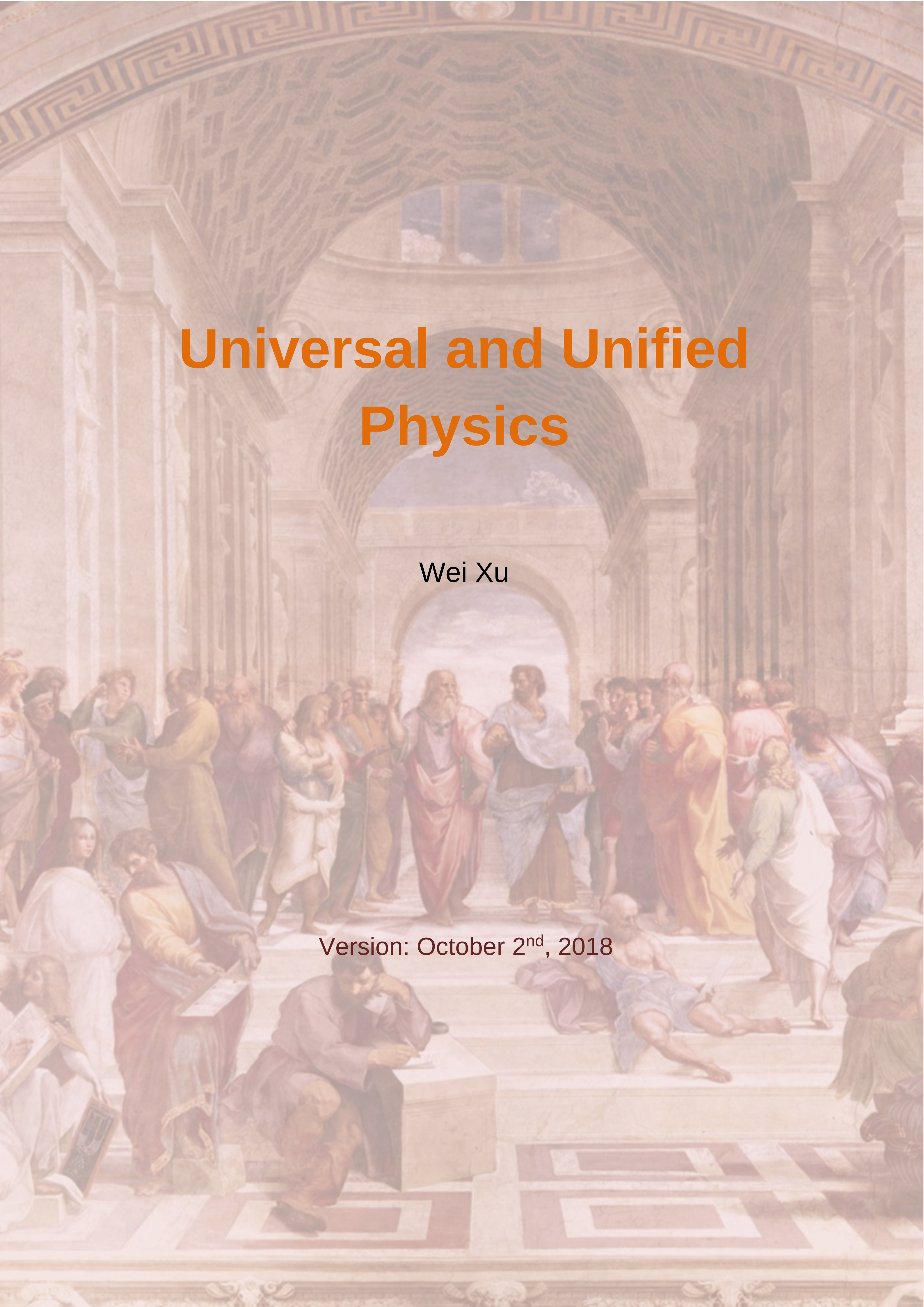

Universal and Unified Physics

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Version: October 2nd, 2018

To Those in Search of The Truth

To Generations of Civilization

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I. TOPOLOGICAL FRAMEWORK AND UNIVERSAL FIELD EQUATIONS

Abstract

The workings of ***Universal Topology*** unfolds a duality of our natural world at the following remarks:

1. Dual complex manifolds and the interactive world planes beyond a single non-complex spacetime manifold,
2. Two pairs of the scalar potentials for field entanglements complementarily, reciprocally and interdependently,
3. A mathematical framework of the dual variances to clone the event operations as an inevitable feature of reality,
4. Law of Event Evolutions carrying out World Equations, Motion Operations, Geodesic routing and Horizon hierarchy,
5. A set of the holistic *Universal Field Equations*, foundational and general to all dynamic fields of natural evolutions.

Upon this foundation, our *Universal Topology and Framework* are ready to give rise to the unified classical and contemporary physics ...

Introduction

The classical theories, based on the observation at many observable collapsed states, have resulted in their theoretical models toward the decoherence interpretations or physical existence only [1]. After an observation is made, each element of the superposition becomes the combined subject–object and any object with the two "relative states" is "collapsed" at its state with the same collapsed outcome. As a single manifold, reality has always been viewed or isolated as an unfolding history. Schrödinger's cat, for example, is one of the well-known paradox as a thought experiment [2] of the classic concepts.

To extend our fundamental physics into a duality of a oneness nature, *Universal Topology* views historical and real-life reality as a many-branched tree, wherein every possible quantum outcome is realized or rising from horizons. Naturally, many-worlds [3,4], multiverse [,5], and dark energy [,6] has become the main mainstream of philosophical interpretations. Although these models describes indirectly to the observable states, they are developed as the most accepted hypothesis today [,7]. These theories or interpretations imply the common ideas that, at minimum, there exists a pair of the fields: one for our physical world and the other for its reciprocal other world or virtual world [,8, ,9].

More precisely in principle, an object possesses a pair of the fields and requires a duality of manifolds for their life entanglement. Because each object possesses a pair of the virtual and physical fields, an interruption between two objects involves two pairs of the fields, which constitute cross-entangling simultaneously and reciprocally [8, 10, 11]. In mathematics, this means that, instead of a single manifold, a oneness of the real world of our universe must be modeled by a duality of the *World Planes*, or the *Dual Manifolds* of *Universal Topology*.

Therefore, it provides the context for our main philosophical interpretation to extend our fundamental physics into a duality of a oneness of natural world [11]. As a conceptual simplicity, our

1 Bryce Seligman DeWitt, R. Neill Graham, eds, The Many-Worlds Interpretation of Quantum Mechanics, Princeton Series in Physics, Princeton University Press (1973), ISBN 0-691-08131-X Contains Everett's thesis: The Theory of the Universal Wavefunction, pp 3–140.

2 Schrödinger, Erwin (November 1935). "Die gegenwärtige Situation in der Quantenmechanik (The present situation in quantum mechanics)". Naturwissenschaften. 23 (48): 807–812. doi:10.1007/BF01491891.

3 Hugh Everett (1956, 1973), Theory of the Universal Wavefunction, Thesis, Princeton University, pp 1–140

4 Everett, Hugh (1957). "Relative State Formulation of Quantum Mechanics". Reviews of Modern Physics. 29 (3): 454–462. Bibcode:1957RvMP...29..454E. doi:10.1103/RevModPhys.29.454.

5 Aguirre, A & Tegmark, M (2004). Multiple universes, cosmic coincidences, and other dark matters. arXiv:hep-th/0409072.

6 Exirifard, Q. (2010). "Phenomenological covariant approach to gravity". General Relativity and Gravitation. 43: 93–106. arXiv:0808.1962 . Bibcode:2011GReGr..43...93E. doi:10.1007/s10714-010-1073-6.

7 Cecile M. DeWitt, John A. Wheeler eds, The Everett–Wheeler Interpretation of Quantum Mechanics, Battelle Rencontres: 1967 Lectures in Mathematics and Physics (1968).

8 Bryce Seligman DeWitt, The Many-Universes Interpretation of Quantum Mechanics, Proceedings of the International School of Physics "Enrico Fermi" Course IL: Foundations of Quantum Mechanics, Academic Press (1972).

9 Xu, Wei; Unified Field Theory - Universal Topology and First Horizon of Quantum Fields, International Journal of Physics. 2017, 5(1), 16-20 doi:10.12691/ijp-5-1-3

10 Landau, L. D. & Lifshitz, E. M. (1975). Classical Theory of Fields (Fourth Revised English Edition). Oxford: Pergamon. ISBN 0-08-018176-7.

11 Jonathan G. Richens, John H. Selby, and Sabri W. Al-Safi. (Aug. 2017) "Entanglement is Necessary for Emergent Classicality in All Physical Theories." Physical Review Letters 119(8). DOI: 10.1103/PhysRevLett.119.080503.

entire theory of the nature is based on the principle: *Dual Manifolds*, instead of one single manifold. In fact, the two metric signatures $(+ - - -)$ or $(- + + +)$ of *Minkowski* spacetime have been discovered since 1908 [12].

In our universe, a duality of the two-sidedness lies at the heart of all events or instances as they are interrelate, opposite or contrary to one another, each dissolving into the other in alternating streams that operates a life of creation, generation, or actions complementarily, reciprocally and interdependently. The nature consistently emerges as or entangle with a set of the fields that communicates and projects their interoperable values to its surrounding environment, alternatively arisen by or acting on its opponent through the reciprocal interactions.

12 Lee, J. M. (1997). Riemannian Manifolds – An Introduction to Curvature. Springer Graduate Texts in Mathematics. 176. New York Berlin Heidelberg: Springer Verlag. ISBN 978-0-387-98322-6.

1. Universal Topology

As the nature duality, our world always manifests a mirrored pair in the imaginary part or a conjugate pair of the complex manifolds, such that the physical nature of P functions is associated with its virtual nature of V functions to constitute a duality of the real world functions. Among them, the most fundamental dynamics are our dark resources of the universal energies, known as *Yin* "$-$" and *Yang* "+" dark objects, with neutral balance "0" as if there were nothing. Each type of the dark objects $(+,0,-)$ appearing as energy fields has their own domain of the relational manifolds such that one defines a Y^- (Yin) manifold while the other the Y^+ (Yang) manifold, respectively. They jointly present the two-sidedness of any events, operations, transportations, and entanglements, each dissolving into the other in the alternating streams that generates the life of entanglements, conceals the inanimacy of resources, and operates the event actions.

Because each manifold has unique representations, worlds do not exactly coincide and require transportations to pass from one to the other through commonly shared natural foundations. Therefore, our universe manifests as an associative framework of objects, crossing neighboring worlds of manifolds, illustrated as the three dimensions as the mutually orthogonal units: a coordinate manifold of physical world $P(\mathbf{r},\lambda)$, a coordinate manifold of virtual world $V(\mathbf{k},\lambda)$, and a coordinate manifold of global function $G(\lambda)$, of *Word Events* λ, shown in Figure 1a.

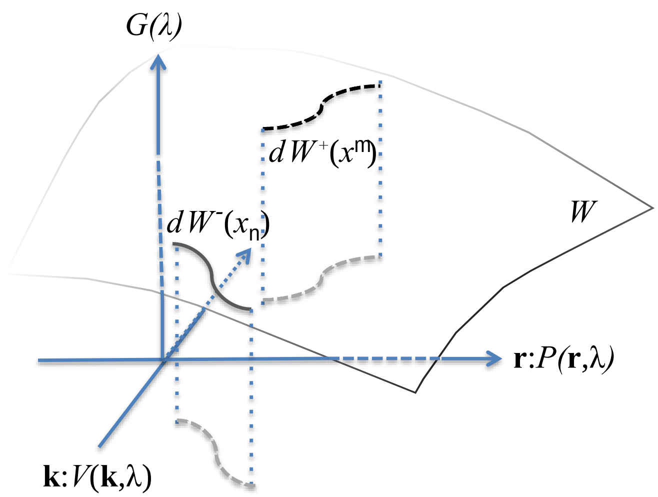

Figure 1a: Worlds of Universe Topology

where $P(\mathbf{r},\lambda)$ is parameterized by the coordinates of spatial vector $\mathbf{r}(\lambda)=\mathbf{r}(x_1,x_2,x_3)$, and $V(\mathbf{k},\lambda)$ is parameterized by the coordinates of *timestate* vector $\mathbf{k}(\lambda)=\mathbf{k}(x^0,x^{-1},x^{-2},\cdots)$. The global functions in $G(\lambda)$ axis is a collection of common objects and states of events λ, with unique functions applicable to both virtual and physical spaces of the world *W*. In other words, a universe manifold is visualized as a transitional region among the associated manifolds of the worlds, which globally forms the topological hierarchy of a universe. A curve in this three-dimensional manifold $\{\mathbf{r},\mathbf{k},G(\lambda)\}$ is called a *Universe Line*, corresponding to intersection of world planes from the two-dimensions of virtual and physical regimes of Yinyang (Y^-Y^+) manifolds.

As a two-dimensional plane, the virtual positions of $\pm i\mathbf{k}$ 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 $W^\pm$ distinctively, forms a duality of the universal topology $W^\mp = P \pm iV$ 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, the compound dimensions become the tetrad-coordinates, known as the following spacetime manifolds:

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

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

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.

In complex analysis, events of world planes $W^\pm$ are holomorphic functions, representing a duality of complex-conjugate functions $W^\pm$ of one or more complex variables $\check{x}$ and $\hat{x}$ in neighborhood spaces of every point in its universe regime of an open set $\mho$.

$$G(W^+, W^-, \lambda) = G(\hat{x}, \check{x}, \lambda) \quad : W^\pm \in Y^\pm \subset \mho \tag{1.3}$$

$$W^+(\hat{x}, \lambda) = P(\hat{x}, \lambda) - iV(\hat{x}, \lambda), \tag{1.3}$$

$$W^-(\check{x}, \lambda) = P(\check{x}, \lambda) + iV(\check{x}, \lambda) \tag{1.4}$$

These two formulae are called the Y^-Y^+ *Topology of Universe*. Composed into a Y^- component, the world W^- is in the manifold of yin supremacy which dominants the processes of reproductions or animations. Likewise, composed into a Y^+ component, the world W^+ is in the manifold of yang supremacy which dominants the processes of creations or annihilations.

Together, the two world planes $\{\mathbf{r}\pm i\mathbf{k}\}$ compose the *two-dimensional* dynamics of *Boost*, a residual generators, and *Spiral*, a rotational contortions for stresses, which function as a reciprocal or conjugate duality transforming and transporting global events among sub-coordinates. Consequently, for any type of the events, the Y^-Y^+ functions are always connected, coupled, and conjugated between each other, a duality of which defines entanglements as the virtually inseparable and physically reciprocal pairs of all natural functions.

Artifact 1.1: Virtual and Physical Manifolds

For the conceptual simplicity, this manuscript refers the states, events, and operations of “physical” functions to the yin supremacy, implying the *Spacetime or* Y^- manifold parallel to its global domain with the spatial relativistic dynamics, symmetry characteristics, and of “virtual” functions to the yang supremacy, implying the *Timespace or* Y^+ manifold transformational to its reciprocal domain for physical observations with the general commutative dynamics and asymmetry characteristics, respectively. A world plane of the universe manifold is a global duality of virtual and physical worlds or yin and yang manifolds.

Artifact 1.2: Four-dimensional Spacetime

Historically, in 1905–06 *Henri Poincaré* showed [13] that by taking time to be an imaginary fourth spacetime coordinate *ict*, a *Lorentz* transformation can formally be regarded as a rotation of coordinates in a four-dimensional space with three real coordinates representing space, and one imaginary coordinate representing time, as the fourth dimension.

Artifact 1.3: Dual Minkowski Space

Equipped with a nondegenerate, the *Minkowski* inner product with metric signature is selected either $(-+++)$ as the space-like vectors or $(+---)$ as the time-like vectors [12]. However, most of the mathematicians and general relativists sticks to one choice regardless of the other or not to both, such that, apparently, any object with the two "relative states" is "collapsed" at its state with the same collapsed outcome. Therefore, a duality of the two manifolds has been hidden in contemporary physics.

13 Poincaré, Henri (1905–1906), "Sur la dynamique de l'électron" [On the Dynamics of the Electron], Rendiconti del Circolo matematico di Palermo, 21: 129–176, doi:10.1007/BF03013466

2. Duality of Potential Fields

Governed by a global event λ under the universal topology, an operational environment is initiated by the virtual scalar fields $\phi(\lambda)$ of a quantum tensor, a differentiable function of a complex variable in its *Superphase* nature, where the scalar function is also accompanied with and characterized by a single magnitude $\phi(x)$ in *Superposition* nature with variable components of the respective coordinate sets $\hat{x}$ or $\check{x}$ of their own manifold. Corresponding to its maximal set of commutative and enclave states, a wave function defines the states of an enclaved quantum system and represses the degrees of freedom. Uniquely on both of the two-dimensional world planes, a wave function is a type of virtual generators, potential modulators, or dark energies that lies at the heart of all events, instances, or objects. A wave field can be classified as a scalar field, a vector field, or a tensor field according to whether the represented physical horizon is at a scope of scalar, vector, or tensor potentials, respectively.

In the universal topology, a field $\psi(x,\lambda)$ is incepted or operated under both virtual $\psi(\lambda)$ and physical $\psi(x)$ primacies of an Y^+ or Y^- manifold respectively and simultaneously

$$\psi(x,\lambda) = \psi\big(x(\lambda)\big)\psi\big(\lambda(x)\big) \quad : \psi \in \{\psi^+,\psi^-\},\ x \in \{x^\mu, x_m\} \tag{2.1}$$

where $x(\lambda)$ represents the spatial supremacy with the implicit event λ as an indirect dependence; and likewise, $\lambda(x)$ represents the virtual supremacy with the redundant degrees of freedom in the implicit coordinates x as an indirect dependence. Besides, each point of the fields $\phi^{\pm}(x,\lambda)$ is entangled with and appears as a conjugate function of the scalar field $\varphi^{\mp}$ in its opponent manifold. Therefore, the effects are stationary projected to and communicated from their reciprocal opponent, shown as the following conjugate pairs:

$$\psi^+ = i\phi^+(\hat{x},\lambda) + \varphi^+(\hat{x},\lambda) \tag{2.2}$$

$$\psi^- = \phi^-(\check{x},\lambda) + i\varphi^-(\check{x},\lambda) \tag{2.3}$$

where $\phi^{\pm}$ implies the local supremacy of the $Y^{\pm}$ manifold, respectively. A conjugate field of the Y^+ scalar is mapped to a field $\varphi^-(x^\mu \mapsto x_m)$ in the Y^- manifold, and vice versa that a conjugate field of the Y^- scalar is mapped to a field $\varphi^+(x_m \mapsto x^\mu)$ in the Y^+ manifold. Apparently, two pairs of the potential fields give rise to the *Double Streams* $\{\psi^-,\psi^+\}$ of life entanglements.

In order to regulate the redundant degrees of freedom in particle interruptions, the double streaming entanglements of a wave function consists of the complex-valued probability of relative amplitude $\psi(x)$ and spiral phase $\vartheta(\lambda)$, its formalism of which has the degrees of event λ actions shown by the following:

$$\psi^+ = \psi^+(\hat{x})\ exp[i\hat{\vartheta}(\lambda)] \quad : x^\mu = x^\mu(\lambda),\ \lambda = \lambda(x^\mu) \tag{2.4}$$

$$\psi^- = \psi^-(\check{x})\ exp[i\check{\vartheta}(\lambda)] \quad : x_\nu = x_\nu(\lambda),\ \lambda = \lambda(x_\nu) \tag{2.5}$$

The amplitude function $\psi(x) : x = x(\lambda)$ represents the spatial position of the wave function complying with *superposition* or implicit to its λ event. The spiral function $\vartheta(\lambda) : \lambda = \lambda(x)$ features superphase of the λ event at the quantum states implicit to the physical dimensions *x*.

Artifact 2.1: Double Streaming Entanglements

A conjugate pair of the wave functions (2.4-2.5) or (2.2-2.3) constitutes the density distributions for each of the manifolds:

$$\rho = \rho^- + i\rho^+ = \psi^-(\check{x})\ \psi^+(\hat{x})\ exp\left\{i\left[\check{\vartheta}(\lambda) + \hat{\vartheta}(\lambda)\right]\right\} \tag{2.6}$$

$$Y^+:\ \rho^+ = \phi^+(\hat{x},\lambda)\ \phi^-(\check{x},\lambda) + \varphi^+(\hat{x},\lambda)\ \varphi^-(\check{x},\lambda) \tag{2.7}$$

$$Y^-:\ \rho^- = \phi^-(\check{x},\lambda)\ \varphi^+(\hat{x},\lambda) - \phi^+(\hat{x},\lambda)\ \varphi^-(\check{x},\lambda) \tag{2.8}$$

For a given system, the set of all possible normalizable wave functions forms an abstract mathematical scalar or vector space such that it is possible to add together different wave functions, multiply the wave functions, and extend further into the complex functions under a duality of entanglements. With normalization condition, wave functions form a projective magnitudes of space and phase states because a location cannot be determined from the wave function, but is described by a probability distribution. These two formulae of the fields and densities represent that the four-potentials are entangling in *Double Streaming* between the $Y^-\ Y^+$ manifolds, simultaneously, reciprocally, and systematically.

Artifact 2.2: Decoherence In Physics

In physics of the twentieth century, the superposed wave functions are hardly correlated to a duality of the two-dimensional world planes. Instead, the four-dimensional manifold is limited to the physical existence within one world plane such that the reality is isolated or decoherence to the superposition: homogeneity and additivity. For example, a pair of the conjugate fields $\varphi \neq \phi^*$ becomes purely imaginary $\varphi = \phi^*$, upon which the superphase is collapsed at the physical states such as the density $\rho = |\phi|^2$. Unfortunately, this density decoherence has lost its meaning to neither fluxions nor entanglements, which are critical to both symmetric and asymmetric dynamics. Therefore, the wave decoherence of the system no longer exhibits the superphase interference or wave–particle duality as in a double-slit experiment, performed by *Thomas Young* in 1801 [14]. Incredibly, this superphase interference not only demonstrates a duality of the complex fields but also is a parallel fashion to *Gauge Theory*, shown briefly in the section below.

Artifact 2.3: Gauge Fields

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, shown by the examples.

$$\frac{\partial\left[\psi(x)e^{i\vartheta(\lambda)}\right]}{\partial\lambda} = \psi(x)\frac{\partial\vartheta(\lambda)}{\partial\lambda}e^{i\vartheta(\lambda)} = \frac{\partial x}{\partial\lambda}\frac{\partial\vartheta(\lambda)}{\partial x}\left[\psi(x)e^{i\vartheta(\lambda)}\right] \tag{2.9}$$

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:

$$D^\lambda\psi(x^\mu,\lambda) = \left[\frac{\partial x^\mu}{\partial\lambda}\frac{\partial}{\partial x^\mu}\psi(x^\mu)\right]e^{-i\hat{\vartheta}(\lambda)} + \psi(x^\mu)\frac{\partial}{\partial\lambda}e^{-i\hat{\vartheta}(\lambda)}$$

14 Heavens, O. S.; Ditchburn, R. W. (1991). Insight into Optics. John Wiley & Sons. ISBN 978-0-471-92769-3.

$$= \dot{x}^{\mu}\Big(\frac{\partial}{\partial x^{\mu}} - i\Theta^{\mu}\Big)\psi(x^{\mu},\lambda) \qquad : \Theta^{\mu} = \frac{\partial\hat{\vartheta}(\lambda)}{\partial x^{\mu}},\ \dot{x}^{\mu} = \frac{\partial x^{\mu}}{\partial \lambda} \tag{2.10a}$$

$$D_{\lambda}\psi(x_{\nu},\lambda) = \Big[\frac{\partial x_{\nu}}{\partial\lambda}\frac{\partial}{\partial x_{\nu}}\psi(x_{\nu})\Big]e^{i\check{\vartheta}(\lambda)} + \psi(x_{\nu})\frac{\partial}{\partial\lambda}e^{i\check{\vartheta}(\lambda)}$$

$$= \dot{x}_{\nu}\Big(\frac{\partial}{\partial x_{\nu}} + i\Theta_{\nu}\Big)\psi(x_{\nu},\lambda) \qquad : \Theta_{\nu} = \frac{\partial\check{\vartheta}(\lambda)}{\partial x_{\nu}},\ \dot{x}_{\nu} = \frac{\partial x_{\nu}}{\partial\lambda} \tag{2.10b}$$

where the $\hat{\vartheta}$ or $\check{\vartheta}$ is the Y^+ or Y^- superphase, respectively. Furthermore, when $\Theta = eA_{\nu}/\hbar$ and $D_{\nu} \mapsto \partial_{\nu} + ieA_{\nu}/\hbar$, this is known as *Gauge derivative* for an object with the electric charge *e* and the gauge field A_{ν}.

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:

$$F^{+n}_{\nu\mu} = (\partial^{\nu}A^{\mu} - \partial^{\mu}A^{\nu})_n \qquad : F^{+n}_{\mu\nu} = -F^{+n}_{\nu\mu} \tag{2.11}$$

$$D^{\nu} \mapsto \partial^{\nu} - ieA^{\nu}/\hbar \qquad : \Theta^{\nu} = \frac{e}{\hbar}A^{\nu} \tag{2.12}$$

$$F^{-n}_{\nu\mu} = (\partial_{\nu}A_{\mu} - \partial_{\mu}A_{\nu})_n \qquad : \Theta_{\nu} = \frac{e}{\hbar}A_{\nu}, \tag{2.13}$$

$$D_{\nu} \mapsto \partial_{\nu} + ieA_{\nu}/\hbar \qquad : F^{-n}_{\mu\nu} = -F^{-n}_{\nu\mu} \tag{2.14}$$

where *n* represent either a particle or a quantum state. A *Gauge Theory* was the first time widely recognized by *Pauli* in 1941 [15]. and followed by the second generally popularized by *Yang-Mills* in 1954 [16] 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 at the heart of all potential fields.

Artifact 2.4: Eigenvalues

In the first horizon or a quantum system, a result of the measurement lies in an observable set of the reciprocal states at a duality of relative amplitudes $\{\phi^{\pm}(\hat{x}\,|\,\check{x}), \varphi^{\mp}(\check{x}\,|\,\hat{x})\}$, cohesive phases $\{\hat{\vartheta}(\lambda), \check{\vartheta}(\lambda)\}$ and their density distributions $\{\rho^+, \rho^-\}$. Introduced by *Max Born* in 1926 [17], an observation yields a result given by the eigenvalues or identified by eigenvectors. Besides, within each of the respective manifold or between the cohesive Y^-Y^+ manifolds, the field entanglements are characterized by either local or relativity of the linear continuity density and commutation, cohesively. At observations, the foundation of a quantum system consists of the entangling fields of the eigenvectors, continuities and commutations.

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15 Pauli, Wolfgang (1941). "Relativistic Field Theories of Elementary Particles". Rev. Mod. Phys. 13: 203–32. Bibcode:1941RvMP...13..203P. doi:10.1103/revmodphys.13.203.

16 Yang C. N., Mills R. L. (1954). "Conservation of Isotopic Spin and Isotopic Gauge Invariance". Phys. Rev. 96: 191–195. Bibcode:1954PhRv...96..191Y. doi:10.1103/PhysRev.96.191.

17 Born, Max (1926). "I.2". In Wheeler, J. A.; Zurek, W. H. Zur Quantenmechanik der Stoßvorgänge [On the quantum mechanics of collisions]. Princeton University Press (published 1983). pp. 863–867. Bibcode:1926ZPhy(37)863B. doi:10.1007/BF01397477. ISBN 0-691-08316-9.

As a summary, the workings of *Universal Topology* reveals that a duality of the potential fields are operated by both of the explicit *Magnitude* $\{\psi(x^{\nu}), \psi(x_{\nu})\}$ dimensions and the implicit *Superphase* $\{\hat{\vartheta}(\lambda), \check{\vartheta}(\lambda)\}$ modulations. It naturally consists of two pairs of the wave functions and transforms into a variety of energy forms of quantum fields that lies at the heart of all life events, instances or objects, essential to the operations and processes of creations, annihilations, reproductions and interactions.

3. Mathematical Framework

Both time and space are the functional spectra of the events λ, operated by and associated with their virtual and physical structure, and generated by supernatural Y^-Y^+ events associated with their virtual and physical framework. The event states of spatial-time planes are open sets and can either rise as subspaces transformed from the other worlds or confined as locally independent existence within their own domain. As in the settings of spatial and time geometry for physical or virtual world, a global parameter $G(\lambda)$ of event λ on a world plane is complex differentiable not only at $W^{\pm}(\lambda)$, but also everywhere within neighborhood of W in the complex plane or there exists a complex derivative in a neighborhood. By a major theorem in complex analysis, this implies that any holomorphic function is infinitely differentiable as an expansion of a function into an infinite sum of terms.

As a part of the natural architecture, the mathematical regulation of terminology not only includes symbol notation, operators, and indices of vectors and tensors, but also classifies the mathematical tools and their interpretations under the universal topology. In order to describe the nature precisely, it is essential to define a duality of the contravariant $Y^+ = Y\{\mathbf{r} - i\,\mathbf{k}\}$ manifold and the covariant $Y^- = Y\{\mathbf{r} + i\,\mathbf{k}\}$ manifold, respectively by the following regulations.

1 Contravariance ($\hat{\partial}^\lambda$) - One set of the symbols with the upper indices $\{x^\mu, u^\nu, M^{\nu\sigma}\}$, as contravariant forms, are the numbers for the $Y\{\hat{x}\}$ basis of the Y^+ manifold labelled by its identity symbols $\{\hat{}, ^+\}$. "Contravariance" is a formalism in which the nature laws of dynamics operates the event actions $\hat{\partial}^\lambda$, maintains its virtual supremacy of the Y^+ dynamics, and dominates the virtual characteristics under the manifold $\hat{x}$ basis.

2 Covariance ($\check{\partial}_\lambda$) - Other set of the symbols with the lower indices (x_m, u_n, M_{ab}), as covariance forms, are the numbers for the $Y\{\check{x}\}$ basis of the Y^- manifold labelled by its identity symbols of $\{\check{}, ^-\}$. "Covariance" is a formalism in which the nature laws of dynamics performs the event actions $\check{\partial}_\lambda$, maintains its physical supremacy of the Y^- dynamics, and dominates the physical characteristics under the manifold $\check{x}$ basis.

Either contravariance or covariance has the same form under a specified set of transformations to the lateral observers within the same or boost basis as a common or parallel set of references for the operational event.

The communications between the manifolds are related through the tangent space of the world planes, regulated as the following operations:

6. Communications ($\hat{\partial}_\lambda$ and $\check{\partial}^\lambda$) - Lowering the operational indices $\hat{\partial}_\lambda$ is a formalism in which the quantitative effects of an event λ under the contravariant Y^+ manifold are projected into, transformed to, or acted on its conjugate Y^- manifold. Rising the operational indexes $\check{\partial}^\lambda$, in parallel fashion, is a formalism in which the quantitative effects of an event λ under the

covariant Y^- manifold are projected into, transformed to, or reacted at its reciprocal Y^+ manifold.

The dual variances are isomorphic to each other regardless if they are isomorphic to the underlying manifold itself, and form the norm (inner product) of the manifolds or world lines. Because of the reciprocal and contingent nature, the dual manifolds conserve their invariant quantities under a change of transform commutations and transport continuities with the expressional freedom of its underlying basis.

As a part of the universal topology, these mathematical regulations of the dual variances architecturally defines further framework of the event characteristics, its operational interactions and their commutative infrastructures. In the $Y^\mp$ manifolds, a potential field can be characterized by a scalar function of $\psi \in \{\phi^+, \phi^-, \varphi^+, \varphi^-\}$ as *Ground Fields*, to serve as a state environment of entanglements. Among the fields, their localized entanglements form up, but are not limited to, the density fields, as *First Horizon Fields*. The derivative to the density fields are event operations of their motion dynamics, which generates an interruptible tangent space, named as *Second Horizon Fields*.

Artifact 3.1: Residual Operations

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 $\dot{x}^\nu\partial^\nu$ to the vector $x^\mu\mathbf{b}^\mu$ has the changes of both magnitude quantity $\dot{x}^\nu\mathbf{b}^\mu\partial x^\nu/\partial x^\mu$ and basis direction $\dot{x}_a x^\nu \overset{+}{\Gamma}{}^{\mu}_{a\nu}\mathbf{b}^\mu$ 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.

$$\hat{\partial}^\lambda\psi = \dot{x}^\mu X^{\nu\mu}\big(\partial^\nu - i\Theta^\mu(\lambda)\big)\psi \qquad : X^{\nu\mu} \equiv (S_2^+ + R_2^+)_{\nu\mu} \tag{3.1a}$$

$$S_2^+ \equiv \frac{\partial x^\nu}{\partial x^\mu},\ R_2^+ \equiv x^\mu \overset{+}{\Gamma}_{\nu\mu a}, \qquad \overset{+}{\Gamma}_{\nu\mu a} = \frac{1}{2}\Big(\frac{\partial \hat{g}^{\nu\mu}}{\partial x^a} + \frac{\partial \hat{g}^{\nu a}}{\partial x^\mu} - \frac{\partial \hat{g}^{\mu a}}{\partial x^\nu}\Big) \tag{3.1b}$$

$$\check{\partial}_\lambda\psi = \dot{x}_m X_{nm}\big(\partial_n + i\Theta_m(\lambda)\big)\psi \qquad : X_{nm} \equiv (S_2^- + R_2^-)_{\nu\mu} \tag{3.2a}$$

$$S_2^- \equiv \frac{\partial x_n}{\partial x_m},\ R_2^- \equiv x_m \overset{-}{\Gamma}_{nma}, \qquad \overset{-}{\Gamma}_{nm\alpha} = \frac{1}{2}\Big(\frac{\partial \check{g}_{nm}}{\partial x_\alpha} + \frac{\partial \check{g}_{n\alpha}}{\partial x_m} - \frac{\partial \check{g}_{m\alpha}}{\partial x_n}\Big) \tag{3.2b}$$

where the $\overset{-}{\Gamma}_{nm\alpha}$ or $\overset{+}{\Gamma}_{\nu\mu a}$ is an Y^- or Y^+ metric connection, similar but extend the meanings to the *Christoffel* symbols of the *First* kind, introduced in 1869 [18]. The first partial derivative ∂^ν or ∂_n acts on the potential argument's value x^μ or x_m with the exogenous event λ as indirect effects. Associated with the horizon actions, the partial derivative ∂^λ or ∂_λ is embedded in the event operations $\Theta^\mu(\lambda)$ or $\Theta_m(\lambda)$, gives rise to the horizons, and acts on the potential argument's value λ as direct effects. Shown by the artifact 2.3, the events operates $\Theta^\mu = e\dot{x}^\mu A^\mu/\hbar$ and $\Theta_m = e\dot{x}_m A_m/\hbar$ which give rise to the second horizon potentials. The transformation S_2^+ or transportation R_2^+ is communication between two coordinate frames that move at velocity relative to each other under the

18 Christoffel, E.B. (1869), "Ueber die Transformation der homogenen Differentialausdrücke zweiten Grades", Journal für die reine und angewandte Mathematik, B70: 46–70

local Y^+ manifold. Vice versa for the boost S_1^- transformation or spiral R_1^- transportation.

Artifact 3.2: Relativistic Operations.

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 $\dot{x}_a\partial_a$ 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 $\dot{x}_a x^\mu \overset{+}{\Gamma}{}^{\nu}_{a\mu} \mathbf{b}^\nu$ 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 *Inertial 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.

$$\hat{\partial}_\lambda \psi = \dot{x}_a X^\nu{}_a \left(\partial^\nu - i\Theta^\nu(\lambda)\right)\psi \qquad : X^\nu{}_a \equiv S_1^+ + R_1^+ \tag{3.3a}$$

$$S_1^+ \equiv \frac{\partial x^\nu}{\partial x_a},\ R_1^+ \equiv x^\mu \overset{+}{\Gamma}{}^{\nu}_{\mu a},\ \ \overset{+}{\Gamma}{}^{\nu}_{\mu a} = \frac{1}{2}\hat{g}_{\nu\epsilon}\left(\frac{\partial \hat{g}^{\epsilon\mu}}{\partial x^a} + \frac{\partial \hat{g}^{\epsilon a}}{\partial x^\mu} - \frac{\partial \hat{g}^{\mu a}}{\partial x^\epsilon}\right) \tag{3.3b}$$

Because the exogenous event λ has indirect effects via the local arguments of the potential function, the non-local derivative to the local event λ is at zero. Likewise, the Y^- actions, $\dot{x}^\alpha \partial^\alpha (x_m \mathbf{b}_m)$, can be cloned straightforwardly, which gives rise from the Y^- tangent rotations of both magnitude quantity $\dot{x}^\alpha \partial x_m / \partial x^\alpha \mathbf{b}_m$ and basis rotation $\dot{x}^\alpha x_s \overset{-}{\Gamma}{}^{m}_{s\alpha}$ into a vector Y^+ potentials of the second horizon:

$$\check{\partial}^\lambda \psi = \dot{x}^\alpha X_m{}^\alpha \left(\partial_m + i\Theta_m(\lambda)\right)\psi \qquad : X_m{}^\alpha \equiv S_1^- + R_1^- \tag{3.4a}$$

$$S_1^- \equiv \frac{\partial x_m}{\partial x^\alpha},\ R_1^- \equiv x_s \overset{-}{\Gamma}{}^{m}_{s\alpha}, \qquad \overset{-}{\Gamma}{}^{m}_{s\alpha} = \frac{1}{2}\check{g}^{me}\left(\frac{\partial \check{g}_{e\alpha}}{\partial x_s} + \frac{\partial \check{g}_{es}}{\partial x_\alpha} - \frac{\partial \check{g}_{\alpha s}}{\partial x_e}\right) \tag{3.4b}$$

where the matrix $\check{g}_{\sigma\epsilon}$ or $\hat{g}^{se}$ is the Y^- or Y^+ metric, and the matrix $\check{g}^{\sigma\epsilon}$ or $\hat{g}_{se}$ is the inverse metric, respectively. Besides, the $\overset{-}{\Gamma}{}^{m}_{s\alpha}$ or $\overset{+}{\Gamma}{}^{\nu}_{\mu a}$ is an Y^- or Y^+ metric connection, similar but extend the meanings to the *Christoffel* symbols of the *Second* kind.

Artifact 3.3: Vector Residual Operations

Following the local tangent curvature of the potential vectors through the next tangent vector of the curvature, the λ event gives rise to the *Third Horizon Fields*, shown by the expressions:

$$\hat{\partial}^\lambda V^\mu = \dot{x}^\nu\left(\partial^\nu V^\mu - \overset{+}{\Gamma}{}^{\sigma}_{\nu\mu} V^\sigma\right) \tag{3.5}$$

$$\check{\partial}_\lambda V_m = \dot{x}_n\left(\partial_n V_m - \overset{-}{\Gamma}{}^{s}_{nm} V_s\right) \tag{3.6}$$

where the reference of an observation is at the Y^- manifold. The event operates the *local* actions in the tangent space relativistically, where the scalar fields are given rise to the vector fields and the vector fields are given rise to the matrix fields.

Artifact 3.4: Vector Interactions

Through the tangent vector of the third curvature, the events $\hat{\partial}^\lambda \hat{\partial}^\lambda$ and $\check{\partial}_\lambda \check{\partial}_\lambda$ continuously entangle the residual vector fields, shown by the formulae:

$$\hat{\partial}^\lambda \hat{\partial}^\lambda V^\mu = \left(\dot{x}^\iota \partial^\iota\right)\left(\dot{x}^\nu \partial^\nu\right) V^\mu - \dot{x}^\iota \overset{+}{\Gamma}{}^{s}_{\iota\nu}\left(\dot{x}^\nu \partial^\nu V^\mu\right) + \dot{x}^n \overset{+}{\Gamma}{}^{n}_{ms} \dot{x}^\nu \overset{+}{\Gamma}{}^{\sigma}_{\mu\nu} V^\sigma$$

$$-\left(\ddot{x}^{\nu}\overset{+}{\Gamma}{}^{\sigma}_{\mu\nu} + \dot{x}^{\nu}\dot{x}^{\iota}\partial^{\iota}\overset{+}{\Gamma}{}^{\sigma}_{\mu\nu} + \dot{x}^{\nu}\overset{+}{\Gamma}{}^{\sigma}_{\mu\nu}\dot{x}^{\iota}\partial^{\iota}\right)V^{\sigma} \tag{3.7}$$

$$\check{\partial}_{\lambda}\check{\partial}_{\lambda}V_m = \left(\dot{x}_e\partial_e\right)\left(\dot{x}_n\partial_n\right)V_m - \dot{x}_e\overset{-}{\Gamma}{}^{s}_{en}\left(\dot{x}_n\partial_n V_m\right) + \dot{x}_{\nu}\overset{-}{\Gamma}{}^{\mu}_{\sigma\nu}\dot{x}_n\overset{-}{\Gamma}{}^{o}_{mn}V_o$$
$$-\left(\ddot{x}_n\overset{-}{\Gamma}{}^{o}_{mn} + \dot{x}_n\dot{x}_e\partial_e\overset{-}{\Gamma}{}^{o}_{mn} + \dot{x}_n\overset{-}{\Gamma}{}^{o}_{mn}\dot{x}_e\partial_e\right)V_o \tag{3.8}$$

Besides, the cross-entanglements, $\hat{\partial}_{\lambda}$ and $\check{\partial}^{\lambda}$, elaborate relativistic transformations between the manifolds and give rise to the next horizon fields, simply by the conversion $L^{\pm}_{\nu\mu}$ matrices:

$$\dot{x}_{\nu} \mapsto \dot{x}^{\mu}L^{-}_{\nu\mu} \qquad \dot{x}^{\nu} \mapsto \dot{x}_{\mu}L^{-}_{\nu\mu} \tag{3.9}$$

As an integrity, they perform full operational commutations of vector boosts and torque rotations operated between the $Y^{-}Y^{+}$ world planes. The event processes continue to build up the further operable and iterative horizons of the associated rank-n tensor fields. Systematically, sequentially, and progressively, a chain of these reactions constitutes various domains, each of which gives rise to the distinct field entanglements.

Artifact 3.5: Classical Operators

In quantum physics, a mathematical operator is driven by the event λ, which, for example at $\lambda = t$, can further derive the classical momentum $\hat{p}$ and energy $\hat{E}$ operators at the second horizon:

$$\hat{\partial}^{t} : \dot{x}^{\mu}\partial^{\mu} = \left(-ic\,\partial^{\kappa},\, \mathbf{u}^{+}\partial^{r}\right) = \frac{i}{\hbar}\left(\hat{E}, \mathbf{u}^{+}\hat{p}\right) \qquad : \partial^{\kappa} = \frac{\partial}{\partial x^{0}},\ \mathbf{u}^{+} = \frac{\partial x^{r}}{\partial t} \tag{3.11}$$

$$\check{\partial}_{t} : \dot{x}_m\partial_m = \left(+ic\,\partial_{\kappa},\, \mathbf{u}^{-}\partial_{r}\right) = \frac{i}{\hbar}\left(\hat{E}, \mathbf{u}^{-}\hat{p}\right) \qquad : \partial_{\kappa} = \frac{\partial}{\partial x_{0}},\ \mathbf{u}^{-} = \frac{\partial x_{r}}{\partial t} \tag{3.12}$$

$$\hat{E} = -i\hbar\frac{\partial}{\partial t}, \qquad \hat{p} = -i\hbar\nabla \qquad : \partial^{r} = \partial_{r} = \nabla \tag{3.13}$$

For $\mathbf{u}^{\mp} = \pm c$, one has the classical operators at the third horizon:

$$\check{\partial}^{\lambda}\check{\partial}_{\lambda} = \hat{\partial}^{\lambda}\hat{\partial}_{\lambda} = \hat{\partial}_{\lambda}\check{\partial}^{\lambda} = \hat{\partial}^{\lambda}\check{\partial}_{\lambda} = \frac{\partial^2}{\partial t^2} - c^2\nabla^2 \equiv c^2\Box^{+} \qquad : \lambda = t \tag{3.14}$$

$$\hat{\partial}_{\lambda}\hat{\partial}_{\lambda} = \check{\partial}^{\lambda}\check{\partial}^{\lambda} = \check{\partial}_{\lambda}\hat{\partial}_{\lambda} = \hat{\partial}^{\lambda}\check{\partial}^{\lambda} = \frac{\partial^2}{\partial t^2} + c^2\nabla^2 \equiv c^2\Box^{-} \qquad : \lambda = t \tag{3.15}$$

where the operator $\Box^{\mp}$ extends the *d'Alembert* operator into the $Y^{-}Y^{+}$ properties. These operators can normally be applied to the diagonal elements of a matrix, observable to the system explicitly or externally.

It is worthwhile to emphasize that *a*) the manifold operators of $\{\partial^{\mu}, \partial_m\}$, including traditional "operators" of $\{\partial/\partial t, \partial/\partial x, \nabla, \Box, \cdots\}$ are exclusively useable as mathematical tools only, and *b*) the tools do not operate or perform by themselves unless they are driven or operated by an event λ, implicitly or explicitly.

Artifact 3.6: Flux Continuity

For the entanglement streams between the manifolds, the ensemble of an event λ is in a mix of the Y^{-} or Y^{+}-supremacy states such that each pair of the reciprocal states $\{\phi_n^{-}, \varphi_n^{+}\}$ or $\{\phi_n^{+}, \varphi_n^{-}\}$ is performed in alignment with an integrity of their probability $p_n^{\pm} = p_n(h_n^{\pm})$, where $h_n^{\pm}$ are the $Y^{\pm}$ distributive or horizon factors, respectively. The parameter p_n^{-} or p_n^{+} is a statistical function of horizon factor $h_n^-(T)$ or $h_n^+(T)$ and fully characterizable by *Thermodynamics*. Under the event operations, the interoperation among four types of scalar fields of $\phi_n^\pm$ and $\varphi_n^\pm$ correlates and entangles an environment of dual densities $\rho_\phi^+ = \phi_n^+\varphi_n^-$ and $\rho_\phi^- = \phi_n^-\varphi_n^+$ by means of the natural derivatives $\dot\lambda$ to form a pair of fluxions $\langle\dot\lambda\rangle^\mp$:

$$\dot\lambda\rho_\phi^- = \langle\check\lambda, \hat\lambda\rangle^- = \langle\dot\lambda\rangle^- = \sum\nolimits_n p_n^-\left(\varphi_n^+\check\lambda\phi_n^- + \phi_n^-\hat\lambda\varphi_n^+\right) \tag{3.17}$$

$$\dot\lambda\rho_\phi^+ = \langle\hat\lambda, \check\lambda\rangle^+ = \langle\dot\lambda\rangle^+ = \sum\nolimits_n p_n^+\left(\varphi_n^-\hat\lambda\phi_n^+ + \phi_n^+\check\lambda\varphi_n^-\right) \tag{3.18}$$

where $\dot\lambda \in \{\check\lambda, \hat\lambda\}$, $\check\lambda \in \{\check\partial_\lambda, \check\partial^\lambda\}$, and $\hat\lambda \in \{\hat\partial^\lambda, \hat\partial_\lambda\}$. The symbols $\langle\ \rangle^\mp$ are called Y^- or Y^+ *Continuity Bracket*. They represent the dual continuities of the Y^-Y^+ scalar densities, each of which extends its meaning to the classic anti-commutator or commutator,

$$\langle a, b\rangle = ab + ba, \qquad [a, b] = ab - ba \tag{3.19}$$

known as commutators or *Lei Bracket*, introduced in 1930s [19].

Artifact 3.7: Flux Commutation

In a parallel fashion, as another pair of the operational symbols $[\dot\lambda]^\mp$ at respective Y^- or Y^+ supremacy, the reciprocal entanglements of fluxion fields define the *Commutator Bracket* $[\ ]^\mp$:

$$[\hat\lambda, \check\lambda]^+ = [\dot\lambda]^+ = \sum\nolimits_n p_n^+\left(\varphi_n^-\hat\lambda\phi_n^+ - \phi_n^+\check\lambda\varphi_n^-\right) \tag{3.20}$$

$$[\check\lambda, \hat\lambda]^- = [\dot\lambda]^- = \sum\nolimits_n p_n^-\left(\varphi_n^+\hat\lambda\phi_n^- - \phi_n^-\hat\lambda\varphi_n^+\right) \tag{3.21}$$

$$\left\langle\dot\lambda\right)_s^\pm = \sum\nolimits_n p_n^\pm\varphi_n^\mp\dot\lambda\phi_n^\pm, \qquad \left(\dot\lambda\right\rangle_s^\pm = \sum\nolimits_n p_n^\mp\phi_n^\pm\dot\lambda\varphi_n^\mp \tag{3.22}$$

where, in addition, the bracket $\langle\ )^\mp$ and $(\ \rangle^\mp$ are called Y^- or Y^+ *Asymmetry Brackets*. They are essential to ontological and cosmological dynamics.

Artifact 3.8: Vector Fluxions

Similarly, a set of the reciprocal vector fields of $V_m^\pm = -\dot\partial\phi_m^\pm$ and $\Lambda_\mu^\pm \equiv -\dot\partial\varphi_\mu^\pm$, has the brackets of Y^- or Y^+ continuity and commutation:

$$\langle\hat\lambda, \check\lambda\rangle_v^\pm \equiv \sum\nolimits_n p_n^\pm\left(\varphi_n^\mp\hat\lambda V_n^\pm + \phi_n^\pm\check\lambda\Lambda_n^\mp\right) \qquad \left\langle\dot\lambda\right)_v^\pm = \varphi_n^\mp\dot\lambda V_n^\pm \tag{3.23}$$

$$[\hat\lambda, \check\lambda]_v^\mp \equiv \sum\nolimits_n p_n^\mp\left(\varphi_n^\pm\hat\lambda V_n^\mp - \phi_n^\mp\check\lambda\Lambda_n^\pm\right) \qquad \left(\dot\lambda\right\rangle_v^\pm = \phi_n^\pm\dot\lambda\Lambda_n^\mp \tag{3.24}$$

where the index n is corresponds to each type of particle, and v indicates entanglements of vector potentials, which respectively give rise to or balance each other's horizon environment.

19 Schrödinger, Erwin (November 1935). "Die gegenwärtige Situation in der Quantenmechanik (The present situation in quantum mechanics)". Naturwissenschaften. 23 (48): 807–812. doi:10.1007/BF01491891

Artifact 3.9: Interpretation of Entropy

A measure of the specific operations of ways is called entropy in which states of a universe system could be arranged and balanced towards its equilibrium. The total entropy $\mathcal{S}^{\pm}$ represent law of conservation of area commutation and defined by the following commutations. For a triplet quark system, the blackhole entropy $\mathcal{S}_A$ is at $2\phi_a^+(\phi_b^- + \phi_c^-) \approx 4\phi_a^+\phi_{b/c}^-$, which is about four times of the area entropy for the wave emission

$$\mathcal{S}_a = \mathcal{S}^+ + \mathcal{S}^- = 4\mathcal{S}_A \qquad : \mathcal{S}^{\pm} = \kappa_s\left[\hat{\partial}_\lambda\hat{\partial}^\lambda, \check{\partial}^\lambda\check{\partial}_\lambda\right]^{\pm} \tag{3.25}$$

where κ_s is factored by normalization of the potential fields for a pair of the world planes. As an operational duality, the entropy tends towards both extrema alternately to maintain a continuity of energy conservations, operated by each of the opponent *World Plane.* When a total entropy decreases, the intrinsic order, or Y^- development, of virtual into physical regime $\hat{\partial}_\lambda\hat{\partial}^\lambda$ is more dominant than the reverse process. This philosophy states that for the central quantity of *Motion Dynamics*, conversely, when a total entropy increases, the extrinsic disorder, or Y^+ annihilation $\check{\partial}^\lambda\check{\partial}_\lambda$, becomes dominant and conceals physical resources into virtual regime. For an observation at long range, the commutation becomes a conservation of the Y^-Y^+ thermodynamics, or is known as blackhole radiations, which yields law of the *Area Entropy* of the dual manifolds on the world planes.

Artifact 3.10: Interpretation of *Lagrangians*

To seamlessly integrate with the classical dynamic equations, it is critical to interpret or promote the natural meanings of *Lagrangian* mechanics $\mathcal{L}$ in forms of the dual manifolds. As a function of generalized information and formulation, *Lagrangians* $\mathcal{L}$ can be redefined as a set of densities, continuities, or commutators, entanglements of the Y^-Y^+ manifolds respectively. A few of the examples are:

The density *Lagrangians* for the *Artifact* 2.1 can be defined by the formulae:

$$\tilde{\mathcal{L}}_\rho = \check{\mathcal{L}}_\rho + i\hat{\mathcal{L}}_\rho = \psi^-(\check{x})\ \psi^+(\hat{x})\ exp\left(i\vartheta(\lambda)\right) \tag{3.26}$$

$$\check{\mathcal{L}}_\rho = \phi^-(\check{x},\lambda)\ \varphi^+(\hat{x},\lambda) - \phi^+(\hat{x},\lambda)\ \varphi^-(\check{x},\lambda) \tag{3.27}$$

$$\hat{\mathcal{L}}_\rho = \phi^+(\hat{x},\lambda)\ \phi^-(\check{x},\lambda) + \varphi^+(\hat{x},\lambda)\ \varphi^-(\check{x},\lambda) \tag{3.28}$$

For a scalar or vector entanglement, the commutator *Lagrangians* can be expressed by their local- or inter-communications:

$$\tilde{\mathcal{L}}_L^{\pm} = -\frac{1}{c^2}\left[\hat{\partial}^\lambda\hat{\partial}^\lambda, \check{\partial}_\lambda\check{\partial}_\lambda\right]_{s/v}^{\pm} \quad : \text{Local-Commutators} \tag{3.29}$$

$$\tilde{\mathcal{L}}_I^{\pm} = -\frac{1}{c^2}\left[\check{\partial}^\lambda\hat{\partial}_\lambda, \hat{\partial}_\lambda\check{\partial}^\lambda\right]_{s/v}^{\pm} \quad : \text{Inter-Commutators} \tag{3.30}$$

Those formulae generalize the *Lagrangian* and state that the central quantity of *Lagrangian*, introduced in 1788, represents the bi-directional fluxions that sustain, stream, harmonize and balance the dual continuities of entanglements of the Y^-Y^+ dynamic fields. Apparently, there are a variety of ways to comprehend or empathize on a *Lagrangian* function under a scope of isolations.

4. Law of Event Processes

Following *Universal Topology*, world events, illustrated in the Y^-Y^+ flow diagram of Figure 4a, 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 and transported 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 ρ_n^+ for the Y^+ manifold and its equivalent ρ_n^- for the Y^- manifold, respectively.

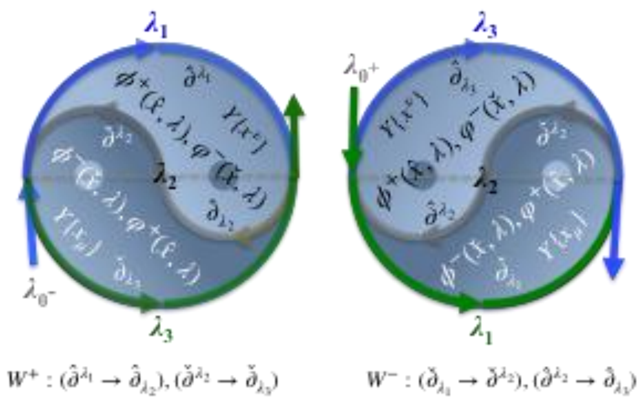

Figure 4a: Event Flows of Y^-Y^+ Evolutional Processes

Besides, the left-side diagram presents the event flow acted from the inception of λ_{0-} through λ_1 λ_2 λ_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 λ_1 λ_2 λ_3 to complete a cycle process for the Y^- supremacy. The details are described by the loops of *Evolutional Processes* as the following interrelations:

1. Visualized in the left-side of Figure 4a, the transitional event process between virtual and physical manifolds involves a cyclic sequence throughout the dual manifolds of the environment: incepted at λ_{0-}, the event actor produces the virtual operation $\hat{\partial}_{\lambda_1}$ in $Y\{x^\nu\}$ manifold (the left-hand blue curvature) projecting $\hat{\partial}^{\lambda_2}$ to and transforming into its physical opponent $\check{\partial}^{\lambda_2}$ (the tin curvature transforming from the left-hand into right-hand), traveling through $Y\{x_\mu\}$ manifold (the right-hand green curvature), and reacting the event $\check{\partial}_{\lambda_3}$ back to the actor.
2. As a duality in the parallel reaction, exhibited in the right-side of Figure 4a, initiated at λ_{0+}, the event actor generates the physical operation $\check{\partial}_{\lambda_1}$ in $Y\{x_\mu\}$ manifold (the right-hand green curvature) projecting $\check{\partial}^{\lambda_2}$ to and transforming into its virtual opponent $\hat{\partial}^{\lambda_2}$ (the tin curvature transforming from right-hand

into left-hand), traveling through $Y\{x^\nu\}$ manifold (the left-hand blue curvature), and reacting the event $\hat{\partial}_{\lambda_3}$ back to the actor.

With respect to one another, the two sets of the Universal Event processes, cycling at the opposite direction simultaneously, formulate the flow charts in the following mathematical expressions:

$$W^+ : (\hat{\partial}^{\lambda_1} \to \hat{\partial}_{\lambda_2}), (\check{\partial}^{\lambda_2} \to \check{\partial}_{\lambda_3}) \quad (4.1)$$

$$W^- : (\check{\partial}_{\lambda_1} \to \check{\partial}^{\lambda_2}), (\hat{\partial}^{\lambda_2} \to \hat{\partial}_{\lambda_3}) \quad (4.2)$$

This pair of the interweaving system pictures an outline of the internal commutation of dark energy and continuum density of the entanglements. It demonstrates that the two-sidedness of any event flows, each dissolving into the other in alternating streams, operate a life of situations, movements, or actions through continuous helix-circulations aligned with the universe topology, which lay behind the context of the main philosophical interpretation of *World Equations*.

Artifact 4.1: Motion Operations

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 (4.1)-(4.2), the principle of least-actions derives a set of the *Motion Operations*:

$$\check{\partial}^-\left(\frac{\partial W}{\partial(\hat{\partial}^+\phi^+)}\right) - \frac{\partial W}{\partial\phi^+} = 0 \quad : \check{\partial}^- \in \{\check{\partial}_\lambda, \check{\partial}^\lambda\},\ \phi^+ \in \{\phi_n^+, \varphi_n^+\} \quad (4.3)$$

$$\hat{\partial}^+\left(\frac{\partial W}{\partial(\check{\partial}^-\phi^-)}\right) - \frac{\partial W}{\partial\phi^-} = 0 \quad : \hat{\partial}^+ \in \{\hat{\partial}^\lambda, \hat{\partial}_\lambda\},\ \phi^- \in \{\phi_n^-, \varphi_n^-\} \quad (4.4)$$

This set of dual formulae extends the philosophical meaning to the *Euler-Lagrange Motion Equation* [20] 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 formulations from each of the motion extrema, simultaneously driving a duality of physical and virtual dynamics.

Artifact 4.2: Geodesic Routing

Unlike a single manifold space, where the shortest curve connecting two points is described as a parallel line, the optimum route between two points of a curve is connected by the tangent transportations of the Y^- and Y^+ manifolds. As an extremum of event actions on a set of curves, the rate of divergence of nearby geodesics determines curvatures that is governed by the equivalent formulation of geodesic deviation for the shortest paths on each of the world planes:

$$\ddot{x}^\mu + \overset{+}{\Gamma}{}^{\mu}_{\alpha\beta}\dot{x}^\alpha\dot{x}^\beta = 0 \qquad \ddot{x}_m + \overset{-}{\Gamma}{}^{m}_{ab}\dot{x}_a\dot{x}_b = 0 \quad (4.5)$$

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20 Courant, R; Hilbert, D (1953). Methods of Mathematical Physics. Vol. I. New York: Interscience Publishers, Inc. ISBN 978-0471504474

This set extends a duality to and is known as *Geodesic Equation* [21], where the motion accelerations of $\ddot{x}^{\mu}$ and $\ddot{x}_m$ are aligned in parallel to each of the world lines. It states that, during the inception of the universe, the tangent vector of the virtual $Y^{-}Y^{+}$ energies to the geodesic entanglements is either unchanged or parallel transport as an object moving along the world planes that creates the inertial transform generators and twist transport torsions to emerge a reality of the world.

21 Landau, L. D. & Lifshitz, E. M. (1975). Classical Theory of Fields (Fourth Revised English Edition). Oxford: Pergamon. ISBN 0-08-018176-7

5. World Equations

In mathematical analysis, a complex manifold yields a holomorphic operation and is complex differentiable in a neighborhood of every point in its domain, such that an operational process can be represented as an infinite sum of terms:

$$f(\lambda) = f(\lambda_0) + f'(\lambda_0)(\lambda - \lambda_0) \cdots + f^n(\lambda_0)(\lambda - \lambda_0)^n / n! \tag{5.1}$$

known as the *Taylor* and *Maclaurin* series, introduced in 1715 [22]. 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*** $\dot{\lambda}_i \in \{\dot{\partial}_{\lambda_1}, \dot{\partial}_{\lambda_2}\dot{\partial}_{\lambda_1}, \cdots, \dot{\partial}_{\lambda_n\lambda_{n-1}\cdots\lambda_1}\}$ in the dual variant forms:

$$f(\lambda) = f_0 + \kappa_1\dot{\partial}_{\lambda_1} + \kappa_2\dot{\partial}_{\lambda_2}\dot{\partial}_{\lambda_1} \cdots + \kappa_n\dot{\partial}_{\lambda_n}\dot{\partial}_{\lambda_{n-1}}\dots\dot{\partial}_{\lambda_1} \tag{5.2a}$$

$$\kappa_n = f^n(\lambda_0)/n!, \qquad \dot{\lambda}_i \in \{\dot{\partial}\} = \{\check{\partial}_\lambda, \check{\partial}^\lambda, \hat{\partial}^\lambda, \hat{\partial}_\lambda\} \tag{5.2b}$$

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. Because the events are operated through the potential fields, it essentially incepts on the world planes a set of the $\dot{\lambda}_i$ derivatives, giving rise to the horizon infrastructures, simply given by the above:

$$\hat{W}_n = \phi_n^+(\lambda, \hat{x})\phi_n^-(\lambda, \check{x}) \quad \text{: First World Equation} \tag{5.3}$$

$$\phi_n^\mp(\lambda, x) = \left(1 \pm \tilde{\kappa}_1\dot{\partial}_{\lambda_1} \pm \tilde{\kappa}_2\dot{\partial}_{\lambda_2}\dot{\partial}_{\lambda_1} \cdots\right)\phi_n^\mp(\lambda, x)|_{\lambda=\lambda_0} \tag{5.4}$$

where $\phi_n^+(\lambda, \hat{x})$ or $\phi_n^-(\lambda, \check{x})$ 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

a) 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 $\pm(\kappa_2\dot{\partial}_{\lambda_2}\dot{\partial}_{\lambda_1} + \cdots\kappa_i\dot{\partial}_{\lambda_i}\dot{\partial}_{\lambda_{i-1}}\dots\dot{\partial}_{\lambda_1})$ - 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, it reveals the principles of *Force Fields,* which include, but are not limited

22 Taylor, Brook (1715). Methodus Incrementorum Directa et Inversa [Direct and Reverse Methods of Incrementation] (in Latin). London. p. 21–23

to, and are traditionally known as the *Spontaneous Breaking* and fundamental forces. For the physical observation, the real part $R_e\{\hat{W}_n\}$ features the Y^- behaviors of the forces explicitly while the imaginary $I_m\{\hat{W}_n\}$ attributes the Y^+ comportment of the actions implicitly.

Once the physical three-dimensions are evolving or developed, the operational function $f(\lambda)$ for the event λ actions involves the local state densities $\rho_n(x)$ and its relativistic spacetime exposition of a system with N objects or particles. Assuming each of the $\phi_n^\pm$ particles is in one of three possible states: |-⟩, |+⟩, and |o⟩, the system has N_n^+ and N_n^- particles at non-zero charges with their reciprocal state functions of $\varphi_n^\mp$ confineable to the respective manifold $Y^\pm$ locally. Therefore, the horizon functions of the system can be expressed by:

$$\check{W}_c = k_w \int \check{W}_b d\Gamma, \qquad \check{W}_b = \sum\nolimits_n h_n \check{W}_a, \quad \check{W}_a = f(\lambda)\rho_n \tag{5.5}$$

$$\rho_n = \psi_n^+(\hat{x})\psi_n^-(\check{x}) \qquad : \psi_n^\pm \in \{\phi_n^\pm, \varphi_n^\mp\}, \; h_n = N_n^\pm / N \tag{5.6}$$

where h_n is a horizon factor, $N_n^\pm/N$ are percentages of the Y^-Y^+ particles, and k_w is defined as a world constant. During space and time dynamics, the density $\psi_n^-\psi_n^+$ is incepted at $\lambda = \lambda_0$ and followed by a sequence of the evolutions $\dot{\lambda}_i \mapsto \dot{\partial}_{\lambda_1} \cdots \dot{\partial}_{\lambda_i \lambda_{i-1} \cdots \lambda_1}$. As a horizon infrastructure, this process engages and applies a series of the event operations of equations (5.2) to the equations of (5.4) in the forms of the following expressions, named as *Second Type* of ***World Equations***:

$$\check{W}^\pm = k_w \int d\Gamma \sum_n h_n \left[W_n^\pm + \kappa_1 \dot{\partial}_{\lambda_1} + \kappa_2 \dot{\partial}_{\lambda_2} \dot{\partial}_{\lambda_1} \cdots \right] \psi_n^+(\hat{x})\psi_n^-(\check{x}) \tag{5.7}$$

where $\check{W}_n^\pm \equiv \check{W}(\hat{x} \,|\, \check{x}, \lambda_0)$ is the Y^+ or Y^- ground environment or an initial potential density of a system, respectively. This type of *World Equations* features the physical supremacy of kinetic dynamics or *Field Equations* as a part of the horizon infrastructure. Although, two types of the *World Equations* are mathematically equivalent, they represents the real situations further favorable to a variety of variations.

As the topological framework, various horizons are defined as, but not limited to, timestate, microscopic and macroscopic regimes, each of which is in a separate zone, emerges with its own fields, and aggregates or dissolves into each other as the interoperable neighborhoods, systematically and simultaneously. Through the $Y^- Y^+$ communications, the expression of the tangent vectors defines and gives rise to each of the horizons.

Artifact 5.1: First Horizon

The field behaviors of individual objects or particles have their potentials of the timestate or superposing functions in forms of, but not limited to, the dual densities, given by the (2.4-2.5) of the density (2.7) ρ_n^+ at Y^+ supremacy and the ρ_n^- (2.8) at Y^- supremacy. This horizon is confined by its neighborhoods of the potential fields and second horizons, which is characterizable by the scalar objects of $\phi^\pm$ and $\varphi^\pm$ fields of the ground horizon, individually, and reciprocally.

Artifact 5.2: Second Horizon

The effects of aggregated objects have their continuity and commutative entanglements towards the microscopic functions in forms of commutative fluxions of Y^+ and Y^- fields, respectively:

$$\mathbf{f}_x^{\pm} = k_x^{\pm} \partial \rho_s^{\pm} \tag{5.8}$$

This horizon summarizes the timestate functions $\mathbf{f}^{\pm} = \sum_n p_n \mathbf{f}_n^{\pm}$ confined between the first and third horizons of the microscopic forces and statistic p_n distributions.

Artifact 5.3: Fluxion Density and Currents

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 densities $\rho_s^{\mp}$ and currents $\mathbf{j}_s^{\mp}$, generated by the first order of energy densities at the second horizon (5.4) as the following:

$$\begin{aligned} \tilde{\rho}_s^- &= \sum_n \left(\phi_n^- + \tilde{\kappa}_1^- \check{\partial}_\lambda \phi_n^- \cdots\right)\left(\varphi_n^+ + \tilde{\kappa}_1^+ \hat{\partial}^\lambda \varphi_n^+ \cdots\right) \\ &= \sum_n \left\{ \phi_n^- \varphi_n^+ + \frac{1}{ic} \mathbf{f}_n^- + \tilde{\kappa}_1^- \tilde{\kappa}_1^+ \left(\check{\partial}_\lambda \phi_n^-\right) \wedge \left(\hat{\partial}^\lambda \varphi_n^+\right) + \cdots \right\} \end{aligned} \tag{5.9a}$$

$$\begin{aligned} \tilde{\rho}_s^+ &= \sum_n \left(\phi_n^+ + \tilde{\kappa}_1^+ D_\lambda \phi_n^+\right)\left(\varphi_n^- + \tilde{\kappa}_1^- D_\lambda \varphi_n^-\right) \\ &= \sum_n \left\{ \phi_n^+ \varphi_n^- + \frac{1}{ic} \mathbf{f}_n^+ + \tilde{\kappa}_1^- \tilde{\kappa}_1^+ \left(\hat{\partial}^\lambda \phi_n^+\right) \wedge \left(\check{\partial}_\lambda \varphi_n^-\right) + \cdots \right\} \end{aligned} \tag{5.9b}$$

$$\mathbf{f}_s^{\mp} = ic\rho_s^{\mp} + \mathbf{j}_s^{\mp} \qquad : \rho_s^{\mp} = \frac{i\hbar}{2E^{\pm}} \langle \partial_t \rangle_s^{\mp}, \quad \mathbf{j}_s^{\mp} = \frac{\hbar c}{2E^{\mp}} \langle \mathbf{u} \nabla \rangle_s^{\mp} \tag{5.10}$$

where the wedge circulations $\wedge$ is the nature of the entangling processes. The $Y^- Y^+$ fluxions $\mathbf{f}_s^{\mp}$ are also known as the classic *Covariant Density and Current* of the tetrad-coordinates $\left(ic\rho_s^{\pm}, \mathbf{j}_s^{\pm}\right)$. 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^- primary and the other Y^+ primary.

Artifact 5.4: Third Horizon

The integrity of massive objects characterizes their global motion dynamics of the matrices and tensors through an integration of, but not limited to, the derivative to the second horizon fields of densities and fluxions, defined as macroscopic *Force Fields*:

$$\dot{\mathbf{F}}^{\pm} = \kappa_{\mathbf{F}}^{\pm} \int \rho_a \dot{\partial} \dot{\mathbf{f}}_s^{\pm} d\Gamma \qquad : \dot{\partial} \in \{\check{\partial}_\lambda, \hat{\partial}^\lambda\} \tag{5.11}$$

where $\kappa_{\mathbf{F}}^{\pm}$ are coefficients. This horizon is confined by its neighborhoods of the second and fourth horizons and characterizable by the acceleration fields $\dot{\partial} \mathbf{f}_m^{\pm}$.

Artifact 5.5: Continuity Equations of $Y^- Y^+$ Fluxions

The derivative to the density and current (5.10) represent and extend as the classical continuity equations into a pair of the matrix equations

$$\dot{\partial}_\lambda \mathbf{f}_s^\pm = \frac{\partial \rho_s^\pm}{\partial t} + (\mathbf{u}^\pm \nabla) \cdot \mathbf{j}_s^\pm = K_s^\mp \qquad : K_s^+ \to 0^+ \tag{5.12}$$

The above equations are defined as *Continuity Equations of* $Y^- Y^+$ *Fluxions*, the streaming forms of conservation laws for flows balancing between the Y^- and Y^+ manifolds. The scalar K_s^+ balancing the Y^- continuity is the virtual source of energy, producing Y^- continuity $\dot{\partial}_\lambda \mathbf{f}^-$ of dark fluxions. For a virtual object of energy and momentum, its massless entity to the external observers is cyclic surrounding a point object. Therefore, the Y^+ field may appear as if its virtual source were not existent, or physically empty: $K_s^+ \to 0^+$. The symbol 0^+ means that, although the fluxion may be physically hidden, its Y^+ field rises whenever there is a physical flow as its opponent in tangible interactions or entanglements. As a byproduct, we might redefine the *Aether Theory* in order for its interpretation to be more accurate.

Artifact 5.6: Higher Horizons

The horizon ladder continuously accumulates and gives a rise to the next objects in forms of a ladder hierarchy:

$$\iiiint \cdots \rho_c \dot{\partial} \int \rho_b \dot{\partial} \mathbf{F}^\pm d\,\Gamma \mapsto \check{\mathbf{W}}_x^\pm \tag{5.13}$$

They are orchestrated into groups, organs, globes or galaxies.

6. Universal Field Equations

The potential entanglements is a fundamental principle of the real-life streaming 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. Under the law of event operations, they are fully describable by the mathematical framework of the dual manifolds. As a foundation of the potential entanglements, the kinetic dynamics of field equations can be derived by the *Second Type* of *World Equations.*

During the events of the virtual supremacy, a chain of the event actors in the loop flows of Figure 4a and equation (4.1) can be shown by and underlined in the sequence of the following processes:

$$W^+ : (\underrightarrow{\hat{\partial}^{\lambda_1}} \to \underbrace{\hat{\partial}_{\lambda_2}}), (\underrightarrow{\check{\partial}^{\lambda_2}} \to \underbrace{\check{\partial}_{\lambda_3}}); \;\; W^- : (\underline{\check{\partial}_{\lambda_1}} \to \underleftarrow{\check{\partial}^{\lambda_2}}), (\underline{\hat{\partial}^{\lambda_2}} \to \underleftarrow{\hat{\partial}_{\lambda_3}}) \tag{6.1}$$

From the event actors $\hat{\partial}_{\lambda_2}$ and $\check{\partial}_{\lambda_3}$, the *World Equations* (5.5) becomes:

$$W_a^+ = \left(W_n^+ + \kappa_1 \underbrace{\hat{\partial}_{\lambda_2}}\right)\phi_n^+\varphi_n^- + \kappa_2 \underbrace{\check{\partial}_{\lambda_3}}\left(\phi_n^+\hat{\partial}_{\lambda_2}\varphi_n^- + \varphi_n^-\hat{\partial}_{\lambda_2}\phi_n^+\right)\dots \tag{6.2}$$

Meanwhile the event actors $\hat{\partial}^{\lambda_1}$ and $\check{\partial}^{\lambda_2}$ turn World Equations into:

$$W_a^{+*} = \left(W_n^- + \kappa_1\underrightarrow{\hat{\partial}^{\lambda_1}}\right)\varphi_n^+\phi_n^- + \kappa_2\underrightarrow{\check{\partial}^{\lambda_2}}\left(\varphi_n^+\hat{\partial}^{\lambda_1}\phi_n^- + \phi_n^-\hat{\partial}^{\lambda_1}\varphi_n^+\right)\cdots \tag{6.3}$$

where $W_n^\pm = W_n^\pm(\mathbf{r}, t_0)$ is the time invariant Y^+Y^--energy area fluxion. Rising from the opponent fields of ϕ_n^- or φ_n^-, the dynamic reactions under the Y^- manifold continuum give rise to the *Motion Operation* (4.4) of the Y^+ fields ϕ_n^+ or φ_n^+ approximated at the first and second orders of perturbations in terms of *Second Type* of *World Equations*:

$$\frac{\partial W_a^+}{\partial\varphi_n^-} = W_n^+\phi_n^+ + \kappa_1\hat{\partial}_{\lambda_2}\phi_n^+ + \kappa_2\check{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2}\phi_n^+ \tag{6.4a}$$

$$\check{\partial}^{\lambda_2}\left(\frac{\partial W_a^+}{\partial(\underbrace{\hat{\partial}_{\lambda_2}}\;\varphi_n^-)}\right) = \underleftarrow{\check{\partial}^{\lambda_2}}\left(\kappa_1 + \kappa_2\check{\partial}_{\lambda_3}\right)\phi_n^+ \tag{6.4b}$$

$$\hat{\partial}_{\lambda_3}\left(\frac{\partial W_a^+}{\partial(\underbrace{\check{\partial}_{\lambda_3}}\;\varphi_n^-)}\right) = \underleftarrow{\hat{\partial}_{\lambda_3}}\left(\kappa_2\hat{\partial}_{\lambda_2}\phi_n^+\right) \tag{6.4c}$$

$$\frac{\partial W_a^{+*}}{\partial\phi_n^-} = W_n^-\varphi_n^+ + \kappa_1\hat{\partial}^{\lambda_1}\varphi_n^+ + \kappa_2\check{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1}\varphi_n^+ \tag{6.5a}$$

$$\check{\partial}_{\lambda_1}\left(\frac{\partial W_a^{+*}}{\partial(\underrightarrow{\hat{\partial}^{\lambda_1}}\phi_n^-)}\right) = \underline{\check{\partial}_{\lambda_1}}\left(\kappa_1 + \kappa_2\check{\partial}^{\lambda_2}\right)\varphi_n^+ \tag{6.5b}$$

$$\hat{\partial}^{\lambda_2}\left(\frac{\partial W_a^{+*}}{\partial(\underrightarrow{\check{\partial}^{\lambda_2}}\phi_n^-)}\right) = \underline{\hat{\partial}^{\lambda_2}}\left(\kappa_2\hat{\partial}^{\lambda_1}\right)\varphi_n^+ \tag{6.5c}$$

where the primary potentials of $\hat{\partial}_{\lambda_2}\varphi_n^-$ and $\check{\partial}_{\lambda_3}\varphi_n^-$ give rise simultaneously to their opponent's reactors of the physical to virtual $\check{\partial}^{\lambda 2}$ and the virtual to physical $\hat{\partial}_{\lambda_3}$ transformations, respectively. From these interwoven relationships, the motion operations (4.4) 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:

$$\kappa_1(\check{\partial}^{\lambda 2} - \hat{\partial}_{\lambda_2})\phi_n^+ + \kappa_2(\check{\partial}_{\lambda_3}\check{\partial}^{\lambda 2} + \hat{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2} - \check{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2})\phi_n^+ = W_n^+\phi_n^+ \quad (6.7)$$
$$\kappa_1(\check{\partial}_{\lambda_1} - \hat{\partial}^{\lambda 1})\varphi_n^+ + \kappa_2(\check{\partial}^{\lambda 2}\check{\partial}_{\lambda_1} + \hat{\partial}^{\lambda 2}\hat{\partial}^{\lambda 1} - \check{\partial}^{\lambda 2}\hat{\partial}^{\lambda 1})\varphi_n^+ = W_n^-\varphi_n^+ \quad (6.8)$$

giving rise to the Y^+ *General Fields* from each respective opponent during their physical interactions.

In the events of the physical supremacy in parallel fashion, a chain of the event actors in the flows of Figure 4a and equation (4.2) can be shown by the similar sequence of the following processes:

$$W^- : (\underline{\check{\partial}_{\lambda_1}} \to \underbrace{\check{\partial}^{\lambda 2}}), (\underline{\hat{\partial}^{\lambda 2}} \to \underbrace{\hat{\partial}_{\lambda_3}}); \;\; W^+ : (\hat{\partial}^{\lambda 1} \to \hat{\partial}_{\lambda_2}), (\check{\partial}^{\lambda 2} \to \check{\partial}_{\lambda_3}) \quad (6.9)$$

$$W_a^- = (W_n^- + \kappa_1\underline{\check{\partial}_{\lambda_1}})\ \varphi_n^+\phi_n^- + \kappa_2\underline{\hat{\partial}^{\lambda 2}}(\varphi_n^+\check{\partial}_{\lambda_1}\phi_n^- + \phi_n^-\check{\partial}_{\lambda_1}\varphi_n^+)\cdots \quad (6.10)$$
$$W_a^{-*} = (W_n^- + \kappa_1\underbrace{\overline{\check{\partial}^{\lambda 2}}})\phi_n^+\varphi_n^- + \kappa_2\ \underbrace{\hat{\partial}_{\lambda_3}}\ (\phi_n^+\check{\partial}^{\lambda 2}\varphi_n^- + \varphi_n^-\check{\partial}^{\lambda 2}\phi_n^+)\cdots \quad (6.11)$$

where $W_n^- = W_n^-(\mathbf{r}, t_0)$ is the time invariant Y^--energy area fluxion. Rising from its opponent fields of ϕ_n^+ or φ_n^+ in parallel fashion, the dynamic reactions (6.1) under the Y^+ manifold continuum give rise to the *Motion Operations* (4.3) of the Y^- state fields ϕ_n^- or φ_n^-, which determine a pair of linear partial differential equations of the state function ϕ_n^- or φ_n^- under the supremacy of physical dynamics at the $Y\{x_m\}$ manifold:

$$\kappa_1(\hat{\partial}^{\lambda 1} - \check{\partial}_{\lambda_1})\phi_n^- + \kappa_2(\hat{\partial}^{\lambda 2}\hat{\partial}^{\lambda 1} + \check{\partial}^{\lambda 2}\check{\partial}_{\lambda_1} - \hat{\partial}^{\lambda 2}\check{\partial}_{\lambda_1})\phi_n^- = W_n^-\phi_n^- \quad (6.12)$$
$$\kappa_1(\hat{\partial}_{\lambda_2} - \check{\partial}^{\lambda 2})\varphi_n^- + \kappa_2(\hat{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2} + \check{\partial}_{\lambda_3}\check{\partial}^{\lambda 2} - \hat{\partial}_{\lambda_3}\check{\partial}^{\lambda 2})\varphi_n^- = W_n^+\varphi_n^- \quad (6.13)$$

giving rise to the Y^- *General Fields* from each of the respective opponents during their virtual interactions. For the sake of a completeness, the motion operations (4.3) that derives the above equations similar to a set of (6.4, 6.5) are shown as below:

$$\frac{\partial W_a^-}{\partial \varphi_n^+} = W_n^-(\mathbf{x}, t_0)\,\phi_n^- + \kappa_1\check{\partial}_{\lambda_1}\phi_n^- + \kappa_2\hat{\partial}^{\lambda 2}\check{\partial}_{\lambda_1}\phi_n^- \quad (6.14a)$$
$$\hat{\partial}^{\lambda 1}\left(\frac{\partial W_a^-}{\partial(\check{\partial}_{\lambda_1}\varphi_n^+)}\right) = \underbrace{\hat{\partial}^{\lambda 1}}(\kappa_1 + \kappa_2\hat{\partial}^{\lambda 2})\phi_n^- \quad (6.14b)$$
$$\check{\partial}_{\lambda_2}\left(\frac{\overline{\partial W_a^-}}{\partial(\underline{\hat{\partial}^{\lambda 2}}\varphi_n^+)}\right) = \underbrace{\check{\partial}^{\lambda 2}}(\kappa_2\check{\partial}_{\lambda_1}\phi_n^-) \quad (6.14c)$$
$$\frac{\partial W_a^{-*}}{\partial \phi_n^+} = W^+\varphi_n^- + \kappa_1\check{\partial}^{\lambda 2}\varphi_n^- + \kappa_2\hat{\partial}_{\lambda_3}\check{\partial}^{\lambda 2}\varphi_n^- \quad (6.15a)$$
$$\hat{\partial}_{\lambda_2}\left(\frac{\partial W_a^{-*}}{\partial(\check{\partial}^{\lambda 2}\phi_n^+)}\right) = \hat{\partial}_{\lambda_2}(\kappa_1 + \kappa_2\hat{\partial}_{\lambda_3})\varphi_n^- \quad (6.15b)$$
$$\check{\partial}_{\lambda_3}\left(\frac{\partial W_a^{-*}}{\partial(\hat{\partial}_{\lambda_3}\phi_n^+)}\right) = \check{\partial}_{\lambda_3}(\kappa_2\check{\partial}^{\lambda 2}\varphi_n^-) \quad (6.15c)$$

where the primary potentials of the local dynamics $\check{\partial}_{\lambda_1}\varphi_n^+$ and $\hat{\partial}^{\lambda 2}\varphi_n^+$ give rise simultaneously to their opponent's reactors of the virtual animation $\hat{\partial}^{\lambda_1}$ and the physical to virtual transformation $\check{\partial}^{\lambda_2}$, respectively.

A homogeneous system is a trace of diagonal elements where an observer is positioned external to or outside of the objects. The source of the fields appears as a point object and has the uniform *Conservations* at every point without irregularities in field strength and direction, regardless of how the source itself is constituted with or without its internal or surface twisting torsions.

Whereas, a heterogeneous system is the off-diagonal elements of the symmetric tensors where an observer is positioned internal to or inside of the objects, and the duality of virtual annihilation and physical reproduction are balanced to form the local *Continuity* or *Invariance*.

Under the *Universal Topology*, the two pairs of the dynamic fields (6.7, 6.8) and (6.12, 6.13) are operated generically under horizon of the *World Events*. Together, the four formulae are named as *First Universal Field Equations*, because they are fundamental and general to all fields of natural evolutions.

Conclusion

Universal Topology $W = P \pm iV$, has revealed a set of the following discoveries (in August 2016) or groundbreakings:

1 To align closely with life-streams of our natural world, the ***Dual complex manifolds*** are established that overcomes the limitations of a single spacetime manifold.

3. ***Two pairs of the potential fields*** lies at the heart of the field theory for the fundamental interactions among the virtual dark energies and physical motion dynamics. Naturally, one of its applications derives *Gauge* theory of quantum invariant.
4. ***Mathematical Framework*** is imperatively regulated on a new theoretical foundation by the dual variances to intimately mimic event actions of transform and transport processes.
5. Both of the ***Boost Generators*** and ***Twist Coordinators*** are manifested by the entangling alternators (3.1, 3.2, 3.5, 3.6), which lies at the heat of the light and gravitational fields: photon and graviton.
6. ***Law of Event Processes*** lies at the heart of the field entanglements reciprocally and consistently as the fundamental flows of loop interactions for the dark field entanglements.
7. ***Motion Operations*** are further regulated on and performed with a new theoretical foundation of the dual events intimately mimic operational actions (4.3, 4.4) on the geodesic covertures, extend the meanings to the *Euler-Lagrange Motion Equation*.
8. ***World Equations*** align a series of the infinite sequential actions (5.7) concisely with potential-streams of the event operations that overcome the limitations of classical *Lagrangian* representations.
9. ***First Universal Field Equations*** of (6.7, 6.8) and (6.12, 6.13) are discovered as a set of general formulae, which lies at the heart of and is grounded for all horizon fields of *Universal and Unified Physics*.

As a result, it has laid out a ground foundation towards a unified physics that gives rise to the fields of quantum, photon, electromagnetism, graviton, gravitation, thermodynamics, ontology, cosmology, and beyond.

II. GENERAL HORIZON INFRASTRUCTURE OF QUANTUM FIELDS

Abstract

Harnessed with the *Universal Topology, Mathematical Framework* and *Universal Field Equations*, the comprehensive discoveries and a broad range of applications to both classical and contemporary physics prevail throughout the following contexts but are not limited to,

1. Two sets of boost transform and spiral transport *Generators* construct a communication infrastructure and function as the event actors producing photons from the well-known grammar-matrices and gravitons from the exceptional ***chi-matrices***.
2. An ***evolutional process*** reveals its superphase modulations and appears as the *Gauge* fields, giving rise to the horizons.
3. At the second horizon, the gravitation conserves invariance at its divergence with ***singularity-free*** on *World* planes.
4. ***Laws of Conservation of Creation and Reproduction*** illustrate the philosophical and mathematical derivations of classical quantum mechanics including but not limited to *Dirac*, *Hamiltonian*, *Pauli*, *Schrödinger*, *Lorentz*, *Klein–Gordon*, *Weyl* equations.
5. ***Embody Structure of Mass Enclave*** is discovered as a part of the horizon evolution processes. Particles at inauguration acquire their partial mass and evolve into the third horizons to become its full mass object, where the energy embodies its mass enclave and extends the extra freedom of the rotational coordinates into an integrity of the three-dimensional physical-space and one-dimensional virtual-time.
6. A set of the complex *matrices* formalizes ***Speed of Light and Gravitational Fields*** at a superphase modulation such that their r-directional amplitude of world line is at a constant *c*.
7. The virtual entangling functions are further decoherence or collapsed into the conventional physical interpretations that extend the fully virtual states to reformulate the classic equations, for example, *Lagrangians as well as Einstein* mass-energy equivalence.

Consequently, this unified theory testifies to, complies with and extends at precisely the empirical physics of *Pauli* matrices, *Lorentz* generators, quantum electrodynamics, spacetime evolution, horizon processes, and beyond.

Introduction

The main objective of this manuscript is to clearly demonstrate that, under *Universal Topology* $W = P \pm iV$, a duality of the potential entanglements lies at the heart of all event operations as the natural foundation giving rise to and orchestrating relativistic transformations for photons and spiral transportations for gravitons. Besides, the superphase modulation conducts laws of evolutions and horizon of conservations, and maintains field entanglements of coupling weak and strong forces compliant to quantum electrodynamics of classic physics. As a result, it inaugurates a unified physics dawning at special remarks of

Chapter VII: Discovers that a duality of the boost $S_i^{\pm}$ and spiral $R_i^{\pm}$ matrices constructs two sets of the *Generators*, establishes the quantum communication infrastructure, and institutes the well-known *Pauli* matrices or gamma-$\tilde{\gamma}^{\nu}$ transformations, and the exceptional chi-$\tilde{\chi}^{\nu}$ transportations, incepted at the second horizon on *World Planes*. Surprisingly, it reveals that the spiral torque is not only a source of graviton, but also has a hidden singularity such that its divergency of torque matrix is conserved to and yields the superphase modulations.

Chapter VIII: Demonstrates that a physical infrastructure is incepted by and given rise to the third horizon to have the extra freedom of the rotational coordinates as a three-dimensional space. As expected, the gravitation fields turnout the principle of the central-singularity.

Chapter IX: Derives all well-known quantum fields to include but not be limited to *Dirac Equation*, *Schrödinger Equation*, *Pauli Theory*, *Weyl Equation*, the enhanced *Klein–Gordon* equation. In addition, it exposes mass formation during the quantum harmonic oscillations between the horizons. Remarkably, it further reveals *Embody Structure of Mass Enclave* and the *Speed Matrices* of light and gravitational fields.

Consistently landing on classical and modern physics, this manuscript uncovers a series of the philosophical and mathematical groundbreakings accessible and testified by the countless artifacts.

7. Communication Infrastructures

As a part of the *Universal Topology*, a communication infrastructure formalizes the ontological processes in mathematical presentation driven by axiomatic creators and evolutions of the event operations that transform and transport informational messages and conveyable actions. Empowered with the speed of light, the *two-dimensional* $\{\mathbf{r} \mp i\mathbf{k}\}$ communication of the World Planes is naturally contracted for tunneling between the Y^- and Y^+ domains at both local residual and relativistic interaction among virtual dark and physical massive energies, which is mathematically describable by local invariances and relativistic commutations of entanglements cycling reciprocally and looping consistently among the four potential fields of the dual manifolds.

Remarkably, there are the environmental settings of originators and commutators that establish entanglements between the manifolds as a duality of the $Y^- Y^+$ infrastructures for the life transformation, transportation, or commutation simultaneously and complementarily. When the event $\lambda = t$ operates at constant speed *c*, the $Y^- Y^+$ dynamics incepts the matrices of (3.1-3.2) and (3.5,3.7) at the second horizon of the world planes. Each world contracts a two-dimensional manifold, generates a pair of the boost and spiral transportations, and entangles an infinite loop between the manifolds:

$$\hat{\partial}^\lambda \hookrightarrow \hat{\partial}_\lambda \rightleftharpoons \check{\partial}^\lambda \hookleftarrow \check{\partial}_\lambda \qquad : x_m \in \{ict, \tilde{r}\},\ x^\mu \in \{-ict, \tilde{r}\} \qquad (7.1)$$

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. For example, it features *Pauli* matrices, *Gamma* matrices, *Dirac* basis, *Weyl* spinors, *Majorana* basis, etc. At the third horizon *SU*(3) in the parallel fashion, another infrastructure institutes, but are not limited to, the symmetric and asymmetric transform or transport fields featuring electromagnetism, gravitation, weak, and strong forces, cosmological fields, etc.

Artifact 7.1: Dual Manifolds

Both manifolds $\hat{x}\{\mathbf{r} - i\mathbf{k}\}$ and $\check{x}\{\mathbf{r} + i\mathbf{k}\}$ simultaneously govern and alternatively perform the event operations as one integral stream of any physical and virtual dynamics. Apparently, the virtual positions $\pm i\mathbf{k}$ naturally forms a duality of the conjugate manifolds: $x^\nu \in \hat{x} \subset Y^+$ and $x_m \in \check{x} \subset Y^-$. Each of the super two-dimensional coordinate system $G(\lambda) \in G\{\mathbf{r} \pm i\mathbf{k}\}$ constitutes its *World Plane* $W^- \in G(\lambda = t)$ or $W^+ \in G(\lambda = t)$ distinctively, forms a duality of the universal topology $W^\mp = P \pm iV$ cohesively, and maintains its own sub-coordinate system $\mathbf{r}$ or $\mathbf{k}$ respectively and expendably. A sub-coordinate system has its own rotational freedom of either physical sub-dimensions $\mathbf{r}(\theta, \varphi)$ or virtual sub-dimensions $\mathbf{k}(x^1, x^2)$. Together, they compose two rotational manifolds as a reciprocal or conjugate duality operating and balancing the world events.

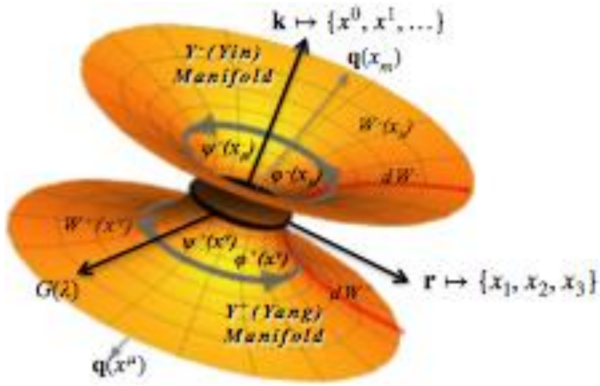

Figure 7a: Dual Manifolds of Communication Infrastructure

Artifact 7.2: Boost Generators

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 following

$$S_2^+ = \frac{\partial x^\nu}{\partial x^m} = \begin{pmatrix} 1 & -i \\ i & 1 \end{pmatrix} \equiv s_0 + i s_2 \qquad : \hat{\partial}^\lambda = \dot{x}^m S_2^+ \partial^\nu \tag{7.2a}$$

$$S_1^+ = \frac{\partial x^\nu}{\partial x_m} = \begin{pmatrix} -1 & -i \\ -i & 1 \end{pmatrix} \equiv s_3 - i s_1 \qquad : \hat{\partial}_\lambda = \dot{x}_m S_1^+ \partial^\nu \tag{7.2b}$$

$$S_1^- = \frac{\partial x_m}{\partial x^\nu} = \begin{pmatrix} -1 & i \\ i & 1 \end{pmatrix} \equiv s_3 + i s_1 \qquad : \check{\partial}^\lambda = \dot{x}^\nu S_1^- \partial_m \tag{7.2c}$$

$$S_2^- = \frac{\partial x_m}{\partial x_\nu} = \begin{pmatrix} 1 & i \\ -i & 1 \end{pmatrix} \equiv s_0 - i s_2 \qquad : \check{\partial}_\lambda = \dot{x}_\nu S_2^- \partial_m \tag{7.2d}$$

The $S_1^\pm$ matrices are a duality of the horizon settings for transformation between the two-dimensional world planes. The $S_2^\pm$ 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:

$$s_\kappa = \left[\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}_0, \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}_1, \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}_2, \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}_3 \right] \tag{7.3}$$

Intuitively simplified to a group of the 2x2 matrices, the infinite (7.1) 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:

$$[s_a, s_b] = 2\varepsilon_{cba}^- s_c \qquad \langle s_a, s_b \rangle = 0 \qquad : a, b, c \in \{1,2,3\} \tag{7.4}$$

where the *Levi-Civita* [23].connection ε_{cba}^- represents the right-hand chiral. In accordance with our philosophical anticipation, the non-zero commutation reveals the loop-processes of entanglements,

23 Levi-Civita, Tullio (1917) "Nozione di parallelismo in una varietà qualunque", Rendiconti del Circolo Matematico di Palermo (in Italian), 42: 173–205, JFM 46.1125.02, doi:10.1007/BF03014898

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.

Artifact 7.3: Torque Generators

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 solar 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 ϑ coordinate:

$$ds^2 = (d\tilde{r} + i\tilde{r}d\tilde{\vartheta})(d\tilde{r} - i\tilde{r}d\tilde{\vartheta}) = d\tilde{r}^2 + \tilde{r}d\tilde{\vartheta}^2 \quad (7.6)$$

$$x^m \in \check{x}\{\tilde{r} + i\tilde{\vartheta}\}, \; x^\nu \in \hat{x}\{\tilde{r} - i\tilde{\vartheta}\} \quad (7.7)$$

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

$$\check{g}_{\nu\mu} = \hat{g}^{\nu\mu} = \begin{pmatrix} 1 & 0 \\ 0 & \tilde{r}^2 \end{pmatrix}, \qquad \check{g}^{\nu\mu} = \hat{g}_{\nu\mu} = \begin{pmatrix} 1 & 0 \\ 0 & \tilde{r}^{-2} \end{pmatrix} \quad (7.8)$$

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 the following matrices,

$$R_2^+ = x^\mu \Gamma_{\nu\mu a}^+ = x^\mu \begin{pmatrix} 0 & \tilde{r} \\ \tilde{r} & -\tilde{r} \end{pmatrix} \equiv \epsilon_0 \tilde{r} + i\epsilon_2 \tilde{\vartheta} \qquad : \hat{\partial}^\lambda = \dot{x}^m R_2^+ \partial^\nu \quad (7.9a)$$

$$R_1^+ = x^\mu \Gamma_{\mu a}^{+\nu} = x^\mu \begin{pmatrix} 0 & 1/\tilde{r} \\ 1/\tilde{r} & -\tilde{r} \end{pmatrix} \equiv \epsilon_3 \tilde{r} - i\epsilon_1 \tilde{\vartheta} \qquad : \hat{\partial}_\lambda = \dot{x}_m R_1^+ \partial^\nu \quad (7.9b)$$

$$R_1^- = x_s \Gamma_{s\alpha}^{-m} = x_s \begin{pmatrix} 0 & 1/\tilde{r} \\ 1/\tilde{r} & -\tilde{r} \end{pmatrix} \equiv \epsilon_3 \tilde{r} + i\epsilon_1 \tilde{\vartheta} \qquad : \check{\partial}^\lambda = \dot{x}^\nu R_1^- \partial_m \quad (7.9c)$$

$$R_2^- = x_m \Gamma_{nma}^- = x_m \begin{pmatrix} 0 & \tilde{r} \\ \tilde{r} & -\tilde{r} \end{pmatrix} \equiv \epsilon_0 \tilde{r} - i\epsilon_2 \tilde{\vartheta} \qquad : \check{\partial}_\lambda = \dot{x}_\nu R_2^- \partial_m \quad (7.9d)$$

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:

$$\epsilon_\kappa = \tilde{r}\left[\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}_0, \begin{pmatrix} 0 & 0 \\ 0 & -1 \end{pmatrix}_1, \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix}_2, \frac{1}{\tilde{r}^2}\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}_3\right] \quad (7.10)$$

As a group of the 2x2 matrices, the infinite (7.9) loops of entanglements institute an integrity of the spiral generators ϵ_n sourced by the transform generators ϵ_0, shown by the following:

$$[\varepsilon_2, \varepsilon_1] = 0 = [\varepsilon_1, \varepsilon_0] \qquad : \text{Independent Freedom} \quad (7.11a)$$

$$[\varepsilon_2, \varepsilon_3] = \frac{1}{\tilde{r}} s_2 = [\varepsilon_3, \varepsilon_1] \qquad : \text{Force Exposions} \quad (7.11b)$$

$$[\varepsilon_2, \varepsilon_0] = \tilde{r}^2 s_2 = [\varepsilon_0, \varepsilon_1] \qquad \text{: Commutation Invariance} \tag{7.11c}$$

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

$$\langle \varepsilon_3, \varepsilon_0 \rangle = \frac{2}{\tilde{r}} s_0 \qquad \langle \varepsilon_2, \varepsilon_1 \rangle = 2\tilde{r}\varepsilon_1 \tag{7.12a}$$

$$\langle \varepsilon_2, \varepsilon_3 \rangle = 2\varepsilon_3 = -\langle \varepsilon_3, \varepsilon_1 \rangle \qquad \langle \varepsilon_2, \varepsilon_0 \rangle = 2\tilde{r}\varepsilon_0 = -\langle \varepsilon_0, \varepsilon_1 \rangle \tag{7.12b}$$

It demonstrates the commutative principles among the torque generators:

a. The entire torque is sourced from the inception of the transformation s_0 and the physical contortion ε_3; and
b. Each of the physical or virtual torsion is driven by the real force ε_3 or superposing torsion ε_0, respectively.

Similar to the boost generators, the double streaming torques orchestrate a set of the four-status.

Artifact 7.4: Conservation of Superposed Torsion

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

$$\nabla \cdot R_2^- = \frac{1}{\tilde{r}} \frac{\partial}{\partial \tilde{r}} (\epsilon_0 \tilde{r}) - \frac{1}{\tilde{r}} \frac{\partial}{\partial \tilde{\vartheta}} (i\epsilon_2 \tilde{\vartheta}) = (2\epsilon_0 - i\epsilon_2) \frac{1}{\tilde{r}} \tag{7.13a}$$

$$\nabla \cdot R_1^- = \frac{1}{\tilde{r}} \frac{\partial}{\partial \tilde{r}} (\epsilon_3 \tilde{r}) + \frac{1}{\tilde{r}} \frac{\partial}{\partial \tilde{\vartheta}} (i\epsilon_1 \tilde{\vartheta}) = i\epsilon_1 \frac{1}{\tilde{r}} \tag{7.13b}$$

Because of the $Y^- Y^+$ reciprocality, each superphase ϑ 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, introduced at 8:17 July 17th of 2018.

$$Y^- : \nabla \cdot (R_1^- + R_2^-) = 2 \begin{pmatrix} 0 & 1 \\ 1 & -i \end{pmatrix} \tag{7.14a}$$

$$Y^+ : \nabla \cdot (R_1^+ + R_2^+) = 2 \begin{pmatrix} 0 & 1 \\ 1 & +i \end{pmatrix} \tag{7.14b}$$

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

1. Modulated by the superphase $2\tilde{\vartheta}$-chirality, bi-directionally,
2. Operated at independence of spatial $\tilde{r}$-coordinate, respectively,
3. Steaming with its residual and opponent commutatively, and

4. Entangling of a duality 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.

Artifact 7.5: Manifold Signature

The scaling s_0 and transform s_3 generators operate as the evolution processes giving rise to the infrastructure of the second horizon $SU(2)$ at two-dimensions and the third horizon $SU(3)\times SU(2)\times U(1)$ at four-dimensions, each constitutes a pair of the bilinear forms

$$S_0^{\pm} = s_0 \pm i s_3 \equiv \eta^0 + i\eta^{\pm} \qquad \text{: Manifold Signatures,} \qquad (7.15)$$

$$s_0 = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \mapsto \begin{pmatrix} 1 & 0 \\ 0 & \mathbf{I}_3 \end{pmatrix}, \qquad s_3 = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \mapsto \begin{pmatrix} -1 & 0 \\ 0 & \mathbf{I}_3 \end{pmatrix} \qquad (7.16)$$

$$\eta^{\pm} = \pm \begin{pmatrix} -1 & 0 \\ 0 & \mathbf{I}_3 \end{pmatrix} \qquad \text{: Metric Signature} \qquad (7.17)$$

where $\eta^0 = s_0$ and $\eta^{\mp} = \pm s_3$ are known as the metric signature of the manifolds, and S_0^- or S_0^+ is defined as the Y^- or Y^+ *Manifold Signature*, respectively. When the metric signatures are a diagonal matrix, *Lie* algebra $O(1,3)$ consists of 2x2 or 4x4 matrices M such that it has the transform with the metric signatures $\eta^{\mp} \rightleftharpoons \eta^{\pm}$ between the manifolds:

$$\eta^{\mp} M \eta^{\pm} = -M \qquad : \eta^{\mp} \rightleftharpoons \eta^{\pm} \qquad (7.18)$$

Consequently, with one dimension $\tilde{r}$ in the world planes, the global manifolds are operated to extend the extra freedom of the two dimensions to its spatial coordinates or ***r**-vector*, where the group $SU(2)$ is locally isomorphic to $SU(3)$, and the physical ***r*** generators follow the same *Lie* algebra [24].

Artifact 7.6: Infrastructural Signatures

Upon the foundations of originator s_0 and commutator s_3, the infrastructures S_n^+ and S_n^- contract the s_1 matrix as an *evolution producer* between manifolds, and the s_2 matrix as a *transformer* within each of the manifolds.

$$S_1^{\pm} = s_3 \mp i s_1 \qquad \text{: Horizon Signature} \qquad (7.19a)$$

$$S_2^{\pm} = s_0 \pm i s_2 \qquad \text{: Transform Signature} \qquad (7.19b)$$

Meanwhile, the spiral torques operate at signatures of the rotational infrastructure:

$$R_1^{\pm} = \epsilon_3 \tilde{r} \mp i \epsilon_1 \tilde{\vartheta} \qquad \text{: Interactive Signature} \qquad (7.20a)$$

$$R_2^{\pm} = \epsilon_0 \tilde{r} \pm i \epsilon_2 \tilde{\vartheta} \qquad \text{: Transport Signature} \qquad (7.20b)$$

Instinctively, the (7.1) flow institutes naturally the loop signature of the infrastructures:

24 Bourbaki, N. (1989). Lie Groups and Lie Algebras: Chapters 1-3. Berlin·Heidelberg·New York: Springer. ISBN 978-3-540-64242-8

$$S_2^+ \hookrightarrow S_1^+ \rightleftharpoons S_1^- \hookleftarrow S_2^- \qquad \text{: Loop Infrastructure} \qquad (7.21)$$
$$R_2^+ \rightleftharpoons R_1^+, \qquad R_1^- \rightleftharpoons R_2^- \qquad \text{: Torque Infrastructure} \qquad (7.22)$$
$$S_1^- = (S_1^+)^*,\ S_2^+ = (S_2^-)^* \qquad R_1^- = (R_1^+)^*,\ R_2^+ = (R_2^-)^* \qquad (7.23)$$

Incredibly, the loop infrastructure orchestrates a life-cycle of the double steaming entanglements giving rise to the horizon and force fields.

Artifact 7.7: Horizon Infrastructure

As a loop sequence of the matrices, the infrastructure consists of the self-circular commutations and constructs miraculously a pair of the tangent manifold spaces to facilitates the generalization of horizon entanglements from world planes to affine spaces, shown as the following:

$$[S_2^+, S_1^+] = +\,S_1^+ = [S_1^+, S_2^-],\ [S_2^+, S_1^-] = -\,S_1^- = [S_1^-, S_2^-] \qquad (7.24)$$
$$[R_2^+, R_1^+] = i(\vartheta - \tilde{r}^3)s_2 = [R_1^-, R_2^-], \qquad \lim_{\tilde{r}\to 0}[R_1^\pm, R_2^\pm] = \mp\, i\,\vartheta\, s_2 \qquad (7.25)$$
$$[S_1^+, S_1^-] = i\,s_2 \qquad (7.26)$$

where the "$-$" sign implies the reverse or mirroring loop charity between the $Y^- Y^+$ manifolds. Apparently, the horizon signatures $S_1^\pm$ and the interactive signatures $R_1^\pm$ lie at a center of the core infrastructure dynamically bridging the two district activities or residual dynamics $S_2^\pm$ or $R_2^\pm$ distinctively. Phenomenally, the transform *Generator* s_2 plays an essential role as the natural resource tie bonding and streaming the double entanglements.

Artifact 7.8: Entangling Independence

At the local environment, the relationship of their commutations and continuities can be derived as the following, respectively:

$$[S_2^+, S_2^-] = 0 \qquad \langle S_2^+, S_2^-\rangle = 0 \qquad (7.27)$$
$$[R_2^+, R_2^-] = [R_1^+, R_1^-] = 0 \qquad \lim_{\tilde{r}\to 0}\langle R_2^+, R_2^-\rangle = s_0\tilde{r}^4 + \epsilon_2\tilde{r}\,\tilde{\vartheta}^2 \to 0 \qquad (7.28)$$

When any two objects are commutative at zero, it implies and reveals amazingly the independence between the manifold opponents:

1. The residual dynamics is independent to its opponent $[S_2^+, S_2^-] = 0$ and $[R_2^+, R_2^-] = [R_1^+, R_1^-] = 0$ while they jointly conserves the density flow $\langle S_2^+, S_2^-\rangle = 0$ and torque flow $\lim_{\tilde{r}\to 0}\langle R_2^+, R_2^-\rangle \to 0$, harmonizing integrity of their environment and conserving a duality of the dynamic invariant.
5. The super force interaction between objects is independent to their torque commutation $[\varepsilon_0, \varepsilon_3] = 0$ while, under invariant of the torque transportations, they are jointly modulated by the superposing phases to maintain or preserve the transformational s_0 generator.

$$\lim_{\tilde{r}\to 0}\langle R_1^+, R_1^-\rangle = s_0 + \epsilon_2\tilde{r}\,\tilde{\vartheta}^2 \to s_0 \qquad (7.29)$$

Inconceivably, the infrastructural invariant orchestrates the life-cycle generators of the double entanglements, giving rise to the horizon and force fields.

Artifact 7.9: Chiral Entanglement

When an axis passes through the center of an object, the object is said to rotate upon itself locally, or spin. Furthermore, when there are two axes passing through the center of an object, the object is said under the entanglements of the *YinYang* duality. Remarkably, the infrastructure consists of a pair of the double rotation fields such that each of the entangling matrix $S_1^{\pm}$ or $S_2^{\pm}$ has its corresponding normalized *Eigenvectors* ($|S_n^{\pm}\psi - \lambda I| = 0$, $S_n^{\pm}\psi = \lambda\psi$), respectively:

$$S_2^+, S_1^- \mapsto \psi^L = \begin{pmatrix} 1 \\ -i \end{pmatrix}^{\circlearrowright} \quad \text{: Left-hand chirality} \tag{7.30}$$

$$S_1^+, S_2^- \mapsto \psi^R = \begin{pmatrix} 1 \\ +i \end{pmatrix}^{\circlearrowleft} \quad \text{: Right-hand chirality} \tag{7.31}$$

Together, the $S_1^+ + S_2^-$ matrix of virtual supremacy produces the left-hand eigenvector or (7.14) while the $S_1^- + S_2^+$ matrix of physical supremacy servers the right-hand eigenvector or (7.15). With respect to the whole-cycle of the spin-up and spin-down potentials, the "$-i$" sign represents the left-hand chiral in the Y^+ manifold, and the "$+i$" sign depicts the right-hand chiral in the Y^- manifold. Therefore, spin chirality is a type of the virtual Y^+ and physical Y^- transformation that object entanglements on the world lines ($\hat{\partial}_\lambda, \check{\partial}^\lambda$) consists of the residual transportations ($\hat{\partial}^\lambda, \check{\partial}_\lambda$) of the Y^-Y^+ spinors, reciprocally, such that the nature appears the spinors characterized by the left-handed and the right-handed chirality sourced from or driven by each of the manifolds of the virtual Y^+ and physical Y^- dynamics. Following the trajectory (7.1), it takes in total two full rotations 720° from the W^+ to W^- and then back to W^+ world plane, and vice versa, for an object to return to its original state. With its opponent companionship, the infrastructure (7.10) of a whole system yields the parity conservation by maintaining and entangling the double duality reciprocally and simultaneously.

Artifact 7.10: Entangle Invariance

As the dynamic steaming, the entanglements of commutative densities are operated and balanced by the dark energies providing the common resources between the physical and virtual existences in order to maintain conservation of entanglements, shown by the chart.

Law of Conservation of Entanglements

1. *At least two types of densities are required in order to entangle fluxions.*
2. *Flux transports and performs as a duality of virtual fields and real forces.*
3. *Total fluxion of an entangle steaming must be sustainable and invariance.*
4. *Flux remains constant and conserves over time during its transportation.*
5. *A fluxion density can neither be created nor destroyed for entanglement.*
6. *Transportation of entangle momentum is conserved at its zero net value.*
7. *Momentum is exchangeable through cross interactions among participants.*

It represents *Law of Conservation of Entanglements*, or simply *Entangle Invariance*. Conservation of momentum applies only to an isolated system of entangle objects as a whole. Under this condition, an isolated system is one that is not acted on by objects external to the system, and that both entanglers are closed in a virtual space of the world irrelevant to their physical distance.

Artifact 7.11: Gamma Matrices

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

$$\tilde{\gamma}^{\nu} \equiv \begin{pmatrix} \{S_1^-, S_2^+\} \\ -\{S_1^+, S_2^-\}^* \end{pmatrix} \qquad \tilde{\gamma}_{\nu} \equiv \begin{pmatrix} \{S_1^+, S_2^-\} \\ -\{S_1^-, S_2^+\}^* \end{pmatrix} \tag{7.32}$$

$$\tilde{\gamma}^{\nu} = \left[\begin{pmatrix} s_0 & 0 \\ 0 & -s_0 \end{pmatrix}_0, -i \begin{pmatrix} 0 & s_1 \\ s_1 & 0 \end{pmatrix}_1, i \begin{pmatrix} 0 & s_2 \\ s_2 & 0 \end{pmatrix}_2, \begin{pmatrix} 0 & s_3 \\ -s_3 & 0 \end{pmatrix}_3 \right] \tag{7.33}$$

$$\tilde{\gamma}_{\nu}^- = -\eta^- \tilde{\gamma}^{\nu} \qquad \{S_1^-, S_2^+\} = \{S_1^+, S_2^-\}^* \tag{7.34}$$

Simply extended by the mirroring chirality $-(S_n^{\pm})^*$, the tilde-gamma matrices $\tilde{\gamma}^{\nu}$ represents the upper-row for one manifold dynamic stream $\{\hat{\partial}^{\lambda}, \check{\partial}^{\lambda}\}$ and the lower-row for its opponent $\{\hat{\partial}_{\lambda}, \check{\partial}_{\lambda}\}$.

Artifact 7.12: Chi Matrices

In parallel to the tilde-gamma matrices, one can contracts another superposed tilde-chi matrices $\tilde{\chi}^{\nu}$ represents (7.9) a set of the mirroring spiral torque tensors.

$$\tilde{\chi}^{\nu} = \left[\tilde{r} \begin{pmatrix} \epsilon_0 & 0 \\ 0 & -\epsilon_0 \end{pmatrix}_0, -i\tilde{\vartheta} \begin{pmatrix} 0 & \epsilon_1 \\ \epsilon_1 & 0 \end{pmatrix}_1, i\tilde{\vartheta} \begin{pmatrix} 0 & \epsilon_2 \\ \epsilon_2 & 0 \end{pmatrix}_2, \tilde{r} \begin{pmatrix} 0 & \epsilon_3 \\ -\epsilon_3 & 0 \end{pmatrix}_3 \right] \tag{7.35}$$

$$\tilde{\chi}_{\nu} = -\eta^- \tilde{\chi}^{\nu} \qquad \{R_1^-, R_2^+\} = \{R_1^+, R_2^-\}^* \tag{7.36}$$

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 decedent into its higher dimensional manifold. The $\chi_{\mu}^{\pm}$ fields are a pair of the torque-graviton potentials.

Artifact 7.13: Superphase Fields at Second Horizon

At the loop entanglements $\phi^+(\hat{x}) \rightleftharpoons \varphi^-(\check{x})$, the processes operate the particle fields in forms of transformations $S_i^{\pm}$, torque representations $K^{\mu}{}_{\nu}$ and $K_{\mu}{}^{\nu}$, and *Gauge* potentials $A_{\nu} \mapsto eA_{\nu}/\hbar$ for electrons and $A^{\nu} \mapsto eA^{\nu}/\hbar$ for positrons. Consequently, we have the total effective fields in each of the respective manifolds:

$$\check{\partial}_{\lambda}\phi^- + \hat{\partial}_{\lambda}\varphi^+ = \dot{x}_{\nu}\tilde{\zeta}_{\nu}\left[\begin{pmatrix} \partial_{\nu} \\ \partial^{\nu} \end{pmatrix}' + i\frac{e}{\hbar}\begin{pmatrix} A_{\nu} \\ A^{\nu} \end{pmatrix}' \right]\psi^- \quad : \psi^- = \begin{pmatrix} \phi^- \\ \varphi^+ \end{pmatrix} \tag{7.37}$$

$$\check{\partial}_{\lambda} = \dot{x}_{\nu}(S_2^- + R_2^-)(\partial_m + i\frac{e}{\hbar}A_{\nu}), \qquad \hat{\partial}_{\lambda} = \dot{x}_{\nu}(S_1^+ + R_1^+)(\partial^{\mu} - i\frac{e}{\hbar}A^{\mu})$$

$$\hat{\partial}^{\lambda}\phi^+ + \check{\partial}^{\lambda}\varphi^- = \dot{x}^{\nu}\tilde{\zeta}^{\nu}\left[\begin{pmatrix} \partial^{\nu} \\ \partial_{\nu} \end{pmatrix}' - i\frac{e}{\hbar}\begin{pmatrix} A^{\nu} \\ A_{\nu} \end{pmatrix}' \right]\psi^+ \quad : \psi^+ = \begin{pmatrix} \phi^+ \\ \varphi^- \end{pmatrix} \tag{7.38}$$

$$\hat{\partial}^{\lambda} = \dot{x}^{\nu}(S_2^+ + R_2^+)(\partial^m - i\frac{e}{\hbar}A^{\nu}), \qquad \check{\partial}^{\lambda} = \dot{x}^{\nu}(S_1^- + R_1^-)(\partial_{\mu} + i\frac{e}{\hbar}A_{\mu})$$

$$\tilde{\zeta}^{\nu} = \tilde{\gamma}^{\nu} + \tilde{\chi}^{\nu} \qquad \tilde{\zeta}_{\nu} = \tilde{\gamma}_{\nu} + \tilde{\chi}_{\nu} \tag{7.39}$$

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 expressed by or degenerated to the classical formulae:

$$\check{\partial}\psi^- \equiv \check{\partial}_\lambda\phi^- + \hat{\partial}_\lambda\varphi^+ \equiv \dot{x}_\nu\tilde{\zeta}_\nu D_\nu\psi^- \qquad : D_\nu = \partial_m + i\frac{e}{\hbar}A_m \tag{7.41}$$

$$\hat{\partial}\psi^+ \equiv \hat{\partial}^\lambda\phi^+ + \check{\partial}^\lambda\varphi^- \equiv \dot{x}^\nu\tilde{\zeta}^\nu D^\nu\psi^+ \qquad : D^\nu = \partial^\nu - i\frac{e}{\hbar}A^\nu \tag{7.42}$$

To our expectation, the A_ν and A^ν fields are a pair of the electro-photon potentials. Intuitively, both photons and gravitons are the outcomes or products of a duality of the double entanglements.

8. Physical Horizon Infrastructures

At motion dynamics of the second horizon, the tangent of the scalar density fields constructs the vector fields. As an astonishing consequence, under the two-dimensions of the world planes, the horizon generator s_1 incepts a freedom of the extra dimensions into the physical or virtual world, respectively giving rise to the third horizon:

$$s_1(2) = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \mapsto \begin{pmatrix} 0 & 1 \\ 1 & s_1(3) \end{pmatrix}, \qquad s_1(3) = \begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix} \tag{8.1}$$

By means of transformation between the manifolds, the matrix s_1 functions as *Generators* giving rise to the three-dimensional space. Simultaneously, by means of the transportation, the residual freedom of the s_2 matrix rotating itself into three-dimensions of the spatial manifolds: $SO(3)$.

$$s_2(2) = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \mapsto \begin{pmatrix} 0 & -1 \\ 1 & s_2(3) \end{pmatrix}, \qquad s_2(3) = \begin{pmatrix} 0 & -1 & 1 \\ 1 & 0 & -1 \\ -1 & 1 & 0 \end{pmatrix} \tag{8.2}$$

Together, a pair of the matrices, s_1 and s_2, institutes the third horizon and constructs an infrastructure in four-dimensions: $SU(2) \times SO(3)$.

Artifact 8.1: Pauli Matrices

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:

$$\sigma_\kappa = \left[\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}_0, \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}_1, \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}_2, \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}_3 \right] \tag{8.3}$$

$$\sigma_0 = s_0 \qquad \sigma_1 = s_1 \qquad \sigma_2 = i s_2 \qquad \sigma_3 = -s_3 \qquad \sigma_n^2 = I \tag{8.3a}$$

$$[\sigma_a, \sigma_b]^- = 2i\varepsilon_{cba}^- \sigma_c \qquad [\sigma_a, \sigma_b]^+ = 0 \qquad : a, b, c \in (1,2,3) \tag{8.3b}$$

known as *Pauli* spin matrices, introduced in 1925 [25]. 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 for physical reality.

Artifact 8.2: Physical Gamma and Chi Matrices

Aligning to the topological comprehension, we extend the gamma matrix γ^ν, introduced by W. K. Clifford in the 1870s [26], and chi gamma matrix χ^ν for physical coordinates.

$$\gamma^\nu = \left[\begin{pmatrix} \sigma_0 & 0 \\ 0 & -\sigma_0 \end{pmatrix}_0, \begin{pmatrix} 0 & \sigma_1 \\ -\sigma_1 & 0 \end{pmatrix}_1, \begin{pmatrix} 0 & \sigma_2 \\ -\sigma_2 & 0 \end{pmatrix}_2, \begin{pmatrix} 0 & \sigma_3 \\ -\sigma_3 & 0 \end{pmatrix}_3 \right] \tag{8.4a}$$

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25 Wolfgang Pauli (1927) Zur Quantenmechanik des magnetischen Elektrons Zeitschrift für Physik (43) 601-623

26 W. K. Clifford, "Preliminary sketch of bi-quaternions, Proc. London Math. Soc. Vol. 4 (1873) pp. 381–395

$$\chi^\nu = \left[r\begin{pmatrix} \epsilon_0 & 0 \\ 0 & -\epsilon_0 \end{pmatrix}_0, \vartheta\begin{pmatrix} 0 & \epsilon_1 \\ -\epsilon_1 & 0 \end{pmatrix}_1, i\vartheta\begin{pmatrix} 0 & \epsilon_2 \\ -\epsilon_2 & 0 \end{pmatrix}_2, r\begin{pmatrix} 0 & -\epsilon_3 \\ \epsilon_3 & 0 \end{pmatrix}_3 \right] \tag{8.4b}$$

$$\zeta^\nu = \gamma^\nu + \chi^\nu, \qquad \zeta_\nu = \gamma_\nu + \chi_\nu \tag{8.5}$$

The superphase $d\vartheta^2 = d\theta^2 + \sin^2\theta\, d\phi^2$ extends into the circumference-freedom polar 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. To collapse the (7.41, 7.42) equations together, we have a duality of the states expressed by or degenerated to the formulae of event operations:

$$\check{\partial} = \check{\partial}_\lambda + \hat{\partial}_\lambda = \dot{x}_\nu \zeta_\nu D_\nu = \dot{x}_\nu\, \zeta_\nu\left(\partial_\nu + i\frac{e}{\hbar}A_\nu + \tilde{\kappa}_2^-\partial_\nu A_\mu + \cdots\right) \tag{8.6a}$$

$$\hat{\partial} \equiv \hat{\partial}^\lambda + \check{\partial}^\lambda = \dot{x}^\mu \zeta^\mu D^\mu = \dot{x}^\mu \zeta^\mu\left(\partial^\mu - i\frac{e}{\hbar}A^\mu - \tilde{\kappa}_2^+\partial^\mu A^\nu - \cdots\right) \tag{8.6b}$$

Accordingly, all terms have a pair of the irreducible and complex quantities that preserves the full invariant and streams a duality of the Y^- and Y^+ loop $\hat{\partial}^\lambda \hookrightarrow \hat{\partial}_\lambda \rightleftharpoons \check{\partial}^\lambda \hookleftarrow \check{\partial}_\lambda$ entanglements.

Artifact 8.3: Superphase Fields at Second Horizon

As the superphase function from the first to second horizon, the vector field A^ν bonds and projects its potentials superseding with its conjugators, arisen by or acting on its opponent A_ν through a duality of reciprocal interactions dominated by boost $\tilde{\gamma}$ and twist $\tilde{\chi}$ fields, evolution into the second ($\tilde{\zeta} \mapsto \zeta$) horizon. Under the Y^- or Y^+ primary, the event operates the third terms of (8.6) in a pair of the relativistic entangling fields:

$$T_{\nu\mu}^{-n} = \left(\gamma_\nu\partial_\nu A_\mu - \gamma^\mu\partial^\mu A^\nu\right)_n = -\,T_{\mu\nu}^{+n} \qquad : \tilde{T}_{\nu\mu}^{\pm n}(\tilde{\gamma}) \mapsto T_{\mu\nu}^{\pm n}(\gamma) \tag{8.7}$$

$$\Upsilon_{\nu\mu}^{-n} = \left(\chi_\nu\partial_\nu A_\mu - \chi^\mu\partial^\mu A^\nu\right)_n = -\,\Upsilon_{\mu\nu}^{+n} \qquad : \tilde{\Upsilon}_{\nu\mu}^{\pm n}(\tilde{\chi}) \mapsto \Upsilon_{\mu\nu}^{\pm n}(\chi) \tag{8.8}$$

The tensor $T_{\nu\mu}^{\pm n}$ is the transform fields and $\Upsilon_{\nu\mu}^{\pm n}$ is the torque fields at second horizon. The transform and transport tensors naturally consist of the antisymmetric field components. These *Tensors* construct a pair of the superphase potentials in world planes giving rise to the third horizon fields, emerging the four-dimensional spacetime, and producing the electromagnetism and gravitation fields.

Artifact 8.4: Lorentz Generators

Giving rise to the third horizon, the (8.1, 8.2) generators contracts with the ζ infrastructure and evolves into the four-dimensional matrices $SU(2)_{s_1} \times SO(3)_{s_2}$, shown by the following:

$$J_1 = \begin{pmatrix} 0&0&0&0\\0&0&0&0\\0&0&0&-1\\0&0&1&0 \end{pmatrix},\quad J_2 = \begin{pmatrix} 0&0&0&0\\0&0&0&1\\0&0&0&0\\0&-1&0&0 \end{pmatrix},\quad J_3 = \begin{pmatrix} 0&0&0&0\\0&0&-1&0\\0&1&0&0\\0&0&0&0 \end{pmatrix} \tag{8.10}$$

$$K_1 = \begin{pmatrix} 0&1&0&0\\1&0&0&0\\0&0&0&0\\0&0&0&0 \end{pmatrix},\quad K_2 = \begin{pmatrix} 0&0&1&0\\0&0&0&0\\1&0&0&0\\0&0&0&0 \end{pmatrix},\quad K_3 = \begin{pmatrix} 0&0&0&1\\0&0&0&0\\0&0&0&0\\1&0&0&0 \end{pmatrix} \tag{8.11}$$

$$L_\nu^- = K_\nu + iJ_\nu \qquad L_\nu^+ = K_\nu - iJ_\nu \tag{8.12a}$$

$$[J_1, J_2]^- = J_3 \qquad [K_1, K_2]^- = -\,J_3 \qquad [J_1, K_2]^- = K_3 \tag{8.12b}$$

known as *Generator* of the *Lorentz* group, discovered since 1892 [27] or similar to *Gell-Mann* matrices [28]. Conceivably, the K_ν or J_ν matrices are residual $\{\hat{\partial}^\lambda, \check{\partial}_\lambda\}$ or rotational $\{\hat{\partial}_\lambda, \check{\partial}^\lambda\}$ components, respectively. During the transitions between the horizons, the redundant degrees of freedom is developed and extended from superphase ϑ of world-planes into the extra physical coordinates (such as θ and ϕ in).

Artifact 8.3: Fields at Third Horizon

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.

$$T^{-n}_{\nu\mu}(L) = \left(L^{-}_{\nu\mu}\partial_\nu V_\mu - L^{+}_{\mu\nu}\partial^\mu V^\nu\right)_n \qquad : T^{\pm n}_{\nu\mu}(\gamma) \mapsto T^{\pm n}_{\mu\nu}(L) \tag{8.13}$$

$$\Upsilon^{-n}_{\nu\mu}(L) = \left(L^{-}_{\nu\mu}\partial_\nu A_\mu - L^{+}_{\mu\nu}\partial^\mu A^\nu\right)_n \qquad : \Upsilon^{\pm n}_{\nu\mu}(\chi) \mapsto \Upsilon^{\pm n}_{\mu\nu}(L) \tag{8.14}$$

Under the Y^- or Y^+ primary, the event operates the third terms of (8.6) in a pair of the relativistic entangling fields:

Artifact 8.5: Physical Torque Singularity

Descendent from the world planes with the convention coordinates $\{r, \theta, \varphi\}$, a physical coordinate system is further extended its metric elements of $ds^2 = dr^2 + r^2(d^2\theta + sin^2 d\varphi^2)$ in a physical $\mathscr{R}^3$ space. The redundant degrees has its freedom of $\{\theta, \varphi\}$ coordinates with the metric and its inverse elements of:

$$\check{g}_{\nu\mu} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & r^2 & 0 \\ 0 & 0 & r^2 sin^2\theta \end{pmatrix}, \qquad \check{g}^{\nu\mu} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & r^{-2} & 0 \\ 0 & 0 & r^{-2} sin^{-2}\theta \end{pmatrix} \tag{8.15}$$

The *Christoffel* symbols of the sphere coordinates become the matrices:

$$\bar{\Gamma}_{r\nu\mu} = \bar{\Gamma}^{r}_{\nu\mu} = \begin{pmatrix} 0 & 0 & 0 \\ 0 & -r & 0 \\ 0 & 0 & -r sin^2\theta \end{pmatrix} \tag{8.16a}$$

$$\bar{\Gamma}^{\theta}_{\nu\mu} = \begin{pmatrix} 0 & \frac{1}{r} & 0 \\ \frac{1}{r} & 0 & 0 \\ 0 & 0 & -sin\theta cons\theta \end{pmatrix}, \quad \bar{\Gamma}^{\varphi}_{\nu\mu} = \begin{pmatrix} 0 & 0 & \frac{1}{r} \\ 0 & 0 & cot\theta \\ \frac{1}{r} & cot\theta & 0 \end{pmatrix} \tag{8.16b}$$

$$\bar{\Gamma}_{\theta\nu\mu} = r^2 \bar{\Gamma}^{\theta}_{\nu\mu}, \qquad \bar{\Gamma}_{\varphi\nu\mu} = r^2 sin^2\theta\, \bar{\Gamma}^{\varphi}_{\nu\mu} \tag{8.16c}$$

Apparently, the divergence of the spiral torque fields has the *r*-dependency, expressed by the divergence in spherical coordinates:

$$\nabla \cdot R^{-}_{1} = \frac{1}{r^2}\frac{\partial}{\partial r}(r^2 \bar{\Gamma}^{r}_{\nu\mu}) + \frac{1}{r sin\theta}\left[\frac{\partial}{\partial\theta}(sin\theta\, \bar{\Gamma}^{\theta}_{\nu\mu}) + \frac{\partial}{\partial\varphi}(\bar{\Gamma}^{\varphi}_{\nu\mu})\right] \tag{8.17}$$

27 William O. Straub, (2017) "A Child's Guide to Spinors" viXra:1701.0299
28 Gell-Mann, M. (1962) "Symmetries of baryons and mesons" Physical Review 125 (3) 1067

When the r-coordinate aligns to the superposition $\tilde{r}$, the three-dimensions of a physical space has its redundant degrees of freedom $\{\theta, \varphi\}$ such that the torque transportation becomes r-dependent inversely proportional to the square of distance or appears as the gravitational singularity. Therefore, one spatial dimension on the world planes evolves its physical world into the extra two-coordinates with a rotational *Central-Singularity*. This nature of physical-supremacy characterizes forces between objects and limits their interactive distances. As an associative affinity, this principle of the central-singularity, for examples, operates the gravitational attractions between the mass bodies, or gives weight to physical objects in residence.

Artifact 8.6: Friedmann-Lemaître Model

Introduced in the 1920s [29], the *Friedmann–Lemaître–Robertson–Walker* (FLRW) metric attempts a solution of *Einstein's* field equations of general relativity. Aimed to the gravitational inverse-square law, the research discovered that the desired outcome leads to the reduced-circumference polar coordinates:

$$d\Sigma^2 = dr^2 + S_k(r)^2 \, d\vartheta^2 \qquad : d\vartheta^2 = d\theta^2 + \sin^2\theta \, d\phi^2 \tag{8.18}$$

$$S_k(r) = \begin{cases} \sin\left(r\sqrt{k}\right)/\sqrt{k}, & k > 0 \\ r, & k = 0 \\ \sinh\left(r\sqrt{|k|}\right)/\sqrt{k}, & k < 0. \end{cases} \tag{8.19}$$

Apparently, it represents the virtual (k>0) and physical (k<0) of the “hyperspherical coordinates” bridged by the polar coordinate system (k=0). Therefore, it evidently supports a proof to our full description of the evolutional process coupling the horizons between the two-dimensional *World Planes* and the three-dimensional physical space.

Artifact 8.7: Spacetime Evolution

Generally, a spacetime of the third horizon is manifested and given rise from the second horizon to gain the extra freedom and evolution into three-dimensions of a physical space. The event operation of evolution is mathematically describable through transitioning functions from the tilde-zeta-matrices of the first horizon to the zeta-matrices $\tilde{\zeta} \mapsto \zeta$ of the second horizon, to the *Lorentz*-matrices $\zeta \mapsto L_\nu^\pm$ of the third horizon. Dependent on their Y^-Y^+ commutations or continuities through the tangent curvatures of potentials, the entangling processes develop the dark fluxions of fields, forces and entanglements to evolute the physical spacetime, prolific ontology, and eventful cosmology.

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29 Lemaître, Georges (1931), "Expansion of the universe, A homogeneous universe of constant mass and increasing radius accounting for the radial velocity of extra-galactic nebulæ", Monthly Notices of the Royal Astronomical Society, 91: 483–490, Bibcode:1931MNRAS..91..483L, doi:10.1093/mnras/91.5.483 translated from Lemaître, Georges (1927), "Un univers homogène de masse constante et de rayon croissant rendant compte de la vitesse radiale des nébuleuses extra-galactiques", Annales de la Société Scientifique de Bruxelles, A47: 49–56, Bibcode:1927ASSB...47...49L

Artifact 8.8: Inauguration of Gravitation

At the second horizon, conservation of *light* is sustained by its electromagnetic fields $F_{\nu\mu}^{\pm n}$ and transported by its companion partner: torque $\tilde{\Upsilon}_{\nu\mu}^{\pm n}$ fields. At the third horizon, given rise to, $\chi^{\nu} \mapsto L_{\nu}^{\pm}$, the freedom of the extra rotations, the world planes are further evolved into *Spacetime* manifolds, where the torque $\Upsilon_{\nu\mu}^{\pm n}$ fields are transited to gravitational $\Upsilon_{\nu\mu}^{\pm n}(\tilde{\chi}^{\nu}) \mapsto \Upsilon_{\mu\nu}^{\pm n}(L_{\nu}^{\pm})$ forces with a central-singularity. Therefore, at the inauguration of mass enclave appearing as if it were from nothing, the entanglement of the superphase fluxions exerts a pair of the gravitational fields in a spacetime manifold.

9. Quantum Field Equations

At the first horizon, the individual behaviors of objects or particles are characterized by their timestate functions of ϕ_n^+ or ϕ_n^- in the W_a equations. Due to the nature superphase modulation of virtual and physical coexistences, particle fields appear as quantization in mathematics.

Under a steady environment of the energy fluxions $W_n^\pm$, the equations of (6.7) and (6.13) can be reformulated into the compact forms for the Y^+ supremacy of the entanglements: *the Y^+ Quantum Field Equations*

$$\frac{-\hbar^2}{2E_n^+}\hat{\partial}_\lambda\hat{\partial}_\lambda\phi_n^+ - \frac{\hbar}{2}\left(\hat{\partial}_\lambda - \check{\partial}^\lambda\right)\phi_n^+ + \frac{\hbar^2}{2E_n^+}\check{\partial}_\lambda\left(\hat{\partial}_\lambda - \check{\partial}^\lambda\right)\phi_n^+ = \frac{W_n^+}{c^2}\phi_n^+ \qquad (9.1)$$

$$\frac{\hbar^2}{2E_n^-}\check{\partial}^\lambda\check{\partial}^\lambda\varphi_n^- - \frac{\hbar}{2}\left(\check{\partial}^\lambda - \hat{\partial}_\lambda\right)\varphi_n^- + \frac{\hbar^2}{2E_n^-}\left(\check{\partial}_\lambda - \hat{\partial}_\lambda\right)\check{\partial}^\lambda\varphi_n^- = \frac{W_n^+}{c^2}\varphi_n^- \qquad (9.2)$$

$$\kappa_1 = \hbar c^2/2 \qquad \kappa_2 = \pm(\hbar c)^2/(2E_n^\mp) \qquad W_n^\pm = c^2 E_n^\pm \qquad (9.3)$$

where $E_n^\pm$ is an energy state of a virtual object or a physical particle. It emanates that the bi-directional transformation has two rotations one with left-handed $\phi_n^+ \mapsto \phi_n^L$ acting from the Y^+ source to the Y^- manifold, and the other with right-handed $\varphi_n^- \mapsto \phi_n^R$ reacting from the Y^- back to the Y^+ manifold. Both fields are alternating into one another under a parity operation with relativistic preservation.

The entanglement of Y^+-supremacy represents one of the important principles of natural governances - ***Law of Conservation of Virtual Creation and Annihilation***:

1. The operational action $\hat{\partial}^\lambda$ of virtual supremacy results in the physical effects as the parallel and reciprocal reactions or emanations $\check{\partial}_\lambda$ in the physical world;
2. The virtual world transports the effects $\hat{\partial}_\lambda\hat{\partial}_\lambda$ emerging into or appearing as the creations of the physical world, even though the bi-directional transformations seem balanced between the commutative operations of $\hat{\partial}_\lambda$ and $\check{\partial}^\lambda$; and
6. As a part of the reciprocal processes, the physical world transports the reactive effects $\check{\partial}^\lambda\check{\partial}_\lambda$ concealing back or disappearing as annihilation processes of virtual world.

As a set of the universal laws, the events incepted in the virtual world not only generate its opponent reactions but also create the real-life objects in the physical world. The obvious examples are the formations of the elementary particles that a) the antiparticles in a virtual world generate the physical particles through their opponent duality of the event operations; b) by carrying and transitioning the informational massages, antiparticles grow into real-life objects vividly in a physical world and maintain their living entanglement; c) recycling objects of a physical world as one of continuity processes for virtual-life streaming.

As a reciprocal process, another pair of the equations (6.12) and (6.8) simultaneously formulates the following components for the Y^- supremacy of entanglements: *the Y^- Quantum Field Equations*

$$\frac{\hbar^2}{2E_n^-}\check{\partial}^\lambda\check{\partial}_\lambda\phi_n^- - \frac{\hbar}{2}\left(1+\frac{\hbar}{E_n^-}\hat{\partial}^\lambda\right)\left(\check{\partial}_\lambda - \hat{\partial}^\lambda\right)\phi_n^- = \frac{W_n^-}{c^2}\phi_n^- \tag{9.4}$$

$$\frac{-\hbar^2}{2E_n^+}\hat{\partial}^\lambda\hat{\partial}^\lambda\varphi_n^+ - \frac{\hbar}{2}\left(1-\frac{\hbar}{E_n^+}\check{\partial}^\lambda\right)\left(\hat{\partial}^\lambda - \check{\partial}_\lambda\right)\varphi_n^+ = \frac{W_n^-}{c^2}\varphi_n^+ \tag{9.5}$$

The Y^- parallel entanglement represents another essential principle of Y^- natural behaviors - ***Law of Conservation of Physical Animation and Reproduction***:

1. The operational action $\check{\partial}_\lambda$ of physical supremacy results in their conjugate or imaginary effects of animations because of the parallel reaction $\hat{\partial}^\lambda$ in the virtual world;
7. Neither the actions nor reactions impose their final consequences $\check{\partial}^\lambda\check{\partial}^\lambda$ on their opponents because of the parallel mirroring residuals for the horizon phenomena of reproductions $\hat{\partial}^\lambda\hat{\partial}^\lambda$ during the symmetric fluxions;
8. There are one-way commutations of $\check{\partial}^\lambda\check{\partial}_\lambda$ in transporting the events of the physical world into the virtual world asymmetrically. As a part of the reciprocal processes, the virtual world replicates $\hat{\partial}^\lambda$ the physical events during the mirroring $\hat{\partial}^\lambda\check{\partial}_\lambda$ processes in the virtual world.

As another set of laws, the events initiated in the physical world must leave a life copy of its mirrored images in the virtual world without the intrusive effects in the virtual world. In other words, the virtual world is aware of and immune to the physical world. In this perspective, continuity for a virtual-life steaming might become possible as a part of recycling or reciprocating a real-life in the physical world.

Artifact 9.1: Mass-energy Equivalence

In mathematical formulations of entanglements, we redefine the energy-mass formations in forms of virtual complex as the following:

$$E_n^{\mp} = \pm\, i m c^2 \qquad : \hbar\omega \rightleftharpoons m c^2 \tag{9.6}$$

where m is the rest mass. Compliant with a duality of *Universal Topology* $W = P \pm iV$, it extends *Einstein* mass-energy equivalence, introduced in 1905 [30], into the virtual energy states as one of the essential formulae of the topological framework.

Artifact 9.2: Dirac Equation

At the intrinsic 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 and applying the transformational characteristics (8.6), we add the (9.1)-(9.5) together to formulate the simple compartment:

30 Einstein, A. (1905), "Ist die Trägheit eines Körpers von seinem Energieinhalt abhängig?", Annalen der Physik, 18: 639–643, Bibcode:1905AnP...323..639E, doi:10.1002/andp.19053231314

$$\frac{\hbar}{2}\left(\dot{x}_\nu \zeta_\mu D_\nu - \dot{x}^\mu \zeta^\mu D^\mu\right)\psi_n^\pm \mp E_n^\pm \psi_n^\pm = 0 \tag{9.7}$$

$$\psi_n^+ = \begin{pmatrix}\phi_n^+\\ \varphi_n^-\end{pmatrix}, \qquad \overline{\psi}_n^- = \bar{\kappa}\begin{pmatrix}\varphi_n^-\\ \phi_n^+\end{pmatrix}, \qquad \psi_n^- = \begin{pmatrix}\phi_n^-\\ \varphi_n^+\end{pmatrix}, \qquad \overline{\psi}_n^+ = \bar{\kappa}\begin{pmatrix}\varphi_n^+\\ \phi_n^-\end{pmatrix} \tag{9.8}$$

where $\overline{\psi}_n^\pm$ is the adjoint potential and $\bar{\kappa}$ 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:

$$\tilde{\mathscr{L}}_D^+ = \overline{\psi}_n^- \gamma^\mu\left(i\hbar c\,\partial^\mu + eA^\mu\right)\psi_n^+ + mc^2\overline{\psi}_n^-\psi_n^+ \to 0 \tag{9.9a}$$

$$\tilde{\mathscr{L}}_D^- = \overline{\psi}_n^+ \gamma_\nu\left(i\hbar c\,\partial_\nu - eA_\nu\right)\psi_n^- - mc^2\overline{\psi}_n^+\psi_n^- \to 0 \tag{9.9b}$$

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 [31]. For elementary (unit charge, massless) fermions satisfying the *Dirac* equation, it suffices to note their field entanglements [32]:

$$\left(\gamma^\mu D^\mu\right)\left(\gamma_\nu D_\nu\right) = D^\mu D_\nu + \frac{i}{4}[\gamma^\mu, \gamma^\nu]F_{\mu\nu}^{-n} \tag{9.10}$$

Historically, the *Dirac* equation was a major achievement and gave physicists great faith in its overall correctness.

Artifact 9.3: Spinor Fields

As the function quantity from the first to second horizon, a scalar field ϕ^- bonds and projects its potentials superseding its surrounding space, arisen by or acting on its opponent φ^+ through a duality of reciprocal interactions dominated by *Lorentz Generators*. From the *gamma matrix* (8.4a) to *Lorentz generators* (8.12), the respective transformations of spinors are given straightforwardly by the matrixes of spinor σ_n quantities [33].

$$\phi_n^L = S(\Lambda^+)\phi_n^+(\hat{x}) \qquad : (\phi_n^L)^{-1}\gamma^\mu\phi_n^L = \Lambda^+\gamma^\nu,\ \check{x} = \Lambda^+\hat{x} \tag{9.11a}$$

$$\phi_n^R = S(\Lambda^-)\varphi_n^-(\check{x}) \qquad : (\phi_n^R)^{-1}\gamma_\mu\phi_n^R = \Lambda^-\gamma_\nu,\ \hat{x} = \Lambda^-\check{x} \tag{9.11b}$$

$$S(\Lambda^\pm) = exp\left\{\frac{1}{2}\left(i\sigma_k\hat{\theta}_k \pm \sigma_m\hat{\phi}_m\right)\right\},\ \ \Lambda^\pm = exp\left(\frac{\omega_k}{2}L_\kappa^\pm\right) \tag{9.11c}$$

Each of the first terms of $S(\Lambda^\pm)$ is the transformation matrix of the two dimensional world planes, respectively. Each of the second terms of $S(\Lambda^\pm)$ is an extension to the additional dimensions for the physical freedoms. The quantities are irreducible, preserve full parity invariant with respect to the physical change $\check{\theta}_i \to -\hat{\theta}_i$ for spin-up and spin-down positrons, which has the extra freedoms and extends the two degrees from a pair of each physical dimension of the world planes.

31 Dirac, P.A.M. (1982) [1958]. Principles of Quantum Mechanics. International Series of Monographs on Physics (4th ed.). Oxford University Press. p. 255. ISBN 978-0-19-852011-5

32 F. Wilczek, (1996) “Asymptotic Freedom” arXiv:hep-th/9609099, p17

33 Dennery, Philippe; Krzywicki, André (2012). Mathematics for Physicists. Courier Corporation. p. 138. ISBN 978-0-486-15712-2

Artifact 9.4: Weyl Equation

In the limit as m → 0, the above *Dirac* equation is reduced to the massless particles:

$$\sigma_\mu \partial_\mu \psi = 0, \quad or \quad I_2 \frac{1}{c}\frac{\partial \psi}{\partial t} + \sigma_1 \frac{\partial \psi}{\partial x} + \sigma_2 \frac{\partial \psi}{\partial y} + \sigma_3 \frac{\partial \psi}{\partial z} = 0 \tag{9.12}$$

known as *Weyl* equation introduced in 1918 [34].

Artifact 9.5: Schrödinger Equation

For observations under an environment of $W_n^- = -ic^2 V^-$ 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

$$\check{\partial}_\lambda - \hat{\partial}^\lambda = \dot{x}_\nu S_2^- \partial_m - \dot{x}^m S_2^+ \partial^\nu = 2ic \begin{pmatrix} \partial_\kappa \\ -\partial^\kappa \end{pmatrix} \tag{9.13}$$

Referencing the (3.14-3.15) equations, we decode the quantum fields of (9.4, 9.5) into the following formulae:

$$-i\hbar \frac{\partial}{\partial t}\phi_n^- - \frac{i\hbar^2}{2E_n^-}\frac{\partial^2 \phi_n^-}{\partial t^2} = -i\frac{(\hbar c)^2}{2E_n^-}\nabla^2 \phi_n^- + V^- \phi_n^- \equiv \hat{H}\phi_n^- \tag{9.14a}$$

$$-i\hbar \frac{\partial}{\partial t}\varphi_m^+ + \frac{i\hbar^2}{2E_m^+}\frac{\partial^2 \varphi_m^+}{\partial t^2} = -i\frac{(\hbar c)^2}{2E_m^+}\nabla^2 \varphi_m^+ + V^- \varphi_m^+ \equiv \hat{H}\varphi_m^+ \tag{9.14b}$$

where $\hat{H}$ is known as the classical *Hamiltonian* operator, introduced in 1834 [35]. For the first order of time evolution, it emerges as the *Schrödinger* equation, introduced in 1926 [36].

$$-i\hbar \frac{\partial}{\partial t}\psi = \hat{H}\psi \qquad \hat{H} \equiv -i\frac{(\hbar c)^2}{2E_n^-}\nabla^2 + V^- \tag{9.15}$$

The $Y^- Y^+$ entanglement of the (9.14) equations can be integrated into the following formulae:

$$-i\hbar \left\langle \frac{\partial}{\partial t} \right\rangle_{mn}^- - \frac{\hbar^2}{2mc^2}\left[\frac{\partial^2}{\partial t^2}\right]_{mn}^- = \tilde{H}_{mn}^- \quad \to \quad -i\hbar \frac{\partial}{\partial t} = \hat{H} \tag{9.16a}$$

$$\tilde{H}_{mn}^- \equiv -\frac{\hbar^2}{2m}\left\langle \nabla^2 \right\rangle_{mn}^- + 2V^-\left(\phi_n^- \varphi_m^+\right) \tag{9.16b}$$

where the bracket $\langle\ \rangle_{mn}^{\pm}$ and $[\ ]_{mn}^{\pm}$ are given by the (3.17-3.21) of fluxion entanglements. Remarkably, it reveals that the entanglement lies at the second order of the virtual time commutation $[\partial^2/\partial t^2]_{mn}^-$ of the event operations.

34 Weyl, Hermann (1939) "The Classical Groups. Their Invariants and Representations", Princeton University Press, ISBN 978-0-691-05756-9

35 Schiff, Leonard I. (1968). "Quantum Mechanics. McGraw-Hill" ISBN 978-0070552876

36 Schrödinger, E. (1926) "An Undulatory Theory of the Mechanics of Atoms and Molecules" (PDF). Physical Review. 28 (6): 1049–1070

Artifact 9.6: Pauli Theory

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 form of $A^\nu = \{\phi, \mathbf{A}\}$ such that the (9.15) equation is conceivable by (8.6) as the following gauge invariant:

$$-i\hbar\zeta^0 D^\kappa \varphi^+ = -\frac{\hbar^2}{2m}(\zeta^r D^r)(\zeta^r D^r)\varphi^+ + \hat{V}\varphi^+ \quad : D^\nu = D^\kappa + D^r \tag{9.17a}$$

$$D^\kappa = \partial^t - i\frac{e}{\hbar}\phi, \qquad D^r = \partial^r - i\frac{e}{\hbar}\mathbf{A} \quad : A^\nu = \{\phi, \mathbf{A}\} \tag{9.17b}$$

Since $\gamma^r = (\sigma_x, \sigma_y, \sigma_z) \equiv \boldsymbol{\sigma}$, the Schrödinger Equation (9.15) becomes the general form of Pauli Equation, formulated by *Wolfgang Pauli* in 1927 [37]:

$$i\hbar\frac{\partial}{\partial t}|\varphi^+\rangle = \left\{\frac{1}{2m}\left[\boldsymbol{\sigma}\cdot\left(\mathbf{p} - e\mathbf{A}\right)\right]^2 + e\phi + \hat{V}\right\}|\psi\rangle \equiv \check{H}\,|\varphi^+\rangle \tag{9.18}$$

$$\mathbf{p} = -i\hbar\partial^r, \qquad \boldsymbol{\sigma} = (\sigma_x, \sigma_y, \sigma_z) \qquad : \chi^\nu \mapsto 0, \ \partial^t = -\partial_t \tag{9.19}$$

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

$$(\boldsymbol{\sigma}\cdot\mathbf{a})(\boldsymbol{\sigma}\cdot\mathbf{b}) = \mathbf{a}\cdot\mathbf{b} + i\boldsymbol{\sigma}\cdot(\mathbf{a}\times\mathbf{b}) \qquad : \gamma^r = (\sigma_x, \sigma_y, \sigma_z) \equiv \boldsymbol{\sigma} \tag{9.20}$$

to obtain the standard form of *Pauli Equation* [38],

$$i\hbar\frac{\partial}{\partial t}|\psi\rangle = \left\{\frac{1}{2m}\left(\mathbf{p} - e\mathbf{A}\right)^2 - \frac{e\hbar}{2m}\boldsymbol{\sigma}\cdot\mathbf{B} + \tilde{V}\right\}|\psi\rangle \equiv \check{H}\,|\psi\rangle \tag{9.21}$$

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 [39]. As a result, the above equation is implicitly observable under the Y^+ characteristics. The experiment was first conducted by the *German* physicists *Otto Stern* and *Walter Gerlach*, in 1922. Analogously, the term is responsible for the splitting of quantum spectral lines in a magnetic field anomalous to *Zeeman* effect, named after *Dutch* physicist *Pieter Zeeman* [40] in 1898.

Artifact 9.7: Current Density

For the particle fluxion, the electromagnetic current associates it with flow of its probability. With the equation (8.6b), the (5.9) becomes the following:

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37 Wolfgang Pauli (1927) Zur Quantenmechanik des magnetischen Elektrons Zeitschrift für Physik (43) 601-623

38 Bransden, BH; Joachain, CJ (1983) "Physics of Atoms and Molecules" (1st ed.). Prentice Hall, p. 638–638. ISBN 0-582-44401-2

39 Gerlach, W.; Stern, O. (1922) "Der experimentelle Nachweis der Richtungsquantelung im Magnetfeld" Zeitschrift für Physik. 9: 349–352. Bibcode:1922ZPhy....9..349G. doi:10.1007/BF01326983

40 Zeeman, P. (1897). "The Effect of Magnetisation on the Nature of Light Emitted by a Substance". Nature. 55 (1424): 347. Bibcode:1897Natur..55..347Z. doi:10.1038/055347a0

$$\mathbf{j}_s^+ = \frac{\hbar c^2}{2E^+}\left[Tr(\zeta^\nu)\left(\varphi^-\partial\phi^+ - \phi^+\partial\varphi^-\right) - 2e\varphi^-\zeta^\nu\mathbf{A}\phi^+\right] \tag{9.22a}$$

$$\approx \frac{1}{2m}\left([\hat{p}]^+ - 2e\mathbf{A}\varphi^-\phi^+\right) + \frac{\mu_S}{s}\nabla\times\left(\varphi^-\mathbf{S}\phi^+\right) \tag{9.22b}$$

where the momentum operator is $\hat{p} = -i\hbar\nabla$. The spin vector **S** of the particles might be correspond with the spin magnetic moment μ_s and quantum number *s* [41].

Artifact 9.8: Continuity Equation

Considering a pair of the wave function observed externally at a constant speed, the diagonal elements of (9.1, 9.2) has the potential density $\Phi_c^+ = \varphi^-\phi^+$of light transporting massless waves, conserving to a constant, and maintaining its continuity states of current density.

$$\partial_\mu J_c^\mu \mapsto \frac{\partial\rho_c^+}{\partial t} + \mathbf{u}^+\nabla\cdot\mathbf{j}_c^+ = 0 \; : \; J_c^\mu = \left(c\rho^+, \mathbf{j}^+\right) \tag{9.23}$$

$$\rho_c^+ = \frac{\hbar}{2E^+}\partial_t\Phi_c^+, \qquad \mathbf{j}_c^+ = \frac{\hbar c}{2E^+}\mathbf{u}^+\nabla\Phi_c^+ \; : \; \Phi_c^+ = \varphi^-\phi^+ \tag{9.24}$$

This continuity equation is an empirical law expressing charge neutral conservation. It implies that a pair of photons is transformable or convertible into a pair of the electron and positron or vice versa.

Artifact 9.9: Mass Acquisition and 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:

$$\tilde{H} = \sum_{n=1}^{N}\frac{\hat{p}_n^2}{2m} + \frac{1}{2}m\omega^2 r_n^2 \qquad : \hat{p}_n = -i\hbar\frac{\partial}{\partial r_n} \tag{9.25}$$

Developed by *Paul Dirac* [42], the "ladder operator" method introduces the following operators:

$$\tilde{H} = \hbar\omega\sum_{n=1}^{N}\left(\tilde{a}_n^\pm\tilde{a}_n^\mp \mp \frac{1}{2}\right) \quad : \tilde{a}_n^\mp = \sqrt{\frac{m\omega}{2\hbar}}\left(\pm\frac{i}{m\omega}\hat{p}_n + r_n\right) \tag{9.26}$$

Under the Y^- supremacy, $\hat{a}_n^+$ is the creation operation for the wave-to-mass of physical animation, while $\hat{a}_n^-$ 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.

41 Quantum mechanics, E. Zaarur, Y. Peleg, R. Pnini, Schaum's Easy Oulines Crash Course, Mc Graw Hill (USA), 2006, ISBN 978-0-07-145533-6

42 Dirac, P.A.M. (1927) "The Quantum Theory of the Emission and Absorption of Radiation". Proceedings of the Royal Society of London A. 114 (767): 243–6

$$\varphi_n^+(r_n) = \frac{1}{\sqrt{2^n n!}} \left(\frac{m\omega}{\pi\hbar}\right)^{1/4} e^{-\frac{m\omega r_n^2}{2\hbar}} H_n\left(\sqrt{\frac{m\omega}{\hbar}} r_n\right) \tag{9.27}$$

$$\phi_{nlm}^-(r_n, \theta, \phi) = N_{nl} r^l e^{-\frac{m\omega}{2\hbar} r_n^2} L_n^{(l+1/2)}\left(\frac{m\omega}{\hbar} r_n^2\right) Y_{lm}(\theta, \phi) \tag{9.28}$$

$$N_{kl} = \left[\left(\frac{2\nu^3}{\pi}\right)^{1/2} \frac{2^{k+2l+3}\, k!\, \nu^l}{(2k+2l+1)!}\right]^{1/2} \qquad : \nu \equiv \frac{m\omega}{2\hbar} \tag{9.29}$$

The $H_n(x)$ is the *Hermite* polynomials, detail by *Pafnuty Chebyshev* in 1859 [43]. The N_{kl} 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 [44] 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}^-

Artifact 9.10: Embody Structure of Mass Enclave

Based on the above artifacts at the n=0 ground level $H_0 = L_0 = Y_{00} = 1$, the energy potentials, $\psi_n^- \psi_n^+ \propto m$, embody the full mass enclave that splits the potential $\psi_n^+ \propto m^{1/4}$ in the second horizon and $\psi_n^- \propto m^{3/4}$ in the third horizon. Remarkably, the operations represent not only a duality of the creation and annihilation, but also the seamless transitions between the virtual world planes and the real spacetime manifold. For example, The Sun is the star at the center of the solar system between the virtual and physical worlds. The Sun rotates in the quantum layers with the innermost 1/4 (or higher to include the excited levels at n>0) of the core radius at the second and lower horizons. Between this core radius and 3/4 of the radius, it forms a "radiative zone" for energy embody at the full mass enclave by means of photon radiation. The rest of the physical zone is known as the “convective zone” for the massive outward heat transfer.

Artifact 9.11: Speed of Light

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 (7.2) equations represents the motion fluxions:

$$\mathbf{f}_c^+ = \psi_c^- \begin{pmatrix} \hat{\partial}^\nu \\ \check{\partial}^\nu \end{pmatrix}' \psi_c^+ = \psi_c^- \dot{x}^\nu \tilde{\gamma}^\nu \begin{pmatrix} \partial^\nu \\ \partial_\nu \end{pmatrix}' \psi_c^+ \mapsto C_{\nu\mu}^+ \psi_c^- \nabla \psi_c^+ \tag{9.30a}$$

$$\mathbf{f}_c^- = \psi_c^+ \begin{pmatrix} \check{\partial}_\nu \\ \hat{\partial}_\nu \end{pmatrix}' \psi_c^- = \psi_c^+ \dot{x}_\nu \tilde{\gamma}_\nu \begin{pmatrix} \partial_\mu \\ \partial^\mu \end{pmatrix}' \psi_c^- \mapsto C_{\nu\mu}^- \psi_c^+ \nabla \psi_c^- \tag{9.30b}$$

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

43 Hermite, C. (1864). "Sur un nouveau développement en série de fonctions" [On a new development in function series]. C. R. Acad. Sci. Paris. 58: 93–100. Collected in Œuvres II, 293–303

44 B. Spain, M.G. Smith, Functions of mathematical physics, Van Nostrand Reinhold Company, London, 1970. Chapter 10 deals with Laguerre polynomials

the *C*-matrices for the speed of light:

$$C_{\nu\mu}^{+} = \dot{x}^{\nu}\gamma^{\nu}e^{-i\vartheta}, \qquad C_{\nu\mu}^{-} = \dot{x}_{\nu}\gamma_{\nu}e^{i\vartheta} \qquad : \vartheta = \vartheta^{-} - \vartheta^{+} \tag{9.31}$$

where the quanta ϑ is the superphase, and $\nu \in (1,2,3)$. Remarkably, the speed of lights is characterized by a pair of the above $Y^{-}Y^{+}$ matrices, revealing the intrinsic entanglements of lights 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 observation external to the object, the quantities can be further characterized by the diagonal elements of the *C*-matrices at the r-direction of world line, shown by the following:

$$C_{rr}^{\pm} = c e^{\mp i\vartheta} \qquad : \text{Speed of Light} = |C_{rr}^{\pm}| = c \tag{9.32}$$

As expected, the speed of light is generally a non-constant matrix, representing its traveling dynamics is 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 wildly 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.

Artifact 9.12: Speed of Gravitation

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

$$\mathbf{f}_g^{+} = \psi_g^{-}\begin{pmatrix}\hat{\partial}^{\nu}\\ \check{\partial}^{\nu}\end{pmatrix}'\psi_g^{+} = \psi_g^{-}\dot{x}^{\nu}\tilde{\chi}^{\nu}\begin{pmatrix}\partial^{\nu}\\ \partial_{\nu}\end{pmatrix}'\psi_g^{+} \mapsto G_{\nu\mu}^{+}\psi_g^{-}\nabla\psi_g^{+} \tag{9.33}$$

$$\mathbf{f}_g^{-} = \psi_g^{+}\begin{pmatrix}\check{\partial}_{\nu}\\ \hat{\partial}_{\nu}\end{pmatrix}'\psi_g^{-} = \psi_c^{+}\dot{x}_{\nu}\tilde{\chi}_{\nu}\begin{pmatrix}\partial_{\mu}\\ \partial^{\mu}\end{pmatrix}'\psi_g^{-} \mapsto G_{\nu\mu}^{-}\psi_g^{+}\nabla\psi_g^{-} \tag{9.34}$$

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 the *L*-matrices 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

$$G_{\nu\mu}^{+} = \lim_{r\to 0}(\dot{x}^{\nu}\chi^{\nu}e^{-i\vartheta}) = \dot{x}^{\nu}\epsilon_3 e^{-i\vartheta} = c_g e^{-i\vartheta} \tag{9.35}$$

$$G_{\nu\mu}^{-} = \lim_{r\to 0}(\dot{x}_{\nu}\chi_{\nu}e^{i\vartheta}) = \dot{x}_{\nu}\epsilon_3 e^{i\vartheta} = c_g e^{i\vartheta} \tag{9.36}$$

$$\text{Speed of Gravitation} = |G_{\nu\nu}^{\pm}| = c_g \tag{9.37}$$

Therefore, the gravitational speed c_g is a constant similar to the speed of light. Interrupting with mass objects at the third horizon, the gravitation becomes gravity that exerts a force inversely proportional to a square of the distance. Apparently, gravity has the same characteristics of the quantum entanglement.

Artifact 9.13: Invariance of Flux Continuity

At both of the boost and twist transformations at a constant speed, the (9.1, 9.2) equations obey the time-invariance, transform between virtual and physical instances, and transport into the third horizon *SU*(3). For the external observation, the diagonal elements can be converted into a pair of dynamic fluxions of the Y^-Y^+ energy flows:

$$\hbar^2 \check{\partial}_\lambda \check{\partial}^\lambda \phi_n^+ = 2E_n^- E_n^+ \phi_n^+ \to \frac{1}{c^2}\frac{\partial^2 \phi_n^+}{\partial t^2} - \nabla^2 \phi_n^+ = 2\frac{E_n^- E_n^+}{(\hbar c)^2}\phi_n^+ \tag{9.39}$$

$$\hbar^2 \hat{\partial}_\lambda \hat{\partial}_\lambda \varphi_n^- = 2E_n^- E_n^+ \varphi_n^- \to \frac{1}{c^2}\frac{\partial^2 \varphi_n^-}{\partial t^2} + \nabla^2 \varphi_n^- = 2\frac{E_n^- E_n^+}{(\hbar c)^2}\varphi_n^- \tag{9.40}$$

where the (3.14-3.15) equations are applied. It extends and amends the Klein–Gordon equation, introduced in 1926 [45], by a factor of number 2. Adding φ_n^- times the first equation and ϕ_n^+ times the second equation, one has an observable flux-continuity of the Y^+-primacy entanglement.

$$\Diamond_n^+ = 2\frac{E_n^- E_n^+}{(\hbar c)^2}\varphi_n^- \phi_n^+ \qquad : \Diamond_n^+ \equiv \left\langle \frac{1}{c^2}\frac{\partial^2}{\partial t^2}\right\rangle_n^+ - \left[\nabla^2\right]_n^+ \tag{9.41}$$

Correspondingly, the diagonal elements of the (9.4, 9.5) equations can be similarly reformulated to the similar Y^- flux-continuity.

$$\Diamond_n^- = 2\frac{E_n^- E_n^+}{(\hbar c)^2}\varphi_n^+ \phi_n^- \qquad : \Diamond_n^- \equiv \left\langle \frac{1}{c^2}\frac{\partial^2}{\partial t^2}\right\rangle_n^- + \left[\nabla^2\right]_n^- \tag{9.42}$$

Together, they represent a flux propagation of the Y^-Y^+ entanglements:

$$\Diamond_n \equiv \Diamond_n^+ + \Diamond_n^- = 4\frac{E_n^- E_n^+}{(\hbar c)^2}\Phi_n \qquad : \Phi_n = \frac{1}{2}\left(\varphi_n^- \phi_n^+ + \varphi_n^+ \phi_n^-\right) \tag{9.43}$$

Amazingly, it reveals that an integrity of entanglements lies at the continuity of virtual time and the commutators of physical space.

Artifact 9.14: Lagrangian of Fluxions

In reality, the above flux-continuities are 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, we can represent a pair of the *Lagrangians* as a duality of the area flux-continuities:

$$\mathscr{L}_{Force}^{\pm SU1} \equiv \Diamond_n^\pm = 2\frac{E_n^- E_n^+}{(\hbar c)^2}\Phi_n^\pm \ : \Phi_n^\pm = \varphi_n^\mp \phi_n^\pm \tag{9.44}$$

$$\mathscr{L}_{Force}^{SU1} = \Diamond_n^+ + \Diamond_n^- = 4\frac{E_n^- E_n^+}{(\hbar c)^2}\Phi_n \qquad : \Phi_n = \frac{1}{2}\left(\Phi_n^+ + \Phi_n^-\right) \tag{9.45}$$

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

45 Matsumo, Y. "Exact Solution for the Nonlinear Klein-Gordon and Liouville Equations in Four-Dimensional Euclidean Space." J. Math. Phys. 28, 2317-2322, 1987

exists alternatively between the physical-particle E_n^- and virtual-wave E_n^+ states.

Artifact 9.15: Big Bang Theory

In the *Big Bang* theory, “the universe began from a singularity,” introduced in 1931 by *Lemaître* [46], and the expansion of the observable universe began with the explosion of a single particle at a definite point in time. According to this horizon infrastructure, obviously, the universe is amazingly a chain of the seamlessly processes at the *conservation of superphase evolutions* for the progressive mass acquisitions from virtual no-singularity to physical spacetime singularity. Therefore, the model of “*Big Bang* theory” might be limited to a process of the mass inauguration in physical only. A property of the entire universe is orchestrated as a whole rather than a phenomenon that applies just to one part of the universe or from the physical observation only.

46 Lemaître, Georges (1931), "Expansion of the universe, A homogeneous universe of constant mass and increasing radius accounting for the radial velocity of extra-galactic nebulæ", Monthly Notices of the Royal Astronomical Society, 91: 483–490, Bibcode:1931MNRAS..91..483L, doi:10.1093/mnras/91.5.483 translated from Lemaître, Georges (1927), "Un univers homogène de masse constante et de rayon croissant rendant compte de la vitesse radiale des nébuleuses extra-galactiques", Annales de la Société Scientifique de Bruxelles, A47: 49–56, Bibcode:1927ASSB...47...49L

Conclusion

Complying with classical and contemporary physics, this charter of universal and unified theory demonstrates its holistic foundations applicable to the well-known natural intrinsics of the following remarks:

1. At the two-dimensions of the world planes, a pair of transform and transport ***Entangling Generators***, $\tilde{\gamma}^{\nu}$- and $\tilde{\chi}^{\nu}$-matrices, incepts, acquires, and extends the empirical formulae of, but not limited to, *Lorentz* generators, *Pauli* spin γ^{μ}-matrices, torque χ^{μ} -matrices, and transformation and transportation structures of quantum fields.
9. *Stateful Einstein mass-energy* is refined philosophically as the entanglements $\hbar\omega \rightleftharpoons mc^2$ of complex states with virtual imaginary interpretations $E_n^{\mp} = \pm\, imc^2$.
10. *Lagrangian* $\mathscr{L}$ is concisely redefined philosophically as the entanglements of continuity (10.10) dynamically transported and balanced between the manifolds and horizons.
11. *Quantum Physics* is derived as the compliance to contemporary physics and particle physics, testified by the empirical theories of *Schrödinger*, *Dirac*, *Klein–Gordon* and *Pauli* equations, *Quantum Electrodynamics, etc*.
12. *Embody Structure of Mass Enclave* is an evolutional process from the second horizon of world line giving rise to the third horizon of the physical spacetime manifold.
13. Besides a constant, the speed of light is entangled or operated by the C-matrices with the superphase modulations.
14. Likewise, the speed of gravitation has the superphase modulations operated by the G-matrices.

Consequently, this manuscript of the *Universal Topology* has testified and extended to the numerous theoretical foundations, mathematical framework, event operations, and world equations for the quantum physics.

Natural Secret of Scalar Fields. Since the evolution processes of the mass inauguration is between the second and third horizons, the scalar fields are massless instances under the virtual supremacy dominant at the first and second horizons. In addition, the scalar potentials are the gauge fields, operated by the superphase modulation and subjected to the event actions. Conceivably and strikingly, the scalar fields behaves or known as *Dark Energy*.

III. General Symmetric Fields of Electromagnetism, Gravitation and Thermodynamics

Abstract

As a major part of the unification theory, the quantum fields give rise to a symmetric environment and bring together *all* field entanglements of the flux conservation and continuity. Remarkably, it reveals the natural secrets of:

1. ***General Symmetric Fields*** - A set of generic fluxions unifying electromagnetism, gravitation, and thermodynamics.
15. ***Thermodynamics and Blackbody*** - Horizon fluxions of thermodynamics, area entropies, and photon-graviton emissions.
16. ***Photon** and **Light Radiation*** - Conservation of light and photons convertible to or emitted by the triplet quarks of blackholes.
17. ***Graviton** and **Gravitation*** - Principles of graviton quantity, gravitational transportations and the law of conservation of gravitation.
18. ***Dark Energy*** - A philosophical view of a decisive model to dark energy that lies at the heart of the fundamental nature of potential fields, the superphase modulations and event operations.

Conclusively, this manuscript presents the unification and compliance with the principal theories of classical and contemporary physics in terms of *Symmetric* dynamics.

Introduction

A duality nature of virtual and physical coexistences is a universal phenomenon of dynamic entanglements, which always performs a pair of the reciprocal entities. Each of the states cannot be separated independently of the others. Only together do they form a system as a whole although they may not be bound physically. The potential entanglements are a fundamental principle of the real-life streaming 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 constituent. Under the *Law of Event Evolutions* and *Universal Topology*, they are fully describable by the mathematical framework of the dual manifolds.

This manuscript further represents the entangling characteristics of both boost transformation and twist transportations in the generic forms. As the functional quantity of an object, a set of the scalar fields forms and projects its potentials to its surrounding space, arising from or acting on its opponent through a duality of reciprocal interactions dominated by both *Inertial Boost* $J_{\mu a}^{+}$ and *Spiral Torque* $K_{\mu a}^{+}$ alternators between the dual world planes. As a result, it constitutes the general symmetric fields of gravitation, electromagnetism and thermodynamics.

10. Second Universal Field Equations

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. The basic principles of symmetry and anti-symmetry are as the following:

1. Associated with its opponent potentials of either scalar or vector fields, symmetry is a fluxion system cohesively and completely balanced such that it is invariant among all composite fields.
19. As a duality, an $Y^- Y^+$ anti-symmetry is a reciprocal component of its symmetric system to which it has a mirroring similarity physically and can annihilate into nonexistence virtually.
20. Without a pair of $Y^- Y^+$ objects, no symmetry can be delivered to its surroundings consistently and perpetually sustainable as resources to a life streaming of entanglements at zero net momentum.
21. Both $Y^- Y^+$ symmetries preserve the laws of conservation consistently and distinctively, which orchestrate their local continuity respectively and harmonize each other dynamically.

In mathematics, *World Equations* of (5.7) can be written in terms of the scalar, vector, and higher orders tensors, shown as the following:

$$W_b = W_0^\pm + \sum_n h_n \{ \kappa_1 \langle \dot{\partial}_\lambda \rangle^\pm + \kappa_2 \dot{\partial}_{\lambda_2} \langle \dot{\partial}_{\lambda 1} \rangle_s^\pm + \kappa_3 \dot{\partial}_{\lambda_3} \langle \dot{\partial}_{\lambda 2} \rangle_v^\pm \cdots \} \tag{10.1}$$

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 $A_\nu^\pm$ and $B_\nu^\pm$ at the third horizon (index v), and their tensor fields at higher horizons.

Add φ_n^- times (6.7) and $\phi_n^+ \mapsto V_n^+$ times (6.13), we constitute a density commutation of the Y^+ fluxion in forms of the first symmetric formulation:

$$\dot{\partial}_\lambda \mathbf{f}_\nu^+ = \langle W_0^+ \rangle - \left[\left(\kappa_1 - \kappa_2 \check{\partial}_{\lambda_3} \right) \left(\check{\partial}^{\lambda 2} - \hat{\partial}_{\lambda_2} \right) \right]_\nu^+ + \kappa_2 \zeta^+ \tag{10.2}$$

$$\kappa_1 = \frac{\hbar c^2}{2}, \qquad \kappa_2 = -\frac{(\hbar c)^2}{2E^+}, \qquad \zeta^+ = \left(\hat{\partial}_{\lambda_2} \check{\partial}^{\lambda 2} - \check{\partial}_{\lambda_2} \hat{\partial}_{\lambda_2} \right)_\nu^+ \tag{10.3}$$

where a pair of potentials $\{\phi_n^+, \varphi_n^-\}$ is mapped to their vector potentials $\{V_n^+, \varphi_n^-\}$. The entangle bracket $\dot{\partial}_\lambda \mathbf{f}_\nu^+ = \langle \hat{\partial}_\lambda \hat{\partial}_\lambda, \check{\partial}^\lambda \check{\partial}^\lambda \rangle_\nu^+$ 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 $\{\phi_n^-, \varphi_n^+\}$ in the dynamic equilibrium, given by φ_n^+ times (6.12) and $\phi_n^- \mapsto L_\nu^-$ times (6.8). Adding the two formulae, we institute Y^- fluxion of density continuity $\dot{\partial}_\lambda \mathbf{f}_\nu^- = \kappa_2 \langle \check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda \rangle_\nu^-$ of the second general formulation:

$$\dot{\partial}_\lambda \mathbf{f}_v^- = \langle W_0^- \rangle + \kappa_1 \big[\check{\partial}_{\lambda_1} - \hat{\partial}^{\lambda_1}\big]_v^- + \kappa_2 \big\langle \check{\partial}_{\lambda_1} \big(\hat{\partial}^{\lambda_2} - \check{\partial}^{\lambda_2}\big) \big\rangle_v^- + \kappa_2 \zeta^- \tag{10.4}$$

$$\kappa_1 = \frac{\hbar c^2}{2}, \qquad \kappa_2 = \frac{(\hbar c)^2}{2E^-}, \qquad \zeta^- = \big(\hat{\partial}^{\lambda_1} \check{\partial}^{\lambda_2} - \hat{\partial}^{\lambda_2} \check{\partial}_{\lambda_1}\big\rangle_v^- \tag{10.5}$$

where a pair of potentials $\{\phi_n^-, \varphi_n^+\}$ is mapped to their vector potentials $\{V_n^-, \varphi_n^+\}$, respectively. 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 fluxion of density commutation (10.2) and continuity (10.4) at the third horizon, where a bulk system of N particles aggregates into macroscopic domain associated with thermodynamics.

Artifact 10.1: Acceleration Tensors

Under the Y^+ environment, it contains the Y^- energy continuity as the physical resources. The Y^+ equation of the commutation fluxion $\dot{\partial}_\lambda \mathbf{f}^+$ gives rise to both of the acceleration tensors $\mathbf{g}^\pm = \dot{\partial}_\lambda \mathbf{f}^\pm / (\hbar c)$ for dynamics and interactions balancing the physical forces:

$$\mathbf{g}^- = \mathbf{g}_0^- + \frac{c}{2}\big[\check{\partial}_\lambda - \hat{\partial}^\lambda\big]_v^- + \frac{\hbar c}{2E^-} \big\langle \check{\partial}_\lambda \big(\hat{\partial}^\lambda - \check{\partial}^\lambda\big) \big\rangle_v^- + \frac{\hbar c}{2E^-} \zeta^- \tag{10.6}$$

$$\mathbf{g}^+ = \mathbf{g}_0^+ + \frac{\hbar c}{2E^+} \Big[\Big(\frac{E^+}{\hbar} + \check{\partial}_\lambda\Big)\big(\hat{\partial}_\lambda - \check{\partial}^\lambda\big)\Big]_v^+ + \frac{\hbar c}{2E^+} \zeta^+ \tag{10.7}$$

The $\mathbf{g}_0^\pm = \big\langle W_0^\pm \big\rangle \big/ (\hbar c)$, is the dark flux continuity of the potential densities, representing a duality of the entangling environments. Because the virtual resources are massless and appear as if it were nothing or at zero resources 0^+, the Y^- supremacy of flux continuity equation might be given by $\mathbf{g}^- - \mathbf{g}_0^-$ that is maintained by the Y^+ supremacy of the flux commutation. Apparently, since the physical world is riding on the world planes where the virtual world is primary and dominant, the acceleration at a constant rate in universe has its special meaning different from the spacetime manifold.

Artifact 10.2: Symmetric Fields of Third Horizon

At a view of the symmetric system (10.6) 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 a) the horizon is given rise to the physical world by the commutative forces; and b) the continuity mechanism is a primary vehicle of the Y^- supremacy for its operational actions. Since a pair of the equations (10.2) and (10.4) 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. Throughout the rest of this manuscript, the fluxions satisfy the residual conditions of $Y^- Y^+$ *Symmetric Entanglements*, or $\zeta^\pm = 0$

$$\bar{\mathbf{g}}^+ = \mathbf{g}^+ - \mathbf{g}_0^+ = \frac{1}{\hbar c}\dot{\partial}_\lambda \bar{\mathbf{f}}_\nu^+ = \frac{\hbar c}{2E^+}\left[\left(\frac{E^+}{\hbar} + \check{\partial}_\lambda\right)\left(\hat{\partial}_\lambda - \check{\partial}^\lambda\right)\right]_\nu^+ \tag{10.8}$$

$$\bar{\mathbf{g}}^- = \mathbf{g}^- - \mathbf{g}_0^- = \frac{1}{\hbar c}\dot{\partial}_\lambda \bar{\mathbf{f}}_\nu^- = \frac{c}{2}\left[\check{\partial}_\lambda - \hat{\partial}^\lambda\right]_\nu^- + \frac{\hbar c}{2E^-}\left\langle \check{\partial}_\lambda\left(\hat{\partial}^\lambda - \check{\partial}^\lambda\right)\right\rangle_\nu^- \tag{10.9}$$

defined as a system without asymmetric entanglements or symmetric dynamics that does not have the asymmetric flex transportation spontaneously.

Artifact 10.3: Y^- Transform Fields

As the function quantity from the second to third horizon, a vector field V_ν forms and projects its potentials to its surrounding space, arisen by or acting on its opponent potential φ^+ through a duality of reciprocal interactions dominated by *Lorentz Generators* [47],. Under the Y^- primary given by the generator of (8.10, 8.11), the event processes institute and operate the entangling fields:

$$\check{T}_{\mu\nu}^{-n} \equiv \frac{\hbar c}{2E^-}\left\langle \hat{\partial}^\lambda - \check{\partial}^\lambda \right\rangle_\gamma^- \mapsto \frac{\hbar c}{2E^-}\left\langle \dot{x}^\mu L_\mu^+ \partial^\mu - \dot{x}^\nu L_\nu^- \partial_\nu \right\rangle_\nu^- \tag{10.10}$$

$$\check{T}_{\mu\nu}^{-n} = \begin{pmatrix} 0 & \beta_1 & \beta_2 & \beta_3 \\ -\beta_1 & 0 & -e_3 & e_2 \\ -\beta_2 & e_3 & 0 & -e_1 \\ -\beta_3 & -e_2 & e_1 & 0 \end{pmatrix} = \begin{pmatrix} 0 & \mathbf{B}_q^- \\ -\mathbf{B}_q^- & \frac{\check{\mathbf{b}}}{c} \times \mathbf{E}_q^- \end{pmatrix} \tag{10.10a}$$

$$\beta_\alpha = \check{T}_{0\alpha}^{-n} \qquad \varepsilon_{iam}^- e_i = \check{T}_{m\alpha}^{-n} \tag{10.10b}$$

where $\hat{\mathbf{b}}$ is a base vector, symbol $(\ )_\times$ indicates the off-diagonal elements of the tensor, and the *Levi-Civita* connection $\varepsilon_{iam}^- \in Y^-$ represents the left-hand chiral. At a constant speed, this Y^- *Transform Tensor* constructs a pair of its off-diagonal fields: $\check{T}_{m\alpha}^{+n} = -\check{T}_{m\alpha}^{-n}$ and embeds a pair of the antisymmetric matrix as a foundational structure of symmetric fields, giving rise to a foundation of the magnetic ($\beta_a \mapsto \mathbf{B}_q^-$) and electric ($e_\nu \mapsto \mathbf{E}_q^-$) fields.

Artifact 10.4: Y^+ Transform Fields

In the parallel fashion above, the event processes generate the reciprocal entanglements of the Y^+ commutation of the vector V^ν and scalar φ^- fields, shown by the following equations:

$$\hat{T}_{\mu\nu}^{+n} \equiv \frac{\hbar c}{2E^+}\left[\hat{\partial}_\lambda - \check{\partial}^\lambda\right]_\gamma^+ \mapsto \frac{\hbar c}{2E^+}\left[\dot{x}_\mu L_\mu^+ \partial^\mu - \dot{x}^\nu L_\nu^- \partial_\nu\right]_\nu^+ \tag{10.11}$$

$$\hat{T}_{\nu\alpha}^{+n} = \begin{pmatrix} 0 & d^1 & d^2 & d^3 \\ -d^1 & 0 & h^3 & -h^2 \\ -d^2 & -h^3 & 0 & h^1 \\ -d^3 & h^2 & -h^1 & 0 \end{pmatrix} = \begin{pmatrix} 0 & \mathbf{D}_q^+ \\ -\mathbf{D}_q^+ & \frac{\mathbf{u}}{c^2} \times \mathbf{H}_q^+ \end{pmatrix} \tag{10.11a}$$

$$d^\alpha = \hat{T}_{0\alpha}^{+n} \qquad \varepsilon_{\nu\alpha\mu}^+ h^\nu = c^2 \hat{T}_{\mu a}^{+n} \tag{10.11b}$$

where the *Levi-Civita* connection ε_{iam}^+ represents the right-hand chiral. At a constant speed, this Y^+

47 Mattingly, David (2005). "Modern Tests of Lorentz Invariance". Living Reviews in Relativity. 8 (1): 5. arXiv:gr-qc/0502097

Transport Tensor constructs another pair of off-diagonal fields $\hat{T}^{-n}_{\nu\alpha} = -\hat{T}^{+n}_{\nu\alpha}$, giving rise to the displacement $d^\alpha \mapsto \mathbf{D}^+_q$ and magnetizing $h^\nu \mapsto \mathbf{H}^+_g$ fields.

Artifact 10.5: Spiral Torque Fields

Because of the Y^-Y^+ continuity and commutation infrastructure of rising *horizons*, an event generates entanglements between the manifolds, and performs the operators of ∂^μ and ∂_m, transports the motion vectors of toques and gives rise to the vector potentials. Parallel to the γ generators, *Spiral Torque*, the χ generators naturally construct a pair of operational matrices into the third horizon that are also antisymmetric for elements in the 4x4 matrixes of the respective manifolds:

$$\check{\Upsilon}^{-a}_{\mu\nu} \equiv \frac{\hbar c}{2E^-}\left\langle \hat{\partial}^\lambda - \check{\partial}^\lambda \right\rangle^-_\chi \mapsto \begin{pmatrix} 0 & \mathbf{B}^-_g \\ -\mathbf{B}^-_g & \frac{\check{\mathbf{b}}}{c} \times \mathbf{E}^-_g \end{pmatrix} = -\check{\Upsilon}^{+a}_{\nu\mu} \tag{10.12}$$

$$\hat{\Upsilon}^{+a}_{\nu\mu} \equiv \frac{\hbar c}{2E^+}\left[\hat{\partial}_\lambda - \check{\partial}^\lambda\right]^+_\chi \mapsto \begin{pmatrix} 0 & \mathbf{D}^+_g \\ -\mathbf{D}^+_g & \frac{\mathbf{u}}{c_g^2} \times \mathbf{H}^+_g \end{pmatrix} = -\hat{\Upsilon}^{-a}_{\mu\nu} \tag{10.13}$$

These *Torsion Tensors* construct two pairs of the off-diagonal fields: $\check{\Upsilon}^+_{m\alpha} = -\check{\Upsilon}^-_{m\alpha}$ and $\hat{\Upsilon}^+_{m\alpha} = -\hat{\Upsilon}^-_{m\alpha}$, and embed the antisymmetric matrixes as a foundational structure giving rise to i) a pair of the virtual motion stress $\mathbf{B}^-_g$ and physical twist torsion $\mathbf{E}^-_g$ fields at Y^--supremacy, and ii) another pair of the physical displacement stress $\mathbf{D}^+_g$ and virtual *polarizing* twist $\mathbf{H}^+_g$ fields at Y^+-supremacy. Together, a set of the torsion fields institutes the *Gravitational* infrastructure at the third horizon.

11. General Symmetric Fields

For the symmetric fluxions, the entangling invariance requires that their fluxions are either conserved at zero net momentum or maintained by energy resource. Normally, the divergence of Y^- fluxion is conserved by the virtual forces 0^+ of massless energies and the divergence of Y^+ fluxion is balanced by the mass forces of physical resources. Together, they maintain each other's conservations and continuities cohesively and complementarily.

Under physical primacy, the Y^- fluxion generates acceleration tensor $\mathbf{g}_\times^-$ and represents the time divergence of the forces acting on the opponent objects. This divergence, $\check{\partial}_{\lambda=t} = \left(ic\partial_\kappa \quad \mathbf{u}^-\nabla\right)$, appears at the *Two-Dimensional* world plane acting on the 2x2 tensors and extend to the 4x4 spacetime tensors. Substituting the equations (10.10, 10.12) into symmetric (10.9) fluxion, we have the matrix formula in a vector formulation for the off-diagonal fields:

$$\bar{\mathbf{g}}_x^- = c\check{\partial}_\lambda\left(\check{T}_{\mu\nu}^{-a} + \check{\Upsilon}_{\mu\nu}^{-a}\right)_\times = c\left(ic_\kappa\partial_\kappa \quad \mathbf{u}^-\nabla\right)\begin{pmatrix} 0 & \mathbf{B}^- \\ -\mathbf{B}^- & \frac{\check{\mathbf{b}}}{c}\times\mathbf{E}^- \end{pmatrix} \tag{11.1}$$

$$\mathbf{B}^- = \mathbf{B}_q^- + \mathbf{B}_g^- \qquad\qquad \mathbf{E}^- = \mathbf{E}_q^- + \frac{c}{c_g}\,\mathbf{E}_g^- \tag{11.2}$$

where the $\mathbf{E}_q^-$ and $\mathbf{E}_g^-$ are the *Electric* and *Torsion Strength* fields, and the $\mathbf{B}_q^-$ and $\mathbf{B}_g^-$ are the *Magnetic* and *Twist* fields.

In a parallel fashion, the symmetric Y^+ fluxion (10.8) generates acceleration tensor $\bar{\mathbf{g}}_\times^+$ under virtual primacy for the off-diagonal (10.11) $\hat{T}_{\mu\nu}^{+a}$ and (10.13) $\hat{\Upsilon}_{\mu\nu}^{+a}$ elements. At the third horizon, one can reformulate the (10.8) into the following:

$$\bar{\mathbf{g}}_\times^+ = c\left(\frac{E^+}{\hbar} + \check{\partial}_\lambda\right)\begin{pmatrix} 0 & \mathbf{D}^+ \\ -\mathbf{D}^+ & \frac{\mathbf{u}_q}{c^2}\times\mathbf{H}_q^+ + \frac{\mathbf{u}_g}{c_g^2}\times\mathbf{H}_g^+ \end{pmatrix} \tag{11.3}$$

$$\mathbf{D}^+ = \mathbf{D}_q^+ + \mathbf{D}_g^+ \qquad\qquad : \check{\partial}_{\lambda=t} = \left(ic\partial_\kappa \quad \mathbf{u}^-\nabla\right) \tag{11.4}$$

where $\mathbf{u}_q$ is speed of a charged object, and $\mathbf{u}_g$ is speed of a gravitational mass. The $\mathbf{D}_q^+$ and $\mathbf{D}_g^+$ are the *Electric* and *Torsion Displacing* fields, and the $\mathbf{H}_q^+$ and $\mathbf{H}_g^+$ are the *Magnetic* and *Twist Polarizing* fields.

Artifact 11.1: Horizon Forces

Apparently, the field of equation (11.3) has a force that gives rise to the next field of the horizons. Projecting on the spacetime manifold, it emerges and acts as the flux forces on objects.

$$\mathbf{F}^+ = \kappa_x^+\bar{\mathbf{g}}_\times^+ = \kappa_x^+\frac{cE^+}{\hbar}\begin{pmatrix} 0 & \mathbf{D}^+ \\ -\mathbf{D}^+ & \frac{\mathbf{u}_q}{c^2}\times\mathbf{H}_q^+ + \frac{\mathbf{u}_g}{c_g^2}\times\mathbf{H}_g^+ \end{pmatrix} \tag{11.5}$$

With charges or masses, this force is imposed on the physical lines of the world planes and projecting to spacetime manifold at the following expressions:

$$\mathbf{F}_q^+ = Q\mu_e\left(c^2\mathbf{D}_q^+ + \mathbf{u}_q \times \mathbf{H}_q^+\right) \qquad : \kappa_q^+ = \frac{Qc\mu_e\hbar}{E^+},\ c^2 = \frac{1}{\varepsilon_q\mu_q} \tag{11.6}$$

$$\mathbf{F}_g^+ = M\mu_g\left(c_g^2\mathbf{D}_g^+ + \mathbf{u}_g \times \mathbf{H}_g^+\right) \qquad : \kappa_g^+ = \frac{Mc_g\mu_g\hbar}{E^+},\ c_g^2 = \frac{1}{\varepsilon_g\mu_g} \tag{11.7}$$

where Q is a charge, M is a mass, ε_q or ε_g is the permittivity, μ_q or μ_g is the permeability of the materials.

Artifact 11.2: Lorentz Force

In a free space or vacuum, the constitutive relation (11.6) results in a summation of electric and magnetic forces:

$$\mathbf{F}_q = Q\left(\mathbf{E}_q^- + \mathbf{u}_q \times \mathbf{B}_q^-\right) \qquad : \mathbf{D}_q^+ = \varepsilon_e\mathbf{E}_q^-, \qquad \mathbf{B}_q^- = \mu_e\mathbf{H}_q^+ \tag{11.8}$$

known as *Lorentz Force*, discovered in 1889 [48]. Because the fluxion force $\dot{\partial}_\lambda\bar{\mathbf{f}}_s^+$ (10.7) is proportional to $(\hat{\partial}_\lambda - \check{\partial}^\lambda)$, the force is statistically aggregated from or arisen by *Dirac Spinors* (9.7), symmetrically.

Following the same methodology, the *Torsion* forces emerges as gravitation given by the off-diagonal elements of Y^+ dark fluxions of the symmetric system.

$$\mathbf{F}_g = M\mu_g\left(c_g^2\mathbf{D}_g^+ + \mathbf{u}_g \times \mathbf{H}_g^+\right) = M\left(\mathbf{E}_g^- + \mathbf{u}_g \times \mathbf{B}_g^-\right) \tag{11.9}$$

where $c^2 = 1/(\varepsilon_g\mu_g)$, ε_g is gravitational permittivity and μ_g gravitational permeability of the materials.

Artifact 11.3: Resources

Balanced by the physical sources of the macroscopic fluxion density $\rho_x\mathbf{u}_x$ and current density $\mathbf{J}_x$, the Y^+ continuity institutes a general expression of local conservations:

$$\bar{\mathbf{g}}_\times^+ = \mathbf{J}_q^- - \mathbf{J}_g^- \qquad : \mathbf{J}_q^- = \left\{\mathbf{u}_q\rho_q, \mathbf{J}_q\right\} \tag{11.10a}$$

$$\bar{\mathbf{g}}_\times^- \to 0^+ \qquad : \mathbf{J}_g^- = 4\pi G\left\{\mathbf{u}_g\rho_g, \mathbf{J}_g\right\} \tag{11.10b}$$

where the $\mathbf{u}_q$ is a negative charged object and $\mathbf{u}_g$ appears moving in an opposite direction, and G is *Newton's* gravitational constant. For the $\bar{\mathbf{g}}_\times^+$ equation above, the total source might comprise multiple components $\mathbf{J}^- = \sum_n p_n^-\left\{\mathbf{u}\rho_n^-, \mathbf{j}_n^-\right\} \propto \left\{\mathbf{u}\rho, \mathbf{J}\right\}$ to include both of the $Y^\mp$ fluxion forces, thermodynamics, as well as other asymmetric suppliers ζ^+ of (10.3, 10.5). Likewise, since the virtual sources are massless or dark energy, it yields the local conservations such that the acceleration $\bar{\mathbf{g}}_\times^-$ has a continuity balancing at its virtual source or massless forces at zero 0^+.

Artifact 11.4: Y^- Symmetric Fields

Sourced by the virtual time operation $\lambda = t$, the dark fluxion of Y^- boost fields has the

48 Per F. Dahl, Flash of the Cathode Rays: A History of J J Thomson's Electron, CRC Press, 1997, p. 10

conservation equation: $\check{\partial}_\lambda \bar{\mathbf{f}}_\times^- = 0$. Therefore, the equation (11.1) is equivalent to a pair of the expressions:

$$(\mathbf{u}_q\nabla)\cdot\mathbf{B}_q^- + (\mathbf{u}_g\nabla)\cdot\mathbf{B}_g^- = 0 \tag{11.11}$$

$$\frac{\partial}{\partial t}(\mathbf{B}_q^- + \mathbf{B}_g^-) + \left(\frac{\mathbf{u}_q}{c}\nabla\right)\times\mathbf{E}_q^- + \left(\frac{\mathbf{u}_g}{c_g}\nabla\right)\times\mathbf{E}_g^- = 0 \tag{11.12}$$

It represents the cohesive equations of gravitational and electromagnetic fields under the Y^- symmetric dynamics.

Artifact 11.5: Y^+ Symmetric Fields

Continuing to operate through the time events $\lambda = t$, sustained by the resources (11.10), the derivative $\check{\partial}_{\lambda=t}$ to the second field of (11.3) evolves and gives rise to the fields for next horizon, shown by the Y^+ field relationships:

$$\mathbf{u}_q\nabla\cdot\mathbf{D}_q^+ + \mathbf{u}_g\nabla\cdot\mathbf{D}_g^+ = \mathbf{u}_q\rho_q - 4\pi G\mathbf{u}_g\rho_g \tag{11.13}$$

$$\frac{\mathbf{u}_q\cdot\mathbf{u}_q}{c^2}\nabla\times\mathbf{H}_q^+ + \frac{\mathbf{u}_g\cdot\mathbf{u}_g}{c_g^2}\nabla\times\mathbf{H}_g^+ - \frac{\partial\mathbf{D}_q^+}{\partial t} - \frac{\partial\mathbf{D}_g^+}{\partial t}$$
$$= \mathbf{J}_q - 4\pi G\mathbf{J}_g + \mathbf{H}_q^+\cdot\left(\frac{\mathbf{u}_q}{c}\nabla\right)\times\frac{\mathbf{u}_q}{c} + \mathbf{H}_g^+\cdot\left(\frac{\mathbf{u}_g}{c_g}\nabla\right)\times\frac{\mathbf{u}_g}{c_g} \tag{11.14}$$

where the formula, $\nabla\cdot(\mathbf{u}\times\mathbf{H}) = \mathbf{H}\cdot(\nabla\times\mathbf{u}) - \mathbf{u}\cdot(\nabla\times\mathbf{H})$, is applied.

Artifact 11.6: General Symmetric Fields

At the constant speed, a set of the formulations above is further simplified to and collected as:

$$\nabla\cdot(\mathbf{B}_q^- + \eta\mathbf{B}_g^-) = 0^+ \qquad : \eta = c_g/c \tag{11.15}$$

$$\nabla\cdot(\mathbf{D}_q^+ + \eta\mathbf{D}_g^+) = \rho_q - 4\pi G\eta\rho_g \tag{11.16}$$

$$\nabla\times(\mathbf{E}_q^- + \mathbf{E}_g^-) + \frac{\partial}{\partial t}(\mathbf{B}_q^- + \mathbf{B}_g^-) = 0^+ \tag{11.17}$$

$$\nabla\times(\mathbf{H}_q^+ + \mathbf{H}_g^+) - \frac{\partial}{\partial t}(\mathbf{D}_q^+ + \mathbf{D}_g^+) = \mathbf{J}_q - 4\pi G\mathbf{J}_g \tag{11.18}$$

Because the gravitational fields are given by *Torque Tensors* $\Upsilon_{\mu\alpha}$ and emerged from the second horizon on the world planes, *Gravitational* fields might appear weak where the charge fields are dominant by electrons. At the third horizon, electromagnetic fields become weak while gravitational force can be significant at short range closer to its central-singularity. At the higher horizon, a massive object has a middle range of gravitation fields. For any charged objects, both electromagnetic and gravitational fields are hardly separable although their intensive effects can be weighted differently by the range of distance and quantity of charges and masses.

12. Electromagnetism and Gravitation

As the four fundamental interactions, commonly called forces, in nature, *Electromagnetism* or *Graviton* constitute all type of physical interaction that occurs between electrically charged or massive particles, although they appear as independence or loosely coupled at the third or fourth horizons. The electromagnetism usually exhibits a duality of electric and magnetic fields as well as their interruption in light speed. The graviton represents a torque duality between the virtual and the physical energies of manifolds. Not only have both models accounted for the charge or mass volume independence of energies and explained the ability of matter and photon-graviton radiation to be in thermal equilibrium, but also reveals anomalies in thermodynamics, including the properties of blackbody for both light and gravitational radiance.

Artifact 12.1: Maxwell's Equations

At the constant speed c and $\zeta^{\mu} \to \gamma^{\mu}$, the *General Symmetric Fields* (11.15-11.18) emerge in a set of classical equations:

$$\nabla \cdot \mathbf{B}_q = 0 \qquad : \mathbf{B}_q \equiv \mathbf{B}_q^- \qquad (12.1)$$

$$\nabla \cdot \mathbf{D}_q = \rho_q \qquad : \mathbf{D}_q \equiv \mathbf{D}_q^+ \qquad (12.2)$$

$$\nabla \times \mathbf{E}_q + \frac{\partial \mathbf{B}_q}{\partial t} = 0 \qquad : \mathbf{E}_q \equiv \mathbf{E}_q^- \qquad (12.3)$$

$$\nabla \times \mathbf{H}_q - \frac{\partial \mathbf{D}_q}{\partial t} = \mathbf{J}_q \qquad : \mathbf{H}_q \equiv \mathbf{H}_q^+ \qquad (12.4)$$

known as *Maxwell's Equations*, discovered in 1820s [49]. Therefore, as the foundation, the quantum symmetric fields give rise to classical electromagnetism, describing how electric and magnetic fields are generated by charges, currents, and weak-force interactions. One important consequence of the equations is that they demonstrate how fluctuating electric and magnetic fields propagates at the speed of light.

Artifact 12.2: Electrostatic Force

Taking a spherical surface in the integral form of (12.2) at a radius r, centered at the point charge Q, we have the following formulae in a free space or vacuum:

$$\mathbf{E}(\mathbf{r}) = \frac{Q}{4\pi\varepsilon_0}\frac{\hat{\mathbf{r}}}{r^2} \qquad \mathbf{F}(\mathbf{r}) = q\mathbf{E}(\mathbf{r}) \qquad (12.5)$$

known as *Coulomb*'s force, discovered in 1784 [50]. An electric force may be either attractive or repulsive, depending on the signs of the charges.

49 James Clerk Maxwell, "A Dynamical Theory of the Electromagnetic Field", Philosophical Transactions of the Royal Society of London 155, 459–512 (1865)

50 Coulomb (1785a) "Premier mémoire sur l'électricité et le magnétisme," Histoire de l'Académie Royale des Sciences, pages 569-577

Artifact 12.3: Gravitational Fields

For the charge neutral objects, the equations (11.15)-(11.18) become a group of the pure *Gravitational Fields*, shown straightforwardly by:

$$\left(\mathbf{u}_g \nabla\right) \cdot \mathbf{B}_g^- = 0 \tag{12.6}$$

$$\mathbf{u}_g \nabla \cdot \mathbf{D}_g^+ = -\, 4\pi G\, \mathbf{u}_g \rho_g \tag{12.7}$$

$$\frac{\partial}{\partial t}\mathbf{B}_g^- + \left(\frac{\mathbf{u}_g}{c_g}\nabla\right) \times \mathbf{E}_g^- = 0 \tag{12.8}$$

$$\frac{\mathbf{u}_g \cdot \mathbf{u}_g}{c_g^2}\nabla \times \mathbf{H}_g^+ - \frac{\partial \mathbf{D}_g^+}{\partial t} = -\, 4\pi G \mathbf{J}_g + \mathbf{H}_g^+ \cdot \left(\frac{\mathbf{u}_g}{c_g}\nabla\right) \times \frac{\mathbf{u}_g}{c_g} \tag{12.9}$$

At the constant speed, these equations can be reduced to and coincide closely with *Lorentz invariant Theory* of gravitation [51], introduced in 1893.

Artifact 12.4: Newton’s Law

For the charge neutral objects, the equations (12.6) become straightforwardly as:

$$\nabla^2 \psi_g^+ = 4\pi G \rho_g \qquad : \mathbf{D}_g^+ = -\, \nabla \psi_g^+ \tag{12.10}$$

$$\mathbf{F}^- = -\, m \nabla \psi_g^+ = m G \rho_g \frac{\mathbf{b}_r}{r^2} \tag{12.11}$$

known as *Newton's Law* of Gravity for a homogeneous environment where, external to an observer, source of the fields appears as a point object and has the uniform property at every point without irregularities in field strength and direction, regardless of how the source itself is constituted with or without its internal or surface twisting torsions.

51 Oliver Heaviside. A Gravitational and Electromagnetic Analogy, Part I, The Electrician,31, 281-282 (1893)

13. Thermodynamics

During the formation of the horizons, movements of macro objects undergo interactions with and are propagated by the Y^+ commutative fields, while events of motion objects are characterized by the Y^- continuity dynamics. Under the formations of the ground horizons, the Y^-Y^+ dynamics of the symmetric system aggregates timestate objects to develop thermodynamics related to bulk energies, statistical works, and interactive forces at the third horizon towards the next horizon of macroscopic variables for processes and operations characterized as a massive system, associated with the rising temperature.

For a bulk $\langle W_0^{\pm}\rangle$ system of *N* particles, each is in one of three possible states: Y^- |-⟩, Y^+ |+⟩, and neutral |o⟩ with their energy states given by E_n^-, E_n^+ and E_n^o, respectively. If the bulk system has $N_n^{\pm}$ particles at non-zero charges and $N^o = N - N_n^{\pm}$ neutrons at neutral charge, the interruptible energy of the internal system is $E_n = N_n^{\pm}E_n^{\pm}$. The number of states $\Omega(E_n)$ of the total system of energy E_n is the number of ways to pick $N_n^{\pm}$ particles from a total of *N*,

$$\Omega(E) = \prod \Omega(E_n) = \prod \frac{N!}{N_n^{\pm}!(N - N_n^{\pm})!} \qquad : N_n^{\pm} = \frac{E_n}{|E_n^{\pm}|} \tag{13.1}$$

and the entropy, a measure of state probability, is given by

$$S(E) = \sum_n S(E_n) = -k_B \sum_n \log \frac{N!}{(N_n^{\pm})!(N - N_n^{\pm})!} \tag{13.2}$$

where k_B is ***Boltzmann*** constant [52]. For large *N*, there is an accurate approximation to the factorials as the following:

$$log\,(N!) = N\,\log(N) - N + \frac{1}{2}\log(2\pi N) + \Re(1/N) \tag{13.3}$$

known as the *Stirling's* formula, introduced 1730s [53]. Therefore, the entropy is simplified to:

$$S(N_n^{\pm}) = -\,k_B N\left[\left(1 - \frac{N_n^{\pm}}{N}\right)\log\left(1 - \frac{N_n^{\pm}}{N}\right) + \frac{N_n^{\pm}}{N}\log\left(\frac{N_n^{\pm}}{N}\right)\right] \tag{13.4}$$

Generally, one of the characteristics of a bulk system can be presented and measured completely by the thermal statistics of energy k_BT such as a scalar function of the formless entropy above. In a bulk system with intractable energy $E_n^{\pm}$, its temperature can be risen by its entropy as the following:

$$\frac{1}{T} \equiv \sum_n \frac{\partial S_n}{\partial E_n} = \sum_n \frac{\mp i k_B}{E_n^{\pm}} \log\left(\frac{NE_n^{\pm}}{E_n} - 1\right) \qquad : k_BT \in (0, \pm\, iE_n^{\pm}) \tag{13.5}$$

With a bulk system of *n* particles, it represents that both energies $E_n^{\pm}(T)$ and horizon factor $h_n(T)$ are temperature-dependent.

52 Landau, Lev Davidovich & Lifshitz, Evgeny Mikhailovich (1980) [1976]. Statistical Physics. Oxford: Pergamon Press. ISBN 0-7506-3372-7

53 Le Cam, L. (1986), "The central limit theorem around 1935", Statistical Science, 1 (1): 78–96(p. 81)

$$E_n = NE_n^{\pm} h_n = \frac{NE_n^{\pm}}{e^{\pm iE_n^{\pm}/k_B T} + 1} = k_B T N_n^{\pm} \log\left(\frac{N}{N_n^{\pm}} - 1\right) \tag{13.6}$$

Apparently, the horizon factor is given rise to and emerged as the temperature T of a bulk system.

Artifact 13.1: Horizon Factor

During processes that give rise to the bulk horizon, the temperature emerges in form of energy between zero and $k_B T \simeq E_n^{\pm}$, reproducing the n particles balanced at their population $N_n^{\pm}$. Remarkably, the horizon factor is simplified to:

$$h_n^{\pm} = \frac{N_n^{\pm}}{N} = \frac{1}{e^{\pm\beta E_n^{\pm}} + 1} \qquad : \beta = \frac{i}{k_B T} \tag{13.7}$$

where i presents that the temperature $k_B T$ is a virtual character, the reciprocal of which, $\beta = i/(k_B T)$ is similar to the virtual time dimension ict.

Artifact 13.2: State Probability

Fundamental to the statistical mechanics, we recall that all accessible energy states are equally likely. This means the probability that the system sits in state |n⟩ is just the ratio of this number of states to the total number of states, emerged and reflected in the above equations at the state probabilities, $p_n^{\pm} = p_n(h_n^{\pm})$, to form the macroscopic density and to support the equations of (3.17)-(3.23) by the following expression:

$$p_n^{\pm} = \frac{h_n^{\pm}}{\sum h_\nu} = \frac{e^{\pm\beta E_n^{\pm}}}{Z} \qquad : Z \equiv \sum_\nu e^{\pm\beta E_\nu^{\pm}} = \frac{e^{\pm\beta E_\nu^{\pm}/2}}{1 - e^{\pm\beta E_\nu^{\pm}}} \tag{13.8}$$

known as the *Boltzmann* distribution [54], or the canonical ensemble, introduced in 1877. The average energy in a mode can be expressed by the partition function:

$$\tilde{E}^{\pm} = -i\frac{d\log(Z)}{d\beta} = \pm\frac{iE_n^{\pm}}{2} \pm \frac{iE_n^{\pm}}{e^{\pm\beta E_n^{\pm}} - 1} \qquad : E_n^{\pm} = \mp imc^2 \tag{13.9}$$

As $T \to 0$, the distribution forces the system into its ground state at the lowest energy before transforming to the virtual world. All higher energy states have vanishing probability at zero temperature or the mirroring effects of infinite temperature.

Artifact 13.3: Chemical Potential

For a bulk system with the internal energy and the intractable energy of E_n, the chemical potential $\mu = -\sum \mu_n$ rises from the numbers of particles:

$$\mu = -\sum_n \left(\frac{\partial E_n}{\partial N_n^{\pm}}\right)_{S,V} = k_B T \sum_n \frac{1 - \left(1 - N_n^{\pm}/N\right)\log\left(N/N_n^{\pm} - 1\right)}{\left(1 - N_n^{\pm}/N\right)}$$

54 Landau, Lev Davidovich & Lifshitz, Evgeny Mikhailovich (1980) [1976]. Statistical Physics. Oxford: Pergamon Press. ISBN 0-7506-3372-7

$$= -\sum_n \left[E_n^{\pm} - k_B T\left(1 + e^{\pm\beta E_n^{\pm}}\right)\right] \quad (13.10)$$

Its heat capacity can be given by the following definition:

$$C_V \equiv \sum_n \left(\frac{\partial E_n}{\partial T}\right)_{V,N_n^{\pm}} = k_B \sum_n \frac{N\left(E_n^{\pm}\right)^2 e^{\pm\beta E_n^{\pm}}}{\left[k_B T\left(e^{\pm\beta E_n^{\pm}} + 1\right)\right]^2} \quad (13.11)$$

The maximum heat capacity is around $k_B T \to |E^{\pm}|$. As $T \to 0$, the specific heat exponentially drops to zero, whereas $T \to \infty$ drops off at a much slower pace defined by a power-law.

Artifact 13.4: Thermodynamics

Consider a system with entropy $S(E, V, N_n)$ that undergoes a small change in energy, volume, and number $N_n^{\pm}$, one has the change in entropy

$$dS = \frac{\partial S}{\partial E} dE + \frac{\partial S}{\partial E}\frac{\partial E}{\partial V} dV + \frac{\partial S}{\partial E}\sum_n \left(\frac{\partial E}{\partial N_n^{\pm}} dN_n^{\pm}\right) = \frac{1}{T}\left(dE + PdV - \sum_n \mu_n dN_n^{\pm}\right)$$

$$\frac{1}{T} = \frac{\partial S}{\partial E}, \qquad P = \left(\frac{\partial E}{\partial V}\right)_T \quad (13.12)$$

known as fundamental laws of thermodynamics of common conjugate variable pairs. The principles of thermodynamics were established and developed by *Rudolf Clausius*, *William Thomson*, and *Josiah Willard Gibbs*, introduced during the period from 1850 to 1879.

Artifact 13.5: Thermal Density Equations

Furthermore, convert all parameters to their respective densities as internal energy density $\rho_E = E/V$, thermal entropy density $\rho_s = S/V$, mole number density $\rho_{n_i} = N_i/V$, state density of $\rho_\Phi \sim 1/V$; the (13.12) equation has the entropy relationship among their densities as the following:

$$S_\rho = -k_s \int \rho_\psi dV = -k_s \int \frac{d\rho_E - Td\rho_s - \sum_i \mu_i d\rho_{n_i}}{T\rho_s + \sum_i \mu_i \rho_{n_i} - (P + \rho_E)} dV \quad (13.13)$$

Satisfying entropy equilibrium at extrema results in the general density equations of the thermodynamic fields:

$$Y^- : d\rho_E^- = Td\rho_s^- + \sum_i \mu_i d\rho_{n_i}^- \quad (13.14)$$

$$Y^+ : P + \rho_E^+ = T\rho_s^+ + \sum_i \mu_i \rho_{n_i}^+ \quad (13.15)$$

The first equation indicates that entropy increases towards Y^- maximum in physical disorder, so that the dynamics of the internal energy are the interactive fields of thermal and chemical reactions as they influence substance molarity. The second equation indicates that entropy decreases towards Y^+ minimum in physical order, so that both external forces and internal energy hold balanced macroscopic fields in one bulk system.

Artifact 13.6: Bloch Density Equations

At the arisen horizon, a macroscopic state consists of pairs of $Y^-\{\rho^-, \varrho^+ = \rho^{-^*}\}$ and $Y^+\{\rho^+, \varrho^- = \rho^{+^*}\}$ thermal density fields. By mapping $\phi_n^\pm \mapsto \rho^\pm$, $\varphi_n^\pm \mapsto \varrho^\pm$ and $x_0 \mapsto \beta$, the same mathematical framework in deriving (9.15, 9.39) can be reapplied to formulate a duality of the thermal densities, shown by the following:

$$-i\frac{\partial\rho^-}{\partial\beta} = \hat{H}\rho^-, -h_\beta\frac{\partial^2\rho}{\partial\beta^2} = \hat{H}\rho \qquad : \hat{H} \equiv -h_\beta\nabla^2 + \hat{U}(\mathbf{r}, \beta_0) \qquad (13.16)$$

where $\rho = \rho^+\rho^-$ and h_β is a horizon constant of thermodynamics. The equations are known as *Bloch* equations introduced in 1932 [55] for the grand canonical ensemble on *N*-particles.

55 F. Bloch, Zeits. f. Physick 74, 295 (1932)

14. Blackbody and Blackhole

Every physical body spontaneously and continuously emits electromagnetic and gravitational radiation. At near thermodynamic equilibrium, the emitted radiation is closely described by either Planck's law for blackbodies or *Bekenstein-Hawking* radiation for blackholes, or in fact at both for normal objects. These waves, making up the radiations, can be imagined as $Y^{-}Y^{+}$-propagating transverse oscillating electric, magnetic and gravitational fields.

Because of its dependence on temperature and area, *Planck* and *Schwarzschild* radiations are said to be thermal radiation obeying area entropies. The higher the temperature or area of a body the more radiation it emits at every wave-propagation of light and entangling-transportation of gravitation. Since a blackhole acts like an ideal blackbody as it reflects no light and absorbs full gravitation.

Artifact 14.1: Electromagnetic Radiation

A radiation consists of photons, the uncharged elementary particles with zero rest mass, and the quanta of the electromagnetic force, responsible for all electromagnetic interactions. Electric and magnetic fields obey the properties of massless superposition such that, for all linear systems, the net response caused by multiple stimuli is the sum of the responses that would have been caused by each stimulus individually. The matter-composition of the medium for the light transportation determines the nature of the absorption and emission spectrum. With the horizon factor (13.7), *Planck* derived in 1900 [56,57] that an area entropy S_A of radiance of a blackbody is given by frequency at absolute temperature *T*.

$$S_A(\omega_c, T) = \frac{\hbar\omega_c^3}{4\pi^3 c^2 k_B T}\left(e^{\hbar\omega_c/k_B T} - 1\right)^{-1} \simeq \frac{\omega_c^2}{4\pi^3 c^2} \qquad (14.1)$$

Expressed as an energy distribution of entropy, it is the unique stable radiation in quantum electromagnetism. Planck's theory was originally based on the idea that blackbodies emit light (and other electromagnetic radiation) only as discrete bundles or packets of energy: photons. Therefore, the above formula is applicable to generate *Photon*s in electromagnetic radiation.

Artifact 14.2: Gravitational Radiation

Blackholes are sites of immense gravitational entanglement. According to the conjectured $Y^{-}Y^{+}$ duality (also known as the AdS/CFT correspondence), blackholes in general are equivalent to solutions of quantum field theory at a non-zero temperature. This means that no information loss is expected in blackholes and the radiation emitted by a blackhole contains the usual thermal radiation. By associating the horizon factor with *Schwarzschild* radius $r_s = 2GM/c^2$ of a blackhole, derived in

56 Planck, M. (1915). Eight Lectures on Theoretical Physics. Wills, A. P. (transl.). Dover Publications. ISBN 0-486-69730-4)

57 Planck, M. (1900a). "Über eine Verbesserung der Wien'schen Spectralgleichung". Verhandlungen der Deutschen Physikalischen Gesellschaft. 2: 202–204

1915 [58], an area entropy S_A of the quantum-gravitational radiance is given by frequency at an absolute temperature T and constant speed c_g as the following:

$$S_A(\omega_g, T) = \frac{c_g^3}{4\hbar G} \tag{14.2}$$

where G is the gravitational constant, known as *Bekenstein-Hawking* radiation [59,60], introduced in 1974. This formula is applicable to generate *Graviton* in gravitational radiations.

Artifact 14.3: Conservation of Energy-Momentum

Since two photons can convert to each of the mass-energies $E_n^{\mp} = \pm imc^2$, one has the empirical energy-momentum conservation in a complex formula:

$$\hat{E}^2 = \hat{\mathbf{P}}^2 + 4m^2c^4 \ \rightarrow \qquad \left(\hat{\mathbf{P}} + i\hat{E}\right)\left(\hat{\mathbf{P}} - i\hat{E}\right) = 4E_n^+ E_n^- \tag{14.3}$$

$$\hat{E} = -i\hbar\partial_t, \qquad \mathbf{P} = ic\hat{\mathbf{p}}, \qquad \hat{\mathbf{p}} = -i\hbar\nabla \tag{14.4}$$

known as the relativistic invariance relating a pair of intrinsic masses at their energy $\hat{E}$ and momentum $\hat{\mathbf{P}}$. As a duality of alternating actions $\hbar\omega \rightleftharpoons mc^2$, one operation $\hat{\mathbf{P}} + i\hat{E}$ is a process for physical reproduction or animation, while another $\hat{\mathbf{P}} - i\hat{E}$ is a reciprocal process for virtual annihilation or creation. Governed by *Universal Topology*: $W = P \pm iV$, they comply with relativistic wave equation. Together, the above functions institute conservation of wave propagation of the potential density $\Phi_n^- = \phi_n^- \varphi_n^+$ fields:

$$\frac{1}{c^2}\frac{\partial^2 \Phi_n^-}{\partial t^2} - \nabla^2 \Phi_n^- = 4\frac{E_n^- E_n^+}{\left(\hbar c\right)^2}\Phi_n^- \tag{14.5}$$

Therefore, besides the (9.42), we demonstrate an alternative approach to derive and amend the *Klein–Gordon* equation, introduced in 1926 [61] or manifestly *Lorentz* covariant symmetry described as that the feature of nature is independent of the orientation or the boost velocity of the laboratory through spacetime [62].

Artifact 14.4: Invariance of Entropy

External to observers at constant speed, a system is describable fully by the coherent entropy $\mathcal{S}_a$ of blackhole radiations to represent the law of conservation of the area fluxions or the time-invariance. As a total energy density travelling on the two-dimensional word planes $\{\mathbf{r} \pm i\mathbf{k}\}$, it is

58 K. Schwarzschild, "Über das Gravitationsfeld eines Massenpunktes nach der Einsteinschen Theorie", Sitzungsberichte der Deutschen Akademie der Wissenschaften zu Berlin, Klasse fur Mathematik, Physik, und Technik (1916) p189

59 Bekenstein, Jacob D. (April 1973). "Black holes and entropy". Physical Review D. 7 (8): 2333–2346

60 S. W. Hawking,"Black hole explosions?", Nature 248, 30 (1974)

61 Matsumo, Y. "Exact Solution for the Nonlinear Klein-Gordon and Liouville Equations in Four-Dimensional Euclidean Space." J. Math. Phys. 28, 2317-2322, 1987

62 Mattingly, David (2005). "Modern Tests of Lorentz Invariance". Living Reviews in Relativity. 8 (1): 5. arXiv:gr-qc/0502097

equivalent to a fluxion of blackhole density scaling at entropy $\mathcal{S}_a$ of an area flux continuity (9.45) for the potential radiations in a free space or vacuum, or the law of conservation of the area fluxions:

$$S_A = \Diamond_n = 4\frac{E_n^- E_n^+}{(\hbar c)^2}\Phi_n \tag{14.6}$$

It illustrates that it is the intrinsic radiance of its potential elements that are entangling and transforming between physical and virtual instances. The potential density Φ_n transports as the waves, conserves to the constant energies, carries the potential information, and maintains its continuity states of the area density. Essentially, the entangling bounds on an area entropy S_A in radiance propagating long-range of energy fluxions, before embodying the mass enclave and possessing two-degrees of freedom.

Artifact 14.5: Photon

As a fluxion flow of light, it balances statistically at each of the states $E_n^{\mp} : mc^2 \rightleftharpoons \hbar\omega$, where $\hbar\omega$ is known as the *Planck* matter-energy, introduced in 1900 [63]. Therefore, at a minimum, light consists of two units, a pair of *Photons*. For a total of mass-energy $4m^2c^4$, the equation presents a conservation of photon energy-momentum and relativistic invariance. Because the potential fields on a pair of the world planes are a triplet quark system at $2\varphi_a^+(\phi_b^- + \phi_c^-) \approx 4\varphi_a^+\phi_{b/c}^-$, it is about four times of the density for the wave emission. Applicable to the conservation above, an area energy fluxion of the potentials (16,6) is equivalent to an entropy of the electro-photon radiations (14.1) in thermal equilibrium:

$$S_A(\omega_c, T) = 4\left(\frac{\omega_c^2}{4\pi^3 c^2}\right) = \eta_c\left(\frac{\omega_c}{c}\right)^2 \mapsto 4\frac{E_c^- E_c^+}{(\hbar c)^2} \quad : \eta_c = \pi^{-3} \tag{14.7}$$

where the factor 4 is given by (3.25) that has compensated to account for one blackbody with the dual states at minimum of two physical Y^- and one virtual Y^+ quarks. In a free space or vacuum for the massless objects, the above equivalence results in a pair of the complex formulae:

$$E_c^{\pm} = \mp\frac{i}{2}\hbar\omega_c \qquad : \eta_c = \frac{1}{\pi^3} \approx 33\,\% \tag{14.8}$$

Introduced at 20:00 August 19 of 2017, the coupling constant at $33\,\%$ implies that the triplet quarks institute a pair of the photon energies $\mp i\hbar\omega_c/2$ for a blackhole to emit lights by electro-photon radiations. It reveals that light can be converted to or emitted by the triplet quarks: an electron, a positron and a gluon.

Artifact 14.6: Conservation of Light

Combining the chapter VIII and XI, we uncover the remarkable nature such that, besides the primary properties of visibility, intensity, propagation direction, wavelength spectrum and polarization, the light can be characterized by the law of conservation, shown by the chart.

63 Planck, M. (1900a). "Über eine Verbesserung der Wien'schen Spectralgleichung". Verhandlungen der Deutschen Physikalischen Gesellschaft. 2: 202–204

Law of Conservation of Light

1. Light remains constant and conserves over time during its propagation.
2. Light consists of virtual energy duality as its irreducible unit: the photon.
3. A light energy of potential density neither can be created nor destroyed.
4. Light has at least two photons for entanglement with zero net momentum.
5. Light transports and transforms a duality of virtual wave and real object.
6. Without an energy supply, no light can be delivered to its surroundings.
7. Light transforms from one form to another carrying potential messages.
8. Light is convertible to or emitted by triplets: electron, positron and gluon.
9. The net flow across a region is sunk to or drawn from physical resources.

Artifact 14.7: Graviton.

Gravitation exhibits wave–particle duality such that its properties must acquire characteristics of both virtual and physical particles. Integrating with the blackhole thermal radiance, gravitational fluxion (14.5) has the transportable commutation of area entropy S_A and conservable radiations of a *Schwarzshild* blackbody. It is equivalent to associate it with *Bekenstein-Hawking* (14.2) radiation.

$$S_A(\omega_g, T) = 4\left(\frac{c_g^3}{4\hbar G}\right) = 4\frac{E_g^- E_g^+}{(\hbar c_g)^2} \qquad \rightarrow \qquad E_g^{\pm} = \mp\frac{i}{2}\sqrt{\hbar c_g^5/G} \tag{14.9}$$

where the number 4 is factored for a dual-state system, given by (3.25). Consequently, the gravitational energies $E_g^{\pm}$ contain not only a duality of the complex functions but also an irreducible unit: ***Graviton***, introduced at 21:30 November 25 of 2017, as a pair of graviton units:

$$E_g^{\pm} = \mp\frac{i}{2}E_p \qquad\qquad : E_p = \sqrt{\hbar c_g^5/G} \tag{14.10}$$

where E_p is the *Plank* energy. For the blackhole emanations, a coupling constant 100% to emit gravitational radiations implies that graviton is a type of dark energies accompanying particle radiations as a duality of the reciprocal resources. At a minimum, the blackhole emanation, conservation of momentum, or equivalently transportation invariance require that at least a pair of gravitons is superphase-modulated for entanglements transporting at their zero net momentum. Unlike a pair of photons emitted by particles, the nature of graviton is associated with the superphase modulation of the Y^-Y^+ energy or dark energy entanglement for all particles. In the center of entanglement, the colliding duality has no net momentum, whereas gravitons always have the temperature sourced from their spiral torques and modulated by superphase of the nature.

Artifact 14.8: Conservation of Gravitation

Similar in acquisition of *Conservation of Light*, we represent the characteristics of gravitation, shown by the chart. Under the superphase modulations, the feature of nature is independent of the orientation, the boost velocity or spiral torque through the world lines. Together with law of conservation of light, the initial state of the universe is conserved or invariant at the horizon where the inception of the physical world is entangling with and operating by the virtual supremacy. As an area density streaming, graviton waves may be interfered with themselves.

Law of Conservation of Gravitation

1. Gravitation is operated by torque transportations and the superphase messages.
2. Gravitation remains constant and conserves over time during its transportation.
3. A gravitation energy of potential density neither can be created nor destroyed.
4. Gravitation transports in wave formation virtually and acts on objects physically.
5. Without an energy supply, no gravitation can be delivered to its surroundings.
6. Gravitation consists of an energy duality as the irreducible complex gravitons.
7. Gravitation has at least two gravitons for entanglement at zero net momentum.
8. The net flexion across a region is sunk to or drawn from physical resources.
9. External to objects, gravity is inversely proportional to a square of the distance.

Artifact 14.9: Aether Theory

As one of the crucial implication of the law of conservation of light, the nature of lights is propagated at or appeared between where the two objects interrupts potentially at near third horizon. Although the superphase modulation is at all levels of horizons, the transformation, transportation as well as interruption on the world lines are independent to or free from the degrees of freedom in physical space of the redundant coordinates such as $\{\theta,\varphi\}$. Therefore, *Aether* theory [64], introduced by Isaac Newton in 1718, has correctly sensed that there is something existence but overly defined by the interpretation: "the existence of a medium, named as the Aether, is a space-filling substance or field, necessary as a transmission medium for the propagation of electromagnetic or gravitational forces." The replacement of *Aether* in modern physics is *Dark Energy,* defined as "an unknown form of energy which is hypothesized to permeate all of space, tending to accelerate the expansion of the universe." Both of the key words, "space-filling" or "all of space" are contradict to the law of neither conservation of light nor conservation of gravitation.

Artifact 14.10: Dark Energy

The nature of the mysterious dark energy [65] may have been detected by recent cosmological tests, which make a good scientific case for the context. In a philosophical view, the dark energy lies at the heart of the fundamental nature of potential fields, event operations, and the superphase modulations. Some classical forms might be compliant to our *Universal Topology* for dark energy in terms of the scalar fields:

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64 Matsumo, Y. "Exact Solution for the Nonlinear Klein-Gordon and Liouville Equations in Four-Dimensional Euclidean Space." J. Math. Phys. 28, 2317-2322, 1987

65 Isaac Newton The Third Book of Opticks (1718) http://www.newtonproject.sussex.ac.uk/view/texts/normalized/NATP00051

a) Quintessence is a hypothetical form of dark energy, more precisely a scalar field, postulated as an explanation of the observation of an accelerating rate of expansion of the universe, introduced by *Ratra* and *Peebles* in 1988 [66].

b) Moduli fields, introduced by *Bernhard Riemann* in 1857 [67]], are scalar field of global minima, occurring in supersymmetric systems. The first restriction of a moduli space, found in 1979 by *Bruno Zumino* [68]], is an *N*=1 theory in 4-dimensions degenerated into a global supersymmetry algebra with the chiral superfields. The *N*=2 supersymmetry algebra contains *Coulomb* branch and *Higgs* branch, corresponding to a *Dirac* spinor supercharge [69]].

As a summary, although the deeper understanding of the dark energy is out of a scope of this manuscript, our *Universal Topology* aligns well with the similar researches above. Tranquilly, the full model of both philosophical and mathematical achievements has fully arrived as the *Christmas Gifts* of 2013 [70]], where a set of the virtual objects, called *Universal Messaons*, constitutes concisely not only the dark energy but also the dark matter and elementary particles. As a consequence, *messaons* complement the fully-scaled quantum properties of virtual and physical particles in accordance well with numerous historical experiments, including the *European Space Agency*'s spacecraft data published in 2013 and 2015, that the universe is composed of 4.82±0.05% ordinary matter, 25.8±0.4% dark matter, and 69.0±1% dark energy [71]].

66 Peebles, P. J. E.; Ratra, Bharat (2003) "The cosmological constant and dark energy". Reviews of Modern Physics. 75 (2): 559–606. arXiv:astro-ph/0207347. doi:10.1103/RevModPhys.75.559

67 Ratra, P.; Peebles, L. (1988) "Cosmological consequences of a rolling homogeneous scalar field". Physical Review D. 37 (12): 3406. Bibcode:1988PhRvD..37.3406R. doi:10.1103/PhysRevD.37.3406.

68 Bernhard Riemann, Journal für die reine und angewandte Mathematik, vol. 54 (1857), pp. 101-155 "Theorie der Abel'schen Functionen".

69 B.Zumino, (1979) “Supersymmetry and Kähler manifolds” Physics Letters B, Volume 87, Issue 3, 5 November 1979, Pages 203-206

70 B.de WitA.Van Proeyen,“Potentials and symmetries of general gauged N = 2 supergravity-Yang-Mills models” Nuclear Physics B, Volume 245, 1984, Pages 89-117

71 Xu, C. Wei. “The Christmas Gifts of 2013 - Revealing Intrinsic Secrets of Elementary Particles beyond Theoretical Physics. https://itunes.apple.com/us/book/id880471063 (Jan 5, 2014)

Conclusion

From *First Universal Field Equations* (6.7-8) and (6.12-13), the $Y^{-}Y^{+}$ fluxions are operated to give rise to the horizons where a set of continuities is instituted symmetrically to function as the horizon of *Third Universal Field Equations* (10.2) and (10.4), unifying the symmetric fields of electromagnetism, gravitation and thermodynamics.

For the first time, the *Law of Conservation of Light* is revealed in the comprehensive integrity and characteristics of photon beyond its well-known nature at a constant speed. Remarkably, the *Law of Conservation of Gravitation* demonstrates that graviton is conserved to invariance of the *Torque Transportations* on world lines, given by gravitational fields of Eq (12.6-12.11), symmetrically. Our model of graviton not only quantifies concisely the graviton characteristics, but also unifies cohesively with light, electromagnetic and blackhole fields at the horizons factored by statistical thermodynamics.

In the center of a blackhole, a system of partial differential equations forms the entanglements of gravitational and electromagnetic fields and emerges the associated phase modulations from massive objects for internal communications. Essentially, the natural context of *relativistic boost* $T_{\mu a}^{\pm}$ and spiral torque $\Upsilon_{m\alpha}^{\pm}$ entanglements constitutes and acts as the sources of "photon" and "graviton" fields being operated at the heart of energy formulations of stress strengths and twist torsions, driven by the events descending from the two-dimensional world planes of the dual manifolds and the affine connections aligning to each of the superphase modulations.

IV. General Asymmetric Fields of Ontology and Cosmology

Abstract

By discovering *Asymmetric World Equations*, this manuscript formulates astonishing results to represent a consequence of the laws of asymmetric conservations and commutations, and characterize universal evolutions and motion dynamics of *Ontology* and *Cosmology* as the following remarks:

a) Creation and Annihilation of Virtual and Physical Ontological Fields
b) Decipher the law of asymmetric conservation of virtual and physical entanglements ontologically.
c) Animation and Reproduction of Physical and Virtual Cosmological Fields
d) Reveal the law of asymmetric conservation of physical and virtual motion dynamics cosmologically.

As a result, it reveals that the virtual world supplies energy resources and modulates the messaging secrets of the intrinsic operations, beyond *General Relativity.*

Introduction

In reality, the laws of nature strike an aesthetically 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 continuities 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.

In physics, we define two types of asymmetric dynamics: *Ontology* for the massless objects, and *Cosmology* for massive matters with the further interrelations as the following:

a. Because of the massless phenomena or dark objects, *Ontology* is intrinsic, evolutionary, dominant and explicit at the first and second horizons. As the actions of the scalar potential fields, it characterizes interrelationships of the living types, properties, and the natural entities that exist in a primary domain of being, becoming, existence, or reality. It compartmentalizes the informational discourse or theory required for sets of formulation and establishment of the relationships between creation and reproduction, and between animation and annihilation.
b. *Cosmology* is the living behaviors, motion dynamics, and interrelationships of the large scale natural matter or supernovae that exist in the evolution and eventual trends of the universe as a whole. At the third horizon and beyond, the vector potentials compartmentalizes the infrastructural discourse or theory required for sets of formulation and constitution of the relationships between motion and dynamics, and between universal conformity and hierarchy.

The scope of this manuscript is at where, based on *universal symmetry*, a set of formulae is constituted of, given rise to and conserved for ontological and cosmological horizons *asymmetrically*. Through the performances of the $Y^{-}Y^{+}$symmetric actions, laws of conservation and continuity determine the asymmetric properties of interruptive transformations, dynamic transportations, entangle commutations, photon and graviton fields of *Ontology* or stellar and galaxy evolutions of *Cosmology*.

15. Asymmetric World Equations

Asymmetry is an event process capable of occurring at a different perspective to its symmetric counterpart. The natural characteristics of the Y^-Y^+ asymmetry have the following basic properties:

1. Associated with its opponent potentials of scalar fields, an asymmetric system is a dark fluxion flowing dominantly in one direction without its mirroring or equivalent fluxion from the other.
2. The scalar fields are virtual supremacy at the first and second horizons, where objects are the massless instances, actions or operations, known as dark energy. Conceivably, an asymmetric structure of physical system is always accompanied or operated by the dark energies.
3. Asymmetry is a part of components to the symmetric fluxions of the underlining transform and transport infrastructure cohesively and persistently aligning with its systematic symmetry.
4. As a duality of asymmetry, the Y^- or Y^+ anti-asymmetry is another part of components for the dual asymmetric fluxions of the base infrastructure consistently aligning with the underlying Y^- or Y^+ symmetry.
5. Both of the Y^- and Y^+ asymmetries have the laws of conservation consistently and perpetually, that orchestrate their respective continuity locally and harmonize each other's movements externally in progressing towards the next level of symmetry.

The *World Equations* of (5.7) can be updated and generalized in terms of a pair of the Y^- and Y^+ asymmetric scalar fields, vector fields, matrix fields, and higher orders of the tensor fields, shown straightforwardly as:

$$W_b = W_0^\pm + \sum_n h_n \left\{ \kappa_1 \left(\dot{\partial}_{\lambda 1}\right\rangle^\pm + \kappa_2 \dot{\partial}_{\lambda_2} \left(\dot{\partial}_{\lambda 1}\right\rangle_s^\pm + \kappa_3 \dot{\partial}_{\lambda_3} \left(\dot{\partial}_{\lambda 2}\right\rangle_v^\pm \cdots \right\} \qquad (15.1)$$

where κ_n is the coefficient of each order n of the λ^n event. Defined by (3.22-3.24), the symbol $(\ \rangle_o^\mp$ implies asymmetry of a Y^--supremacy or a Y^+-supremacy with the lower index o=s for scalar fields, o=v for vector fields and o=M for matrix tensors:

$$\left(\dot{\partial}_\lambda\right\rangle_s^+ \equiv \psi_n^+ \dot{\partial}_\lambda \psi_n^-, \qquad \left(\dot{\partial}_\lambda\right\rangle_s^- \equiv \psi_n^- \dot{\partial}_\lambda \psi_n^+ \qquad (15.2)$$

$$\left(\dot{\partial}_\lambda\right\rangle_v^+ \equiv \psi_n^+ \dot{\partial}_\lambda V_n^-, \qquad \left(\dot{\partial}_\lambda\right\rangle_v^- \equiv \psi_n^- \dot{\partial}_\lambda V_n^+ \qquad (15.3)$$

Because the above equations contain a pair of the scalar density fields $\varrho_\phi^{\pm n} = \psi_n^\mp \psi_n^\pm$ or vector fluxions $\mathcal{J}_v^{\pm n} \propto \psi^\mp V^\pm$ as one-way commutation without the symmetric engagement from a pair of its reciprocal fields, they institute the fluxion fields as Y^--asymmetry or Y^+-asymmetry, complementarily.

For asymmetric evolutions or acceleration forces, the underlying system of the symmetric commutations and continuities do not change, but the motion dynamics of the world lines as a whole changes. In this view, the Y^-Y^+ entanglements are independent or superposition at each of the "ontological" primacy during their formations. Obviously, asymmetry occurs when a fluxion flows without a correspondence to its mirroring opponent. In reality, as a one-way steaming of a supremacy, an Y^- or Y^+ asymmetric fluxion is always consisted of, balanced with, and conserved by its conjugate potentials as a reciprocal opponent, resulting in motion dynamics, creation, annihilation, animation, reproduction, etc.

As a part of the symmetric components, fluxions not only are stable and consistent but also can dictate its own system's fate by determining its dynamic motion lines taken on the world planes. Therefore, the two entanglers have the freedom to control each of their own operations, asynchronously, independently and cohesively - another stunning example of the workings of the remarkable nature of our universe.

16. Dynamic Framework of Commutations

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.

Under the environment of both Y^-Y^+ manifolds for a duality of fields, the event λ initiates its parallel transport and communicates along a direction at the first tangent vectors of each Y^+ and Y^- curvatures. Following the tangent curvature, the event λ operates the effects transporting $(\check{\partial}^\lambda, \hat{\partial}_\lambda)$ into its opponent manifold through the second tangent vectors of each curvature, known as *Normal Curvature or* perpendicular to the fist tangent vectors. The scalar communicates are defined by the *Commutator* and continuity *Bracket* of the (3.17-3.21) equations. From two pairs of the scalar fields (15.2-3), asymmetric fluxions consist of and operate a pair of the commutative entanglements consistently and perpetually. Similar to the derivative of the formulae (10.2) and (10.4), the Y^-Y^+ acceleration fields contrive a pair of the following commutations

$$\mathbf{g}_s^-/\kappa_g = \left[\check{\partial}_\lambda\check{\partial}_\lambda, \hat{\partial}^\lambda\hat{\partial}^\lambda\right]^- = -\,\zeta^- \qquad : \zeta^- = \left(\hat{\partial}^\lambda\check{\partial}^\lambda - \hat{\partial}^\lambda\check{\partial}_\lambda\right\rangle^- \tag{16.1}$$

$$\mathbf{g}_s^+/\kappa_g = \left[\hat{\partial}_\lambda\hat{\partial}_\lambda, \check{\partial}^\lambda\check{\partial}^\lambda\right]^+ = -\,\zeta^+ \qquad : \zeta^+ = \left(\hat{\partial}_\lambda\check{\partial}^\lambda - \check{\partial}_\lambda\hat{\partial}_\lambda\right\rangle^+ \tag{16.2}$$

where $\left[W_0\right]^\mp = 0$. Named as the *Third Universal Field Equations*, introduced at 2:00am September 3rd 2017 *Washington, DC* USA, 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*.

As the horizon quantity of an object, a vector field forms and projects its motion potentials to its surrounding space, arisen by or acting on its opponent through a duality of reciprocal interactions. Because of the vector transportation, both of the boost and spiral communications give rise to various tensors of the horizon fields aligned with the motions of dynamic curvatures and beyond. When an object has a rotation on the antisymmetric manifolds of the world $\{\mathbf{r} \pm i\,\mathbf{k}\}$ planes, the event naturally operates, constitutes or generates *Torsions*, twisting on the dual dynamic resources and appearing as the *Centrifugal* or *Coriolis* compulsion on the objects such as triplets of particles, earth, and solar system. At the third horizon, acting upon the vector fields of $\zeta^\mu D^\mu$ and $\zeta_\nu D_\nu$, the event operates and gives rise to the tangent curvatures and vector rotations of the communications, defined by the commutators of the (3.23-3.24) equations.

At the second horizon of the event evolution 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:

$$\check{\partial}_\lambda\check{\partial}_\lambda\psi^- = \dot{x}_m\left(\partial_m - \overset{-}{\Gamma}{}^s_{nm}\right)\dot{x}_s\partial_s\psi^- \tag{16.3}$$

$$\hat{\partial}^\lambda\hat{\partial}^\lambda\psi^+ = \dot{x}^\nu\left(\partial^\nu - \overset{+}{\Gamma}{}^\sigma_{m\nu}\right)\dot{x}^\sigma\partial^\sigma\psi^+ \tag{16.4}$$

For mathematical convenience, the zeta-matrices are hidden and implied by the mappings to the derivatives of $\dot{x}^{\nu}$ and $\dot{x}^{\nu}$ as the relativistic transformations.

$$\hat{\partial}^{\lambda} : \dot{x}^{\nu} \mapsto \hat{\partial}_{\lambda} : \dot{x}_a \zeta^{\nu} \qquad \check{\partial}_{\lambda} : \dot{x}_m \mapsto \check{\partial}^{\lambda} : \dot{x}^{\alpha} \zeta_m \tag{16.5}$$

The events operate the local actions in the tangent space of the scalar fields relativistically, where the scalar fields are given rise to the vector fields and its vector fields are further given rise to the matrix fields.

In a parallel fashion, through the tangent vector of the third curvature, the events of the full $\hat{\partial}$ and $\check{\partial}$ operation continuously entangle the vector fields and gives rise to the next horizon fields, shown by the cosmological formulae:

$$\check{\partial}_{\lambda}\check{\partial}_{\lambda} V_m = \dot{x}_{\nu}\left(\partial_{\nu} - \Gamma^{-n}_{\mu\nu}\right)\dot{x}_n\left(\partial_n V_m - \Gamma^{-s}_{mn} V_s\right) \tag{16.6}$$

$$\hat{\partial}^{\lambda}\hat{\partial}^{\lambda} V^{\mu} = \dot{x}^{n}\left(\partial^{n} - \Gamma^{+\nu}_{mn}\right)\dot{x}^{\nu}\left(\partial^{\nu} V^{\mu} - \Gamma^{+\sigma}_{\mu\nu} V^{\sigma}\right) \tag{16.7}$$

As an integrity, they perform full operational commutations of vector boosts and torque rotations operated between the $Y^- Y^+$ world planes. Because the event processes continue to build up the further operable and iterative horizons of the associated rank-n tensor fields, a chain of these reactions constitutes various domains, each of which gives rise to the distinct field entanglements, systematically, sequentially and simultaneously.

Artifact 16.1: Ontological Commutations

For entanglement between $Y^- Y^+$ manifolds, considering the parallel transport of a *Scalar* density of the fields $\rho=\psi^+\psi^-$ around an infinitesimal parallelogram. The chain of this reactions can be interpreted by (16.3, 16.4) to formulate a commutation framework of *Physical Ontology*. This entanglement consists of a set of the unique fields, illustrated by the following components of the *entangling commutators,* respectively:

$$\left[\check{\partial}_{\lambda}\check{\partial}_{\lambda}, \hat{\partial}^{\lambda}\hat{\partial}^{\lambda}\right]_s^- = \dot{x}_{\nu}\dot{x}_m\left(P^-_{\nu m} + G^{-\sigma s}_{m\nu}\right) \tag{16.10}$$

$$P^-_{\nu m} \equiv \frac{1}{\dot{x}_{\nu}\dot{x}_m}\left[(\dot{x}_{\nu}\partial_{\nu})(\dot{x}_m\partial_m), (\dot{x}^{\nu}\partial^{\nu})(\dot{x}^m\partial^m)\right]_s^- \tag{16.11}$$

$$G^{-\sigma s}_{m\nu} = \frac{1}{\dot{x}_{\nu}\dot{x}_m}\left[\dot{x}^{\nu}\Gamma^{+\sigma}_{m\nu}\dot{x}^{\sigma}\partial^{\sigma}, \dot{x}_m\Gamma^{-s}_{nm}\dot{x}_s\partial_s\right]_s^- \tag{16.12}$$

$$\left[\hat{\partial}_{\lambda}\hat{\partial}_{\lambda}, \check{\partial}^{\lambda}\check{\partial}^{\lambda}\right]_s^+ : \quad (\hat{\partial}^{\lambda}, \dot{x}^{\nu}) \mapsto (\hat{\partial}_{\lambda}, \dot{x}_a\zeta^{\nu}), \quad (\check{\partial}_{\lambda}, \dot{x}_m) \mapsto (\check{\partial}^{\lambda}, \dot{x}^{\alpha}\zeta_m) \tag{16.13}$$

The *Ricci* curvature $P^-_{\nu\mu}$ is defined on any pseudo-*Riemannian* manifold as a trace of the *Riemann* curvature tensor, introduced in 1889 [72, 73]. The $G^{-s\sigma}_{m\nu}$ is a *Connection Torsion,* a rotational stress of the transportations.

72 Petersen, Peter (2006), Riemannian Geometry, Berlin: Springer-Verlag, ISBN 0-387-98212-4

73 Lee, J. M. (1997). Riemannian Manifolds – An Introduction to Curvature. Springer Graduate Texts in Mathematics. 176. New York Berlin Heidelberg: Springer Verlag. ISBN 978-0-387-98322-6

Artifact 16.2: Ontological Dynamics

Considering a system $\zeta \mapsto \gamma$ in a free space or vacuum at the constant speed, the above equations become at the motion dynamics:

$$\mathbf{g}_s^- / \kappa_s^- \equiv \left[\check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda\right]_s^- = \dot{x}_\nu \dot{x}_m \left(\frac{R}{2} g_{\nu m} + G_{m\nu}^{\sigma s}\right) \quad : \{\phi^-, \varphi^+\} \tag{16.14}$$

$$P_{\nu m}^- = R_{\nu m} = \frac{R}{2} g_{\nu m} \tag{16.15}$$

$$R_{\nu m}^- = \left[(\dot{x}_\nu \partial_\nu)(\dot{x}_m \partial_m), (\dot{x}^\nu \partial^\nu)(\dot{x}^m \partial^m)\right]_s^- \equiv R_{\nu m}(\hat{\partial}^\lambda, \check{\partial}_\lambda) \tag{16.16}$$

$$G_{m\nu}^{-s\sigma} = \overset{+}{\Gamma}{}_{m\nu}^{s} \partial^s - \overset{-}{\Gamma}{}_{nm}^{\sigma} \partial_\sigma \equiv G_{m\nu}^{-s\sigma}(\hat{\partial}^\lambda, \check{\partial}_\lambda) \tag{16.17}$$

Like the metric itself, the *Ricci* tensor R is a symmetric bilinear form on the tangent space of the manifolds. Both $R_{\nu m}^-$ and $G_{m\nu}^{-\sigma s}$ are the residual tensors with the local derivatives $\{\hat{\partial}^\lambda, \check{\partial}_\lambda\}$. Similarly, its counterpart exists as the following:

$$\mathbf{g}_s^+ / \kappa_s^+ \equiv \left[\hat{\partial}_\lambda \hat{\partial}_\lambda, \check{\partial}^\lambda \check{\partial}^\lambda\right]_s^+ = \dot{x}_\nu \dot{x}_m \left(\tilde{R}_{\nu m}^+ + \tilde{G}_{\nu m}^{+s\sigma}\right) \quad : \{\phi^+, \varphi^-\} \tag{16.18}$$

$$\tilde{R}_{\nu m}^+ = R_{\nu m}^+(\hat{\partial}_\lambda, \check{\partial}^\lambda) \quad \tilde{G}_{\nu m}^{+\sigma s} = G_{\nu m}^{+\sigma s}(\hat{\partial}_\lambda, \check{\partial}^\lambda) \tag{16.19}$$

$$\hat{\partial}_\lambda = X^\sigma{}_\nu \partial^\sigma, \qquad \check{\partial}^\lambda = X_\sigma{}^\nu \partial_\sigma \tag{16.20}$$

where the *Ricci* curvature $R_{\nu m}^+$ and connection torsion $G_{\nu m}^{+s\sigma}$ are mapped to the event transformations $\{\hat{\partial}_\lambda, \check{\partial}^\lambda\}$. Both $\tilde{R}_{\nu m}^+$ and $\tilde{G}_{m\nu}^{+s\sigma}$ are the interactive tensors with the relativistic derivatives $\{\hat{\partial}_\lambda, \check{\partial}^\lambda\}$. The curvature measures how movements ($\dot{x}$ and $\ddot{x}$) under the Y^-Y^+ *Scalar Fields* $\{\phi^-, \varphi^+\}$ and $\{\phi^+, \varphi^-\}$ are balanced with the inherent stress $G_{m\nu}^{\pm s\sigma}$ during a parallel transportation between the $Y^- Y^+$ manifolds. The equation represents the $Y^- Y^+$ *Scalar Commutation of Residual Entanglement.*

Artifact 16.3: Cosmological Commutations

In cosmology, the vector communications under physical primacy generally involve both boost and spiral movements entangling between the $Y^- Y^+$ manifolds. Considering the parallel transport around an infinitesimal parallelogram under the dual *Vector* fields of V^μ and V_m, the entanglements are given by (16.6, 16.7) as the following formulae:

$$\left[\check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda\right]_v^- = \dot{x}_\nu \dot{x}_n \left(P_{\nu n}^- - R_{n\nu s}^\sigma + G_{n\nu}^{-s\sigma} + C_{n\nu}^{-s\sigma}\right) \tag{16.21}$$

$$P_{\nu n}^- = \frac{1}{\dot{x}_\nu \dot{x}_n}\left[(\dot{x}_\nu \partial_\nu)(\dot{x}_n \partial_n),\ (\dot{x}^n \partial^n)(\dot{x}^\nu \partial^\nu)\right]_v^- \tag{16.22}$$

$$R_{n\nu s}^\sigma = \frac{1}{\dot{x}_\nu \dot{x}_n}\left[\dot{x}_\nu \partial_\nu (\dot{x}_n \overset{-}{\Gamma}{}_{\nu n}^{s}),\ \dot{x}^n \partial^n (\dot{x}^\nu \overset{+}{\Gamma}{}_{n\nu}^{\sigma})\right]_v^- \tag{16.23}$$

$$G_{n\nu}^{-s\sigma} = \frac{1}{\dot{x}_\nu \dot{x}_n}\left[\dot{x}^\nu \overset{+}{\Gamma}{}_{n\nu}^{\sigma} \dot{x}_n \partial_n,\ \dot{x}_n \overset{-}{\Gamma}{}_{\nu n}^{s} \dot{x}^\nu \partial^\nu\right]_v^- \tag{16.24}$$

$$C_{n\nu}^{-s\sigma} = \frac{1}{\dot{x}_\nu \dot{x}_n}\left[\dot{x}_\nu \overset{-}{\Gamma}{}_{n\nu}^{\alpha} \dot{x}_n \overset{-}{\Gamma}{}_{\nu n}^{s},\ \dot{x}^n \overset{+}{\Gamma}{}_{\nu n}^{a} \dot{x}^\nu \overset{+}{\Gamma}{}_{n\nu}^{\sigma}\right]_v^- \tag{16.25}$$

$$\left[\hat{\partial}_\lambda \hat{\partial}_\lambda, \check{\partial}^\lambda \check{\partial}^\lambda\right]_v^+ : \quad (\hat{\partial}^\lambda, \dot{x}^\nu) \mapsto (\hat{\partial}_\lambda, \dot{x}_a \zeta^\nu), \ (\check{\partial}_\lambda, \dot{x}_m) \mapsto (\check{\partial}^\lambda, \dot{x}^\alpha \zeta_m) \tag{16.26}$$

The matrix $P_{\nu n}^-$ is defined as the *Growth Potential*, an entanglement capacity of the dark energies; $R_{n\nu s}^\sigma$ as *Transport Curvature*, a routing track of the communications; $G_{n\nu}^{-s\sigma}$ as *Connection Torsion*, a stress energy of the transportations; and $C_{n\nu}^{-s\sigma}$ as *Entangling Connector*, a connection of dark energy dynamics. Therefore, this framework represents a foundation of physical cosmology at the horizon commutations.

Artifact 16.4: Cosmological Dynamics

Consider an object observed externally and given by the (16.6, 16.7) equations that actions of the commutation are dominant towards the residual entanglement $\left[\check{\partial}_\lambda\check{\partial}_\lambda, \hat{\partial}^\lambda\hat{\partial}^\lambda\right]_v^-$. Following the similar commutation infrastructure of the above equations, the event operations contract directly to the manifold communications and the commutation relations of equation (16.21, 16.26) are simplified to:

$$\left[\check{\partial}_\lambda\check{\partial}_\lambda, \hat{\partial}^\lambda\hat{\partial}^\lambda\right]_v^- = \dot{x}_n\dot{x}_\nu\left(\frac{R}{2}g_{n\nu} - R_{n\nu s}^{\sigma} + G_{n\nu}^{\sigma s} + C_{n\nu}^{s\sigma}\right) \tag{16.27}$$

$$R_{\nu m}^- = \left[(\dot{x}_\nu\partial_\nu)(\dot{x}_m\partial_m), (\dot{x}^\nu\partial^\nu)(\dot{x}^m\partial^m)\right]_s^- = \frac{R}{2}g_{\nu m} \tag{16.28}$$

$$R_{\nu\nu\sigma}^{\mu} = -\left(\partial_\nu\overset{-}{\Gamma}{}_{a\sigma}^{\mu}\partial_a\overset{+}{\Gamma}{}_{\nu\sigma}^{\mu} + \overset{-}{\Gamma}{}_{a\sigma}^{\rho}\overset{+}{\Gamma}{}_{\nu\rho}^{\mu} - \overset{+}{\Gamma}{}_{\nu\sigma}^{\rho}\overset{-}{\Gamma}{}_{a\rho}^{\mu}\right) \equiv R_{n\nu\sigma}^{\mu}(\hat{\partial}^\lambda, \check{\partial}_\lambda) \tag{16.29}$$

$$G_{n\nu}^{-s\sigma} = \overset{+}{\Gamma}{}_{n\nu}^{s}\partial^s - \overset{-}{\Gamma}{}_{\nu n}^{\sigma}\partial_\sigma \equiv G_{n\nu}^{-s\sigma}(\hat{\partial}^\lambda, \check{\partial}_\lambda) \tag{16.30}$$

$$C_{n\nu}^{-s\sigma} = \overset{-}{\Gamma}{}_{m\nu}^{s}\overset{+}{\Gamma}{}_{\nu n}^{\sigma} - \overset{+}{\Gamma}{}_{\nu n}^{\sigma}\overset{-}{\Gamma}{}_{m\nu}^{s} \equiv C_{n\nu}^{-s\sigma}(\hat{\partial}^\lambda, \check{\partial}_\lambda) \tag{16.31}$$

$$\left[\hat{\partial}_\lambda\hat{\partial}_\lambda, \check{\partial}^\lambda\check{\partial}^\lambda\right]_v^+ = \dot{x}_n\dot{x}_\nu\left(\tilde{R}_{n\nu}^- - \tilde{R}_{n\nu s}^{\sigma} + \tilde{G}_{n\nu}^{-s\sigma} + \tilde{C}_{n\nu}^{-s\sigma}\right) \tag{16.32}$$

$$\tilde{R}_{\nu m}^- = R_{\nu m}^-(\hat{\partial}_\lambda, \check{\partial}^\lambda),\ \tilde{R}_{n\nu s}^{\sigma} = R_{n\nu s}^{\sigma}(\hat{\partial}_\lambda, \check{\partial}^\lambda) \qquad : \hat{\partial}_\lambda = L_{\sigma\sigma}^{+}\partial^\sigma \tag{16.33}$$

$$\tilde{G}_{\nu m}^{-s\sigma} = G_{\nu m}^{-s\sigma}(\hat{\partial}_\lambda, \check{\partial}^\lambda),\ \tilde{C}_{\nu m}^{-s\sigma} = C_{\nu m}^{-s\sigma}(\hat{\partial}_\lambda, \check{\partial}^\lambda) \qquad : \check{\partial}^\lambda = L_{\sigma\sigma}^{-}\partial_\sigma \tag{16.34}$$

where $L_{\sigma\sigma}^{\mp}$ is the *Lorentz* group (8.12). More precisely, the event presences of the Y^-Y^+ dynamics manifests infrastructural foundations and transportations of the potential, curvature, stress, torsion, and contorsion, which give rise to the interactional entanglements through the center of an object by following its geodesics of the underlying virtual and physical commutations. Generally, transportations between Y^-Y^+ manifolds are conserved dynamically.

Artifact 16.5: Classical General Relativity

For a statically frozen or inanimate state, the two-dimensions of the world line can be aggregated in the expression $R_{n\nu s}^{\sigma} \mapsto R_{n\nu}$, $C_{n\nu}^{-s\sigma} \mapsto C_{n\nu}$ and $G_{n\nu}^{-s\sigma} \mapsto G_{n\nu}$. Therefore, the above equation formulates *General Relativity*:

$$G_{n\nu} = R_{n\nu} - \frac{1}{2}R\,g_{n\nu} \qquad : \left[\check{\partial}^\lambda\check{\partial}^\lambda, \hat{\partial}_\lambda\hat{\partial}_\lambda\right]_v^+ = 0,\ C_{n\nu} = 0 \tag{16.35}$$

known as the *Einstein* field equation [74], discovered in November 1915. The theory has been one of the most profound discoveries of the 20th-century physics to account for general commutation in the context of classical forces. Thirty-four years after Einstein's discovery of *General Relativity*, he claimed, "The general theory of relativity is as yet incomplete .... We do not yet know with certainty, by what mathematical mechanism the total field in space is to be described and what the general invariant laws are to which this total field is subject." Next year in 1950, he restated "... all attempts

74 Einstein, Albert (1916). "The Foundation of the General Theory of Relativity". Annalen der Physik. 354 (7): 769

to obtain a deeper knowledge of the foundations of physics seem doomed to me unless the basic concepts are in accordance with general relativity from the beginning." [75]. It turns out to be impossible to find a general definition for a seemingly simple property such as a system's total mass (or energy). The main reason is that the gravitational field—like any physical field—must be ascribed a certain energy, but that it proves to be fundamentally impossible to localize that energy [76]. Apparently, for a century, the philosophical interpretation had remained a challenge or unsolved, until this *Universal Topology* was discovered in 2016, representing an integrity of philosophical and mathematical solutions to extend further beyond general relativity to include the obvious phenomenons of cosmological photon and graviton transportation, blackhole radiation, and dark energy modulation.

Artifact 16.6: Contorsion Tensor

In 1955, *Einstein* stated that "...the essential achievement of general relativity, namely to overcome 'rigid' space (i.e. the inertial frame), is only indirectly connected with the introduction of a *Riemannian* metric. The directly relevant conceptual element is the 'displacement field' Γ^{l}_{ik}, which expresses the infinitesimal displacement of vectors. It is this which replaces the parallelism of spatially arbitrarily separated vectors fixed by the inertial frame (i.e. the equality of corresponding components) by an infinitesimal operation. This makes it possible to construct tensors by differentiation and hence to dispense with the introduction of 'rigid' space (the inertial frame). In the face of this, it seems to be of secondary importance in some sense that some particular Γ field can be deduced from a *Riemannian* metric..." [77]. In this special case, stress tensor $G^{\mu}_{\nu\sigma}$ of an object vanishes from or immune to its external fields while its internal commutations conserve a contorsion tensor of $T^{\mu}_{\sigma\nu}$ as a part of the life entanglements:

$$T^{\mu}_{\sigma\nu} = \overset{-}{\Gamma}{}^{\mu}_{\sigma\nu} - \overset{+}{\Gamma}{}^{\mu}_{\sigma\nu} \qquad : G^{\mu}_{\nu\sigma} \mapsto T^{\mu}_{\sigma\nu}\partial_{\nu} = \left(\overset{-}{\Gamma}{}^{\mu}_{\sigma\nu} - \overset{+}{\Gamma}{}^{\mu}_{\sigma\nu}\right)\partial_{\nu} \qquad (16.36)$$

This extends the meaning to and is known as *Élie Cartan Torsion*, proposed in 1922 [78]. Besides spin generators, this tensor carries out the additional degrees of freedom for internal communications.

Artifact 16.7: Conservation of Asymmetric Dynamics

For convenience of expression, it is articulated by each of four distinctive conceptions that deliver the Laws of Conservation and Commutation Equations characterizing universal evolutions as each of the above subjects, namely: i) *Creation*, ii) *Reproduction*, iii) *Animation*, and iv) *Annihilation*. A consequence of these laws of conservations and commutations is that the perpetual motions, transformations, or transportations on the world line curvatures can exist only if its motion dynamics of energies are conserved, or that, without virtual symmetric and asymmetric fluxions, no system can

75 Einstein, Albert. "The theory of relativity" 1949, "On the Generalized Theory of Gravitation" 1950, http://www.relativitybook.com/einstein_quotes.html
76 Misner, Charles W.; Thorne, Kip. S.; Wheeler, John A. (1973), Gravitation, W. H. Freeman, ISBN 0-7167-0344-0
77 Einstein, Albert (1916). "The Foundation of the General Theory of Relativity". Annalen der Physik. 354 (7): 769
78 Friedrich W. Hehl, Yuri N. Obukhov (2007) "Elie Cartan's torsion in geometry and in field theory, an essay", arXiv:0711.1535

deliver unlimited time of movements throughout its surroundings. Carried out by equations of (16.1, 16.2), each of the *Laws of Conservation of Asymmetric Dynamics* is presented in the next two chapters.

17. Asymmetric Dynamics of Potential Fields

The asymmetric commutation is operated by one of the interpretable and residual features exchanging the information carried by the scalar fields (16.1)-(16.2):

$$\left[\check{\partial}_\lambda\check{\partial}_\lambda, \hat{\partial}^\lambda\hat{\partial}^\lambda\right]_s^- = -\left(\hat{\partial}^\lambda(\check{\partial}^\lambda - \check{\partial}_\lambda)\right\rangle_s^- \quad : \{\phi^-, \varphi^+\} \qquad (17.1)$$

$$\left[\hat{\partial}_\lambda\hat{\partial}_\lambda, \check{\partial}^\lambda\check{\partial}^\lambda\right]_s^+ = -\left(\hat{\partial}_\lambda(\check{\partial}^\lambda - \check{\partial}_\lambda)\right\rangle_s^+ \quad : \{\phi^+, \varphi^-\} \qquad (17.2)$$

where the index s refers to the scalar potentials. The first equation is the physical animation and reproduction of asymmetric ontology, and the second equation is the virtual creation and annihilation of asymmetric ontology. As a general expectation, the asymmetric motion of ontology features that i) *Residual Dynamics* closely resembles the objects under a duality of the real world; and ii) *Transformational Dynamics* operates the processes under the event actions. As a notation, this chapter was introduced at September 9th of 2018.

From definitions of the γ^ν *-Matrices* (8.4), one can convert each of the right-side equations of the above asymmetric scalar entanglers explicitly under the second horizon at the constant speed:

$$\mathcal{O}_{\nu\mu}^{+\zeta} \equiv \zeta^\sigma\partial^\sigma\left(\zeta_\nu\partial_\nu - \zeta_\mu\partial_\mu\right\rangle_s^- = -\mathcal{O}_{\mu\nu}^{+\zeta} \quad : \{\phi^-, \varphi^+\} \qquad (17.3)$$

$$\mathcal{O}_{\nu\mu}^{-\zeta} \equiv \zeta^\sigma\partial^\sigma\left(\zeta_\nu\partial_\nu - \zeta_\mu\partial_\mu\right\rangle_s^+ = -\mathcal{O}_{\mu\nu}^{-\zeta} \quad : \{\phi^+, \varphi^-\} \qquad (17.4)$$

The $\mathcal{O}_{\nu\mu}^{\pm\zeta}$ is the Y^+ or Y^- ontological modulators. Illustrated by equations of (16.10, 16.13), the ontological dynamics can now be fabricated in the covariant form of asymmetric ontology:

$$\frac{R}{2}g_{\nu m} + G_{\nu m}^{\sigma s} + \mathcal{O}_{m\nu}^{+\zeta} = 0 \quad : \zeta_\nu = \gamma_\nu + \chi_\nu \qquad (17.5)$$

$$\tilde{R}^{\nu m} + \tilde{G}_{\nu m}^{\sigma s} + \mathcal{O}_{m\nu}^{-\zeta} = 0 \quad : \zeta^\nu = \gamma^\nu + \chi^\nu \qquad (17.6)$$

The first equation at the Y^--supremacy is affiliated with the *physical Annihilation of Ontological processes*. The second equation at the Y^+-supremacy is the conservation inherent in the *Virtual Creation of Ontological processes*. Apparently, the creation processes are much more sophisticated because of the message transformations, relativistic commutations, and dynamic modulations.

With the scalar potentials, the $Y^\pm$ events conjure up the entanglements of eternal fluxions as a perpetual streaming for residual motions traveling on curvatures of the world lines, which is the persistence of an object without deviation in its situation of movements at its state and energies. The term $\mathcal{O}_{\nu\mu}^{+\zeta}$ or $\mathcal{O}_{\nu m}^{-\zeta}$ implies the left- or right-hand modulations balanced to its opposite motion curvatures. Classically, the term "residual" is described by or defined as: an object is not subject to any net external forces and moves at a constant energy on the world plane. This means that an object continues moving at its current state superposable until some interactions or modulations causes its state or energy to change.

Artifact 17.1: Transformation of Ontological Modulators

Considering the *Infrastructural Transformation Matrices* $\gamma^\nu\gamma_\nu = -1 \ \zeta \mapsto \gamma$, and *Gauge* invariance $\partial^\nu \mapsto \partial^\nu - ieA^\nu/\hbar$, $\partial_m \mapsto \partial_m + ieA_m/\hbar$, one can convert the ζ-tensor explicitly into the γ-matrix components (8.4a) of the asymmetric scalar entanglers, shown by the following:

$$\mathscr{O}^{\pm\gamma}_{\nu\mu} = i\frac{e}{\hbar}\phi^{\mp}\gamma^{\sigma}\partial^{\sigma}(\gamma_{\nu}F^{\pm}_{\nu\mu})\varphi^{\pm} = -\,i\frac{e}{\hbar}\phi^{\mp}\partial^{\sigma}F^{\pm}_{\nu\mu}\varphi^{\pm} = -\,\mathscr{O}^{\pm\gamma}_{\mu\nu} \tag{17.7}$$

$$F^{-}_{\nu\mu} \equiv \partial_{\nu}A_{\mu} - \partial_{\mu}A_{\nu} = \begin{pmatrix} 0 & \mathbf{B}^{-}_{a} \\ -\mathbf{B}^{-}_{a} & \frac{\check{\mathbf{b}}}{c}\times\mathbf{E}^{-}_{a} \end{pmatrix} \tag{17.8}$$

$$F^{+}_{\nu\mu} \equiv \partial^{\nu}A^{\mu} - \partial^{\mu}A^{\nu} = \begin{pmatrix} 0 & \mathbf{D}^{+}_{a} \\ -\mathbf{D}^{+}_{a} & \frac{\mathbf{u}}{c^2}\times\mathbf{H}^{+}_{a} \end{pmatrix} \tag{17.9}$$

$$\mathbf{O}^{-}_{\gamma} \equiv \mathscr{O}^{-\gamma}_{\nu\mu} = i\frac{e}{\hbar}\phi^{+}\begin{pmatrix} 0 & -\frac{\partial}{\partial t}\mathbf{B}^{-}_{a} \\ \nabla\cdot\mathbf{B}^{-}_{a} & -\nabla\times\mathbf{E}^{-}_{a} \end{pmatrix}\varphi^{-} \tag{17.10}$$

$$\mathbf{O}^{+}_{\gamma} \equiv \mathscr{O}^{+\gamma}_{\nu\mu} = i\frac{e}{\hbar}\phi^{-}\begin{pmatrix} 0 & -\frac{\partial}{\partial t}\mathbf{D}^{+}_{a} \\ \nabla\cdot\mathbf{D}^{+}_{a} & \frac{1}{c}\nabla\times\mathbf{H}^{+}_{a} \end{pmatrix}\phi^{+} \tag{17.11}$$

Apparently, the ontological process is primarily the superphase A^{ν} and A_{ν} operations as the resource supplier for the asymmetric dynamics.

Artifact 17.2: Transportation of Ontological Modulators

In parallel fashion at the *Infrastructural Torque Matrices* $\zeta \mapsto \chi$, the $Y^{-}Y^{+}$ events conjure up the entanglements of eternal fluxions as another perpetual streaming for transportations on the world-line curvatures. The torque transportation between the complex manifolds of the $Y^{-}Y^{+}$ world planes redefines the invariable quantities of how commutations between the dual spaces are entangled under the conjugation framework in two referential frames traveling at a consistent velocity with respect to one another. Unfolding the (9.3, 9.4) ζ-matrices into the χ-matrices of the (8.4b) equations, we have a similar approach for the following expressions:

$$\mathscr{O}^{\pm\chi}_{\nu\mu} = -\,i\frac{e}{\hbar}\phi^{\mp}\chi^{\sigma}\partial^{\sigma}(\chi_{\nu}T^{\pm}_{\nu\mu})\varphi^{\pm} = -\,\mathscr{O}^{\pm\chi}_{\mu\nu} \tag{17.12}$$

$$T^{-}_{\nu\mu} \equiv \chi_{\nu}\partial_{\nu}A_{\mu} - \chi_{\mu}\partial_{\mu}A_{\nu} \qquad T^{+}_{\nu\mu} \equiv \chi^{\nu}\partial^{\nu}A^{\mu} - \chi^{\mu}\partial^{\mu}A^{\nu} \tag{17.14}$$

where the $T^{\pm\sigma s}_{\nu m}$ contains the gravitational fields. These equations are the transport dynamics affiliated with the physical *Reproduction and Animation* of the ontological processes. At the constant speed $\mathbf{u}^{\pm} = \mp c$, the ontological dynamics implies the motion curvatures be operated at the second horizon giving rise to the third horizon and transporting the entangling forces $\tilde{\chi}^{\nu} \mapsto \chi^{\nu}$.

Artifact 17.3: Conservation of Ontological Dynamics

At a free space or vacuum, the above equations derives the commutative formulae:

$$\frac{R}{2}\mathbf{g}^{-} + \mathbf{G} + \mathbf{O}^{+} = 0 \qquad : \mathbf{g}^{-} = g_{\nu m}, \quad \mathbf{G} = G^{\sigma s}_{\nu m}, \quad \mathbf{O}^{+} \equiv \mathscr{O}^{+\zeta}_{\nu\mu} \tag{17.17}$$

$$\tilde{\mathbf{R}}^{+} + \tilde{\mathbf{G}} + \mathbf{O}^{-} = 0 \qquad : \tilde{\mathbf{R}}^{+} = \tilde{R}^{\nu m}, \; \tilde{\mathbf{G}} = \tilde{G}^{\sigma s}_{\nu m}, \quad \mathbf{O}^{-} \equiv \mathscr{O}^{-\zeta}_{\nu\mu} \tag{17.18}$$

where $\mathscr{O}^{\pm\zeta}_{\nu\mu} = \mathscr{O}^{\pm\gamma}_{\nu\mu} + \mathscr{O}^{\pm\chi}_{\nu\mu}$. As expected, the ontological *gamma*- and *chi*-fields are similar to or evolve into electromagnetic fields and gravitational fields. As the processes of the nature of being, the equations (17.3, 17.4) uncoil explicitly the compacted covariant formulae. Generally, the above conservation of ontological dynamics describe the following principles:

1. The ontological dynamics is conserved and carried out by the area densities for creations or annihilations, which serve as *Law of Conservation of Ontology*.
2. In the world planes, the curvature R and stress tensor $G_{\nu m}^{\sigma s}$ is dynamically sustained during the asymmetric modulations over the gesture movements.
3. Operated and maintained by the superphase potentials, the conservation of energy fluxions supplies the resources, modulates the transform, and transports potential messages or forces, alternatively.
4. The commutation fields $F_{\nu\mu}^{\pm}$ of the superphase potentials transform and entangle between manifolds as the resource propagation of the asymmetric dynamics.
5. The torque fields $T_{\nu\mu}^{\pm}$ of the superphase potentials transport and entangle between manifolds as the force generators of the ontological processes of motion dynamics.

Apparently, it represents that the resources are composited of, supplied by or conducted with the residual activators and motion modulators primarily in the virtual world. It implies that, in the physical world, the directly observable parameters are the coverture R, and stress tensor $\mathbf{G}$. 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 while performing actions or reactions.

Artifact 17.4: Ontological Accelerations

Connected to the Y^- or Y^+ entanglement, the dynamic accelerations $\mathbf{g}_s^{\pm}$ of ontology are given by (17.1) and (17.2) as the following expression:

$$\mathbf{g}_s^-/\kappa_g = -\left[\check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda\right]_s^- = \mathbf{O}^+ \qquad : \mathbf{O}^+ = \mathbf{O}_\chi^+ + \mathbf{O}_\gamma^+ \qquad (17.19)$$

$$\mathbf{g}_s^+/\kappa_g = -\left[\hat{\partial}_\lambda \hat{\partial}_\lambda, \check{\partial}^\lambda \check{\partial}^\lambda\right]_s^+ = \mathbf{O}^- \qquad : \mathbf{O}^- = \mathbf{O}_\chi^- + \mathbf{O}_\gamma^- \qquad (17.20)$$

where $\kappa_g = 1/(\hbar c)$ is a constance. For a system, its core center may absorb the objects when $\mathbf{g}_s^+ > 0$ and emits objects at $\mathbf{g}_s^+ < 0$. To maintain the stability at $\tilde{\mathbf{g}}_s = \mathbf{g}_s^+ - \mathbf{g}_s^- \approx 0$, the accelerations of a system might be conserved: $\mathbf{g}_s^+ + \mathbf{g}_s^- = 0$ and usually has to balance both a black core absorbing energies and a white core exert energies. Because the resources are primarily supplied by the virtual world where operates the residual activators and motion modulators, any life activities appear to be favorable towards the Y^+ deceleration $\mathbf{g}_s^+ < 0$ for mass emission and balanced by the Y^- accelerations $\mathbf{g}_s^- > 0$, known as *Hubble's* Law [79]. In other words, the energy conservation implies that the light emission at the second horizon might always be observable at redshift, which, however, is not *Doppler* shift [80]. The conservation of virtual and physical dynamics balances the expansion

79 Hubble, E. (1929). "A relation between distance and radial velocity among extra-galactic nebulae". Proceedings of the National Academy of Sciences. 15 (3): 168–73

80 Buys Ballot (1845). "Akustische Versuche auf der Niederländischen Eisenbahn, nebst gelegentlichen Bemerkungen zur Theorie des Hrn. Prof. Doppler (in German)". Annalen der Physik und Chemie. 11 (11): 321–351

or reduction of the universe at the scale of both virtual and physical spaces. It is a property of the entire universe as a whole rather than a phenomenon that applies just to one part of the universe observable physically.

18. Cosmic Dynamics of Vector Fields

At the third horizon or higher, the energy potentials embodied at the mass enclave conserve the asymmetric commutations as one of the transient astronomical events and features propagation of the curvature dynamics carried by the vector fields, shown by a pair of the commutative equations:

$$\left[\check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda\right]_v^- = -\left(\hat{\partial}^\lambda \check{\partial}^\lambda - \hat{\partial}^\lambda \check{\partial}_\lambda\right\rangle_v^- \qquad : \{\phi^-, V^+\} \qquad (18.1)$$

$$\left[\hat{\partial}_\lambda \hat{\partial}_\lambda, \check{\partial}^\lambda \check{\partial}^\lambda\right]_v^+ = -\left(\hat{\partial}_\lambda \check{\partial}^\lambda - \check{\partial}_\lambda \hat{\partial}_\lambda\right\rangle_v^+ \qquad : \{\phi^+, V^-\} \qquad (18.2)$$

where the index v refers to the vector potentials. The first equation is the physical dynamics of cosmology, and the second equation is the virtual motion dynamics.

Artifact 18.1: Y^- Cosmological Dynamics

Aligning with the continuously arising horizons, the events determine the derivative operations through the vector potentials giving rise to the matrix fields for further dynamic evolutions at the Y^+-supremacy. From definitions of the *Lorentz-matrices* (8.13-8.14), one can convert the right-side equation (18.1) of the asymmetric vector entanglers explicitly into the following formulae, similar to the derivation of equation (17.11):

$$\Lambda_{\mu\nu}^+ = (-ic\partial^\kappa \quad \mathbf{u}^+\partial^r)\begin{pmatrix} 0 & -\mathbf{D}_v^+ \\ \mathbf{D}_v^+ & -\frac{\mathbf{u}^+}{c^2} \times \mathbf{H}_v^+ \end{pmatrix} = \begin{pmatrix} 0 & -\frac{\partial}{\partial t}\mathbf{D}_v^+ \\ \nabla \cdot \mathbf{D}_v^+ & \nabla \times \mathbf{H}_v^+ \end{pmatrix} \qquad (18.3)$$

where the lower index v indicates the vector potentials. The $\Lambda_{\nu\mu}^+$ is the Y^+ cosmological modulator that extends the classic cosmological constant to the matrix. Illustrated by equations of (16.27), the motion dynamics can now be fabricated in the covariant form of asymmetric equation:

$$\mathscr{R}_{\nu m\mu}^{-\sigma} = \frac{R}{2} g_{\nu m} + G_{\nu m}^{s\sigma} + C_{\nu m}^{s\sigma} + \Lambda_{\nu m}^+ \qquad (18.4a)$$

$$\mathfrak{R}^- = \frac{R}{2}\mathbf{g}^- + \mathbf{G} + \mathbf{C}^- + \mathbf{\Lambda}^+ \qquad (18.4b)$$

The *Riemannian* curvature $\mathfrak{R}^- \equiv \mathscr{R}_{\nu m\mu}^{-\sigma}$ associates the metric $\mathbf{g}^-$, relativistic stress $\mathbf{G}$ and contorsion $\mathbf{C}$ tensors to each world-line points of the Y^- manifolds that measures the extent to the metric tensors from its locally isometric to its opponent manifold or, in fact, conjugate to each other's metric. Apparently, the dark dynamics is the sophisticated processes with the message transformations, relativistic commutations, and dynamic modulations that operate the physical motion curvature. This equation servers as *Law of Conservation of Y^- Cosmological Motion Dynamics*, introduced at 17:16 September 7th 2017 that the Y^- fields of a world-line curvature are constituted of and modulated by asymmetric fluxions, given rise from the Y^+ vector potential fields not only to operate motion geometry, but also to carry messages for reproductions and animations. It implies that the virtual world supplies energy resources in the forms of area fluxions, and that the cosmological modulator $\mathbf{\Lambda}_v^+$ has the intrinsic messaging secrets of the dark energy operations, further outlined in the following statement:

1. During the Y^-Y^+ entanglements between the world planes, the asymmetric potentials dynamically operate the world-line curvatures $\mathfrak{R}^-$ and supply the area energy at a horizon rising from symmetric fluxions of vector potentials.
2. These Y^- motion curvature $\mathfrak{R}^-$, stress $\mathbf{G}$ and contorsion $\mathbf{C}$ dynamically balance the transformation and transportation through the asymmetric fluxions entangling between the dual manifolds.
3. The Y^- asymmetric dynamic motions are internally adjustable through the potentials of the Y^+ modulator $\boldsymbol{\Lambda}^+$ by the energy fluxions. A cosmic system is governed by the modulator $\boldsymbol{\Lambda}^+$ symmetrically and the commutation asymmetrically.
4. The modulator evolutes, generates and gives rise to the horizons which integrate with the dynamic forces, motion collations, or symmetric dynamics.
5. Remarkably as its resources of symmetric counterpart, it associates the diagonal components that embed and carryout the horizon radiations, wave transportations, as well as the force generators, described by the chapter 14.

Usually, the matrix $\boldsymbol{\Lambda}^+$ institutes dynamic modulations internally while the symmetric area fluxions and the reactors are observable externally to the system. Besides, the antisymmetric strength $\mathbf{D}_v^+$ and twisting $\mathbf{H}_v^+$ fields of the asymmetric $\boldsymbol{\Lambda}^+$ components are part of the propagational entanglements throughout the system intrinsically, resourcefully and modularly.

Artifact 18.2: Y^+ Cosmological Dynamics

In a parallel fashion, by following the same approach, we can fabricate compactly the contravariant formula at the Y^--modulation and its conservation inherent in the *Virtual Dark Dynamics*.

$$\tilde{\mathscr{R}}^{+\sigma}_{\nu m\mu} = \tilde{R}_{\nu m} + \tilde{G}^{\sigma s}_{\nu m} + \tilde{C}^{\sigma s}_{\nu m\mu} + \Lambda^-_{\nu m} \tag{18.5a}$$

$$\tilde{\mathfrak{R}}^+ = \tilde{\mathbf{R}} + \tilde{\mathbf{G}} + \tilde{\mathbf{C}} + \boldsymbol{\Lambda}^- \tag{18.5b}$$

$$\Lambda^-_{\mu\nu} = \begin{pmatrix} -ic\partial^\lambda & \mathbf{u}^+\partial^r \end{pmatrix} \begin{pmatrix} 0 & -\mathbf{B}_v^- \\ \mathbf{B}_v^- & -\frac{\check{\mathbf{b}}}{c} \times \mathbf{E}_v^- \end{pmatrix} = \begin{pmatrix} 0 & -\frac{\partial}{\partial t}\mathbf{B}_v^- \\ \nabla \cdot \mathbf{B}_v^- & -\nabla \times \mathbf{E}_v^- \end{pmatrix} \tag{18.6}$$

where the matrices are associated with the *Lorenz*-group at the third or higher horizon. The above equation also serves as *Law of Conservation of Y^+ Cosmological Field Dynamics* that associates curvature, stress and contorsion with commutator of area fluxions:

1. At a horizon rising from commutations of vector potentials, this equation describes the outcomes between the internal entanglements and motion behaviors observable externally to the system though the Y^- modulation $\boldsymbol{\Lambda}^-$ of the activator.
2. The motion annihilation of metric $\mathbf{g}^+$, stress $\tilde{\mathbf{G}}$ and connector tensors $\tilde{\mathbf{C}}$ conserve the *Riemannian* curvature $\mathfrak{R}^+$ travelling over the world lines and entangling through the actor $\boldsymbol{\Lambda}^-$ matrix between the Y^-Y^+ manifolds at the third or higher horizons.

3. The Y^+ motion curvature $\mathfrak{R}^+$, stress $\tilde{\mathbf{G}}$ and contorsion $\tilde{\mathbf{C}}$ dynamically balancing the transportation through the asymmetric fluxions may radiate the waves of photons and gravitons associated with its symmetric counterpart.
4. The fluxion is entangling the vector potentials to propagate the resource modulator $\mathbf{\Lambda}_v^-$ of the antisymmetric strength $\mathbf{B}_v^-$ and twisting $\mathbf{E}_v^-$ fields, conservatively and consistently.
5. The internal continuity of energy fluxion might be hidden and convertible to and interruptible with its Y^+ opponent fields for the dynamic entanglements reciprocally throughout and within the system.

At the Y^--supremacy, the asymmetric forces or acceleration is logically affiliated with the *virtual dynamics* while its physical motion curvature is driven by the Y^+-supremacy of the virtual world.

Artifact 18.3: Cosmological Accelerations

For the accelerations at non-zero $\mathbf{g}_v^\pm \neq 0$, one has the following expression, similar to (17.19-17.20) of the ontological accelerations:

$$\mathbf{g}_v^-/\kappa_g = -\left[\check{\partial}_\lambda\check{\partial}_\lambda, \hat{\partial}^\lambda\hat{\partial}^\lambda\right]_s^- = \mathbf{\Lambda}^+ \quad (18.7)$$

$$\mathbf{g}_v^+/\kappa_g = -\left[\hat{\partial}_\lambda\hat{\partial}_\lambda, \check{\partial}^\lambda\check{\partial}^\lambda\right]^+ = \mathbf{\Lambda}^- \quad (18.8)$$

where $\mathbf{g}_v^-$ or $\mathbf{g}_v^+$ is a normalized acceleration of cosmology. As a duality, a galaxy center may have a mixture of a black core absorbing objects and a white core radiating the photons and gravitons. For a blackhole, its core center may absorb the objects in order to maintain its activities for its motion stability of annihilation. Reciprocal to a blackhole, a galaxy center may have more radiations instead of absorbing objects, which results in a brightness of its core to stabilize its highly functioning activators and operating modulators - the nature of the mysterious dark energy.

Artifact 18.4: Cosmological Redshift

In reality, only in the third horizon, a moving body away from or towards to the receiver is the redshift blueshift caused by the *Doppler* effect [81]. For the light emitted at the second horizon, it doesn't matter what happens to the emitting object physically - it won't affect the wavelength of the light that is received at the third or higher physical horizons. In the case of the cosmological redshift, the emitting object appears as expanding due to the energy conversion between the physical and virtual regime with time-lapse. This is a Doppler-like effect irrelevant to the speed of the galaxy or star, but on the changing geometry of cosmological distances over world-lines. Because the rate of action time changes or “expends” between the emitting and the receiving, that will affect the received wavelength. Apparently, the cosmological redshift is a measure of the total "stretching" that the universe has undergone between the virtual time when the light was physically emitted and the virtual time when it was physically received. As expected, the time-lapse is equivalent to or always “expanding” that is the known characteristics of the virtual world imposing or exposing on the

81 R. Gray, J. Dunning-Davies (2008) “A review of redshift and its interpretation in cosmology and astrophysics”, arXiv:0806.4085

physical world.

Besides no-singularity in the virtual event operations of the universe, the cosmological redshirt is another property of the mass annihilation or inauguration between the light emitting and receiving. The entire universe is orchestrated as a whole rather than a phenomenon that applies just to one part of the universe or from the physical observation only. Therefore, our astronomers shall bid farewell to the model of “Big Bang theory”.

Conclusions

In summary, asymmetric dynamics is the resources or modulators of motion entanglements for ontological evolutions and spacetime curvatures for cosmological events. Generally, it is the virtual world that dominants our universal topology or world activities for creations and annihilations, and that the physical world for reproduction and animations. No dynamics can sustain without its reciprocal counterpart, although it might be hidden or appear as dark energy to the physical observers. In fact, the acceleration forces of the physical curvature, stress and contorsion are operated by virtual supremacy of modulations internally. Apparently, since the motion dynamics of the Y^- (17.5-17.6) or Y^+ (18.4, 18.5) equation is associated with its opponent Y^+ or Y^- modulator, a natural bing has its dynamic life characterized and modulated by the Y^-Y^+ entanglements.

V. Field Evolutions of Elementary Particles

Abstract

Operated by the superphase processes, *Field Evolutions* give rise to the natural horizons and develop the comprehensive intrinsics that result in a broad range of applications to characterize the behaviors of the elementary particles, prevailing throughout the following contexts, but are not limited to,

1. *Law of Field Evolution* uncoils the secrets of ***Double Loops of Triple Entanglements*** as a chain of the evolutional and imperative processes of the implicit creation, explicit reproduction, and transitional *Gauge* invariance.
2. Remarkably, it derives *Yang-Mills* action that transposes seamlessly a duality of triplet synergy among elementary particle fields into modern physics of electroweak interaction, strong nuclear forces of chromodynamics, and *Standard Model* of particle physics.
3. Finally, a ***General Horizon Infrastructure of Quantum Evolutions*** is formulated concisely and demonstrates a holistic quantum equation of the horizon fields that unifies the four fundamental forces in term of a set of *Lagrangians*.

Consequently, this universal and unified field theory complies precisely with and extends further in answer to the empirical and contemporary physics of quantum chromodynamics and *Standard Model*.

Introduction

Under *Universal Topology* $W = P \pm iV$, a duality of the potential entanglements lies at the heart of all event operations as the natural foundation giving rise to and orchestrating relativistic transformations for photons and spiral transportations for gravitons. In addition, the superphase modulation conducts laws of evolutions and horizon of conservations, and maintains field entanglements of coupling weak and strong forces compliant to quantum chromodynamics and *Standard Model* of particle physics. It extends the unified physics stunning at exceptional remarks of the ontological specifics:

Chapter XIX: Exhibits "*Two Implicit Loops of Triple Explicit Entanglements*" that the horizon evolution fields in physical regime unifies the classical week, strong, gravitational and electromagnetic forces, integrated with the well-known formulae of *Yang-Mills* action, *Gauge Invariance*, *Chromodynamics*, *Field Breaking*, and *Standard Model* of particle physics. Finally, it uncovers a holistic equation - *General Horizon Infrastructure of Quantum Evolutions*.

Chapter XX: As a part of horizon evolutions, the nature comes out and conceals the characteristics of the *Strong Forces* of *Field Breaking* such that one bids farewell to the hypothesized "*Big Bang*" model.

Chapter XXI: As a general prediction of this theory, particles are created and operated by a set of the time-dependent fields that the superphase events evolve and modulate the dynamic horizons and field curvatures in microscopies, named as *Quantum Ontology*.

Consistently landing on classical and extending to modern physics, this manuscript uncovers a series of the philosophical and mathematical groundbreakings accessible and concluded by the countless artifacts of modern physics.

19. Evolution of Horizon Fields

When an event gives rise to the states crossing each of the horizon points, an *evolution* 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 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 the nature, its counterpart is another process named as 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 the *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 the reactions to produce and couple the weak electromagnetic and strong gravitational forces symmetrically in massive dynamics between the second and third horizons.

At the second horizon of the event evolution processes, the gauge fields yield the holomorphic superphase operation, continue to give rise to the next horizons, and develop a complex event operation (5.2) in term of an infinite sum of operations:

$$\check{\partial} = \dot{x}_\nu \zeta_\nu D_\nu = \dot{x}_\nu \zeta_\nu \partial_\nu + i\,\dot{x}_\nu \zeta_\nu \left(\Theta_\nu + \tilde{\kappa}_2^- \dot{\Theta}_{\mu\nu} + \cdots\right) \tag{19.1a}$$

$$\Theta_\nu = \frac{\partial \vartheta(\lambda)}{\partial x_\nu}, \qquad \dot{\Theta}_{\nu\mu} = \frac{\partial A_\mu}{\partial x_\nu} - \frac{\partial A_\nu}{\partial x_\mu} = F_{\nu\mu}^{-n}, \qquad \tilde{\kappa}_2^- = 1/2 \tag{19.1b}$$

$$\hat{\partial} = \dot{x}^\nu \dot{\zeta}^\nu D^\nu = \dot{x}^\nu \zeta^\nu \partial^\nu - i\,\dot{x}^\nu \zeta^\nu \left(\Theta^\nu + \tilde{\kappa}_2^+ \dot{\Theta}^{\nu\mu} + \cdots\right) \tag{19.2a}$$

$$\Theta^\nu = \frac{\partial \vartheta(\lambda)}{\partial \lambda}, \qquad \dot{\Theta}^{\nu\mu} = \frac{\partial A^\mu}{\partial x^\nu} - \frac{\partial A^\nu}{\partial x^\mu} = F_{\nu\mu}^{+n}, \qquad \tilde{\kappa}_2^+ = (\tilde{\kappa}_2^-)^* \tag{19.2b}$$

where $\dot{\Theta}$ is mapped to $F_{\nu\mu}^{\pm n}$. Therefore, the third horizon fields are emerged and unfold into the following expression:

$$\check{\partial} = \dot{x}_\nu \zeta_\nu D_\nu = \dot{x}_\nu \zeta_\nu \partial_\nu + i\,\dot{x}_\nu \zeta_\nu \left(\frac{e}{\hbar} A_\nu + \tilde{\kappa}_2^- F_{\nu\mu}^{+n} + \cdots\right) \tag{19.3a}$$

$$\hat{\partial} = \dot{x}^\nu \dot{\zeta}^\nu D^\nu = \dot{x}^\nu \zeta^\nu \partial^\nu - i\,\dot{x}^\nu \zeta^\nu \left(\frac{e}{\hbar} A^\nu + \tilde{\kappa}_2^+ F_{\nu\mu}^{-n} + \cdots\right) \tag{19.3b}$$

where e is a coupling constant of the bispinor fields. Naturally, defined as the event operation or similar to the classical *Spontaneous Breaking*, it is the evolutional and symmetric processes of the natural *Creation* and its complement duality known as *Annihilation*.

As the virtual superphase events on both of the $Y^- Y^+$ reactions $\psi^\pm$, their density evolves the circular process, simultaneously:

$$\begin{aligned} \rho_s + \dot{\lambda} \rho_s &= \left[\psi^+(\hat{x}, \lambda) + \hat{\partial}\psi^+(\hat{x}, \lambda)\right]\left[\psi^-(\check{x}, \lambda) + \check{\partial}\psi^-(\check{x}, \lambda)\right] \\ &= \psi^+\psi^- + \left(\psi^+\check{\partial}\psi^- + \psi^-\hat{\partial}\psi^+\right) + \left(\hat{\partial}\psi^+\right) \wedge \left(\check{\partial}\psi^-\right) \end{aligned} \tag{19.4a}$$

$$\tilde{J}_s = \frac{\hbar}{2m\,i}\left(\psi^+\check{\partial}\psi^- + \psi^-\hat{\partial}\psi^+\right) = \left\{i\,c\tilde{\rho}, \tilde{\mathbf{J}}\right\} \tag{19.4b}$$

The first term $\psi^+\psi^-$ is the ground density, and the second term is the probability current or flux J_s. 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:

$$\left(\hat{\partial}\psi_j^+\right) \wedge \left(\check{\partial}\psi_k^-\right) = \left(\dot{x}^\mu \zeta^\mu D^\lambda \psi_j^+\right) \wedge \left(\dot{x}_\nu \zeta_\mu D_\lambda \psi_k^-\right) =$$
$$\dot{x}^\mu \zeta^\mu \left(\partial^\mu - i\frac{e}{\hbar}A^\mu - \tilde{\kappa}_2^+ F_{\mu\nu}^{+n}\right)\psi_j^+ \wedge \dot{x}_\nu \zeta_\nu \left(\partial_\nu + i\frac{e}{\hbar}A_\nu + \tilde{\kappa}_2^- F_{\nu\mu}^{-n}\right)\psi_k^- \quad (19.5)$$

The symbol $j, k \in \{a, b, c\}$ indicates a loop chain of three particles. The equation is defined as *Evolutional Equation*.

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 steaming entanglement with the three action states, illustrated in Figure 21a, introduced in June 6th of 2018.

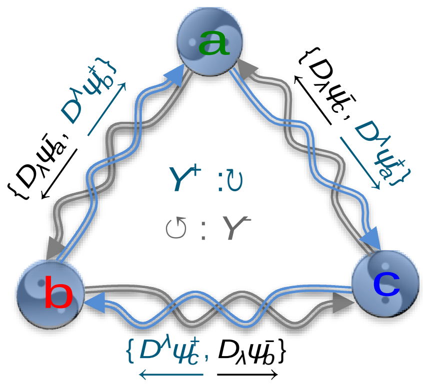

Figure 21a: Two Implicit Loops of Triple Explicit Entanglements

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

$$\circlearrowleft: \ (D_\lambda\psi_a^- \to D_\lambda\psi_b^- \to D_\lambda\psi_c^-)^{\urcorner} \quad : \text{Right-hand Loop} \quad (19.6)$$
$$\circlearrowright: \ {}^{\ulcorner}(D^\lambda\psi_b^+ \leftarrow D^\lambda\psi_c^+ \leftarrow D^\lambda\psi_a^+) \quad : \text{Left-hand Loop} \quad (19.7)$$
$$\{D_\lambda\psi_a^-, D^\lambda\psi_b^+\}, \{D_\lambda\psi_b^-, D^\lambda\psi_c^+\}, \{D_\lambda\psi_c^-, D^\lambda\psi_a^+\} \quad : \text{Triple States} \quad (19.8)$$

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

This can 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 (9.1-9.5) equations, and substituting them into the *Lagrangians* (3.29), respectively, one comes out the quantum fields that extends a pair of the first order *Dirac* equations of (9.9) into the second orders in forms of *Lagrangians* respectively:

$$\tilde{\mathscr{L}}_s^\pm = -\frac{1}{c^2}\left[\hat{\partial}^\lambda\hat{\partial}^\lambda, \check{\partial}_\lambda\check{\partial}_\lambda\right]_s^\pm \quad (19.9)$$
$$\tilde{\mathscr{L}}_s^+ = \overline{\psi}_n^-\left(i\frac{\hbar}{c}\zeta^\mu D^\mu + m\right)\psi_n^+ - \frac{1}{c^2}\overline{\psi}_n^-\zeta^\mu\check{\partial}_\lambda\hat{\partial}_\lambda\psi_n^+ \quad (19.9a)$$

$$\tilde{\mathscr{L}}_s^- = \overline{\psi}_n^+ \left(i \frac{\hbar}{c} \zeta_\nu D_\nu - m \right) \psi_n^- - \frac{1}{c^2} \overline{\psi}_n^+ \zeta_\nu \hat{\partial}_\lambda \check{\partial}^\lambda \psi_n^- \qquad (19.9b)$$

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 (19.5) with the mapping $\hat{\partial}_\lambda \check{\partial}^\lambda \mapsto (\dot{x}^\mu \zeta^\mu D^\lambda \hat{\psi})(\dot{x}^\nu \zeta^\nu D_\lambda \check{\psi})$. Applying the transform conversion (8.6), we generalize the above equations for a group of the triplet quarks in forms of a set of the classic *Lagrangians*:

$$\tilde{\mathscr{L}}_h^a = \tilde{\mathscr{L}}_s^+ + 2\tilde{\mathscr{L}}_s^- = \mathscr{L}_D^{-a} + \left(\overline{\psi}_c^- \frac{\dot{x}_\nu}{c} \zeta^\nu D^\lambda \psi_a^+ \right) \wedge \left(\overline{\psi}_b^+ \frac{\dot{x}^\mu}{c} \zeta_\mu D_\lambda \psi_a^- \right) \qquad (19.10)$$

$$\tilde{\mathscr{L}}_h^a \equiv \mathscr{L}_D + \mathscr{L}_\psi + \mathscr{L}_W + \mathscr{L}_F + \mathscr{L}_M \qquad : \psi_k^+ \psi_j^- \to 1 \qquad (19.11)$$

$$\mathscr{L}_D \equiv \overline{\psi}_k^\pm i \frac{\hbar}{c} \zeta^\mu D_\nu \psi_j^\mp \mp m_j \quad : j, k \in \{a, b, c\} \qquad (19.12)$$

$$\mathscr{L}_\psi = -\frac{1}{c^2} \left(\overline{\psi}_c^- \dot{x}_\nu \zeta^\mu \partial^\mu \psi_a^+ \right) \left(\overline{\psi}_b^- \dot{x}^\mu \zeta_\nu \partial_\nu \psi_a^- \right) \qquad : \dot{x}^\nu \dot{x}^\mu = c^2 \qquad (19.13)$$

$$\mathscr{L}_C = \frac{e}{2\hbar} \left\langle \zeta_\nu A_\nu \zeta^\mu F_{\mu\nu}^{+n}, \zeta^\mu A^\mu \zeta_\nu F_{\nu\mu}^{-n} \right\rangle_{jk}^- \qquad : \tilde{\kappa}_2^+ = \tilde{\kappa}_2^- = \frac{1}{2} \qquad (19.14)$$

$$\mathscr{L}_F = i \frac{e}{\hbar} \left[\zeta^\nu \partial^\nu (\zeta_\mu A_\mu), \zeta_\mu \partial_\mu (\zeta^\nu A^\nu) \right]_{jk}^- - \frac{e^2}{\hbar^2} \left(\zeta^\mu A^\mu \zeta_\nu A_\nu \right)_{jk} \qquad (19.15)$$

$$\mathscr{L}_M = \frac{i}{2} \left[\zeta^\nu \partial^\nu (\zeta_\nu F_{\nu\mu}^{-n}), \zeta_\mu \partial_\mu (\zeta^\mu F_{\mu\nu}^{+n}) \right]_{jk}^- - \frac{1}{4} \left(\zeta^\nu F_{\nu\mu}^{+n} \right)_j \left(\zeta_\mu F_{\mu\nu}^{-n} \right)_k \qquad (19.16)$$

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 bounding 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" [82], uncoiling the event actions [83], and representing an essential basis of the "global gauge." The *Standard Model*, developed in the mid-1960-70s [84] 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 *Evolutional Infrastructures* might promote a way towards concisely exploring physical nature, universal messages, and beyond.

82 H.D. Politzer (1973) "Reliable perturbative results for strong interactions". Physical Review Letters, 30 (26): 1346–1349

83 Yang, C. N.; Mills, R. (1954) "Conservation of Isotopic Spin and Isotopic Gauge Invariance". Physical Review. 96 (1): 191–195

84 Augustin, J.; et al. (1974) "Discovery of a Narrow Resonance in e+e− Annihilation", Physical Review Letters, 33 (23): 1406–1408

Artifact 19.1: Yang-Mills Theory

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^+ steaming of (19.15, 19.16):

$$\mathscr{L}_F(\gamma) \approx -\frac{e^2}{\hbar^2}\left(\gamma^{\mu} A^{\mu} \gamma_{\nu} A_{\nu}\right)_{jk} \equiv -\frac{1}{4} W_{\mu\nu}^{+j} W_{\nu\mu}^{-k} \tag{19.17}$$
$$\mathscr{L}_M(\gamma) \approx -\frac{1}{4}\left(\gamma^{\nu} F_{\nu\mu}^{+n} \gamma_{\mu} F_{\mu\nu}^{-n}\right)_{jk} = -\frac{1}{4} F_{\nu\mu}^{+j} F_{\mu\nu}^{-k} \tag{19.18}$$

At the second horizon, the $\zeta^{\mu} \to \gamma^{\mu}$ is contributed to the weak isospin fields $W_{\mu\nu}^{+j} W_{\nu\mu}^{-k}$ of coupling actions. Meanwhile, at the third horizon, the gamma γ^{μ} fields are converted and accord to the hypercharge $F_{\nu\mu}^{+j} F_{\mu\nu}^{-k}$ 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 *Quantum Electrodynamics* (*QED)* that extends a pair of the first order *Dirac* equation (9.7) into the second orders in form of a *SU*(2) + *SU*(3) *Lagrangian* [85]:

$$\mathscr{L}_Y^a \equiv \left(\bar{\psi}_j^{\mp} i \frac{\hbar}{c} \gamma^{\nu} D_{\nu} \psi_i^{\pm}\right)_{jk} - \frac{1}{4} F_{\nu\mu}^{+j} F_{\mu\nu}^{-k} - \frac{1}{4} W_{\mu\nu}^{+j} W_{\nu\mu}^{-k} \tag{19.19}$$

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 [86]. As one of the most important results, *Yang–Mills* theory with *Gauge Invariance* represents

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 the (9.27, 9.28) equations.

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.

Artifact 19.2: Gauge Invariance

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 evolutional event operations, The horizon force is symmetrically conducted or acted by an ontological process as a part of the evolutional actions that give rise to the next horizon *SU(3*). Under a pair of the event operations, an evolutional 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

85 Dirac, P.A.M. (1927) "The Quantum Theory of the Emission and Absorption of Radiation". Proceedings of the Royal Society of London A. 114 (767): 243–65

86 Yu Shi (2017) "Beauty and Physics: 13 Important Contributions of Chen Ning Yang". arXiv:1702.01901

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:

$$\mathscr{L}_F(\gamma) = i\frac{e}{\hbar}\left[\gamma_\mu\partial_\mu(\gamma^\nu A_a^\nu), \gamma^\nu\partial^\nu(\gamma_\mu A_\mu^a)\right]^- - \frac{e^2}{\hbar^2}\left(\gamma_\mu A_\mu^b \gamma^\nu A_c^\nu\right) \quad (19.20)$$

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

$$\mathscr{L}_F(\gamma) \mapsto F_{\nu\mu}^a = \partial_\nu A_\mu^a - \partial_\mu A_\nu^a + g_\gamma f_\gamma^{abc} A_\nu^b A_\mu^c \quad (19.21)$$

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 [87] 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

$$\partial^\mu(\zeta^\mu F_{\mu\nu}^a) + g f^{abc}\zeta^\mu A_\mu^b \zeta_\nu F_{\mu\nu}^c = -J_\nu^a \quad (19.22)$$

where J_ν^a is the potential current. Besides, it holds an invariant principle of the double-loop implicit entanglements, or known as a *Bianchi or Jacobi* identity [88,89]:

$$(D_\mu F_{\nu\kappa})^a + (D_\kappa F_{\mu\nu})^b + (D_\nu F_{\kappa\mu})^c = 0 \quad (19.23)$$

$$[D_\mu, [D_\nu, D_\kappa]] + [D_\kappa, [D_\mu, D_\nu]] + [D_\nu, [D_\kappa, D_\mu]] = 0 \quad (19.24)$$

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.

Artifact 19.3: Quantum Chromodynamics (QCD)

Given the rise of the horizon from the scalar potentials to the vector's 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 (19.12) $\mathscr{L}_D$ and (19.15) for $G_{\nu\mu}^a \equiv \mathscr{L}_F(\chi)$ as the following:

87 Augustin, J.; et al. (1974) "Discovery of a Narrow Resonance in e+e− Annihilation", Physical Review Letters, 33 (23): 1406–1408

88 Shoshichi Kobayashi and Katsumi Nomizu (1963) "Foundations of Differential Geometry", Vol. I, Chapter 2.5: Curvature form and structure equation, p. 75, Wiley Interscience

89 Bourbaki, N. (1989). Lie Groups and Lie Algebras: Chapters 1-3. Berlin·Heidelberg·New York: Springer. ISBN 978-3-540-64242-8

$$\mathscr{L}_{QCD}(\chi) = \bar{\psi}_n^-\left(i\frac{\hbar}{c}\gamma_\nu D_\nu - m\right)\psi_n^+ - \frac{1}{4}G_{\nu\mu}^n G_{\nu\mu}^n + \mathscr{L}_{CP}(\chi) \qquad (19.25)$$

$$G_{\nu\mu}^a = i\frac{e}{\hbar}\left[\chi_\mu\partial_\mu(\chi^\nu A_a^\nu), \chi^\nu\partial^\nu(\chi_\mu A_\mu^a)\right]^- - \frac{e^2}{\hbar^2}\left(\chi_\mu A_\mu^b \chi^\nu A_c^\nu\right) \qquad (19.26)$$

where $\mathscr{L}_{CP}(\chi)$ is the strong coupling. Coincidentally, this is similar to the quark coupling theory, the *Standard Model* [90], known as classical *QCD*, discovered in 1973 [91]. Philosophically, the torque chi-matrix of gravitational fields 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* equation under the spiral torque of chi-matrix:

$$\mathscr{L}_{CP}(\chi) = i\frac{\hbar}{c}\left(\bar{\psi}_n^+\chi_\nu D_\nu\psi_n^-\right)_{jk} \mapsto -\frac{e}{c}\left(\bar{\psi}_n^+\chi_\nu A_\nu\psi_n^-\right)_{jk} \qquad (19.27)$$

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*

$$\mathscr{L}_{CP} = ig_s\left(\bar{\psi}_n^+\gamma^\mu G_\mu^a T^a\psi_n^-\right)_{jk} \qquad : \chi_\nu A_\nu^a \mapsto \gamma^\mu G_\mu^a T^a \qquad (19.28)$$

where 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 [92], introduced in 1962, as generators of the *SU*(2) color group.

Artifact 19.4: Time-Independent Horizon Infrastructure

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

$$\tilde{\mathscr{L}}_h^a = \tilde{\mathscr{L}}_s^+ + 2\tilde{\mathscr{L}}_s^- = \mathscr{L}_D^{-a} + \overline{\psi}\left(\hat{\partial}\wedge\check{\partial}\right)\psi \qquad : \nu,\mu \in \{1,2,3\} \qquad (19.29)$$

$$\hat{\partial}\wedge\check{\partial} = \dot{x}^\mu\dot{x}_\nu\left(\hat{D}\cdot\check{D} + i\zeta^\mu\cdot\hat{D}\times\check{D}\right) \qquad : \tilde{\zeta}^\nu \mapsto \zeta^\nu = \gamma^\nu + \chi^\nu \qquad (19.30)$$

$$\hat{D}\cdot\check{D} = \left(\partial^\mu - i\frac{e}{\hbar}A^\mu - \frac{1}{2}F_{\mu\nu}^{+n}\cdots\right)\cdot\left(\partial_\nu + i\frac{e}{\hbar}A_\nu + \frac{1}{2}F_{\nu\mu}^{-n}\cdots\right) \qquad (19.31)$$

$$\hat{D}\times\check{D} = \left(\partial^\mu - i\frac{e}{\hbar}A^\mu - \frac{1}{2}F_{\mu\nu}^{+n}\cdots\right)\times\left(\partial_\nu + i\frac{e}{\hbar}A_\nu + \frac{1}{2}F_{\nu\mu}^{-n}\cdots\right) \qquad (19.32)$$

Introduced at August 26th of 2018, this concludes a unification of the spacial 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 21a.

90 S.L. Glashow (1961) "Partial-symmetries of weak interactions" Nuclear Physics. 22 (4): 579–588

91 D.J. Gross; F. Wilczek (1973) "Ultraviolet behavior of non-abelian gauge theories". Physical Review Letters, 30 (26): 1343–1346. Bibcode:1973PhRvL..30.1343G. doi:10.1103/PhysRevLett.30.1343

92 Gell-Mann, M. (1962) "Symmetries of baryons and mesons" Physical Review 125 (3) 1067

20. Forces of Field Breaking

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 the ***Law of Field Evolutions*** concealing the characteristics of *Horizon Evolutions*:

1. 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 appears as dark or virtual, streaming its natural intrinsic commutations for their living operations, and alternates the $Y^{-}Y^{+}$ supremacies throughout entanglement, consistently.
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 spontaneously breaking.
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 orchestrates the higher horizon, composites the interactive forces, redefines the simple symmetry group U(1)×SU(2) ×SU(3), and obeys the entangling invariance, known as Gauge Theory.
6. An integrity of strong nuclear forces is characterizable at the third horizon of the tangent vector interactions or known as gauge SU(3).
7. Entanglement of the alternating Y^{-} Y^{+} superphase processes in the above actions can prevail as a chain of the 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:

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 [93], for example, predicts that, at lower energies, there emerges the photon and the massive *W* and *Z* bosons [94]. Apparently, fermions develop from the energy to mass consistently as the *creation* of the evolution process that emerges massive bosons and follows up the animation or companion of electrons or positrons in the *SU*(3) horizon.

93 Weinberg, S (1967) "A Model of Leptons" (PDF). Phys. Rev. Lett. 19: 1264–66. Bibcode: 1967PhRvL19.1264W, doi:10.1103/PhysRevLett.19.1264

94 Augustin, J.; et al. (1974) "Discovery of a Narrow Resonance in e+e− Annihilation", Physical Review Letters, 33 (23): 1406–1408

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 has inherently such a high strength that 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 evolution* 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 the *Lagrangians* (19.10-19.16) 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 (9.1-9.5) embed the ground foundations and emerge the evolutional 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*.

Artifact 20.1: Field Breaking of Mass Acquisition

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 exposure its extra-degree of freedom in the ambient space. In a similar fashion, the annihilation operates a concealment for a enclaved energy back to the oscillator system of the world planes. For a force interruption, the massive dynamics becomes the inception key components, known as the strong forces. Strong forces are observable at the collapsed states of the diagonal matrix mainly for its physical mass acquisition. For example, a strong interaction between quarks and gluons with symmetry group *SU(3)* makes up composite hadrons such as the proton, neutron and pion.

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 as the strong mass forces in the double streaming of three entangling procedures (Figure 12a), known as a chain of the reactions:

1. At the second horizon $SU(2)$ under the gauge invariance, the gauge symmetry incepts the evolution actions implicitly:

$$D_\nu = \partial_\nu + i\sqrt{\lambda_2/\lambda_0}\phi_c^-, \qquad D^\nu = \partial^\nu - i\sqrt{\lambda_2/\lambda_0}\varphi_a^+ \tag{20.1}$$

2. Extend into the third horizon, the mass acquisition (9.28) is proportional to $m\omega/\hbar$ during the potential breaking, spontaneously:

$$\Phi_n^+ \mapsto \varphi_b^+ - \sqrt{\lambda_0}D^\nu\varphi_c^+/m\ , \ \Phi_n^- \mapsto \phi_a^- + \sqrt{\lambda_0}D_\nu\phi_b^-/m \tag{20.2}$$

Therefore, the *SU*(1) potentials of the (9.45) actions result in a form of *Lagrangian* forces at *SU*(2):

$$\mathscr{L}_{Force}^{SU1} \mapsto \mathscr{L}_{ST}^{SU2} \ \rightarrow \ \Phi_n^+\Phi_n^- \mapsto \lambda_0 D^\nu\varphi_b^+ D_\nu\phi_a^- - m^2\varphi_c^+\phi_b^- \tag{20.3}$$

3. Combining the above evolutional breaking, the interruption force is further emerged into a rotational $SO(3)$ regime:

$$\mathscr{L}_{ST}^{SU3} = \kappa_f\left(\lambda_0(\partial^\nu \varphi_b^+)(\partial_\nu \phi_a^-) - m^2\phi_{bc}^2 + \lambda_2\phi_{bc}^2\phi_{ca}^2\right) \tag{20.4}$$

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 evolutional fields of the breaking density.

4. With the gauge invariance among the particle fields $\phi_n \mapsto (v + \phi_b^+ + i\phi_a^-)/\sqrt{2}$, this strong force can be eventually developed into *Yukawa* interaction, introduced in 1935 [95], and *Higgs* field, theorized in 1964 [96].

Artifact 20.2: 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:

$$\mathscr{L}_{Force}^{SU3} = \mathscr{L}_{QCD}(\chi) + \mathscr{L}_{ST}^{SU3} + \mathscr{L}_C(\chi) + \mathscr{L}_M(\chi) \tag{20.5}$$

$$\mathscr{L}_C(\chi) = \frac{e}{2\hbar}\left\langle \chi_\nu A_\nu \chi^\mu F_{\mu\nu}^+, \chi^\mu A^\mu \chi_\nu F_{\nu\mu}^- \right\rangle_{jk}^- \tag{20.6}$$

$$\mathscr{L}_M(\chi) = \frac{i}{2}\left[\partial^\nu(\chi_\nu F_{\nu\mu}^-), \partial_\mu(\chi^\mu F_{\mu\nu}^+)\right]_{jk}^- - \frac{1}{4}\left(\chi^\nu F_{\nu\mu}^+\right)_j\left(\chi_\mu F_{\mu\nu}^-\right)_k \tag{20.7}$$

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 torquer 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 torquer 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.

Artifact 20.3 Fundamental Forces

Classically, there are roughly four fundamental interactions 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 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 transitioning 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

95 H. Yukawa, Proc. Phys.-Math. Soc. Jap. 17 (1985), 48

96 Higgs, Peter (1964) Broken symmetries and the masses of gauge bosons. Physical Review Letters 13 (16): 508–509

binding forces build up the horizon infrastructure seamlessly.

Artifact 20.4: Big Bang Theory

Based upon our conclusions, the gravitational singularity exists only at the third horizon where the energy embodies its enclave as a mass object, which gains the rotational coordinates. Applicable to prevail the earliest states of physical objects, *Big Bang Theory*, introduced by *Georges Lemaître* in 1927, would have been a cosmological model for the universe, if the ordinary matter in the universe were dominant or created virtual energy. In reality, acceleration of a physical object is simply embarrassed by a common phenomenon or a result of the generation process of light radiations.

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 general relativity of asymmetric dynamic forces is further specified by the chapter below.

21. Quantum Ontology

For entanglement between $Y^- Y^+$ manifolds, considering the parallel transport of a *Scalar* density of the fields $\rho=\psi^+\psi^-$ around an infinitesimal parallelogram. The chain of this reactions can be interpreted by the commutation framework (16.8) integrated with the gauge potential (2.10) for *Physical Ontology*. At the third horizon for asymmetric dynamics, the ontological expressions (16.3, 16.4) have the gauge derivatives:

$$\check{\partial}_\lambda \check{\partial}_\lambda \psi^- = \dot{x}_m \left(D_m - \Gamma_{nm}^{-s}\right) \dot{x}_s D_s \psi^- \qquad : D_\nu = \partial_\nu + i\Theta_\nu \qquad (21.1)$$

$$\hat{\partial}^\lambda \hat{\partial}^\lambda \psi^+ = \dot{x}^\nu \left(D^\nu - \Gamma_{m\nu}^{+\sigma}\right) \dot{x}^\sigma D^\sigma \psi^+ \qquad : D^\nu = \partial^\nu - i\Theta^\nu \qquad (21.2)$$

where the Y^- and Y^+ superphase fields are defined by:

$$\Theta^\nu = \frac{e}{\hbar} A^\nu, \qquad \Theta_\nu = \frac{e}{\hbar} A_\nu \qquad (21.3)$$

Similar to derive the equation (16.10), this gauge entanglement consists of a set of the unique fields, illustrated by the evolutional components of the entangling commutators:

$$\left[\hat{\partial}^\lambda \hat{\partial}^\lambda, \check{\partial}_\lambda \check{\partial}_\lambda\right]_\nu^+ = \dot{x}^\nu \dot{x}^m \left(P_{\nu\mu}^+ + G_{m\nu}^{+\sigma s} + \Theta_{\nu m}^{+\sigma s}\right) \qquad (21.4)$$

$$P_{\nu\mu}^+ \equiv \frac{1}{\dot{x}^\nu \dot{x}^m} \left[(\dot{x}^\nu \partial^\nu)(\dot{x}^m \partial^m), (\dot{x}_\nu \partial_\nu)(\dot{x}_m \partial_m)\right]_s^+ = \frac{R}{2} g^{\nu m} \qquad (21.5)$$

$$G_{m\nu}^{\pm\sigma s} = \mp \frac{1}{\dot{x}^\nu \dot{x}^m} \left[\dot{x}^\nu \Gamma_{m\nu}^{+\sigma} \dot{x}^\sigma \partial^\sigma, \dot{x}_m \Gamma_{nm}^{-s} \dot{x}_s \partial_s\right]_s^\pm \qquad (21.6)$$

$$\Theta_{\nu m}^{+\sigma s} = i\,\Xi_{\nu m}^+ + i\frac{e}{\hbar} F_{\nu m}^+ - i\eth_{m\nu}^{+s\sigma} - Ⓢ_{\nu m}^+ \qquad (21.7)$$

$$\Xi_{\nu m}^\pm = \mp \frac{1}{\dot{x}^\nu \dot{x}^m} \left[\dot{x}^\nu \Theta^\nu \dot{x}^m \partial^m, \dot{x}_m \Theta_m \dot{x}_\nu \partial_\nu\right]_s^\pm \qquad (21.8)$$

$$F_{\nu m}^\pm = \pm \frac{\hbar}{e} \frac{1}{\dot{x}^\nu \dot{x}^m} \left[\dot{x}^\nu \partial^\nu (\dot{x}^m \Theta^m), \dot{x}_m \partial_m (\dot{x}_\nu \Theta_\nu)\right]_s^\pm \qquad (21.9)$$

$$\eth_{m\nu}^{\pm s\sigma} = \pm \frac{1}{\dot{x}^\nu \dot{x}^m} \left[\dot{x}^m \Gamma_{\nu m}^{+\sigma} \dot{x}^\sigma \Theta^\sigma, \dot{x}_m \Gamma_{m\nu}^{-s} \dot{x}_s \Theta_s\right]_s^\pm \qquad (21.10)$$

$$Ⓢ_{\nu m}^\pm = \pm \frac{1}{\dot{x}^\nu \dot{x}^m} \left[\dot{x}^\nu \Theta^\nu \dot{x}^m \Theta^m, \dot{x}_m \Theta_m \dot{x}_\nu \Theta_\nu\right]_s^\pm \qquad (21.11)$$

The *Ricci* curvature $P_{\nu\mu}^\pm$ are defined on a pseudo-*Riemannian* manifold as the trace of the *Riemann* curvature tensors. The $G_{m\nu}^{\pm s\sigma}$ tensors are the *Connection Torsions*, the rotational stress of the transportations. The $\Xi_{\nu m}^\pm$ are the *Superpose Torsions*, the superphase stress of the transportations. the $F_{\nu\mu}^\pm$ are the skew-symmetric or antisymmetric fields, the quantum potentials of the superphase energy. The $\eth_{m\nu}^{\pm s\sigma}$ are the superphase contorsion, the superposed commutation of entanglements. The $Ⓢ_{\nu m}^\pm$ are *Entangling Connectors*, the commutation of the superphase energy. Apparently, the Θ^ν and Θ_m as actors lie at the heart of the ontological framework for the life entanglements.

Artifact 21.1: Ontological Relativity

Similar to derive the equation (17.5) and (17.6), the above motion dynamics of the field evolutions can be expressed straightforwardly for the asymmetric dynamics of quantum ontology,

$$\frac{R}{2} g_{\nu m} + G_{\nu m}^{-\sigma s} + \Theta_{\nu m}^{-\sigma s} + \mathcal{O}_{m\nu}^{+\zeta} = 0 \quad (21.13)$$

$$\frac{R}{2} g^{\nu m} + G_{\nu m}^{+\sigma s} + \Theta_{\nu m}^{+\sigma s} + \mathcal{O}_{m\nu}^{-\zeta} = 0 \quad (21.14)$$

The notion of quantum evolution equations is intimately tied in with another aspect of general relativistic 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 covariance combined with the gauge fixing, this *Ontological Relativity* is sufficient by itself to determine the time evolution of the metric tensor and of the universe over time. This is done in "1+1+2" formulations, where the world plane of one time-dimension and one spacial-dimension is split into the extra space dimensions at horizon evolutions. The best-known example is the classic ADM formalism [97], the decompositions of which show that the spacetime evolution equations of general relativity are well-behaved: solutions always exist, and are uniquely defined, once suitable initial conditions have been specified.

Artifact 21.2: Quantum Field Curvature

Since the ordinary quantum fields forms the basis of elementary particle physics, the *Ontological Relativity* is an excellent artifact describing the behaviors of microscopic particles in weak gravitational fields like those found on Earth [98]. Quantum fields in curved spacetime demonstrates its evolutional processes beyond mass acquisition in quantization itself, and general relativity in a curved background spacetime strongly influenced by the superphase modulations $\Theta_{\nu m}^{\pm\sigma s}$. Integrated with the above formalism, the equation (14.6) illustrates that, besides of the dynamic curvatures, the blackhole quantum fields emit a blackbody spectrum of particles known as *Bekenstein-Hawking* radiation (14.9) leading to the possibility not only that they evaporate over time, but also that it quantities a graviton. As briefly mentioned above, this radiation plays an important role for the thermodynamics of blackholes [99].

Artifact 21.3: Quantum Gravity

As a full theory to cover the quantum gravity, it represents an adequate description of the interior of blackholes, and of the very early physical world, a theory in which gravity and the associated geometry of spacetime are described in the language of quantum physics. Besides the appearance of singularities where curvature scales become microscopic ontology, it, apparently, might suppress numerous attempts to overcome the difficulties at the classic theory of quantum gravity, some

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98 Auyang, Sunny Y. (1995), How is Quantum Field Theory Possible?, Oxford University Press, ISBN 0-19-509345-3
99 Wald, Robert M. (2001), "The Thermodynamics of Black Holes", Living Reviews in Relativity, 4, arXiv:gr-qc/9912119

examples being string theory [100] and M-theory with unusual nine or ten space-dimensions, the lattice theory of gravity based on the *Feynman Path* Integral approach and *Regge Calculus* [101], dynamical triangulations [102], causal sets [103] twistor models [104] or the path integral based models of quantum cosmology [105].

100 Polchinski, Joseph (1998a), String Theory Vol. I: An Introduction to the Bosonic String, Cambridge University Press, ISBN 0-521-63303-6. Polchinski, Joseph (1998b), String Theory Vol. II: Superstring Theory and Beyond, Cambridge University Press, ISBN 0-521-63304-4

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Conclusion

Further in answering to modern and contemporary physics, this universal and unified theory demonstrates its holistic foundations extendable and applicable to the well-known natural intrinsics of the evolutional processes at the following remarks:

1. As the foundation of particle physics, the process of ***Double Loops of Triple Entanglements*** is introduced that constitutes the horizon forces of *Implicit Evolution* and *Explicit Reproduction* with *Gauge Invariance*.
2. It reveals the laws of the symmetric processes of virtual creations and physical reproductions that give rise to a synergy of the weak, strong and medium forces crossing the horizon regimes, systematically, simultaneously and symmetrically.
3. The theory is further illustrated by the artifacts of *Yang-Mills* actions, *Quantum Chromodynamics* and the weak and strong forces of *Standard Model*.
4. ***General infrastructure of Field Evolutions*** is derived and unified by a set of generic field equations in forms of *Lagrangians* (19.10-19.16) rising from the quantum fields (9.1-9.5).
5. Finally, *Quantum Ontology* integrates general relativity, quantum curvature, and gravitational fields seamlessly together.

Conclusively, this manuscript represents the *Universal and Unified Physics* as a holistic theory to include, but not be limited to, the topological infrastructure, horizon framework, superphase operations, loop evolutions, quantum ontology, cosmological dynamics, and beyond.

Universal and Unified Physics

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October 2nd, 2018

Sciences in Dialectical Nature of Virtual and Physical Duality