Deuterium Bond Electrodynamics

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Abstract

Deuterium's 2.224 MeV bond energy is an energy nexus between the Strong nuclear and Electromagnetic atomic energy functions, Yukawa's and Feynman's $\alpha\sqrt{2}m_{\pi^-} + E_n = 2.224$ MeV pion Up-Down quark exchange between particles, the quark-gluon $m_D - m_U - \frac{1}{3}E_n(m_e + E_n)/m_e = 2.224$ MeV interaction within the proton, and the atomic domain $2E_n + \frac{1}{3}E_n(m_e + E_n)/m_e = 2.224$ MeV Electron Capture bond formation the pion operates on, and shows by Weak force decay relations that this bond energy is accessible from the Electromagnetic atomic domain as a non-statistical radiation free nuclear energy source.

Discussion

The $\alpha\sqrt{2}m_{\pi^-} + E_n = m_D - m_U - \frac{1}{3}E_n(m_e + E_n)/m_e = 2E_n + \frac{1}{3}E_n(m_e + E_n)/m_e = 2.224$ MeV nexus between the pion, Up and Down quarks, and Electron Capture occurs at the nuclear-atomic domain boundary because:

1) Boltzmann $P = e^{S/k}$ statistiscal systems are bounded by E_o ground and E_c saturated light speed energy states;
2) the energy domains correlate by an $\alpha^2 = E_o/E_c$ Entropic Energy Density coefficient;
3) they transform between each other at their respective E_c saturated and E_o ground state energies by an $\int 1/f(x)\,dx$ Singularity Principle energy transform that occur's because a domain's f(x) function becomes a Heisenberg Uncertainty at light speed that constitutes the next domain's E_o ground state;
4) and the natural laws are the same in all relative frames of reference.

Intersecting domains form a stasis at their nexus because at E_o ground and E_c saturated energy state conditions there is either no extra energy beyond the minimum needed for the matter construct so its entropic degrees of freedom are only occupied sequentually and with periodicity or no extra energy can be accomodated for statistical behavior. They also maintain energy equilibrium ratios proportionate to their α based relative energy densities, where $\alpha = (E_o/E_c)^{1/2} = e^2/2\varepsilon_o hc$ is Sommerfeld's ratio of hydrogen's $e^2/2\varepsilon_o h$ elctrodynamic potential and c light speed kinetic energy roots, and under Weak force decay the $m_{\pi^-} = 139.6$ MeV pion undergoes a 1-D decompression from light speed to the 2-D E_o ground state orbital, a $\alpha\sqrt{2}m_{\pi^-}$ pion plus $E_n = m_n - m_p - m_e = 0.782$ MeV neutron state Beta particle to E_o ground state decay, so $(\alpha\sqrt{2}m_{\pi^-} + E_n) = 2.224$ MeV.

In Weak decay a Beta particle's energy transforms from a λ_c light speed Compton to λ_o ground state wavelength by $\lambda_c = \alpha\,\lambda_o = \alpha \times 3.325 \times 10^{-10}$ m $= 2.42637 \times 10^{-12}$ m which corresponds to a $t_{Wv} = (t_c/\alpha^4)\sqrt{2}\sqrt{32\pi} = 0.44 \times 10^{-10}$ s time "distance" change in the same domain (i.e. Relativisitc 4-D time flow duration change between events), where $t_c = \lambda_c / c = 0.809 \times 10^{-20}$ s.

The decay energy can manifest as an electromagnetic gamma ray, as a neutral pion π^o with a $t_{\pi^o} = \sqrt{3}t_c / \pi\alpha^2 = 0.838 \times 10^{-16}$ s half life decay time, or as an atomic domain Beta particle after $t_{\pi^-} = t_{Wv}\,3\sqrt{2}/\alpha = 2.57 \times 10^{-8}$ s negative pion and $t_{\mu^-} = \sqrt{3}t_{\pi^-} / \sqrt{2}\,2\alpha = 2.16 \times 10^{-6}$ s muon half life decays under typical statistical conditions. However since probability is a $P = e^{S/k}$ system entropy function by Boltzmann's $S = k \ln P$ principle when S is a system macrostate function, the entropic conditions can be controlled to "tune" the outcome by controlling statististical probabilities.

Since the $\alpha\sqrt{2}m_{\pi}$- + E_n = $m_D - m_U - ⅓E_n(m_e + E_n)/m_e$ = $2E_n$ + $⅓E_n(m_e + E_n)/m_e$ = 2.22 MeV bond energy is an atomic and nuclear domain nexus and the E_o ground and E_c saturated energy states are non-statistical $E_o = \alpha^2 E_c$ boundary conditions it means the change in their 4-D space-time entropy conditions are system state functions, where E_c is the nuclear domain state and E_o is the atomic domain state, and $\lambda_c = \alpha\lambda_o$ and $t_{Wv} = (t_c/\alpha^4)\sqrt{2\sqrt{3}}\, 2\pi = 0.44 \times 10^{-10}$ s are the space-time energy transitions between the nuclear and atomic domains, and since t_{π}- and t_{μ}- are defined in terms of t_{Wv} it means that a controlled nuclear to atomic domain Beta decay transition is possible by controlling system entropies and providing an entropic degree of freedom for the energy.

In physical terms this means providing an E_o domain electron for energy transfer. The energy state of the light speed pion operating on the neutron's orbital electron is E_c and corresponds to the E_D = $\alpha\sqrt{2}m_{\pi}$- + E_n = 2.224 MeV average bond energy ground state for a nuclear domain Deuteron bond. It's stable because there's no place for the E_D energy to flow to unless an E_o atomic domain electron is present to provide an entropic degree of freedom path.

However the Deuteron's 4-D space-time entropic degrees of freedom make the bond energy's access a $P = e^{S/k}$ Boltzmann principle probability in terms of synchronization and alignment. The bond itself is 100% stable, continuous and predictable because every entropic degree of freedom of the pion's interaction with the neutron's electron is a controlled system function, including the bond distance and synchronization and alignment of the pion with the neutron's orbital electron because at its 2.224 MeV bond ground state there's no extra energy for statistical behavior but an external E_o energy electron is not aligned or synchronized with the pion so its external interaction is statistical.

This alignment-synchronization problem is akin to achieving a Bose-Einstein Condensation by alignment of the construct's matter waves with super-cooling and alignment lasers. In this case however thermal alignment isn't relevant because the E_o ground state electron only needs to be synchronized with the pion's Down quark energy state transfer between the proton and neutron. This inverse Electron Capture interaction which can be achieved by a Larmor type magnetic alignment and rf field synchronization of the pion because its generation is electromagnetic and can therefore by synchronized with the matter waves of an E_o constant energy electron beam.

In Quark Relativity Transform at mqnf.com it was shown that the Up quark's mass energy is $m_U = (½m_e c^2)\sqrt{2\sqrt{3}}\, 2\pi$ = 3.9323 MeV and that the Down quark is an excited $m_D = \sqrt{3}m_U$ = 6.8109 MeV Up quark state with an $m_D - m_U$ = 2.88 MeV difference. It was further shown that in a proton this 2.88 MeV Down quark energy state is actually a gluon that binds 3 Up quarks into a triton that appears to be an Up-Up-Down configuration whose orbital electromagnetically generates the $m_H = [m_p - \sqrt{3}(m_D + 2m_U)]/\alpha$ = 125 MeV bosonic Higgs mass energy, where $m_p = (½eh/2\pi)\sqrt{2\sqrt{3}}\, 3c^3 = 1.6727 \times 10^{-27}$ kg is the mass energy generated by the triton's orbital charge.

The positively charged orbital triton is a $B = d\Phi_E/dt$ = $½eh/2\pi$ EM generation function but because its velocity and pole rotations are at light speed it's a $\int 1/f(x)\,dx$ Heisenberg Uncertainty singualrity to sub-light speed components that can't differentiate light speed polarity reversals. For instance, a rotating magnet inside a coil causes its electrons to oscillate at the rotation frequency. However as rotation increases to light speed the electron oscillations decrease to 0 as their inertial mass increases by $m_o/(1 - v^2/c^2)^{1/2}$ and become increasingly less responsive to the polarity reversals until they stand still, unable to differentiate the polarity reversals while the field energy exists as an undifferentiated $\int 1/f(x)\,dx$ Higgs Heisenberg Uncertainty mass energy singularity event.

The triton's light speed orbital of the field energy it generates is a cause and effect resonance that correlates to the proton's radius because the force of the △ + triton's charge motion attracts its opposite motion ▽ +on the opposite side by $\lambda_p = hc/\sqrt{3}(2m_U + m_D)\pi\sqrt{2\sqrt{3}}\, 2\pi$ = 1.01 fm as descibed in

Higgs Mass Energy Gravity Construct, p. 3, at mqnf.com, where $\sqrt{3}(2m_U + m_D) = 25.4$ MeV = 4.07 x 10^{-12} J. The quark triton thus maintains an equilibrium resonance with the $m = E/c^2$ mass of field energy its $B = d\Phi_E/dt$ motion generates and is bosonic because light speed polarity reversals can't be differentiated. The triton's light speed orbital forms the interactive positive charge surface with an $r_{pi} = (hc/\alpha^4)\,\pi^2\, 3^{2/3} / \sqrt{2} = 1.017$ fm radius.

Because the $\sqrt{3}(2m_U + m_D) = 25.4$ MeV mass-energy operates at light speed it contracts space between the triton and $m_p - \sqrt{3}(2m_U + m_D) = 912.9$ MeV mass-energy it generates, effectively drawing it towards the $r_{pi} = 1.017$ fm surface and since the mass-energy's size is the $r_{po} = r_{qi}3^{2/3}2\pi = 0.83$ fm volumetric radius of the quark triton's wave energies, where $r_{qi} = r_{qo} / \alpha\sqrt{3} = 6.353 \times 10^{-17}$ m and $r_{qo} = ½(hc / \alpha^3)\pi = 0.803 \times 10^{-18}$ m is the quantum optical radius. The relativistic mass offset produces an arc sin $1 - (r_{pi} - r_{po})$ = arc sin $r_{pi} / r_{po} = 54.7^o$ ½-spin magneton and mass-energy offset and an external magnetic alignment field aligns the generated magneton to produce a $\mu_p = (½eh/2\pi)(r_p/r_e)^3/(m_p/m_e) = 2.7928\ \mu_n$ nuclear magneton. Thus $m_p = ½eh / \mu_p 2\pi$ and equates the mass-energy, the μ_n magneton and ½-spin moment generation, and $r_{pi} = 1.017$ fm size of the triton's orbital.

The triton's 2.88 MeV gluon is significant because it equates to the 2.224 MeV bond energy. The bond forms when the proton's pion interacts with the neutron's orbital electron in its E_n energy state. This results in an electron resonance between the interacting proton and neutron's proton, thus forming two E_n states and an $⅓E_n(m_e + E_n)/m_e = 0.66$ MeV transition state energy between them. Two transition energies are necessary for the bond in order to form equal and opposite 2.224 MeV momentums, one for each half of the resonance, and which therefore cancel to yield the mass defect. The gluon's 2.88 MeV provides the second 0.66 MeV transition state momentum energy by colliding with the Up quarks in its light speed orbital since 2.88 MeV – 2.22 MeV = 0.66 MeV.

The gluon's collision triggers the pion generation because its transition between the Up quarks disrupts the triton's charge and the generated $B = d\Phi_E/dt$ mass-energy field starts collapsing, as explained in Higgs Mass Electrodynamics, p. 5. The charge disruption duration of the gluon-quark interaction equates to the pion's light speed transition time and distance by $r_{qi} / \sqrt{2}\alpha^2\pi = 1$ fm, where $r_{qi} = hc\pi / 2\sqrt{3}\alpha^4 = 6.353 \times 10^{-17}$ m is the quark's quantum wave field interactive radius, thus providing the interaction energy of Yukawa's pion matter wavelength. Normally this energy is returned at the resonance cycle termination but interaction with an E_o energy electron would provide an entropic degree of freedom into its lower energy atomic domain.

Three energy conditions co-exist in equilibrium in this bond resonance:

1) the pion's $\sqrt{2}\alpha m_{\pi^-} + E_n = 2.224$ MeV momentum energy;
2) the $2E_n + ⅓E_n(m_e + E_n)/m_e = 2.224$ MeV neutron electron resonance energy between two protons; and
3) the $m_D - m_U - ⅓E_n(m_e + E_n)/m_e = 2.224$ MeV quark-gluon interaction energy that transfers the neutron's Down quark excited energy state to the proton as part of the Feynman bond resonance function that transforms the proton and neutron into each other as the orbital electron resonates between them.

Normally the pion only interacts with the $E_n = 0.78$ MeV neutron state electron but an $E_o = 13.6$ eV electron provides a deeper energy hole degree of freedom.

Because the quark triton's orbital $B = d\Phi_E/dt$ Higgs mass-energy generation and the gluon-quark interaction charge disruption, pion energy generation, and Down quark state transfer are synchronous electrodynamic events the $½eh/2\pi$ rotating Bohr magneton can be synchronized with a Larmor type magnetic alignment and rf field to synchronize pion interaction with an E_o electron beam's composite matter wave in a controlled way in order to extract nuclear energy without fragmentation or radiation, a Nuclear Fuel Cell.