The Gravitational Constant Problem

Chapter 10

Recent experiments that attempted to refine the value of the accepted value of the gravitational constant has revealed a fairly large discrepancy, not only between the new values, but the old value as well. A quote from the April 29, 1995 issue of Science News is, "Now, experiments by three independent groups have produced values for the strength of the gravitational force (G) that disagree significantly with the currently accepted number and with each other." (See Reference [1], p. 176).

Further, from the May 18, 1996 issue of Science News, "The news that three respected research groups had independently produced values for the strength of the gravitational force (G) that disagreed significantly with the currently accepted number and with each other created a considerable stir last year." (See Reference [2]).

Finally, a quote from the March 1996 issue of Discover Magazine, "Ever since Isaac Newton watched an apple fall to the ground, scientists have taken gravity for granted. Until, that is, they tried to measure its strength with high-tech precision. Their results were so incredibly far off as to be newsworthy." (See Reference [3]).

The results quoted above can be accounted for by the quantum vector potential nature of electrogravitation as proposed in this book.

Some of the equations that have been previously presented will be repeated in this chapter in order that they may be made immediate to our present discussion. Also, the following parameters are stated for the equations that follow for those who are reading this in the active Mathcad mode.

The following constants are pertinent to this chapter and are all in the MKS system of units.

$m_e := 9.109389700 \cdot 10^{-31} \cdot kg$	Electron rest mass.
$q_o := 1.602177330 \cdot 10^{-19} \cdot coul$	Electron quantum charge.
$\mu_o := 1.256637061 \cdot 10^{-06} \cdot henry \cdot m^{-1}$	Magnetic permeability.
$\varepsilon_o := 8.854187817 \cdot 10^{-12} \cdot farad \cdot m^{-1}$	Dielectric permittivity.
$r_c := 3.861593255 \cdot 10^{-13} \cdot m$	Compton electron radius.
$l_q := 2.817940920 \cdot 10^{-15} \cdot m$	Classic electron radius.
$c := 2.997924580 \cdot 10^{08} \cdot m \cdot sec^{-1}$	Speed of light in vacuum.
$\alpha := 7.297353080 \cdot 10^{-03}$	Fine structure constant.
$G := 6.672590000 \cdot 10^{-11} \cdot newton \cdot m^2 \cdot kg^{-2}$	Accepted gravitational constant.
$R_{n1} := 5.291772490 \cdot 10^{-11} \cdot m$	Bohr radius of Hydrogen.
$h := 6.626075500 \cdot 10^{-34} \cdot joule \cdot sec$	Plank constant.

These are the currently accepted values. The below constants are related directly to the theory of electrogravitation proposed by this author.

$V_{LM} := 8.542454612 \cdot 10^{-02} \cdot m \cdot sec^{-1}$	Least quantum velocity.
$f_{LM} := 1.003224805 \cdot 10^{1} \cdot Hz$	Least quantum frequency.
$L_Q := 2.5729832158 \cdot 10^{3} \cdot henry$	Least quantum inductance.
$C_Q := 3.861593281 \cdot 10^{-6} \cdot farad$	Least quantum capacitance.

$i_{LM} := q_o \cdot f_{LM}$ or, $i_{LM} = 1.607344039464671 \cdot 10^{-18} \cdot amp$

(= Least quantum amp.)

It is shown below that several electrogravitational force equations can be presented that will all yield the same answers. This indicates that the gravitational force-field theory presented herein spans a great many of the forms of energy and force branches on the tree of physics. Three of those equations are presented below in equations (303), (304), and (305).

(303) $$F1_{Gnew} := \left(\frac{h \cdot f_{LM}}{R_{n1}}\right) \cdot \mu_o \cdot \left(\frac{h \cdot f_{LM}}{R_{n1}}\right)$$

or, $$F1_{Gnew} = 1.982973082194035 \cdot 10^{-50} \cdot \frac{henry}{m} \cdot newton^2$$

(304) $$F2_{Gnew} := \left(\frac{L_Q \cdot i_{LM}^2}{R_{n1}}\right) \cdot \mu_o \cdot \left(\frac{L_Q \cdot i_{LM}^2}{R_{n1}}\right)$$

or, $$F2_{Gnew} = 1.982973078357832 \cdot 10^{-50} \cdot \left(\frac{henry}{m}\right) \cdot newton^2$$

(305) $$F3_{Gnew} := \frac{m_e \cdot V_{LM}^2}{R_{n1}} \cdot \mu_o \cdot \frac{m_e \cdot V_{LM}^2}{R_{n1}}$$

or, $$F3_{Gnew} = 1.982973080311042 \cdot 10^{-50} \cdot \left(\frac{henry}{m}\right) \cdot newton^2$$

It is easily seen that all three answers in equations (303), (304), and (305) are equal in magnitude and units.

It can also be shown that the famous Biot-Savart law that relates the magnetic field generated by a current can be incorporated into an electrogravitational expression also. This is presented by equations (308a, b & c) next.

First let us define the electrogravitational domain wavelength as:

(306) $$\lambda_{LM} := \frac{V_{LM}}{f_{LM}} \qquad \text{or,} \qquad \lambda_{LM} = 8.514995412219695 \cdot 10^{-3} \cdot m$$

Also let the following angles be defined:

(307) $\theta := \frac{\pi}{2}$ and $\phi := \frac{\pi}{2}$

Then the Biot-Savart equation for the electrogravitational force between two electrons separated by the Bohr radius is given below in equation set (308).

(308a) $$F_{sys1} := \left(q_o \cdot V_{LM} \cdot \sin(\phi)\right) \cdot \left(\frac{\mu_o \cdot i_{LM} \cdot \lambda_{LM} \cdot \sin(\theta)}{4 \cdot \pi \cdot l_q \cdot R_{n1}}\right)$$

(308b) $$F_{sys2} := \left(q_o \cdot V_{LM} \cdot \sin(\phi)\right) \cdot \left(\frac{\mu_o \cdot i_{LM} \cdot \lambda_{LM} \cdot \sin(\theta)}{4 \cdot \pi \cdot l_q \cdot R_{n1}}\right)$$

Then finally;

(308c) $$F4_{Gnew} := F_{sys1} \cdot \mu_o \cdot F_{sys2}$$

or, $$F4_{Gnew} = 1.982973075196836 \cdot 10^{-50} \cdot \frac{henry}{m} \cdot newton^2$$

The portion of the equations for the individual system forces that is the Biot-Savart least quantum expression at the Bohr radius is given below in equation (309).

(309) $$B_{LM} := \left(\frac{\mu_o \cdot i_{LM} \cdot \lambda_{LM} \cdot \sin(\theta)}{4 \cdot \pi \cdot l_q \cdot R_{n1}}\right)$$ or, $$B_{LM} = 9.178257004292848 \cdot 10^{-3} \cdot tesla$$

Both of the equations in equation (308a & b) are of the standard form, F = qV X B.

Now we have enough of what may be called a preponderance of evidence that will support the case for assigning new units to the classic value of G. This new value is stated below in equation (310).

(310) $$G_{new} := \mu_o \cdot V_{LM}^{\;4}$$ or, $$G_{new} = 6.69176350019664 \cdot 10^{-11} \cdot henry \cdot \left(\frac{m^3}{sec^4}\right)$$

The ratio of this new proposed value of Gnew to G is:

(311) $$\frac{G_{new}}{G} = 1.002873471949669 \cdot \frac{henry}{m} \cdot newton$$

The new value of G may be inserted into the classical formula for the gravitational force and the the result is an electrogravitational expression. This is presented in equation (312) below.

(312) $$F5_{Gnew} := \frac{\overbrace{\left(\mu_o \cdot V_{LM}{}^4\right)}^{NewG} \cdot \overbrace{\left(\frac{\mu_o \cdot q_o{}^2}{4 \cdot \pi \cdot l_q}\right)}^{m_e} \cdot \overbrace{\left(\frac{\mu_o \cdot q_o{}^2}{4 \cdot \pi \cdot l_q}\right)}^{m_e}}{R_{n1}{}^2}$$

or, $$F5_{Gnew} = 1.982973075196837 \cdot 10^{-50} \cdot \frac{henry}{m} \cdot newton^2$$

The above equation is now in the same general form as the classic gravitational expression. What is different are the extra henry/m and newton units. These 'extra' units are hidden units since the henry/m unit is a constant and the newton squared portion is actually inversely proportional to distance where each quantum newton force is also a constant / r. Thus on a macroscopic scale the simpler form of the classic gravitational force expression is assumed to be a correct form.

The following quote is from the book, Feynman Lectures on Gravitation, where Feynman's thoughts on the subject of the gravitational constant were condensed by the editor of the book, Brian Hatfield. He summed Feynman's conclusions as; "Of course, he expected that there might be difficulties in defining a consistent quantum theory (for example, the dimension of the gravitational constant is an obstacle to renormalization)." (See Reference [4])

It is suggested by this author that the problem of renormalization may be more easily solved by using the new value as defined in equation (310) previous.

It is also suggested by this author that the errors discovered in the recent attempts to measure the gravitational constant may be due to at least two effects. The first cause of error may be due to the metal and electronics that are part of the experimental hardware interacting with the quantum vector potentials generated in the Earth's molten core and stray ground currents associated with other actions near the Earth's surface. The second cause of error is that caused by the movement of mass in the locale of the test apparatus. It seems logical that if electrogravitation can cause a mass to accelerate, then accelerating a mass should create electrogravitation. (More specifically, a wave of gravitation.) This could be a stronger influence than that accounted for by ordinary gravitational influences since the electrogravitational wave would have a strength related to the rate of acceleration of the mass as well as the magnitude of the mass.

It is suggested by this author that sensitive quantum interference detectors feeding an amplifier tuned to f_{LM} might detect nearby mass accelerations.

One of the strongest arguments against an electromagnetic connection to the gravitational field was that an electromagnetic field can be shielded against while the gravitational field cannot. Further, the electromagnetic field has a bipolar aspect consisting of a negative and positive sense in the field and is a closed field such that all magnetic lines form a closed loop. The gravitational field apparently has no counterpart aspect of repulsion as does the magnetic or electric fields. The magnetic vector potential, (MVP), **can** however act through the best of shielding and when combined with the concept of the vector cross-product of two quantum uncertain currents acting 90 degrees to each others inline motion, the quantum electrogravitational action is generated that we take to be what is currently called gravity. Even though the action is unidirectional and always outwards from the origin, the reaction is a mirror image and is the conjugate of the action vector in every way. Thus, the total interaction that occurs partly in normal space is closed through the classic quantum radius points through imaginary energy space while to an outside observer in normal space it would appear that a monopole action had just occurred.

The Aharonov-Bohm effect has been demonstrated by actual experiment to prove that there exists quantum electromagnetic action through normally effective shielding.

The following is quoted from the April 1989 issue of Scientific American, (pages 56 to 62), "When the theories of relativity and quantum mechanics were introduced, the potentials, not the electric and magnetic fields, appeared in the equations of quantum mechanics, and the equations of relativity simplified into a compact mathematical form if the fields were expressed in terms of potentials." (See Reference [5]. Also, "The consequence of the Aharonov-Bohm effect is that the potentials, not the fields, act directly on charges." (Reference [5] also.)

It has been mentioned before that the electric, magnetic and gravitational force equations all have the same general form. Therefore, it is suggested that they are likely unified by a common mechanism of action. (See equations (312-314) below.)

(312) $$F = \frac{q_o^2}{4 \cdot \pi \cdot \varepsilon_o \cdot r^2}$$ (313) $$F = \frac{\mu_o \cdot m_1 \cdot m_2}{4 \cdot \pi \cdot r^2}$$ (314) $$F = \frac{G \cdot M_1 \cdot M_2}{r^2}$$

The terms m_1 and m_2 are the magnetic pole strengths in a classical magnetic force equation. M_1 and M_2 are the macroscopic mass terms in the classical gravitational force equation.

In concluding this chapter this author would like to say that while the classical gravitational equation was the first equation to be formalized concerning force at a distance, it has stubbornly refused to be improved upon with the possible exception of Einstein's General Theory of Relativity. Unfortunately this theory has not explained the mechanics correctly or we would have solved the anti-gravity puzzle. This book is a new approach utilizing the very basic accepted classical equations as a starting point to put the gravitational action in a logical engineering format and at the same time in terms of the more recent formulas of quantum physics.

Chapter 10 References

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3. Hans Christian von Baeyer, "Big G," *Discover,* March 1996: 96.

4. Richard P. Feynman, Fernando B. Moringo, and William G. Wagner, *Feynman Lectures on Gravitation* (Menlo Park, Calif.: Addison-Wesley Publishing Company, June 1995), xxxi.

5. Yoseph Imry and Richard A. Webb, "Quantum Interference and the Aharonov-Bohm Effect," *Scientific American*, April 1989: 56.