Exploration

The Monopolar Quantum Relativistic Electron: An Extension of the Standard Model & Quantum Field Theory (Part 4)

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Abstract

In this paper, a particular attempt for unification shall be indicated in the proposal of a third kind of relativity in a geometric form of quantum relativity, which utilizes the string modular duality of a higher dimensional energy spectrum based on a physics of wormholes directly related to a cosmogony preceding the cosmologies of the thermodynamic universe from inflaton to instanton. In this way, the quantum theory of the microcosm of the outer and inner atom becomes subject to conformal transformations to and from the instanton of a quantum big bang or qbb and therefore enabling a description of the macrocosm of general relativity in terms of the modular T-duality of 11-dimensional supermembrane theory and so incorporating quantum gravity as a geometrical effect of energy transformations at the wormhole scale.

Part 4 of this article series includes: Matter Interacts with Antimatter-based Neutrinos in Majorana-Dirac Electron Capture; CP Violation in the Weak Nuclear Interaction; Matter Interacts with Matter Based Anti-Neutrinos via Superposed VPE-Weakon Action; Matter Interacts with Antimatter-based Neutrinos via Unified Weakon Action; and The Inflaton & the Grand Unification Symmetry in a Transformation of Supermembranes.

Keywords: Monopolar, quantum relativity, Standard Model, extension, quantum field theory.

Matter Interacts with Antimatter-based Neutrinos in Majorana-Dirac Electron Capture

An Electron in the inner atomic nucleus is captured by a proton to create a neutron accompanied by an electron neutrino. This requires a u-quark of the proton to transform into a d-quark of the neutron. As the d-quark is a KIR quark of inner mesonic ring of electro charge [+2/3] coupled to the MIR of electro charge [-1], a W^- weakon must be engaged to couple to a left-handed proton via the Nonparity of the weak nuclear interaction. However in electron capture a left-handed electron neutrino is emitted, requiring the interaction of a W^+ weakon as the kernel gauge for any such right handed antimatter weak decay.

So should the interacting electron initiate electron capture then a W^- becomes the bosonic partner for the interaction; but if it is the interacting proton, then a W^+ should become the weak

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interaction agent to neutralize its positive electric charge with the negative electric charge of the interacting electron.

The interaction of matter and anti-matter in the form of the weak interaction bosons and their associated anti-neutrinos and neutrinos can however be shown to result from a basic kernel-ring interaction of the anti-neutrinos and neutrinos as both Majorana particles and as Dirac particles. Majorana particles are their own anti-particles allowing identification of right-handed antineutrinos as left-handed neutrinos in the base templated or massless self-state.

Dirac particles distinguish right handed anti-neutrinos from left handed neutrinos due their mass and inertia in their native oscillation potential.

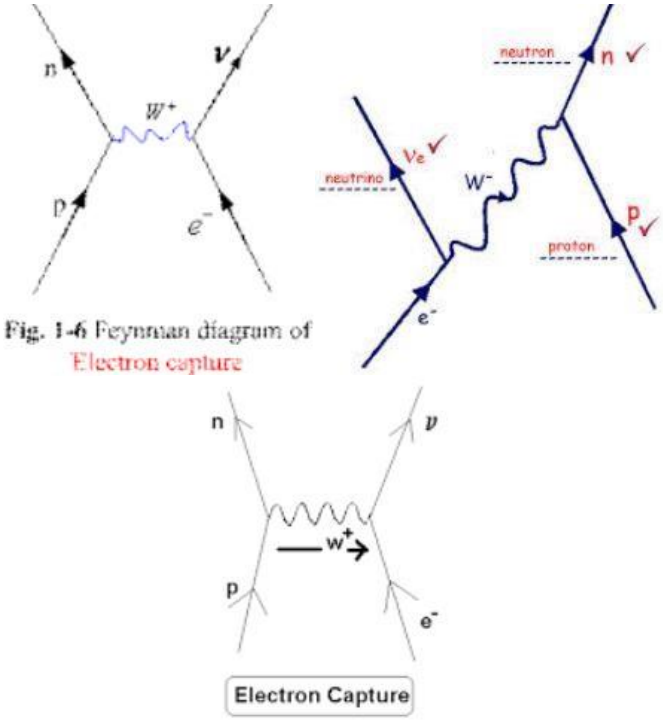


Fig. 1-6 Feynman diagram of Electron capture

For a left-handed proton u[-½]d[+½]u[-½] and a left-handed electron e^-[-½], the W^- consisting of a right-handed electron and a right-handed anti-neutrino initiates the KIR-Oscillation from the Anti-Neutrino-Gluon kernel of the up quark in coupling it to the OR part of the W^-. The colourless Graviphoton or Gγ rendering the 'virtuality' of the W^- as physically real in neutralizing the bosonic weakon spin, which 'flips' the right-handed anti-neutrino into a left-handed neutrino observed.

Proton p^+[-½] + Electron e^-[-½] ⇒ p^+[-½] + OR^-[-½]* + ({Electron e^-[+½] + $Antiv_{electron}$[+½]}$_{W-}$ + Graviphoton[-1])

⇒ d[+½]u[-½]{u[-½] + IR^-[0]}*{KIR-Oscillation $(OR\text{-}IR)^o$[-½]+W^-[+1]+GP[-1]} ⇒ d[+½]u[-½]d[-½] + {$(OR\text{-}IR)^o$[0] + $Antiv_{electron}$[+½]+GP[-1]}

⇒ n^o[-½] + $\nu_{electron}$[-½] with the KIR-Oscillation transferring the interacting left handed electron charge -1 without spin in the OR-IR-K for the IR-K up-down quark transformation {+2/3-1=-

1/3} and neutralizing the weakon associated intrinsic right-handed electron spin as +½-½=0 for the remaining OR-IR transition.
The neutron is cyclically delinearized from spin self-state d[+½]u[-½]d[-½] into the triplet configuration YCM=CMY=MYC as d[-½]u[+½]d[-½].

A Magneto axis symmetric Proton K(KIR)K transforms into Magneto axis symmetric Neutron KIR(K)KIR as one of the proton's end Kernel up-quarks 'captures' the Weakonic VPE scalar OR^- Electron Outer Ring in the Unified Field of Quantum Relativity.
It is in fact a W^-, that interacts, but coupling to the left-handed electron instead of the left-handed proton, the latter requiring some coupling to the W^+ weakon in the quantum field to materialize the electron neutrino from the W^+ template in a direct fashion and not as the Majorana-Dirac 'flip' initiated by the W^- from before.
It is the W^+ intrinsic positron which is 'flipped' to 'free' the materializing neutrino from the W^+ weakon base state.
But as the resultant Outer Ring - Inner Ring remnant $\{(OR\text{-}IR)^+[0]\}$ is positively charged and not charge neutral as was the case for the previous W^- weakon interaction; the W^+ weakon from the proton is suppressed in electron capture in favour of the W^- weakon from the electron.

Proton $p^+[-½]$ + Electron $e^-[-½] \Rightarrow p^+[-½] + IR^-[-½] + (\{\text{Positron } e^+[-½] + \nu_{electron}[-½]\}_{W+} +$ Graviphoton[+1])
$\Rightarrow d[+½]u[-½]\{u[-½] + IR^-[0]\}*\{\text{KIR-Oscillation } (OR\text{-}IR)^o[-½]+e^+[+½]+\nu_{electron}[-½]\} \Rightarrow$
$d[+½]u[-½]d[-½] + \{(OR\text{-}IR)^+[0]\} +\nu_{electron}[-½]$
$\Rightarrow n^o[+½]+\nu_{electron}[-½] + \{(OR\text{-}IR)^+[0]\}$

The W^- then supplies the required KIR for the up-quark to down-quark transmutation with the gauge spin neutralizer of the left handed Graviphoton [-1] flipping the right-handed electron antineutrino constituent of the W^- into its anti-particular form of a left-handed electron neutrino as a Majorana self-state transforming into a Dirac self-state.

Electron capture so displays the Majorana nature of the two base neutrinos of the electron positron and muon-antimuon definition in their massless gauge nature when engaged in the direct interaction or 'tapping' of the UFoQR in the Vortex-Potential-Energy or VPE/ZPE in $R^2G^2B^2[+½]+B^2G^2R^2[-½] = BY^2B[0]=GM^2G[0]=RC^2R[0] = VPE[0]$.
An Anti-Neutrino template $R^2G^2B^2[+½] = W^2[+½] = B^2G^2R^2[-½]$ as Neutrino template in E=hf radiative 'White'-eigen energy and being undifferentiated between the particle and anti-particular energy eigen state under the application of the spin symmetry of the 'flipping' 'white' Graviphoton.
The Dirac nature of the base neutrinos then can be said to apply to all (anti)neutrinos carrying mass in their oscillation potential and properties exhibited in their wave mechanical dynamics manifested in the Anti-Neutrino template $R^2G^2B^2[+½]$ being the anti-state for the Neutrino template $B^2G^2R^2[-½]$ and without or following the Graviphoton 'flip'.

CP Violation in the Weak Nuclear Interaction

The difference between matter and antimatter subsequently derives from the difference between the Outer Ring charge of the W^+ for antimatter and the W^- for matter and so becomes related to the nature of constituent neutrinos and anti-neutrinos in the Kernel-Ring oscillations respectively.
The described gluon-anti-neutrino-electron oscillation from Kernel to mesonic IR to leptonic OR so becomes an inherent supersymmetry between bosonic gluons and fermionic (anti)neutrinos manifesting in the weak interaction and its associated parity violations in Charge-Parity (CP) symmetry.
All quark-antiquark states engaging outer ring oscillations, such as the neutral kaon pairing d.sbar and dbar.s and bottom quark energy states such as b.sbar =(ud)bar.sbar = so will exhibit a difference between matter and antimatter.

For matter IR with antimatter ORbar, for the neutral kaon K^o oscillates from its kernel VPE K.Kbar or u.ubar a matter IR to an antimatter ORbar for the antimatter weakon: K^o = d.sbar = [K+IR].[Kbar+ORbar] = [K.Kbar][0]+[IR*ORbar][0] = [K.Kbar][0]+[IR*{ORbar+$\nu_{electron}$][-1]}w^+ +Gγ[+1]

⇒ {u.ubar+d.dbar or u.dbar+ubar.d} + {strong weak anti-gluon-neutrino kernel-ring interaction suppressing any lepton decay products}[-½-½+1]}

⇒ {π^o+π^o or π^++π^-} ⇒ $K_{short}{}^o$ or

⇒ {ubar.d+e^+[½]+$\nu_{electron}$[-½]} ⇒ π^-[0] + e^+[½]+$\nu_{electron}$[-½] ⇒ $K_{long}{}^o$, if the W^+ manifests from its quantum geometric VPE structure in an ORbar-IR oscillation.

For antimatter IRbar with matter OR, for the neutral kaon K^obar oscillates from its kernel VPE K.Kbar or u.ubar an antimatter IRbar to a matter OR for the matter weakon:

K^o = dbar.s = [Kbar+IRbar].[K+OR] = [K.Kbar][0]+[IRbar*OR][0] = [K.Kbar][0]+[IRbar{OR+anti$\nu_{electron}$][+1]}w^- +Gγ[-1]

⇒ {u.ubar+d.dbar or u.dbar+ubar.d} + {strong weak gluon-anti-neutrino kernel-ring interaction suppressing any lepton decay products}[-½-½+1]}

⇒ {π^o+π^o or π^++π^-} ⇒ $K_{short}{}^o$ or ⇒ {u.dbar+e[-½]+$\nu_{electron}$[+½]} ⇒ $K_{long}{}^o$, if the W^- manifests from its quantum geometric VPE structure in an IRbar-OR oscillation.

But an exchange of the inner and outer rings in their matter and antimatter nature is also possible resulting in the super positioning of the neutral kaon's wavefunctions and leading to CP violation in that mixing between matter and antimatter in characteristics defined in the weakon quantum geometry.
Here, the Graviphoton does not neutralize the interacting weakon spin, but spin induces the interacting mesonic inner ring in the IR-ORbar or IRbar-OR oscillation and delaying the strong weak kernel-ring interactions for the antigluon-neutrino or gluon-anti-neutrino kernel templates respectively.

K^o = d.sbar = [K+IR].[Kbar+ORbar] = [K.Kbar][0]+[IR*ORbar][0] = [K.Kbar][0]+[IR*[0]{ORbar+$\nu_{electron}$][-1]}w^+ +Gγ[+1]

$\Rightarrow$ [u.ubar][0]+{IR*[+1]+ORbar[-1]+$\nu_{electron}$[0]} $\Rightarrow$ [u.ubar][0]+[KIR.KIRbar][0] $\Rightarrow$ {u.ubar+d.dbar} as a two-particle decay in anti-gluon-neutrino strong weak interaction and with the Graviphoton[+1] spin inducing the matter based Inner Ring to neutralize the opposite spin of the interacting W^+[-1] weakon.

K^o = dbar.s = [Kbar+IRbar].[K+OR] = [K.Kbar][0]+[IRbar*OR][0] = [K.Kbar][0]+[IRbar{OR+anti$\nu_{electron}$][+1]}w^- +Gγ[-1]

$\Rightarrow$ [u.ubar][0]+{IRbar*[-1]+OR[-1]+anti$\nu_{electron}$[0]} $\Rightarrow$ [u.ubar][0]+[KIRbar.KIR][0] $\Rightarrow$ {u.ubar+d.dbar} as a two particle decay in gluon-anti-neutrino strong weak interaction and with the Graviphoton[-1] spin inducing the antimatter based Inner Ring to neutralize the opposite spin of the interacting W^-[+1] weakon.

The difference in the antimatter to matter and matter to antimatter kernel-ring oscillation so results in the mixing of the wave functions to exemplify the CP violation in the neutral kaon as decaying in different fashion and decay rates as the K_{short}^o = {d.sbar+dbar.s}/$\sqrt{2}$ and the K_{long}^o = {d.sbar-dbar.s}/$\sqrt{2}$ in decay times differing in a factor of the light-matter interaction probability α in t_{Ks}^o=8.95x10^{-11} s* in a two particle decay {$\pi^o+\pi^o$ or $\pi^+ + \pi^-$ } and 5.18x10^{-8} s* in a three particle decay {$\pi^o+\pi^o+\pi^o$ or $\pi^o+\pi^+ + \pi^-$ or $\pi^+ + e^- + \nu_{electron}$ or $\pi^- + e^+ + \nu$ or similar pion-lepton combinations from the weakon templates} respectively.

This superposition so shows the K_{short}^o to engage the W^- and the K_{long}^o to utilize the W^+ in a distinct quantum geometric difference between the kernel-inner ring - outer ring oscillations between that of interacting matter weakons and that of interacting antimatter weakons.

The discovery by in 1964 of the K_{long}^o also at times manifesting a two-particle decay proved the CP violation at the Brookhaven Alternating Gradient Synchrotron Laboratory by a collaboration led by James Cronin and Val Fitch of Princeton University.
As shown above, this CP violation becomes a consequence of wave-quarkian quantum geometry applied to quantum chromodynamics.

For the neutral B-mesons defined in a diquark structure (U=[uu] for c=U.ubar; b=[ud].ubar; t=[ds].U) detailed further on in this paper, the CP violation at a higher energy level becomes more pronounced and susceptible to the measurement of the manifesting energies.
Because the K_{long}^o decay pattern also allows a two particle decay in the form of the mesonic ring part of the b-quark being spin induced by the Graviphoton, instead of the latter spin neutralizing the weakon spin; an excess of the matter based diquark b=ud.ubar decay patterns relative to the antimatter based anti-diquark bbar=ud.bar.u will be observed in the experimental evidence in the subtraction of the K_{long}^o decay patterns becoming added to the decay patterns of the K_{short}^o.

Typical decay patterns for the B-mesons are:

B^- = b.ubar = [ud.ubar].ubar = [U+IR+Kbar].[Kbar] = [K+K] + [Kbar+Kbar]+{IR*-OR[+½]+antiν[+½]}$_W^-$ +Gγ[-1]
⇒ UUbar+OR[-½]+antiν[+½] ⇒ ucbar[0] + OR[-½] + antiν[+½] ⇒ D^o[0] + (e^-;μ^-)[-½] + antiν[+½]

B^+= bbar.u = [udbar.u].u = [Ubar+IRbar+K].[K] = [Kbar+Kbar] + [K+K] + {IRbar*-ORbar[-½]+ν[-½]}$_W^+$ +Gγ[+1]
⇒ UbarU+KIRbar*-ORbar[+½]+ν[-½] ⇒ ubarc[0] + ORbar[+½] + ν[-½] ⇒ D^o[0]+(e^+;μ^+)[+½] + ν[-½]

B_d^o = b.dbar = [ud.ubar].dbar = [U+IR+Kbar].[KIRbar] = [U+Kbar+KIRbar] + {IR*-OR[+½]+antiν[+½]}$_W^-$ +Gγ[-1]
⇒ Uubar+KIRbar+OR[-½]+antiν[+½] ⇒ c.dbar + OR[-½]+antiν[+½] ⇒ D^+[0] + (e^-;μ^-)[-½]+antiν[+½]

B_d^o = bbar.d = [udbar.u].d = [Ubar+IRbar+K].[KIR] = [Ubar+K+KIR]+{IRbar*-ORbar[-½]+ν[-½]}$_W^+$ +Gγ[-1]
⇒ Ubaru+KIR+OR[-½]+antiν[+½] ⇒ cbar.d + ORbar[+½] + ν[-½] ⇒ D^-[0] + (e^+;μ^+)[+½] + ν[-½]

B_s^o = b.sbar = [ud.ubar].sbar = [U+IR+Kbar].[KORbar] = [U+Kbar+KORbar] + {IR*-OR[+½]+antiν[+½]}$_W^-$ +Gγ[-1]
⇒ Uubar+KORbar+OR[-½]+antiν[+½] ⇒ c.sbar + OR[-½]+antiν[+½] ⇒ D_s^+[0] + (e^-;μ^-)[-½]+antiν[+½]

B_s^o = bbar.s = [udbar.u].s = [Ubar+IRbar+K].[KOR] = [Ubar+K+KOR]+{IRbar*-ORbar[-½]+ν[-½]}$_W^+$ +Gγ[-1]
⇒ Ubaru+KOR+OR[-½]+antiν[+½] ⇒ cbar.s + ORbar[+½] + ν[-½] ⇒ D_s^-[0] + (e^+;μ^+)[+½] + ν[-½]

B_c^+= b.cbar = [ud.ubar].cbar = [U+IR+Kbar].[UbarK] = [UKbar+UbarK] + {IR*-OR[+½]+antiν[+½]}$_W^-$ +Gγ[-1]
⇒ Uubar+Ubaru+OR[-½]+antiν[+½] ⇒ c.cbar + OR[-½]+antiν[+½] ⇒ J/Ψ[0] + (e^-;μ^-)[-½]+antiν[+½]

B_c^- = bbar.c = [udbar.u].c = [Ubar+IRbar+K].[UKbar] = [UbarK+UKbar]+{IRbar*-ORbar[-½]+ν[-½]}$_W^+$ +Gγ[-1]

⇒ Ubaru+Uubar+ORbar[+½]+ν[-½] ⇒ cbar.c + ORbar[+½] + ν[-½] ⇒ J/Ψ[0] + (e^+;μ^+)[+½] + ν[-½]

For antimatter IR and matter OR, a possible decay mode is: B_s^o = bbar.s = [udbar.u].s = [Ubar+IRbar+K].[K+OR]
⇒ [Ubar+IRbar+K].K[0]+({OR+antiv][+1]}w^-+Gγ[-1]) ⇒
[Ubar+IRbar+K].[K[0]+(OR[0]+antiv[0])
⇒ ([Kbar.Kbar]+K+IRbar)(K+OR) ⇒ [Kbar.K] +[KIRbar.KOR] + {strong weak kernel-ring gluon-anti-neutrino interaction suppressing any lepton decay products} ⇒ uubar + dbar.s ⇒ π^o + K^o
⇒ [Kbar.KOR]+[K.KIRbar] + {strong weak kernel-ring gluon-anti-neutrino interaction suppressing any lepton decay products} ⇒ ubar.s + udbar ⇒ K^- + π^+
⇒ ([K.K]+Kbar.Kbar)+IRbar*({OR+antiv][+1]}w^-+Gγ[-1]) ⇒ {Kernel-VPE + Ring-VPE} ⇒ {uubar+ubaru}+{(e^+;μ^+)[+½} + (e^-;μ^-)[-½]}

For matter IR and antimatter OR, a possible decay mode is: B_s^obar = b.sbar = [ud.ubar].sbar = [U+IR+Kbar].[Kbar+ORbar]
⇒ [U+IR+Kbar].Kbar[0]+({ORbar+ν][-1]}w^++Gγ[+1]) ⇒
[U+IR+Kbar].[Kbar[0]+(ORbar[0]+ν[0]) ⇒ ([Kbar.Kbar]+Kbar+IR)(Kbar+ORbar)
⇒ [Kbar.K] +[KIR.KORbar] + {strongweak kernel-ring gluon-neutrino interaction suppressing any lepton decay products} ⇒ uubar + d.sbar ⇒ π^o + K^o
⇒ [K.KORbar]+[Kbar.KIR] + {strongweak kernel-ring gluon-neutrino interaction suppressing any lepton decay products} ⇒ u.sbar + ubar.d ⇒ K^+ + π^-
⇒ ([Kbar.Kbar]+K.K)]+IR*({ORbar+ν][-1]}w^-+Gγ[+1]) ⇒ {Kernel-VPE + Ring-VPE} ⇒ {ubaru+uubar}+{(e^-;μ^-)[-½] + (e^+;μ^+)[+½]}

In both cases the creation of the neutral kaon K^o d.sbar-dbar.s quark content superposition repeats the CP violation in the manner indicated.

Matter Interacts with Matter Based Anti-Neutrinos via Superposed VPE-Weakon Action

Protons transform into neutrons with antimatter positrons and where the interacting anti-neutrino as constituent part of the W^- weakon induces Pair-Production for weakon's electron in tapping the VPE to manifest a like spinning positron to neutralize the boson spin of the Graviphoton. The spin of the Graviphoton so cancels the spin of the Pair-Production VPE as well as the spin of the weakon boson in a superposition of the VPE and the weak interaction.

A up quark of the proton then changes into a down quark for the produced neutron in a double transition from the Outer Ring of the weakon's electron transiting to the Inner Ring and the original anti-neutrino transits from the Inner Ring onto the Gluon-Neutrino kernel K as the decay products of a free neutron. The right-handed spin quantum of the anti-neutrino cancels the left-handed quantum spin of the weakon's electron base which was flipped by the Graviphoton for the MIR oscillation between the up quark and the down quark transformation.
{Mass produced photons (by acceleration of inertia coupled electro charges), have no magneto charge and so form their own anti-particles; whilst gauge or 'virtual' photons carry cyclic and anticyclic colour charges as consequence of the matter-antimatter asymmetry}.

Proton $p^{+}[-½] + Antiν_{electron}[+½] \Rightarrow p^{+}[-½] + \{Antiν_{electron}[+½] + (Electron\ e^{-}[+½]\}_{W^{-}} + Positron\ e^{+}[+½]_{VPE}{}^{o}{}_{[+1]} + Graviphoton[-1]$
$\Rightarrow p^{+}[-½] + \{Electron\ e^{-}[-½] + Antiν_{electron}[+½]\} + Positron\ e^{+}[+½] \Rightarrow \{p^{+}[-½]+IR^{-}[0]+K^{o}[-½+½]\} + e^{+}[+½] \Rightarrow n^{o}[-½] + e^{+}[+½]$

Matter Interacts with Antimatter-based Neutrinos via Unified Weakon Action {OR+Antiν=W⁻;ν+Anti-OR⁺=W⁺}

Neutrons transform into protons with muons, the latter decaying into electrons and anti-neutrinos and neutrinos, so reducing the elementary matter-neutrino interaction to basic neutron beta minus-decay with the leptonic coupling between the 'resonance electron' as a basic muon coupled to its neutrino. A neutron's down quark transforming into a up quark in disassociating the mesonic Inner Ring part of the down quark from its up-quark kernel part to become the leptonic Outer Ring part of the manifesting muon. The interacting muon neutrino couples with the antineutrino of the weakon template as its own anti particle transferring its mass to the muon and changing its self-state from mass defined Diracness to massless Majorananess in the process.

$Neutron\ n^{o}[-½] + ν_{muon}[-½] \Rightarrow n^{o}[-½] + ν_{muon}[-½] + (\{Antiν_{muon}[+½] + (Muon\ μ^{-}[+½]\}_{W^{-}} + GP[-1])$
$\Rightarrow d[-½]u[+½]d[-½] + *\{KIROR\text{-}Oscillation\ (OR\text{-}IR\text{-}K)[+½] + Antiν_{muon}[+½]+ν_{muon}[-½] + GP[1]\}$
$\Rightarrow d[-½]u[+½]u[-½] + IR^{-}[0] + \{OR^{-}[+½]+GP[-1]\} + \{R^{2}G^{2}B^{2}[-½]+B^{2}G^{2}R^{2}[+½]\} \Rightarrow p^{+}[-½] + μ[-½] + VPE[0]$
$\Rightarrow p^{+}[-½] + μ^{-}[-½] + VPE[0] \Rightarrow p^{+}[-½] + *\{KIROR\text{-}Oscillation\ (OR\text{-}IR\text{-}K)[-½]\}(\{e^{-}[+½] + Antiν_{electron}[+½]\}_{W^{-}} + GP[-1])$
$\Rightarrow p^{+}[-½] + ν_{muon}[-½] + e^{-}[-½] + Antiν_{electron}[+½]$

In the muon beta decay, the KIROR oscillation transfers the spin of the interacting muon as the spin of its self-state neutrino and enabling the constituents of the matter weakon W^{-} to manifest with the right-handed electron part flipping to manifest the left-handed electron of the beta decay.

$mv_{Higgs}=m_e\lambda_w.r_E/(2\pi r_M R_e)\{1/r_G-1/r_F\} \sim 9.3x10^{-38}$ kg or 0.052 eV for a scalar blueprint $Antiv_{Higgs} = R^4G^4B^4[0]$ with anti-state $\nu_{Higgs} = B^4G^4R^4[0]$ and coupling as the Tauon (Anti) Neutrino as $Antiv_{tauon} = R^2G^2B^2[+½] + R^4G^4B^4[0] = R^6G^6B^6[+½] = Antiv_{electron} + Antiv_{Higgs}$ and $\nu_{tauon} = B^2G^2R^2[-½] + B^4G^4R^4[0] = B^6G^6R^6[-½] = \nu_{electron} + \nu_{Higgs}$

For a differential equation for Potential Energy: $\nabla^2\emptyset - \{\mu r\}^2 = 0$

$\nabla^2\emptyset - \{r/R_e\}^2 = 0 = (1/r).\partial^2/\partial r^2\{r\emptyset\} - \{r/R_e\}^2.\emptyset\ \partial^2/\partial r^2\{r\emptyset\} = \{r/R_e\}^2.(r\emptyset)$ for a solution
$r\emptyset = constant.exp[-r/R_e]$ for the Yukawa Potential with $\mu = 1/R_e = 4\pi\varepsilon_o m_e c^2/e^2 = 4\pi m_e/\mu_o e^2$

$\emptyset = constant.(1/r).exp[-r/R_e] \Rightarrow m_e c^2 = (\mu_o e^2 c^2/4\pi R).exp[-R/R_e]$ for $R/R_e = exp[-R/R_e]$

$f(R/R_e) = R/R_e - exp[-R/R_e] = f(x) = x - exp[-x] = 0$ with derivative $f'(R/R_e) = f'(x) = 1 + exp(-x)$ and $x_{k+1} = x_k - f(x)/f'(x)$ for a Newton-Raphson solution
x_o =½ for x_1 = ½ - (-0.10653066)/(1.6065307) = 0.56631100; x_2 = 0.56631100 - (-0.00130508243)/(1.56761552) = 0.56714353;
x_3 = 0.56714353 - (0.00000037547)/(1.56714316) = 0.56714330... for R = 0.5671433 R_e

For the potential energy of the electron with effective mass $m_e = \mu_o e^2/4\pi R$, the Yukawa potential for the nucleus reduces the classical electron radius to 0.5671433 R_e, which approximates the radius of the proton as ½R_e but diverges from the proton's charge radius by the factor X approximately.

We have shown that the sought-after reduction of the classical radius of the electron occurs in the interval from A=½ to A=1 and where the Yukawa potential results in ½XR_e or= $0.85838x10^{-15}$ m* for the charge radius of the proton at A=1 as precisely half of the reduced monopolar quantum relativistic electron radius at $1.716761063x10^{-15}$ m*. The Yukawa potential applied to the classical electromagnetic electron in electro stasis so approximates the monopolar quantum relativistic electron in 0.5671433/0.618034 or 91.77%.

This function is called the *Yukawa potential*. For an attractive force, *K* is a negative number whose magnitude must be adjusted to fit the experimentally observed strength of the forces. The Yukawa potential of the nuclear forces dies off more rapidly than 1/r by the exponential factor. The potential—and therefore the force—falls to zero much more rapidly than 1/r for distances beyond 1/μ, as shown in Fig. 28–6. The "range" of nuclear forces is much less than the "range" of electrostatic forces. It is found experimentally that the nuclear forces do not extend beyond about 10^{-13} cm, so $\mu \approx 10^{15}$ m^{-1}. *See Feynman Lecture*.

$$\phi = K\frac{e^{-\mu r}}{r}. \tag{28.18}$$

This function is called the *Yukawa potential*. For an attractive force, K is a negative number whose magnitude must be adjusted to fit the experimentally observed strength of the forces.

The Yukawa potential of the nuclear forces dies off more rapidly than $1/r$ by the exponential factor. The potential—and therefore the force—falls to zero much more rapidly than $1/r$ for distances beyond $1/\mu$, as shown in Fig. 28–6. The "range" of nuclear forces is much less than the "range" of electrostatic forces. It is found experimentally that the nuclear forces do not extend beyond about 10^{-13} cm, so $\mu \approx 10^{15}\ \mathrm{m}^{-1}$.

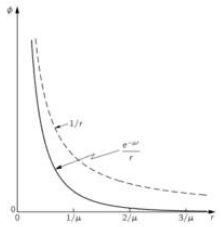


Fig. 28–6. The Yukawa potential $e^{-\mu r}/r$, compared with the Coulomb potential $1/r$.

Finally, let's look at the free-wave solution of Eq. (28.17). If we substitute

$$\phi = \phi_0 e^{i(\omega t - kz)}$$

into Eq. (28.17), we get that

$$\frac{\omega^2}{c^2} - k^2 - \mu^2 = 0.$$

Relating frequency to energy and wave number to momentum, as we did at the end of Chapter 34 of Vol. I, we get that

$$\frac{E^2}{c^2} - p^2 = \mu^2\hbar^2,$$

which says that the Yukawa "photon" has a mass equal to $\mu\hbar/c$. If we use for μ the estimate $10^{15}\ \mathrm{m}^{-1}$, which gives the observed range of the nuclear forces, the mass comes out to 3×10^{-25} g, or 170 MeV, which is roughly the observed mass of the π-meson. So, by an analogy with electrodynamics, we would say that the π-meson is the "photon" of the nuclear force field. But now we have pushed the ideas of electrodynamics into regions where they may not really be valid—we have gone beyond electrodynamics to the problem of the nuclear forces.

8–6.The Yukawa potential e−μr/r, compared with the Coulomb potential 1/r.

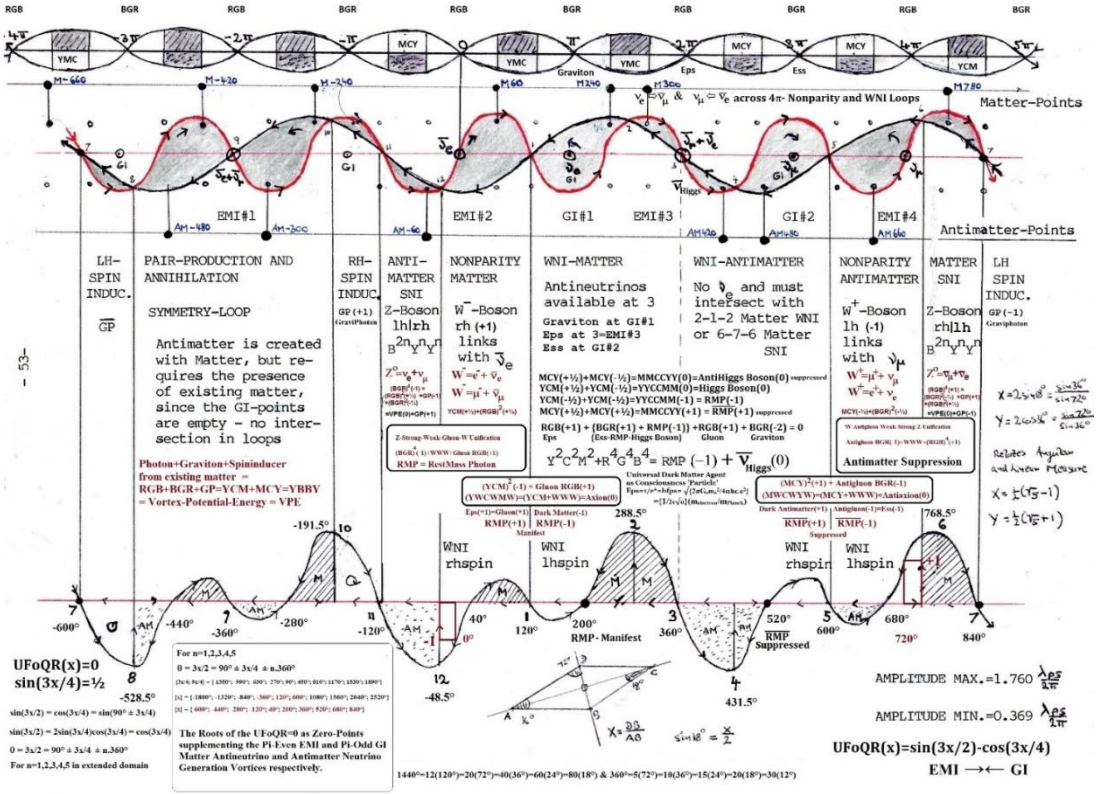
The Unified Gauge Parameter Field of Quantum Relativity

Primary-Secondary-Tertiary Colour Triplets of the Chromaticity Unities in the UFoQR 1-2-3-4-5-6-7-8-9-10-11-12-13
Anticolours for 8 Gluon Permutations in Energy gravitational $E=mc^2$ for B(lack) and Energy radiative E=hf for W(hite)
R+C and O+A and Y+B and L+I and G+M and T+P and C+R and A+O and B+Y and I+L and M+G and P+T and R+C

Gluon RGB=(RG)B=YB=CR=MG=YB=CR=MG=RGB
for: {BBB;BBW;BWB;BWW;WBB;WBW;WWB;WWW} hyperonic triplets and {BB;BW;WB;WW} mesonic doublets

R(ed)-O(range)-Y(ellow)-L(ime)-G(reen)-T(urquoise)-C(yan)-A(quamarine)-B(lue)-I(ndigo)-M(agenta)-P(urple)-R(ed)

The 12 Junction-Loops of the Unified Field Natural Current Field in Quantum Relativity Extent: $4\lambda_{ps}$ & Amplitude=$\lambda_{ps}/2\pi$



EM(M)I=ElectroMagnetic (Monopolic) Radiation Interaction = Unified Field of QR before spacetime creation
{Inflation to Quantum Big Bang} without Gravitational Interaction GI
Metaphysical Abstraction of Mathimatia Supersymmetry by Logos Definition in Radiation-Antiradiation Symmetry

Möbian-Klein Twosided 11D-Mirror SelfIntersection : **RGB(+1)+RGB(-1) ⇒ RRGGBB(0) ⇒ YCM(0)+YCM(0) ⇒ BBGGRR(0)⇒ MCY(0)+MCY(0) ⇒ BGR(-1)+BGR(+1)**

Eps=RGB(+1) at 0°----------Ess=RGB(-1) at 360°.....Eps=BGR(-1) at 180° Inflexion Ess=BGR(+1)
Ess=RGB(+1) at 0°----------Eps=RGB(+1) at 360°.....Breaking of the metaphysical supersymmetry in quantum spin to allow the birth of the Graviton and matter-antimatter symmetry, suppressing however the matter-antimatter symmetry in the reformulation of antiradiation
[Encoded as the retracing of the 'steps of the creator' --Ezekiel.28.13-19; Isaiah.14.12-14]

Unified Field of QR in the 11D-Membrane Inflation, followed by a Quantum Big Bang of Relativistic Thermodynamic Cosmology
Physicalisation of the Metaphysical Precursor in an inherent Matter-Antimatter Asymmetry

Möbian-Klein Onesided 10D/12D-Mirror SelfIntersection as the Goldstone Boson Unification of all Interactions in the UFOQR:
RGB(+1)+BGR(+1)+RGB(+1)+BGR(-2)+YYCCMM(-1) = EMI Eps-Photon + WNI Ess-Antiphoton + SNI Gluon + Graviton + EMMR-RMP
⇒ MGGM(+2)+MGGM(-1)+YYCCMM(-1) = VPE(+2)+VPE(-1)+YYCCMM(-1) = VPE(+1)+YYCCMM(-1) = EMMR UFOQR Unification

The Ess-Anti-Photon(+1) is suppressed as Goldstone ambassador gauge in spin +1 by The SNI ambassador Gluon and is suppressed in colour charge BGR by the GI gauge ambassador Graviton. The birth of the Graviton demands a net spin of +1 of the Vortex-Potential Energy or VPE/ZPE to become neutralized by the fifth gauge ambassador of the RMP with spin -1 as the gauge ambassador and Goldstone Boson as the primal gauge ambassador for the consciousness energy interaction encompassing all particular constituents in the Unified Field of Quantum Relativity.

Council of Thuban, Saturday, August 15th, 2015

Besides conventional string class considerations, the graviton must have spin 2 as a consequence of quantum angular momentum conservation.

Before spacetime creation in the instanton of the quantum Big Bang, the transformation of the five string classes manifested in the inflaton using a prior supersymmetry between matter- and antimatter templates., represented in say sinx+sin(-x)=0 and where the positive region becomes a quantum geometric matter conformal mapping and the negative region becomes its conjugative for antimatter. As the linearization of the circle inflects at 180 degrees, matter and antimatter become defined in adjacent clockwise and anticlockwise semi cyclicities.

If now the arbitrary boundaries are defined in some unitary interval between 0 and 360 degrees or [-∞,0,+∞] or [-1,0,+1] or [0,½,1] or [-(X+1),-½,X]; then the left boundary dynamics of say righthandedness cancels the right boundary dynamic of left-handedness throughout the 2 semi cycles, say described in a Moebian connectivity and topology of surface non-orientability in a conformal mapping of a 2D surface onto a 11D supermembrane in a membrane-mirror space.

After the completion of a full cycle, the matter- and antimatter templates exist in the membrane space of the inflaton, say as a supersymmetry between the righthanded electromagnetic monopolar radiation (emmr) and its antistate in a lefthanded electromagnetic monopolar antiradiation. This supersymmetry between radiative self-states precedes any possible supersymmetry between the matter and antimatter blueprints, as the dynamic of the emmr eigenstate defines the former as a secondary manifestation of potential manifestation, once the instanton of spacetime creation supersedes that of the prior string-brane epoch.

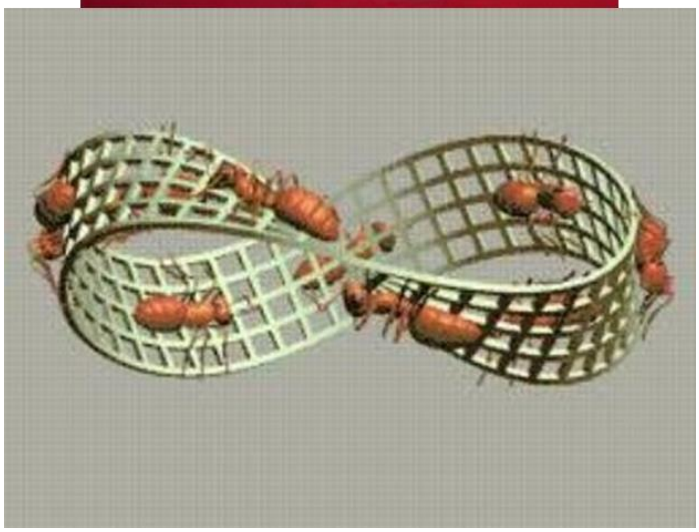
To realize the matter-antimatter potential, the completion of the full emmr cycle breaks its own supersymmetry in the exchange of the right- and left boundary and initial conditions. The original righthanded (Weyl-gauge photon say of the left mirror) now situated at the right mirror extends the unitary interval towards the positive abscissa (aleph null enumerability) and inflects its anticlockwise parity into its original clockwise parity or chirality.
The original Weyl-antiphoton from the right mirror, now situated at the left mirror retraces the path of the Weyl-gauge photon however and so does not inflect and so creates the necessity to negate two clockwise quantum spins by a doubled anticlockwise spin angular momentum.

This demands the birth of quantum gravity and of its gauge agent of the graviton in the formation of a new universal wavefunction traversing in the opposite direction of the now twinned electromagnetic monopolar propagation of the original emmr supersymmetry.
A consequence of this 'changing of the fundamental supersymmetry' becomes the restriction of any matter-antimatter symmetry to become confined to the concept of pair production in the presence of existing matter or antimatter in Nonparity.

Defining matter to couple in a Goldstone gauge boson form to the original Weyl-photon (RGB) then forces the Weyl-antiphoton (anticyclic BGR) to suppress the antimatter (MCY anticyclic to matter YCM) template in lieu of a 'twinned' emergent blueprint known as the scalar 0-spin Higgs Boson ($Y^2C^2M^2$).

Imagine a Moebian strip without thickness und so restricted to be two dimensional. The perimeter of the quasi-inner ring so defines a self-intersection with its quasi-outer ring and depicts half of the total 2D-space of the Möbius strip for the inflection at 180 degrees. Then the Möbian strip breaks its own non-orientable nature and symmetry to create the 3rd dimension.

The second parameter space can now become orientable (without the Möbian twist of 180 degrees) and the self-relativity of the first part becomes now 3-dimensional relative and allows a new mixing of the tripartite sectors of the quantum chromodynamics of the constituent Goldstone bosons. From this point in the cosmogony onwards an older non-manifested matter antimatter supersymmetry can eventuate in the observed pair-production, being otherwise suppressed by the earlier radiation-antiradiation supersymmetry described.



The Inflaton & the Grand Unification Symmetry in a Transformation of Supermembranes

SEWG----------SEWg--------SEW.G--------SeW.G-------S.EW.G----------S.E.W.G

Planck Unification I----------IIB----------HO32----------IIA----------HE64---------Bosonic Unification

Quantum Gravitation Unification in a Coupling of the Supermembranes in Self dual Monopole Class IIB

SEWG ---- SEWg as string transformation from Planck brane to (Grand Unification/GUT) monopole brane.
{Capitalization of letters infers emphasis and decapitalization of letters implies suppression of respective fundamental interactions}.

String Boson	**Decoupling Time s***	**Wavelength ($\lambda=2\pi l$) m***	**Energy (hc/λ) J* & eV***	**Modular Wavelength m***	**Temp K***	**Significance**
0. Genesis-Boson Algorithmic	TIME=1/FREQUENCY $= \lambda_{ps}/R_H = \lambda_{ps}H_o/c = n_{ps} = H_o t_{ps}$ $6.2591x10^{-49}$	LIGHTPATH c.TIME $1.8777x10^{-40}$	ENERGY= hR_{max}/λ_{ps} =k.TEMPERATURE =h.FREQUENCY =h/TIME=MASS.c2 1.065 PJ* or $6.629x10^{33}$ eV*	$5.326x10^{39}$	TEMPERATURE $= hR_{max}/k\lambda_{ps}$ $7.54481x10^{37}$	Algorithmic Definiton
1. Planck-Boson I/SEWG⇒sEwG	$t_P=2\pi r_P/c$ $4.377x10^{-43}$	$L_P=2\pi r_P$ $1.313x10^{-34}$	1.523 GJ* or $9.482x10^{27}$ eV*	$7.617x10^{33}$	$1.079x10^{32}$	Outside Hubble Horizon Limit in Protoverse

2. Monopole-Boson IIB/sEwG⇒ SEWg GI-GUT decoupling	$t_M=2\pi r_M/c$ $1.537x10^{-40}$	$4.6110x10^{-32}$	4.337 MJ* or $2.700x10^{25}$ eV*	$2.169x10^{31}$	$3.072x10^{29}$	Outside Hubble Horizon Limit in Protoverse
3. XLBoson HO32/SEW.G	$t_{XL}=2\pi r_{XL}/c$ $2.202x10^{-39}$	$6.605x10^{-31}$	302.817 kJ* or $1.885x10^{24}$ eV*	$1.514x10^{30}$	$2.145x10^{28}$	Outside Hubble Horizon Limit in Protoverse
4. Ecosmic-Boson IIA/SeW.G SNI decoupling	$t_{EC}=2\pi r_{EC}/c$ $6.618x10^{-34}$	$1.986x10^{-25}$	1.0073 J* or $6.270x10^{18}$ eV*	$5.035x10^{24}$	$7.135x10^{22}$	Galactic Supercluster Sarkar Scale $M_o=R_{Sarkar}c^2/2G_o$
5. False Higgs Vacuum (min to max)	$t_{dBmin}=G_oM_o/c^3n_{ps}$ $4.672x10^{-33}$ [min] to [max] $t_{dBmax}=\sqrt{\alpha}t_{ps}$ $2.847x10^{-32}$	$1.402x10^{-24}$ [min] to [max] $8.541x10^{-24}$	0.143 J* or $8.883x10^{17}$ eV* [min] to [max] 0.023 J* or $1.458x10^{17}$ eV*	$1.171x10^{23}$ [min] to [max] $7.133x10^{23}$	{$7.206x10^{37}$ [min] to [max] $1.857x10^{37}$ Algorithmic from Genesis Boson}	Galactic Supercluster Scale

6. Weyl-Boson HE64/S.EW.G Big Bang Instanton EMI decoupling	$t_{ps}=2\pi r_{ps}/c$ $3.333x10^{-31}$	$1.000x10^{-22}$	0.002 J* or $1.245x10^{16}$ eV*	$1.000x10^{22}$	{Temperature Gradient $T_{ps}/T(n_{ps})$ Genesis Boson $T(n_{ps}) = 2.935x10^{36}$}	Galactic Halo (Group) Scale
7. $T(n)=T_{ps}$ Bosonic Condensate Unification	$t_{BU}=n_{BU}/H_o$ $1.897x10^{-9}$	$ct_{BU}/(1+H_o t_{BU})$ 0.5691 Protoverse Inflaton min to Instanton to Inflaton max	Bosonic Plasma h/t_{BU} $= \sum hf_{ps}$ $= \sum \boldsymbol{\lambda_{ps}}$	1.757 Protoverse	$T_{BU} = T_{ps}$ $= 1.417x10^{20}$ $18.2[n+1]^2/n^3$ $n=H_o t_{BU}$	Unitary Modular Geometric Mean Scale
8. Higgs Chi-Boson/ Super Diquark Sbar=ss Vacuum Expectation Electroweak WNI decoupling	$t_{EW}=n_{EW}/H_o$ 0.00274~1/365	$4.167x10^{-18}$ Quantum Scale	$4.799x10^{-8}$ J* or 298.785 GeV*	$2.400x10^{17}$	$3.400x10^{15}$	Inner Mesonic Ring Quantum Scale

The X-Boson is modular dual to the L-Boson in the string class transformation from the Planck brane to the monopole brane to the X/L-brane to the Cosmic String brane to the Weyl brane.
For the X-Boson, the coupling can be written as: : $\#.(m_{ps}/m_{Planck})f(G)$ and for the L-Boson it is written as: $\#^{54}.(m_{Planck}/m_{ps})f(S)$ to indicate the inherent modular duality.
As alpha=$\#^3$ specifies the emmr-matter-emr interaction probability; EMI/SNI=$\#^3/\#=\#^2$ breaks the unified symmetry via the WNI and defines #f(G) as a unitary mass.

A 'mixing angle' θ_{ps} is defined via constant $X \Rightarrow \{\aleph\}^3 \Rightarrow$ alpha α as $X = \varpi(n).\sin\theta_{ps}$ for a unitary force action $\varpi(n)$ acting on the inflaton acceleration cf_{ps} modulated from the inflaton source

hyper-acceleration of the de Broglie matter wave for phase speed R_Hf_{ps} in $R_Hf_{ps}^2=1.43790791x10^{87}$ (m/s^2)* in the displacement light path for the nodal Hubble constant H_o = dn/dt = c/R_H defining the frequency ratio $n_{ps} = \lambda_{ps}/R_H = 2\pi r_{ps}/R_H = f_{ps}/H_o$ as the linearization of the wormhole from its closed Planck brane form as string class I into its transformation as open string class HE(8x8) then manifesting as the Compton-de Broglie wavelengths in the emr-matter-emmr interactions.

The Hubble law so modulates the inflaton as the instanton in a dimensionless cycle time parameter n in a time rate change constant as the nodal Hubble constant $H(n)|_{min} = H_o = 58.04$ km/Mpc.s (extrapolated to 66.9 km/Mpc.s for a present $n_{present}$ =1.13271... cycle time coordinate) and in inverse proportion to its maximum as the wormhole frequency f_{ps}, becoming the maximum node for H(n) in the associated multiverse cosmology, which defines this multiverse as parallel in time space, but as holofractally nested in spacetime. It is then a quantum tunneling of the entire universe upon the completion of interwoven cycles defining the nodal oscillations in particular nodal 'walls of time' defined in the light path, which become the medium for this quantum tunneling of lower dimensional spacetime itself.

The inflaton angle θ_{ps} so is maximized at 90° at $X = \varpi(n).\ \sin\theta_{ps}$ for θ_{ps} = 38.17270761° for a unitary force $\varpi(n)=1$ and for the X/L bosonic coupling for a GUT scale characterizing SEW.G for the decoupling of the gravitational interaction from the unified energy field described by the Standard Model.
Now the Planck string for a Planck time of $t_P=2\pi r_P/c = 4.377x10^{-43}$ is connected to the X/L string via the monopole string at the unified SEWG level in the self-duality of the GUT-monopole at $[ec.c^2]_{uimd} = 2.7x10^{16}$ GeV* and at a brane inflaton time of $t_M=2\pi r_M/c=1.537x10^{-40}$ s* and for which SEWG transformed into sEwG to indicate the unified nature between the long-range EMI and GI in a coupling of the electromagnetic and gravitational fine structures here termed alpha and g-alpha respectively.

The X/L boson time is $t_{XL}=2\pi r_{XL}/c=2.202x10^{-39}$ s* and string class HO(32) decouples gravity in replacing $f(G)/m_{Planck}$ by the monopole mass $\#^2/[ec]_{uimd}$ modular dual to $f(S)m_{Planck}$ to account for the SNI/EMI breaking of the native supersymmetry SEWG and to transform the Planck brane energy scale into the X/L brane energy scale.

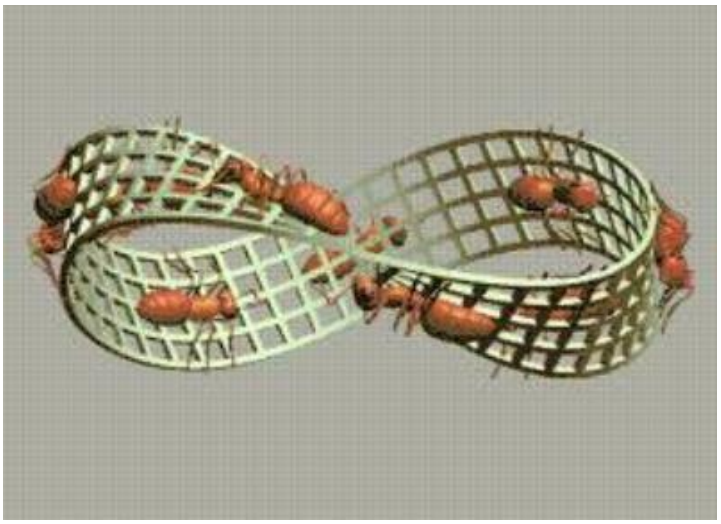
m_{XB} = alpha.$m_{ps}/[ec]_{uimd}$ = $\#^3.m_{ps}/[ec]_{uimd}$ = $3.364554269x10^{-12}$ kg* = $1.884955575x10^{15}$ GeV* unifying SEW in the monopolar electron boson energy $m_{ec}|_{max} = \alpha m_{ps}$ m_{LB} = alpha^{18}.$[ec]u_{imd}/\#^2.m_{ps}$ = $\#^{52}.[ec]u_{imd}/\#^2.m_{ps}$ = $1.982105788x10^{-28}$ kg* = 111.0453587 MeV* unifying EWG at the bosonic muon energy

The X-Boson mass and the L-Boson mass then transform into the string class IIA, as the coupling from the self-dual monopole class, here termed the ECosmic Boson to indicate its native characterization as primordial cosmic string ancestor for a spectrum of cosmic rays, tabulated following this discussion.

The ECosmic Boson manifests at an inflaton time of $t_{EC}=2\pi r_{EC}/c = 6.717x10^{-34}$ s* at an energy of 0.9927 J* or $6.180x10^{9}$ eV* and as a consequence of the universal wavefunction B(n) = {2e/hA}.exp{-Alpha.T(n)} and where T(n)=n(n+1) defines X and Y in the Euler identity for T(n)=1.
The electromagnetic interaction, which was emphasized in the decoupling of the gravitational interaction in the sEwG to form the X/L-Boson in SEW.G now becomes suppressed in SeW.G in the B(n) for $n=n_{ps}=6.259093473x10^{-49} \Rightarrow 0$ and T(0)=0 for $B(n_{ps})=2e/hA= 0.992729794$..in units of inverse energy that is as units of the magneto charge under modular string duality.
The constant $A=4.854663436x10^{14}$ Ampere* can be defined as a cosmic string magneto current and derives from particular algorithmic encodings underpinning the numerical values for the fundamental constants of nature.

The ECosmic boson then triggers a 'false vacuum' in a brane time interval from $t_{dBmin}=G_oM_o/c^3n_{ps} = 4.672x10^{-33}$ [min] to [max] $t_{dBmax}=\sqrt{\alpha}t_{ps} = 2.847...\ x10^{-32}$ defined in a non-kinematic temperature gradient of the cosmogenesis and related to the hyper acceleration gradient between the de Broglie inflaton wave phase speed $a_{dB} = R_Hf_{ps}^2$ and the boundary cosmological (dark energy) constant $\Lambda_{Einstein}(n_{ps}) = G_oM_o/\lambda_{ps}^2$ =with $2.\Lambda_{Einstein}(n_{ps})/a_{dB} = M_o/M_H=0.02803$.. descriptive for the baryonic matter content at the instanton as a proportional coupling between the 'mother black hole' defined in the Schwarzschild metric with an event horizon the size of the Hubble radius $R_H = 2G_oM_H/c^2$.

It can be said, that the universal wave function B(n) remains 'frozen' within this encompassing inflaton event horizon about the FRB (Functional Riemann Bound) at the x=-½ coordinate and between a cosmic uncertainty interval {X: -1,0} defining the Witten-M-space in this presentation; until it is observed and/or defined in accordance with the premises of quantum mechanics applied to the universe in total. In particular the 'unfreezing' of B(n) requires the linearization of the quantum geometric circularity of the Compton wavelength into its particularized quantum radius.



(*Continued on Part 5*)

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