Higgs Mass Electrodynamics

by William Gray

Abstract

Mass is shown to be electrodynamic energy, a Heisenberg Uncertainty singularity.

I) Energy

Instead of regarding energy as Strong nuclear, Electrodynamic atomic, Weak transform and Gravity forms it's more useful to view it as a mathematical function whose form depends on circumstances.

This is based on Boltzmann's $P = e^{S//k}$ probability principle that an energy state is a system entropy probability function. Because physical reality has actual limits, instead of mathematical reality's 0 and ∞, there are two 100% predictable energy states that arise from the system's "range" degree of freedom, the hip ground and E_c saturation states because they are the limits of statistical behavior.

For instance, at E_0 ground state a one component minimum energy system would distribute energy equally in all available entropic degrees of freedom and could not achieve excited states. This follows from examining an Einstein 4-D Minkowski space-time minimum system occupying the time degree of freedom equally with the space degrees of freedom so it has periodicity, an $e^{-ix} = \cos x - i \sin x$ quantum continuous function like earth's orbit or a hydrogen atom at absolute 0.

Similarly, at the E_c saturation state such as light speed, there can be no statistical states because saturated components can't exchange energy and light speed is a Heisenberg resolution uncertainty state to sub-light speed components. The Uncertainty principle states that position and momentum can't be simultaneously measured with infinite resolution because resolving a particle with a wave leaves a ½ wave resolution uncertainty and resolving a field with a particle leaves a particle radius uncertainty. Because sub-light speed components are subject to a $y = (1 - v^2/c^2)^{1/2}$ Lorentz space-time-mass transformation and light speed components aren't there's always a resolution uncertainty between them.

Furthermore, since saturation is an uncertainty state whose characteristics can't be resolved by sub-light speed components, the effect of the system f(x) function goes to 0. This is a $\int 1/f(x)\,dx$ singularity event that occurs when $f(x) \rightarrow 0$, like Bohr's Correspondence principle that $E_n = E_o / n^2$ quantum behavior becomes classical when the distinctions between quantum states vanish, for $n > 10^4$ or $n^2 > 10^8$, corresponding to the $c = 3 \times 10^8$ m/s speed of light resolution uncertainty.

For instance, for $n > 10^4$ hydrogen's line spectra match the electron's orbital frequency to within 0.0015%, indicating a classical EM theory orbiting charge oscillating dipole that transmits EM wave energy, an inertial motion to EM energy transformation. Conversely, a rotating magnetic dipole generates an oscillating field energy in space that constitutes an electromotive force on electrons in a conductor, but as the rotation approaches light speed the transmission of energy to the electron attenuates because the sub-light speed electrons can't resolve the light speed dipole oscillation.

II) Energy Domain Correlations

The energy field in space generated by a rotating dipole constitutes a definite energy generated

by the domain's f(x) functions (i.e. $E = d\Phi_B/dt$, $B = d\Phi_E / dt$ etc.), but which cannot be resolved by the domain's $E = d\Phi_B /dt$ and $B = d\Phi_E /dt$ because at light speed rotation it's a resolution uncertainty. This is shown to be an electrodynamic generation of Higgs boson mass energy by showing that a domain's E_o and E_c limits have the same $\alpha^2 = E_c /E_c$ ratio in all domains, reference to the same $hc = h/(\mu_0\varepsilon_0)^2$ electromagnetic impedance of space that determines the speed of EM waves, and is based on the $(½eh/2\pi)$ light speed rotation of charge oriented EM energy by the following energy form derivations.

1) Impedance energy of space:

$hc = h/(\mu_0\varepsilon_0)^2 = 1.9864473 \times 10^{-25}$ J•m $= (½eh/2\pi)^{1/2}/2\alpha$, corrected to $1.9866279 \times 10^{-25}$ J•m within 0.01% of hc by $(1 - \alpha/\pi)(1 - \sqrt{2}\sqrt{3}\alpha^2)$ momentum effects.

2) Electron quantum optical and interactive radii and mass energy:

$r_{eo} = (hc/\alpha^2)\sqrt{3}\,\pi = 2.03 \times 10^{-20}$ m $\qquad r_{ei} = (r_{eo}/\alpha)3(\sqrt{2}\sqrt{3})^2 = 5.01 \times 10^{-17}$ m

$m_e = (\alpha/hc)(½eh/2\pi)3^{2/3}\sqrt{2} = 9.129378 \times 10^{-31}$ kg, corrected to within 0.0003% of m_e by $(1 – \alpha/\pi)(1 + \sqrt{2}\,\sqrt{3}\,\alpha^2)$ momentum effects.

3) Quark radii and mass energies:

$r_{qo} = (hc/\alpha^3)\pi/2 = 0.803 \times 10^{-18}$ m $\qquad r_{gi} = r_{go} /\sqrt{3}\,\alpha = 6.353 \times 10^{-17}$m

$m_{Up} = (½m_ec^2)\sqrt{2}\,\sqrt{3}\,2\pi = 3.9323$ MeV $\qquad m_{Down} = \sqrt{3}\,m_{Up} = 6.8109$ MeV

4) Proton radii and mass energy:

$r_{po} = r_{qi}\,3^{2/3}\,2\pi = 0.83$ fm $\qquad r_{pi} = (hc/\alpha^4)pi^2\,3^{2/3}\,/\sqrt{2} = 1.017$ fm

$m_p = (½eh/2\pi)\sqrt{2}\sqrt{3}\,3c^3 = 3^{1/2}(\,(m_U\,/\alpha) + m_D - m_U) = 1.673 \times 10^{-27}$ kg $= 938.33$ MeV

5) Higgs boson mass energy:

$m_H = [m_p - \sqrt{3}(\,2m_U + m_D)]/\alpha = 125.1$ GeV

6) Hydrogen ground state energy:

$E_o = (\alpha^3/hc)(½eh/2\pi)3^{2/3}\,/\,\sqrt{2} = 2.43 \times 10^{-35}$ kg $= 13.60355$ eV, corrected to within 0.0003% of E_o by $(1 – \alpha/\pi)(1 + \sqrt{2}\sqrt{3}\alpha^2)$ momentum effects

7) Gravity 's earth ground state orbit energy and Light Year:

a) $E = \sqrt{3}\,/\,(½eh/2\pi)2\pi = 3.263 \times 10^{52}$ eV, where $(½eh/2\pi) = (2\alpha hc)^2$ is the proton and electron EM mass energy basis, within 1.6% of the $G\,m_em_s/r_{es} = 5.3 \times 10^{33}$ J $= 3.315 \times 10^{52}$ eV value

b) Light Year $= 3^{4/3}\,\sqrt{2}\,\pi/2r_{pi} = 9.45 \times 10^{15}$ m, within 0.1% of the 9.46×10^{15} m value

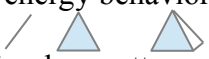
The cumulative conclusion of these mathematical energy forms is that mass energy is a $(½eh/2\pi) = (2\alpha hc)^2$ light speed angular momentum Heisenberg Uncertainty singularity function that can't be resolved by other sub-light speed mass energies but which is resolved by the $hc = 2 \times 10^{-25}$ J•m impedance of space that interacts with the light speed dipole angular momentum because hc interacts

with light speed EM waves. Thus Higgs mass requires energy to accelerate it through space according to the $\gamma = (1 - v^2/c^2)^{1/2}$ Lorentz space-time-mass transformation, is an electrodynamic effect, a bosonic force carrier since all energies have an EM basis, and operates on space's hc impedance as a Gravity effect according to Einstein's "Riemann condition" of 4-D Minkowski space-time.

III) Energy Domains

The energy domain correlations show a very specific matter construct pattern referenced to the hc impedance of space by the α size, velocity and force energy root and α^2 energy density coefficients between them with $E_o = e^{-ix} = \cos x - i \sin x$ quantum continuous ground states and E_c saturation state boundaries, and $e^{S/k} E_n = E_o / n^2$ quantum statistical states in between.

The domains occur by a change in the size degree of freedom that determines the amount of space, and thus energy density, in between the energy forms, which makes the energy forms the boundary conditions of the domains. The α size ratio in all the energy domains is Sommerfeld's $\alpha = e^2 / 2\varepsilon_o hc$ number that correlates the electric force energy root of a hydrogen electron ground state with respect to its speed of light velocity energy root limit, and this ratio is the same in all energy domains by the principle of Relativity that the laws of nature are the same in all frames of reference.

Thus domains are defined by α size and α^2 energy density ratio limits, e^{-ix} to $e^{S/k}$ behavior limits, and E_o predictable quantum continuous to E_c unresolvable Heisenberg Uncertainty limits, with one additional constraint. Both e^{-ix} and $e^{S/k}$ are the limits of e^x energy behavior functions and e^x is an $\Sigma_{n=o}^{n=\infty} = x^0/0! + x^1/1! + x^2/2! + x^3/3! + x^4/4! + \ldots =$ ◦  →⋯calculus integration progression that follows a geometric entropic degree of freedom pattern so the probable progression of stable states are geometric energy distributions, as shown in the energy form equations, in conjunction with the $(1/2eh/2\pi) = (2\alpha hc)^2$ rotating charge EM basis of mass energy.

IV) Electrodynamic Mass-Energy

The fact that the $\mu = \frac{1}{2}eh/2\pi$ rotating charge magneton yields the correct mass energies for the proton and electron supports an electrodynamic basis for mass but this is only the internal generation side of the thesis. Confirmation of this requires agreement with the circumstantial behaviors of the mass energy. As explained in pages 6-9 of Quark Relativity Transform the proton's Up Up Down quarks form a triton structure with an $m_D - m_U = 2.88$ MeV gluon that binds them together as it carries the Down quark's excited energy state and charge sequentially to the triton's 3 Up quark energy states. As the gluon interacts with a relatively stationary Up quark it generates a $\pi° = 135$ MeV with two energy components: the $(m_D - m_U/\pi) = 5.56$ MeV of the gluon - Up quark interaction and the $\sqrt{(3/2)}[3(\frac{1}{2}m_e c^2)/\alpha + \sqrt{2}m_e] = 129.53$ MeV that derives from the $B = d\Phi_E/dt$ mass generation function of the quark triton's orbital rotation in the proton.

This model was based on the concept of the $\mu = \frac{1}{2}eh/m2\pi$ Bohr magneton as a $m = \frac{1}{2}eh/\mu 2\pi$ mass definition and $E_0 = e^{-ix}$ quantum continuous ground state. If the Up Up Down quark triton's light speed orbital +e charge generates the Higgs boson mass center then the orbital must correlate to the proton's radius because the force of the triton's $\uparrow e^+$ charge motion must transmit through the mass energy to attract its $\downarrow e^+$ motion on the opposite side: $\lambda = hc/\sqrt{3}(2m_U + m_D)\sqrt{2}\sqrt{3}\ 2\pi = r_{pi} = 1.01$ fm, where $hc = 2 \times 10^{-25}$ J•m is space's EM energy impedance, $\sqrt{3}(2m_U + m_D) = 25.4$ MeV $= 4.07 \times 10^{-12}$ J is the quark triton's spherical momentum mass energy, π is the ½ sphere ½ wave length it travels at light speed c, $\sqrt{2}\sqrt{3}$ is the angular and spherical quantum continuous distribution of its E_0 ground state orbital energy, and 2π is the wave length of the diametric motion of the e^+ charge through it:

Furthermore, the proton's $(r_{pi}/r_{ei})^3 / \sqrt{3}(m_p/m_e) = 2.7928$ calculated density coefficient yields the correct proton magneton when the $u = ½eh/m2\pi$ Bohr magneton relation is used. And finally, as shown in QRT pp. 6-9, the gluon's interaction with the triton's quarks triggered the $\pi° = 135$ MeV pion energy but it only generated $(m_D - m_U)/\pi = 5.56$ MeV of its energy, with the bulk $\sqrt{(3/2)}[3(½m_ec^2)/\alpha + \sqrt{2}m_e] = 129.53$ MeV deriving from decay of the $B = d\Phi_E/dt$ mass generation function, as would occur from the interruption of the triton's e^+ charge as the gluon's information carries the $e^-/3$ charge information of the Down quark state to the next Up quark in its orbital. (The Up and Down quarks are actually integral e^+ and e^- charges but the 10^{-24} s transitions resolve as $2e^+/3$ and $e^-/3$ averages.)

If the charge disruption by the pion generation causes the generated $B = d\Phi_E/dt$ mass energy to decay then the circumference of the triton's orbital of the $r_{po} = 0.83$ fm Higgs mass would be disrupted in terms of charge for as long as the pion travels outside the proton since both occur at light speed. For a $r_{po} = 0.83$ fm Higgs mass radius the circumference is $C_H = 2\pi r_{po} = 5.215$ fm, and 129.53 MeV is 13.805 % of the proton's total mass so the orbital distance traveled is C_H x 0.13805 = 0.72 fm, which must match the nuclear bond length because both the $\pi°$ and triton travel at light speed. The local perspective nuclear bond is 1 fm which contracts to 1 fm$(m_e/(m_e + E_n)) = 0.4$ fm upon interaction with the neutron's electron component so the pion's 0.72 fm ½ wave distance falls right in this range, and is thus a product of the proton's mass generation.

The electron interaction adds $3(m_e + E_n) + \sqrt{2}m_e = 4.6$ MeV to yield the 129.53 + 5.56 + 4.6 = 139.7 MeV π^- negative pion that decays when the bond is broken, which means the electron can interact with the proton's $\pi° = 135$ MeV pion to extract mass energy from the proton. This actually occurs in nature during upper atmospheric lightning discharges that result in 140 MeV gamma ray emissions, a characteristic signature of pion decay from bond cleavage effects of the lightning discharge.

Although somewhat rare this occurrence demonstrates the feasibility of interaction of EM energy and Strong force nuclear energy constructs in which an entropic domain of high energy electrons provides a degree of freedom atmosphere for a nuclear discharge. Given the proton construct derived in QRT it's easy to see that they can be aligned and synchronized in a strong magnetic field with an orthogonal rf field, like a Larmor precession in Nuclear Magnetic Resonance Interferometry. However the purpose in this case would be interaction with a stream of electrons to generate a high energy current. In other words, a Nuclear Fuel Cell that converts the Higgs boson mass energy in protons directly into electricity without radiation or radioactive wastes.

Actual implementation would be considerably more complex but no more so than the concept of a light speed orbital triton generating a Higgs boson mass energy that maintains the triton's orbital by transmitting its opposing force to the opposite side. In essence the rotating triton charge generates a $\mu = ½eh/2\pi$ magneton whose dipole reorients at light speed to create a spherical bosonic mass energy force carrier that resonates with the pion generation function within the triton. This Mass Electodynamics concept yields the correct proton, electron and pion mass energies, the gravitational basis for earth's orbit and the Light Year, and appears to offer a readily available clean nuclear energy source.