Theory of Natural Ontology: 2. Horizon Generators and Superphase Evolutions

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INTRODUCTION

In our universe, the laws of *Universal Topology* $W = P \pm iV$ [1] presents a conjugate duality of the potential entanglements that lies at the heart of all event operations as the natural foundation that the superphase modulation, defined as a part of *Ontology*, conducts laws of formational evolutions, generates horizon of communication infrastructure, and maintains conservations of field entanglements, giving rise to photons and gravitons, orchestrating relativistic transformations and spiral transportations, and coupling electroweak weak and strong nuclear forces compliant to physical horizons. As a result, the hierarchy topology inaugurates mass acquisition for the classical or contemporary physics, unifying the mathematical models of quantum electrodynamics, spontaneous field breaking, chromodynamics, gauge theory, perturbation theory, standard model, etc.

The scope of this manuscript is at where a set of mathematical formulae is constituted of, given rise to and conserved for the field formations and evolutions at ontological horizons. Through the events of the Yin (Y^-) and Yang (Y^+) actions, laws of creation, reproduction, conservation and continuity determine the physical properties or particle fields of interruptive transformations, dynamic transportations, entangle commutations and fundamental forces.

I. EVOLUTIONARY POTENTIALS

On a two-dimensional *World Plane*, the physical $\mathbf{r}$ and virtual $\pm i\mathbf{k}$ positions naturally form a duality of the conjugate manifolds: $Y^-\{\mathbf{r}+i\mathbf{k}\}$ and $Y^+\{\mathbf{r}-i\mathbf{k}\}$. Each of the system constitutes its world plane $W^\mp = P \pm iV$ distinctively, forms a duality of the universal topology cohesively, and maintains its own sub-coordinate system $\{\mathbf{r}\}$ or $\{\mathbf{k}\}$ respectively. Because of the two dimensions of the world planes $\{\mathbf{r} \pm i\mathbf{k}\}$, each transcends its event operations further down to its sub-coordinate system with extra degrees of freedoms for either physical dimensions $\mathbf{r}(\lambda)$ or virtual dimensions $\mathbf{k}(\lambda)$. For example, in the scope of space and time duality at event $\lambda = t$, the compound dimensions become the tetrad-coordinates, known as the following spacetime manifolds:

$$x_m \in \check{x}\{x_0, x_1, x_2, x_3\} \subset Y^-\{\mathbf{r}+i\mathbf{k}\} \qquad : x_0 = ict,\ \check{x} \in Y^- \tag{1.1}$$

$$x^\mu \in \hat{x}\{x^0, x^1, x^2, x^3\} \subset Y^+\{\mathbf{r}-i\mathbf{k}\} \qquad : x^0 = -x_0,\ \hat{x} \in Y^+ \tag{1.2}$$

As a consequence, a manifold appears as or is combined into the higher dimensional coordinates, which results in the spacetime manifolds in the four-dimensional spaces.

State Potentials

A potential interweavement is a fundamental principle of the real-life streaming states such that one constituent cannot be fully described without considering the other. As a consequence, the state of a composite system is always expressible as a sum of products of states of each constituents, superposing the potentials of a system virtually and the degrees of freedom physically. Uniquely on both of the two-dimensional world planes, a field functions as a type of virtual generators, potential modulators, or dark energies that lies at the heart of all events, instances, or objects. A state field can be classified as a scalar field, a vector field, or a tensor field according to whether the represented horizon is at a scope of dark scalar, flexion vector, or force tensor potentials, respectively.

Governed by a global event λ under the universal topology, an operational environment is initiated by the virtual yang Y^+ scalar fields $\phi^+(\lambda)$ of a state tensor, a differentiable function of a complex variable in its *superphase* nature, where the scalar function is also accompanied with, conjugated to and characterized by a single yin Y^- magnitude $\varphi^-(x)$ in *superposition* nature with variable components of the respective coordinate sets $\hat{x}$ or $\check{x}$ of their own Y^+ or Y^- manifold, reciprocally. Vise verse. As a result of the universal topology, a field $\psi(x,\lambda)$ is incepted or operated under either virtual $\phi^+(\lambda)$ or physical $\phi^-(x)$ primacy of an Y^+ or Y^- manifold respectively or simultaneously,

$$\psi^\pm(x,\lambda) = \varphi^\mp(x)\phi^\pm(\lambda) \qquad : x_\nu = x_\nu(\lambda),\ \lambda = \lambda(x^\mu), \tag{1.3}$$

$$\psi^+(x,\lambda) = \psi^+(x)\ exp\big[-i\hat{\vartheta}(\lambda)\big], \qquad \psi^-(x,\lambda) = \psi^-(x)\ exp\big[i\check{\vartheta}(\lambda)\big] \tag{1.4}$$

where the $\hat{\vartheta}$ or $\check{\vartheta}$ is the Y^+ or Y^- superphase, respectively. The $x = x(\lambda)$ represents the spatial supremacy with the implicit event λ as an indirect dependence; and likewise, $\lambda = \lambda(x)$ represents the virtual supremacy with the redundant degrees of freedom in the implicit coordinates x as an indirect dependence. For a given system, the set of all possible normalizable state functions forms an abstract mathematical scalar or vector space such that it is possible to add together different state potentials, multiply the state functions, and extend further into the complex actions under a duality of entanglements. With normalizable conditions, the potentials form a projective magnitudes of space and phase states when a location cannot be determined from the state function, but is described by a probability distribution. These two formulae of the fields and densities represent the principle *of Superposing Interruption* of *Superphase or Dark Energy Operation* that the four-potentials are entangling in *Double Streaming* between the Y^-Y^+ manifolds, simultaneously, reciprocally, and systematically.

Gauge Theory

Mathematically, a partial derivative of a function of several variables is its derivative with respect to one of those variables, while the others held as constant. Therefore, an event λ operates a full derivative D^λ or D_λ to include all indirect dependencies of magnitude and phase wave function with respect to an exogenous λ argument:

$$D^\lambda\psi(x^\mu,\lambda) = \Big[\frac{\partial x^\mu}{\partial\lambda}\frac{\partial}{\partial x^\mu}\psi(x^\mu)\Big]e^{-i\hat{\vartheta}(\lambda)} + \psi(x^\mu)\frac{\partial}{\partial\lambda}e^{-i\hat{\vartheta}(\lambda)} = \dot{x}^\mu\Big(\frac{\partial}{\partial x^\mu} - i\Theta^\mu\Big)\psi(x^\mu,\lambda) \tag{1.5a}$$

$$D_\lambda\psi(x_\nu,\lambda) = \Big[\frac{\partial x_\nu}{\partial\lambda}\frac{\partial}{\partial x_\nu}\psi(x_\nu)\Big]e^{i\check{\vartheta}(\lambda)} + \psi(x_\nu)\frac{\partial}{\partial\lambda}e^{i\check{\vartheta}(\lambda)} = \dot{x}_\nu\Big(\frac{\partial}{\partial x_\nu} + i\Theta_\nu\Big)\psi(x_\nu,\lambda) \tag{1.5b}$$

$$\Theta^{\mu} = \frac{\partial \hat{\vartheta}(\lambda)}{\partial x^{\mu}}, \quad \dot{x}^{\mu} = \frac{\partial x^{\mu}}{\partial \lambda}, \qquad \Theta_{\nu} = \frac{\partial \check{\vartheta}(\lambda)}{\partial x_{\nu}}, \quad \dot{x}_{\nu} = \frac{\partial x_{\nu}}{\partial \lambda} \tag{1.6}$$

Furthermore, when $\Theta = eA_{\nu}/\hbar$ and $D_{\nu} \mapsto \partial_{\nu} + ieA_{\nu}/\hbar$, one derives *Gauge derivative* for an object with the electric charge e and the gauge field A_{ν}.

$$D^{\nu} \mapsto \partial^{\nu} - ieA^{\nu}/\hbar, \quad D_{\nu} \mapsto \partial_{\nu} + ieA_{\nu}/\hbar \qquad : \Theta^{\nu} = \frac{e}{\hbar}A^{\nu}, \Theta_{\nu} = \frac{e}{\hbar}A_{\nu} \tag{1.7}$$

The *gauge field*, A_{ν} or A^{ν} in terms of the field strength tensor, is exactly the electrodynamic field, or an antisymmetric rank-2 tensor:

$$F^{+n}_{\nu\mu} = (\partial^{\nu} A^{\mu} - \partial^{\mu} A^{\nu})_{n}, \quad F^{-n}_{\nu\mu} = (\partial_{\nu} A_{\mu} - \partial_{\mu} A_{\nu})_{n} \qquad : F^{+n}_{\mu\nu} = -F^{+n}_{\nu\mu}, F^{-n}_{\mu\nu} = -F^{-n}_{\nu\mu} \tag{1.8}$$

where *n* represent either a particle or an object. A *Gauge Theory* was the first time widely recognized by *Pauli* in 1941 [2] and followed by the second generally popularized by *Yang-Mills* in 1954 [3] for the strong interaction holding together nucleons in atomic nuclei. Classically, the *Gauge Theory* was derived mathematically for a *Lagrangian* to be conserved or invariant under certain *Lie* groups of *local* transformations. Apparently, the superphase fields Θ^{ν} and Θ_{ν} are the event modulators operated naturally at the heart of all potential fields, which defines ontological dynamics.

Horizon Infrastructure

As the topological framework, various horizons define and emerge with its own fields, which aggregate or dissolve into each other as the interoperable neighborhoods, systematically and simultaneously.

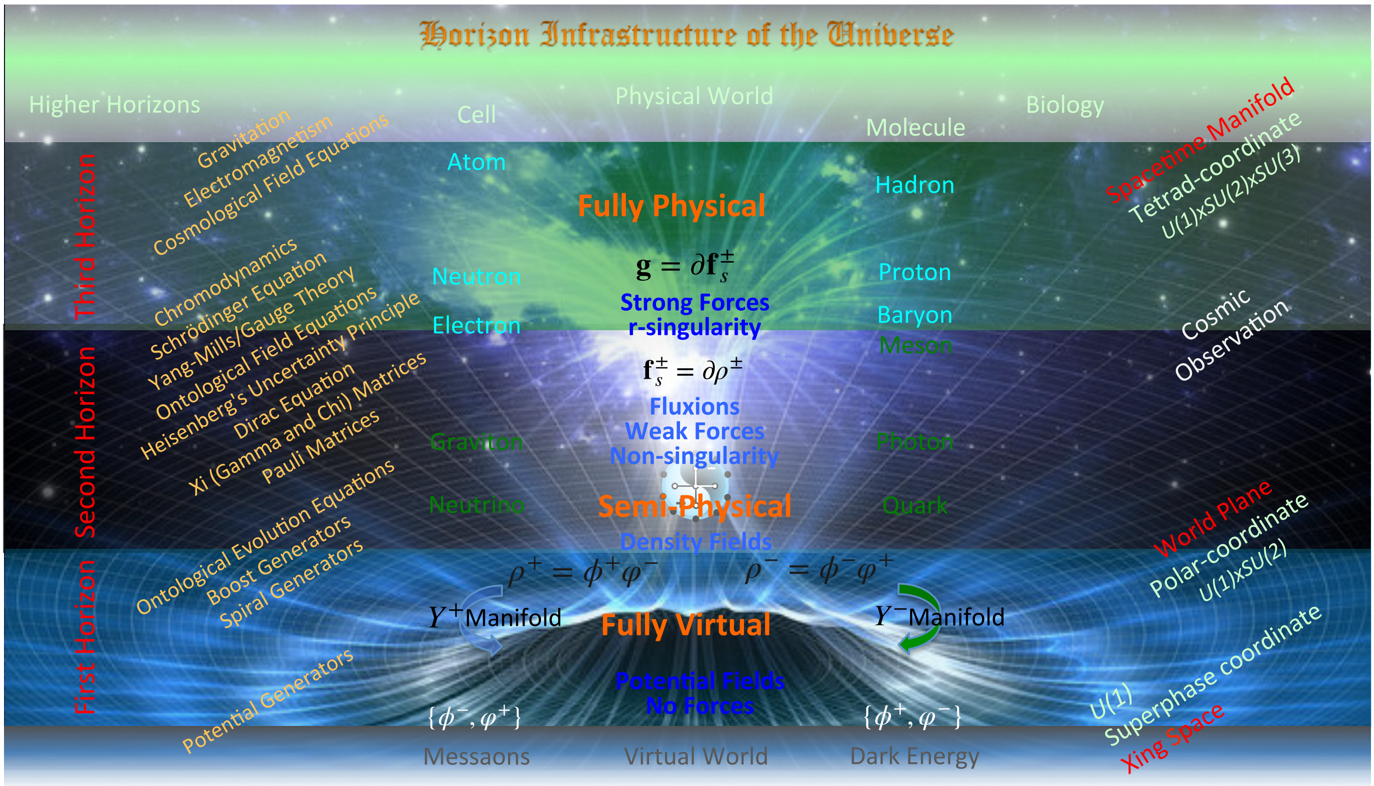

Figure 1: Horizon Infrastructure of the Universe

Through the $Y^{-}Y^{+}$ communications, the virtual Y^{+} and physical Y^{-} duality architecturally defines further hierarchy of the event evolutions, its operational interactions and their commutative infrastructures such that each serves the state environment of universe with a pair of the scalar potential functions of $\{\phi^{+},\varphi^{-}\}$ for Y^{+} primary or of $\{\phi^{-},\varphi^{+}\}$ for Y^{-} primary, named as *Ground Fields*. Among the fields, their localized entanglements form up, but are not limited to, the density fields ($\rho^{+} = \phi^{+}\varphi^{-}$, $\rho^{-} = \phi^{-}\varphi^{+}$) as *First Horizon Fields*. Known as fluxions, the derivatives to each of the density fields $\mathbf{f}_s^{\pm} = \partial\rho^{\pm}$ is an event operation of their motion continuity with interweaving commutations, and generates an interruptible tangent space as *Second Horizon Fields*, which further gives rise to *Third Horizon* and beyond.

In physics, the *Horizon Hierarchy* can be interpreted by the following structure:

a. Ground Horizon: *Potential* fields of elementary particles ($\{\phi^+, \varphi^-\}$, $\{\phi^-, \varphi^+\}$)
b. First Horizon: state *Density* of *world planes* ($\rho^+ = \phi^+\varphi^-$, $\rho^- = \phi^-\varphi^+$)
c. Second Horizon: *Flux* continuity and commutation of interweaving densities ($\mathbf{f}_s^\pm = \partial\rho^\pm$)
d. Third Horizon: symmetry and asymmetry of *Force Fields* in spacetime manifolds ($\mathbf{g}_s = \partial\mathbf{f}_s^\pm$)
e. Fourth Horizon: continuity and commutation of symmetric and asymmetric matrix fields ($\mathbf{g}_v = \partial\mathbf{f}_v^\pm$)

Rigorously in mathematics, the fields of $\phi^\pm$, $\varphi^\pm$, $\mathbf{f}_s^\pm$, $\mathbf{g}_s^\pm$, and $\mathbf{g}_v^\pm$ are interactively cross boundaries between the neighborhoods functioning as the building blocks to gracefully give rise to the horizons constituting a oneness of the real world of our universe. Fro example, the *force fields are classically known as weak forces* in a second horizon and become *strong forces* in a third horizon.

Illustrated by the review article [4], the picture above depicts three regimes of the manifolds: spacetime, world plane, and xingspace, where each scope of the states is characterized by physical, semi-physical or virtual formations of matters and associated with their field equations of the horizon, respectively.

II. INFRASTRUCTURE GENERATORS

Remarkably, there are the environmental settings of originators and commutators that establish entanglements between the manifolds as a duality of the $Y^{-}Y^{+}$ potentials for the life transformation, transportation, or commutation simultaneously and complementarily.

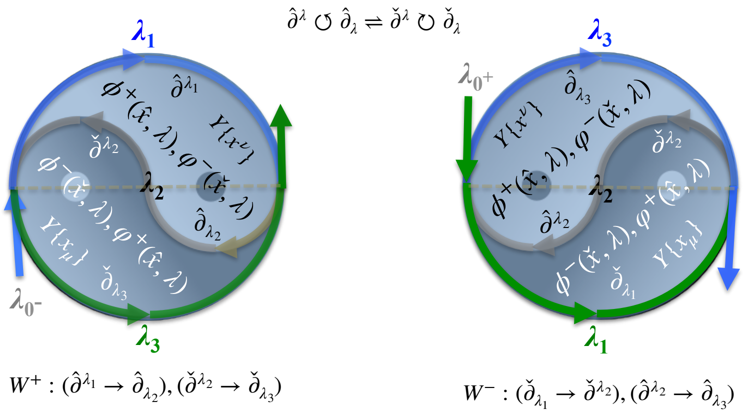

Figure 2: Event Flows of $Y^{-}Y^{+}$ Horizon Infrastructure

Horizon Events

Illustrated in the $Y^{-}Y^{+}$ flow diagram of Figure 2, world events, operate the potential entanglements that consist of the Y^{+} supremacy (white background) at a top-half of the cycle and the Y^{-} supremacy (black background) at a bottom-half of the cycle. Each part is dissolving into the other to form an alternating stream of dynamic flows. Their transformations in between are bi-directional antisymmetric transportations crossing the dark tunnel through a pair of the end-to-end circlets on the center line. Both of the top-half and bottom-half share the common global environment of the state density ρ_n that mathematically represents the $\rho_n^{+} = \phi^{+}\varphi^{-}$ for the Y^{+} manifold and its equivalent $\rho_n^{-} = \phi^{-}\varphi^{+}$ for the Y^{-} manifold, respectively. The left-side diagram presents the event flow acted from the inception of λ_{0^-} through $\lambda_1\ \lambda_2\ \lambda_3$ to intact a cycle process for the Y^{+} supremacy. In parallel, the right-side diagram depicts the event flow initiated from the event λ_{0^+} through $\lambda_1\ \lambda_2\ \lambda_3$ to complete a cycle process for the Y^{-} supremacy. For full description of *Law of Event Processes*, please refer to section IV of [1].

In order to operate the local actions, an event λ exerts its effects of the virtual supremacy within its Y^{+} manifold or physical supremacy within its Y^{-} manifold. Because of the local relativity, the derivative ∂^{λ} to the vector $x^{\nu}\mathbf{b}^{\nu}$, where $\mathbf{b}^{\nu}$ is the basis, has the changes of both magnitude quantity $\dot{x}^{\mu}(\partial x^{\nu}/\partial x^{\mu})\mathbf{b}^{\nu}$ and basis direction $\dot{x}^{\mu}x^{\nu}\overset{+}{\Gamma}_{\mu\nu a}\mathbf{b}^{\mu}$, where $\dot{x}^{\mu} = \partial x^{\mu}/\partial\lambda$, transforming between the coordinates of x^{ν} and x^{μ}, giving rise to the second horizon in its *Local* or *Residual* derivatives with the boost and spiral relativities. By lowering the index, the virtual Y^{+} actions manifest the first tangent potential $\hat{\partial}_{\lambda}$ projecting into its opponent basis of the Y^{-} manifold. Because of the relativistic interactions, the derivative ∂_{λ} to the vector $x^{\nu}\mathbf{b}^{\nu}$ has the changes of both magnitude quantity $\dot{x}_a(\partial x^{\nu}/\partial x_a)\mathbf{b}^{\nu}$ and basis direction $\dot{x}^{a}x_{\mu}\overset{+}{\Gamma}{}^{\nu}_{\mu a}\mathbf{b}^{\nu}$, transforming from one world plane $W^{+}\{\mathbf{r} - i\mathbf{k}\}$ to the other $W^{-}\{\mathbf{r} + i\mathbf{k}\}$. This action redefines the Y^{+} event quantities of relativity and creates the *Relativistic Boost* S_1^{+} *Transformation* and the *Spiral Torque* R_1^{+} *Transportation* around a central point, which gives rise from the Y^{+} tangent rotations into a vector Y^{-} potentials for the second horizon. Therefore, when the event $\lambda = t$ operates at the second horizon of the world planes, the $Y^{-}Y^{+}$ dynamics incepts the full derivatives of potential evolutions.

$$\partial^{\lambda} = \hat{\partial}^{\lambda} + \hat{\partial}_{\lambda} = \dot{x}^{\mu}X_{\nu\mu}^{+}\left(\partial^{\nu} - i\Theta^{\mu}(\lambda)\right) \qquad : X_{\nu\mu}^{+} = \{S_1^{+} + R_1^{+}, S_2^{+} + R_2^{+}\} \tag{2.1}$$

$$S_1^{+} \equiv \frac{\partial x^{\nu}}{\partial x_a}, \quad R_1^{+} \equiv x^{\mu}\overset{+}{\Gamma}{}^{\nu}_{\mu a}, \quad S_2^{+} \equiv \frac{\partial x^{\nu}}{\partial x^{\mu}}, \quad R_2^{+} \equiv x^{\mu}\overset{+}{\Gamma}_{\nu\mu a} \tag{2.2}$$

$$\overset{+}{\Gamma}{}^{\nu}_{\mu a} = \frac{1}{2}\hat{g}_{\nu\epsilon}\left(\frac{\partial\hat{g}^{\epsilon\mu}}{\partial x^{a}} + \frac{\partial\hat{g}^{\epsilon a}}{\partial x^{\mu}} - \frac{\partial\hat{g}^{\mu a}}{\partial x^{\epsilon}}\right), \qquad \overset{+}{\Gamma}_{\nu\mu a} = \frac{1}{2}\left(\frac{\partial\hat{g}^{\nu\mu}}{\partial x^{a}} + \frac{\partial\hat{g}^{\nu a}}{\partial x^{\mu}} - \frac{\partial\hat{g}^{\mu a}}{\partial x^{\nu}}\right) \tag{2.3}$$

Similarly, one has the Y^- derivative relativistic to its Y^+ opponent:

$$\partial_\lambda = \breve{\partial}_\lambda + \breve{\partial}^\lambda = \dot{x}_m X^-_{nm}\big(\partial_n + i\Theta_m(\lambda)\big) \qquad : X^-_{\nu\mu} = \{S^-_1 + R^-_1, S^-_2 + R^-_2\} \tag{2.4}$$

$$S^-_1 \equiv \frac{\partial x_m}{\partial x^\alpha}, \quad R^-_1 \equiv x_s \Gamma^{-m}_{s\alpha}, \quad S^-_2 \equiv \frac{\partial x_n}{\partial x_m}, \quad R^-_2 \equiv x_m \Gamma^-_{nma} \tag{2.5}$$

$$\Gamma^-_{nm\alpha} = \frac{1}{2}\Big(\frac{\partial \breve{g}_{nm}}{\partial x_\alpha} + \frac{\partial \breve{g}_{n\alpha}}{\partial x_m} - \frac{\partial \breve{g}_{m\alpha}}{\partial x_n}\Big) \qquad \Gamma^{-m}_{s\alpha} = \frac{1}{2}\breve{g}^{me}\Big(\frac{\partial \breve{g}_{e\alpha}}{\partial x_s} + \frac{\partial \breve{g}_{es}}{\partial x_\alpha} - \frac{\partial \breve{g}_{\alpha s}}{\partial x_e}\Big) \tag{2.6}$$

where the $\Gamma^-_{nm\alpha}$ or $\Gamma^+_{\nu\mu a}$ is an Y^- or Y^+ metric connection, similar but extend the meanings to the *Christoffel* symbols of the *First* kind, and the $\Gamma^{-m}_{s\alpha}$ or $\Gamma^{+\nu}_{\mu a}$ is an Y^- or Y^+ metric connection, similar but extend the meanings to the *Christoffel* symbols of the *Second* kind, introduced in 1869 [5].

Event Generators

Each world contracts a two-dimensional manifold, generates a pair of the boost and spiral transportations, and entangles an infinite loop between the manifolds:

$$\hat{\partial}^\lambda \circlearrowleft \hat{\partial}_\lambda \rightleftharpoons \check{\partial}^\lambda \circlearrowright \check{\partial}_\lambda \qquad : x_m \in \{ict, \tilde{r}\},\ x^\mu \in \{-ict, \tilde{r}\} \tag{2.7}$$

This infrastructure has a set of constituents, named as *Generators* which are a group of the irreducible foundational matrices and constructs a variety of the applications in forms of horizon evolution, fields or forces.

At the second horizon SU(2), the Generators institutes the infrastructure with a set of the metric signatures, *Local* originators, the Horizon commutators. On the world planes at a constant speed c, this event flow naturally describes and concisely derives a set of the *Boost* matrix tables as the *Quadrant-State*:

$$S^+_2 \hookrightarrow S^+_1 \rightleftharpoons S^-_1 \hookleftarrow S^-_2 \qquad : \textit{Loop Infrastructure} \tag{2.8}$$

$$S^+_2 = \frac{\partial x^\nu}{\partial x^m} = \begin{pmatrix} 1 & -i \\ i & 1 \end{pmatrix} \equiv s_0 + is_2 \qquad S^+_1 = \frac{\partial x^\nu}{\partial x_m} = \begin{pmatrix} -1 & -i \\ -i & 1 \end{pmatrix} \equiv s_3 - is_1 \tag{2.8a}$$

$$S^-_2 = \frac{\partial x_m}{\partial x_\nu} = \begin{pmatrix} 1 & i \\ -i & 1 \end{pmatrix} \equiv s_0 - is_2 \qquad S^-_1 = \frac{\partial x_m}{\partial x^\nu} = \begin{pmatrix} -1 & i \\ i & 1 \end{pmatrix} \equiv s_3 + is_1 \tag{2.8b}$$

The $S^\pm_1$ matrices are a duality of the horizon settings for transformation between the two-dimensional world planes. The $S^\pm_2$ matrices are the local or residual settings for Y^- or Y^+ transportation within their own manifold, respectively. Defined as the *Infrastructural Boost Generators*, this s_κ group consists of the distinct members, shown by the following:

$$s_\kappa = \left[\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}_0, \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}_1, \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}_2, \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}_3\right] \tag{2.9}$$

Intuitively simplified to a group of the 2x2 matrices, the infinite (2.8) loops of entanglements compose an integrity of the boost generators s_n that represents law of conservation of life-cycle transform continuity of motion dynamics, shown by the following:

$$[s_a, s_b] = 2\varepsilon^-_{cba} s_c \qquad \langle s_a, s_b \rangle = 0 \qquad : a, b, c \in \{1,2,3\} \tag{2.10}$$

where the symbols $[\ ]^\mp$ are called Y^- or Y^+ *Commutator Bracket* and the $\langle\ \rangle^\mp$ are *Continuity Bracket*, extend to *Lei Bracket*, introduced in 1930s [6]. The *Levi-Civita* [7] connection ε^-_{cba} represents the right-hand chiral. In accordance with our philosophical anticipation, the non-zero commutation reveals the loop-processes of entanglements, reciprocally. The zero continuity illustrates the conservations of virtual supremacy that are either extensible from or degradable back to the global two-dimensions of the world planes.

Simultaneously on the world planes at a constant speed, the loop event naturally describes and concisely elaborates another set of the *Spiral* matrix tables. The world planes are supernatural or intrinsic at the two-dimensional coordinates presentable as a vector calculus in polar coordinates. Because of the superphase modulation, in *Cartesian* coordinates all *Christoffel* symbols vanish, which implies the superphase modulation becomes hidden. Therefore, we consider the polar manifold $\{\tilde{r} \pm i\tilde{\vartheta}\} \in \mathscr{R}^2$ that a physical world has its superposition $\tilde{r}$ superposed with the virtual world through the superphase $\tilde{\vartheta}$ coordinate:

$$ds^2 = (d\tilde{r} + i\tilde{r}d\tilde{\vartheta})(d\tilde{r} - i\tilde{r}d\tilde{\vartheta}) = d\tilde{r}^2 + \tilde{r}^2 d\tilde{\vartheta}^2 \qquad : x^m \in \check{x}\{\tilde{r} + i\tilde{\vartheta}\},\ x^\nu \in \hat{x}\{\tilde{r} - i\tilde{\vartheta}\} \tag{2.11}$$

The relationship of the metric tensor and inverse metric components is given straightforwardly by the following

$$\check{g}_{\nu\mu} = \hat{g}^{\nu\mu} = \begin{pmatrix} 1 & 0 \\ 0 & \tilde{r}^2 \end{pmatrix}, \qquad \check{g}^{\nu\mu} = \hat{g}_{\nu\mu} = \begin{pmatrix} 1 & 0 \\ 0 & \tilde{r}^{-2} \end{pmatrix} \tag{2.12}$$

where $\check{g}_{\nu\mu} \in Y^-$, and $\hat{g}^{\nu\mu} \in Y^+$. Normally, the coordinate basis vectors $\mathbf{b}_{\tilde{r}}$ and $\mathbf{b}_{\tilde{\vartheta}}$ are not orthonormal. Since the only nonzero derivative of a covariant metric component is $\check{g}_{\tilde{\vartheta}\tilde{\vartheta},\tilde{r}} = 2\tilde{r}$, the toques in *Christoffel* symbols for polar coordinates are simplified to and become as a set of *Quadrant-State* matrices,

$$R_2^+ \nleftrightarrow R_1^+ \rightleftharpoons R_1^- \nleftarrow R_2^- \qquad : \textit{Torque Infrastructure} \tag{2.13}$$

$$R_2^+ = x^\mu \Gamma^+_{\nu\mu a} = x^\mu \begin{pmatrix} 0 & \tilde{r} \\ \tilde{r} & -\tilde{r} \end{pmatrix} \equiv \tilde{r}^2 \epsilon_0 + i\epsilon_2 \tilde{r}\tilde{\vartheta} \tag{2.13a}$$

$$R_1^+ = x^\mu \Gamma^{+\nu}_{\mu a} = x^\mu \begin{pmatrix} 0 & 1/\tilde{r} \\ 1/\tilde{r} & -\tilde{r} \end{pmatrix} \equiv \tilde{r}^2 \epsilon_3 - i\epsilon_1 \tilde{r}\tilde{\vartheta} \tag{2.13b}$$

$$R_1^- = x_s \Gamma^{-m}_{s\alpha} = x_s \begin{pmatrix} 0 & 1/\tilde{r} \\ 1/\tilde{r} & -\tilde{r} \end{pmatrix} \equiv \tilde{r}^2 \epsilon_3 + i\epsilon_1 \tilde{r}\tilde{\vartheta} \tag{2.13c}$$

$$R_2^- = x_m \Gamma^-_{nma} = x_m \begin{pmatrix} 0 & \tilde{r} \\ \tilde{r} & -\tilde{r} \end{pmatrix} \equiv \tilde{r}^2 \epsilon_0 - i\epsilon_2 \tilde{r}\tilde{\vartheta} \tag{2.13d}$$

where $\tilde{\vartheta} = \tilde{\vartheta}^+ = -\tilde{\vartheta}^-$. The $R_1^\pm$ matrices are a duality of the interactive settings for transportation between the two-dimensional world planes. The $R_2^\pm$ matrices are the residual settings for Y^- and Y^+ transportation or within their own manifold, respectively. Defined as a set of the *Infrastructural Torque Generators*, this ϵ_κ group consists of the distinct members, featured as the following:

$$\epsilon_\kappa = \left[\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}_0, \begin{pmatrix} 0 & 0 \\ 0 & -1 \end{pmatrix}_1, \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix}_2, \frac{1}{\tilde{r}^2} \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}_3 \right] \tag{2.14}$$

As a group of the 2x2 matrices, the infinite (2.7) loops of entanglements institute an integrity of the spiral generators ϵ_n sourced by the transport generators ϵ_0, shown by the following commutators:

$$[\varepsilon_2, \varepsilon_1] = 0 = [\varepsilon_1, \varepsilon_0] \qquad : \textit{Independent Freedom} \tag{2.15}$$

$$[\varepsilon_2, \varepsilon_3] = \frac{1}{\tilde{r}^2} s_2 = [\varepsilon_3, \varepsilon_1] \qquad : \textit{Force Exposions} \tag{2.16}$$

$$[\varepsilon_2, \varepsilon_0] = s_2 = [\varepsilon_0, \varepsilon_1] \qquad : \textit{Commutation Invariance} \tag{2.17}$$

In accordance with our philosophical anticipation, the above commutations between manifolds reveals that

1. Double loop entanglements are invariant and yield local independency, respectively.
2. Conservations of transportations are operated at the superposed world planes.
3. Spiral commutations generate the s_2 spinor to maintain its torsion conservation.
4. Commutative generators exert its physical contortion at inverse r-dependent.

Besides, the continuity of life-cycle transportations has the characteristics of

$$\langle \varepsilon_3, \varepsilon_0 \rangle = \frac{2}{\tilde{r}^2} s_0 \qquad \langle \varepsilon_2, \varepsilon_1 \rangle = 2\varepsilon_1 \tag{2.18}$$

$$\langle \varepsilon_2, \varepsilon_3 \rangle = \varepsilon_3 = -\langle \varepsilon_3, \varepsilon_1 \rangle \qquad \langle \varepsilon_2, \varepsilon_0 \rangle = \varepsilon_0 = -\langle \varepsilon_0, \varepsilon_1 \rangle \tag{2.19}$$

It demonstrates the commutative principles among the torque generators:

a. The torque is sourced from the inception of the transformation s_0 and the physical contorsion ε_3; and

b. Each of torsions is driven by the real force ε_3 or superposing torsion ε_0, respectively.

At the constant speed, the divergence of the torsion tensors are illustrated by the following:

$$\nabla \cdot R_2^- = \frac{1}{\tilde{r}}\frac{\partial}{\partial \tilde{r}}\left(\epsilon_0 \tilde{r}^2\right) - \frac{1}{\tilde{r}}\frac{\partial}{\partial \tilde{\vartheta}}\left(\epsilon_2 \tilde{r}\tilde{\vartheta}\right) = 2\epsilon_0 - \epsilon_2 \tag{2.20}$$

$$\nabla \cdot R_1^- = \frac{1}{\tilde{r}}\frac{\partial}{\partial \tilde{r}}\left(\epsilon_3 \tilde{r}^2\right) + \frac{1}{\tilde{r}}\frac{\partial}{\partial \tilde{\vartheta}}\left(\epsilon_1 \tilde{r}\tilde{\vartheta}\right) = \epsilon_1 \tag{2.21}$$

Because of the Y^-Y^+ reciprocity, each superphase $\tilde{\vartheta}$ is paired at its mirroring spiral opponent. Remarkably, on the world planes at $\tilde{r} = 0$, the total of each Y^-Y^+ torsion derivatives is entangling without singularity and yields invariant.

$$Y^- : \nabla \cdot (R_1^- + R_2^-) = 2\begin{pmatrix} 0 & 1 \\ 1 & -i \end{pmatrix} \tag{2.22}$$

$$Y^+ : \nabla \cdot (R_1^+ + R_2^+) = 2\begin{pmatrix} 0 & 1 \\ 1 & +i \end{pmatrix} \tag{2.23}$$

As the *Conservation of Superposed Torsion* under the superposed global manifolds, it implies that the transportations of the spiral torques between the virtual and physical worlds are

a. Modulated by the superphase $2\tilde{\vartheta}$-chirality, bi-directionally,
b. Operated at independence of spatial $\tilde{r}$-coordinate, respectively,
c. Streaming with its residual and opponent, commutatively, and
d. Entangling a duality of the reciprocal spirals, simultaneously.

This virtual-supremacy nature features the world planes a principle of *Superphase Ontology*, which, for examples, operates a macroscopic galaxy or blackhole system, or generates a microscopic spinor of particle system.

Horizon Operations

Considering the mirroring effects $-f^*(z^*)$ between manifolds, the (7.2) matrices institutes an infrastructure,

$$\tilde{\gamma}^\nu \equiv \begin{pmatrix} \{S_1^-, S_2^+\} \\ -\{S_1^+, S_2^-\}^* \end{pmatrix} \qquad \tilde{\gamma}_\nu \equiv \begin{pmatrix} \{S_1^+, S_2^-\} \\ -\{S_1^-, S_2^+\}^* \end{pmatrix} \tag{2.24}$$

$$\tilde{\gamma}^\nu = \left[\begin{pmatrix} s_0 & 0 \\ 0 & -s_0 \end{pmatrix}_0, -i\begin{pmatrix} 0 & s_1 \\ s_1 & 0 \end{pmatrix}_1, i\begin{pmatrix} 0 & s_2 \\ s_2 & 0 \end{pmatrix}_2, \begin{pmatrix} 0 & s_3 \\ -s_3 & 0 \end{pmatrix}_3\right] \tag{2.25}$$

Simply extended by the mirroring chirality $-(S_n^\pm)^*$, the tilde-gamma matrices $\tilde{\gamma}^\nu$ represent the upper-row of one manifold dynamic stream $\{\hat{\partial}^\lambda, \check{\partial}^\lambda\}$ and the lower-row for its opponent $\{\hat{\partial}_\lambda, \check{\partial}_\lambda\}$. In parallel to the tilde-gamma matrices, one can contract another superposed tilde-chi matrices $\tilde{\chi}^\nu$ representing (2.13) a set of the mirroring spiral torque tensors.

$$\tilde{\chi}^\nu = \tilde{r}\left[\tilde{r}\begin{pmatrix} \epsilon_0 & 0 \\ 0 & -\epsilon_0 \end{pmatrix}_0, -i\tilde{\vartheta}\begin{pmatrix} 0 & \epsilon_1 \\ \epsilon_1 & 0 \end{pmatrix}_1, i\tilde{\vartheta}\begin{pmatrix} 0 & \epsilon_2 \\ \epsilon_2 & 0 \end{pmatrix}_2, \tilde{r}\begin{pmatrix} 0 & \epsilon_3 \\ -\epsilon_3 & 0 \end{pmatrix}_3\right] \tag{2.26}$$

Each of the $\tilde{\chi}_\nu^\pm$ matrices is a set of the vector matrices with the upper-row for one infrastructural stream and the lower-row for its opponent manifold. Together, they further descend into its higher dimensional manifold. The $\chi_\mu^\pm$ fields are a pair of the torque-graviton potentials.

Consequently, we have the total effective fields in each of the respective manifolds:

$$\check{\partial}_\lambda \phi^- + \hat{\partial}_\lambda \varphi^+ = \dot{x}_\nu \tilde{\zeta}_\nu \left[\begin{pmatrix} \partial_\nu \\ \partial^\nu \end{pmatrix}' \pm i\frac{e}{\hbar}\begin{pmatrix} A_\nu \\ A^\nu \end{pmatrix}'\right]\psi^- \qquad : \psi^- = \begin{pmatrix} \phi^- \\ \varphi^+ \end{pmatrix}, \tilde{\zeta}_\nu = \tilde{\gamma}_\nu + \tilde{\chi}_\nu \tag{2.27}$$

$$\hat{\partial}^\lambda \phi^+ + \check{\partial}^\lambda \varphi^- = \dot{x}^\nu \tilde{\zeta}^\nu \left[\begin{pmatrix} \partial^\nu \\ \partial_\nu \end{pmatrix}' \mp i\frac{e}{\hbar}\begin{pmatrix} A^\nu \\ A_\nu \end{pmatrix}'\right]\psi^+ \qquad : \psi^+ = \begin{pmatrix} \phi^+ \\ \varphi^- \end{pmatrix}. \tilde{\zeta}^\nu = \tilde{\gamma}^\nu + \tilde{\chi}^\nu \tag{2.28}$$

The potential ψ^- or ψ^+ implies each of the loop entanglements is under its Y^- or Y^+ manifold, respectively. The first equation represents the horizon potentials at the local $\check{\partial}_\lambda \varphi^-$ of the Y^- manifold and the transformation $\hat{\partial}_\lambda \phi^+$ from its Y^+ opponent. Likewise, the second equation corresponds to the horizon potentials at the local $\hat{\partial}^\lambda \phi^+$ of the Y^+ manifold and the transformation $\check{\partial}^{\lambda}\varphi^{-}$ from its Y^{-} opponent. To collapse the above equations together, we have a duality of the states simplified or degenerated to the classical formulae:

$$\check{\partial}\psi^{-} \equiv \check{\partial}_{\lambda}\phi^{-} + \hat{\partial}_{\lambda}\varphi^{+} \equiv \dot{x}_{\nu}\tilde{\zeta}_{\nu}D_{\nu}\psi^{-} \qquad : D_{\nu} = \partial_{m} + i\frac{e}{\hbar}A_{m} \tag{2.29}$$

$$\hat{\partial}\psi^{+} \equiv \hat{\partial}^{\lambda}\phi^{+} + \check{\partial}^{\lambda}\varphi^{-} \equiv \dot{x}^{\nu}\tilde{\zeta}^{\nu}D^{\nu}\psi^{+} \qquad : D^{\nu} = \partial^{\nu} - i\frac{e}{\hbar}A^{\nu} \tag{2.30}$$

To our expectation, the fields inherent a pair of electro-photon $\tilde{\gamma}_{\nu}A_{\nu}$ and $\tilde{\gamma}^{\nu}A^{\nu}$ as well as torque-graviton $\tilde{\chi}_{\nu}A_{\nu}$ and $\tilde{\chi}^{\nu}A^{\nu}$ potentials. Intuitively, both photons and gravitons are the outcomes or products of a duality of the double entanglements.

Speed of Transformation and Transportation

At an event $\lambda = t$, the observable light speed in a free space or vacuum has the relativistic effects of transformations. A summation of the right-side of the four (2.8) equations represents the motion fluxions:

$$\mathbf{f}_{c}^{+} = \psi_{c}^{-}\begin{pmatrix}\hat{\partial}^{\nu}\\ \check{\partial}^{\nu}\end{pmatrix}'\psi_{c}^{+} = \psi_{c}^{-}\dot{x}^{\nu}\tilde{\gamma}^{\nu}\begin{pmatrix}\partial^{\nu}\\ \partial_{\nu}\end{pmatrix}'\psi_{c}^{+} \mapsto C_{\nu\mu}^{+}\psi_{c}^{-}\nabla\psi_{c}^{+} \tag{2.31a}$$

$$\mathbf{f}_{c}^{-} = \psi_{c}^{+}\begin{pmatrix}\check{\partial}_{\nu}\\ \hat{\partial}_{\nu}\end{pmatrix}'\psi_{c}^{-} = \psi_{c}^{+}\dot{x}_{\nu}\tilde{\gamma}_{\nu}\begin{pmatrix}\partial_{\mu}\\ \partial^{\mu}\end{pmatrix}'\psi_{c}^{-} \mapsto C_{\nu\mu}^{-}\psi_{c}^{+}\nabla\psi_{c}^{-} \tag{2.31b}$$

where the equations are mapped to the three-dimensions of a physical space at the second horizon ($\tilde{\gamma} \mapsto \gamma$). For the potential fields $\psi_{c}^{\pm} = \psi_{c}^{\pm}(r)exp(i\vartheta^{\pm})$ at massless in the second horizon, we derive the *C*-matrices for the speed of light:

$$C_{\nu\mu}^{+} = \dot{x}^{\nu}\gamma^{\nu}e^{-i\vartheta}, \qquad C_{\nu\mu}^{-} = \dot{x}_{\nu}\gamma_{\nu}e^{i\vartheta} \qquad : \vartheta = \vartheta^{-} - \vartheta^{+} \tag{2.32}$$

where the quanta ϑ is the superphase, and $\nu \in (1,2,3)$. Remarkably, the speed of light is characterized by a pair of the above $Y^{-}Y^{+}$ matrices, revealing the intrinsic entanglements of light that constitutes of transforming γ-fields and superphase modulations. Philosophically, no light can propagate without the internal dynamics, which is described by the off-diagonal elements of the *C*-matrices. Applying to an external object, the quantities can be further characterized by the diagonal elements of the *C*-matrices at the r-direction of world lines, shown by the following:

$$C_{rr}^{\pm} = ce^{\mp i\vartheta} \qquad : \text{Speed of Light } = |C_{rr}^{\pm}| = c \tag{2.33}$$

As expected, the speed of light is generally a non-constant matrix, representing its traveling dynamics sustained and modulated by the $Y^{-}Y^{+}$ superphase entanglements. Because the constituent elements of the γ-matrices are constants, the amplitude of the *C*-matrices at a constant *c* is compliant to and widely known as a universal physical constant. The speed *C*-matrix applies to all massless particles and changes of the associated fields travelling in vacuum or free-space, regardless of the motion of the source or the inertial or rotational reference frame of the observer.

Associated to the motion fluxions of light, one has the fluxion fields of gravitational transportation in a free space or vacuum:

$$\mathbf{f}_{g}^{+} = \psi_{g}^{-}\begin{pmatrix}\hat{\partial}^{\nu}\\ \check{\partial}^{\nu}\end{pmatrix}'\psi_{g}^{+} = \psi_{g}^{-}\dot{x}^{\nu}\tilde{\chi}^{\nu}\begin{pmatrix}\partial^{\nu}\\ \partial_{\nu}\end{pmatrix}'\psi_{g}^{+} \mapsto G_{\nu\mu}^{+}\psi_{g}^{-}\nabla\psi_{g}^{+} \tag{2.34}$$

$$\mathbf{f}_{g}^{-} = \psi_{g}^{+}\begin{pmatrix}\check{\partial}_{\nu}\\ \hat{\partial}_{\nu}\end{pmatrix}'\psi_{g}^{-} = \psi_{c}^{+}\dot{x}_{\nu}\tilde{\chi}_{\nu}\begin{pmatrix}\partial_{\mu}\\ \partial^{\mu}\end{pmatrix}'\psi_{g}^{-} \mapsto G_{\nu\mu}^{-}\psi_{g}^{+}\nabla\psi_{g}^{-} \tag{2.35}$$

Unlike the light transformation seamlessly at massless, the uniqueness of gravitation is at its massless transportation of the χ-matrices from the second horizon potential $\psi_{g}^{+} = \psi_{g}(r)exp(i\vartheta)$ of world planes into the third horizon potential $\psi_{g}^{-} = \psi_{nlm}(r_{n}, \theta, \phi)$ of spacetime manifolds for its massive gravitational attraction. At inception of the mass enclave in the second horizon, the *G*-matrices are free of its central-singularity $r \to 0$, and result in

$$G_{\nu\mu}^{+} = \lim_{r\to 0}(x^{\nu}\dot{x}^{\nu}\chi^{\nu}e^{-i\vartheta}) = x^{\nu}\dot{x}^{\nu}\epsilon_{3}e^{-i\vartheta} = c_{g}s_{1}e^{-i\vartheta} \tag{2.36}$$

$$G_{\nu\mu}^{-} = \lim_{r\to 0}(x_{\nu}\dot{x}_{\nu}\chi_{\nu}e^{i\vartheta}) = x_{\nu}\dot{x}_{\nu}\epsilon_{3}e^{i\vartheta} = c_{g}s_{1}e^{i\vartheta} \tag{2.37}$$

$$\text{Speed of Gravitation } = |G_{\mu\nu}^{\pm}| = c_{g} \qquad : \mu \neq \nu \tag{2.38}$$

Remarkably, the speed c_g of gravitational transportation is a constant similar to the speed of light, but propagating orthogonally in the off-diagonal elements. Interrupting with mass objects at the third horizon, the gravitation becomes gravity that exerts and reveal a force inversely proportional to a square of the distance. Apparently, gravity posses the same characteristics of the quantum entanglement.

Similar to electromagnetic radiation consists of two electromagnetic waves, the equations of (2.33) and (2.37) illustrate that the oscillations of the photon and graviton fields at the second horizon are synchronized not only perpendicular to each other but also perpendicular to the direction of energy propagation, forming a transverse wave of lights. Therefore, gravitation can be significant only as an internal field, and no gravitation can propagate to interact to an external object without a duality of the photon and graviton waves.

III. PHYSICAL HORIZON

Apparently, the *Infrastructural Generators* can contract alternative matrices that might extend to the physical topology. Among them, one popular set is shown as the following:

$$\sigma_\kappa = \left[\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}_0, \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}_1, \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}_2, \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}_3 \right] \tag{3.1}$$

$$\sigma_0 = s_0 \qquad \sigma_1 = s_1 \qquad \sigma_2 = i s_2 \qquad \sigma_3 = -s_3 \qquad \sigma_n^2 = I \tag{3.2}$$

known as *Pauli* spin matrices, introduced in 1925 [8]. In this definition, the residual spinors $S_2^{\pm}$ are extended into the physical states toward the interpretations for the decoherence into a manifold of the four-dimensional spacetime-coordinates of physical reality.

Zeta-matrix

Aligning to the topological comprehension, we extend the gamma-matrix γ^ν, introduced by *W. K. Clifford* in the 1870s [9], and chi-matrix χ^ν for physical coordinates.

$$\gamma^\nu = \left[\begin{pmatrix} \sigma_0 & 0 \\ 0 & -\sigma_0 \end{pmatrix}_0, \begin{pmatrix} 0 & \sigma_1 \\ -\sigma_1 & 0 \end{pmatrix}_1, \begin{pmatrix} 0 & \sigma_2 \\ -\sigma_2 & 0 \end{pmatrix}_2, \begin{pmatrix} 0 & \sigma_3 \\ -\sigma_3 & 0 \end{pmatrix}_3 \right] \tag{3.3}$$

$$\chi^\nu = \left[\begin{pmatrix} \varsigma_0 & 0 \\ 0 & -\epsilon_0 \end{pmatrix}_0, \begin{pmatrix} 0 & \varsigma_1 \\ -\varsigma_1 & 0 \end{pmatrix}_1, \begin{pmatrix} 0 & \varsigma_2 \\ -\varsigma_2 & 0 \end{pmatrix}_2, \begin{pmatrix} 0 & \varsigma_3 \\ -\varsigma_3 & 0 \end{pmatrix}_3 \right] \tag{3.4a}$$

$$\varsigma_0 = \tilde{r}^2 \epsilon_0 \qquad \varsigma_1 = \tilde{r}\tilde{\vartheta}\epsilon_1 \qquad \varsigma_2 = i\tilde{r}\tilde{\vartheta}\epsilon_2 \qquad \varsigma_3 = \tilde{r}^2\epsilon_3 \tag{3.4b}$$

$$\zeta^\nu = \gamma^\nu + \chi^\nu \qquad\qquad \zeta_\nu = \gamma_\nu + \chi_\nu \tag{3.5}$$

The superphase $\mathrm{d}\vartheta$ of polar coordinates extends into the circumference-freedom $\mathrm{d}\vartheta \mapsto \mathrm{d}\theta \pm i \sin\theta \, \mathrm{d}\phi$ of sphere coordinates. Similar to *Pauli* matrices, the gamma γ^ν and chi χ^ν matrices are further degenerated into a spacetime manifold of the physical reality. Similar to (2.29-2.30), we have a duality of the states expressed by or degenerated to the formulae of physical operations:

$$\check{\partial} = \check{\partial}_\lambda + \hat{\partial}_\lambda = \dot{x}_\nu \zeta_\nu D_\nu = \dot{x}_\nu \, \zeta_\nu \left(\partial_\nu + i\frac{e}{\hbar}A_\nu + \tilde{\kappa}_2^- \partial_\nu A_\mu + \cdots \right) \qquad : \tilde{\kappa}_2^- = \frac{1}{2} \tag{3.6a}$$

$$\hat{\partial} = \hat{\partial}^\lambda + \check{\partial}^\lambda = \dot{x}^\mu \zeta^\mu D^\mu = \dot{x}^\mu \zeta^\mu \left(\partial^\mu - i\frac{e}{\hbar}A^\mu - \tilde{\kappa}_2^+ \partial^\mu A^\nu \cdots \right) \qquad : \tilde{\kappa}_2^+ = \frac{1}{2} \tag{3.6b}$$

Accordingly, all terms have a pair of the irreducible and complex quantities a duality of the spacetime entanglements.

Mass Acquisition or Annihilation

As a duality of evolution, consider *N* harmonic oscillators of quantum objects. The energy spectra operates between the virtual wave and physical mass oscillating from one physical dimension on world planes into three dimensional *Hamiltonian* of *Schrödinger Equation* in spacetime dimensions, shown by the following:

$$\tilde{H} = \sum_{n=1}^{N} \frac{\hat{p}_n^2}{2m} + \frac{1}{2} m \omega_n^2 r_n^2 \qquad : \hat{p}_n = -i\hbar\frac{\partial}{\partial r_n} \tag{3.7}$$

Developed by *Paul Dirac* [10], the "ladder operator" method introduces the following operators:

$$\tilde{H} = \sum_{n=1}^{N} \hbar\omega_n \left(\tilde{a}_n^{\pm} \tilde{a}_n^{\mp} \mp \frac{1}{2} \right) \qquad : \tilde{a}_n^{\mp} = \sqrt{\frac{m\omega_n}{2\hbar}} \left(r_n \pm \frac{i}{m\omega_n}\hat{p}_n \right) \tag{3.8}$$

Under the Y^- supremacy, $\tilde{a}_n^+$ is the creation operation for the wave-to-mass of physical animation, while $\tilde{a}_n^-$ is the reproduction operation for mass-to-wave of virtual annihilation. Intriguingly, the solution to the above equation can be either one-dimension *SU*(2) for ontological evolution or three-dimension for spacetime at the *SU*(3) horizon.

$$\varphi_n^+(r_n) = \frac{1}{\sqrt{2^n\, n!}} \left(\frac{m\,\omega_n}{\pi\hbar}\right)^{1/4} e^{-\frac{m\omega_n r_n^2}{2\hbar}} H_n\Big(\sqrt{\frac{m\,\omega_n}{\hbar}}r_n\Big) \qquad : \textit{On World Planes} \qquad (3.9)$$

$$\phi_{nlm}^-(r_n,\theta,\phi) = N_{nl} r^l e^{-\frac{m\omega_n}{2\hbar}r_n^2} L_n^{(l+1/2)}\Big(\frac{m\,\omega_n}{\hbar}r_n^2\Big) Y_{lm}\big(\theta,\phi\big) \qquad : \textit{On Spacetime Manifolds} \qquad (3.10a)$$

$$N_{nl} = \Big[\Big(\frac{2\nu_n^3}{\pi}\Big)^{1/2} \frac{2^{n+2l+3}\, n!\, \nu_n^l}{(2n+2l+1)!}\Big]^{1/2} \qquad : \nu_n \equiv \frac{m\,\omega_n}{2\hbar} \qquad (3.10b)$$

The $H_n(x)$ is the *Hermite* polynomials, detail by *Pafnuty Chebyshev* in 1859 [11]. The N_{nl} is a normalization function for the enclaved mass at the third horizon. Named after *Edmond Laguerre* (1834-1886), the $L_k^\nu(x)$ are generalized *Laguerre* polynomials [12] for the energy embody dynamically. Introduced by *Pierre Simon de Laplace* in 1782, the $Y_{lm}(\theta,\phi)$ is a spherical harmonic function for the freedom of the extra rotations or the basis functions for *SO*(3). Apparently, the classic normalizations are at the second horizon for φ_n^+ and the third horizon for ϕ_{nlm}^-. At the n=0 ground level $H_0 = L_0 = Y_{00} = 1$, the energy potentials embody the full mass enclave $\phi_n^-\varphi_n^+ \propto m$ that splits between the potential $\varphi_n^+ \propto m^{1/4}$ in the second horizon and $\phi_n^- \propto m^{3/4}$ in the third horizon. The density emerges from the second to third horizon for the full-mass acquisition:

$$\rho^- \approx \phi_0^-\varphi_0^+ = 2\frac{m\,\omega_0}{\pi\hbar} exp\big[-\frac{m\,\omega_0}{2\hbar}(r_s^2+r_w^2)\big] \qquad (3.11)$$

$$\phi_0^- = 2\left(\frac{m\,\omega_0}{\pi\hbar}\right)^{3/4} e^{-\frac{m\omega_0}{2\hbar}r_s^2}, \qquad \varphi_0^+ = \left(\frac{m\,\omega_0}{\pi\hbar}\right)^{1/4} e^{-\frac{m\omega_0 r_w^2}{2\hbar}} \qquad (3.12)$$

where the radius r_s or r_w is the interactive range of the strong or weak forces, respectively. Therefore, the energy embodies its mass enclave in a process from its ¼ to ¾ core during its evolution of the second to third horizon, progressively. Vice versa for the annihilation. Remarkably, the operations represent a duality of the creation and annihilation, including the seamless mass acquisition or dispersion between the virtual world planes and the real spacetime manifolds.

Lorentz Generator

Giving rise to the third horizon, the ζ generators contract with the infrastructure and evolve into the four-dimensional matrices $SU(2)_{s_1} \times SO(3)_{s_2}$, shown by the following:

$$L_\nu^- = K_\nu + i\,J_\nu \qquad L_\nu^+ = K_\nu - i\,J_\nu \qquad (3.13)$$

$$J_1 = \begin{pmatrix} 0&0&0&0\\0&0&0&0\\0&0&0&-1\\0&0&1&0 \end{pmatrix},\; J_2 = \begin{pmatrix} 0&0&0&0\\0&0&0&1\\0&0&0&0\\0&-1&0&0 \end{pmatrix},\; J_3 = \begin{pmatrix} 0&0&0&0\\0&0&-1&0\\0&1&0&0\\0&0&0&0 \end{pmatrix} \qquad (3.13a)$$

$$K_1 = \begin{pmatrix} 0&1&0&0\\1&0&0&0\\0&0&0&0\\0&0&0&0 \end{pmatrix},\; K_2 = \begin{pmatrix} 0&0&1&0\\0&0&0&0\\1&0&0&0\\0&0&0&0 \end{pmatrix},\; K_3 = \begin{pmatrix} 0&0&0&1\\0&0&0&0\\0&0&0&0\\1&0&0&0 \end{pmatrix} \qquad (3.13b)$$

$$[J_1, J_2]^- = J_3 \qquad [K_1, K_2]^- = -J_3 \qquad [J_1, K_2]^- = K_3 \qquad (3.13c)$$

known as *Generator* of the *Lorentz* group, discovered since 1892 [13] or similar to *Gell-Mann* matrices [14]. Conceivably, the K_ν or J_ν matrices are residual and rotational components, respectively.

During the transitions between the horizons, the redundant degrees of freedom is developed and extended from superphase $\tilde{\vartheta}$ of world-planes into the extra physical coordinates (such as $\mathrm{d}\tilde{\vartheta}^2 = \mathrm{d}\theta^2 + \sin^2\theta\, \mathrm{d}\phi^2$). For the field structure at the third horizon, a duality of reciprocal interactions dominated by boost γ and twist χ fields is developed into the third ($\zeta \mapsto L$) horizon.

$$F_{\nu\mu}^{-n}(L) = \big(L_{\nu\mu}^-\partial_\nu A_\mu - L_{\mu\nu}^+\partial^\mu A^\nu\big)_n \qquad : F_{\nu\mu}^{\pm n}(\zeta) \mapsto F_{\mu\nu}^{\pm n}(L) \qquad (3.14)$$

$$T_{\nu\mu}^{-n}(L) = \big(L_{\nu\mu}^-\partial_\nu V_\mu - L_{\mu\nu}^+\partial^\mu V^\nu\big)_n \qquad : F_{\nu\mu}^{\pm n}(L) \mapsto T_{\mu\nu}^{\pm n}(L) \qquad (3.15)$$

Under the Y^- or Y^+ primary, the event operates the third terms of (3.6) in a pair of the relativistic entangling fields.

IV. FIELD EQUATIONS

Normally, a global event generates a series of sequential actions, each of which is associated with its opponent reactions, respectively and reciprocally. For any event operation as the functional derivatives, the sum of terms are calculated at an initial state λ_0 and explicitly reflected by a series of the *Event Operations* $\lambda_i \in \left\{\dot{\partial}_{\lambda_1}, \dot{\partial}_{\lambda_2}\dot{\partial}_{\lambda_1}, \cdots, \dot{\partial}_{\lambda_n \lambda_{n-1} \cdots \lambda_1}\right\}$ in the dual variant forms:

$$f(\lambda) = f_0 + \kappa_1 \dot{\partial}_{\lambda_1} + \kappa_2 \dot{\partial}_{\lambda_2}\dot{\partial}_{\lambda_1} \;\cdots + \kappa_n \dot{\partial}_{\lambda_n}\dot{\partial}_{\lambda_{n-1}} \ldots \dot{\partial}_{\lambda_1} \qquad : \kappa_n = f^n\left(\lambda_0\right)/n!, \tag{4.1}$$

$$\lambda_i \in \{\dot{\partial}_{\lambda_i}\} = \{\check{\partial}_\lambda, \check{\partial}^\lambda, \hat{\partial}^\lambda, \hat{\partial}_\lambda\} \tag{4.2}$$

where κ_n is the coefficient of each order n. The event states of world planes are open sets and can either rise as subspaces transformed from the other horizon or remain confined as independent existences within their own domain, as in the settings of $Y^\mp$ manifolds expending from the world planes.

World Equations

Because the events are operated through the potential fields, it essentially incepts on the world planes a set of the λ_i derivatives, giving rise to the horizon infrastructures, simply given by the above $\phi_n^\mp(\lambda, x) = f(\lambda)\ \phi_n^\mp(\lambda, x)|_{\lambda=\lambda_0}$:

$$\hat{W}_n = \psi_n^+(\lambda, \hat{x})\psi_n^-(\lambda, \check{x}) \qquad : \textit{First World Equation} \tag{4.3}$$

$$\psi_n^\mp(\lambda, x) = \left(1 \pm \tilde{\kappa}_1 \dot{\partial}_{\lambda_1} \pm \tilde{\kappa}_2 \dot{\partial}_{\lambda_2}\dot{\partial}_{\lambda_1} \;\cdots\right)\phi_n^\mp(\lambda, x)|_{\lambda=\lambda_0} \tag{4.4}$$

where $\psi_n^+(\lambda, \hat{x})$ or $\psi_n^-(\lambda, \check{x})$ is the virtual or physical potential of a particle n, and $\hat{\kappa}_n$ is defined as the world constants. An integrity of the two functions is, therefore, named as *First Type of World Equations*, because the function $\hat{W}_n$ represents that

1. The first two terms $(1 \pm \kappa_1 \dot{\partial}_{\lambda_1})$ - The event drives both virtual and physical system and incepts from the world planes systematically breakup and extend into each of the manifolds.

b. The higher terms $\pm(\kappa_2 \dot{\partial}_{\lambda_2}\dot{\partial}_{\lambda_1} + \cdots \kappa_i \dot{\partial}_{\lambda_i}\dot{\partial}_{\lambda_{i-1}} \ldots \dot{\partial}_{\lambda_1})$ - The event operations transcend further down to each of its sub-coordinate system with extra degrees of freedoms for either physical dimensions $\mathbf{r}(\lambda)$ or virtual dimensions $\mathbf{k}(\lambda)$, reciprocally.

This *World Equation* $\hat{W}_n$ features the virtual supremacy for the processes of creations and annihilations. Amazingly, the higher horizon reveals the principles of *Force Fields,* which include, but are not limited to, and are traditionally known as the *Spontaneous Breaking* towards fundamental forces. For the physical observation, the amplitude $|\hat{W}_n|$ features the Y^- behaviors of the forces explicitly while the phase attributes the Y^+ comportment of the superphase actions implicitly.

Dark Fluxion is an important type of energy flow, derivative of which gives rise to continuity for electromagnetism while associated with charge distribution, the gravitational force when affiliated with inauguration of mass distribution, or blackholes in connected with dark matters. At the energy $\tilde{E}_n^\mp$, the characteristics of time evolution interprets the Y^-Y^+ fluxions $\mathbf{f}_s^\pm$ of the world densities $W_s^\mp$ and currents $\mathbf{j}_s^\mp$, generated by the first order of energy densities at the second horizon (5.4) as the following:

$$W_s^- = p_n\left(\phi_n^- + \tilde{\kappa}_1^- \check{\partial}_\lambda \phi_n^- \cdots\right)\left(\varphi_n^+ + \tilde{\kappa}_1^+ \hat{\partial}^\lambda \varphi_n^+ \cdots\right) = p_n\left\{\phi_n^- \varphi_n^+ + \kappa_f^- \mathbf{f}_n^- + \tilde{\kappa}_1^- \tilde{\kappa}_1^+ \left(\check{\partial}_\lambda \phi_n^-\right) \wedge \left(\hat{\partial}^\lambda \varphi_n^+\right) + \cdots\right\} \tag{4.5}$$

$$W_s^+ = p_n\left(\phi_n^+ + \tilde{\kappa}_1^+ \hat{\partial}^\lambda \phi_n^+ \cdots\right)\left(\varphi_n^- + \tilde{\kappa}_1^- \check{\partial}_\lambda \varphi_n^- \cdots\right) = p_n\left\{\phi_n^+ \varphi_n^- + \kappa_f^+ \mathbf{f}_n^+ + \tilde{\kappa}_1^- \tilde{\kappa}_1^+ \left(\hat{\partial}^\lambda \phi_n^+\right) \wedge \left(\check{\partial}_\lambda \varphi_n^-\right) + \cdots\right\} \tag{4.6}$$

$$\mathbf{f}_n^\mp = ic\rho_n^\mp + \mathbf{j}_n^\mp \qquad : \rho_n^\mp = \frac{i\hbar}{2E_n^\pm}\langle \partial_t \rangle_s^\mp, \quad \mathbf{j}_n^\mp = \frac{\hbar c}{2E_n^\mp}\langle \mathbf{u}\nabla \rangle_s^\mp \tag{4.7}$$

where the wedge circulations $\wedge$ is the nature of the entangling processes. The Y^-Y^+ fluxions $\mathbf{f}_n^\mp$ are also known as the classic *Variant Density and Current* of the tetrad-coordinates $\left(ic\rho_n^\pm, \mathbf{j}_n^\pm\right)$. Upon the internal superphase modulations from the first horizon, the Y^-Y^+ duality inheres and forms up the higher horizons as the micro symmetry of a group community in form of flux continuities, characterized by their entangle components of transformation and standard commutations of the dual-manifolds. As one of the Y^-Y^+ entanglement principles, it results a pair of the fluxion equations: one for Y^- supremacy and the other Y^+ supremacy.

As a natural principle of motion dynamics, one of the flow processes dominates the intrinsic order, or development, of virtual into physical regime, while, at the same time, its opponent dominates the intrinsic annihilation or physical resources into virtual domain. Applicable to world expressions of (4.3), the principle of least-actions derives a set of the *Motion Operations*:

$$\check{\partial}^{-}\Big(\frac{\partial W}{\partial(\hat{\partial}^{+}\phi^{+})}\Big)-\frac{\partial W}{\partial\phi^{+}}=0 \qquad : \check{\partial}^{-}\in\{\check{\partial}_{\lambda},\check{\partial}^{\lambda}\},\ \phi^{+}\in\{\phi_n^{+},\varphi_n^{+}\} \tag{4.8}$$

$$\hat{\partial}^{+}\Big(\frac{\partial W}{\partial(\check{\partial}^{-}\phi^{-})}\Big)-\frac{\partial W}{\partial\phi^{-}}=0 \qquad : \hat{\partial}^{+}\in\{\hat{\partial}^{\lambda},\hat{\partial}_{\lambda}\},\ \phi^{-}\in\{\phi_n^{-},\varphi_n^{-}\} \tag{4.9}$$

This set of dual formulae extends the philosophical meaning to the *Euler-Lagrange* [15] *Motion Equation* for the actions of any dynamic system, introduced in the 1750s. The new sets of the variables of $\phi_n^{\mp}$ and the event operators of $\check{\partial}^{-}$ and $\hat{\partial}^{+}$ signify that both manifolds maintain equilibria and formulations from each of the motion extrema, simultaneously driving a duality of physical and virtual dynamics. During the events of the virtual supremacy, a chain of the event actors in the loop flows of Figure 2 and equation (4.5-4.6) can be shown by and underlined in the sequence of the following processes:

$$W^{+}:(\underrightarrow{\hat{\partial}^{\lambda_1}}\to\underbrace{\hat{\partial}_{\lambda_2}}),(\underrightarrow{\check{\partial}^{\lambda_2}}\to\underbrace{\check{\partial}_{\lambda_3}});\ \ W^{-}:(\underline{\check{\partial}_{\lambda_1}}\to\underleftarrow{\check{\partial}^{\lambda_2}}),(\underline{\hat{\partial}^{\lambda_2}}\to\underleftarrow{\hat{\partial}_{\lambda_3}}) \tag{4.10}$$

$$W^{-}:(\underline{\check{\partial}_{\lambda_1}}\to\underbrace{\check{\partial}^{\lambda_2}}),(\underline{\hat{\partial}^{\lambda_2}}\to\underbrace{\hat{\partial}_{\lambda_3}});\ \ W^{+}:(\hat{\partial}^{\lambda_1}\to\hat{\partial}_{\lambda_2}),(\check{\partial}^{\lambda_2}\to\check{\partial}_{\lambda_3}) \tag{4.11}$$

From the event actors, the *World Equations* can be approximated at the first and second orders of perturbations in term of *Second Type* of *World Equations*:

$$W_a^{+}=\big(W_n^{+}+\kappa_1\underbrace{\hat{\partial}_{\lambda_2}}\big)\phi_n^{+}\varphi_n^{-}+\kappa_2\underbrace{\check{\partial}_{\lambda_3}}\big(\phi_n^{+}\hat{\partial}_{\lambda_2}\varphi_n^{-}+\varphi_n^{-}\hat{\partial}_{\lambda_2}\phi_n^{+}\big)\cdots \tag{4.12}$$

$$W_a^{-}=\big(W_n^{-}+\kappa_1\underline{\check{\partial}_{\lambda_1}}\big)\ \varphi_n^{+}\phi_n^{-}+\kappa_2\ \underline{\hat{\partial}^{\lambda_2}}\ \big(\varphi_n^{+}\check{\partial}_{\lambda_1}\phi_n^{-}+\phi_n^{-}\check{\partial}_{\lambda_1}\varphi_n^{+}\big)\cdots \tag{4.13}$$

Meanwhile, their reciprocal event actors have the similar *World Equations* in a conjugate flow processes:

$$W_a^{+*}=\big(W_n^{-}+\kappa_1\underrightarrow{\hat{\partial}^{\lambda_1}}\big)\varphi_n^{+}\phi_n^{-}+\kappa_2\underrightarrow{\check{\partial}^{\lambda_2}}\big(\varphi_n^{+}\hat{\partial}^{\lambda_1}\phi_n^{-}+\phi_n^{-}\hat{\partial}^{\lambda_1}\varphi_n^{+}\big)\cdots \tag{4.14}$$

$$W_a^{-*}=\big(W_n^{-}+\kappa_1\ \underbrace{\check{\partial}^{\lambda_2}}\big)\phi_n^{+}\varphi_n^{-}+\kappa_2\ \underbrace{\hat{\partial}_{\lambda_3}}\ \big(\phi_n^{+}\check{\partial}^{\lambda_2}\varphi_n^{-}+\varphi_n^{-}\check{\partial}^{\lambda_2}\phi_n^{+}\big)\cdots \tag{4.15}$$

where $W_n^{\pm}=W_n^{\pm}(\mathbf{r},t_0)$ is the time invariant area fluxion of $Y^{+}Y^{-}$-energy environments. From these interwoven relationships, the motion operations (4.8-4.9) determine a pair of partial differential equations of the $Y^{-}Y^{+}$ state fields ϕ_n^{+} and φ_n^{+} under the supremacy of virtual dynamics at the $Y\{x^{\nu}\}$ manifold:

$$\kappa_1\big(\check{\partial}^{\lambda_2}-\hat{\partial}_{\lambda_2}\big)\phi_n^{+}+\kappa_2\big(\check{\partial}_{\lambda_3}\check{\partial}^{\lambda_2}+\hat{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2}-\check{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2}\big)\phi_n^{+}=W_n^{+}\phi_n^{+} \tag{4.16}$$

$$\kappa_1\big(\check{\partial}_{\lambda_1}-\hat{\partial}^{\lambda_1}\big)\varphi_n^{+}+\kappa_2\big(\check{\partial}^{\lambda_2}\check{\partial}_{\lambda_1}+\hat{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1}-\check{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1}\big)\varphi_n^{+}=W_n^{+}\varphi_n^{+} \tag{4.17}$$

Under the physical supremacy in parallel fashion, the event actors has the similar sequence of the following processes:

$$\kappa_1\big(\hat{\partial}^{\lambda_1}-\check{\partial}_{\lambda_1}\big)\phi_n^{-}+\kappa_2\big(\hat{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1}+\check{\partial}^{\lambda_2}\check{\partial}_{\lambda_1}-\hat{\partial}^{\lambda_2}\check{\partial}_{\lambda_1}\big)\phi_n^{-}=W_n^{-}\phi_n^{-} \tag{4.18}$$

$$\kappa_1\big(\hat{\partial}_{\lambda_2}-\check{\partial}^{\lambda_2}\big)\varphi_n^{-}+\kappa_2\big(\hat{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2}+\check{\partial}_{\lambda_3}\check{\partial}^{\lambda_2}-\hat{\partial}_{\lambda_3}\check{\partial}^{\lambda_2}\big)\varphi_n^{-}=W_n^{-}\varphi_n^{-} \tag{4.19}$$

Together, these four formulae are named as *First Universal Field Equations*, fundamental and general to all fields of natural evolutions. For full description, please refer to section 6 of [1].

Quantum Field Equations

Intrinsically heterogeneous, one of the characteristics of spin is that the events in the Y^{+} or Y^{-}manifold transform into their opponent manifold in forms of bispinors of special relativity, reciprocally. Considering the first order $\dot{\partial}$ only, we add (4.16-4.19) together to formulate the simple compartment:

$$\frac{\hbar}{2}\left(\dot{x}_\nu\zeta_\mu D_\nu - \dot{x}^\mu\zeta^\mu D^\mu\right)\psi_n^\pm \mp E_n^\pm\psi_n^\pm = 0 \tag{4.20}$$

$$\psi_n^+ = \begin{pmatrix}\phi_n^+\\ \varphi_n^-\end{pmatrix}, \quad \overline{\psi}_n^- = \overline{\kappa}\begin{pmatrix}\varphi_n^-\\ \phi_n^+\end{pmatrix}, \quad \psi_n^- = \begin{pmatrix}\phi_n^-\\ \varphi_n^+\end{pmatrix}, \quad \overline{\psi}_n^+ = \overline{\kappa}\begin{pmatrix}\varphi_n^+\\ \phi_n^-\end{pmatrix} \tag{4.21}$$

where $\overline{\psi}_n^\pm$ is the adjoint potential and $\overline{\kappa}$ is a constant subject to renormalization. Ignoring the torsion fields χ^μ and χ_μ, we have the above compact equations reformulated into the formulae:

$$\tilde{\mathscr{L}}_D^+ = \overline{\psi}_n^-\gamma^\mu\left(i\hbar c\partial^\mu + eA^\mu\right)\psi_n^+ + mc^2\overline{\psi}_n^-\psi_n^+ \to 0 \tag{4.22}$$

$$\tilde{\mathscr{L}}_D^- = \overline{\psi}_n^+\gamma_\nu\left(i\hbar c\partial_\nu - \ eA_\nu\right)\psi_n^- - mc^2\overline{\psi}_n^+\psi_n^- \to 0 \tag{4.23}$$

where $\tilde{\mathscr{L}}_D^\pm$ is defined as the classic *Lagrangians.* As a pair of entanglements, they philosophically extend to and are known as *Dirac Equation*, introduced in 1925 [16].

For observations under an environment of $W_n^- = -ic^2V^-$ at the constant transport speed *c*, the homogeneous fields are in a trace of diagonalized tensors. From the first to the second horizon, it is dominated by the virtual time entanglement with the equation of

$$\check{\partial}_\lambda - \hat{\partial}^\lambda = \dot{x}_\nu S_2^-\partial_m - \dot{x}^m S_2^+\partial^\nu = 2ic\begin{pmatrix}\partial_\kappa\\ -\partial^\kappa\end{pmatrix} \tag{4.24}$$

Referencing the (4.17-4.18) equations for the first order of time evolution, it emerges as the *Schrödinger* equation, introduced in 1926 [17].

$$-i\hbar\frac{\partial}{\partial t}\psi = \hat{H}\psi \qquad\qquad \hat{H} \equiv -i\frac{(\hbar c)^2}{2E_n^-}\nabla^2 + V^- \tag{4.25}$$

In the gauge fields, a particle of mass *m* and charge *e* can be extended by the vector potential $\mathbf{A}$ and scalar electric potential ϕ in the form of $A^\nu = \{\phi, \mathbf{A}\}$ such that the above equation is conceivable by (8.6) as the following gauge invariant:

$$-i\hbar\zeta^0 D^\kappa\varphi^+ = -\frac{\hbar^2}{2m}(\zeta^r D^r)(\zeta^r D^r)\varphi^+ + \hat{V}\varphi^+ \qquad : D^\nu = D^\kappa + D^r \tag{4.26}$$

$$D^\kappa = \partial^t - i\frac{e}{\hbar}\phi, \qquad D^r = \partial^r - i\frac{e}{\hbar}\mathbf{A} \qquad : A^\nu = \{\phi, \mathbf{A}\} \tag{4.27}$$

Since $\gamma^r = (\sigma_x, \sigma_y, \sigma_z) \equiv \boldsymbol{\sigma}$, the *Schrödinger* Equation becomes the general form of *Pauli Equation*, formulated by *Wolfgang Pauli* in 1927 [18]:

$$i\hbar\frac{\partial}{\partial t}|\varphi^+\rangle = \left\{\frac{1}{2m}\left[\boldsymbol{\sigma}\cdot\left(\mathbf{p} - e\mathbf{A}\right)\right]^2 + e\phi + \hat{V}\right\}|\psi\rangle \equiv \check{H}\,|\varphi^+\rangle \tag{4.28}$$

$$\mathbf{p} = -i\hbar\partial^r, \qquad \boldsymbol{\sigma} = (\sigma_x, \sigma_y, \sigma_z) \qquad : \chi^\nu \mapsto 0,\ \partial^t = -\partial_t \tag{4.29}$$

where $\mathbf{p}$ is the kinetic momentum. The *Pauli* matrices can be removed from the kinetic energy term, using the *Pauli* vector identity:

$$(\boldsymbol{\sigma}\cdot\mathbf{a})(\boldsymbol{\sigma}\cdot\mathbf{b}) = \mathbf{a}\cdot\mathbf{b} + i\boldsymbol{\sigma}\cdot(\mathbf{a}\times\mathbf{b}) \qquad : \gamma^r = (\sigma_x, \sigma_y, \sigma_z) \equiv \boldsymbol{\sigma} \tag{4.30}$$

to obtain the standard form of *Pauli Equation* [19],

$$i\hbar\frac{\partial}{\partial t}|\psi\rangle = \left\{\frac{1}{2m}\left(\mathbf{p} - e\mathbf{A}\right)^2 - \frac{e\hbar}{2m}\boldsymbol{\sigma}\cdot\mathbf{B} + \tilde{V}\right\}|\psi\rangle \equiv \check{H}\,|\psi\rangle \tag{4.31}$$

where $\mathbf{B} = \nabla\times\mathbf{A}$ is the magnetic field and $\tilde{V} = \hat{V} + e\phi$ is the total potential including the horizon potential $e\phi$. The *Stern–Gerlach* term, $e\hbar\boldsymbol{\sigma}\cdot\mathbf{B}/(2m)$, acquires the spin orientation of atoms with the valence electrons flowing through an inhomogeneous magnetic field [20].

In flux-continuities, a pair of virtual and physical energies in each of the asymmetric entanglements to give rise to the strong forces at higher horizons of *SU*(2) and *SU*(3). Therefore, under a trace of the diagonalized tensors, The equations (4.16-4.19) aggregate a duality of the area flux-continuities, equivalent to the *Lagrangians or Area Flex* Entropy:

$$\mathscr{L}^{SU1}_{Flux} = \left[\nabla^2\right]_n \Phi_n - \left\langle \frac{1}{c^2}\frac{\partial^2}{\partial t^2}\right\rangle_n \Phi_n = 4\frac{E_n^- E_n^+}{(\hbar c)^2}\Phi_n \qquad : \Phi_n = \frac{1}{2}\left(\Phi_n^+ + \Phi_n^-\right) \tag{4.32}$$

The area flow of energy, $4E_n^- E_n^+/(\hbar c)^2$, represents a pair of the irreducible density units $E_n^- E_n^+$ that exists alternatively between the physical-particle E_n^- and virtual-wave E_n^+ states.

Symmetric Fields

Symmetry is the law of natural conservations that a system is preserved or remains unchanged or invariant under some transformations or transportations. As a duality, there is always a pair of intrinsics reciprocal conjugation: $Y^- Y^+$ symmetry. In mathematics, the *World Equations* of (4.3) can be rewritten and named as a second type of *World Equations*:

$$W_b = \langle W_0^\pm \rangle + \sum_n h_n \left[\kappa_1 \langle \dot\partial_\lambda \rangle^\pm + \kappa_2 \dot\partial_{\lambda_2} \langle \dot\partial_{\lambda 1} \rangle_s^\pm + \kappa_3 \dot\partial_{\lambda_3} \langle \dot\partial_{\lambda 2} \rangle_v^\pm \cdots \right] \qquad : \textit{Second World Equation} \tag{4.33}$$

where κ_n is the coefficient of each order n of the event $\lambda^n = \lambda_1 \lambda_2 \cdots \lambda_n$ aggregation. The above equations are constituted by the scalar fields: $\phi^\pm$ and $\varphi^\mp$ giving rise to their tangent vector fields at the third horizon (index v), and their tensor fields at higher horizons. Add φ_n^- times (4.16) and $\varphi_n^+ \mapsto V_n^+$ times (4.19), we constitute a density commutation of the Y^+ fluxion of density continuity $\dot\partial_\lambda \mathbf{f}_v^+ = \kappa_f \langle \hat\partial_\lambda \hat\partial_\lambda, \check\partial^\lambda \check\partial^\lambda \rangle^+$ in forms of the Y^+ symmetric formulation:

$$\dot\partial_\lambda \mathbf{f}_s^+ = \langle W_0 \rangle^+ - \kappa_1 \left[\check\partial^{\lambda_2} - \hat\partial_{\lambda_2}\right]_s^+ + \kappa_2 \left\langle \check\partial_{\lambda_3} \left(\hat\partial_{\lambda_2} - \check\partial^{\lambda_2}\right)\right\rangle_s^+ + \mathbf{g}_a^- / \kappa_g^- \tag{4.34}$$

$$\mathbf{g}_a^- / \kappa_g^- = \left[\hat\partial_\lambda \hat\partial_\lambda, \check\partial^\lambda \check\partial^\lambda\right]_a^+ + \zeta^+ \qquad : \kappa_1 = \frac{\hbar c^2}{2},\ \kappa_2 = -\frac{(\hbar c)^2}{2E^+},\ \zeta^+ = \left(\hat\partial_{\lambda_2} \check\partial^{\lambda_2} - \hat\partial_{\lambda_2} \check\partial_{\lambda_3}\right)_v^+ \tag{4.35}$$

where a pair of potentials $\{\phi_n^+, \varphi_n^-\}$ is mapped to their vector potential $\{\phi_n^+, V_n^-\}$. The entangle bracket $\dot\partial_\lambda \mathbf{f}_v^+ = \langle \hat\partial_\lambda \hat\partial_\lambda, \check\partial^\lambda \check\partial^\lambda \rangle_v^+$ features the Y^+ continuity for their vector potentials. As one set of the universal laws, the events incepted in the virtual world not only generate its opponent reactions but also create and conduct the real-life objects in the physical world, because the asymmetric element $\zeta^\nu \mapsto L_\nu^+$ embeds the bidirectional reactions $\hat\partial_\lambda$ and $\check\partial^\lambda$ entangling between the $Y^- Y^-$ manifolds asymmetrically. In a parallel fashion, there is another dual state fields $\{\phi_n^-, \varphi_n^+\}$ mapped to their vector potentials $\{\phi_n^-, V_n^+\}$ in the dynamic equilibrium, given by $\varphi_n^+ \mapsto V_n^+$ times (4.18) and ϕ_n^- times (4.17). Adding the two formulae, we institute Y^- fluxion of density continuity $\dot\partial_\lambda \mathbf{f}_v^- = \kappa_f \langle \check\partial_\lambda \check\partial_\lambda, \hat\partial^\lambda \hat\partial^\lambda \rangle^-$ of the Y^- general formulation:

$$\dot\partial_\lambda \mathbf{f}_s^- = \langle W_0^- \rangle + \kappa_1 \left[\check\partial_{\lambda_1} - \hat\partial^{\lambda_1}\right]_v^- + \kappa_2 \left\langle \check\partial_{\lambda_1} \left(\hat\partial^{\lambda_2} - \check\partial^{\lambda_2}\right)\right\rangle_v^- + \mathbf{g}_a^+ / \kappa_g^+ \tag{4.36}$$

$$\mathbf{g}_a^+ / \kappa_g^+ = \left[\check\partial_\lambda \check\partial_\lambda, \hat\partial^\lambda \hat\partial^\lambda\right]_v^- + \zeta^- \qquad : \kappa_1 = \frac{\hbar c^2}{2},\ \kappa_2 = \frac{(\hbar c)^2}{2E^-},\ \zeta^- = \left(\check\partial^{\lambda_2} \hat\partial^{\lambda_1} - \hat\partial^{\lambda_2} \check\partial_{\lambda_1}\right)_v^- \tag{4.37}$$

where a pair of potentials $\{\phi_n^-, \varphi_n^+\}$ is mapped to their vector potential $\{\phi_n^-, V_n^+\}$. The entangle bracket $\langle \check\partial_\lambda \check\partial_\lambda, \hat\partial^\lambda \hat\partial^\lambda \rangle_v^- = \dot\partial_\lambda \mathbf{f}_v^-$ of the general dynamics features the Y^- continuity for their vector potentials. As another set of the laws, the events initiated in the physical world have to leave a life copy of its mirrored images in the virtual world without an intrusive effect into the virtual world, because the asymmetric element $\zeta_\nu \mapsto L_\nu^-$ doesn't have the reaction $\hat\partial_\lambda$ to the Y^- manifold. In other words, the virtual world is aware of and immune to the physical world.

Similar to derive the quantum field dynamics at the second horizons, we have derived the fluxions of density commutation (4.34) and continuity (4.36) at the third horizon, where a bulk system of *N* particles aggregates into macroscopic domain associated with thermodynamics. At a view of the symmetric system (4.36) that the Y^- continuity of density is sustained by both commutation $[\check\partial^\lambda - \hat\partial_\lambda]^-$ and continuity $\langle \check\partial_\lambda (\hat\partial^\lambda - \check\partial^\lambda) \rangle^-$, it implies that

1. The horizon is given rise to the physical world by the commutative forces of fluxions; and
2. The continuity mechanism is a primary vehicle of the Y^- supremacy for its operational actions.

Since a pair of the equations (4.34) and (4.36) is generic or universal, it is called *Second Universal Field Equations,* representing the conservations of symmetric $\zeta^\pm = 0$ dynamics, and of asymmetric $\zeta^\pm \neq 0$ motions at a macroscopic regime or the condensed matter. As a precise duality, the asymmetry coexists with symmetric continuity to extend discrete subgroups, and exhibits additional dynamics to operate spacetime motions and to carry on the symmetric system as a whole.

Electrodynamics and Gravitation

At the third or higher horizon, dynamics of the vector potentials might be out scope of *Ontology*. Nevertheless, at the third horizon, a pair of the flux commutations above can derive the electromagnetic and gravitational fields, shown by the following:

$$\nabla \cdot \left(\mathbf{B}_q^- + \eta \mathbf{B}_g^-\right) = 0^+ \qquad : \eta = c_g/c \tag{4.38}$$

$$\nabla \cdot \left(\mathbf{D}_q^+ + \eta \mathbf{D}_g^+\right) = \rho_q - 4\pi G \eta \rho_g \tag{4.39}$$

$$\nabla \times \left(\mathbf{E}_q^- + \mathbf{E}_g^-\right) + \frac{\partial}{\partial t}\left(\mathbf{B}_q^- + \mathbf{B}_g^-\right) = 0^+ \tag{4.40}$$

$$\nabla \times \left(\mathbf{H}_q^+ + \mathbf{H}_g^+\right) - \frac{\partial}{\partial t}\left(\mathbf{D}_q^+ + \mathbf{D}_g^+\right) = \mathbf{J}_q - 4\pi G \mathbf{J}_g \tag{4.41}$$

where the index q for *Electromagnetism* and g for *Gravitation* fields. For full details, please refer to section III of [1].

V. FIELD EVOLUTIONS

When an event gives rise to the states crossing each of the horizon boundary, an *evolutionary* process takes place. One of such actions is the field loops $(\partial^\nu A^\mu - \partial_\mu A_\nu)_{jk}$ that incept a superphase process into the physical world from the virtual Y^+ regime where a virtual instance is imperative and known as a process of creations or annihilations. Because it is a world event incepted on the two dimensional planes $\{\mathbf{r} \mp i\mathbf{k}\}$ residually, the potential fields of massless instances can transform, transport and emerge the mass objects symmetrically into the physical world that extends the extra two-dimensional freedom. Within the second horizon, this virtual evolution is *implicit* until it embodies as an energy enclave of the acquired mass, and associates with strong nuclear and gravitational energy in the next horizon.

As a duality of nature, its counterpart is another process named the Y^- *Explicit Reproduction* $(\dot{x}_\nu D_\nu)_j \wedge (\dot{x}^\mu D^\mu)_k$. It requires a physical process of the Y^- reaction or annihilation for *Animation*. Associated with the inception of a Y^+ spontaneous evolution, the actions of the Y^- *explicit* reproduction are normally sequenced and entangled as a chain of reactions to produce and couple the weak electromagnetic and strong gravitational forces symmetrically in massive dynamics between the second and third horizons.

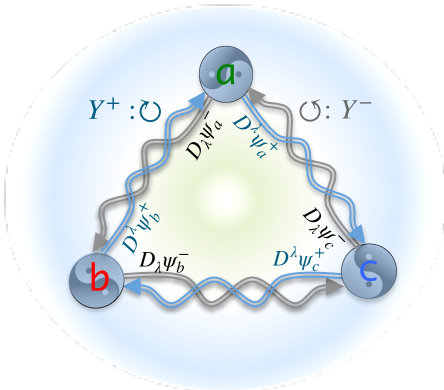

Figure 5: Two Implicit Loops of Triple Explicit Entanglements

As a part of infrastructure of universe, the principle of the chain of least reactions in nature is for three particles to form a loop. Confined within a triplet group, the particles jointly institute a double streaming entanglement with the three action states, illustrated in Figure 5.

Superphase Actions

At the second horizon of the event evolutionary processes, the Y^-Y^+ fields yield the holomorphic superphase modulation, continue to give rise to the next horizons, and develop the complex event λ-series (4.1) in term of an infinite sum of operations:

$$\check{\partial} = \dot{x}_\nu \zeta_\nu D_\nu = \dot{x}_\nu \zeta_\nu \partial_\nu + i\,\dot{x}_\nu \zeta_\nu \left(\Theta_\nu + \tilde{\kappa}_2^- \dot{\Theta}_{\mu\nu} + \cdots\right) \tag{5.1a}$$

$$\Theta_\nu = \frac{\partial \vartheta(\lambda)}{\partial x_\nu}, \qquad \dot{\Theta}_{\nu\mu} = \frac{\partial A_\mu}{\partial x_\nu} - \frac{\partial A_\nu}{\partial x_\mu} = F_{\nu\mu}^{-n}, \qquad \tilde{\kappa}_2^- = 1/2 \tag{5.1b}$$

$$\hat{\partial} = \dot{x}^\nu \dot{\zeta}^\nu D^\nu = \dot{x}^\nu \zeta^\nu \partial^\nu - i\,\dot{x}^\nu \zeta^\nu \left(\Theta^\nu + \tilde{\kappa}_2^+ \dot{\Theta}^{\nu\mu} + \cdots\right) \tag{5.2a}$$

$$\Theta^\nu = \frac{\partial \vartheta(\lambda)}{\partial \lambda}, \qquad \dot{\Theta}^{\nu\mu} = \frac{\partial A^\mu}{\partial x^\nu} - \frac{\partial A^\nu}{\partial x^\mu} = F_{\nu\mu}^{+n}, \qquad \tilde{\kappa}_2^+ = (\tilde{\kappa}_2^-)^* \tag{5.2b}$$

Under a series of the superphase Θ^ν actions, the events give rise to horizon of the vector potentials $F_{\nu\mu}^{\pm n}$. Naturally, defined as the event operation or similar to the classical *Spontaneous Breaking*, it involves the evolutionary and symmetric processes of the natural *Creation* and its complement duality known as *Annihilation*. From the first type of *World Equations*

(4.5-4.6), the virtual superphase events under both of the Y^-Y^+ reactions $\psi^\pm$ evolve their density of the circular process, simultaneously:

$$\hat{W}_n = \left[\psi^+(\hat{x},\lambda) + \kappa_1^+\hat{\partial}\psi^+(\hat{x},\lambda)\cdots\right]\left[\psi^-(\check{x},\lambda) + \kappa_1^-\check{\partial}\psi^-(\check{x},\lambda)\cdots\right] = \psi^+\psi^- + k_J J_s + k_\wedge\left(\hat{\partial}\psi^+\right)\wedge\left(\check{\partial}\psi^-\right) \quad (5.3)$$

$$J_s = \frac{\hbar}{2mi}\left(\psi^+\check{\partial}\psi^- + \psi^-\hat{\partial}\psi^+\right) = \left\{ic\rho, \mathbf{J}\right\} \quad (5.4)$$

The first term $\psi^+\psi^-$ is the ground density, and the second term J_s is the probability current or flux. Apparently, the third term constructs the horizon interactions. Since the tensor product has two symmetric types, the tensors react upon each other, symbolized by the wedge product $\wedge$ as the following: $\hat{W}_n = \psi^+\psi^- + J_s + \left(\dot{x}^\mu\zeta^\mu D^\lambda\psi_j^+\right)\wedge\left(\dot{x}_\nu\zeta_\mu D_\lambda\psi_k^-\right)$

$$\left(\hat{\partial}\psi_j^+\right)\wedge\left(\check{\partial}\psi_k^-\right) = \left(\dot{x}^\mu\zeta^\mu D^\lambda\psi_j^+\right)\wedge\left(\dot{x}_\nu\zeta_\mu D_\lambda\psi_k^-\right) \quad (5.5)$$

where the symbol $j,k \in \{a,b,c\}$ indicates a triangle loop of three objects. The equation (5.3) is named as *Horizon Equations of Ontological Evolution.*

$$\hat{W}_{jk} = \psi^+\psi^- + \kappa_J J_s + \dot{x}^\mu\zeta^\mu\left(\partial^\mu - i\frac{e}{\hbar}A^\mu - \frac{1}{2}F_{\mu\nu}^{+n}\cdots\right)\psi_j^+ \wedge \dot{x}_\nu\zeta_\nu\left(\partial_\nu + i\frac{e}{\hbar}A_\nu + \frac{1}{2}F_{\nu\mu}^{-n}\cdots\right)\psi_k^- \quad (5.6)$$

Therefore, the actions of double wedge circulations $\wedge$ in the above figure have the natural interpretation of the entangling processes:

$$\circlearrowleft : \ (D_\lambda\psi_a^- \to D_\lambda\psi_b^- \to D_\lambda\psi_c^-)^{\urcorner} \qquad : \textit{Right-hand Loop} \quad (5.7a)$$

$$\circlearrowright : \ {}^{\ulcorner}(D^\lambda\psi_b^+ \leftarrow D^\lambda\psi_c^+ \leftarrow D^\lambda\psi_a^+) \qquad : \textit{Left-hand Loop} \quad (5.7b)$$

$$\{D_\lambda\psi_a^-, D^\lambda\psi_b^+\}, \{D_\lambda\psi_b^-, D^\lambda\psi_c^+\}, \{D_\lambda\psi_c^-, D^\lambda\psi_a^+\} \qquad : \textit{Triple States} \quad (5.8)$$

Acting upon each other, the triplets are streaming a pair of the Y^-Y^+ *Double-Loops* implicitly, and the *Triple States* of entanglements explicitly.

Evolutionary Equations

The *Ontological Evolution* might be conveniently expressed in forms of *Horizon Lagrangians* of virtual creation and physical reproduction. Considering the second orders of the ψ_n^- and ψ_n^+ times into (4.16-4.19) equations, one comes out with the quantum fields that extend a pair of the first order *Dirac* equations of (4.2,4.23) into the second orders in the forms of *Lagrangians* respectively:

$$\tilde{\mathscr{L}}_s^+ = \overline{\psi}_n^-\left(i\frac{\hbar}{c}\zeta^\mu D^\mu + m\right)\psi_n^+ - \frac{1}{c^2}\overline{\psi}_n^-\zeta^\mu\check{\partial}_\lambda\hat{\partial}_\lambda\psi_n^+ \qquad : \tilde{\mathscr{L}}_s^+ = -\frac{1}{c^2}\left[\hat{\partial}^\lambda\hat{\partial}^\lambda, \check{\partial}_\lambda\check{\partial}_\lambda\right]_s^+ \quad (5.9a)$$

$$\tilde{\mathscr{L}}_s^- = \overline{\psi}_n^+\left(i\frac{\hbar}{c}\zeta_\nu D_\nu - m\right)\psi_n^- - \frac{1}{c^2}\overline{\psi}_n^+\zeta_\nu\hat{\partial}_\lambda\check{\partial}^\lambda\psi_n^- \qquad : \tilde{\mathscr{L}}_s^- = -\frac{1}{c^2}\left[\hat{\partial}^\lambda\hat{\partial}^\lambda, \check{\partial}_\lambda\check{\partial}_\lambda\right]_s^- \quad (5.9b)$$

As a pair of dynamics, it defines and generalizes a duality of the interactions among spinors, electromagnetic and gravitational fields. The nature of the commuter $[\hat{\partial}_\lambda\check{\partial}^\lambda, \check{\partial}_\lambda\hat{\partial}_\lambda]^\pm$ is the horizon interactions (5.6) with the mapping $\hat{\partial}_\lambda\check{\partial}^\lambda \mapsto (\dot{x}^\mu\zeta^\mu D^\lambda\hat{\psi})\wedge(\dot{x}^\nu\zeta^\nu D_\lambda\check{\psi})$. Applying the transform conversion (3.6), the above equations for a group of the triplet quarks generalize a set of the classic *Lagrangians*:

$$\tilde{\mathscr{L}}_h^a = \tilde{\mathscr{L}}_s^+ + 2\tilde{\mathscr{L}}_s^- = \mathscr{L}_D^{-a} + \left(\overline{\psi}_c^-\frac{\dot{x}_\nu}{c}\zeta^\nu D^\lambda\psi_a^+\right)\wedge\left(\overline{\psi}_b^+\frac{\dot{x}^\mu}{c}\zeta_\mu D_\lambda\psi_a^-\right) \quad (5.10)$$

$$\tilde{\mathscr{L}}_h^a \equiv \mathscr{L}_D + \mathscr{L}_\psi + \mathscr{L}_C + \mathscr{L}_F + \mathscr{L}_M \qquad : \psi_k^+\psi_j^- \to 1 \quad (5.11)$$

$$\mathscr{L}_D \equiv \overline{\psi}_k^\pm i\frac{\hbar}{c}\zeta^\mu D_\nu\psi_j^\mp \mp m_j \qquad : j,k \in \{a,b,c\} \quad (5.12)$$

$$\mathscr{L}_\psi = -\frac{1}{c^2}\left(\overline{\psi}_c^-\dot{x}_\nu\zeta^\mu\partial^\mu\psi_a^+\right)\left(\overline{\psi}_b^-\dot{x}^\mu\zeta_\nu\partial_\nu\psi_a^-\right) \qquad : \dot{x}^\nu\dot{x}^\mu = c^2 \quad (5.13)$$

$$\mathscr{L}_C = \frac{e}{2\hbar}\left\langle\zeta_\nu A_\nu\zeta^\mu F_{\mu\nu}^{+n}, \zeta^\mu A^\mu\zeta_\nu F_{\nu\mu}^{-n}\right\rangle_{jk}^- \qquad : \tilde{\kappa}_2^+ = \tilde{\kappa}_2^- = \frac{1}{2} \quad (5.14)$$

$$\mathscr{L}_F = i\frac{e}{\hbar}\left[\zeta^\nu\partial^\nu(\zeta_\mu A_\mu), \zeta_\mu\partial_\mu(\zeta^\nu A^\nu)\right]^-_{jk} - \frac{\alpha c}{\hbar}\left(\zeta^\mu A^\mu \zeta_\nu A_\nu\right)_{jk} \qquad : \alpha = e^2/(\hbar c) \tag{5.15}$$

$$\mathscr{L}_M = \frac{i}{2}\left[\zeta^\nu\partial^\nu(\zeta_\nu F^{-n}_{\nu\mu}), \zeta_\mu\partial_\mu(\zeta^\mu F^{+n}_{\mu\nu})\right]^-_{jk} - \frac{1}{4}\left(\zeta^\nu F^{+n}_{\nu\mu}\right)_j\left(\zeta_\mu F^{-n}_{\mu\nu}\right)_k \tag{5.16}$$

where the *Lagrangians* are normalized at $\psi_k^+\psi_j^- = 1$. The fine-structure constant $\alpha = e^2/(\hbar c)$ arises naturally in coupling horizon fields. The $\mathscr{L}_\psi$ has the kinetic motions under the second horizon, the forces of which are a part of the horizon transform and transport effects characterizable explicitly when observed externally to the system. The $\mathscr{L}_D$ is a summary of Dirac equations over the triple quarks. The $\mathscr{L}_C$ is the binding or coupling force between the horizons. The $\mathscr{L}_F$ has the actions giving rise to the electromagnetic and gravitational fields of the third horizon. Similarly, the $\mathscr{L}_M$ has the actions giving rise to the next horizon.

At the infrastructural core of the evolution, it implies that a total of the three states exists among two $\tilde{\mathscr{L}}_s^-$ and one $\tilde{\mathscr{L}}_s^+$ dynamics to compose an integrity of the dual fields, revealing naturally the particle circling entanglement of three "colors" [21], uncoiling the event actions [22], and representing an essential basis of the "global gauge." The *Standard Model*, developed in the mid-1960-70s [23] breaks various properties of the weak neutral currents and the *W* and *Z* bosons with great accuracy. Specially integrated with the superphase potentials, our scientific evaluations to this groundwork of *Evolutionary Equations* (5.10) might promote a way towards concisely exploring physical nature, universal messages, and beyond.

Quantum Electrodynamics

Considering $\zeta^\mu \to \gamma^\mu$ and ignoring the higher orders and the coupling effects, we simplify the $\mathscr{L}_F$ and $\mathscr{L}_M$ for the Y^+ streaming of (5.15, 5.16):

$$\mathscr{L}_F(\gamma) \approx -\frac{e^2}{\hbar^2}\left(\gamma^\mu A^\mu \gamma_\nu A_\nu\right)_{jk} \equiv -\frac{1}{4}W^{+j}_{\mu\nu}W^{-k}_{\nu\mu} \tag{5.17}$$

$$\mathscr{L}_M(\gamma) \approx -\frac{1}{4}\left(\gamma^\nu F^{+n}_{\nu\mu}\gamma_\mu F^{-n}_{\mu\nu}\right)_{jk} = -\frac{1}{4}F^{+j}_{\nu\mu}F^{-k}_{\mu\nu} \tag{5.18}$$

At the second horizon, the $\zeta^\mu \to \gamma^\mu$ is contributed to the weak isospin fields $W^{+j}_{\mu\nu}W^{-k}_{\nu\mu}$ of coupling actions. Meanwhile, at the third horizon, the gamma γ^μ fields are converted and accord to the hypercharge $F^{+j}_{\nu\mu}F^{-k}_{\mu\nu}$ actions of electroweak fields. Therefore, the *Lagrangian* $\tilde{\mathscr{L}}_h^a$ becomes $\tilde{\mathscr{L}}_h^a \approx \mathscr{L}_D + \mathscr{L}_F + \mathscr{L}_M \equiv \mathscr{L}_Y^a$, which, in mathematics, comes out as *Quantum Electrodynamics* (*QED)* that extends from a pair of the first order *Dirac* equations to the second orders in the form of a *SU*(2) + *SU*(3) *Lagrangian* [24]:

$$\mathscr{L}_Y^a \equiv \left(\bar{\psi}_j^\mp i\frac{\hbar}{c}\gamma^\nu D_\nu \psi_i^\pm\right)_{jk} - \frac{1}{4}F^{+j}_{\nu\mu}F^{-k}_{\mu\nu} - \frac{1}{4}W^{+j}_{\mu\nu}W^{-k}_{\nu\mu} \tag{5.19}$$

where $j, k \in \{a, b, c\}$ is the triplet particles. When the strong torque of gravitation fields are ignored, the above equation is known as *Yang-Mills* theory, introduced in 1954 [25]. As one of the most important results, *Yang–Mills* theory represents *Gauge Invariance*:

1. The classic *Asymptotic Freedom* from a view of the physical coordinates;
2. A proof of the confinement property in the presence of a group of the triple-color particles; and
3. Mass acquisition processes symmetrically from the second to third horizon, describable by Eq. (3.9, 3.10).

Since the quanta of the superphase fields is massless with gauge invariance, *Yang–Mills* theory represents that particles are semi-massless in the second horizon, and acquire their full-mass through evolution of the full physical horizon. Extended to the philosophical interpretation, it represents mathematically: conservation of *Double Loops of Triple Entanglements*, or *Law of Conservation of Evolutions of Ontology* philosophically illustrated by Figure 5.

The magic lies at the heat of the horizon process driven by the entangling action $\varphi_n^-\check{\partial}^\lambda\hat{\partial}_\lambda\phi_n^+$, which gives rise from the ground and second horizon *SU*(2)×*U*(1) implicitly to the explicit states *SU*(2) through the evolutionary event operations, The horizon force is symmetrically conducted or acted by an ontological process as a part of the evolutionary actions that give rise to the next horizon *SU(3*). Under a pair of the event operations, an evolutionary action creates and populates a duality of the quantum symmetric density $\psi_n^+\psi_n^-$ for the entanglements among spins, field transforms, and torque transportations. Evolving into the *SU(3)* horizon, the gauge symmetry is associated with the electro-weak and graviton-weak forces to further generate masses that particles separate the electromagnetic and weak forces, and embrace with the strong coupling forces globally. The first order of the commutators is the gauge field:

$$\mathscr{L}_F(\gamma) = i\frac{e}{\hbar}\left[\gamma_\mu \partial_\mu(\gamma^\nu A_a^\nu), \gamma^\nu \partial^\nu(\gamma_\mu A_\mu^a)\right]^- - \frac{e^2}{\hbar^2}\left(\gamma_\mu A_\mu^b \gamma^\nu A_c^\nu\right) \tag{5.20}$$

As the gamma γ^ν function is a set of the constant matrices, it is equivalent in mathematics to the *Gauge Invariance* of *Standard Model*:

$$\mathscr{L}_F(\gamma) \mapsto F_{\nu\mu}^a = \partial_\nu A_\mu^a - \partial_\mu A_\nu^a + g_\gamma f_\gamma^{abc} A_\nu^b A_\mu^c \tag{5.21}$$

where the $F_{\nu\mu}^a$ is obtained from potentials $eA_\mu^n/\hbar$, g_γ is the coupling constant, and the f_γ^{abc} is the structure constant of the gauge group *SU*(2), defined by the group generators [23] of the *Lie algebra*. From the given *Lagrangians* $\mathscr{L}_C$ and $\mathscr{L}_M$ in term of the gamma ζ^ν matrix, one can derive to map the equations of motion dynamics, expressed by the following

$$\partial^\mu(\zeta^\mu F_{\mu\nu}^a) + g f^{abc} \zeta^\mu A_\mu^b \zeta_\nu F_{\mu\nu}^c = -J_\nu^a \tag{5.22}$$

where J_ν^a is the potential current.

Conservations of Loop Dynamics

Besides, it holds an invariant principle of the double-loop implicit entanglements, or known as a *Bianchi or Jacobi* identity [26, 27]:

$$(D_\mu F_{\nu\kappa})^a + (D_\kappa F_{\mu\nu})^b + (D_\nu F_{\kappa\mu})^c = 0 \tag{5.23a}$$

$$[D_\mu, [D_\nu, D_\kappa]] + [D_\kappa, [D_\mu, D_\nu]] + [D_\nu, [D_\kappa, D_\mu]] = 0 \tag{5.23b}$$

As a property of the placement of parentheses in a multiple product, it describes how a sequence of events affects the result of the operations. For commutators with the associative property $(xy)z = x(yz)$, any order of operations gives the same result or a loop of the triplet particles is gauge invariance. Philosophically, this is *Law of Conservation of Least Entanglement*

As a duality of double-loops, the loop entanglement involves a reciprocal pair of both normal particles and antiparticles. This consistency preserves their momentum while changing their quantum internal states. Known as the *Yang–Baxter Equation*, it states that a matrix R, acting on two out of three objects, satisfies the following equation

$$(R \otimes \mathbf{1})(\mathbf{1} \otimes R)(R \otimes \mathbf{1}) = (\mathbf{1} \otimes R)(R \otimes \mathbf{1})(\mathbf{1} \otimes R) \qquad : e^{i\vartheta} \mapsto e^{-i\vartheta} \tag{5.24}$$

where R is an invertible linear transformation on world planes, and *I* is the identity. Under the yinyang principle of $Y^-\{e^{i\vartheta}\} \mapsto Y^+\{e^{-i\vartheta}\}$, a quantum system is integrable with or has conservation of the particle-antiparticle entanglement or philosophically *Law of Conservation of Antiparticle Entanglement*.

Quantum Chromodynamics

Given the rise of the horizon from the scalar potentials to the vectors through the tangent transportations, the *Lagrangian* above can further give rise from transform-primacy $\zeta^\nu \approx \gamma^\nu$ at the second horizon $\gamma^\nu F_{\nu\mu}^{\pm n}$ to the strong torque at the third horizon, where the chi $\zeta^\nu \approx \chi^\nu$ fields correspond to the strength tensors $\chi^\nu F_{\nu\mu}^{\pm n}$ for the spiral actions of superphase modulation. Once at the third horizon, the field forces among the particles are associated with the similar gauge invariance of the $\gamma^\nu \to \chi^\nu$ transportation dynamics, given by (5.12) $\mathscr{L}_D(\gamma)$ and (5.15) for $\mathscr{L}_F(\chi) \mapsto G_{\nu\mu}^a$ as the following:

$$\mathscr{L}_{QCD}(\chi) = \bar{\psi}_n^-\left(i\frac{\hbar}{c}\gamma_\nu D_\nu - m\right)\psi_n^+ - \frac{1}{4}G_{\nu\mu}^n G_{\nu\mu}^n + \mathscr{L}_{CP}(\chi) \tag{5.25}$$

$$G_{\nu\mu}^a = i\frac{e}{\hbar}\left[\chi_\mu \partial_\mu(\chi^\nu A_a^\nu), \chi^\nu \partial^\nu(\chi_\mu A_\mu^a)\right]^- - \frac{e^2}{\hbar^2}\left(\chi_\mu A_\mu^b \chi^\nu A_c^\nu\right) \tag{5.26}$$

Coincidentally, this is similar to the quark coupling theory, known as classical *Quantum Chromodynamics (QCD)*, discovered in 1973 [28]. Philosophically, the torque chi-matrix of gravitation plays an essential role in kernel interactions, appearing as a type of strong forces. It illustrates that the carrier particles of a force can radiate further carrier particles during the rise of horizons. The interactions, coupled with the strong forces, are given by the term of *Dirac* actor $\mathscr{L}_D(\chi)$ under the spiral torque of chi-matrix:

$$\mathscr{L}_{CP}(\chi) = i\frac{\hbar}{c}\left(\bar{\psi}_n^+ \chi_\nu D_\nu \psi_n^-\right)_{jk} \mapsto -\frac{e}{c}\left(\bar{\psi}_n^+ \chi_\nu A_\nu \psi_n^-\right)_{jk} \tag{5.27}$$

Mathematically, *QCD* is an abelian gauge theory with the symmetry group *SU(3)*×*SU*(2)×*U*(1). The gauge field, which mediates the interaction between the charged spin-1/2 fields, involves the coupling fields of the torque, hypercharge and gravitation, classically known as *Gluons* - the force carrier, similar to photons. As a comparison, the gluon energy for the spiral force coupling with quantum electrodynamics has a traditional interpretation of *Standard Model:*

$$\mathscr{L}_{CP} = ig_s\left(\bar{\psi}_n^+ \gamma^\mu G_\mu^a T^a \psi_n^-\right)_{jk} \qquad : \chi_\nu A_\nu^a \mapsto \gamma^\mu G_\mu^a T^a \tag{5.28}$$

The g_s is the strong coupling constant, G_μ^a is the 8-component *SO*(3) gauge field, and T_{ij}^a are the 3×3 *Gell-Mann* matrices [29], introduced in 1962, as generators of the *SU*(2) color group.

Time-Independent Physical Dynamics

For a physical system in spatial evolution at any given time, the equation (9.20) can be used to abstract the *Evolutionary Equations* (19.5) and its *Lagrangians* (19.10) to a set of special formulae:

$$\tilde{\mathscr{L}}_h^a = \tilde{\mathscr{L}}_s^+ + 2\tilde{\mathscr{L}}_s^- = \mathscr{L}_D^{-a} + \overline{\psi}_j\left(\hat{\partial} \wedge \check{\partial}\right)\psi_k \qquad : \nu, \mu \in \{1,2,3\} \tag{5.29}$$

$$\hat{\partial} \wedge \check{\partial} = \dot{x}^\mu \dot{x}_\nu\left(\hat{D} \cdot \check{D} + i\zeta^\mu \cdot \hat{D} \times \check{D}\right) \qquad : \tilde{\zeta}^\nu \mapsto \zeta^\nu = \gamma^\nu + \chi^\nu \tag{5.30}$$

$$\hat{D} \cdot \check{D} = \left(\partial^\mu - i\frac{e}{\hbar}A^\mu - \frac{1}{2}F_{\mu\nu}^{+n}\cdots\right) \cdot \left(\partial_\nu + i\frac{e}{\hbar}A_\nu + \frac{1}{2}F_{\nu\mu}^{-n}\cdots\right) \tag{5.31}$$

$$\hat{D} \times \check{D} = \left(\partial^\mu - i\frac{e}{\hbar}A^\mu - \frac{1}{2}F_{\mu\nu}^{+n}\cdots\right) \times \left(\partial_\nu + i\frac{e}{\hbar}A_\nu + \frac{1}{2}F_{\nu\mu}^{-n}\cdots\right) \tag{5.32}$$

This concludes a unification of the spatial horizon and operations of the quantum fields philosophically describable by the two implicit loops $\hat{D} \times \check{D}$ of triple explicit $\hat{D} \cdot \check{D}$ entanglements, concisely and fully pictured by Figure 5.

Law of Field Evolutions

Under the principle of the *Universal Topology*, the weak and strong force interactions are characterizable and distinguishable under each scope of the horizons. Philosophically, the nature comes out with the *Law of Field Evolutions* concealing the characteristics of *Horizon Evolutions*:

1. Ontological forces are not transmitted directly between interacting objects, but instead are described and interrupted by intermediary entities of fields.
2. Fields are a set of the natural energies that appear as dark or virtual, streaming their natural intrinsic commutations for living operations, and alternating the Y^-Y^+ supremacies consistently throughout entanglement.
3. At the second horizon *SU*(2), a force is incepted or created by the double loops of triple entanglements. The Y^+ manifold supremacy generates or emerges the off-diagonal elements of the potential fields embodying mass enclave and giving rise to the *third* horizon, a process traditionally known as *Weak Interaction*.
4. As a natural duality, a stronger force is reproduced dynamically and animated symmetrically under the Y^- supremacy, dominated by the diagonal elements of the field tensors.
5. Together, both of the Y^-Y^+ processes orchestrate the higher horizon, composite the interactive forces, redefine the simple symmetry group *U*(1)×*SU*(2) ×SU(3), and obey the entangling invariance, known as *Ontological Evolution.*
6. An integrity of strong nuclear forces is characterizable at the third horizon of the tangent vector interactions, known as gauge *SU*(3).
7. Entanglement of the alternating Y^-Y^+ superphase processes in the above actions can prevail as a chain of reactions that gives rise to each of the objective regimes.

The field evolutions have their symmetric constituents with or without singularity. The underlying laws of the dynamic force reactions are invariant at both of the creative transformation and the reproductive generations, shown by the empirical examples:

a. At the second horizon, the elementary particles mediate the weak interaction, similar to the massless photon that interferes the electromagnetic interaction of gauge invariance. The *Weinberg–Salam* theory [30], for example, predicts that, at lower energies, there emerges the photon and the massive *W* and *Z* bosons [23]. Apparently, fermions develop from the energy to mass consistently as the *creation* of the evolutionary process that emerges massive bosons and follows up the animation or companion of electrons or positrons in the *SU*(3) horizon.

b. At the third horizon, the strong nuclear force holds most ordinary matter together, because, for example, it confines quarks into composite hadron particles such as the proton and neutron, or binds neutrons and protons to produce atomic nuclei. During the *reactive animations*, the strong force inherently has such a high strength that it can produce new massive particles. If hadrons are struck by high-energy particles, they give rise to new hadrons instead of emitting freely moving radiation. Known as the classical color confinement, this property of the strong force is the reproduction of the *explicit evolutionary* process that produces massive hadron particles.

Normally, forces are composited of three correlatives: weaker forces of the off-diagonal matrix, stronger forces of the diagonal matrix, and coupling forces between the horizons. To bring together the original potentials and to acquire the root cause of the four known forces beyond the single variations of the *Lagrangian*, the entangling states in a set of *Lagrangians* (5.10-5.16) establish apparently the foundation to orchestrate triplets into the field interactions between the $Y^{-}Y^{+}$ double streaming among the color confinement of triplet particles. Coupling with the techniques of the *Implicit Evolution, Explicit Breaking* and *Gauge Invariance*, the four quantum fields (4.16-4.19) embed the ground foundations and emerge the evolutionary intrinsics of field interactions for the weak and strong forces. Together, the terminology of *Field Breaking* and its associated *Invariance* contributes to a part of *Horizon Evolutions*.

Spontaneous Breaking

Operating on the states of various types of particles, the creation process embodies an energy enclave acquiring mass from the quantum oscillator system; meanwhile, it unfolds the hyperspherical coordinates to expose its extra degree of freedom in ambient space. In a similar fashion, the annihilation operates a concealment of an energy enclave back to the oscillator system of the world planes.

G*iving rise to* the horizon *SU*(3), the processes of mass acquisition and annihilation function as and evolve into a sequential processes of the energy enclave from the weak to strong massive forces in the double streaming of three entangling procedures, known as a chain of reactions:

a) At the *SU*(2) horizon, the gauge symmetry incepts the evolutionary actions implicitly:

$$D_\nu = \partial_\nu + i\sqrt{\lambda_2/\lambda_0}\phi_c^-, \qquad D^\nu = \partial^\nu - i\sqrt{\lambda_2/\lambda_0}\varphi_a^+ \tag{5.33}$$

b) Extending into the third horizon, the mass acquisition (3.11) is proportional to $m\omega/\hbar$ during the potential breaking, spontaneously:

$$\Phi_n^+ \mapsto \varphi_b^+ - \sqrt{\lambda_0}D^\nu\varphi_c^+/m^+\,,\ \ \Phi_n^- \mapsto \phi_a^- + \sqrt{\lambda_0}D_\nu\phi_b^-/m^- \tag{5.34}$$

Therefore, the potentials (4.32) of the *SU*(1) actions result in a form of *Lagrangian* forces at *SU*(2):

$$\mathscr{L}_{Force}^{SU1} \mapsto \mathscr{L}_{ST}^{SU2} \ \rightarrow\ \Phi_n^+\Phi_n^- \mapsto \lambda_0 D^\nu\varphi_b^+ D_\nu\phi_a^- - m^+m^-\varphi_c^+\phi_b^- \tag{5.35}$$

c) Combining the above evolutionary breaking, the interruption force is further emerged into a rotational *SO*(3) regime:

$$\mathscr{L}_{ST}^{SU3} = \kappa_f\Big(\lambda_0(\partial^\nu\varphi_b^+)(\partial_\nu\phi_a^-) - m^+m^-\phi_{bc}^2 + \lambda_2\phi_{bc}^2\phi_{ca}^2\Big) \tag{5.36}$$

where κ_f or λ_i is a constant. The $\phi_{bc}^2 = \phi_b^-\varphi_c^+$ or $\phi_{ca}^2 = \phi_c^-\varphi_a^+$ is the triplet evolutionary fields of density.

d) With the gauge invariance among the particle fields $\phi_n \mapsto (v + \phi_b^+ + i\phi_a^-)\big/\sqrt{2}$, this strong force can be eventually developed into *Yukawa* interaction, introduced in 1935 [31], and *Higgs* field, theorized in 1964 [32].

In summary, a weak force interruption between quarks becomes the inceptive fabricator, which evolves into the horizon dynamics of triplet quarks embodied into a oneness of the mass enclave, known as the strong forces, observable at the collapsed states of the diagonal matrix external to its physical massive interruption. For example, a strong interaction between triplet-quarks and gluons with symmetry group *SU(3)* makes up composite hadrons such as proton and neutron.

Strong Forces

Since the coupling $\mathscr{L}_C$ between the horizons is also extendable to the strong forces, the total force at the third horizon become the following:

$$\mathscr{L}^{SU3}_{Force} = \mathscr{L}_{QCD}(\chi) + \mathscr{L}^{SU3}_{ST} + \mathscr{L}_C(\chi) + \mathscr{L}_M(\chi) \tag{5.37}$$

$$\mathscr{L}_C(\chi) = \frac{e}{2\hbar}\left\langle \chi_\nu A_\nu \chi^\mu F^+_{\mu\nu}, \chi^\mu A^\mu \chi_\nu F^-_{\nu\mu} \right\rangle^-_{jk} \tag{5.38}$$

$$\mathscr{L}_M(\chi) = \frac{i}{2}\left[\partial^\nu(\chi_\nu F^-_{\nu\mu}), \partial_\mu(\chi^\mu F^+_{\mu\nu})\right]^-_{jk} - \frac{1}{4}\left(\chi^\nu F^+_{\nu\mu}\right)_j\left(\chi_\mu F^-_{\mu\nu}\right)_k \tag{5.39}$$

As a part of the creation processes for the inception of the physical horizons, the potentials start to enclave energies, acquire their masses and emerge the torque forces at *r*-dependency. Besides, it develops the *SU(3)* gauge group obtained by taking the triple-color charge to refine a local symmetry. Since the torque forces generate gravitation, singularity emerges at the full physical horizon at *SU*(3) regime and beyond, arisen by the extra two-dimensional freedom of the rotational coordinates.

Fundamental Forces

Classically, roughly four fundamental interactions are known to exist:

1. The gravitational and electromagnetic interactions, which produce significant long-range forces whose effects can be seen directly in everyday life, and
2. The weak and strong interactions, which produce forces at minuscule, subatomic distances and govern nuclear interactions.

Generally in the forms of matrices, the long range forces are the effects of the diagonal elements of the field matrixes while the short range forces are those off-diagonal components. Transitions between the primacy ranges are smooth and natural such that there is no singularity at the second horizon between the physical and virtual regimes. Because of the freedom of the rotational coordinates in the third horizon, those diagonal components become singularity and the strong binding forces build up the horizon infrastructure seamlessly.

Finally, we have landed at the classical *QCD, Standard Model* and classic *Spontaneous Breaking* for the field evolution of interactions crossing the multiple horizons, and unified fundamentals of the known natural forces: electromagnetism, weak, strong and torque generators (graviton). Theses forces are symmetric or in the loop interruptions in nature. The relativistic state of asymmetric dynamic forces is further specified by the section below.

VI. ASYMMETRIC DYNAMICS

In reality, the laws of nature strike aesthetically a harmony of duality not only between Y^-Y^+ symmetries, but also between symmetry and asymmetry. Because of the Y^-Y^+ duality, a symmetric system naturally consists of asymmetric ingredients or asymmetric constituents. Symmetry that exists in one horizon can be cohesively asymmetric in the other simultaneously without breaking its original ground symmetric system that coexists with its reciprocal opponents. A universe finely tuned, almost to absurdity, is a miracle of asymmetry and symmetry together that give rise to the next horizon where a new symmetry is advanced and composed at another level of consistency and perpetuation. Similar to the Y^-Y^+ flux commutation and continuity of potential densities, a duality of symmetry and asymmetry represents the cohesive and progressive evolutions aligning with the working of the topological hierarchy of our nature. For asymmetric fluxions, the entangling invariance requires that their fluxions are conserved with motion acceleration, operated for creation and annihilation, or maintained by reactive forces. Normally, the divergence of Y^- fluxion is conserved by the virtual forces 0^+ and the divergence of Y^+ fluxion is balanced by physical motion of dynamic curvature. Together, they maintain each other's conservations and commutations cohesively, reciprocally or complementarily.

Asymmetric Equations

From two pairs of the scalar fields (4.16-4.19), asymmetric fluxions consist of and operate a pair of the commutative entanglements consistently and perpetually:

$$\mathbf{g}_v^-/\kappa_g^- = \left[\hat{\partial}_\lambda\hat{\partial}_\lambda, \check{\partial}^\lambda\check{\partial}^\lambda\right]_v^- + \zeta^+ \qquad : \zeta^+ = \left(\hat{\partial}_{\lambda_2}\check{\partial}^{\lambda_2} - \hat{\partial}_{\lambda_2}\check{\partial}_{\lambda_3}\right\rangle_v^+ \tag{6.1}$$

$$\mathbf{g}_v^+/\kappa_g^+ = \left[\check{\partial}_\lambda\check{\partial}_\lambda, \hat{\partial}^\lambda\hat{\partial}^\lambda\right]_v^+ + \zeta^- \qquad : \zeta^- = \left(\check{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1} - \hat{\partial}^{\lambda_2}\check{\partial}_{\lambda_1}\right\rangle_v^- \tag{6.2}$$

Named as the *Third Universal Field Equations*, the general formulae is balanced by a pair of commutation of the asymmetric Y^-Y^+ entanglers $\zeta^\mp$ that constitutes the laws of conservations universal to all types of Y^-Y^+ interactive motions, curvatures, dynamics, forces, accelerations, transformations, and transportations on the world lines of the dual manifolds. Therefore, these two equations above outline and define the *General Asymmetric Equations.*

At the second horizon of the event evolutionary processes, the local tangent curvature of the potential vectors through the next tangent vector of the curvature, the λ events of the above $\hat{\partial}$ and $\check{\partial}$ operations, give rise to the *Third Horizon Fields*, shown by the ontological expressions:

$$\check{\partial}_\lambda\check{\partial}_\lambda\psi^- = \dot{x}_m\left(D_m - \overset{-}{\Gamma}{}^s_{nm}\right)\dot{x}_s D_s\psi^- \qquad : D_\nu = \partial_\nu + i\Theta_\nu,\ \Theta^\nu = \frac{e}{\hbar}A^\nu \tag{6.3a}$$

$$\hat{\partial}^\lambda\hat{\partial}^\lambda\psi^+ = \dot{x}^\nu\left(D^\nu - \overset{+}{\Gamma}{}^\sigma_{m\nu}\right)\dot{x}^\sigma D^\sigma\psi^+ \qquad : D^\nu = \partial^\nu - i\Theta^\nu,\ \Theta_\nu = \frac{e}{\hbar}A_\nu \tag{6.3b}$$

where the Θ^ν and Θ_ν are superphase fields.

Superphase Commutations

This ontological process consists of a set of the unique fields, illustrated by the evolutionary components of the entangling commutators:

$$\left[\hat{\partial}^\lambda\hat{\partial}^\lambda, \check{\partial}_\lambda\check{\partial}_\lambda\right]_v^+ = \dot{x}^\nu\dot{x}^m\left(P_{\nu\mu}^+ + G_{m\nu}^{+\sigma s} + \Theta_{\nu m}^{+\sigma s}\right) \tag{6.4}$$

$$P_{\nu\mu}^+ \equiv \frac{1}{\dot{x}^\nu\dot{x}^m}\left[(\dot{x}^\nu\partial^\nu)(\dot{x}^m\partial^m), (\dot{x}_\nu\partial_\nu)(\dot{x}_m\partial_m)\right]_s^+ = \frac{R}{2}g^{\nu m} \tag{6.5}$$

$$G_{m\nu}^{\pm\sigma s} = \mp\frac{1}{\dot{x}^\nu\dot{x}^m}\left[\dot{x}^\nu\overset{+}{\Gamma}{}^\sigma_{m\nu}\dot{x}^\sigma\partial^\sigma, \dot{x}_m\overset{-}{\Gamma}{}^s_{nm}\dot{x}_s\partial_s\right]_s^\pm \tag{6.6}$$

$$\Theta_{\nu m}^{+\sigma s} = i\Xi_{\nu m}^+ + i\frac{e}{\hbar}F_{\nu m}^+ - i\eth_{m\nu}^{+s\sigma} - \circledS_{\nu m}^+ \tag{6.7}$$

$$\Xi_{\nu m}^\pm = \mp\frac{1}{\dot{x}^\nu\dot{x}^m}\left[\dot{x}^\nu\Theta^\nu\dot{x}^m\partial^m, \dot{x}_m\Theta_m\dot{x}_\nu\partial_\nu\right]_s^\pm \tag{6.8}$$

$$F_{\nu m}^\pm = \pm\frac{\hbar}{e}\frac{1}{\dot{x}^\nu\dot{x}^m}\left[\dot{x}^\nu\partial^\nu(\dot{x}^m\Theta^m), \dot{x}_m\partial_m(\dot{x}_\nu\Theta_\nu)\right]_s^\pm \tag{6.9}$$

$$\eth^{\pm s\sigma}_{m\nu} = \pm \frac{1}{\dot{x}^{\nu}\dot{x}^{m}}\left[\dot{x}^{m}\Gamma^{+\sigma}_{\nu m}\dot{x}^{\sigma}\Theta^{\sigma}, \dot{x}_{m}\Gamma^{-s}_{m\nu}\dot{x}_{s}\Theta_{s}\right]^{\pm}_{s} \tag{6.10}$$

$$Ⓢ^{\pm}_{\nu m} = \pm \frac{1}{\dot{x}^{\nu}\dot{x}^{m}}\left[\dot{x}^{\nu}\Theta^{\nu}\dot{x}^{m}\Theta^{m}, \dot{x}_{m}\Theta_{m}\dot{x}_{\nu}\Theta_{\nu}\right]^{\pm}_{s} \tag{6.11}$$

The *Ricci* curvature R is defined on a *World Plane* as a trace of the curvature tensors. The $G^{\pm s\sigma}_{m\nu}$ tensors are the *Connection Torsions*, the rotational stress of the transportations. The $\Xi^{\pm}_{\nu m}$ are the *Superpose Torsions*, the superphase stress of the transportations. the $F^{\pm}_{\nu\mu}$ are the skew-symmetric or antisymmetric fields, the quantum potentials of the superphase energy. The $\eth^{\pm s\sigma}_{m\nu}$ are the superphase contorsion, the superposed commutation of entanglements. The $Ⓢ^{\pm}_{\nu m}$ are *Entangling Connectors,* the commutation of the superphase energy. Apparently, the superphase operations Θ^{ν} and Θ_{m} as actors lie at the heart of the ontological framework for the life entanglements.

Conservation of Ontological Dynamics

The above motion dynamics of the field evolutions can be expressed straightforwardly for asymmetric dynamics of acceleration,

$$\mathbf{g}^{-}_{s}/\kappa_{g} = \frac{R}{2}g_{\nu m} + G^{-\sigma s}_{\nu m} + \Theta^{-\sigma s}_{\nu m} - \mathcal{O}^{+\zeta}_{m\nu} \tag{6.12}$$

At the constant speed *c*, the matrix $\mathcal{O}^{+\sigma}_{\nu m}$ is defined as *Ontological Y^{+} Modulator* on a *World Plane:*

$$\mathcal{O}^{+\sigma}_{\nu\nu} = \mathcal{O}^{+}_{d} - \kappa^{+}_{o}\begin{pmatrix} -(\mathbf{u}^{+}\nabla)\cdot\mathbf{D}^{*}_{a} \\ \frac{\partial}{\partial t}\mathbf{D}^{+}_{a} + \frac{\mathbf{u}^{+}}{c}\nabla\left(\frac{\mathbf{u}^{+}}{c}\times\mathbf{H}^{+}_{a}\right)\end{pmatrix} \tag{6.13}$$

$$\nabla\cdot\mathbf{D}^{*}_{a} = 4\pi G\rho_{a} \tag{6.14}$$

$$\frac{\partial}{\partial t}\mathbf{D}^{+}_{a} - \nabla\times\mathbf{H}^{+}_{a} = 4\pi G\mathbf{J}^{+}_{a} \tag{6.15}$$

where the $\mathbf{D}^{+}_{a}$ and $\mathbf{H}^{+}_{a}$ fields are the intrinsic modulations in the form of a duality of asymmetry and anti-asymmetry cohesively and implicitly. Apparently, the processes are the sophisticated message transformations and relativistic commutations, embedded in and superphase-operated by the $\mathcal{O}^{+\sigma}_{\nu m}$ matrices of the potentials $\{\phi^{+},\varphi^{-}\}$ ontologically. It represents that the resources are composited of, supplied by or conducted with the residual activators and motion modulators primarily in either virtual or physical world, reciprocally. It implies further that, in the physical world, the directly observable parameters are the *Ricci* curvature R, stress tensor $\mathbf{G}$ and wave propagation $\mathcal{O}^{+}_{d}$. Aligning with the dual world-lines of the universal topology, the commutation of energy fluxions animates the resources, modulates messages of the potential transform and transports the performing actions or reactions.

The notion of evolutionary equations is intimately tied in with another aspect of ontological physics. Each solution of the equation encompasses the whole history of the superphase modulations at both dark-filled and matter-filled reality. It describes the state of matter and geometry everywhere at every moment of that particular universe. Due to its general variance combined with the gauge fixing, this *Conservation of Ontological Dynamics* is sufficient by itself to determine the time evolution of the metric tensor and of the universe over time. Physically, this is done in "1+1+2" formulations, where the world plane of one time-dimension and one spatial-dimension is split into the extra space dimensions during horizon evolutions such that solutions always exist, and are uniquely defined, once suitable initial conditions have been specified. For further details, please refer to section 16 of reference [1].

Blackbody Radiations

Since the ordinary ontological fields forms the basis of elementary particle physics, the *ontological field* is an excellent artifact describing the behaviors of microscopic particles in weak gravitational fields like those found on Earth [33]. Quantum fields in curved spacetime demonstrate its evolutionary processes beyond mass acquisition in quantization itself, and natural cosmology in a curved background spacetime strongly influenced by the superphase modulations $\Theta^{\pm\sigma s}_{\nu m}$. Besides, as a part of evolutionary dynamics, radiation plays an important role for the thermodynamics of blackholes [34]. Integrated with the above formalism, the equation (6.12) illustrates that, besides of its eternal curvature, the blackhole quantum fields emit a blackbody spectrum of particles leading to the possibility not only that they evaporate over time, but also that it quantities the graviton and photon radiations.

$$Tr(\mathcal{O}_d^+) = S_{A1}(\omega_c, T) + S_{A2}(\omega_c, T) + S_{A3}(\omega_g, T) = 4\frac{E_c^- E_c^+}{(\hbar c)^2}\left(\eta_c N_v^\pm + \eta_h N_s^\pm\right) + 4\frac{E_g^- E_g^+}{(\hbar c_g)^2} N \tag{6.14}$$

$$E_c^\pm = \mp \frac{i}{2}\hbar\omega_c \qquad \eta_c = \pi^{-3} = 3.22\,\%\,,\ \eta_h = \frac{2}{\pi} = 63.7\,\% \qquad : Photon \tag{6.15}$$

$$E_g^\pm = \mp \frac{i}{2}E_p, \qquad E_p = \sqrt{\hbar c_g^5 / G} \qquad : Graviton \tag{6.16}$$

where the emission density $N_v^\pm$ is at the third horizon, and $N_s^\pm$ at the second horizon. For further details of blackhole emissions, please refer to section III of reference [35].

CONCLUSION AND BEYOND

As a major application of *Universal and Unified Physics [1]*, a brand-new and advanced theory is harvested as a second part of the *Ontology.* It derives concisely at and integrates empirically with quantum mechanics, *gauge theory, quantum electrodynamics, chromodynamics, spontaneous field breaking,* and *standard model*. Conclusively, the ontology of horizon infrastructure is compacted at and illustrated by the Figure below.

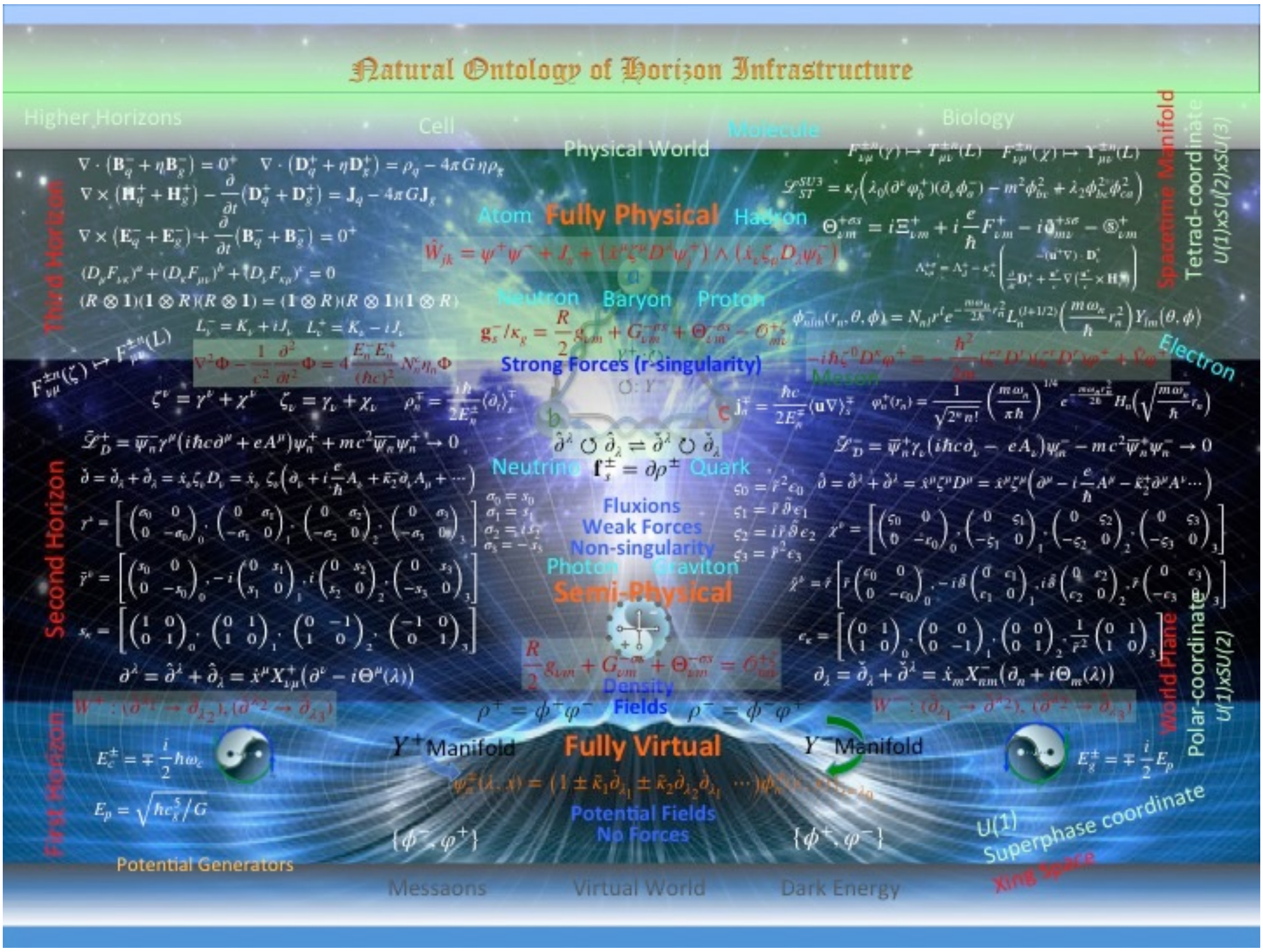

Figure 7: Natural Ontology of Horizon Infrastructure

The ontological foundation of superphase dynamics lies further at the heat of the creation and formation of the elementary particles, given by the next topic of "*Theory of Natural Ontology*： *1. Building Blocks of Elementary Particles*".

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