research, A259, (1,2), 1-

30   316 (1987)

In one embodiment shown in FIGURE 11, the HECTER reactor 210 described in my previous U.S. patent applications entitled "Energy/Matter Conversion Methods and Structures", Serial No. 08/107,357 filed on August 16, 1993 provides heat which is

35   converted to steam in heat exchanger 214. The steam is transferred

30

by connection 216 to turbine 218 which is driven by the steam to produce electricity to supply the electrical load of the antigravity apparatus 224. Alternatively, the heat is transferred by connection 212 to thermionic power converter 226 which directly converts the

5   heat to electricity to supply the electrical load of the antigravity apparatus 224, where the unused heat is returned via connection 213. The electrical energy is converted into antigravitational energy by antigravity apparatus 228 which provides propulsion and levitation to the vehicle to which the antigravity apparatus 228 is structurally

10   attached by structural connection 206. The HECTER reactor 210, the heat exchanger 214, the turbine 218, the power generator 220, and the thermionic power converter 226, are also propelled or levitated with the vehicle by their respective structural connections 201-206 to the vehicle.

15   An electron as a plane wave is accelerated by the force of an electric field, and a nonradiative electron current density function of negative curvature moves at constant velocity and exists when the forces of absorbed photons, shaping/warping forces, the propagation acceleration forces, and the repulsive gravitational force between the

20   electron and a gravitating body comprising matter of opposite (positive) curvature exactly balance. The electron does constant antigravity work as it propagates along the guide where the gravitating body's and the electron's curvatures are essentially constant over the time of interaction of the gravitational forces.

25   For a propagation electric field strength of 109 V/m and a gravitational interaction of 1 meter, the antigravity work of the electron is 1 GeV.

       The propulsion power available for guide or a series of guides (109 of FIGURE 7) carrying a total of 1000 Amps with a repulsive

30   gravitational interaction force-distance product per electron of 1 GeV is given as follows:

$$\frac{10^9 \, ev}{electron} \times 1.6(10)^{-19} \, J/ev \times 1000 \, c/sec \times \frac{1 \; electron}{1.6(10)^{-19} \; c} =$$

$$10^{12} \, J/sec = one \; terawatt$$

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The time to accelerate a structure such as a vehicle having a mass of 500,000 kg to a velocity of 1000 m/sec is given as follows:

$$\frac{1}{2} \times 500,000 \times (1000 \text{ m/sec})^2 = 2.5 \times 10^{11} \text{ J}$$

$$\frac{2.5 \times 10^{11}}{10^{12} \text{ J/sec}} = .250 \text{ seconds} = 250 \text{ milliseconds. Thus, the}$$

5 antigravity force produced by the antigravity apparatus according to the present invention can be applied to accelerate large vehicles or to levitate any large object.

In a further embodiment, the force provided by the antigravity apparatus according to the present invention is central with respect to
10 the gravitating body. However, acceleration in a direction tangential to the gravitating body's surface can be effected via conservation of angular momentum. Thus, a centrally accelerated structure such as an aerospace vehicle to be tangentially accelerated possesses a cylindrically or spherically symmetrically movable mass having a
15 moment of inertia, such as a flywheel device. The flywheel is driven with angular motion by a driving device such as an electric motor which is powered by an electric energy source means such as a HECTER reactor with a thermionic or steam generator, or batteries. The driving device provides angular momentum to the flywheel. The
20 vehicle is levitated using antigravity means to overcome the gravitational force of the gravitating body where the levitation is such that the angular momentum vector of the flywheel is parallel to the central vector of the gravitational force of the gravitating body. The angular momentum vector of the flywheel is forced to make a finite
25 angle with the central vector of gravitational force by tuning the symmetry of the levitating (antigravitational) forces provided by antigravity apparatus. A torque is produced on the flywheel as the angular momentum vector is reoriented with respect to the central vector due to the interaction of the central force of gravity of the
30 gravitating body, the force of antigravity of the antigravity means, and the angular momentum of the flywheel device. The resulting acceleration which conserves angular momentum is perpendicular to the plane formed by the central vector and the angular momentum

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vector. Thus, the resulting acceleration is tangential to the surface of the gravitating body.

The equation that describes the motion of the vehicle with a moment of inertia I, a spin, moment of inertial I_S, a total mass m, and
5   a spin frequency of its flywheel device of S is given as follows:

$$S = \frac{mgl}{I_S\dot{\phi}} + \frac{I}{I_S}\dot{\phi}\cos\theta \qquad (78)$$

$$\dot{\phi} \approx \frac{mgl}{I_S S} \approx \frac{mgl}{mr^2 S} = \frac{gl}{r^2 S} \qquad (79)$$

where θ is the tilt angle between the central vector and the angular momentum vector, g is the acceleration due to gravity of the

10   gravitating body, l is the height to which the vehicle levitates, and $\dot{\phi}$ is the angular procession frequency resulting from the said torque. The schematic appears in FIGURE 8.

A calculation of the approximate velocity achieved when the vehicle's angular momentum vector is tilted 45° with respect to the
15   central vector is given as follows where g = 10 m/sec^2, l = 5000 m, r = 10 m, S = 25 sec^{-1}

$$\dot{\phi} \approx \frac{gl}{Sr^2} = \frac{(10)(5000)}{(25)(10)^2} = \frac{20 \text{ cycles}}{\text{second}} \qquad (80)$$

The linear velocity is the radius times the angular frequency which is given as follows:

20   2π 20 cycles/second (5000 m)sin(45°) = 4.4 X 10^5 m/sec   (81)

This calculation indicates that large tangential velocities are achievable by executing a trajectory which is vertical followed by tangential (velocities) where the latter motion is effected by tilting the flywheel. During the tangential acceleration energy stored in the
25   flywheel is converted to kinetic energy of the vehicle. The equation for rotational kinetic energy E_R and transitional kinetic energy E_T are given as follows:

$$E_R = 1/2 I \omega^2 \qquad (82)$$

where I is the moment of inertia and ω is the angular rotational
30   frequency;

$$E_T = 1/2\ mv^2 \qquad\qquad\qquad (83)$$

where m is the total mass and v is the transitional velocity.
The equation for the moment of inertia I of the flywheel is given as:

$$I = \Sigma\ mr^2 \qquad\qquad\qquad (84)$$

5 where m is the infinitesimal mass at a distance r from the center of
mass. These equations demonstrate that maximum rotational kinetic
energy can be stored for a given mass by maximizing the distance of
the mass from the center of mass. Thus, ideal design parameters are
cylindrical symmetry with the rotating mass at the perimeter of the
10 vehicle.

Furthermore, according to the methods and apparatus of the
present invention providing antigravitational forces, rapid long
distance transport may be realized where the propelled means, such
as a space vehicle, is accelerated to enormous velocity by executing a
15 hyperbolic trajectory around a gravitating body wherein the force of
gravity of the gravitating body and the antigravity force of the vehicle
provided by the antigravity means of the present invention accelerate
the vehicle to high velocity.

20 **EXPERIMENTAL I**

A high current, high energy electron beam was injected into a
quadrapole magnetic field, and the geometric cross-sectional profile of
the beam was recorded by Carlsten [Carlsten, B. E.; et al., Nuclear
Instruments and Methods in Physics Research, A272, 247-256
25 (1988)]. One embodiment of the antigravity propulsion and levitation
means of the present invention comprises the apparatus of FIGURE 9
with the absence of the wiggler and the spectrometer. But, in addition
the device of the present invention comprises an electron guide means
comprising a channel for the electron beam and a field generating
30 means 109 of FIGURE 7, to produce a constant electric or magnetic
force against the antigravitational force produced on the electrons of
negative curvature following their propagation through the
quadrapole triplets, Q_1, Q_2, and Q_3 of FIGURE 9. Unharnessed
antigravity was achieved as demonstrated by the flame shape of the
35 beam which is a function of current as shown in FIGURE 10. (which is

FIGURE 11 of the reference). The data indicate that a Boltzmann
distribution of negative curvature was achieved as is apparent by the
flame shape of the beam profile (see FIGURE 10). The shape is due to
the constant gravitational field of the Earth interacting with a

5   Boltzmann distribution of electrons of negative curvature resulting in
a Boltzmann distribution of antigravitational forces and corresponding
displacements. The maximum vertical deflection of the relativistic
electrons by the antigravitational forces is approximately 5
centimeters over a displacement in the direction of the electron beam

10   of 50 centimeters. Thus, antigravitational forces comparable to the
electrostatic and electromagnetic forces of the apparatus were
achieved. The current dependence of the efficiency of negative
curvature production resulted from increased electron-electron
interactions with higher beam current which prevented efficient

15   coupling of the electrons with the quadrapole triplets. However,
significant antigravity was produced at currents of several hundred
amperes. Thus, the present experiment indicates that
antigravitational work of the order of 1 GeV per electron is achievable
by the methods and apparatus of the present invention.

20

Preferred Embodiment of An Antigravity Device.
        A method and means to produce an antigravitational force for
propulsion and/or levitation comprises a source of fundamental
particles including electrons and a source of neutral atoms. The

25   source of electrons produces a free electron beam, and the source of
neutral atoms produces a free atom beam. The two beams intersect
such that the neutral atoms cause elastic incompressible scattering of
the electrons of the electron beam to form pseudoelectrons. In a
preferred embodiment, the de Broglie wavelength of each electron is

30   given by

$$\lambda_0 = \frac{h}{m_e v_z} = 2\pi r_0 \qquad (85)$$

where r_0 is the radius of the free electron in the x-y plane, the plane
perpendicular to its direction of propagation. The velocity of each
electron follows from Eq. (85)

$$v_z = \frac{h}{m_e \lambda_0} = \frac{h}{m_e 2\pi r_0} = \frac{\hbar}{m_e r_0} \qquad (86)$$

As shown schematically in FIGURE 12, a device 10 to provide an antigravitational force for levitation or propulsion comprises a source 1 of a gas jet of atoms 101 such as helium atoms such as described by
5   Bonham [Bonham, R.F., Fink, M., High Energy Electron Scattering, ACS Monograph, Van Nostrand Reinhold Company, New York, (1974)] and an energy tunable electron beam source 2 which supplies an electron beam 102 having electrons of a precise energy such that the radius of each electron is equal to the radius of each atom of the gas jet 101.
10   Such a source is described by Bonham [Bonham, R.F., Fink, M., High Energy Electron Scattering, ACS Monograph, Van Nostrand Reinhold Company, New York, (1974)]. The gas jet 101 and electron beam 102 intersect such that each electron is elastically scattered and warped into a pseudosphere of negative curvature (pseudoelectron). The
15   pseudoelectron beam 103 passes into an electric field provided by a capacitor means 3. The pseudoelectrons experience an antigravitational force due to their negative curvature and are accelerated away from the center of the gravitating body such as the Earth. This upward force is transferred to the capacitor means 3 via a
20   repulsive electric force between the pseudoelectrons and the electric field of the capacitor means 3. The capacitor means 3 is rigidly attached to the body to be levitated or propelled by the structural connection 4. The present antigravity means further includes a means to trap unscattered and pseudoelectrons and recirculate them through
25   the beam 102. Such a trap means 5 includes a Faraday cage as described by Bonham [Bonham, R.F., Fink, M., High Energy Electron Scattering, ACS Monograph, Van Nostrand Reinhold Company, New York, (1974)]. The present antigravity means 10 further includes a means 6 to trap and recirculate the atoms of the gas jet 101. Such a
30   gas trap means 6 includes a pump such as a diffusion pump as described by Bonham [Bonham, R.F., Fink, M., High Energy Electron Scattering, ACS Monograph, Van Nostrand Reinhold Company, New York, (1974)].

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In the case of a sphere, surfaces of constant potential are concentric spherical shells. The general law of potential for surfaces of constant curvature is

$$V = \frac{1}{4\pi\varepsilon_0}\sqrt{\frac{1}{r_1 r_2}} = \frac{1}{4\pi\varepsilon_0 R} \qquad (87)$$

5   In the case of a pseudosphere, the radii r_1 and r_2, the two principal curvatures, represent the distances measured along the normal from the negative potential surface to the two sheets of its evolute, envelop of normals (cantenoid and x-axis). The force is given as the gradient of the potential which is proportional to $\frac{1}{r^2}$ in the case of a sphere.

10   However, for a pseudosphere having a curvature of equal magnitude but opposite sign, the electric force is much greater. The pseudoelectron mass density function is equivalent to the charge density function. The solutions to Einstein's field equations for the force on a particle are also a function of spatial derivatives of the

15   mass density function. Thus, the antigravitational force on a pseudoelectron by a gravitating body is much greater than the force on an electron orbitsphere by the same body. Thus, significant lift is possible using pseudoelectrons.

    The force generated by the antigravity levitation and propulsion

20   means can be calculated rigorously by solving Einstein's field equations as a boundary value problem for a two-dimensional spatial mass density function of negative curvature which is produced by the apparatus. However, forces in the limit can be obtained as follows. Consider a negative solution to the variable α of Eq. (57.37) given by

25   Fock [Fock, V., The Theory of Space, Time, and Gravitation, The MacMillan Company, (1964)]. The negative solution arises naturally as a match to the boundary condition of matter with negative curvature. Furthermore, matter having negative curvature would occupy a diminished quantity of four-dimensional spacetime, as

30   compared to matter of positive curvature. The surface to volume ratio of a sphere is a minimum. In effect, μ of Eq. (57.38) given by Fock [Fock, V., The Theory of Space, Time, and Gravitation, The MacMillan

Company, (1964)] would increase. Consequently, the integral of Eq. (57.37) is approximately of the form

$$\frac{m4\pi\rho^2}{s} \tag{88}$$

where s is the space defined by the boundaries of the matter of
5   negative curvature. The presence of a three-dimensional spacetime current density function in four-dimensional spacetime results in curved nonlocal spacetime which is the origin of gravity. For the case of negative curvature, the antigravity force with a gravitating body can be increased by increasing the intensity of negative curvature.

10   The antigravitational force of pseudoelectrons can be increased by using atoms of the neutral atom beam of relativistic kinetic energy. The electrons of the electron beam and the relativistic atoms of the neutral atomic beam intersect at an angle such that the relativistically contracted radius of each atom, z_0, is equal to r_0, the radius of each
15   free electron of the electron beam. Elastic scattering produces pseudoelectrons at relativistic energies. The relativistic radius of helium is calculated by substitution of the relativistic mass (Eq. (14.11 of Mills [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)])) of
20   helium

$$m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}} \tag{89}$$

into Eq. (3.19) of Mills [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company, Lancaster, PA, (1992)]. In a further embodiment, the relativistic
25 · atomic beam which intersects the electron beam directed along the negative x axis is oriented at an angle of $\frac{\pi}{4}$ to both the xz and yz planes with the relativistic radius of each neutral atom equal to the radius of each free electron.

In another further embodiment shown in FIGURE 12,
30   pseudoelectrons are accelerated to relativistic energies by an acceleration means 7 before entering the capacitor means 3 to provide

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relativistic pseudoelectrons with increased energy to be converted to gravitational potential energy as the body to be levitated is levitated.

In another further embodiment shown in FIGURE 12, pseudoelectrons of relativistic energy are produced by the inelastic

5   incompressible scattering of relativistic electrons of the electron beam 102 from the beam of neutrons 101 from the neutron source 1. The relativistic radius of each electron equals the radius, r_N, of the neutron given by Eq. (15.15) of Mills [The Unification of Spacetime, the Forces, Matter, and Energy, Mills, R., Technomic Publishing Company,

10 Lancaster, PA, (1992)].

$$r_N = \frac{h}{m_N c} \qquad (90)$$

where m_N is the mass of the neutron. The relativistic electron velocity is calculated from Eq. (62) and Eq. (90) where the mass of the electron is relativistically corrected by substitution of the mass

15 given by Eq. (89) into Eq. (62).

$$v_z = \frac{h}{\frac{m_e}{\sqrt{1 - \frac{v^2}{c^2}}} r_N} = c \sqrt{\frac{1}{1 + \left[2\pi \frac{m_e}{m_N}\right]^2}} = .9999942 \, c \qquad (91)$$

The relativistic kinetic energy, E_T, is

$$E_T = m_e c^2 \left(\frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} - 1\right) \qquad (92)$$

In the case of neutrons with the substitution of Eq. (91) into Eq. (92),

20 $$E_T = 149.0273 \, MeV \qquad (93)$$

In a further embodiment, electrons from the electron beam 113 of FIGURE 7 are warped into negative curvature by elastic scattering with photons from the photon source 105. The wavelength of each photon and the velocity of each electron is tuned such that the radius

25 of each photon is equal to the radius of each electron. The relationship between the photon radius and wavelength is given by Eq. (35). The relationship between the electron radius and velocity is given by Eq. (61).

EXPERIMENTAL II.

The electron-impact energy-loss spectrum of helium taken in the forward direction with 100 eV incident electrons with a resolution of 0.15 eV by Simpson, Mielczarek, and Cooper [Simpson, J.A.,

5   Mielczarek, S. R., Cooper, J., Journal of the Optical Society of America, Vol. 54, (1964), pp. 269-270] showed large energy-loss peaks at 57.7 eV, 60.0 eV, and 63.6 eV. Resonances in the photoionization continuum of helium at 60 eV and in the 63.6 eV region have been observed spectroscopically by Madden and Codling [Madden, R.B.,

10   Codling, K., Astrophysical Journal, Vol. 141, (1965), pp. 364-375] using synchrotron radiation. Absent was a resonance at 57.7 eV. Both Simpson and Madden assign the peaks of their data to two-electron excitation states in helium. Each of these states decay with the emission of an ionization electron of energy equal to the excitation

15   energy minus the ionization energy of helium, 24.59 eV. The data of Goruganthu and Bonham [Goruganthu, R.R., Bonham, R. A., Physical Review A, Vol. 34, No. 1, (1986), pp. 103-125] shows ejected-energy peaks at 35.5 eV and at 39.1 eV corresponding to the energy loss peaks of Simpson of 60.0 eV and 63.6 eV, respectively. The absence

20   of an ejected-energy peak corresponding to the energy-loss peak at 57.7 precludes the assignment of this peak to a two-electron resonance. The energy of each inelastically scattered electron of incident energy of 100 eV corresponding to the energy-loss of 57.7 eV is 42.3 eV. This is the resonance energy of pseudoelectron production

25   by electron scattering from helium given by Eq. (66). Thus, the 57.7 eV energy-loss peak of Simpson arises from inelastic scattering of electrons of 42.3 eV from helium with resonant pseudoelectron production. The production of electrons with negative curvature is experimentally supported.

30   The electron-impact energy-loss spectrum of helium taken in the forward direction with 400 eV incident electrons by Priestley and Whiddington [Priestley, H., Whiddington, R., Proc. Leeds Phil. Soc., Vol. 3, (1935), p. 81] showed large energy-loss peaks at 42.4 eV, and 60.8 eV. A resonances in the photoionization continuum of helium at 60 eV

35   has been observed spectroscopically by Madden and Codling [6] using

synchrotron radiation. Absent was a resonance at 42.4 eV. Both Priestley and Madden assign the peaks of their data to two-electron excitation states in helium. Each of these states decay with the emission of an ionization electron of energy equal to the excitation
5   energy minus the ionization energy of helium, 24.59 eV. The data of Goruganthu and Bonham [7] shows an ejected-energy peak at 35.5 eV corresponding to the energy loss peak of Priestley of 60.8 eV. The absence of an ejected-energy peak at 17.8 eV corresponding to the energy-loss peak at 42.4 precludes the assignment of this peak to a
10   two-electron resonance. This is the resonance energy of pseudoelectron production by electron scattering from helium given by Eq. (30). Thus, the 42.4 eV energy-loss peak of Priestley arises from inelastic scattering of electrons of 42.3 eV from helium with resonant pseudoelectron production. The production of electrons with
15   negative curvature is experimentally further supported.

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CLAIMS

What is claimed is:

1. A method of providing a repulsive force from a gravitating mass comprising the steps of:

5   providing an element of matter;

forming said element of matter into negative curvature wherein a repulsive force away from said gravitating mass is created;

applying energy from an energy source to said element of matter having negative curvature;

10   applying a field from a field source to said element of matter having negative curvature;

receiving the repulsive force on said field source from the said element of matter in response to the force provided by said gravitating mass and said element of matter.

15   2. The method of claim 1, wherein said step of providing an element of matter comprises the step of providing an electron.

3. The method of claim 2, wherein the step of forming comprises the step of

providing an electron beam and a neutral atom beam; and

20   providing the intersection of said beams such that the electrons form pseudospherical electrons.

4. The method of claim 3, wherein

the radius of each electron equals the radius of each neutral atom.

25   5. The method of claim 1, wherein the step of applying energy from an energy source to said element of matter having negative curvature comprises,

the acceleration of the negatively curved element of matter by an electric field.

30   6. The method of claim 1, wherein the step of receiving said repulsive force on said field source from said element of matter in response to the force provided by said gravitating mass and said element of matter comprises,

providing an electric field which produces a force on the

35   said negatively curved element of matter which is in a direction

opposite that of the force of the gravitating body on the element of matter.

7. The method of claim 6, further including the step of applying the received repulsive force to a structure movable in relation to said gravitating means.

8. The method of claim 7, further including the step of rotating said structure around an axis providing an angular momentum vector of said circularly rotating structure parallel to the central vector of the gravitational force by said gravitating mass.

9. The method of claim 8, further including the step of changing the orientation of said angular momentum vector to accelerate said structure through a trajectory parallel to the surface of said gravitating mass.

10. Apparatus for providing repulsion from a gravitating body comprising:

an element of matter;

means of forming said element of matter into negative curvature wherein a repulsive force away from said gravitating mass is created;

means of applying energy to said element of matter having negative curvature;

means of applying a field to said element of matter having negative curvature;

a repulsive force developed by said negatively curved element of matter in response to said applied field is impressed on said means for applying the field in a direction away from said gravitating body.

11. The method of claim 10, wherein said element of matter comprises an electron.

12. The method of claim 11, wherein the means of forming comprises an electron beam and a neutral atom beam; wherein the beams intersect such that the electrons form pseudospherical electrons.

13. The method of claim 12, wherein

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the radius of each electron equals the radius of each neutral atom.

14. The method of claim 10, wherein the means of applying energy from an energy source to said element of matter having negative

5 curvature comprises,

a means to accelerate the negatively curved element of matter.

15. The means of claim 14 to accelerate the negatively curved element of matter comprising,

10 a means to provide an electric field.

16. The apparatus of claim 10, wherein the means to apply a field to provide a repulsive force against the negatively curved element of matter and receive the repulsive force on said element of matter by said gravitating mass comprises,

15 an electric field means which produces a force on the said negatively curved element of matter which is in a direction opposite that of the force of the gravitating body on the element of matter.

17. The apparatus of claim 10, further including

a circularly rotatable structure having a moment of inertia;

20 and

means for applying said repulsive force to circulating rotatable structure, wherein

the angular momentum vector of said circularly rotatable structure is parallel to the central vector of the gravitational force

25 produced by said gravitating body.

18. The apparatus of claim 17, further including

a means to change the orientation of said angular momentum vector to accelerate said said circularly rotatable structure along a trajectory parallel to the surface of said gravitating mass.

30 19. Apparatus for providing a repulsion from a gravitating body having:

an element of matter having negative curvature which experiences an antigravitational force in the presence of the gravitating body; and

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means for applying a field to said negatively curved element of matter, wherein

a repulsive force is developed by said oppositely curved element of matter in response to said applied field and is impressed

5   on said means for applying the field in a direction away from said gravitating body.
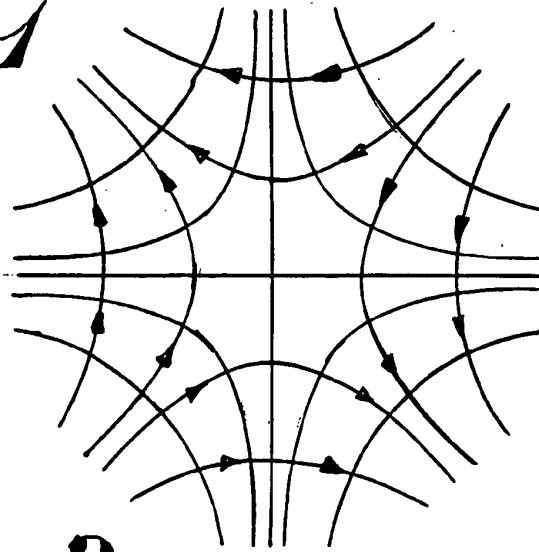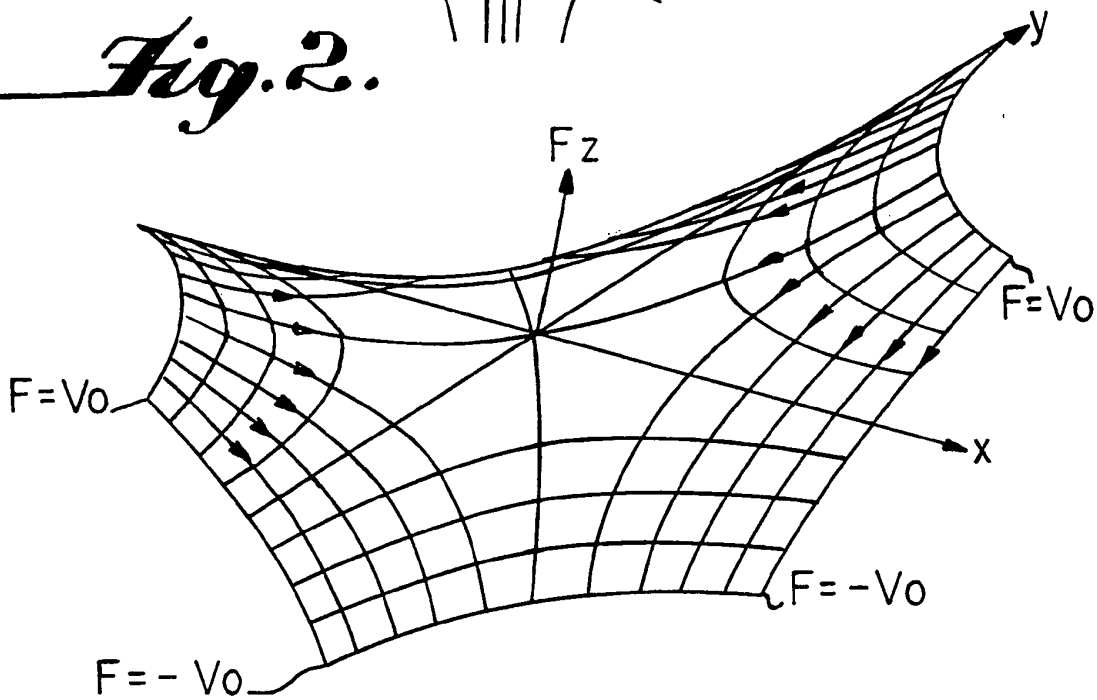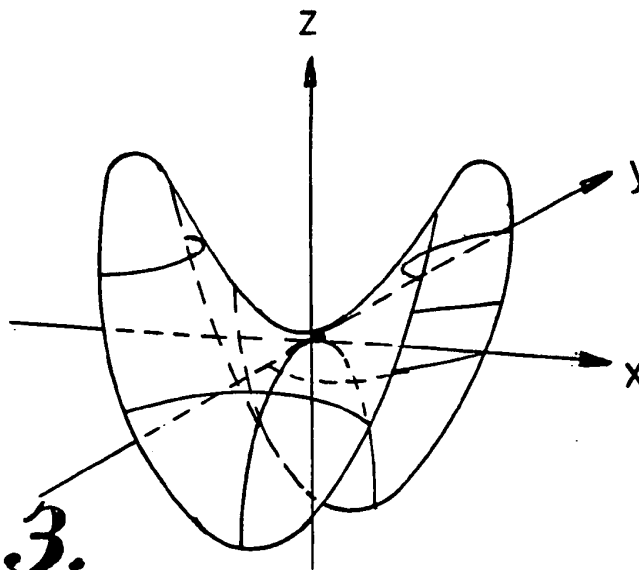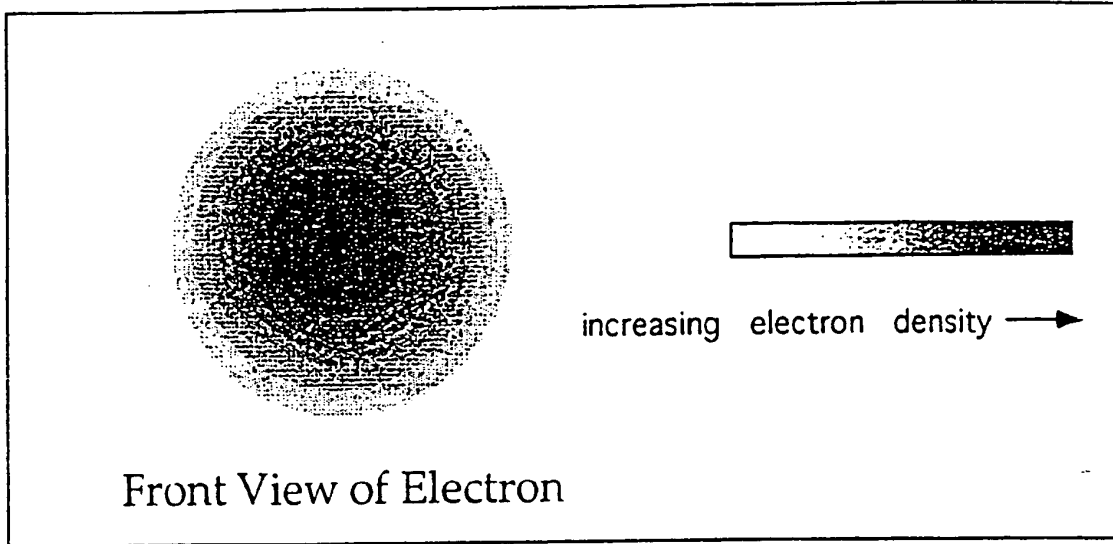
Fig.1

Fig.2.

Fz

F=Vo

F=Vo

x

F=-Vo

F=-Vo

z

y

x

Fig.3.

$$\mathcal{F}ig.4.$$

increasing electron density →

Front View of Electron

$$r_o = \frac{\hbar}{m\,v}$$

$$\mathcal{F}ig.5.$$

electron moving in this direction

Side View of Electron

Fig.6.

Fig.7.

100
Electron-beam
Source
112

102

Electron-
Accelerator
Module

113

103

106

108

120

109

104

121

128

130

111

105
Photon
Source

107

Structural
Connection

140
Electrode
Supply &
Control

110
Electron-beam
Dump

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Fig. 8.

Fig. 9.

BNSDOCID: <WO___9532021A1_I_>

Fig. IO.

100 Λ

200 Λ

300 Λ

400 Λ

Fig. 11

External energy devices
for controlling fusion rate

Lithium
Blanket Regions

Porous wetted wall
Main Pressure Vessel
Inner Structural Wall and Flow Baffle

Steam

Fuel in

HECTER
Reaction
Cavity

Electrical Load
of Antigravity
Apparatus

Supersonic
Spray Condenser

Main Pump

Recirculation
Pump

Condensate
Pump

Electronic Acceleration
Module

Structural
Connection

Cool collector
Heat out
Cesium
Reservoir
Insulator seal
Hot Emitter
Heat in

201 202 203 204 220 224 218 216 214 213 212 210

100 112 102 113 103 106 111 105 130 108 140 120 109 104 128 121 110 107 228

222 213 205 212 224 226

Fig. 12.

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6)   :A61N 5/00; H01J 37/147

US CL   :250/492.3, 398

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. :   250/492.3, 398

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A, 4,870,287 (Cole et al.) 26 September 1989, see entire document.	1-19
A	US,A, 5,260,581 (Lesyna et al.)09 November 1993, see entire document.	1-19
A , P	US,A, 5,349,198 (Takanaka) 20 September 1994, see entire document.	1-19

☐ Further documents are listed in the continuation of Box C.   ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance		
"E"	earlier document published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure. use. exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 JUNE 1995	06 JUL 1995

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