CAN GRAVITY BE AN ELECTROSTATIC FORCE?

Introduction

Unlike electromagnetic force, which acts at right angles to charge motion, gravity is a simple direct inverse-square of distance force, as is electrostatic action. Yet we struggle and fail to forge a link between gravitation and electromagnetism. Can it be that what is seemingly impossible, mutual electrostatic action between matter that is uncharged electrically, is the true answer to the mystery of gravitation? Here we see that there is a strong case in favour of this proposition.

A Quantum Theory of Gravitation

The Schuster-Wilson hypothesis is of relevance here, as is the related research of Nobel Laureate, Blackett [1], it being evident that the charge only reveals itself indirectly in setting up a magnetic moment and only then in a form not concentrated locally as a function of mass density of matter present.

In-depth research on this topic has led the author to believe that rotation of the omnipresent space medium, our quantum underworld, can induce electric charge displacement which can set up a magnetic moment, as in the Sun or body Earth. This research indicates the existence of a charge continuum in space which is neutralized by a structured array of charges of opposite polarity and which governs quantum phenomena and determines basic physical constants. One then finds that continuum charge is displaced by the presence of a graviton population associated with matter present and here one discovers the physical basis of gravitation. The gravitons, which share with matter the Heisenberg jitter motion of quantum theory, provide the mass-related dynamic balance essential to cope with the motion imparted by the quantum underworld of space. This means that the force of gravitation really acts between those gravitons and is, via them, dynamically-coupled with matter that is itself electrically neutral.

Note now a key point at issue. Electrostatic force between two like polarity charges is repulsive but here we are concerned with charge displaced by the presence of gravitons and that implies the effect of voids in a background charge continuum and so mutual attraction between the gravitons creating those voids as the enveloping charge seeks to spread by pushing the gravitons together.

Another key point which needs consideration is the question of how a quantum theory of gravitation which implies a graviton form as a unit of gravitational action can account for weak gravitation forces that still depend upon G but arise from mass or its energy equivalent that is much smaller than the graviton mass. The answer to this is found by recognizing that gravitons, being leptons, can exist in charge pairs and can exchange energy as between themselves and another associated particle form. On a steady gravitational basis the taon form dominates the action according to the charge continuum volume displaced but on a transient basis minor fluctuations in volume of a heavier graviton form cater for the balance.

How then do those gravitons feature in the spectrum of particle physics? Research shows that they mainly comprise the taon - the mystery lepton particle that sits alongside the muon and the electron in the bottom line of the standard quark picture of the particle grid. As to that heavier graviton form it is somewhat elusive but has been detected at around 2.587 GeV in the particle spectrum and is best referred to as the 'Japanese H-quantum' [2]. It exists in anti-particle pairs alongside two anti-particle taon pairs, meaning that there is one such heavy graviton for every two taon-gravitons.

How is all this justified? Simply by derivation of G, the gravitation constant, in terms of the taon mass. Where is the proof of all this? Now, seriously, how can the Gravity Research Foundation expect that in an Essay of 1500 words or less? The proof is of record elsewhere [3] but, this being written solely to meet the concise requirements of the Foundation's Essay competition, it can best be summarized by the following commentary and equations which show how G depends upon the taon/electron mass ratio.

<u>Step 1:</u> Determine σ, the charge density of the space continuum. Do this by delving into the quantum properties of space, as evidenced by the Bohr Magneton er, e being the charge of the electron. With r having the value $h/4\pi m_e c$ we then account for the photon in terms of spin of a 3x3x3 component of that structured charge array mentioned above. This gives us the equation:

$$hc/2\pi e^2 = 144\pi r/d$$

where r is the orbital radius of charge motion, h is Planck's constant, c is the speed of light and d is the cubic spacing of those charges. Accordingly:

$$\sigma = e/d^3$$

We now know the value of σ because we can eliminate h/r and deduce that:

$$m_e c^2 = 72\pi e^2/d$$

m_e being the rest mass of the electron.

<u>Step 2:</u> For encouragement at this stage note that we could digress to find the ratio r/d simply by analysis of electrostatic interaction energy density of the space medium and arguing that it cannot be negative, thereby accounting for charge being displaced from sites at which they would be at rest and so determining r and telling us that the quantum underworld must have that jitter motion postulated by Heisenberg. The analysis is of early record elsewhere [4]. It allows precise determination of the fine-structure constant, a quantity explained by no other theory.

<u>Step 3:</u> We now formulate the link with G in terms of the taon and the heavier graviton form, of masses m_τ and m_g and volumes V_τ and V_g, respectively:

$$\%G(2m_\tau + m_g) = \sigma(2V_\tau + V_g)$$

Next we need to use a formula dating back to the pre-Einstein era of J. J. Thomson:

$$mc^2 = 2e^2/3a$$

which applies to the electron and also relates the mass m of our two particles with their charge radius *a* and so their volume. This assumes that the charge e is distributed within the sphere of radius *a* so as to have uniform pressure or energy density.

The volume to mass ratio of the two-taon and heavy graviton combination must match the corresponding volume to mass ratio for transient fluctuations in which a pair of heavy gravitons annihilate one another to share the volume of three such gravitons in a single charge. The same condition arises for the case where energy is exchanged between the field system of matter and the heavy graviton with, for such minor fluctuations, the preservation of gravitational potential overriding the need for perfect dynamic balance. In the latter case the slight expansion of graviton volume increases just enough to match the mass-energy added to the system of matter, thereby keeping gravitational potential unchanged. The relevant volume to mass ratio which has to equal:

$$(2V_\tau + V_g)/(2m_\tau + m_g)$$

is then:

$$3V_g/m_g$$

Since charge volume is inversely proportional to the cube of the related mass one finds from the above equality that:

$$(m_g/m_\tau)^3 - 3(m_\tau/m_g) -1 = 0$$

which, upon solution, gives:

$$(m_g/m_\tau) = 1.452627$$

This allows us then to write:

$$\%G = \sigma(3V_g/m_g)$$

<u>Step 4:</u> One can now evaluate G based on the measured value of the taon mass-energy, which is 1.781 GeV or 3485 electron mass units, to find that the heavy graviton becomes 2.587 Gev or 5063 electron mass units.

Note that d is $72\pi e^2/m_e c^2$ and so is 108π times the electron charge radius, the latter being 5063 times the charge radius of the heavy graviton. Given that σ is e/d^3 we then find that:

$$\%G = 4\pi(e/m_e)/(108\pi)^3(5063)^4$$

and, e/m_e being 5.272 esu/gm, this tells us that G has the value $6.67\text{x}10^{-8}$ dynes.cm^2.gm^{-2}.

Conclusion

Physicists, and notably Weisskopf [5], have been puzzled as to the role played by both the muon and the taon, the heavy electrons of particle physics. Separately [6] the author has shown how the muon governs the creation of the proton and here we have seen that the taon governs in the field of gravitation. The case put here is that gravitation is an electrostatic phenomenon and this is deemed to justify the above use of the electrostatic units of the c.g.s system. We have derived G, the constant of gravitation, in good accord with its measured value. However, the author has gone further in this quest and is of record in showing how to derive by the same theory the masses of both the muon [3] and the taon [7] in terms of electron mass. Hopefully, therefore, this case that gravitation is an electrostatic phenomenon will come to be accepted in the future spectrum of physics.

References

[1] P. A. M. Blackett, *Nature*, **159**, 658 (1947).
[2] S. Hasagawa et al, *Prog. Theor. Physics,* **47**, 126 (1971).
[3] H. Aspden, *The Physics of Creation*, www.aspden.org (2004).
[4] H. Aspden & D. M. Eagles, *Physics Letters*, **41A**, 423 (1972).
[5] V. F. Weisskopf, *Physics Today*, 69-85 (Nov. 1981).
[6] H. Aspden, *Aspden Research Papers,* **4** www.aspden.org (2005)
[7] H. Aspden, *Hadronic Journal*, **9**, 153 (1986).

[1489 words]