Principles of 《Universal and Unified Physics》

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Abstract: The *Principles* are human wisdoms of our ultimate philosophy, scientific theories and empirical knowledge that give birth to *Universal and Unified Physics* [1]. Since inauguration, it is now strikingly breaking forth systematically from the philosophy of natural laws to the unification of the entire traditional, classic and contemporary physics. This manuscript represents the triple essences of:

- ✓ Laws of nature as *Philosophy of Nature*,
- ✓ Framework of nature as *Infrastructure of Universe*,
- ✓ Hierarchy of horizon structures as *Topology of Physics*.

By exploring the profound thoughts behind the workings of the theory, we simplify complexity of the mathematics from philosophical foundations to promote scientific theories for empiricism:

1. Chapter I: Abstracts principles of *Philosophy of Nature* for the methodology in search of the truth, laws of nature, topology of universe, and hierarchy of worlds.
2. Chapter II: Reveals secrets of how the *Infrastructure of Universe* is developed with the mathematical framework, event evolutions and *YinYang* processes to carry out *Universal Field Equations* and give rise to the foundations of physical *Horizons*.
3. Chapter III: Testifies why the theory can unify our modern physics, conclude numerous groundbreakings, and declare it as *Universal and Unified Physics*.

Therefore, readers will not only grasp the new concepts and techniques, but also gain their confidences in development of our future sciences concisely and effectively.

Keywords: Philosophy of science; Quantum mechanics, field theories, and special relativity; General relativity and gravitation; Statistical physics, thermodynamics, and nonlinear dynamical systems; General theory of fields and particles; Unified field theories and models

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1 Xu, Wei; "Universal and Unified Physics", http://vixra.org/abs/1810.0016 (2018)

To Those in Search of The Truth

To Generations of Civilization

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Introduction

《 Universal and Unified Physics》 is a theory of philosophy, natural operations, and universal laws that produces nature science on the development of, but not limited to, empirical, physical, cosmological, and ontological practice. In other words, *it* is the knowledge of nature that unifies the three branches of the epistemology: theorizing philosophical axioms from the principles of nature, composing scientific framework to infrastructure of topology, and integrating sensory experience as empirical verification.

Since its inauguration of 2016, the *Principles* harvest a variety of the scientific knowledge and theories systematically on cosmology and ontology, concisely revealing secrets of cosmology, ontology, quantum physics, metaphysics and beyond. However, because the fundamental concepts are emerged beyond a level of the contemporary physics, it becomes urgent and yet critical to understand clearly the whole picture of workings of our natural laws, basic terminologies and mathematical structures.

Today, from a scientific perspective, it is pushed to its limits, unable to account for the essences that lay beyond the reach of experimentation, cut off from the intrinsic nature of matter and life in the universe, and struggling with the excessive hype of hypothetical sciences. At a philosophical perspective, scientists are seeking the divine inspiration for the original revelation of supernatural essence. Because we were born with discrepancy of the traditional philosophy and physics, it might have confused and disguised us to search for the truth. In fact, this is the first challenge one has to promote oneself before perceiving or prevailing further for discoveries of our nature.

In this manuscript, we present how the *Principles* accumulate our wisdom over five thousand years and are breaking forth systematically at the following essentials.

4. Chapter I: Abstracts principles of *Philosophy of Nature* for the methodology in search of the truth, laws of nature, topology of universe, and hierarchy of worlds.
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6. Chapter III: Testifies why this theory can unify our modern physics, conclude numerous groundbreakings, and declare as *Universal and Unified Physics*.

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I. Philosophy of Nature

The *Philosophy of Nature* lies at the heart of a few of the basic laws of universal foundations, essential to those in query of the truth. In order to grasp the forthcoming sciences and to comprehend it properly, the core terminologies are presented from the conceptualization to visualize our definitions of the philosophical laws towards mathematical frameworks. They are strikingly different from neither traditional nor modern perspectives seeded in our contemporary physics and other sciences.

From Bohr's declaration "everything we call real is made of things that cannot be regarded as real"[2] to Feynman's claim for the "existence of the rest of the universe" [3], the search for a new philosophical science to overcome physical limitation is today's key mission to the unresolved problems of contemporary physics.

1. Methodology

Modern physics is a positive science characterized by the scientific method as an empirical method of knowledge acquisition since at least the seventeenth century. It involves careful observation, formulating hypotheses, experimental testing of deductions drawn from and refinement of the hypotheses. The methodology, establishes a solid, practical foundation of theory and technique for the exploration and explanation of physical reality, existence, knowledge, and measurements to support the continuous advance of human civilization. As a result, however, hypotheses become a primary vehicle that presupposes a philosophy.

While consistent with common human experience, the divine inspiration pursues a mythological formulation of the hypothetical sciences that explores our inner world based on the ancient compendium of over five millennia of inquiry as a part of metaphysics. Because the process of the enlightenment method is relied on divine inspiration, explanatory principles are in doctrines as reasoning causes and occult essences, without testable hypotheses, empirical evidence, quantitative experiments and controlled mathematics. As a result, it became mired in superstitions and was outstripped by the newborn experimental culture of the scientific methodology.

There are clearly differences between modern physics and classical metaphysics. Although it seems obvious at the use of mathematics, the constitutive cause might actually be hidden at or implies to the way of knowledge acquisition: *research thoughts by brain* or *mind inspirations by heart,* or *both*.

2 Barad, K.; Meeting the Universe Halfway, Duke University Press Books p254 (2007)
3 Feynman, R. P.; Statistical Mechanics. Benjamin/Cummings: Reading, Massachusetts (1972)

Fortunately, unification of the two methodologies is now illuminating the dialectic duality of physics and metaphysics, in quest of *Philosophy of Nature* to precede our current scientific researches. The methodology of searching for truth must dawn on natural philosophy driving and refining scientific theories to empirical verifications.

$$Philosophy \Rightarrow Theory \Longleftrightarrow Observation\ and\ Experiment \qquad (2.a)$$

Specifically, it is vital that one should not construe philosophy from scientific theories based on the empirical observation and experiment. Therefore, we outline the fundamental terminologies of our universe philosophically as the preliminary laws of our nature. Throughout the manuscripts, we abstract each context of the laws philosophically, define their terminologies revelationally, derive the scientific theories mathematically, and testify the "artifacts" empirically.

As always, it might be a common question to most of the readers: where the terminologies of natural philosophy come from, and how much accuracy it represents us to the reality. In fact, the answers to these questions are straightforward: the enlightenments and wisdoms are rooted in the philosophy of five millennia past, when our ancestors built a profound metaphysics and our scientists develop the sophisticated physics. Our traditional and extraordinary intelligences, inherited and advanced from generation to generations, are being naturally integrated, philosophically abstracted, intellectually refined and mathematically applied to our current and future sciences.

Among the series, 《Universal and Unified Physics》 is closest to the next level that our scientists might be capable to comprehend comfortably. Aligning to the formula (2.a) above and illustrating numerous artifacts in promoting our contemporary physics, an integrity of the ultimate philosophy, concise theories and inevitable knowledge is now bringing us to a glorious future.

Rise of the Ancient Philosophy, Back to the Scientific Future.

2. Laws of Nature

In this section, *Philosophy of Nature* constitutes the fundamental terminologies as the laws of virtual existence, matter, states, energy, mass, and especially yinyang constitution.

Matter and States

Matter is defined normally as the set of states, which consists or is composed of any element, object, substance, subject, or situation. Its existence is operated by the event actions that can appear as virtual, or physical, or both. States are mutational and transformable variables of the appearances or characteristics in either virtual or physical, or both. In other words, matter is an existence in the form of states or events in general, virtually and/or physically. The universe is a supernatural environment structured for the totality of existence in the form of states as the formational variables of matter. By grouping the states into virtual or physical, or both, we define the virtual and physical *worlds* as simultaneous or coexistent. In fact, states of a matter are overlaid with transformations across and transportations transverse multiple worlds.

Aristotle famously contends that every physical object is a compound of matter and form. This doctrine has been dubbed "*hylomorphism*", a portmanteau of the Greek words for matter (*hulê*) and form (*eidos or morphê*). In the *Physics*, to account for changes in the natural world, he maintains, there is no generation *ex nihilo* that is "nothing comes from nothing". In this connection, he develops a general hylomorphic framework and extends to work in a variety of contexts. For example, in his *Metaphysics*, form is what unifies some matter into a single object, the compound of the two in his *De Anima*, by treating soul and body as a special case of form and matter and by analyzing perception as the reception of form without matter. [4]

As a part of the supernatural principles in an environment of virtual space, *Chinese* tradition has developed the profound metaphysics and established scientifically the natural laws of *Xing* (性) or *YinYang*（阴阳）duality: the reciprocal interaction of the opposites is to cause all universal phenomena. The yin and yang, or simply - and +, are the states of or the operation on an element or an object, which form a coherent fabric of our nature, as exhibited in all physical existence. This display of duality forms the sense of natural harmony where the opposite is complimented to give dynamism and sense to life. The ever-changing relationship dynamically between *Matter and States* is responsible to operate and conserve the flux of the universe and life in general. Although *YinYang* has its root in *Chinese* philosophy, this conception has its testimony in multiple cultures in *Hindu*, *Egyptian*, *Hebrew*, *Germany* and other traditions.

Consequently, terminologies of *Matter and States* reveal the nature laws correlatively among

4 "Stanford Encyclopedia of Philosophy – Form vs Matter", https://plato.stanford.edu/entries/form-matter

physical and metaphysical disciplines of our mankind, which are continuously playing a vital role in our further development for the triple-unification of philosophy, science and empiricism.

Energy and Mass

Energy is a property of the states associated with the variables in virtual worlds, which are mutable in the transformation between virtual and physical worlds, or between massless and massive substances of a matter. In a physical world, energy appears inexorable, intractable, and transferable among the states. Virtual instances are embedded in or emerge as the formation of energy.

Apparently, energy is characterizable in the virtual world such that, in physical worlds for example, it can only be describable or usable at its properties, which are well established in physics: "energy has i) the quantitative property that must be transferred to an object in order to perform work on, or to heat, the object; and ii) the conserved quantity, the law of conservation of energy states, that can be converted in form, but not created or destroyed" [5]. Another example is the states of mathematical formulation for the energy-mass conversion in the virtual complexes as the following:

$$E_n^{\mp} = \pm imc^2 \qquad : \hbar\omega \rightleftharpoons mc^2 \qquad (2.a)$$

where m is the rest mass. Compliant with a duality of *Topology of Universe*, it redefines and extends *Einstein* mass-energy equivalence, introduced in 1905 [6], into the virtual energy states as one of the essential formulae of the natural philosophy (testified by artifacts in the reference [1]).

Mass is the enclave of energies or virtual objects embodied in a physical world. As the outer world, a physical world has mass enclosure, whereas, as the inner world, a virtual world is commonly massless. Because of the zero mass, it is well known that an interruption is superposing among objects or energies in the virtual word, such as light-wave interference where exists no forces at all. In other words, mass is a source of "forces" for physical interactions only in physical worlds. Based on the evolutional topology of universe, forces cannot be the fundamental formations to give birth to a physical world. The laws of natural philosophy imply no singularity exist during mass inauguration at its initial phase of the acquisition (testified by artifact 9.9 of the reference [1]).

Yin Yang Duality

The principle of *Yin* and *Yang* is the logical operations or substantial states that all things exist as a duality of the inseparable and complimentary opposites, which are neither materials nor energy. Produced from *Wuji (*无极) or nothing, they are complementary, interrelated, interconnected, and interdependent, each opposite giving rises to the other, as they operate in tangible interaction.

For the conceptual simplicity, our natural topology refers the states, events, and operations of

5 Smith, Crosbie (1998). The Science of Energy – a Cultural History of Energy Physics in Victorian Britain. The University of Chicago Press. ISBN 0-226-76420-6

6 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

"physical" functions to the yin supremacy, confined as physical or Y^- manifold, and of "virtual" functions to the yang supremacy, confined as virtual or Y^+ manifold. Because of this yinyang nature, our world always manifests a mirrored pair in the imaginary part, a conjugate pair of a complex manifold. Since a world plane is a global duality of virtual and physical worlds or yin and yang manifolds, various states of both virtual and physical spaces are describable at global domains where emerge as events, operate in zone transformations, and transit between state energies and mass enclaves. Therefore, a universal topology consists of two manifolds: Y^- (*Yin)* and Y^+ (*Yang*) manifolds, progressively and complementarily rising through various stages of alternating streams – *Entanglements*.

3. Universal Topology

Universe is the whole of everything in existence that operates under a topological system of natural laws for, but not limited to, physical and virtual events, states, matters, and actions. Equipped with fundamental properties of universe, the topology constitutes and orchestrates various domains, called *World*, each of which is composed of hierarchical manifests, characterizable and known as a duality of *YinYang* (Y^-Y^+) entanglement for the event operations and transformations among the neighborhood zones or its subsets of areas, called *Horizon*.

In mathematics, *Topology of Universe* in our natural philosophy is simply a complex conjugate function (CCP) as a Y^-Y^+ duality of *Physical* (W^-) and *Virtual* (W^+) worlds:

$$W^{\mp} = P \pm i\,V \qquad or \qquad W^{\mp}(r,\vartheta) = a(r)e^{\pm i\vartheta(\lambda)} \tag{3.a}$$

Using *Euler's* formula [7], the above formulae are equivalent. Since the amplitude a is physical supremacy and the phase ϑ is virtual supremacy, a virtual event λ operation is implicit to a and explicit to ϑ.

Gauge Invariance

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. In physics, this expression evokes the *Gauge Invariance* [8], seamlessly or effortlessly:

$$D^{\lambda}W^{\mp} = \dot{r}\left(\frac{\partial}{\partial r} \pm i\frac{e}{\hbar}\dot{A}\right)W^{\mp} \qquad :\frac{e}{\hbar}A = \frac{\partial\vartheta}{\partial r}, \dot{r} = \frac{\partial r}{\partial\lambda} \tag{3.b}$$

The term $\dot{r}\frac{\partial\vartheta}{\partial \mathrm{r}} \neq 0$ is for the superphase ϑ modulator to operate the λ events in the physical space.

Signatures of Manifolds

The CCP of *Universal Topology*, for another example, represents the world line interval ds^2 between the two events are describable concisely by:

$$\Delta s^2 = (\Delta r - i\,\Delta k)(\Delta r + i\,\Delta k) = (\Delta r)^2 - (c\Delta t)^2 \qquad :k = ict \tag{3.c}$$

In the relativity literature, the sign conventions are associated with a minor or *YinYang* variation of the metric signatures $(+---)$ and $(-+++)$. Either of conventions is widely used within spacetime field in modern physics, but unfortunately not both.

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7 Leonard Euler (1748) Chapter 8: On transcending quantities arising from the circle of Introduction to the Analysis of the Infinite, page 214, section 138

8 Yang C. N., Mills R. L. (1954). "Conservation of Isotopic Spin and Isotopic Gauge Invariance". Phys. Rev. 96: 191–195.

Harmonic Oscillator

The third well-known example is the quantum harmonic oscillator. The "ladder operator" method [9], developed by *Paul Dirac*, defines a pair of the operators $\tilde{a}_n^-$ and $\tilde{a}_n^+$ for Hamiltonian in the CCP formula,

$$\tilde{H} = \hbar\omega \sum_{n=1}^{N} \left(\tilde{a}_n^{\pm} \tilde{a}_n^{\mp} \mp \frac{1}{2} \right) \qquad \tilde{a}_n^{\mp} = \sqrt{\frac{m\omega}{2\hbar}} \left(r_n \pm \frac{i}{m\omega} \hat{p}_n \right) \tag{3.d}$$

$$\tilde{a}_n^+ |n\rangle = \sqrt{n+1}\,|n+1\rangle \qquad \tilde{a}_n^- |n\rangle = \sqrt{n}\,|n-1\rangle \tag{3.e}$$

It means that $\tilde{a}_n^-$ acts on |n⟩ to produce |n–1⟩, and $\tilde{a}_n^+$ acts on |n⟩ to harvest |n+1⟩. For this reason, $\tilde{a}_n^-$ and $\tilde{a}_n^+$ are the CCP "operators" alternatively called "annihilation", a physical yin animation, and "creation", a virtual yang action, because they destroy and create particles, which correspond well to *Universal Topology* of our natural philosophy.

9 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

4. Hierarchy of Worlds

Topology of Universe is an environment composed of events or constituted by hierarchical structures of both massless and massive objects, events, states, matters, and situations. These hierarchical structures of the global manifold are respectively defined as *Virtual World*, where it operates supremacy of virtual event, or *Physical World*, where it performs supremacy of physical actions. Together, the virtual and physical worlds form one integrated *world* of the universe and interoperate as the complementary opponents of all natural states and events.

Three Regimes

Philosophically, the virtual world is referred to as the inner world, the physical world as the outer world, and together they form holistic lives in universe. There are multiple levels of inner worlds and outer worlds. Outer worlds include physical matter of living beings and inanimate objects. Inner worlds are instances of situations, with or without energy or mass formations. Between virtual and physical, there are three domains with each of their own type of spaces or times, respectively defined by:

1. Xingspace field: Xingscope in virtual worlds. Although indirectly sensible and detectable, it is hardly reachable directly for an empirical observer.
2. Timestate field: Statescope between virtual and physical worlds. An observer under statescope environment is usually within the observed system.
3. Spacetime field: Spacescope in physical worlds. A physical observer under spacescope environment is normally external to the observed system.

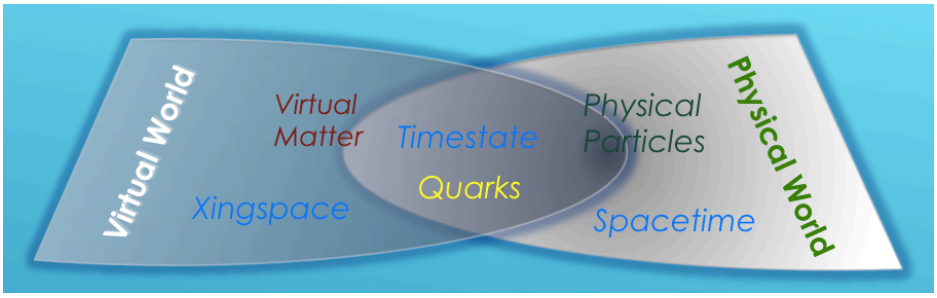

Figure 4a: Words of Hierarchical Structures

In virtual worlds, yinyang interactions under xingspace produce a set of fields through the circular movements of the yinyang elements. This results in the virtual objects birthing reproductions or annealing cyclical processes, bi-directionally transforming into or from the *Timestate* fields, the movements between xingspace modulated virtual worlds and dimensionally confined physical worlds or spacetime dynamics.

World Planes

In physics, a world has a permanent form of global topology, localizes a region of the universe, and interacts with other worlds rising from one or the other with common ground in universal conservations. Our universe, manifests as an associative framework of worlds, illustrated as a global function $G(r,\vartheta)$ of a world plane, the *Two-Dimensions* (r,ϑ) as the mutually independent and reciprocal units: an r-coordinate of physical manifold and a ϑ-coordinate of virtual manifold. This ϑ coordinate is named as a superphase, representing an event at the virtual states implicit to the physical dimensions.

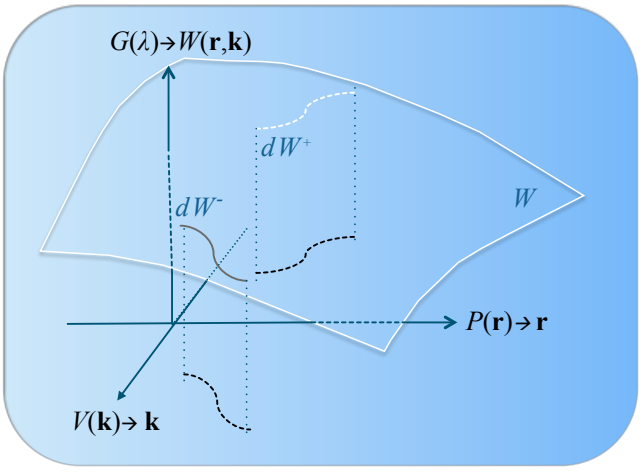

Figure 4b: World Planes of Universal Topology

The global functions in $G(\lambda)$ axis are a collection of common objects and states of events λ, with unique functions applicable to both virtual and physical spaces of the world W.

Boost and Spiral Dynamics

The two-dimensions of a world plane characterize the motion dynamics of world lines such that, to its physical world, a straight line, named as *boost*, is a residual and relativistic generator, and a point circle, named as *spiral*, is a rotational and torque generator. In fact, the boost interweavement generates photons and the spiral entanglement produces gravitons (section 9 and 12). Remarkably in accordance with our philosophical anticipation, conservation of communication between the virtual and physical worlds is operated at the superphased world planes, and maintained for its torsion invariance without r-singularity.

5. 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 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 energy system virtually and represses the degrees of freedom physically. Uniquely on both of the two-dimensional world planes, a wave potential functions as 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. For an object, 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.

In the world planes, a field $\rho^{+}(x,\lambda)$ or $\rho^{-}(x,\lambda)$ is incepted or operated under both virtual and physical primacies of an Y^{+} or Y^{-} manifold respectively and simultaneously

$$\rho^{\pm}(x,\lambda) = \phi^{\pm}(x,\lambda)\varphi^{\mp}(x,\lambda) \qquad : x \in \{x^{\mu}, x_{m}\} \tag{5.a}$$

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.

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:

$$\psi^{+} = \psi^{+}(\hat{x})\ exp[i\hat{\vartheta}(\lambda)] \qquad : x^{\mu} = x^{\mu}(\lambda),\ \lambda = \lambda(x^{\mu}) \tag{5.b}$$

$$\psi^{-} = \psi^{-}(\check{x})\ exp[i\check{\vartheta}(\lambda)] \qquad : x_{\nu} = x_{\nu}(\lambda),\ \lambda = \lambda(x_{\nu}) \tag{5.c}$$

The amplitude function 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.

II. Infrastructure of Universe

In this chapter, we describe how *Philosophy of Nature* functions as a profound architecture that lays out the *Mathematical Framework*, upon which the event operations develop the intrinsic *Infrastructure of Universe* under the principles of event evolution (Eq. 7.d), *YinYang* processes (Figure 7) and least operations (Eq. 7.h-7.i) to carry out *Universal Field Equations* (Eq. 7.j-7.m). Furthermore, we reveal the secrets how the event dynamics of the infrastructure construes *Double Loops of Triple Entanglements* (Figure 8a) to give rise to the foundations of evolutional *Horizons* for *Quantum Physics*, *Quantum Otology* and *Spacetime Cosmology*.

6. Mathematical Framework

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 philosophically classifies the mathematical tools and scopes out their interpretations under the topology of universe.

Variance of Manifolds

In order to describe the nature precisely, we define a duality of the covariant $Y^- = Y\{\mathbf{r} + i\mathbf{k}\}$ and contravariant $Y^+ = Y\{\mathbf{r} - i\mathbf{k}\}$ manifolds operated under the λ event, respectively by the following regulations.

1. Covariance ($\check{\partial}_\lambda$) – One 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. For example, the Y^- spacetime manifold consists of the tetrad-coordinates:

$$x_m \in \check{x}\{x_0, x_1, x_2, x_3\} \subset Y^-\{\mathbf{r} + i\mathbf{k}\} \qquad : x_0 = ict,\ \check{x} \in Y^- \qquad (6.a)$$

2. Contravariance ($\hat{\partial}^\lambda$) - Another 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. For example, the Y^+ timespace manifold consists of the reciprocal coordinates:

$$x^\mu \in \hat{x}\{x^0, x^1, x^2, x^3\} \subset Y^+\{\mathbf{r} - i\mathbf{k}\} \qquad : x^0 = -x_0,\ \hat{x} \in Y^+ \qquad (6.b)$$

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 the 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:

3. 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.

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:

$$\hat{\partial}^t : \dot{x}^\mu \partial^\mu = \left(-ic\partial^\kappa,\ \mathbf{u}^+\partial^r\right) = \frac{i}{\hbar}\left(\hat{E}, \mathbf{u}^+\hat{p}\right) \qquad : \partial^\kappa = \frac{\partial}{\partial x^0},\ \mathbf{u}^+ = \frac{\partial x^r}{\partial t} \qquad (6.c)$$

$$\check{\partial}_t : \dot{x}_m \partial_m = \left(+ic\partial_\kappa,\ \mathbf{u}^-\partial_r\right) = \frac{i}{\hbar}\left(\hat{E}, \mathbf{u}^-\hat{p}\right) \qquad : \partial_\kappa = \frac{\partial}{\partial x_0},\ \mathbf{u}^- = \frac{\partial x_r}{\partial t} \qquad (6.d)$$

$$\hat{E} = -i\hbar\frac{\partial}{\partial t}, \qquad \hat{p} = -i\hbar\nabla \qquad : \partial^r = \partial_r = \nabla \qquad (6.e)$$

It is worthwhile to emphasize that *a*) the manifold operators of $\{\partial^\mu, \partial_m\}$, including traditional "operators" of $\{\partial/\partial t, \partial/\partial x, \nabla, \hat{E}, \hat{p}, \cdots\}$ 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.

Interpretation of Lagrangians

To seamlessly integrate with the classical dynamic equations, it is critical to interpret or promote the natural meanings of *Lagrangian* mechanics $\mathscr{L}$ in forms of the dual manifolds. As a function of generalized information and formulation, *Lagrangians* $\mathscr{L}$ can be redefined as a set of densities, continuities, or commutators, entanglements of the Y^- Y^+ manifolds respectively. For a scalar or vector entanglement, the commutator *Lagrangians*, as examples, can be expressed by their local- or inter-communications:

$$\tilde{\mathscr{L}}_L^\pm = -\frac{1}{c^2}\left[\hat{\partial}^\lambda\hat{\partial}^\lambda, \check{\partial}_\lambda\check{\partial}_\lambda\right]_{s/v}^\pm \qquad : Local\text{-}Commutators \qquad (6.f)$$

$$\tilde{\mathscr{L}}_I^{\pm} = -\frac{1}{c^2}\left[\check{\partial}^{\lambda}\hat{\partial}_{\lambda}, \hat{\partial}_{\lambda}\check{\partial}^{\lambda}\right]_{s/v}^{\pm} \qquad : \textit{Inter-Commutators} \qquad (6.g)$$

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.

Yin and Yang Manifolds

Both virtual and physical 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: $x^{\nu} \in \hat{x}\{\mathbf{r} - i\mathbf{k}\}$ and $x_m \in \check{x}\{\mathbf{r} + i\mathbf{k}\}$. 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 $\mathbf{k}$ extendable, respectively. A sub-coordinate system has its own rotational freedom of either physical sub-dimensions $\mathbf{r}(\theta, \varphi)$ or virtual sub-dimensions $\mathbf{k}(x^0, \cdots)$.

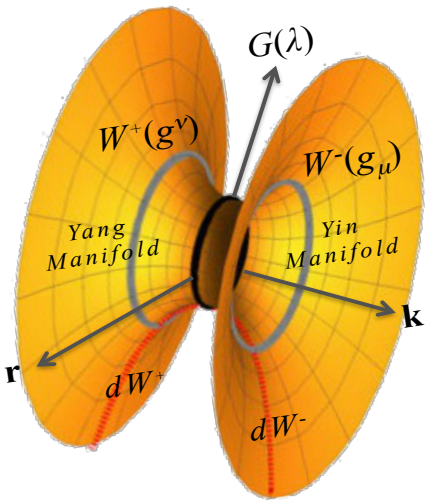

Figure 6: Variance Manifolds

Together, they compose two rotational manifolds as a reciprocal or conjugate duality operating and balancing the world events.

7. Universal Field Equations

Both time and space are the functional spectra of the events λ, operated by and associated with their virtual and physical structures of ontology, and generated by supernatural $Y^- Y^+$ events of operation associated with their virtual and physical framework of universal topology.

The event states of spatial-time world 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.

Event Evolution

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 function can be represented as an infinite sum of the $\dot{\lambda}_i$ events:

$$f(\lambda) = f(\lambda_0) + f'(\lambda_0)(\lambda - \lambda_0)\cdots + f^n(\lambda_0)(\lambda - \lambda_0)^n / n! \qquad (7.a)$$

known as the *Taylor* and *Maclaurin* series, introduced in 1715 [10]. Normally, a global event generates a series of sequential actions, each of which is associated with its opponent reactions, respectively and reciprocally. For any event operation as the functional derivatives, the sum of terms are calculated at an initial state λ_0 and explicitly reflected by a series of the *Event Operations* $\lambda_i \in \{\dot{\partial}_{\lambda_1}, \dot{\partial}_{\lambda_2}\dot{\partial}_{\lambda_1}, \cdots, \dot{\partial}_{\lambda_n\lambda_{n-1}\cdots\lambda_1}\}$ in the dual variant forms:

$$f(\lambda) = f_0 + \kappa_1\dot{\partial}_{\lambda_1} + \kappa_2\dot{\partial}_{\lambda_2}\dot{\partial}_{\lambda_1} \cdots + \kappa_n\dot{\partial}_{\lambda_n}\dot{\partial}_{\lambda_{n-1}}\ldots\dot{\partial}_{\lambda_1} \qquad (7.b)$$

$$\kappa_n = f^n(\lambda_0)/n!,\ \lambda_i \in \{\dot{\partial}_{\lambda_i}\} = \{\check{\partial}_{\lambda}, \check{\partial}^{\lambda}, \hat{\partial}^{\lambda}, \hat{\partial}_{\lambda}\} \qquad (7.c)$$

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.

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

First Type of World Equations

Because the events are operated through the potential fields, it essentially incepts on the world planes a set of the λ_i derivatives, giving rise to the horizon infrastructures:

$$\hat{W}_n = \phi_n^+(\lambda, \hat{x})\phi_n^-(\lambda, \check{x}) \qquad \phi_n^{\mp}(\lambda, x) = \left(1 \pm \tilde{\kappa}_1 \dot{\partial}_{\lambda_1} \pm \tilde{\kappa}_2 \dot{\partial}_{\lambda_2} \dot{\partial}_{\lambda_1} \cdots\right)\phi_n^{\mp}(\lambda, x)|_{\lambda=\lambda_0} \qquad (7.d)$$

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. Integration of the two functions is, therefore, named as *First Type* of ***World Equations***, because the function $\hat{W}_n$ represents that

1. The first two terms $(1 \pm \kappa_1 \dot{\partial}_{\lambda_1})$ - The event drives both virtual and physical system and incepts from the world planes systematically breakup and extend into each of the manifolds.
2. The higher terms $\pm(\kappa_2 \dot{\partial}_{\lambda_2} \dot{\partial}_{\lambda_1} + \cdots \kappa_i \dot{\partial}_{\lambda_i} \dot{\partial}_{\lambda_{i-1}} \ldots \dot{\partial}_{\lambda_1})$ - The event operations transcend further down to each of its sub-coordinate system with extra degrees of freedoms for either physical dimensions $\mathbf{r}(\lambda)$ or virtual dimensions $\mathbf{k}(\lambda)$, reciprocally.

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

YinYang Processes

Following *Universal Topology*, world events, illustrated in the $Y^- Y^+$ event diagram below, 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.

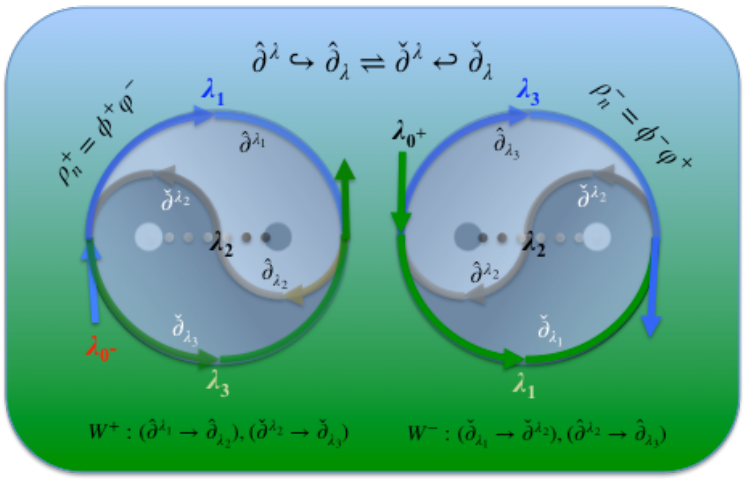

Figure 7: $Y^- Y^+$ Events of *YinYang Processes*: $\hat{\partial}^{\lambda} \hookrightarrow \hat{\partial}_{\lambda} \rightleftharpoons \check{\partial}^{\lambda} \hookleftarrow \check{\partial}_{\lambda}$

Each part is dissolving into the other to form an alternating stream of dynamic flows. Their transformations in between are bi-directional antisymmetric transportation crossing the dark tunnel through a pair of the end-to-end circlets on the center line. Both of the top-half and bottom-half share the common global environment of the state density ρ_n that mathematically represents the $\rho_n^+ = \phi^+\varphi^-$ for the Y^+ manifold and its equivalent $\rho_n^- = \phi^-\varphi^+$ for the Y^- manifold, respectively.

Besides, the left-side diagram presents the event flow acted from the inception of λ_{0-} through $\lambda_1\ \lambda_2\ \lambda_3$ to intact a cycle process for the Y^+ supremacy. In parallel, the right-side diagram depicts the event flow initiated from the event λ_{0+} through $\lambda_1\ \lambda_2\ \lambda_3$ to complete a cycle process for the Y^- supremacy. The details are described by the loops of *Evolutional Processes* as the following interrelations:

1. Visualized in the left-side of the Figure 7, 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^+ 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^- 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 the Figure 7, initiated at λ_{0+}, the event actor generates the physical operation $\check{\partial}_{\lambda_1}$ in Y^- 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^+ 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 *Evolutional Processes*, cycling at the opposite direction simultaneously, formulate the flow charts in the following mathematical expressions:

$$W^+ : (\hat{\partial}^{\lambda_1} \to \hat{\partial}_{\lambda_2}), (\check{\partial}^{\lambda_2} \to \check{\partial}_{\lambda_3}) \qquad (7.f)$$

$$W^- : (\check{\partial}_{\lambda_1} \to \check{\partial}^{\lambda_2}), (\hat{\partial}^{\lambda_2} \to \hat{\partial}_{\lambda_3}) \qquad (7.g)$$

This pair of the interweaving system pictures an outline of the internal commutation of dark energy and continuum density of the entanglements.

Philosophically, 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 topology of universe, which lay behind the context of the main philosophical interpretation of *World Equations*.

Least 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 (7.d), the principle of least-actions derives a set of the *Motion Operations*:

$$\check{\partial}^{-}\left(\frac{\partial W}{\partial(\hat{\partial}^{+}\phi^{+})}\right)-\frac{\partial W}{\partial\phi^{+}}=0 \qquad :\check{\partial}^{-}\in\{\check{\partial}_{\lambda},\check{\partial}^{\lambda}\},\ \phi^{+}\in\{\phi_{n}^{+},\varphi_{n}^{+}\} \tag{7.h}$$

$$\hat{\partial}^{+}\left(\frac{\partial W}{\partial(\check{\partial}^{-}\phi^{-})}\right)-\frac{\partial W}{\partial\phi^{-}}=0 \qquad :\hat{\partial}^{+}\in\{\hat{\partial}^{\lambda},\hat{\partial}_{\lambda}\},\ \phi^{-}\in\{\phi_{n}^{-},\varphi_{n}^{-}\} \tag{7.i}$$

This set of dual formulae extends the philosophical meaning to the *Euler-Lagrange* [11-12] *Motion Equation* for the actions of any dynamic system. The new sets of the variables of $\phi_n^{\mp}$ and the event operators of $\check{\partial}^{-}$ and $\hat{\partial}^{+}$ signify that both manifolds maintain equilibria and formulations from each of the motion extrema, simultaneously and reciprocally driving a duality of physical and virtual dynamics.

First Universal Field Equations

From these interwoven relationships, the motion operations on the *World Equations* 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:

$$\kappa_1\left(\check{\partial}^{\lambda_2}-\hat{\partial}_{\lambda_2}\right)\phi_n^{+}+\kappa_2\left(\check{\partial}_{\lambda_3}\check{\partial}^{\lambda_2}+\hat{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2}-\check{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2}\right)\phi_n^{+}=W_n^{+}\phi_n^{+} \tag{7.j}$$

$$\kappa_1\left(\check{\partial}_{\lambda_1}-\hat{\partial}^{\lambda_1}\right)\varphi_n^{+}+\kappa_2\left(\check{\partial}^{\lambda_2}\check{\partial}_{\lambda_1}+\hat{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1}-\check{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1}\right)\varphi_n^{+}=W_n^{-}\varphi_n^{+} \tag{7.k}$$

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, the dynamic reactions on the *World Equations* under the Y^{+} manifold continuum give rise to the *Motion Operations* 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:

$$\kappa_1\left(\hat{\partial}^{\lambda_1}-\check{\partial}_{\lambda_1}\right)\phi_n^{-}+\kappa_2\left(\hat{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1}+\check{\partial}^{\lambda_2}\check{\partial}_{\lambda_1}-\hat{\partial}^{\lambda_2}\check{\partial}_{\lambda_1}\right)\phi_n^{-}=W_n^{-}\phi_n^{-} \tag{7.l}$$

$$\kappa_1\left(\hat{\partial}_{\lambda_2}-\check{\partial}^{\lambda_2}\right)\varphi_n^{-}+\kappa_2\left(\hat{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2}+\check{\partial}_{\lambda_3}\check{\partial}^{\lambda_2}-\hat{\partial}_{\lambda_3}\check{\partial}^{\lambda_2}\right)\varphi_n^{-}=W_n^{+}\varphi_n^{-} \tag{7.m}$$

giving rise to the Y^{-} *General Fields* from each of the respective opponents during their virtual interactions.

Under Topology of Universe, two pairs of the above dynamic fields 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.

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

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

8. Horizon Structure

The apparent boundary of a realm of perception or the like, where unique structures are evolved, topological functions are performed, various neighborhoods form complementary interactions, and zones of the worlds are composed through multi-functional transformations. Each horizon rises and contains specific fields as a construction of the symmetric and asymmetric dynamics within or beyond its own range. In other words, fields infer and vary from one horizon to the others, each of which are a part of and aligned with *Universal Topology* of the worlds.

Horizon Hierarchy

As a part of *Universal Topology*, this mathematical framework of the dual variances architecturally defines further hierarchy of the event evolutions, 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 universe. Among the fields, their localized entanglements form up, but are not limited to, the density fields, as *First Horizon Fields*. The derivatives to the density fields are event operations of their motion dynamics, which generates an interruptible tangent space, named as *Second Horizon Fields*.

Double Loops of Triple Entanglements

Associated with the inception of a Y^+ spontaneous evolution, the actions of the Y^- *explicit* reproduction are normally sequenced and entangled as a chain of reactions to produce and couple the weak electromagnetic and strong gravitational forces symmetrically in massive dynamics between the second and third horizons.

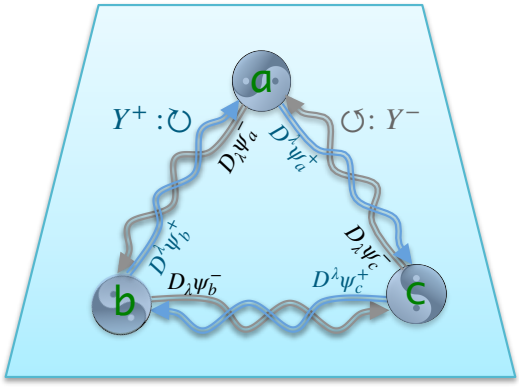

Figure 8a: Two Implicit Loops of Triple Explicit Entanglements

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 in term of an infinite sum of operations. The principle of the chain of least reactions in

nature is for three particles to form a loop. Confined within a triplet group, the particles jointly institute a double streaming interweavement with the three action states.

The *Horizon Infrastructure* defines scopes of, commutations between and relational hierarchy to the natural objects and events. For example, the *Standard Model* is a non-abelian gauge theory with the symmetry group $U(1)\times SU(2)\times SU(3)$, where $U(1)$ is the first horizon, $SU(2)$ the second horizon, and $SU(3)$ the third. This means that, at $U(1)$, it builds a structure as the building blocks for $SU(2)$, the $SU(2)$ builds another structure for $SU(3)$, and so on.

Horizon Equations

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 interweavement 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 give rise to 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 (Figure 7):

$$\hat{\partial}^{\lambda} \hookrightarrow \hat{\partial}_{\lambda} \rightleftharpoons \check{\partial}^{\lambda} \hookleftarrow \check{\partial}_{\lambda} \qquad : x_m \in \{ict, \tilde{r}\},\ x^{\mu} \in \{-ict, \tilde{r}\} \tag{8.a}$$

In order to operate the local actions, an event λ exerts its effects of the virtual supremacy within its Y^+ manifold. Because of the local relativity, the residual derivative ∂^{λ} to the vector $x^{\nu}\mathbf{b}^{\nu}$, where $\mathbf{b}^{\nu}$ is the basis, has the changes of both magnitude quantity $\dot{x}^{\mu}(\partial x^{\nu}/\partial x^{\mu})\mathbf{b}^{\nu}$ and basis direction $\dot{x}^{\mu}x^{\nu}\Gamma^{+}_{\mu\nu a}\mathbf{b}^{\mu}$, where $\dot{x}^{\mu} = \partial x^{\mu}/\partial\lambda$, transforming between the coordinates of x^{ν} and x^{μ}, giving rise to the second horizon in its *Local* or *Residual* derivatives with the boost and spiral relativities.

$$\hat{\partial}^{\lambda}\psi = \dot{x}^{\mu}X^{\nu\mu}\big(\partial^{\nu} - i\Theta^{\mu}(\lambda)\big)\psi \qquad : X^{\nu\mu} \equiv S_2^{+} + R_2^{+},\ S_2^{+} \equiv \frac{\partial x^{\nu}}{\partial x^{\mu}},\ R_2^{+} \equiv x^{\mu}\Gamma^{+}_{\nu\mu a}\ \Theta^{\mu} = \frac{\partial\hat{\vartheta}(\lambda)}{\partial x^{\mu}} \tag{8.b}$$

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 can be cloned straightforwardly, which gives rise from the Y^- tangent rotations of both magnitude quantity $\dot{x}_n(\partial x_m/\partial x_n)\mathbf{b}_m$ and basis rotation $\dot{x}_n x_m\Gamma^{-}_{nm\alpha}\mathbf{b}_n$ into a vector Y^- potentials of the second horizon:

$$\check{\partial}_{\lambda}\psi = \dot{x}_m X_{nm}\big(\partial_n + i\Theta_m(\lambda)\big)\psi \quad : X_{nm} \equiv S_2^{-} + R_2^{-},\ S_2^{-} \equiv \frac{\partial x_n}{\partial x_m},\ R_2^{-} \equiv x_m\Gamma^{-}_{nma},\ \Theta_{\nu} = \frac{\partial\check{\vartheta}(\lambda)}{\partial x_{\nu}} \tag{8.c}$$

where the $\Gamma^{-}_{nm\alpha}$ or $\Gamma^{+}_{\nu\mu a}$ is an Y^- or Y^+ metric connection, similar but extend the meanings to the

Christoffel symbols of the *First* kind, introduced in 1869 [13].

By lowering the index, the virtual Y^+ actions manifest the first tangent potential $\hat{\partial}_\lambda$ projecting into its opponent basis of the Y^- manifold. Because of the relativistic interactions, the derivative ∂_λ to the vector $x^\nu \mathbf{b}^\nu$ has the changes of both magnitude quantity $\dot{x}_a(\partial x^\nu/\partial x_a)\mathbf{b}^\nu$ and basis direction $\dot{x}^a x_\mu \Gamma^{+\nu}_{\mu a}\mathbf{b}^\nu$, transforming from one world plane $W^+\{\mathbf{r}-i\mathbf{k}\}$ to the other $W^-\{\mathbf{r}+i\mathbf{k}\}$. This action redefines the Y^+ event quantities of relativity and creates the *Relativistic Boost* S_1^+ *Transformation* and the *Spiral Torque* R_1^+ *Transportation* around a central point, which gives rise from the Y^+ tangent rotations into the vector Y^- potentials for the second horizon.

$$\hat{\partial}_\lambda \psi = \dot{x}_a X^\nu{}_a \big(\partial^\nu - i\Theta^\nu(\lambda)\big)\psi \quad : X^\nu{}_a \equiv S_1^+ + R_1^+,\ S_1^+ \equiv \frac{\partial x^\nu}{\partial x_a},\ R_1^+ \equiv x^\mu \Gamma^{+\nu}_{\mu a} \tag{8.d}$$

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

$$\check{\partial}^\lambda \psi = \dot{x}^\alpha X_m{}^\alpha \big(\partial_m + i\Theta_m(\lambda)\big)\psi \quad : X_m{}^\alpha \equiv S_1^- + R_1^-,\ S_1^- \equiv \frac{\partial x_m}{\partial x^\alpha},\ R_1^- \equiv x_s \Gamma^{-m}_{s\alpha} \tag{8.e}$$

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

Quantum Ontology

Essentially, an integration of the above formulae, the principle of *Evolutional Processes* outlined philosophically by Figure 7 $\hat{\partial}^\lambda \hookrightarrow \hat{\partial}_\lambda \rightleftharpoons \check{\partial}^\lambda \hookleftarrow \check{\partial}_\lambda$ is concisely translated into the equations of physics in mathematics:

$$S_2^+ + R_2^+ \hookrightarrow S_1^+ + R_1^+ \rightleftharpoons S_1^1 + R_1^1 \hookleftarrow S_2^- + R_2^- \tag{8.f}$$

As an fascinating consequence, one can anticipate the following results:

1. Appling the principle of *Least Operations* of Eq. (7.h-7.i) on *World Equations*, the events produce the fundamental generators of the infrastructure to give rise to *Pauli Matrix, Direct Equation, Schrödinger Equation, Klein–Gordon Equation*, etc., known as *Quantum Physics*.
1. With the principle of *Double Loops of Triple Entanglements* of Figure 8a, the nature orchestrates the potential fields of the infrastructure to produce *Gauge Theory*, *Quantum Chromodynamics*, *Standard Model*, etc., named as *Quantum Ontology*.

At this horizon, some objects acquire a part of their mass quantity (exert strong forces for fully physical interactions) and some have zero-mass (interactive virtually without force). Essentially, they

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

are building blocks of a fully physical domain *SU(3)*. Only at the third horizon, particles have their full mass (weak force interactions). Associated with the mass enclave, a force is natural in physical domain but not in virtual world.

Spacetime Cosmology

Amazingly, under the two-dimensions of the world planes, the horizon generators develop a freedom of the extra dimensions into the physical or virtual worlds, respectively giving rise to the *Third Horizon*, where it generates gamma-matrices and chi-matrices (section 9) emerges the 4x4 *Lorentz* generators, completes a full mass acquisition, and finally develops into the four-dimensional *Spacetime* manifold for physical objects, simultaneously. From a world plane to its spacetime manifold, the evolution can be visualized in mathematics as the following:

$$d\Sigma^2 = dr^2 + S_k(r)^2 d\Omega^2 \quad \rightarrow \quad d\Omega^2 = d\vartheta^2 + sin^2\vartheta\, d\varphi^2 \qquad (8.g)$$

This whole process of inauguration of physical formations is classically known as spontaneous breaking. Thereupon, one spatial dimension on the world planes evolves its physical world with freedom of the extra two-coordinates, which results in a rotational *Central-Singularity* (artifact 8.5).

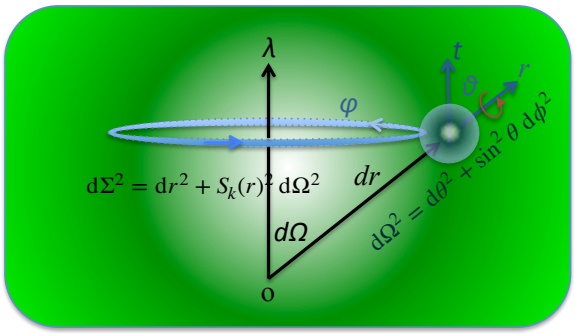

Figure 8b: Evolution from *World Planes* into *Spacetime Manifold*

In fact, the evolution is a course of events for inception of space associated with its reciprocal duality: sequential procedure, named as time in physical world. By acquiring mass with freedom of spacetime, the nature of physical-supremacy characterizes the essential forces between physical objects and limits their interactive distances. As an associative affinity, the principle operates the gravitational attractions between the mass bodies, or gives weight to physical objects in residence. In addition, as the third fascinating consequence, one can further anticipate the following results:

2. Evolving into the symmetric and asymmetric events of *commutation* and *continuity* on *spacetime manifolds*, the yinyang dynamics of the infrastructure prevails upon *Thermodynamics, Blackhole Radiation, Electromagnetism, Gravitation, General Relativity*, etc. known as spacetime Cosmology.

Therefore, through our laws and terminologies philosophically, all fundamental elements and dynamics in the physical worlds can be derived and briefed by the rest of sections or fully detailed by 《*Universal and Unified Physics*》 [1].

III. Topology of Physics

In this chapter, we unfold the previous contexts in further details to testify how and why the theory can conclude numerous of groundbreakings and declare as *Universal and Unified Physics*.

9. Quantum Ontology

In the infrastructure of universe, it consists of 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), a set of the boost and spiral generators institutes the infrastructure of $\hat{\partial}^{\lambda} \hookrightarrow \hat{\partial}_{\lambda} \rightleftharpoons \check{\partial}^{\lambda} \hookleftarrow \check{\partial}_{\lambda}$ (Figure 7 and 8a) with a set of the metric signatures, *local* originators, *horizon* commutators. At the third horizon *SU*(3) or higher, a set of the *Lorentz Generators* institutes the infrastructure of spacetime (Figure 8b), featuring thermal, symmetric, asymmetric and transformational dynamics.

Remarkably, 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.

The actions of Y^{+} supremacy represent 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, balanced by the bi-directional transformations between the commutative operations of $\hat{\partial}_{\lambda}$ and $\check{\partial}^{\lambda}$; and
3. 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, particles and 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.

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;
2. Neither the actions nor reactions impose their final consequences $\check{\partial}^\lambda\check{\partial}^\lambda$ on their virtual opponents because of the parallel mirroring residuals for the horizon phenomena of reproductions $\hat{\partial}^\lambda\hat{\partial}^\lambda$ during the symmetric fluxions;
3. 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 streaming might become possible as a part of recycling or reciprocating a real-life in the physical world.

Boost Generators

On the world planes at a constant speed *c*, the event evolution of quantum ontology (Eq. 8.f) naturally describes and concisely derives a set of the *Boost* matrix tables as the following

$$S_2^+ = \frac{\partial x^\nu}{\partial x^m} = \begin{pmatrix} 1 & -i \\ i & 1 \end{pmatrix} \equiv s_0 + i s_2 \qquad : \hat{\partial}^\lambda = \dot{x}^m S_2^+ \partial^\nu \qquad (9.a)$$

$$S_1^+ = \frac{\partial x^\nu}{\partial x_m} = \begin{pmatrix} -1 & -i \\ -i & 1 \end{pmatrix} \equiv s_3 - i s_1 \qquad : \hat{\partial}_\lambda = \dot{x}_m S_1^+ \partial^\nu \qquad (9.2)$$

$$S_1^- = \frac{\partial x_m}{\partial x^\nu} = \begin{pmatrix} -1 & i \\ i & 1 \end{pmatrix} \equiv s_3 + i s_1 \qquad : \check{\partial}^\lambda = \dot{x}^\nu S_1^- \partial_m \qquad (9.a)$$

$$S_2^- = \frac{\partial x_m}{\partial x_\nu} = \begin{pmatrix} 1 & i \\ -i & 1 \end{pmatrix} \equiv s_0 - i s_2 \qquad : \check{\partial}_\lambda = \dot{x}_\nu S_2^- \partial_m \qquad (9.a)$$

The $S_1^\pm$ matrices are a duality of the horizon settings for transformations 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:

$$s_\kappa = \left[\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}_0, \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}_1, \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}_2, \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}_3 \right] \qquad (9.b)$$

Intuitively simplified to a group of the 2x2 matrices, the infinite loops (Figure 8a) of entanglements compose an integration of the boost generators s_n as well as the spiral generators ϵ_κ that represents law of conservation of life-cycle transformational continuity of motion dynamics.

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:

$$\sigma_\kappa = \left[\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}_0, \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}_1, \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}_2, \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}_3 \right] \qquad (9.c)$$

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

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

***Spiral* 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 polar manifold $\{\tilde{r} \pm i\tilde{\vartheta}\} \in \mathscr{R}^2$ that a physical world has its superposition $\tilde{r}$ superposed with the virtual world through the superphase ϑ coordinate:

$$ds^2 = (d\tilde{r} + i\tilde{r}d\tilde{\vartheta})(d\tilde{r} - i\tilde{r}d\tilde{\vartheta}) = d\tilde{r}^2 + \tilde{r}d\tilde{\vartheta}^2 \qquad : x^m \in \check{x}\{\tilde{r} + i\tilde{\vartheta}\},\ x^\nu \in \hat{x}\{\tilde{r} - i\tilde{\vartheta}\} \qquad (9.d)$$

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

$$\check{g}_{\nu\mu} = \hat{g}^{\nu\mu} = \begin{pmatrix} 1 & 0 \\ 0 & \tilde{r}^2 \end{pmatrix}, \qquad \check{g}^{\nu\mu} = \hat{g}_{\nu\mu} = \begin{pmatrix} 1 & 0 \\ 0 & \tilde{r}^{-2} \end{pmatrix} \qquad (9.e)$$

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,

$$R_2^+ = x^\mu \Gamma^+_{\nu\mu a} = x^\mu \begin{pmatrix} 0 & \tilde{r} \\ \tilde{r} & -\tilde{r} \end{pmatrix} \equiv \epsilon_0 \tilde{r} + i\epsilon_2 \tilde{\vartheta} \qquad : \hat{\partial}^\lambda = \dot{x}^m R_2^+ \partial^\nu \qquad (9.f)$$

$$R_1^+ = x^\mu \Gamma^{+\nu}_{\mu a} = x^\mu \begin{pmatrix} 0 & 1/\tilde{r} \\ 1/\tilde{r} & -\tilde{r} \end{pmatrix} \equiv \epsilon_3 \tilde{r} - i\epsilon_1 \tilde{\vartheta} \qquad : \hat{\partial}_\lambda = \dot{x}_m R_1^+ \partial^\nu \qquad (9.f)$$

$$R_1^- = x_s \Gamma^{-m}_{s\alpha} = x_s \begin{pmatrix} 0 & 1/\tilde{r} \\ 1/\tilde{r} & -\tilde{r} \end{pmatrix} \equiv \epsilon_3 \tilde{r} + i\epsilon_1 \tilde{\vartheta} \qquad : \check{\partial}^\lambda = \dot{x}^\nu R_1^- \partial_m \qquad (9.f)$$

$$R_2^- = x_m \Gamma^-_{nma} = x_m \begin{pmatrix} 0 & \tilde{r} \\ \tilde{r} & -\tilde{r} \end{pmatrix} \equiv \epsilon_0 \tilde{r} - i\epsilon_2 \tilde{\vartheta} \qquad : \check{\partial}_\lambda = \dot{x}_\nu R_2^- \partial_m \qquad (9.f)$$

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:

$$\epsilon_\kappa = \tilde{r}\left[\begin{pmatrix}0 & 1\\ 1 & 0\end{pmatrix}_0, \begin{pmatrix}0 & 0\\ 0 & -1\end{pmatrix}_1, \begin{pmatrix}0 & 0\\ 0 & 1\end{pmatrix}_2, \frac{1}{\tilde{r}^2}\begin{pmatrix}0 & 1\\ 1 & 0\end{pmatrix}_3\right] \tag{9.g}$$

As a group of the 2x2 matrices, the infinite loops of entanglements institute an integration of the spiral generators ϵ_n sourced by the transport generators. Similar to the boost generators, the double streaming torques orchestrate a set of the four-status.

At the constant speed, the divergence of the torsion tensors is invariant under the superposed global manifolds, illustrated by the following:

$$\nabla \cdot R_2^- = \frac{1}{\tilde{r}}\frac{\partial}{\partial \tilde{r}}\left(\epsilon_0 \tilde{r}\right) - \frac{1}{\tilde{r}}\frac{\partial}{\partial \tilde{\vartheta}}\left(i\epsilon_2 \tilde{\vartheta}\right) = (2\epsilon_0 - i\epsilon_2)\frac{1}{\tilde{r}} \tag{9.h}$$

$$\nabla \cdot R_1^- = \frac{1}{\tilde{r}}\frac{\partial}{\partial \tilde{r}}\left(\epsilon_3 \tilde{r}\right) + \frac{1}{\tilde{r}}\frac{\partial}{\partial \tilde{\vartheta}}\left(i\epsilon_1 \tilde{\vartheta}\right) = i\epsilon_1\frac{1}{\tilde{r}} \tag{9.i}$$

Because of the $Y^-\,Y^+$ reciprocity, each superphase $\tilde{\vartheta}$ is paired at its mirroring spiral opponent. Remarkably, on the world planes at $\tilde{r} = 0$, the total of each $Y^-\,Y^+$ torsion derivatives is entangling without singularity and yields invariant, introduced at 8:17 July 17 of 2018.

$$Y^- : \nabla \cdot (R_1^- + R_2^-) = 2\begin{pmatrix}0 & 1\\ 1 & -i\end{pmatrix} \tag{9.j}$$

$$Y^+ : \nabla \cdot (R_1^+ + R_2^+) = 2\begin{pmatrix}0 & 1\\ 1 & +i\end{pmatrix} \tag{9.k}$$

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

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

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

Gamma and Chi Matrices

Aligning to the topological comprehension, we extend the gamma-matrix γ^ν, introduced by W. K. Clifford in the 1870s [14], and chi-matrix χ^ν for physical coordinates.

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

$$\gamma^{\nu}=\left[\begin{pmatrix}\sigma_0 & 0\\ 0 & -\sigma_0\end{pmatrix}_0,\begin{pmatrix}0 & \sigma_1\\ -\sigma_1 & 0\end{pmatrix}_1,\begin{pmatrix}0 & \sigma_2\\ -\sigma_2 & 0\end{pmatrix}_2,\begin{pmatrix}0 & \sigma_3\\ -\sigma_3 & 0\end{pmatrix}_3\right] \tag{9.l}$$

$$\chi^{\nu}=\left[r\begin{pmatrix}\epsilon_0 & 0\\ 0 & -\epsilon_0\end{pmatrix}_0,\vartheta\begin{pmatrix}0 & \epsilon_1\\ -\epsilon_1 & 0\end{pmatrix}_1,i\vartheta\begin{pmatrix}0 & \epsilon_2\\ -\epsilon_2 & 0\end{pmatrix}_2,r\begin{pmatrix}0 & -\epsilon_3\\ \epsilon_3 & 0\end{pmatrix}_3\right] \tag{9.m}$$

$$\zeta^{\nu}=\gamma^{\nu}+\chi^{\nu}\qquad\qquad \zeta_{\nu}=\gamma_{\nu}+\chi_{\nu} \tag{9.n}$$

The superphase $\mathrm{d}\vartheta^2=\mathrm{d}\theta^2+\sin^2\theta\,\mathrm{d}\phi^2$ 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 equations together, we have a duality of the states expressed by or degenerated to the formulae of event operations:

$$\check{\partial}=\check{\partial}_{\lambda}+\hat{\partial}_{\lambda}=\dot{x}_{\nu}\zeta_{\nu}D_{\nu}=\dot{x}_{\nu}\ \zeta_{\nu}\left(\partial_{\nu}+i\frac{e}{\hbar}A_{\nu}+\tilde{\kappa}_2^{-}\partial_{\nu}A_{\mu}+\cdots\right) \tag{9.o}$$

$$\hat{\partial}\equiv\hat{\partial}^{\lambda}+\check{\partial}^{\lambda}=\dot{x}^{\mu}\zeta^{\mu}D^{\mu}=\dot{x}^{\mu}\zeta^{\mu}\left(\partial^{\mu}-i\frac{e}{\hbar}A^{\mu}-\tilde{\kappa}_2^{+}\partial^{\mu}A^{\nu}-\cdots\right) \tag{9.p}$$

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.

Dirac Equation

Intrinsically heterogeneous, one of the characteristics of spin is that the events in the Y^{+} or Y^{-} manifold transform into their opponent manifold in forms of bispinors of special relativity, reciprocally. Considering the first order $\dot{\partial}$ only and applying the transformational characteristics, one can reformulate the *first type* of ***World Equations*** to a simple compartment:

$$\frac{\hbar}{2}\left(\dot{x}_{\nu}\zeta_{\mu}D_{\nu}-\dot{x}^{\mu}\zeta^{\mu}D^{\mu}\right)\psi_n^{\pm}\mp E_n^{\pm}\psi_n^{\pm}=0 \tag{9.q}$$

$$\psi_n^{+}=\begin{pmatrix}\phi_n^{+}\\ \varphi_n^{-}\end{pmatrix},\qquad \overline{\psi}_n^{-}=\overline{\kappa}\begin{pmatrix}\varphi_n^{-}\\ \phi_n^{+}\end{pmatrix},\qquad \psi_n^{-}=\begin{pmatrix}\phi_n^{-}\\ \varphi_n^{+}\end{pmatrix},\qquad \overline{\psi}_n^{+}=\overline{\kappa}\begin{pmatrix}\varphi_n^{+}\\ \phi_n^{-}\end{pmatrix} \tag{9.r}$$

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

$$\tilde{\mathscr{L}}_D^{+}=\overline{\psi}_n^{-}\gamma^{\mu}\left(i\hbar c\,\partial^{\mu}+eA^{\mu}\right)\psi_n^{+}+mc^2\overline{\psi}_n^{-}\psi_n^{+}\to 0 \tag{9.s}$$

$$\tilde{\mathscr{L}}_D^{-}=\overline{\psi}_n^{+}\gamma_{\nu}\left(i\hbar c\,\partial_{\nu}-\ eA_{\nu}\right)\psi_n^{-}-mc^2\overline{\psi}_n^{+}\psi_n^{-}\to 0 \tag{9.t}$$

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 [15].

15 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

Lorentz Generators

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

$$J_1 = \begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 \\ 0 & 0 & 1 & 0 \end{pmatrix},\ J_2 = \begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{pmatrix},\ J_3 = \begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \tag{9.u}$$

$$K_1 = \begin{pmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix},\ K_2 = \begin{pmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix},\ K_3 = \begin{pmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix} \tag{9.v}$$

$$L_\nu^- = K_\nu + i J_\nu \qquad L_\nu^+ = K_\nu - i J_\nu \tag{9.w}$$

$$[J_1, J_2]^- = J_3 \qquad [K_1, K_2]^- = -J_3 \qquad [J_1, K_2]^- = K_3 \tag{9.x}$$

known as *Generator* of the *Lorentz* group, discovered since 1892 [16] or similar to *Gell-Mann* matrices [17]. 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).

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.

$$T_{\nu\mu}^{-n}(L) = \left(L_{\nu\mu}^- \partial_\nu V_\mu - L_{\mu\nu}^+ \partial^\mu V^\nu\right)_n \qquad : T_{\nu\mu}^{\pm n}(\gamma) \mapsto T_{\mu\nu}^{\pm n}(L) \tag{9.y}$$

$$\Upsilon_{\nu\mu}^{-n}(L) = \left(L_{\nu\mu}^- \partial_\nu A_\mu - L_{\mu\nu}^+ \partial^\mu A^\nu\right)_n \qquad : \Upsilon_{\nu\mu}^{\pm n}(\chi) \mapsto \Upsilon_{\mu\nu}^{\pm n}(L) \tag{9.z}$$

Under the Y^- or Y^+ primary, the event operates the third terms of (9.o, 9.p) in a pair of the relativistic entangling fields.

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

10. Quantum Field Evolutions

When the events give rise to the states crossing each of the horizon points, an *evolution* process takes place. One of such actions is the field loops (Figure 8a) that incept a superphase process into the physical *SU(3)* 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.

Evolutional Field Equation

In mathematics, the actions of double wedge circulations in the Figure 8a have the natural interpretation of the entangling processes:

$$\circlearrowleft : \ (D_\lambda \psi_a^- \rightarrow D_\lambda \psi_b^- \rightarrow D_\lambda \psi_c^-)^{\curvearrowleft} \qquad : \textit{Right-hand Loop} \qquad (10.a)$$

$$\circlearrowright : \ ^{\curvearrowright}(D^\lambda \psi_b^+ \leftarrow D^\lambda \psi_c^+ \leftarrow D^\lambda \psi_a^+) \qquad : \textit{Left-hand Loop} \qquad (10.b)$$

$$\{D_\lambda \psi_a^-, D^\lambda \psi_b^+\}, \{D_\lambda \psi_b^-, D^\lambda \psi_c^+\}, \{D_\lambda \psi_c^-, D^\lambda \psi_a^+\} \qquad : \textit{Triple States} \qquad (10.c)$$

Acting upon each other, the triplets are streaming a pair of the $Y^- Y^+$ *Double-Loops* implicitly, and the *Triple States* of entanglements explicitly. In mathematics, it holds an invariant principle of the double-loop implicit entanglements, or known as a *Bianchi or Jacobi* identity [18-19]:

$$(D_\mu F_{\nu\kappa})^a + (D_\kappa F_{\mu\nu})^b + (D_\nu F_{\kappa\mu})^c = 0 \qquad (10.d)$$

$$[D_\mu, [D_\nu, D_\kappa]] + [D_\kappa, [D_\mu, D_\nu]] + [D_\nu, [D_\kappa, D_\mu]] = 0 \qquad (10.e)$$

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 commutation 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.

Conveniently expressed in forms of *Horizon Lagrangians* of virtual creation and physical reproduction, it comes out as and beyond *Quantum Electrodynamics* (*QED)* and *Standard Model* that extends from a pair of the first order *Dirac* equations to the second orders in the form of a $SU(2)\times SU(3)$ *Lagrangian*:

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

19 S.L. Glashow (1961) "Partial-symmetries of weak interactions" Nuclear Physics. 22 (4): 579–588

$$\tilde{\mathscr{L}}_h^a = \tilde{\mathscr{L}}_s^+ + 2\tilde{\mathscr{L}}_s^- = \mathscr{L}_D^{-a} + \left(\overline{\psi}_c^- \frac{\dot{x}_\nu}{c} \zeta^\nu D^\lambda \psi_a^+\right) \wedge \left(\overline{\psi}_b^+ \frac{\dot{x}^\mu}{c} \zeta_\mu D_\lambda \psi_a^-\right) \qquad (10.f)$$

where $j,k \in \{a,b,c\}$ is the triplet particles.

Yang-Mills Theory

When the strong torque of gravitational fields is ignored, the above equation derives *Yang-Mills* theory, introduced in 1954 [7].

$$\mathscr{L}_Y^a \equiv \left(\bar{\psi}_j^{\mp} i \frac{\hbar}{c} \gamma^\nu D_\nu \psi_i^{\pm}\right)_{jk} - \frac{1}{4} F_{\nu\mu}^{+j} F_{\mu\nu}^{-k} - \frac{1}{4} W_{\mu\nu}^{+j} W_{\nu\mu}^{-k} \qquad (10.g)$$

As one of the most important results, *Yang–Mills* theory represents *Gauge Invariance*

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

Since the quanta of the superphase fields is massless with gauge invariance, *Yang–Mills* theory represents that particles are semi-massless in the second horizon, and acquire their full-mass through evolution of the full physical horizon. Extended by the philosophical interpretation, it represents mathematically: conservation of *Double Loops of Triple Entanglements* or philosophically *Law of Conservation of Evolutions of Ontology*, illustrated by Figure 8a as a part of the infrastructure of universe.

Quantum Chromodynamics (QCD)

Given the rise of the horizon from the scalar potentials to the vectors through the tangent transportations, the *Lagrangian* above (Eq.10.f) 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 (artifact 19.3 of reference [1] for more details).

Standard Model

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* to describe known fundamental forces (the electromagnetic, weak, and strong interactions, and not including the gravitational force) in the Universe, as well as classifying all known elementary particles.

Yang–Baxter Equation

In physics, the loop entanglement of Figure 8a involves a reciprocal pair of both normal partials

and antiparticles. This consistency preserves their momentum while changing their quantum internal states. It states that a matrix R, acting on two out of three objects, satisfies the following equation

$$(R \otimes \mathbf{1})(\mathbf{1} \otimes R)(R \otimes \mathbf{1}) = (\mathbf{1} \otimes R)(R \otimes \mathbf{1})(\mathbf{1} \otimes R) \qquad : Y^{-}\{e^{i\vartheta}\} \mapsto Y^{+}\{e^{-i\vartheta}\} \qquad (10.h)$$

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

Ontological Field Equation

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 these reactions can be interpreted by the commutation framework integrated with the gauge potential for *Physical Ontology*. At the third horizon for asymmetric dynamics, the ontological expressions have the gauge derivatives. Similar to derive the cosmic field equation, the motion dynamics of the field evolutions can be expressed straightforwardly the *Ontology Field Equation* (section 21 of the reference [1]):

$$\frac{R}{2} g_{\nu m} + G_{\nu m}^{-\sigma s} + \Theta_{\nu m}^{-\sigma s} = \mathcal{O}_{m\nu}^{+\zeta} \qquad (10.i)$$

The notion of ontological evolution 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. 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 [20]. Quantum fields in curved spacetime demonstrate 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 illustrates that, besides of the dynamic curvatures, the blackhole quantum fields emit a blackbody spectrum of particles known as *Bekenstein-Hawking* radiation leading to the possibility not only that they evaporate over time, but also that it quantities a gravitational modulations.

Mass Acquisition and Annihilation.

As a duality of evolution, consider N harmonic oscillators of quantum objects. The energy

20 Auyang, Sunny Y. (1995), How is Quantum Field Theory Possible?, Oxford University Press, ISBN 0-19-509345-3

spectra operates between the virtual wave and physical mass oscillating from one physical dimension on world planes into three dimensional *Hamiltonian* of *Schrödinger Equation* (Eq. 3.d). Intriguingly, the solution to the above equation can be either one-dimension *SU*(2) for ontological evolution or three-dimension for spacetime at the *SU*(3) horizon.

$$\varphi_n^+(r_n) = \frac{1}{\sqrt{2^n\, n!}} \left(\frac{m\,\omega}{\pi\,\hbar}\right)^{1/4} e^{-\frac{m\omega r_n^2}{2\hbar}} H_n\left(\sqrt{\frac{m\,\omega}{\hbar}} r_n\right) \qquad (10.k)$$

$$\phi_{nlm}^-(r_n,\theta,\phi) = N_{nl} r^l e^{-\frac{m\omega}{2\hbar} r_n^2} L_n^{(l+1/2)}\left(\frac{m\,\omega}{\hbar} r_n^2\right) Y_{lm}(\theta,\phi) \qquad (10.l)$$

$$N_{kl} = \left[\left(\frac{2\nu^3}{\pi}\right)^{1/2} \frac{2^{k+2l+3}\; k!\; \nu^l}{(2k+2l+1)!}\right]^{1/2} \qquad : \nu \equiv \frac{m\,\omega}{2\hbar} \qquad (10.m)$$

The $H_n(x)$ is the *Hermite* polynomials, detail by *Pafnuty Chebyshev* in 1859 [21]. The N_{kl} is a normalization function for the enclaved mass at the third horizon. Named after *Edmond Laguerre* (1834-1886), the $L_k^v(x)$ are generalized *Laguerre* polynomials [22] 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}^-, respectively.

As a quick verification, the density emerges with a full mass $\rho = \varphi_0^+ \phi_0^- \propto m^{1/4} m^{3/4} = m$, exactly. It demonstrates the mass acquisition is a process from its ¼ to ¾ core during its evolution from the second to third horizon, progressively.

21 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

22 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

11. Symmetric Field Equations

As another major part of the unification theory, the quantum fields give rise to a symmetric environment and bring together from conservation of flux commutation and continuity to the *general* field entanglements: *Second Universal Field Equations*.

Symmetric Fluxions

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 intrinsic reciprocal conjugation: $Y^-\ Y^+$ symmetry. The basic principles of symmetry and anti-symmetry are as the following:

1. Associated with its opponent potentials of scalar or vector fields, symmetry is a fluxion system cohesively and completely balanced such that it is invariant among all composite fields.
2. 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.
3. 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.
4. Both $Y^-\ Y^+$ symmetries preserve the laws of conservation consistently and distinctively, which orchestrate their local continuity respectively and harmonize each other dynamically.

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.

For the yinyang entanglement streams, 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 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*.

Continuity and Commutation

Under the event operations, the interoperation among four types of scalar or vector 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 $\langle\dot{\lambda}\rangle^{\mp}$:

$$[\hat{\lambda},\check{\lambda}]^{+}=\sum\nolimits_{n}p_{n}^{+}\left(\varphi_{n}^{-}\hat{\lambda}\phi_{n}^{+}-\phi_{n}^{+}\check{\lambda}\varphi_{n}^{-}\right) \qquad \langle\dot{\lambda}\rangle_{s}^{\pm}=\sum\nolimits_{n}p_{n}^{\pm}\varphi_{n}^{\mp}\dot{\lambda}\phi_{n}^{\pm} \qquad (11.a)$$

$$\langle\hat{\lambda},\check{\lambda}\rangle^{+}=\sum\nolimits_{n}p_{n}^{+}(\varphi_{n}^{-}\hat{\lambda}\phi_{n}^{+}+\phi_{n}^{+}\check{\lambda}\varphi_{n}^{-}) \qquad (\dot{\lambda}\rangle_{s}^{\pm}=\sum\nolimits_{n}p_{n}^{\mp}\phi_{n}^{\pm}\dot{\lambda}\varphi_{n}^{\mp} \qquad (11.b)$$

The symbols $\langle\ \rangle^{\mp}$ are called Y^{-} or Y^{+} *Continuity Bracket*, whereas another pair $[\ ]^{\mp}$ defines the *Commutator Bracket*. In addition, the bracket $\langle\ )^{\mp}$ and $(\ \rangle^{\mp}$ are called Y^{-} or Y^{+} *Asymmetry Brackets*. They are essential to ontological and cosmological dynamics. They represent the dual continuities of the $Y^{-}Y^{+}$ field densities, each of which extends its meaning to the classic anti-commutator or commutator,

$$\langle a,b\rangle=ab+ba, \qquad [a,b]=ab-ba \qquad (11.c)$$

known as *Lei Bracket*, introduced in 1930s [23].

Second Universal Field Equations

Integrating the fluxions of continuity and commutation with the first type of *Universal Field Equations* (7.j-7.m), we arrive at the second type of *Universal Field Equations*:

$$\mathbf{g}^{-}=\mathbf{g}_{0}^{-}+\frac{c}{2}\left[\check{\partial}_{\lambda}-\hat{\partial}^{\lambda}\right]_{v}^{-}+\frac{\hbar c}{2E^{-}}\left\langle\check{\partial}_{\lambda}(\hat{\partial}^{\lambda}-\check{\partial}^{\lambda})\right\rangle_{v}^{-}+\frac{\hbar c}{2E^{-}}\zeta^{-} \qquad (11.d)$$

$$\mathbf{g}^{+}=\mathbf{g}_{0}^{+}+\frac{\hbar c}{2E^{+}}\left[\left(\frac{E^{+}}{\hbar}+\check{\partial}_{\lambda}\right)(\hat{\partial}_{\lambda}-\check{\partial}^{\lambda})\right]_{v}^{+}+\frac{\hbar c}{2E^{+}}\zeta^{+} \qquad (11.e)$$

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

Electrodynamics and Gravitation

As a system without asymmetric entanglements or symmetric dynamics that does not have the asymmetric flex transportation spontaneously, the fluxions satisfy the residual conditions of $Y^{-}Y^{+}$ symmetric interweavement, or $\zeta^{\pm}=0$. At the third horizon, a pair of the flux commutations above

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

can derive the electromagnetic and gravitational fields (artifact 11.6 of the reference [1]), shown by the following:

$$\nabla \cdot \left(\mathbf{B}_q^- + \eta \mathbf{B}_g^-\right) = 0^+ \qquad : \eta = c_g/c \qquad (11.g)$$

$$\nabla \cdot \left(\mathbf{D}_q^+ + \eta \mathbf{D}_g^+\right) = \rho_q - 4\pi G \eta \rho_g \qquad (11.h)$$

$$\nabla \times \left(\mathbf{E}_q^- + \mathbf{E}_g^-\right) + \frac{\partial}{\partial t}\left(\mathbf{B}_q^- + \mathbf{B}_g^-\right) = 0^+ \qquad (11.i)$$

$$\nabla \times \left(\mathbf{H}_q^+ + \mathbf{H}_g^+\right) - \frac{\partial}{\partial t}\left(\mathbf{D}_q^+ + \mathbf{D}_g^+\right) = \mathbf{J}_q - 4\pi G \mathbf{J}_g \qquad (11.j)$$

where the index q for *Electromagnetism* and g for *Graviton*. Appeared as independence or loosely coupled at the third or fourth horizons, they constitute all type of physical interaction that occurs between electrically charged or massive particles. 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 physical energies of entanglements. 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.

12. Thermodynamics

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 [24] for blackbodies or *Bekenstein-Hawking* radiation [25-26] for blackholes, or in fact at both for normal objects. These waves, making up the radiations, can be imagined as $Y^- Y^+$ dynamics of propagating transverse oscillating electric, magnetic and gravitational fields.

Law of Conservation of Light

Besides the primary properties of visibility, intensity, propagation direction, wavelength spectrum and polarization, the light has the law of conservation, derived by and abstracted from the numerous artifacts of quantum infrastructure of universe.

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

Figure 12a: Law of Conservation of Light

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. Based on the principle of *Two Loops of Triple Entanglements*, 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

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

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

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

the potential fields on a pair of the world planes are a triplet quark system at $2\varphi_a^+(\phi_b^- + \phi_c^-) \approx 4\varphi_a^+\phi_{b/c}^-$ (Figure 8a), it is about four times of the density for the wave emission. Applicable to the conservation above, an area energy fluxion of the potentials is equivalent to an entropy of the electro-photon radiations [27] in thermal equilibrium:

$$S_A(\omega_c, T) = 4\left(\frac{\omega_c^2}{4\pi^3 c^2}\right) = \eta_c\left(\frac{\omega_c}{c}\right)^2 \mapsto 4\frac{E_c^- E_c^+}{(\hbar c)^2} \qquad : \eta_c = \pi^{-3} \qquad (12.a)$$

where the factor 4 accounts 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 photon in the complex formulae:

$$E_c^{\pm} = \mp\frac{i}{2}\hbar\omega_c \qquad : \eta_c = \frac{1}{\pi^3} \approx 33\,\% \qquad (12.b)$$

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.

Law of Conservation of Gravitation

Similar to acquisition of *Conservation of Light*, we represent the characteristics of gravitation, derived by and abstracted from the numerous artifacts of quantum infrastructure of universe.

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

Figure 12b: Law of Conservation of Gravitation

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

Under the superphase modulations, the feature of nature gravitation is independent of the orientation and the boost transformation or spiral torque invariance 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.

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 has the transportable commutation of area entropy S_A and conservable radiations of a *Schwarzshild* blackbody [28-29]. It is equivalent to associate it with *Bekenstein-Hawking* radiation.

$$S_A(\omega_g, T) = 4\left(\frac{c_g^3}{4\hbar G}\right) = 4\frac{E_g^- E_g^+}{(\hbar c_g)^2} \qquad \rightarrow \qquad E_g^{\pm} = \mp\frac{i}{2}\sqrt{\hbar c_g^5/G} \tag{12.c}$$

where the number 4 is factored for a dual-state system. Consequently, the gravitational energies $E_g^{\pm}$ contain not only a duality of the complex functions but also an irreducible unit: ***Graviton***, as a pair of graviton units:

$$E_g^{\pm} = \mp\frac{i}{2}E_p \qquad\qquad : E_p = \sqrt{\hbar c_g^5/G} \tag{12.d}$$

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, 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.

28 Bekenstein, Jacob D. (April 1973). "Black holes and entropy". Physical Review D. 7 (8): 2333–2346
29 S. W. Hawking,"Black hole explosions?", Nature 248, 30 (1974)

13. Asymmetry of Cosmology

Under *Universal Topology*, 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 nature.

Law of Asymmetric Dynamics

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, although the interaction is a pair of yin yang entanglements.
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.

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.

General Relativity

Simply applying the commutation for a statically frozen or inanimate state, the two-dimensions of the world line can be aggregated in the following expression to formulate the classical *General*

Relativity:

$$G_{n\nu} = R_{n\nu} - \frac{1}{2} R\, g_{n\nu} \qquad : \left[\check{\partial}^{\lambda}\check{\partial}^{\lambda}, \hat{\partial}_{\lambda}\hat{\partial}_{\lambda}\right]_{v}^{+} = 0,\ C_{n\nu} = 0 \qquad (13.a)$$

known as the *Einstein* field equation [30], discovered in November 1915. The theory had been one of the most profound discoveries of the 20th-century physics to account for general commutation in the context of classical forces.

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 phenomenon of photon and graviton transportation, blackhole radiation, and dark energy modulation, briefly shown in the section below.

Cosmic Field Equations

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. 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. The motion dynamics can be fabricated in the covariant form of asymmetric equation:

$$\mathfrak{R}^{-} + \mathbf{\Lambda}^{+} = \frac{R}{2}\mathbf{g}^{-} + \mathbf{G} + \mathbf{C}^{-} \qquad (13.b)$$

$$\Lambda_{\nu m}^{+\sigma} = \Diamond^{+} - i\begin{pmatrix} 0 & -\frac{\partial}{c\partial t}\mathbf{D}_{v}^{+} \\ \nabla\cdot\mathbf{D}_{v}^{+} & \nabla\times\mathbf{H}_{v}^{+}/c \end{pmatrix}, \qquad \Diamond^{+} = \left(\frac{1}{c^{2}}\frac{\partial^{2}}{\partial t^{2}}\right\rangle^{-} - \left\langle\nabla^{2}\right\rangle^{-} \qquad (13.c)$$

The $\Lambda_{\nu\mu}^{+}$ is the Y^{+} cosmological modulator that extends the classic cosmological constant to the matrix. The D_{v}^{+} and H_{v}^{+} fields are the intrinsic modulations in form of a duality of asymmetry and antiasymmetry cohesively. 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. In our expectation, the light and gravitational propagations $\Diamond^{+}$ are inevitably a part of the field conservation, emitted by the physical and dark objects.

Apparently, the dark dynamics is the sophisticated processes with the message transformations, relativistic commutations, and dynamic modulations that operate the physical motion curvature. 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

30Einstein, Albert (1916). "The Foundation of the General Theory of Relativity". Annalen der Physik. 354 (7): 769

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. As the reciprocal opponent, there is another Y^+ cosmic field as the opponent twin, details in section 18 of the reference [1].

Big Bang Theory

In the *Big Bang* theory, "the universe began from a singularity," introduced in 1927 by *Lemaître* [31], 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 non-singularity to physical spacetime singularity. 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 in the earliest states of physical objects, *Big Bang Theory* would have been a cosmological model for the universe, if the ordinary matter in the universe were dominant or created virtual energy. Therefore, the model of "*Big Bang* theory" might be limited to a process of the mass inauguration in physical object only. Besides, in reality, acceleration of a physical object is simply embarrassed by a common phenomenon or a result of the generation process of light radiations. 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.

Cosmic Redshift

In reality, only in the third horizon, a moving body away from or towards to the receiver is the redshift or blueshift caused by the *Doppler* effect [32]. For the light emitted at the second horizon, it doesn't matter or irrelevant to what happens to the emitting object physically at the third or higher horizons - it will not affect the wavelength of the light that is received at the third or higher physical horizons. In the case of the cosmic 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 [33]. Because the rate of action time changes or "expends" between the

31Lemaître, 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

32Buys 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

33R. Gray, J. Dunning-Davies (2008) "A review of redshift and its interpretation in cosmology and astrophysics", arXiv:0806.4085

emitting and the receiving, that will affect the received wavelength. Apparently, the cosmic 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 physical world.

Besides no-singularity in the virtual event operations of the universe, the cosmic 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, objects are often virtual and physical matters, and the morphisms are dualities of the dialectical processes orchestrating a set or subsets of events, operations, and states in one regime rising, transforming, transporting, and alternating into states of the others: a universal topology of the natural infrastructure.

As a result, our theoretical physics, scoped within physical space as one of the manifolds in the universal topology, is now approaching to its opponent as a twin that more concepts and details need to be further integrated with the virtual space. This signals us that a new era of scientific research is dawning: a duality of virtual-physical reality. As the scientists, we are now challenged with the following missions:

a. It is an essential knowledge for us to uncover the other side of world line, the virtual space plane, which is the twin to the physical space plane under oneness of the global universal manifold.
b. It is the vital conception to integrate a duality of the spaces under the holistic topology of universe manifested to depict our nature with both world planes of physical and virtual manifolds.

In fact, mathematization of the natural philosophy has being developed and demonstrating the theoretical unification that can extend our current sciences, including but not limited to physics, cosmology, biology, metaphysics, ontology, economics, and information technology, into a next generation of virtumanity: life animation and rising of virtual civilization. Our mankind is at dawn of a new era, towards revolutions of:

1. Advancing scientific philosophies towards next generation,
2. Standardizing topological framework for modern physics,
3. Virtualizing informational sciences towards virtue reality,
4. Theorizing biology and biophysics for the life sciences,
5. Rationalizing metaphysics back on the scientific rails.

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