QUANTUM GRAVITY

ABSTRACT

Even the great Newton could not resolve the question, what is the mechanics of action at a distance? In other words if space is truly empty, how can one body exert a force on another - especially at great distances?

One of the most primary endeavors today is to find the answer in a quantized gravity.

Modern physics is not satisfied with Einstein's answer because it does not incorporate the quantum. Many are seeking unsuccessfully to unite the general theory and quantum mechanics into one unified theory.

The present theory bypasses that aspect of the General Theory completely and pursues a course more in line with the present paradigm in which the standard model proposes "virtual" particles which, in the case of gravity is given a name (graviton) – and not much more.

This paper develops a theory in which the "graviton" is a particle known as "the quantum". There is an explanation of how it effects the transmission of the gravity force, and the gravity force itself is explained – consequently, the puzzle of action at a distance is resolved,

The development of the quantum as a physical entity required a paper of book length.[1] But an attempt to briefly describe it here will be made in order to facilitate a full understanding of this work.

The electron, proton and neutron consist of concentric waves of electric force (quantum sized Coulomb fields). These waves expand and contract setting up a standing resonant group wave.

Each wave has mass, spin, angular momentum, internal energy of expansion/contraction, and co-spatial ability. The energy of each wave is the same as Max Planck's h. We declare this configuration to be the physical manifestation of the quantum.

If we were to peer at an electron, proton or neutron from the *polar* perspective, we would see the inner core quanta rotating faster than the outer. This is due to the conservation of momentum.

The rotating quanta supply two forces -- a magnetic force sweeping circularly and transverse to the polar axis, and an electric force parallel to the polar axis.

The equatorial “wind” is the magnetic force -- and much weaker than the electric force created by the expansion/contraction.

The key here is that the inner quanta, spinning faster than the outer quanta, create a vortex force. The importance of this will be evident shortly.

We now discuss the gravity force. It will be found to be related to the strong force inasmuch as the vortex force of fermions comes into play. There is a major difference. Whereas in the case of the strong force the vortex force draws in whole particles in close proximity, in the case of gravity it draws individual quanta. But we are getting ahead of ourselves.

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Consider the hypothesis that not all quanta in a material body are confined, and that some escape to be free, radiating outward in all directions at the speed of light.

We may consider this as analogous to the sublimation of solids such as ice.

It is yet to be determined whether this process is affected quantitatively by extremes of temperature. Beyond that we may assume that all matter, regardless of physical or chemical composition, emanates individual quanta at the same rate, viz., the emanation is a function of fermion particles regardless of how they are grouped. Further, the rate of emanation as a certain percentage of the total mass, is constant. [Be aware that this is an *assumption*. It may well turn out that there are conditions of state of matter, temperature or massiveness, that alter this rate -- and in turn alter the force of gravity. However, for the present, we proceed on this assumption.]

In summation we assume that a portion of a given mass is radiated in all directions as solitary "gravity quanta" and that the portion is constant. Collaterally we also assume that due to the vortex force, all grouped particles (electrons, protons, and neutrons) in a body simultaneously absorb all available free quanta arriving in their vicinity. (Recall that free quanta have a diameter of one light second.[1])

We now consider the absorptive process. "Absorption" is not a wholly accurate term because by the present hypothesis the free gravity quanta are not absorbed so much as they are *drawn* into the body with such great rapidity as to *also draw the absorbing body toward the quanta*, *which is the same direction* *as the emitting body.* Since this process is mutual, there appears what is interpreted as a "*mutual attraction*" and "*action at a distance*".

The question arises, what is the nature of this drawing force? In the case of the strong force it was demonstrated that due to their spin protons and neutrons developed a vortex force that mutually drew neighboring nuclei together. It is this same vortex force that draws ambient quanta into the nuclei. One observes this centrally directed force in a cyclone. As all nuclei draw simultaneously the more nuclei present the faster ambient quanta are ingested.

Let us now quantify the gravitational process.
(temporarily setting General Relativity aside)

STANDARD CONDITIONS

(Two one-gram masses one centimeter apart)

$$F = G = 6.672 \times 10^{-8} \text{ dyne}$$

This assumed mechanism will be shown to be commensurate with the usual mathematical expression for gravity interaction:

$$F = \frac{G\,(m_1 \times m_2)}{d^2}$$

We now quantify the sublimation of matter. To do this we discuss gravitational force in terms of energy under standard conditions.
It is evident that F x 1 cm = E_k. Thereby, a body having a force F exerted on it, will possess a kinetic energy of the same coefficient as the force when it moves 1 cm. By designating the quantity as dyne-centimeter, we keep this relationship constantly in mind.

Since potential and kinetic energy are interchangeable and conserved in a closed system, it matters not whether we consider the energy associated with the bodies under consideration as potential or kinetic, what is essential is that we consider the *energy* and *recognize that it is created by the force G*.

$$m = \frac{G \times 1cm}{c^2}$$

Having ascertained the energy existent between two bodies under standard conditions (1cm apart), we can immediately determine the *equivalent mass* from the familiar m = E/c^2. [This is of the same genre as radiation where $E = mc^2$.]
In the standard case we assert *that* mass to be the *mass equivalent of G* x 1cm.
(the energy between the masses). We see G as the basic force of gravity.

Contemplating the standard condition,

$$F = \frac{G\ (1gr \times 1gr)}{1cm^2} = 6.672 \times 10^{-8} \text{ dyne.}$$

Where
m = mass = 1 gr (G = gravity constant)

(d = distance between the masses = 1 cm)

If the force applied travels 1 cm between masses, we have

F x 1cm = E = 6.672 x 10^-8 dyne centimeter (erg)

and $$\frac{E}{c^2} = m$$

therefore, the mass equivalent of G x 1cm is

$$S = \frac{6.672 \times 10^{-8}}{c^2} = 7.423597 \times 10^{-29} \text{ gr .}$$

Thus we conclude that the mass of the energy between the weights is 7.423597 x 10^-29 gr *and is the quantity sublimated each second from 1 gr*. And so we term this sublimated mass, S.

The reason for taking S as the sublimation of *one* gram instead of two is that the force resulting from S is *common to both*. That means each weight draws that amount from the other, which in turn means each one gram mass sublimates S (7.423597 x 10^-29 gr per sec) to be absorbed by the other.

The correctness of this is displayed in the worked example at the end of this section.

Since S is stated for *one* gram then we can say that it represents the *portion* of mass sublimated for *any* mass. Thus (in grams) m x S is the total mass sublimated per second from any body. We designate that m_S is "mass sublimated from a body per second".

Next we note that by $n = \frac{m}{m_q} = \frac{E}{h_0}$ we can ascertain the number of

(m_q = mass of one quantum – 7.37203854 x 10^-48 gr)[1]
(h_0 = energy of one quantum – 6.625661 x 10^-27 erg)[1]

quanta comprising the 6.672 x 10^-8 erg (or 7.423597 x 10^-29 gr).

This turns to be 1.006994 x 10^19 quanta.

We now ask, if 1.006994 x 10^19 quanta produce 6.672 x 10 ^-8 erg, then what part of an erg would *one* quantum produce? That is to say, how much potential energy exists between one quantum one centimeter from one gram? (*This is equivalent to being an ambient quantum the surface of which is in contact with the drawing mass*.) We write

$$\frac{1.006994 \times 10^{19} \text{ quanta}}{6.672 \times 10^{-8} \text{ erg}} :: \frac{1}{x \text{ erg}}$$

and we see $x = h_0$. (h_0 is 6.626 x 10^-27 erg)

Thus we show that a 1 gr mass will attract one ambient quanta (1q , or Q) with h_0 energy or |h|dyne of force at one centimeter. Thus, G is quantized, that is to say gravity is quantized.

Note:- Henceforward we will refer to sublimated quanta as "gravity quanta", "free quanta", or "ambient quanta" and assign them the symbol, Q. "Ambient quanta" are specifically gravity quanta that are in proximity to an absorbing body and subject to absorption. Although ambient quanta have to touch the body, we use 1 cm as the distance because zero would lead to

a null result.

Note that

$$1.006994 \times 10^{19}\ h_0 = |G| \text{erg. and}$$

$$\frac{|G|\text{erg}}{1\ \text{cm}} = |G|\ \text{dyne}\ .$$

It will be noticed there is a plethora of familiar constants in which the coefficient of the constant appears but has mismatched dimensions. This arrangement is practically incestuous.

We will display these quantities in their symbolic form but bracket the mismatched coefficient symbol; thus we remain aware of the tight interrelation of a relatively few basic quantities and at the same time emphasize the simplicity, rhythm, and beauty of the universe. It is this simplicity and rhythm that forms a fractal-like construction of the universe.

In reiteration, 1.006994 x 10^19 ambient quanta correspond to |G| dyne or 6.672 x 10^-8 dyne .

Therefore, 1 quantum cor |h|dyne. That is, one ambient quantum will produce |h| (6.625661 x 10^-27) dyne *per gram* absorbing it.

It is assumed that bodies radiate individual quanta, i.e., gravity quanta at the same velocity as any other radiation -- c.

The mass loss would also be the same: E/c^2.

The acceleration of ambient quanta drawn into proximate bodies *is tremendously high*. (For all practical purposes the acceleration is pseudo, the velocity of absorption can be considered attained instantaneously.)

(where nQ = m x S)/m_q)

(nQ = number of sublimated quanta per second by a body.)
(recall S = sublimated mass per gram.)
(n = mass of body / m_q.) = number of quanta.
(m = mass of body in grams)

FQ = force of ambient quantum per gram of absorbing body or
$|h|\ \text{gr cm/sec}^2 = |h|\text{dyne}$.

MINIMAL CONDITIONS

The minimal condition, signified by the subscript 1, is a function of the natural, i.e., *uninfluenced emission* of quanta. It is a result of the internal (potential) energy of the quantum solely

$$\text{Action} = h = m\ a\ d\ t = m_q \frac{LS}{sec^2}\ LS\ \ 1\ sec$$

m = mass
a = acceleration
d = distance
t = time

$$a_1 = \frac{c}{sec} = \frac{LS}{sec^2} = \frac{h}{m_q\ LS\ sec} = \frac{m\ a\ d\ t}{m\ \ d\ t}$$

$$t_1 = 1\ sec = \frac{h}{m_q\ \frac{LS\ \ LS}{sec^2}} = \frac{m\ a\ d\ t}{m\ a\ d} = \frac{h}{h_0}$$

$$P_1 = m_q\ c = \frac{h}{LS} = \frac{m\ a\ d\ t}{LS} = 2.210082 \times 10^{-37}\ gr\ cm/sec$$

$$F_1 = \frac{\Delta P_1}{sec} = m_q\ a_1 = 2.210082 \times 10^{-37}\ gr\ cm/sec2$$

$$E_1 = F_1\ d_1 = F_1\ LS = m_q\ c^2 = h_0$$ (d_1 = diameter of quantum)

$$v_1 = a_1\ t_1 = c = \frac{h}{m_q\ LS} = \frac{m\ a\ d\ t}{m\ \ d}$$

$$d_1 = \frac{LS}{1} = LS = \frac{h}{m_q\ c} = \frac{m\ a\ d\ t}{m_q\ \ c/sec}$$

The parameters h, F_1, P_1, and E_1 (or h_0) are *absolute* minimums found in nature.

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Before proceeding it may be well to display a few key shorthand notations.

Q = 1 nascent or gravity quantum.

m_q = mass of one quantum (7.37203854 x 10^-48 gr)

S = 7.423597 x 10^-29 gr = portion of mass sublimated per gram per sec.

mS = sublimated mass, i.e., portion of body sublimated per second (grams).

nQ = mS/m_q = number of Q per second sublimated by a body of mass m.

$$NQ = \frac{nQ}{d^2}$$

= number of Q emitted/sec by a mass that are available at a distance from that mass. (ambient quanta)

FQ = force of ambient quantum per gram of absorbing body or |h| gr cm/sec^2 = |h|dyne.

We show the quantum gravity equation to be

$$F = \frac{m_1 \, S \, m_2 \, h}{m_q \, d^2} \quad \text{[Eq 1]}$$

A WORKED EXAMPLE

We shall concern ourselves with the gravitational attraction of the moon (M) and earth (E) for which some of the parameters are known. There is one disadvantage which is that these parameters are approximate (at least as given here). However, for purposes of illustration, they shall suffice.

(where m = mass, d = distance, r = radius, a = acceleration (at Earth's surface 45 degrees from the equator).

mass of earth m_E = 5.98 x 10^27 gr

mass of moon m_M = 7.36 x 10^25 gr

distance earth-moon $d_{E-M} = 3.8 \times 10^{10}$ cm_ _

radius of earth $r_E = 6.37 \times 10^8$ cm

acceleration at earth surface $a_{E\_sur} = 980.665$ cm/sec^2
Step (1)

We ascertain by *standard form* the gravitational attraction between E and M , which we write F_{E-M}.

Gravity can be expressed either as a force or in terms of acceleration.

By the standard equation,

$$F = \frac{G\ m_E\ m_M}{d_{E-M}^2} = 2.033611 \times 10^{25} \text{ dynes}$$

From $a = \frac{F}{m}$ we obtain

$a_E = 3.400687 \times 10\text{-}3$ cm/sec^2 (acceleration of E toward M)

$a_M = 2.763058 \times 10^{-1}$ cm/sec^2 (acceleration of M toward E)

(We set aside the counteracting conditions as not germane to the example.)

We note that whereas F is common to both bodies, the acceleration of each is different being inversely proportional to its mass.
(We note that in orbit, the centrifugal force offsets the acceleration to a null.)

Next, we note the condition of emitted gravity quanta spreading along the expanding surface of an imaginary sphere; thus quanta available for absorption diminish in numbers inversely proportional to d^2.
Quanta available for absorption are called ambient quanta.(N_Q)

Step (2)

We calculate N_Q, the number of nascent quanta from the moon that *are in the vicinity of Earth*, i.e., *ambient* quanta

$$\frac{m_M\ S}{m_q}$$

N_Q = ========== = 5.132600 x 10^23 Q
d^2

Step (3)

Next we recall that one gram matter attracts one Q with |h|dyne of force.

So m_E x |h|dyne x N_Q = total attraction force = 2.033611 x 10^25 dynes.

We see that this is the same as given by the standard equation.
(This algorithm yields [Eq 1])

Note: calculating the attraction of earth by the moon will give the same result
Thereby we see a mutual attraction, i.e., one force mutually between bodies.
(as in our standard set up and Newton's equation.)

We now calculate the acceleration of a body at the surface of the Earth:

m_E S
nQ = ----------- = 6.02 x 10^46 Q
m_q

6.02 x 10^46 Q
--------------------- = NQ at the surface.
r_E^2
[6.37 x 10^8)^2]

A body on the surface will attract each Q with an |h| dyne of force / gram.

So F = m |h| dynes

F
But before multiplying that out, we note that ------ = a (acceleration)
m

and F = m a

m a
so -------- = a
m

We note the m,s cancel.

The meaning here is that regardless of mass, all masses accelerate equally. (as Galileo discovered)

So the force and acceleration exerted on bodies at the surface is

|h|dyne NQ = 983.3 gr cm/sec^2

Given: a = 980.665 cm/sec^2 (at latitude 45 deg.)

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It should be noted that Newton's equation for gravity does not have the absolute dimensions required for force.

Whether one regards force as mass times acceleration or the differential of momentum with respect to time, the absolute dimensions are the same:

M L / T/ T

Newton's equation is

G MM/LL

So the question arises, how do we solve this dilemma?

One way is to regard G as THE BASIC FORCE OF GRAVITY. Subject to the mass involved.

To rephrase, mass is a function of G.-- and G is a force.

So the force of gravity is Fmm/d^2 or Gmm/d^2

We note that gravity in respect to only one body does not manifest – it requires two bodies. Intuitively, one would suppose that as a function affecting G, the masses would be added. Not the case. It requires the cross multiplication of the masses. Further, since they interact, the distance between them is a factor.

All well and good, but what about the equation for quantum gravity?

$$F = \frac{m\ S\ m\ h}{m_q\ d^2}$$

We see that $\frac{S\ h}{m_q}$ are the additional parameters and equal to $|G| = 6.672 \times 10^{-8}$

Let's see how it works.

Note that S = the mass sublimated from one gram per second.

And that mass divided by the mass of one quantum, $\frac{S}{m_q}$, yields the number of quantum released per gram per second..

And the number of quanta released per second x |h| dyne = 6.672×10^{-8} dyne.= G force

THE QUANTIZATION OF GRAVITY

Gravitational action is not customarily thought of in magnitudes on the order of c because the response of ponderous bodies results in velocities extremely small compared to that of light, nor is it thought of in terms of typical quantum magnitudes because it is such a weak force that determinations of micro proportion are difficult or considered insignificant.

However, the concept here is that the mechanics of gravity in its *initiating* form employs free quanta traveling at c. Absorption velocity must necessarily be of *much greater* magnitudes.

Thus we see gravitational action as initiating on the quantum mass level but altered by the factors nQ and NQ to magnitudes we usually associate with gravity.

Whereas one usually thinks of quantum magnitudes as being very small, in gravitational mechanics we are dealing with a broad spectrum commencing with the dimensions of *individual* quanta having micro mass which are modified by large masses, large numbers of quanta and great velocities to evolve into what appears as a mechanics of macro proportions only.

QUESTIONS

We pursue some inevitable questions regarding the sublimation of mass. We propose here that all bodies radiate gravitational quanta which represent 7.423597 x 10^-29 or one part in 1.347056 x 10^28 per second.

The question arises, is this loss detectable? Probably not because (a) it is so miniscule, and (b) each body also receives ambient quanta from other bodies which compensates for the loss. Thus the individual quanta may be thought of as the "virtual" or exchange particle of gravity (although the mechanics is different).

Other questions: Is the sublimation rate variable for any reason? For example, would near absolute zero temperatures affect the rate? If not, what would? And, is any of this detectable with present day technology?

Collaterally, would extremely high temperatures affect S?

Also, might a body of great mass (ten suns or more) affect sublimation?

In summary, in regard to the basic questions of gravity the present theory has ascertained or explained quantitatively *and* qualitatively

(a) action at a distance -- and its corollary

(b) mutual attraction

(c) the gravity "virtual" particle"

(d) the force engendered

(e) portion of mass radiated as gravitational quanta.

What we are in need of is a more exact picture of the mechanism of absorption.

At this juncture we picture a continuum of free quanta approaching a body at c and being drawn in at an increased velocity proportional to the number of particles comprising the body. Thus the conclusion is that *all* particles of the body simultaneously draw on each and every ambient quantum, the more particles (mass) comprising the body, the faster the draw and consequently the greater the force.

As a given quantum is drawn in it must, being indivisible, be eventually pulled away from other absorbing particles and become an integral part of a single fermion.

But what is the cause or mechanism of absorption, and how do we quantify it?

At base we believe the mechanism must be the vortex action described for the strong force. This is the most logical prospect.

Of course there are differences. The strong force operates between two nuclei extremely close to their centers whereas the gravity situation has many fermions spread over a wide range absorbing inactive ambient quanta. In addition these quanta are impacting at c. This c has to be to be absorbed and then surpassed before a force can be exerted in the direction from which the quanta are arriving.

In addition, in the final stage the absorbed quantum is drawn in many different directions and, because it is indivisible, finally absorbed by only *one* fermion. All these conditions must result in a reduction of force. However, it is extremely difficult to quantitatively assess them.

REGARDING CURVED SPACE AND THE PRESENT THEORY OF GRAVITY

Apparently the universe is comprised of a cluster of galaxy clusters.

We know that galaxies rotate -- and so do virtually all things in cosmology and on the quantum particle level as well.

Thereby, we ask: Does the universe rotate?

If so, we ask

(a) What is the effect of rotation as to centrifugal force?

(b) How would rotation affect Doppler readings?

(c) Does light from distant sources undergo the Coriolis effect?

(d) Do gravity quanta suffer the coriolis effect?

(e) If so would that not create the illusion that space is curved?

End

V. Vergon

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1. On the Quantum as a Physical Entity – 81/2 x 11" 131 pp

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ADDENDUM

Astronomical data support this conclusion. We know, for example, that the Earth accelerates toward a point 20 arc-seconds in front of the visible Sun--that is, toward the true, instantaneous direction of the Sun. Its light comes to us from one direction, its "pull" from a slightly different direction. This implies different propagation speeds for light and gravity.

"Published in Physics Letters A (December 21, 1998), the article claims that the speed with which the force of gravity propagates must be at least twenty billion times faster than the speed of light. "

(This corresponds to the speed of Cosmic Ray protons as determined in the paper "Cosmic Ray Proton Velocity" by V. Vergon. – which declares a velocity of 107 billion times c.)