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Kenneth Paul Hoffman ©

Gravity and the Fine Structure Constant ©

Alpha's relationship with Other Physical Constants

Abstract

When examining the mystery of gravity in the previous paper with regards to the involvement of Space, the Fine Structure Constant appears. It appears in a relationship based on light speed, h bar, Planck mass, Gravitational Mass, (GM), Inertial Mass (IM) and speed, Bohr's radius, the Gravitational Energy Field (GEF) speed, and Newton's gravitational constant G. Previous research was an attempt to incorporate the energy exchange between the involved GM and IM with their immediate connection to Space in addition to the given Newtonian gravitational force equation for the Space distance between them. It led without any purposeful design to an equation for the dimensionless FSC that defines that constant in a relationship with other standard constants common to physics considering it is playing a key role in Gravity and solving Newton's 'Action at a Distance.' The FSC is considered one of the biggest mysteries of physics. What might it tell us about the Universe? [1]

Very Fast Action at a Distance

This paper examines in greater detail the Fine Structure Constant (FSC) equation that was developed. Newton settled for the seemingly impossible 'Action at a Distance' for the action force of Gravity, as he saw no alternative to a physics that "conceives force and gravitation as an irreducible fact of experience." [2] Also, not forgetting that his formulas support his experience still to this day.

The previously calculated Gravitational Energy Field (GEF) speed being much greater than light speed by ten orders of magnitude, based on these same other constants involving the FSC[3] and an examination and use of Lagrangian Kinetic and Potential Energies,[4] suggests that the FSC has a greater purpose than to just be a dimensionless constant at the level of electromagnetism. Also, one must consider the work of Tom Van Flandern that determined that gravity must act at a velocity much faster than light speed not only to do correct calculations in celestial mechanics but also to accept that fact to have a stable mechanical system for objects moving in Space[5]. Does the relationship between the FSC and other constants of physics along with an available speed ten orders of magnitude higher than light speed provide for the possibility of Universe to rapidly move energy in what would otherwise be considered action at a distance, action at a somewhat spooky distance to achieve a final constant acceleration on an IM falling under the influence of the gravity field of the GM.

The Developed Equation

The proposed alternative force equation for analyzing gravity.

$$F_I = m_2a = F_T = \mathbf{GM_1m_e/L_p} + GM_1m_2/r^2 - \mathbf{Gm_2m_e/L_P} \quad (1)$$

The Added Terms

GM_1m_e/L_p is one of two terms that is a modification of Newton's to find an expression that provides an exchange of a claimed energy between the Gravitational Mass (GM) and the Inertial Mass (IM) and the immediate contact at their Mass/Space interface. The standard IM in Newton's formula was replaced by the mass of an electron and the radius by Planck length.

M_1 is the GM (Earth); m_2 is the IM (Moon); m_e is the electron mass; L_p is the Planck length. G is Newton's Gravitational constant.

Converting force terms to energy, dividing by m_2 and rearranging gives:

$$ar = (Gm_e/L_p) \times ((M_1 - m_2)/ m_2)) + GM_1/r \quad (2)$$

Note: Planck constants[6]:

Planck length: $L_p = 1.61625 \times 10^{-35}$ (m)

Planck's h-bar $\hbar = 1.05457 \times 10^{-34}$ (Kg-m^2/s)

Planck mass : $m_p = 2.176434 \times 10^{-8}$ (kg)

Planck Formulas:

Planck length: $L^2_p = \hbar G/c^3$; solve for G = $L^2_p\, c^3/\hbar$

Planck mass: $m^2_p = \hbar c/G$; solve for G = $\hbar c/ m^2_p$

Giving: $L^2_p\, c^3/\hbar = \hbar c/ m^2_p$

Thus: $L^2_p = \hbar^2 / m^2_p\, c^2$ & $L_p = \hbar/ m_p c$

$L_p = \hbar/ m_p c$ & $G = \hbar c/ m^2_p$

From eq. (2) $G/ L_p = \hbar c/ m^2_p \,/\, \hbar/ m_p c = c^2/m_p$

Then: $ar = (c^2m_e/m_p) \times ((M_1 - m_2)/ m_2)) + GM_1/r \quad (3)$

Since distance =rate x time; then $r = vt$

$$av_2t_2 = (c^2m_e/ m_p) \times ((M_1 - m_2)/ m_2)) + GM_1/v_1t_1 \quad (4)$$

v_1 = Gravitational Energy Field (GEF) speed; calc from eq. 4

$v_1 = 4.06714 \times 10^{18}$ m/s.

This value for the velocity in the calculation done in a previous paper when using the Lagrangian factors of KE and PE[4]. v_1 is the same value after adding two additional terms that are so small, they show no effect.

Equation (4) was modified to introduce the Fine Structure Constant, Alpha to the equation.

Alpha (α) is defined in the equation given Bohr radius, 'c,' and the electron mass:

The Bohr radius[7], a_0, is:

$a_0 = \hbar/(m_e c \alpha)$

$m_e = \hbar/(a_0 c \alpha)$

α = Alpha, the Fine Structure Constant 0.007297353 (no units)

m_e = electron mass 9.109×10^{-31} (kg)

$$av_2t_2 = (c\hbar/(a_0 \alpha m_p)) \times ((M_1 - m_2)/ m_2))) + GM_1/v_1t_1 \quad (5)$$

When the equation is modified using the Bohr radius to add Alpha (α), (c^2m_e/ m_p) becomes $(c\hbar/(a_0 \alpha m_p))$.

Alpha adds ħ and Bohr's radius while cutting c^2 to 'c' and eliminating the electron mass from the equation. The GEF speed becomes:

$v_1 = 4.06737 \times 10^{18}$ m/s calc. from eq. (5)

The difference = 1.25349×10^{14} m/s (an increase)

v_2 = Inertial Mass speed. Set $v_2 t_2$ value as one (1)

a = 9.8 m/s, acceleration in Earth Gravitational Mass, = **g**

$t_1 = 0.00001$

Substituting and solving gives:

$$\alpha = ((c\hbar/(a_0 m_p)) \times ((M_1 - m_2)/m_2))) \,/\, ((gv_2t_2) - (GM_1/v_1t_1)) \qquad (6)$$

Returns the value for Alpha of 0.007297353; (1/137.036) **All dimensions cancel.**

$$\alpha = \frac{\left\{\dfrac{\text{(light Spd-c) x (Planck Const-hbar)}}{\text{(Planck Mass) (Bohr radius)}}\right\} \times \left\{\dfrac{\text{(GM – IM)}}{\text{(IM)}}\right\}}{\left\{\text{(GM accel.) x (IM spd) x (time) - }\dfrac{\text{(Newton's Const-G)x(M)}}{\text{(GEF speed) x (time)}}\right\}}$$

$$\alpha = \frac{\left\{\dfrac{(m)\,(kg\text{-}m^2)}{(s)\quad(s)}\right\} \times \left\{\dfrac{(kg) - (kg)}{(kg)}\right\}}{\left\{\dfrac{(m)\,(m)\,(s)}{(s^2)\,(s)}\right\} - \left\{\dfrac{(m^3)\,(kg)}{\dfrac{(kg\text{-}s^2)}{(m)(s)}}\right\}} = \frac{\dfrac{m^2}{s^2}}{\dfrac{m^2}{s^2}} = 1$$

(s)

α is dimensionless. If we multiply by kg-s/kg-s, then : $\dfrac{\dfrac{kg\text{-}m^2}{s}}{\dfrac{kg\text{-}m^2}{s}}$ **The same units as ħ in num./denom.**

ħ is Planck's constant. Thus, α (Alpha) could define/designate the transfer of energy between Matter and Space per unit Planck mass. Alpha plays a key role in its relationship to the other constants. Constants that cover a wide range of values from the incredibly small to the large Gravitational and Inertial Masses. Also, included here from this approach is the Gravitational Energy Field (GEF) speed ten orders of magnitude higher than light speed.

Could Alpha be truly connected to the other constants in physics, even connecting it to Gravity?

> *The constant is everywhere because it characterizes the strength of the electromagnetic force affecting charged particles such as electrons and protons.* ***"In our everyday world, everything is either gravity or electromagnetism****. And that's why alpha is so important," said Holger Müller, a physicist at the University of California, Berkeley.* [8] (my bold)

When the energy involved includes both the micro and macro scale, and a high velocity is involved, it is reasonable to suspect that now that transfer of energy is not just a product of photon involvement. Now that energy transfer could take place in a different process that involves the FSC. The FSC affect in its relationship with the other factors allows for that transfer across Space in an unknown way.

Note that the GEF speed can change with variations with the GM and IM system being studied. The FSC itself might also change with these changing variables.

Nature's System Process for the Flow of Energy

Since energy transfer for the heat process is a simple function of the temperature difference, it is reasonable that the interface point for energy transfer is the '**Space Field (SF)/Matter Field (MF) interface,'** and that interface acts as a directional gate or valve to control the flow of energy. This is the Quantum Gateway that points to the ***quantization of energy***. Einstein's own words in his paper on "The Quantum Theory of Radiation," in 1916, seem to give support to this notion. [9, 10]

> ***"This derivation deserves consideration not only because of its simplicity, but especially because it appears to clarify the processes of emission and absorption of radiation in matter, which is still in such darkness for us.*** *And …"If a body emits the energy E it acquires a backward thrust [impulse] E/c if all the radiation is radiated in the same direction. If, however, the radiation occurs through a spatially symmetric process, for example, spherical waves, there is then no recoil at all. This alternative also plays a role in the quantum theory of radiation.* ***If a molecule, in going from one possible quantum theoretic state to another, absorbs or emits the energy in the form of radiation, such an elementary process can be looked upon as partly or fully directed in space****, or also as a symmetric (non–directed) one. It turns out that* ***we obtain a theory that is free of contradictions only if we consider the above elementary processes as being fully directed events…"*** *(My bold and italics)*

The participation of these natural constants and the variable masses all working together produce a directional energy event at scale that permits a process faster than light speed to be consistent with Newton's instantaneous 'action at a distance' providing a constant rate of acceleration and the necessary condition to accurately perform calculations in celestial mechanics.

Discussion

This process is open to a fully directional movement of energy between the GM, the IM, and Space itself. Physics needs to be open to the reality of Space without understanding what it is. How does it hold onto the idea that Space is an illusion, and that Gravity is only a complex mathematical geometric warping of Space and Time. Space is likely a sea of apparently unseen, undetectable, and unmeasurable energy fields, and physics now acknowledges at least one when it claims to have measured "gravity waves."

Gravity may always be thought of as action at a distance but now without having to deny that Nature has mastered faster than light speed. If the velocity of the Gravity energy/force field being orders of magnitude higher and part of nature and quantum mechanics is also a part of that foundation and the FSC is connected to it all, then the quantum entanglement correlation with its "special way of communicating" [11] could be understood to explain this spooky action across a vast distance.

How would such an energy mechanism work that explains the physical mechanics of the movement and control of celestial objects is not known. All that is required is to be open to the possibility that Nature could generate such a system of physical mechanics and any mathematics that is generated to describe it provides for the predicted results for the movement of visible matter in Space.

It does not really need to explain the process. That may never be possible. Afterall, is not that what is in place now. Perhaps a new focus will lead to a new direction providing a more positive result.

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