PHILOSOPHY OF NATURE, UNIVERSAL FIELD THEORY, NATURAL COSMOLOGY, AND ONTOLOGICAL EVOLUTION

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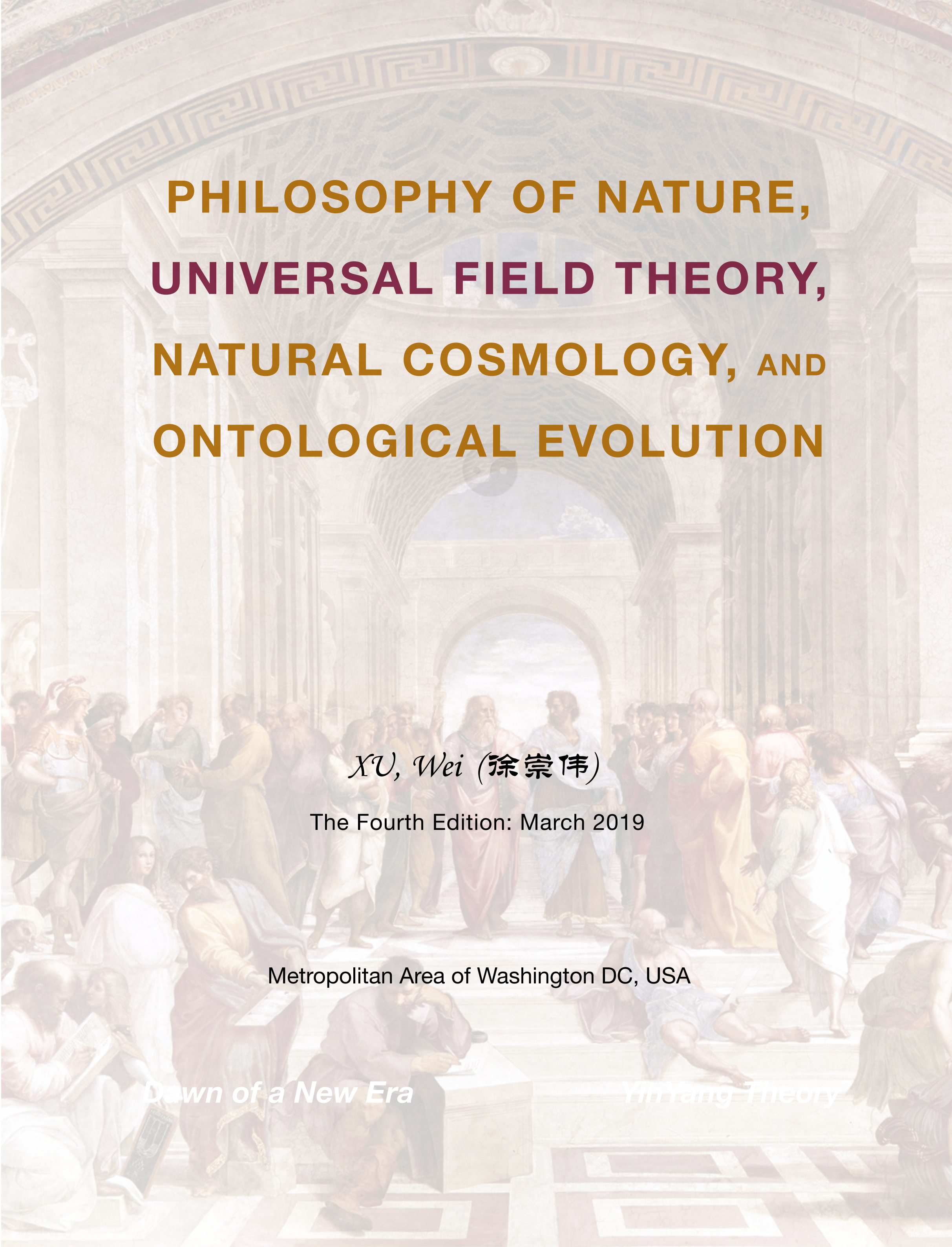

Sciences in Dialectical Nature of Virtual and Physical Duality

Abstract

The fundamental principles of this book are human wisdoms and revelation of our ultimate philosophy, scientific theories and empirical knowledge for over five-millennia that give birth to "*Universal Field Theory*". For the first time in history of human development, this grand unification essentially and dramatically simplifies our classical and contemporary physics holistically, consciously, philosophically and mathematically. By exploring the profound knowledge behind the workings of the nature, a reader can exercise from zero level of physics, to professional level of future sciences, and back to prevail over classical or contemporary physics of particle fields, quantum theories, thermodynamics, electromagnetism, gravitation, cosmology, ontology and more.

Since inauguration during 2016-2018, it is now strikingly breaking forth systematically from the philosophy of natural laws to the unification of the entire traditional, classical and contemporary physics. This manuscript gracefully represents each context of the laws philosophically, defines their terminologies revelationally, derives the scientific theories mathematically, and testifies the artifacts empirically.

Chapter I: Abstracts principles of Philosophy of Nature and reveals secrets of Topology of Universe and Horizon Hierarchy of Worlds, predominantly Laws of YinYang processes and of Event Evolutions.
(Designed for philosophers using methodology of "divine inspirations by heart")

Chapter II: Illustrates how the Infrastructure of Universe is developed as the mathematical framework to carry out Universal Field Equations and give rise to the foundations of physical Horizons.
(Designed for scientists using methodology of "research thoughts by brain")

Chapter III-VII: Testifies why the theory can unify our modern physics, conclude numerous groundbreakings, and declare as Universal Field Theory, prevailing over quantum fields, thermodynamics, electromagnetism, gravitation, cosmology and ontology.
(Designed for empiricism using methodology of "controlled experiments by technology")

Correspondingly, readers will gain their confidences of efficiency and accuracy in development of our future sciences.

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著者：徐崇伟 - 农历丁酉2017年

XU, Wei (徐崇伟)

Mr. *Wei XU* is a resourceful entrepreneur. From software engineer to tech guru, from executive to entrepreneur, he has over thirty years of extensive experiences in delivering comprehensive innovations in information technologies. *Simultaneously*, from scientist to philosopher, he also focuses on the *Scientific Principles of Natural Philosophy* to uncover whole structures of *Elementary Particles*, *Natural Ontology*, *Cosmology*, and *Unified Field Theory*.

Funded by the *White House* in 1993 to secure the first website of whitehouse.gov [a], Wei developed one of the top application firewalls in June 1994: Gauntlet Firewall [b], initiating the third generation firewalls [c]. Upon his successful completion of IPSec [d] research, he released the first commercial VPN product in the IT industry market in December 1994. As a pioneer of information security, Wei founded Spontaneous Networks in 1999, where he created the cloud service security on-demand transformable at the click of a button. Since then, he served as a *Chief Architect* in many commercial and government organizations and delivered thousands of virtual secure datacenter networks nationally and internationally. Today, he is developing the groundbreaking innovations: *Virtual Productive Forces* and next generation of *Internet Protocols*, enlightened by his recent scientific discoveries.

During the two years in 2009 and 2010, *Wei* received a set of the divine books in the old classic manuscripts: *Worlds in Universe*. Appeared initially as the profound topology of universe in philosophy, it turns gradually out groundbreakings and has concisely revealed the theoretical physics: i) the constitution of *Elementary Particles* including *Virtual Dark Energy* in 2013 [e], ii) *Universal Topology and Framework* in 2015, iii) *Universal and Unified Physics* in 2018 [f], iv) Framework of "*Natural Cosmology*" in 2018 [g], and v) inception of "*Ontology of Nature*" in 2019 [h].

Mr. Xu holds his BS and his first MS degrees in Theoretical Physics from Ocean University of China and Tongji University, and his second MS degree in Electrical and Computer Engineering from University of Massachusetts [i].

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PHILOSOPHY OF NATURE, UNIVERSAL FIELD THEORY, NATURAL COSMOLOGY, AND ONTOLOGICAL EVOLUTION

A PHILOSOPHICAL SCIENCE OF “YINYANG PHYSICS”

Foreword

By exploring the profound principles behind the workings of the nature, we abstract each context of the laws philosophically, define their terminologies revelationally, derive the scientific theories mathematically, and testify the “artifacts” empirically. 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 during 2016-2018*, the *Principles* harvest a variety of the scientific knowledge and theories systematically, 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* assemble our human wisdom over five thousand years and are breaking forth systematically at the essentials of

1. *Philosophy of Natural Laws,*
2. *Infrastructure of Horizon Frameworks, Event Evolutions, and Universal Field Equations,*
3. *Empirical unification of our modern physics, to conclude numerous groundbreakings, and finally*
4. *Declaration of Unified Field Theory, newborn Natural Cosmology, and inception of Natural Ontology.*

As a result, our theoretical sciences, scoped within or limited in physical space as one of the manifolds in the universe topology, are now approaching to its twin for a duality of integrations with the virtual spaces. This signals us that a new era of our scientific matureness is dawning: duality of virtual-physical reality.

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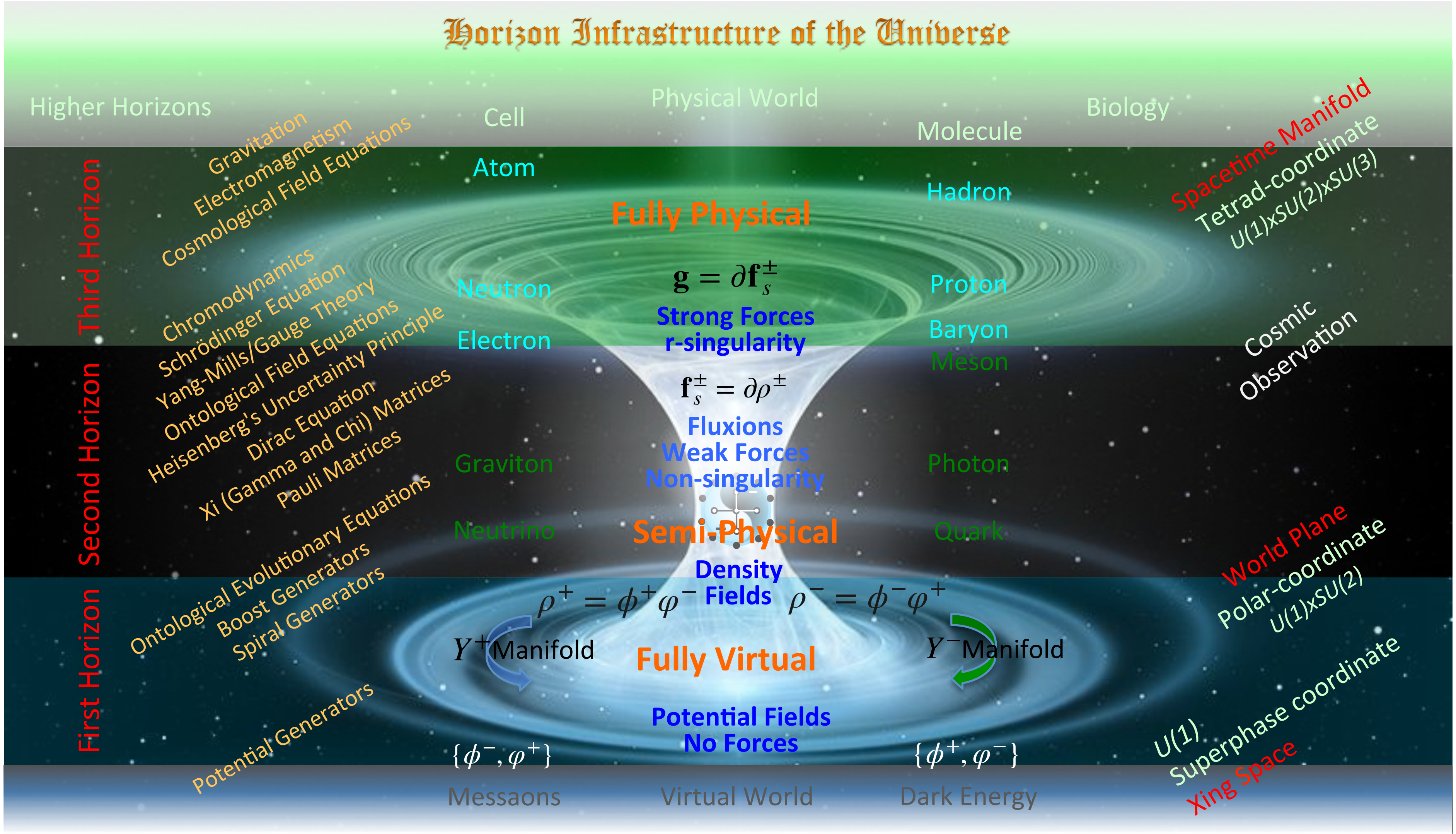
To Those in Search of The Truth

To Generations of Civilization

Author：**Xu, Wei** (徐崇伟)

The core context of this manuscript was given before
and published at Christmas Day of 2017.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Virtual World
Dark Energy

Virtumanity

Sciences in Dialectical Nature of Virtual and Physical Duality

Philosophy of Nature

CHAPTER 1

Since the fundamental concepts in this "*Universal and Unified Field Theory*" 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. The *Natural Philosophy* 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 of nature are presented as the conceptualization to visualize our definitions of the philosophical and mathematical frameworks. They are strikingly different from neither traditional nor modern perspectives seeded in our physics and other sciences. 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.

From Bohr's declaration "Everything we call real is made of things that cannot be regarded as real", to Feynman's claim for the "existence of the rest of the universe", to Hawking's statement "'philosophy is dead" "philosophers have not kept up with modern developments in science, particularly physics", the search for a new philosophical science to overcome physical uncertainty is today's key mission to the unresolved problems of contemporary physics.

1. Methodology in Search of Truth

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.

$$\textit{Interpretation} \Leftarrow \quad \textit{Theory} \quad \Leftarrow\Rightarrow \quad \textit{Observation and Experiment} \qquad (1.1.1)$$

This 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.

Similar to the apocryphal story of the elephant and the three blind men, this classical approach has relied on methods of observation and mathematics to discover the principles of nature in the regime of the “sensible” macro-objects. At the scope of the dark energy and elementary particles towards the virtual regime, no amount of careful empirical approach or mathematical models can replace the intrinsic roles, for the modes of philosophy have always been distinct fundamentally. The vagueness of mathematized physics has been gone awry and pushed to extreme at the “collapsed” physics for a forty-year search on a *Theory of Everything* or *Unified Field Theory*, followed by another sixty-year period wasted on *String* or *Superstring Theory*, *M-Theory*, and other fairy-tale physics. It was excessive hyper among the traditional disciples that, time and again, led metaphysics to pseudoscience. Today, contemporary physics is on the same track.

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. The methodology of searching for truth must dawn on natural philosophy driving and refining scientific theories to empirical verifications.

$$\textit{Philosophy} \quad \Rightarrow \quad \textit{Theory} \quad \Leftarrow\Rightarrow \quad \textit{Observation and Experiment} \qquad (1.1.2)$$

In other worlds, 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.

2. 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.

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 opposite *Matter* and *States* 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 reciprocal *matter* and *states* is responsible to operate and conserve the fluxion 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 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.

3. Duality of Nature

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

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.

Yin (Y^-) and *Yang* (Y^+), or simply - and $+$, are the states of, processes to or operations on an element or an object, which form a coherent fabric of our nature, as exhibited in all real existence. *YinYang*（阴阳）duality is a part of the supernatural principles in an environment of virtual space that Chinese tradition has developed the profound metaphysics and established scientifically the natural laws of *Xing* (性) or *YinYang*: the reciprocal interaction of the opposites is to cause all universal phenomena.

For the conceptual simplicity, our natural topology refers the states, events, and operations of "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. As 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: *Yin* and *Yang* manifolds, progressively and complementarily rising through various stages of alternating streams – *Entanglements*.

In accordance with the alternating cycles, the evolutionary process operates from *YinYang* events to states of dual phases (二相), four symbols (四象), and eight trigrams (八卦), sequentially. The dynamics of sixty-four pairwise permutations of hexagrams (六十四卦) expounds the well-known *Yi Jing* (*I-Ching*) or “*Book of Changes*”, correspondent to astronomy, astrology, geography, geomancy, anatomy, *Chinese* medicine, and elsewhere, studied philosophically and practiced empirically for over five millennia.

4. 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 at the virtual world such that, in physics for example, it can only be describable or usable at its properties, which are well established in the contemporary physics as "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".

Mass is the enclave of energies or virtual objects that is embodied in a physical world only. As the outer world, a physical world has mass enclosure, whereas, as the inner world, a virtual world is commonly massless. For example, the states of mathematical formulation of entanglements for the energy-mass conversion is characterized by the magic "i" in the virtual complexes as:

$$E_n^{\mp} = \pm\, imc^2 \tag{1.4.1}$$

where m is the rest mass. Compliant with a duality of *Topology of Universe*, it redefines, extends and completes *Einstein* mass-energy equivalence, introduced in 1905, into the virtual energy states as one of the essential formulae of the natural philosophy. The terms of "negative" or "positive" energy must be associated with its virtual state precisely. Energy and Matter is a duality of *YinYang* nature of universe. At the zero mass, it is well known that an interruption of virtual matter 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 world. Based on the evolutionary topology of universe, forces cannot be the fundamental formations to give birth to a physical world. Because of the superposing interaction of natural energy, the laws of natural philosophy imply no singularity exist during mass inauguration at or before its initial phase of the physical acquisition.

5. 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. It constitutes and orchestrates various domains, called *World*, each of which is composed of hierarchical manifests for the events, operations, and transformations among the neighborhood zones or its subsets of areas, called *Horizon*. An event or operation is naturally initiated by and interoperated among each of horizons, worlds, and universe. Together, they form the comprehensive situations of the horizon, life steams of the world, and environments of the universe.

As one of the universe domains, for example, our world is consisted by the laws of yinyang principles, characterizable as $Y^{-}Y^{+}$ and known as a duality of YinYang (阴阳 in Chinese) entanglement for the *Event Operations* to transform and transport among the neighborhood zones or its subsets of areas, giving rise to physical horizons. In mathematics, representing the complementary opponents and operating as the resource of the motion dynamics for all natural states and events, *Universal Topology* in our natural philosophy is simply a complex conjugation as a *YinYang* duality of *Physical* (W^{-}) and *Virtual* (W^{+}) worlds:

$$W^{\mp} = We^{\pm i\vartheta} \qquad \text{or} \qquad W^{\mp} = P \pm iV \tag{1.5.1}$$

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

A universal environment is 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.

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 worlds, there are three domains with each of their own type of spaces or times, respectively defined by:

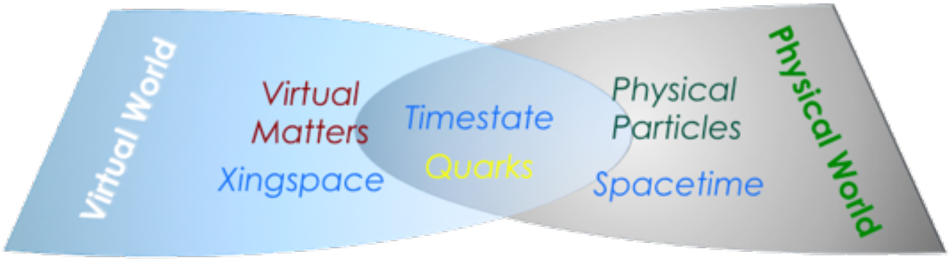

Figure 1.5: Domains of Worlds

1. *Xingspace: Xingscope in virtual worlds.*
2. *Timestate: Statescope between virtual and physical worlds.*
3. *Spacetime or Timespace: Spacescope in physical worlds, where it implies Spacetime as the Y^- primacy and Timespace as the Y^+ primacy in the physical worlds.*

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 give rise to the physical horizons.

6. World Planes

In the universe, 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 interweave 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. 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 a holistic world *W*.

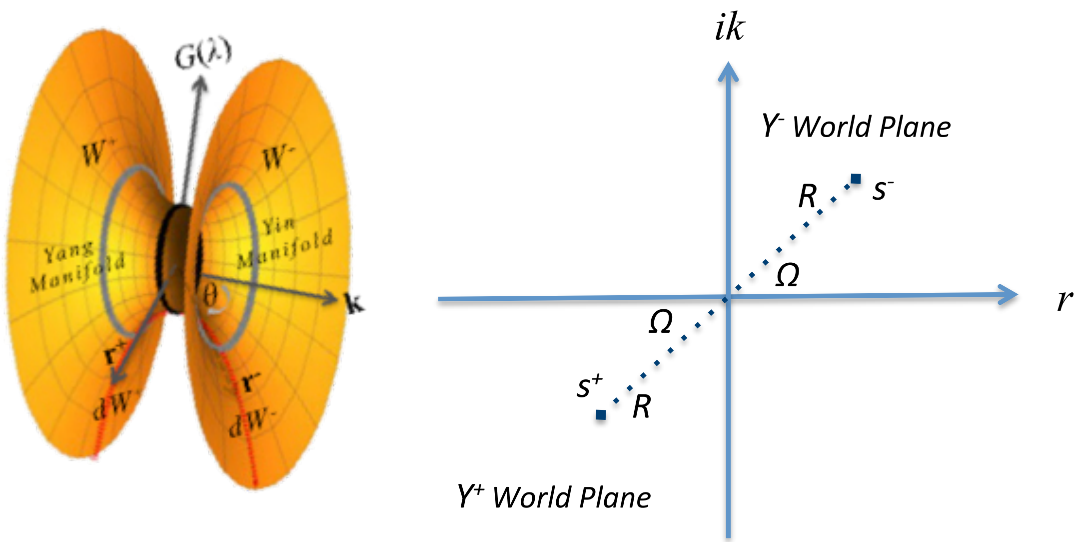

Figure 1.6: Two-Dimensional World Planes of Universal Topology

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* commutation generates photons and the *Spiral* entanglement produces gravitons. Remarkably in accordance with our philosophical anticipation, conservation of communication between the virtual and physical worlds is operated by superphase at the world planes, and maintained at the two-dimensional manifolds under the torsion invariance without r-singularity. For a duality of the polar-coordinate $\{r, k\}$ of world planes, illustrated in Figure 1.6, the two pints of the world lines $w^{\pm}$ are as the following:

$$w^{+} = r - ik = Re^{i\Omega} \qquad w^{-} = r + ik = Re^{-i\Omega} \qquad : R\sin\Omega = ic\lambda,\ k = ic\lambda \tag{1.6.1}$$

where $k = ic\lambda$ at the event λ. The amplitude $R = R(\lambda)$ is the one-diminution of physical location, and the superphase $\Omega = \Omega(\lambda)$ is the one-diminution of virtual modulation. It is straightforward to have their differentiate forms:

$$dw^{\pm} = e^{\pm i\Omega}(dR \pm iRd\Omega) \qquad dR\sin\Omega = icd\lambda - Rd\Omega\cos\Omega \tag{1.6.2}$$

The compact form of the world-line metrics can be written as the following:

$$dw^{+}dw^{-} = (dR)^2 + (Rd\Omega)^2 = \frac{1}{\sin^2\Omega}\left[-(cdt)^2 + R^2(d\Omega)^2 - 2i(cdt)(Rd\Omega)\cos\Omega\right] \tag{1.6.3}$$

$$\frac{dw^{+}}{d\lambda}\frac{dw^{-}}{d\lambda} = \frac{1}{\sin^2\Omega}\left[(R\Theta)^2 - 2ic\left(R\Theta\right)\cos\Omega - c^2\right] \qquad : \Theta = \frac{d\Omega}{d\lambda} \tag{1.6.4}$$

where the $\Theta = d\Omega/d\lambda$ is the superphase potential, similar to a gauge field. At the initial superphase of $\Omega = 0$:

$$\Theta^2R^2 - 2ic\Theta R - c^2 = 0 \qquad \rightarrow \qquad \Theta R_{\Omega=0} = ic \tag{1.6.5}$$

This implies that a galactic center be modulated by the superphase as the rotational center. Since the $\Theta R_{\Omega=0}$ field is at constant *c*, a galactic center for a given Ω is at a fixed point on the world planes. Consequently, any of the stationary points on the world planes represents an eternal state of, for example, the rotational Milky Way.

7. Potential Fields

Governed by a global event λ under the universal topology, an operational environment is initiated by the virtual $\phi^{+}(\lambda)$ or physical $\phi^{-}(\lambda)$ *Potential Field* 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 of their own manifold. Corresponding to its maximal set of commutative and enclave states, a potential function defines the states of an energy system virtually and represses the degrees of freedom physically. Uniquely on both of the two-dimensional world planes, a 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 potential 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 $\varphi^{\pm}$ in its opponent manifold. In order to regulate the redundant degrees of freedom in particle interruptions, the double streaming entanglements of a potential 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:

$$\psi^{+} = \psi^{+}(\hat{x})\ exp[i\hat{\vartheta}(\lambda)] \qquad : x^{\mu} = x^{\mu}(\lambda),\ \lambda = \lambda(x^{\mu}),\ \psi^{+} = \{\phi^{+}, \varphi^{+}\} \qquad (1.7.1)$$

$$\psi^{-} = \psi^{-}(\check{x})\ exp[i\check{\vartheta}(\lambda)] \qquad : x_{\nu} = x_{\nu}(\lambda),\ \lambda = \lambda(x_{\nu}),\ \psi^{-} = \{\phi^{-}, \varphi^{-}\} \qquad (1.7.2)$$

The amplitude function $\psi(x) : x = x(\lambda)$ represents the spatial position of the wave function complying with *superposition* or implicit to its λ event. The spiral function $\vartheta(\lambda) : \lambda = \lambda(x)$ features superphase of the λ event at the quantum states implicit to the physical dimensions. At a physical horizon, each point of the fields becomes flux density or acceleration, giving rise to the correspondent vector $\phi^{\pm}(x, \lambda) \mapsto V^{\pm}(x, \lambda)$ or tensor $V^{\pm}(x, \lambda) \mapsto M^{\pm}(x, \lambda)$ that entangles with its opponent for commutations as well as associates with the modulations in the scalar $\varphi^{\pm}$ fields.

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

$$\rho(x, \lambda) = \psi^{-}\big(x(\lambda)\big)\psi^{+}\big(\lambda(x)\big) \qquad : x \in \{x^{\mu}, x_{m}\} \tag{1.7.3}$$

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.

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

8. Event Evolution

Both time and space are the functional spectra of the events λ, operated by and correlate with their virtual and physical potentials, and generated by supernatural $Y^{-}Y^{+}$ events associated with their virtual and physical framework of universal topology. The event states on spatial-time planes are open sets and can either rise as subspaces transformed from the other worlds or confined as locally independent existence within their own domain. As in the settings of spatial and time manifolds 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. In mathematical analysis, a complex manifold yields a holomorphic operation and is complex differentiable in a neighborhood of every point in its domain, such that an operational process can be represented as an infinite sum of terms:

$$f(\lambda) = f\left(\lambda_0\right) + f^{'}\left(\lambda_0\right)(\lambda - \lambda_0)\cdots + f^{n}\left(\lambda_0\right)(\lambda - \lambda_0)^{n}/n! \qquad (1.8.1)$$

known as the *Taylor* and *Maclaurin* series, introduced in 1715. Normally, a global event generates a series of sequential actions, each of which is associated with its opponent reactions, respectively and reciprocally.

9. Operational Processes

Following *Universal Topology*, world events, illustrated in the Y^-Y^+ flow diagram of Figure 1.9, operate the potential entanglements that consist of the Y^+ supremacy (white background) at a top-half of the cycle and the Y^- supremacy (black background) at a bottom-half of the cycle. Each part is dissolving into the other to form an alternating stream of dynamic flows. Their transformations in between are bi-directional antisymmetric transportations crossing the dark tunnel through a pair of the end-to-end circlets on the center line. Both of the top-half and bottom-half share the common global environment of the state density ρ_n that mathematically represents the $\rho_n^+ = \phi^+\varphi^-$ for the Y^+ manifold and its equivalent $\rho_n^- = \phi^-\varphi^+$ for the Y^- manifold, respectively.

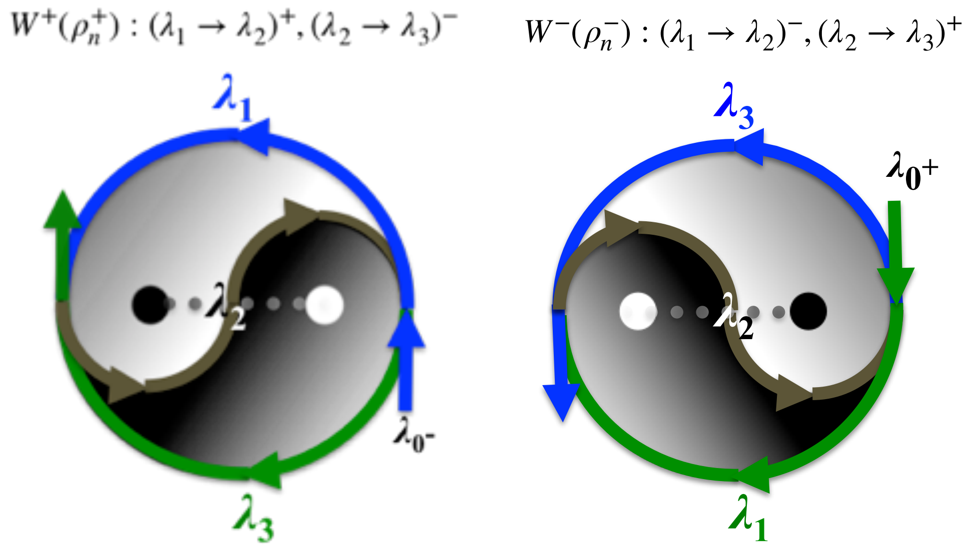

Figure 1.9: Event Operations of YinYang Processes: $\hat{\partial}^\lambda \circlearrowleft \hat{\partial}_\lambda \rightleftharpoons \check{\partial}^\lambda \circlearrowright \check{\partial}_\lambda$

Besides, the left-side diagram presents the event flow acted from the inception of λ_{0^-} through λ_1 λ_2 λ_3 to intact a cycle process for the Y^+ supremacy. In parallel, the right-side diagram depicts the event flow initiated from the event λ_{0^+} through λ_1 λ_2 λ_3 to complete a cycle process for the Y^- supremacy. With respect to one another, the two sets of the *Universal Event* processes, cycling at the opposite direction simultaneously, formulate $W^+(\rho_n^+) : (\lambda_1 \to \lambda_2)^+, (\lambda_2 \to \lambda_3)^-$ and $W^-(\rho_n^-) : (\lambda_1 \to \lambda_2)^-, (\lambda_2 \to \lambda_3)^+$ the flow charts in the quadrant-state expressions:

$$W^+ : (\hat{\partial}^{\lambda_1} \to \hat{\partial}_{\lambda_2}), (\check{\partial}^{\lambda_2} \to \check{\partial}_{\lambda_3}) \quad (1.9.1)$$

$$W^- : (\check{\partial}_{\lambda_1} \to \check{\partial}^{\lambda_2}), (\hat{\partial}^{\lambda_2} \to \hat{\partial}_{\lambda_3}) \quad (1.9.2)$$

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 least continuous helix-circulations aligned with the universal topology, which lay behind the context of the main philosophical interpretation of *World Equations*. In reality, it represents a cycle process of the *Quadrant-State* entanglements on the two-dimensional world planes to give rise to the infrastructure generators that produce a quadrant set of the spin 2x2 *matrices* and reciprocal 4x4 *gamma*-matrices at the second horizon and evolve into the generators of the *Lorentz* transform at the third horizon.

10. Horizon Infrastructure

Horizon is 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.

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

As a part of *Universal Topology*, the virtual Y^+ and physical Y^- duality architecturally defines further hierarchy of the event evolutions, its operational interactions and their commutative infrastructures. In the Y^-Y^+ manifolds, a potential field can be characterized by a set of the scalar function of $\{\phi^+, \varphi^-\} \in Y^+$ and $\{\phi^-, \varphi^+\} \in Y^-$ as *Ground Potentials*, to serve as a state environment of universal topology. 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 commutations, which generate an interruptible tangent space, named as *Second Horizon Fields*, and further give rise to *Third Horizon* and beyond. In physics, the *Horizon Hierarchy* is shown by the following structure:

1. *Ground Horizon: Potential fields of elementary particles* $(\{\phi^+, \varphi^-\}, \{\phi^-, \varphi^+\})$
2. *First Horizon: Thermo-state density of World Planes* $(\rho^+ = \phi^+\varphi^-, \rho^- = \phi^-\varphi^+)$
3. *Second Horizon: Flux continuity and commutation* $(\mathbf{f}_s^\pm = \partial\rho^\pm)$

4. *Third Horizon: Force fields in spacetime manifolds* ($\mathbf{g}_s^{\pm} = \partial \mathbf{f}_s^{\pm}$)
5. *Fourth Horizon: Commutation and continuity of acceleration fields* ($\mathbf{g}_v^{\pm} = \partial \mathbf{f}_v^{\pm}$, $\partial \phi \mapsto V$)

A 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. In our model, the $SU(2)$ horizon is on the world plane described by

I. *A set of the 2x2 boost matrices (Eq. 3.2.5) that generates Sigma-matrix and produces photons, and*
II. *A set of the 2x2 torque-matrices (Eq. 3.3.7) that provokes Epsilon-matrix and harvest gravitons.*

At this second horizon, some objects acquire a part of their mass quantity (exert weak forces for partially physical interactions) and some have zero-mass (interactive virtually without force). Essentially, they are building blocks of a fully physical domain $SU(3)$. Only at the third horizon, particles have their full mass (strong force interactions). Associated with the mass enclave, a force is natural in physical domain but not in virtual world.

A homogeneous system has a trace of diagonal elements where an observer is positioned external to or outside of the objects. The source of the fields appears as a point object and has the uniform *conservations* virtually at every point without irregularities in field strength and direction, regardless of how the source itself is constituted with or without its internal or surface twisting torsions. Whereas, a heterogeneous system has the off-diagonal elements of the symmetric tensors where an observer is positioned internal to or inside of the objects, and the duality of virtual annihilation and physical reproduction are balanced to form the local *Continuity* or *Invariance*.

11. Spacetime Manifold

As a fascinating consequence, under the two-dimensions of the world planes, the horizon generators incept a freedom of the extra dimensions into the physical or virtual world, respectively giving rise to the third horizon, where it completes a full mass acquisition, and finally develops into the four-dimensional *Spacetime* manifold for physical objects, simultaneously.

From the world planes to the spacetime manifolds, the evolution can be visualized in mathematics for the rotational degrees $\{\theta, \phi\}$ of freedom as the following:

$$d\Sigma^2 = dr^2 + S_k(r)^2\, d\vartheta^2 \quad : d\vartheta^2 = d\theta^2 + \sin^2\theta\, d\phi^2 \qquad (1.11.1)$$

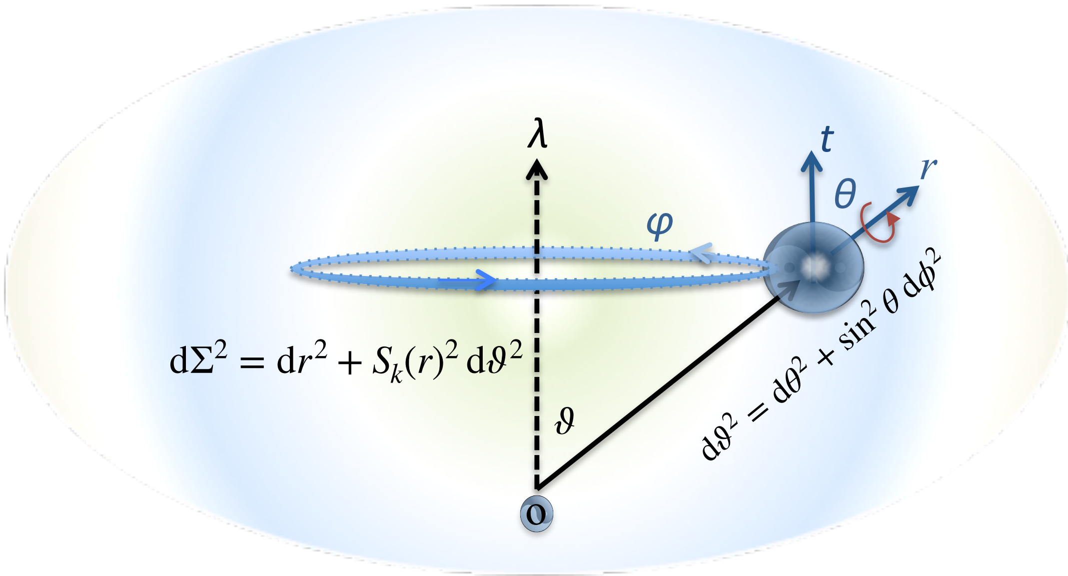

Figure 1.11: Evolution from World Planes into Spacetime Manifold

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*.

In reality, 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.

For the physical or virtual interactions, the fields have to across a wide range of physical domains, spanning spontaneously all length scales: from sub-atomic and particle physics, to molecular length scales of chemical and biological interest, to cosmological length scales encompassing the *Universe* as a whole. Among them, the first and second horizons described by the scalar fields are the essential core for the superphase modulations to all of the physical world. In contemporary physics, these essentials are simply named as *Dark Energy*, currently defined as “an unknown form of energy which is hypothesized to permeate all of space, tending to accelerate the expansion of the universe”. Disregard the ambiguous appellation in this definition, the term is delineated straightforwardly to “the unknown forms of energy”.

12. Field Propagation

Field propagation is a natural essence of virtual potential interruptions accompanied by a transfer of virtual energy that appears as oscillational waves, either travels through a physical medium or entangles cross an empty space. In the physical regime, it always associates with frequency of the vector wave and, referring to the addition of time. In the virtual regime, field propagation is superposing and transfers energy virtually from one point to another, which displace physical particles of the transmission medium – that is, with little or no associated mass transportation. Remarkably, field propagations consist of or source from oscillations or vibrations of a physical quantity, around almost fixed locations at the third or higher horizons, while the propagation is a disturbance entanglement that transfers energy virtually through the first and second horizons.

Described by a field equation, field propagation sets out how the entanglement proceeds over time in the physical regime. By means of commutation and/or continuity, field equation is a partial differential equation which determines the flux dynamics of a pair of the physical or virtual potentials, specifically the time evolution and spatial distribution of the fields. The solutions to the equation are mathematical functions which correspond directly to the field, as a functions of time and space. Since the field equation is a partial differential equation, there are families of solutions which represent a variety of physical possibilities as well as superphase modulations. Usually, there is not just a single equation, but a set of coupled equations which must be solved simultaneously. Field equations are not ordinary differential equations since a pair of the interruptive potentials depends on both of space and time, and crosses over multiple horizons in form of either vector or scalar field or both.

The mathematical form of these equations varies depending on the type of fields. There are three main types of the behaviors of virtual or physical mechanisms, describable by waves as the following:

1. *Mechanical Waves propagate through a medium, and the substance of this medium is deformed. restoring forces then reversing the deformation. For example, Sound Waves propagate via air molecules colliding with their neighbors. When the molecules collide, they also bounce away from*

each other (a restoring force). This keeps the molecules from continuing to travel in the direction of the wave. Mechanical waves can be both transverse and longitudinal. This type of propagation is at the third or higher horizons associated with vector fields and energy momentum of force propagations.

2. *The second main type, electromagnetic waves, do not require a physical medium. Instead, they consist of periodic oscillations of fields originally generated by charged particles, electrically and magnetically. Since it can therefore travel through a vacuum, these types vary in wavelength, and include Radio Waves, microwaves, infrared radiation, visible light, ultraviolet radiation, X-rays and gamma rays. All electromagnetic waves are transverse with their vector potentials correspondent to the physical oscillations at the physical horizons that are perpendicular to the propagation of energy transfer, or longitudinal: the oscillations are parallel to the direction of energy propagation at the second horizon.*
3. *As a part of dark energy, the photon and graviton waves are virtual entanglements over spaces by a duality of the commutative conjugations, which are a result of a yin yang movement of interweaves as the boost and spiral fields of their scalar potentials. The entanglement is transversely superposing, where operation of the superphase modulations generates and mediates interweaving disturbance at the second horizon in the form of light and gravitational potentials, virtually.*

Coherence of two emission sources are perfectly entanglements if they have a constant phase difference and the same frequency. It is a basic property of the third-type waves that engages a pair of the potential interference asymmetrically, which is common during the ontological interweavement. The behaviors have become a very important concept in quantum fields. More generally, coherence describes all properties of the correlation between the commutative quantities between interruption duality of superphase modulations.

Interference of field propagation is a phenomenon in which the interaction of potentials is correlated or coherent with each other, either because they come from the same source or because they have the same or nearly the same phase modulations. Interference effects can be observed with all types of waves, for example, light, radio, acoustic, surface water or gravity fields.

13. Force Interaction

As the constituents of the objects in the virtual regime, their formations and interruptions of elementary particles are in principle not complex, because, they are operated under the laws of energy and event operation, which are fundamentally superposing and structurally bonds to each level of quantum energies, giving rise to or embodying as the energy enclave of physical objects. This implies their interruptions have no forces at all. However, once embodied into the mass enclaves in the physical domain, their interactions expose as the massive forces, some of which are defined as and known as the four "fundamental" forces, described by the classical physics as the following:

1. *Weak Force - Weak interaction, or weak nuclear force is responsible for radioactive decay, which plays an essential role in nuclear fission. Electroweak Interaction is the unified description of two of the four known fundamental interactions of nature: electromagnetism and the weak interaction.*
2. *Strong Force - Strong interaction is the mechanism responsible for the strong nuclear force (also called the strong force, nuclear strong force). At the range of a femtometer, it is the strongest force, being approximately 137 times stronger than electromagnetism, a million times stronger than weak interaction and about 1038 times stronger than gravitation. In classical view, "the strong nuclear force ensures the stability of ordinary matter, confining quarks into hadron particles, such as the proton and neutron, and the further binding of neutrons and protons into atomic nuclei. Most of the mass-energy of a common proton or neutron is in the form of the strong force of field energy; the individual quarks provide only about 1% of the mass-energy of a proton".*
3. *Electromagnetic Force - A type of physical interaction that occurs between electrically charged particles, describable by field propagation.*

4. *Gravity - All things with energy are brought entanglement toward (or gravitate toward) one another, including stars, planets, galaxies and even light and sub-atomic particles.*

Despite of some of the enigmatic descriptions or empirical evidences, it is our human observers using a force to detect them physically that makes their behaviors appear as complex or various forces, which is not the original principles of the nature. After all, force is not the natural foundation at all.

In reality, the elementary particles evolve from sub-atomic to atoms, to chemical elements, to molecular, to biological DNA, to comics, consistently and progressively. Irrelevant to those destructive forces from the observers, so called four fundamental forces above, their bonds are at energy levels of natural structures topologically and operated vividly by the *YinYang* superphase modulations, elegantly or inconceivably. Therefore, our physical detectable forces might be hardly or little effects to the horizon nature of the topology that gives rise from elementary particles to life creatures and to cosmic galaxies. Remarkably, physics is as simple as to follow the laws of conservation of energy, event horizon and energy bonds, naturally.

14. Conclusions

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 spaces. 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 will extend current sciences further, 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.

Finally, 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. Frankly, the answers to these questions are straightforward: the enlightenments and wisdoms are rooted in the philosophy of seven millennia past, when our ancestors built a profound metaphysics and our scientists develop the remarkable physics. Our traditional and extraordinary intelligences, inherited and advanced from generation to generations, are being philosophically integrated, sophistically abstracted, intellectually refined and mathematically applied to our future sciences. As a consequence, hardly with hypothesis, the philosophical principles of nature reveal secrets of *Topology of Universe* and *Horizon Hierarchy of Worlds*. Predominantly, *Laws of Natural Processes* and of *Event Evolutions* constitute the foundations of *Universal Infrastructure* and serve as architecture to *Topology of Physics*.

As a part of the series, this *Universal and Unified Field Theory* is closest to the next level that our scientists might be capable to comprehend comfortably. Aligning to the formula (1.1.2) of the methodology and illustrating numerous artifacts in promoting our contemporary physics, the ultimate philosophy, concise theories and inevitable knowledge will bring us to a glorious future.

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

Equipped with our laws and terminologies philosophically in this chapter, all fundamental elements and dynamics in the physical worlds can be derived or unified to the rest of sections or fully detailed by《Universal and Unified Field Theory》*. In the next Chapter, the mathematic framework is further developed as the Infrastructure of Universe towards the scientific principles of our physical topology.

*《Universal and Unified Physics》http://vixra.org/abs/1810.0016

Universal Infrastructure

CHAPTER 2

In this chapter, we advance *Philosophy of Nature* as a profound architecture to constitute the *Mathematical Framework*, upon which the event operations develop the intrinsic Infrastructure of the universe under the principles of *YinYang* operational processes and event evolutions. Together as the *Universal Architecture*, it carries out all of *Universal Field Equations*, and gives rise to the foundations of evolutionary *Horizons* for *Quantum Fields*, *Ontological Evolutions*, *Cosmic Dynamics*, and beyond.

1. 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.

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

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

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

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

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.

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

2. Classical Interpretation

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:

$$\hat{\partial}^t : \dot{x}^\mu \partial^\mu = \left(-ic\partial^\kappa,\ \mathbf{u}^+ \partial^r\right) = \frac{i}{\hbar}\left(\hat{E}, \mathbf{u}^+ \hat{p}\right) \qquad : \partial^\kappa = \frac{\partial}{\partial x^0},\ \mathbf{u}^+ = \frac{\partial x^r}{\partial t} \qquad (2.2.1)$$

$$\check{\partial}_t : \dot{x}_m \partial_m = \left(+ic\partial_\kappa,\ \mathbf{u}^- \partial_r\right) = \frac{i}{\hbar}\left(\hat{E}, \mathbf{u}^- \hat{p}\right) \qquad : \partial_\kappa = \frac{\partial}{\partial x_0},\ \mathbf{u}^- = \frac{\partial x_r}{\partial t} \qquad (2.2.2)$$

$$\hat{E} = -\,i\hbar \frac{\partial}{\partial t}, \qquad \hat{p} = -\,i\hbar\,\nabla \qquad : \partial^r = \partial_r = \nabla \qquad (2.2.3)$$

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

$$\check{\partial}^\lambda \check{\partial}_\lambda = \hat{\partial}^\lambda \hat{\partial}_\lambda = \hat{\partial}_\lambda \check{\partial}^\lambda = \hat{\partial}^\lambda \check{\partial}_\lambda = \frac{\partial^2}{\partial t^2} - c^2\,\nabla^2 \equiv c^2\,\Box^+ \qquad : \lambda = t \qquad (2.2.4)$$

$$\hat{\partial}_\lambda \hat{\partial}_\lambda = \check{\partial}^\lambda \check{\partial}^\lambda = \check{\partial}_\lambda \hat{\partial}_\lambda = \hat{\partial}^\lambda \check{\partial}^\lambda = \frac{\partial^2}{\partial t^2} + c^2\,\nabla^2 \equiv c^2\,\Box^- \qquad : \lambda = t \qquad (2.2.5)$$

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

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

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. A few of the examples are:

1. *The density Lagrangians can be defined by the formulae:*

$$\tilde{\mathscr{L}}_{\rho} = \psi^{-}(\check{x})\ \psi^{+}(\hat{x})\ exp\big(i\vartheta(\lambda)\big) \tag{2.2.6}$$

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

$$\tilde{\mathscr{L}}_{L}^{\pm} = -\frac{1}{c^2}\left[\hat{\partial}^{\lambda}\hat{\partial}^{\lambda}, \check{\partial}_{\lambda}\check{\partial}_{\lambda}\right]_{x}^{\pm} \qquad \text{: Local-Commutators} \tag{2.2.7}$$

$$\tilde{\mathscr{L}}_{I}^{\pm} = -\frac{1}{c^2}\left[\hat{\partial}_{\lambda}\hat{\partial}_{\lambda}, \check{\partial}^{\lambda}\check{\partial}^{\lambda}\right]_{x}^{\pm} \qquad \text{: Inter-Commutators} \tag{2.2.8}$$

where the index $x{=}s$ is for scalar potentials and $x{=}v$ for vector potentials. These 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.

3. Conjugation Duality and Collapsed States

Signatures of Manifolds - the world line interval between the two events are described concisely by complex conjugation:

$$\Delta s^2 = \pm\left(\Delta\mathbf{r} - i\Delta\mathbf{k}\right)\left(\Delta\mathbf{r} + i\Delta\mathbf{k}\right) \qquad : \mathbf{k} = ict \qquad \textit{(2.3.1a)}$$

This represents a duality of Virtual (Y^+) and Physical (Y^-) worlds. In mathematics, however, the above equation become equivalent to the following expression, deliberately.

$$\Delta s^2 = (c\Delta t)^2 - (\Delta r)^2 \qquad \textit{or} \qquad \Delta s^2 = (\Delta r)^2 - (c\Delta t)^2 \qquad \textit{(2.3.1b)}$$

In the relativity literature of spacetime manifold, 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. Besides, although the above two equations are mathematically equivalent, the philosophical interpretations of the two equations are fundamentally led to the conflict or inconsistent results: i) a conjugate duality of unified virtual and physical topology; or ii) Einstein time of twin paradox at the “collapsed” states.

Harmonic Oscillator - For the quantum harmonic oscillator, the "ladder operator" method, developed by *Paul Dirac*, defines a pair of the operators $\tilde{a}_n^+$ and $\tilde{a}_n^-$ for Hamiltonian in the complex conjugate formula,

$$\tilde{H} = \sum_{n=1}^{N} \hbar\omega_n \left(\tilde{a}_n^{\pm}\tilde{a}_n^{\mp} \mp \frac{1}{2}\right) \qquad \tilde{a}_n^{\mp} = \sqrt{\frac{m\omega_n}{2\hbar}}\left(r_n \pm \frac{i}{m\omega_n}\hat{p}_n\right) \qquad \textit{(2.3.2)}$$

$$\tilde{a}_n^{+}\,|n\rangle = \sqrt{n+1}\,|n+1\rangle \qquad \tilde{a}_n^{-}\,|n\rangle = \sqrt{n}\,|n-1\rangle \qquad \textit{(2.3.3)}$$

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 conjugate “operators” alternatively called "annihilation", a physical yin animation, and "creation", a virtual yang event, because they destroy and create particles, which correspond well to Universal Topology of our natural philosophy. However, the above *Hamiltonian* is mathematically equivalent to or can be "collapsed" to the sum of the kinetic energies of all the particles, plus the potential energy of the particles associated with the system:

$$H = \sum_{n=1}^{N} T_n + V \qquad : T_n = \frac{1}{2} m(\omega_n x)^2 \tag{2.3.4}$$

Therefore, the interpretations of the two approaches are fundamentally led to the contradict results: i) the conjugate operations of virtual $\tilde{a}_n^+$ creation and physical $\tilde{a}_n^+$ annihilation; or ii) the classical or "collapsed" states $H = T + V$ of the kinetic and potential energies.

Gauge Invariance - It represents a duality of virtual supremacy of time and physical supremacy of space. Mathematically, a partial derivative of a function of several variables is its derivative with respect to one of those variables, while the others held as constant, shown by the examples.

$$\frac{\partial\left[\psi(x)e^{i\vartheta(\lambda)}\right]}{\partial\lambda} = \psi(x)\frac{\partial\vartheta(\lambda)}{\partial\lambda}e^{i\vartheta(\lambda)} = \frac{\partial x}{\partial\lambda}\frac{\partial\vartheta(\lambda)}{\partial x}\left[\psi(x)e^{i\vartheta(\lambda)}\right] \tag{2.3.5}$$

Therefore, an event λ operates a full derivative D^λ or D_λ to include all indirect dependencies of magnitude and phase wave function with respect to an exogenous λ argument:

$$D^\lambda\psi(x^\mu,\lambda) = \left[\frac{\partial x^\mu}{\partial\lambda}\frac{\partial}{\partial x^\mu}\psi(x^\mu)\right]e^{-i\hat{\vartheta}(\lambda)} + \psi(x^\mu)\frac{\partial}{\partial\lambda}e^{-i\hat{\vartheta}(\lambda)} = \dot{x}^\mu\left(\frac{\partial}{\partial x^\mu} - i\Theta^\mu\right)\psi(x^\mu,\lambda) \tag{2.3.6}$$

$$D_\lambda\psi(x_\nu,\lambda) = \left[\frac{\partial x_\nu}{\partial\lambda}\frac{\partial}{\partial x_\nu}\psi(x_\nu)\right]e^{i\check{\vartheta}(\lambda)} + \psi(x_\nu)\frac{\partial}{\partial\lambda}e^{i\check{\vartheta}(\lambda)} = \dot{x}_\nu\left(\frac{\partial}{\partial x_\nu} + i\Theta_\nu\right)\psi(x_\nu,\lambda) \tag{2.3.7}$$

$$\Theta^\mu = \frac{\partial\hat{\vartheta}(\lambda)}{\partial x^\mu},\ \dot{x}^\mu = \frac{\partial x^\mu}{\partial\lambda} \qquad \Theta_\nu = \frac{\partial\check{\vartheta}(\lambda)}{\partial x_\nu},\ \dot{x}_\nu = \frac{\partial x_\nu}{\partial\lambda} \tag{2.3.8}$$

where the $\hat{\vartheta}$ or $\check{\vartheta}$ is the Y^+ or Y^- superphase, respectively. Furthermore, when $\Theta = eA_\nu/\hbar$ and $D_\nu \mapsto \partial_\nu + ieA_\nu/\hbar$, this is known as *Gauge derivative* for an object with the electric charge *e* and the gauge field A_ν. The above expressions can evoke the *Gauge* Invariance, seamlessly or effortlessly. However, the *Gauge* derivative can be classically "collapsed" to the covariant derivative:

$$\frac{\partial\psi}{\partial x^i} = \frac{\partial x^j}{\partial x^i}\frac{\partial\psi}{\partial x^j}, \quad \frac{\partial\psi}{\partial x_i} = \frac{\partial x^j}{\partial x_i}\frac{\partial\psi}{\partial x^j}, \quad \frac{\partial\phi}{\partial x_i} = \frac{\partial x_k}{\partial x_i}\frac{\partial\phi}{\partial x_k}, \quad \text{or} \quad \frac{\partial\phi}{\partial x^i} = \frac{\partial x_k}{\partial x^i}\frac{\partial\phi}{\partial x_k} \tag{2.3.9}$$

Therefore, the interpretations of the two approaches are fundamentally led to the different results: i) the superphase operations $D^\nu \mapsto \partial^\nu - ieA^\nu/\hbar$ or $D_\nu \mapsto \partial_\nu + ieA_\nu/\hbar$ of the ontological events; or ii) the classically "collapsed" states of a tangent vector onto the manifold's scalar space.

Hypothetical Sciences *- Further development based upon the above Collapsed Physics* has resulted in the well-known *Special* and *General Relativity.* In the ontological regime, without a duality of manifolds and horizons of *Universal Topology*, however, both of these relativistic theories are collapsed at statically frozen or inanimate states. Therefore, over a century, our science has ingenuously generated numerous of paradoxes such as *Einstein* time travel, *Big Bang*, *Ever Expending Universe*, higher spatial dimensions, string hypothesis, etc.

Today, from a scientific perspective, the *Collapsed Physics* has been pushed to its classical limits, unable to account for the essences that lay beyond the reach of empirical experimentation, cut off from the intrinsic nature of matter and life in the universe, and struggling with the excessive hype of hypothetical sciences.

4. 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. For any event operation (1.8.1) as the functional derivatives, the sum of terms are calculated at an initial state λ_0 and explicitly reflected by a series of the *Event Operations* $\lambda_i \in \left\{\dot{\partial}_{\lambda_1}, \dot{\partial}_{\lambda_2}\dot{\partial}_{\lambda_1}, \cdots, \dot{\partial}_{\lambda_n\lambda_{n-1}\cdots\lambda_1}\right\}$ in the dual variant forms:

$$\hat{W}_n = \psi_n^+(\lambda, \hat{x})\psi_n^-(\lambda, \check{x}) \qquad \text{: First World Equation} \qquad (2.4.1)$$

$$\psi_n^{\mp}(\lambda, x) = \left(1 \pm \tilde{\kappa}_1\dot{\partial}_{\lambda_1} \pm \tilde{\kappa}_2\dot{\partial}_{\lambda_2}\dot{\partial}_{\lambda_1} \ \cdots\right)\psi_n^{\mp}(\lambda, x)\,|_{\lambda=\lambda_0} \qquad : \psi_n^{\pm} \in \{\phi_n^{\pm}, \varphi_n^{\mp}\}, \qquad (2.4.2)$$

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

a. *The first two terms* $(1 \pm \kappa_1\dot{\partial}_{\lambda_1})$ *- The event drives both virtual and physical system and incepts from the world planes systematically breakup and extend into each of the manifolds.*
b. *The higher terms* $\pm(\kappa_2\dot{\partial}_{\lambda_2}\dot{\partial}_{\lambda_1} + \cdots\kappa_i\dot{\partial}_{\lambda_i}\dot{\partial}_{\lambda_{i-1}}\ldots\dot{\partial}_{\lambda_1})$ *- 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 attributes the Y^+ comportment of the superphase actions implicitly.

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

$$\check{W}_c = k_w \int \check{W}_b d\Gamma, \check{W}_b = \sum_n h_n \check{W}_a, \qquad \check{W}_a = f(\lambda)\rho_n \tag{2.4.3}$$

$$\rho_n = \psi_n^+(\hat{x})\psi_n^-(\check{x}) \qquad : \psi_n^{\pm} \in \{\phi_n^{\pm}, \varphi_n^{\mp}\},\ h_n = N_n^{\pm}/N \tag{2.4.4}$$

where h_n is a horizon factor, $N_n^{\pm}/N$ are percentages of the Y^-Y^+ particles, and k_w is defined as a world constant. During space and time dynamics, the density $\psi_n^-\psi_n^+$ is incepted at $\lambda = \lambda_0$ and followed by a sequence of the evolutions $\lambda_i \mapsto \dot{\partial}_{\lambda_1} \cdots \dot{\partial}_{\lambda_i \lambda_{i-1} \cdots \lambda_1}$ of the equation (1.8.1). As a horizon infrastructure, this process engages and applies a series of the event operations of equations (2.4.2) in the forms of the following expressions, expressions, named as *Second Type of World Equations*:

$$\check{W}^{\pm} = k_w \int d\Gamma \sum_n h_n \left[W_n^{\pm} + \kappa_1 \dot{\partial}_{\lambda_1} + \kappa_2 \dot{\partial}_{\lambda_2} \dot{\partial}_{\lambda_1} \cdots \right] \psi_n^{\pm}(\hat{x})\psi_n^{\mp}(\check{x}) \qquad : \textit{Second World Equation} \tag{2.4.5}$$

where $\check{W}_n^{\pm} \equiv \check{W}(\hat{x} \,|\, \check{x}, \lambda_0)$ is the Y^+ or Y^- ground environment or an initial potential density of a system, respectively. This type of *World Equations* features the physical supremacy of kinetic dynamics or field equations as a part of the horizon infrastructure.

Although, two types of the *World Equations* might be mathematically equivalent, they represents the real situations further favorable to a variety of variations. Generally, the first type is in the affirmative to the superphase evolutions whereas the second type is informative to the horizon evolutions.

5. 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 (1.9.1-2), the principle of least-actions derives a set of the *Motion Operations*:

$$\check{\partial}^-\left(\frac{\partial W}{\partial(\hat{\partial}^+\phi^+)}\right) - \frac{\partial W}{\partial\phi^+} = 0 \qquad : \check{\partial}^- \in \{\check{\partial}_\lambda, \check{\partial}^\lambda\},\ \phi^+ \in \{\phi_n^+, \varphi_n^+\} \qquad (2.5.1)$$

$$\hat{\partial}^+\left(\frac{\partial W}{\partial(\check{\partial}^-\phi^-)}\right) - \frac{\partial W}{\partial\phi^-} = 0 \qquad : \hat{\partial}^+ \in \{\hat{\partial}^\lambda, \hat{\partial}_\lambda\},\ \phi^- \in \{\phi_n^-, \varphi_n^-\} \qquad (2.5.2)$$

This set of dual formulae extends the philosophical meaning to the *Euler-Lagrange Motion Equation* for the actions of any dynamic system, introduced in the 1750s. The new sets of the variables of $\phi_n^\mp$ and the event operators of $\check{\partial}^-$ and $\hat{\partial}^+$ signify that both manifolds maintain equilibria and formulations from each of the motion extrema, simultaneously driving a duality of physical and virtual dynamics.

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

$$\ddot{x}^\mu + \overset{+}{\Gamma}{}^\mu_{\alpha\beta}\dot{x}^\alpha\dot{x}^\beta = 0 \qquad \ddot{x}_m + \overset{-}{\Gamma}{}^m_{ab}\dot{x}_a\dot{x}_b = 0 \qquad (2.5.3)$$

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

6. Horizon Framework

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

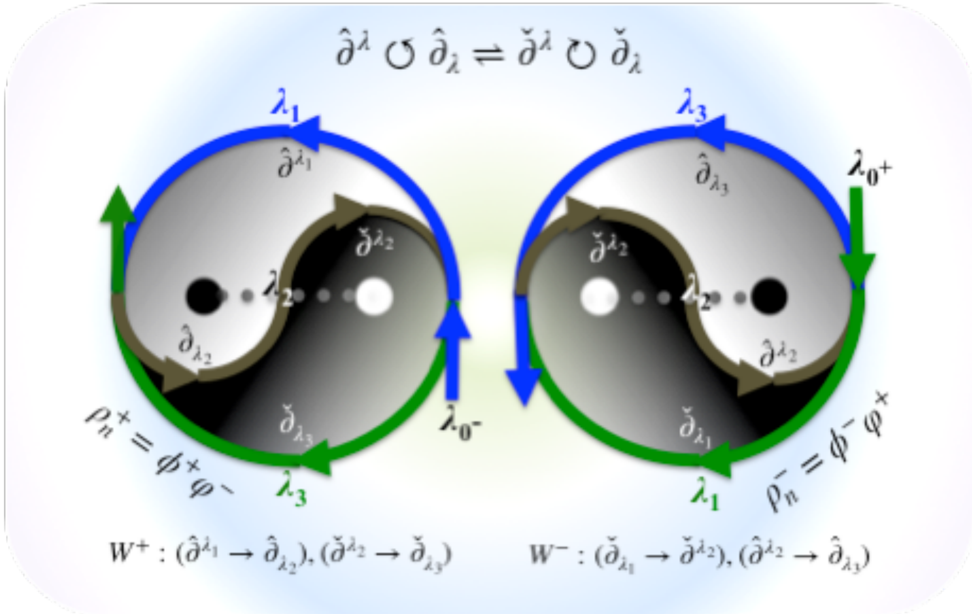

Figure 2.6: YinYang Event Processes

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 Y^-Y^+ manifolds:

$$\hat{\partial}^\lambda \circlearrowleft \hat{\partial}_\lambda \rightleftharpoons \check{\partial}^\lambda \circlearrowright \check{\partial}_\lambda \qquad : x_m \in \{ict, \tilde{r}\},\ x^\mu \in \{-ict, \tilde{r}\} \qquad (2.6.1)$$

Remarkably, these environmental settings of originators and commutators establish entanglements between the manifolds as a duality of the Y^-Y^+ infrastructures for the life transformation, transportation, or commutation simultaneously and complementarily.

Residual Operations - In order to operate the local actions, an event λ exerts its effects of the virtual supremacy within its Y^+ manifold or physical supremacy within its Y^- manifold. Because of the local relativity, the derivative ∂^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.

$$\hat{\partial}^\lambda \psi = \dot{x}^\mu X^{\nu\mu}\big(\partial^\nu - i\Theta^\mu(\lambda)\big)\psi \qquad : X^{\nu\mu} = S_2^+ + R_2^+,\ S_2^+ = \frac{\partial x^\nu}{\partial x^\mu},\ R_2^+ = x^\mu \Gamma^+_{\nu\mu a} \qquad (2.6.2)$$

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:

$$\check{\partial}_\lambda \psi = \dot{x}_m X_{nm}\big(\partial_n + i\Theta_m(\lambda)\big)\psi \qquad : X_{nm} = S_2^- + R_2^-,\ S_2^- = \frac{\partial x_n}{\partial x_m},\ R_2^- = x_m \Gamma^-_{nma} \qquad (2.6.3)$$

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

$$\Gamma^{+}_{\nu\mu a} = \frac{1}{2}\Big(\frac{\partial \hat{g}^{\nu\mu}}{\partial x^{a}} + \frac{\partial \hat{g}^{\nu a}}{\partial x^{\mu}} - \frac{\partial \hat{g}^{\mu a}}{\partial x^{\nu}}\Big), \qquad \Gamma^{-}_{nm\alpha} = \frac{1}{2}\Big(\frac{\partial \check{g}_{nm}}{\partial x_{\alpha}} + \frac{\partial \check{g}_{n\alpha}}{\partial x_{m}} - \frac{\partial \check{g}_{m\alpha}}{\partial x_{n}}\Big) \qquad (2.6.4)$$

similar but extend the meanings to the *Christoffel* symbols of the *First* kind, introduced in 1869. The first partial derivative ∂^{λ} or ∂_{λ} acts on the potential argument's value x^{μ} or x_m with the exogenous event λ as indirect effects.

Relativistic Operations - By lowering the index, the virtual Y^+ actions manifest the first tangent potential $\hat{\partial}_{\lambda}$ projecting into its opponent basis of the Y^- manifold. Because of the relativistic interactions, the derivative ∂_{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 interweave *Spiral Torque* R_1^+ transportation around a central point, which gives rise from the Y^+ tangent rotations into a vector Y^- potentials for the second horizon.

$$\hat{\partial}_{\lambda}\psi = \dot{x}_a X^{\nu}{}_a\big(\partial^{\nu} - i\Theta^{\nu}(\lambda)\big)\psi \qquad : X^{\nu}{}_a = S_1^+ + R_1^+,\ S_1^+ = \frac{\partial x^{\nu}}{\partial x_a},\ R_1^+ = x^{\mu}\Gamma^{+\nu}_{\mu a} \qquad (2.6.5)$$

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

$$\check{\partial}^{\lambda}\psi = \dot{x}^{\alpha} X_m{}^{\alpha}\big(\partial_m + i\Theta_m(\lambda)\big)\psi \qquad : X_m{}^{\alpha} = S_1^- + R_1^-,\ S_1^- = \frac{\partial x_m}{\partial x^{\alpha}},\ R_1^- = x_s\Gamma^{-m}_{s\alpha} \qquad (2.6.6)$$

where the matrix $\check{g}_{\sigma\epsilon}$ or $\hat{g}^{se}$ is the Y^- or Y^+ metric, and the matrix $\check{g}^{\sigma\epsilon}$ or $\hat{g}_{se}$ is the inverse metric, respectively. Besides, the $\Gamma^{-m}_{s\alpha}$ or $\Gamma^{+\nu}_{\mu a}$ is an Y^- or Y^+ metric connection,

$$\Gamma^{+\nu}_{\mu a} = \frac{1}{2}\hat{g}_{\nu\epsilon}\Big(\frac{\partial \hat{g}^{\epsilon\mu}}{\partial x^{a}} + \frac{\partial \hat{g}^{\epsilon a}}{\partial x^{\mu}} - \frac{\partial \hat{g}^{\mu a}}{\partial x^{\epsilon}}\Big), \quad \Gamma^{-m}_{s\alpha} = \frac{1}{2}\check{g}^{me}\Big(\frac{\partial \check{g}_{e\alpha}}{\partial x_{s}} + \frac{\partial \check{g}_{es}}{\partial x_{\alpha}} - \frac{\partial \check{g}_{\alpha s}}{\partial x_{e}}\Big) \qquad (2.6.7)$$

similar but extend the meanings to the *Christoffel* symbols of the *Second* kind.

7. Flux Continuity and Commutation

For the entanglement streams between the manifolds, the ensemble of an event λ is in a mix of the Y^- or Y^+-supremacy states such that each pair of the reciprocal states $\{\phi_n^-, \varphi_n^+\}$ or $\{\phi_n^+, \varphi_n^-\}$ is performed in alignment with an integrity of their probability $p_n^\pm = p_n(h_n^\pm)$, where $h_n^\pm$ are the $Y^\pm$ distributive or horizon factors, respectively. The parameter p_n^- or p_n^+ is a statistical function of horizon factor $h_n^-(T)$ or $h_n^+(T)$, which forms the macroscopic density, described by the *Boltzmann* distribution, or the canonical ensemble expression (4.11.1).

Flux Continuity - Under the event operations, the interoperation among four types of scalar fields of $\phi_n^\pm$ and $\varphi_n^\pm$ correlates and entangles an environment of dual densities $\rho_\phi^+ = \phi_n^+ \varphi_n^-$ and $\rho_\phi^- = \phi_n^- \varphi_n^+$ by means of the natural derivatives $\dot{\lambda}$ to form a pair of fluxions $\langle \dot{\lambda} \rangle^\mp$:

$$\dot{\lambda}\rho_\phi^- = \langle \check{\lambda}, \hat{\lambda} \rangle^- = \langle \dot{\lambda} \rangle^- = \sum\nolimits_n p_n^- \left(\varphi_n^+ \check{\lambda} \phi_n^- + \phi_n^- \hat{\lambda} \varphi_n^+ \right) \qquad (2.7.1)$$

$$\dot{\lambda}\rho_\phi^+ = \langle \hat{\lambda}, \check{\lambda} \rangle^+ = \langle \dot{\lambda} \rangle^+ = \sum\nolimits_n p_n^+ \left(\varphi_n^- \hat{\lambda} \phi_n^+ + \phi_n^+ \check{\lambda} \varphi_n^- \right) \qquad (2.7.2)$$

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

$$\langle a, b \rangle = ab + ba, \qquad [a, b] = ab - ba \qquad (2.7.3)$$

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

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

$$[\hat{\lambda}, \check{\lambda}]^{+} = [\dot{\lambda}]^{+} = \sum_{n} p_n^{+} \left(\varphi_n^{-} \hat{\lambda} \phi_n^{+} - \phi_n^{+} \check{\lambda} \varphi_n^{-} \right) \quad (2.7.4)$$

$$[\check{\lambda}, \hat{\lambda}]^{-} = [\dot{\lambda}]^{-} = \sum_{n} p_n^{-} \left(\varphi_n^{+} \hat{\lambda} \phi_n^{-} - \phi_n^{-} \hat{\lambda} \varphi_n^{+} \right) \quad (2.7.5)$$

$$\left\langle \dot{\lambda} \right)_s^{\pm} = \sum_{n} p_n^{\pm} \varphi_n^{\mp} \dot{\lambda} \phi_n^{\pm}, \qquad \left(\dot{\lambda} \right\rangle_s^{\pm} = \sum_{n} p_n^{\mp} \phi_n^{\pm} \dot{\lambda} \varphi_n^{\mp} \quad (2.7.6)$$

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

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

$$\langle \hat{\lambda}, \check{\lambda} \rangle_v^{\pm} \equiv \sum_{n} p_n^{\pm} \left(\varphi_n^{\mp} \hat{\lambda} V_n^{\pm} + \phi_n^{\pm} \check{\lambda} \Lambda_n^{\mp} \right) \qquad \left\langle \dot{\lambda} \right)_v^{\pm} = \varphi_n^{\mp} \dot{\lambda} V_n^{\pm} \quad (2.7.7)$$

$$[\hat{\lambda}, \check{\lambda}]_v^{\mp} \equiv \sum_{n} p_n^{\mp} \left(\varphi_n^{\pm} \hat{\lambda} V_n^{\mp} - \phi_n^{\mp} \check{\lambda} \Lambda_n^{\pm} \right) \qquad \left(\dot{\lambda} \right\rangle_v^{\pm} = \phi_n^{\pm} \dot{\lambda} \Lambda_n^{\mp} \quad (2.7.8)$$

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

8. First Universal Field Equations

The potential interweavement is a fundamental principle of the real-life streaming such that one constituent cannot be fully described without considering the other. As a consequence, the state of a composite system is always expressible as a sum of products of states of each constituents. Under the law of event operations, they are fully describable by the mathematical framework of the dual manifolds.

During the events of the virtual supremacy, a chain of the event actors in the loop flows of Figure 2.6 and *Universal Event* processes, $W^{+}:(\hat{\partial}^{\lambda_1}\rightarrow\hat{\partial}_{\lambda_2}),(\check{\partial}^{\lambda_2}\rightarrow\check{\partial}_{\lambda_3})$, of equation (1.9.1) can be shown by and underlined in the sequence of the dual processes:

$$\hat{W}^{+}:(\hat{\partial}^{\lambda_1}\rightarrow\underline{\hat{\partial}_{\lambda_2}}),(\check{\partial}^{\lambda_2}\rightarrow\underline{\check{\partial}_{\lambda_3}});\qquad \hat{W}^{-}:(\check{\partial}_{\lambda_1}\rightarrow\underbrace{\check{\partial}^{\lambda_2}}),(\hat{\partial}^{\lambda_2}\rightarrow\underbrace{\hat{\partial}_{\lambda_3}})\tag{2.8.1}$$

From the event actors $\hat{\partial}_{\lambda_2}$ and $\check{\partial}_{\lambda_3}$, the second type of *World Equations* (2.4.5) becomes:

$$\hat{W}_a^{+}=\left(W_n^{+}+\kappa_1\underline{\hat{\partial}_{\lambda_2}}\right)\phi_n^{+}\varphi_n^{-}+\kappa_2\underline{\check{\partial}_{\lambda_3}}\left(\phi_n^{+}\hat{\partial}_{\lambda_2}\varphi_n^{-}+\varphi_n^{-}\hat{\partial}_{\lambda_2}\phi_n^{+}\right)\cdots\tag{2.8.2}$$

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

$$\hat{W}_a^{-}=\left(W_n^{-}+\kappa_1\check{\partial}^{\lambda_2}\right)\phi_n^{+}\varphi_n^{-}+\kappa_2\hat{\partial}_{\lambda_3}\left(\phi_n^{+}\check{\partial}^{\lambda_2}\varphi_n^{-}+\varphi_n^{-}\check{\partial}^{\lambda_2}\phi_n^{+}\right)\cdots\tag{2.8.3}$$

where $W_n^{\pm}=W_n^{\pm}(\mathbf{r},\lambda_0)$ is the time invariant $Y^{+}Y^{-}$-energy area fluxion. Rising from the opponent fields of ϕ_n^{+} or φ_n^{-}, the dynamic reactions under the Y^{-} manifold continuum give rise to the *Motion Operation* (2.5.2) of the Y^{+} fields ϕ_n^{+} or φ_n^{-} approximated at the first and second orders of perturbations in terms of *second type* of *World Equations*:

$$\frac{\partial\hat{W}_a^{+}}{\partial\varphi_n^{-}}=W_n^{+}\left(\mathbf{x},\lambda_0\right)\phi_n^{+}+\kappa_1\hat{\partial}_{\lambda_2}\phi_n^{+}+\kappa_2\check{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2}\phi_n^{+}\tag{2.8.4}$$

$$\underbrace{\check{\partial}^{\lambda_2}}\left(\frac{\partial \hat{W}_a^+}{\partial(\underline{\hat{\partial}_{\lambda_2}}\varphi_n^-)}\right) = \left(\kappa_1 + \kappa_2\check{\partial}_{\lambda_3}\right)\check{\partial}^{\lambda_2}\phi_n^+ \quad (2.8.5)$$

$$\underbrace{\hat{\partial}_{\lambda_3}}\left(\frac{\partial \hat{W}_a^+}{\partial(\underline{\check{\partial}_{\lambda_3}}\varphi_n^-)}\right) = \hat{\partial}_{\lambda_3}\left(\kappa_2\hat{\partial}_{\lambda_2}\phi_n^+\right) \quad (2.8.6)$$

$$\frac{\partial \hat{W}_a^-}{\partial \phi_n^+} = W_n^-\left(\mathbf{x}, \lambda_0\right)\varphi_n^- + \kappa_1\check{\partial}^{\lambda_2}\varphi_n^- + \kappa_2\hat{\partial}_{\lambda_3}\check{\partial}^{\lambda_2}\varphi_n^- \quad (2.8.7)$$

$$\underline{\hat{\partial}_{\lambda_2}}\left(\frac{\partial \hat{W}_a^-}{\partial(\underbrace{\check{\partial}^{\lambda_2}}\ \phi_n^+)}\right) = \hat{\partial}_{\lambda_2}\left(\kappa_1 + \kappa_2\hat{\partial}_{\lambda_3}\right)\varphi_n^- \quad (2.8.8)$$

$$\underline{\check{\partial}_{\lambda_3}}\left(\frac{\partial \hat{W}_a^-}{\partial(\underbrace{\hat{\partial}_{\lambda_3}}\ \phi_n^+)}\right) = \check{\partial}_{\lambda_3}\left(\kappa_2\check{\partial}^{\lambda_2}\varphi_n^-\right) \quad (2.8.9)$$

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

$$\kappa_1\left(\check{\partial}^{\lambda_2} - \hat{\partial}_{\lambda_2}\right)\phi_n^+ + \kappa_2\left(\check{\partial}_{\lambda_3}\check{\partial}^{\lambda_2} + \hat{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2} - \check{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2}\right)\phi_n^+ = W_n^+\phi_n^+ \quad (2.8.10a)$$

$$\kappa_1\left(\hat{\partial}_{\lambda_2} - \check{\partial}^{\lambda_2}\right)\varphi_n^- + \kappa_2\left(\hat{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2} + \check{\partial}_{\lambda_3}\check{\partial}^{\lambda_2} - \hat{\partial}_{\lambda_3}\check{\partial}^{\lambda_2}\right)\varphi_n^- = W_n^-\varphi_n^- \quad (2.8.10b)$$

giving rise to a pair of the Y^+ *primacy fields* from each respective opponent during their physical interactions.

In the events of the physical supremacy in parallel fashion, the dynamic reactions on the second type of *World Equations* under the Y^+ manifold continuum give rise to the motion operations of the Y^- state fields 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. From *Universal Event* processes, $W^-:(\check{\partial}_{\lambda_1}\to\check{\partial}^{\lambda_2}),\ (\hat{\partial}^{\lambda_2}\to\hat{\partial}_{\lambda_3})$, the equation (1.9.2) can be shown by and underlined in the sequence of the dual processes:

$$\check{W}^-:(\underline{\check{\partial}_{\lambda_1}}\to\check{\partial}^{\lambda_2}),(\underline{\hat{\partial}^{\lambda_2}}\to\hat{\partial}_{\lambda_3})\ ;\qquad \check{W}^+:(\underbrace{\hat{\partial}^{\lambda_1}}\to\hat{\partial}_{\lambda_2}),(\underbrace{\check{\partial}^{\lambda_2}}\to\check{\partial}_{\lambda_3}) \tag{2.8.12}$$

$$\check{W}_a^-=\left(W_n^-+\kappa_1\underline{\check{\partial}_{\lambda_1}}\right)\ \varphi_n^+\phi_n^-+\kappa_2\underline{\hat{\partial}^{\lambda_2}}\left(\varphi_n^+\check{\partial}_{\lambda_1}\phi_n^-+\phi_n^-\check{\partial}_{\lambda_1}\varphi_n^+\right)\cdots \tag{2.8.13}$$

$$\check{W}_a^+=\left(W_n^++\kappa_1\ \underbrace{\hat{\partial}^{\lambda_1}}\right)\phi_n^-\varphi_n^++\kappa_2\ \underbrace{\check{\partial}^{\lambda_2}}\left(\phi_n^-\hat{\partial}^{\lambda_1}\varphi_n^++\varphi_n^+\hat{\partial}^{\lambda_1}\phi_n^-\right)\cdots \tag{2.8.14}$$

The motion operations (2.5.1) derives the equations similar to a set of (2.8.4-9) are shown as below:

$$\frac{\partial\check{W}_a^-}{\partial\varphi_n^+}=W_n^-\left(\mathbf{x},\lambda_0\right)\phi_n^-+\kappa_1\check{\partial}_{\lambda_1}\phi_n^-+\kappa_2\hat{\partial}^{\lambda_2}\check{\partial}_{\lambda_1}\phi_n^- \tag{2.8.15}$$

$$\underbrace{\hat{\partial}^{\lambda_1}}\left(\frac{\partial\check{W}_a^-}{\partial(\underline{\check{\partial}_{\lambda_1}}\varphi_n^+)}\right)=\left(\kappa_1+\kappa_2\hat{\partial}^{\lambda_2}\right)\hat{\partial}^{\lambda_1}\phi_n^- \tag{2.8.16}$$

$$\underbrace{\check{\partial}^{\lambda_2}}\left(\frac{\partial\check{W}_a^-}{\partial(\underline{\hat{\partial}^{\lambda_2}}\varphi_n^+)}\right)=\check{\partial}^{\lambda_2}\left(\kappa_2\check{\partial}_{\lambda_1}\phi_n^-\right) \tag{2.8.17}$$

$$\frac{\partial\check{W}_a^+}{\partial\phi_n^-}=W_n^+\left(\mathbf{x},\lambda_0\right)\varphi_n^++\kappa_1\hat{\partial}^{\lambda_1}\varphi_n^++\kappa_2\check{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1}\varphi_n^+ \tag{2.8.18}$$

$$\underline{\check{\partial}_{\lambda_1}}\Big(\frac{\partial \check{W}_a^+}{\partial(\underbrace{\hat{\partial}^{\lambda_1}}\ \phi_n^-)}\Big) = \check{\partial}_{\lambda_1}\big(\kappa_1 + \kappa_2 \check{\partial}^{\lambda_2}\big)\varphi_n^+ \qquad (2.8.19)$$

$$\underline{\hat{\partial}^{\lambda_2}}\Big(\frac{\partial \check{W}_a^+}{\partial(\underbrace{\check{\partial}^{\lambda_2}}\ \phi_n^-)}\Big) = \hat{\partial}^{\lambda_2}\big(\kappa_2 \hat{\partial}^{\lambda_1}\big)\varphi_n^+ \qquad (2.8.20)$$

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

$$\kappa_1\big(\hat{\partial}^{\lambda_1} - \check{\partial}_{\lambda_1}\big)\phi_n^- + \kappa_2\big(\hat{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1} + \check{\partial}^{\lambda_2}\check{\partial}_{\lambda_1} - \hat{\partial}^{\lambda_2}\check{\partial}_{\lambda_1}\big)\phi_n^- = W_n^-\phi_n^- \qquad (2.8.21a)$$

$$\kappa_1\big(\check{\partial}_{\lambda_1} - \hat{\partial}^{\lambda_1}\big)\varphi_n^+ + \kappa_2\big(\check{\partial}^{\lambda_2}\check{\partial}_{\lambda_1} + \hat{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1} - \check{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1}\big)\varphi_n^+ = W_n^+\varphi_n^+ \qquad (2.8.21b)$$

giving rise to the Y^- *primacy fields* from each of the respective opponents during their virtual interactions.

Together as a summary, the two pairs of four formulae are derived and named as ***First Universal Field Equations.*** They are fundamental and general to all fields of natural horizon evolutions.

9. Second Universal Field Equations

In the global environment, the $Y^{-}Y^{+}$ virtual energies have their commutations at operational uniformity to maintain a duality of their equal primacy. From the density equations, the physical events simultaneously operate another dual state $\{\phi_n^+, \varphi_n^-\}$ and their movements, $\dot{\partial}_\lambda \left(\varphi_n^+ \phi_n^-\right)$, that give rise to the Y^+ fluxions of continuity. The successive operations entangle the scalar potentials in fluxions streaming a set of the Y^+ *Universal Fields (2.8.10)* into a pair of the rearrangement:

$$\kappa_2 \varphi_n^- \left(\hat{\partial}_{\lambda_3} \hat{\partial}_{\lambda_2}\right) \phi_n^+ = \varphi_n^- W_n^+ \phi_n^+ - \kappa_1 \varphi_n^- \left(\check{\partial}^{\lambda_2} - \hat{\partial}_{\lambda_2}\right)^+ \phi_n^+ - \kappa_2 \varphi_n^- \check{\partial}_{\lambda_3} \left(\check{\partial}^{\lambda_2} - \hat{\partial}_{\lambda_2}\right) \phi_n^+ \qquad (2.9.1)$$

$$\kappa_2 \phi_n^+ \left(\check{\partial}^{\lambda_3} \check{\partial}^{\lambda_2}\right) \varphi_n^- = \phi_n^+ W_n^- \varphi_n^- + \kappa_1 \phi_n^+ \left(\check{\partial}^{\lambda_2} - \hat{\partial}_{\lambda_2}\right) \varphi_n^- - \kappa_2 \phi_n^+ \left(\check{\partial}_{\lambda_3} - \hat{\partial}_{\lambda_2}\right) \check{\partial}^{\lambda_2} \varphi_n^-$$
$$+ \kappa_2 \phi_n^+ \left(\check{\partial}^{\lambda_3} \check{\partial}^{\lambda_2}\right) \varphi_n^- - \kappa_2 \phi_n^+ \left(\hat{\partial}_{\lambda_3} \hat{\partial}_{\lambda_2}\right) \varphi_n^- \qquad (2.9.2)$$

Add the above two equations together, we constitute a density continuity of the Y^+ fluxion in forms of the Y^+ symmetric formulation:

$$\dot{\partial}_\lambda \mathbf{f}_s^+ = \langle \hat{\partial}_\lambda \hat{\partial}_\lambda, \check{\partial}^\lambda \check{\partial}^\lambda \rangle_s^+ = \langle W_0^+ \rangle - \kappa_1 \left[\check{\partial}^{\lambda_2} - \hat{\partial}_{\lambda_2}\right]_s^+ + \kappa_2 \left\langle \check{\partial}_{\lambda_3} \left(\hat{\partial}_{\lambda_2} - \check{\partial}^{\lambda_2}\right) \right\rangle_s^+ + \mathbf{g}_a^- / \kappa_g^- \qquad (2.9.3)$$

Representing a duality of the entangling environments as the dark flux continuity of the potential densities, a pair of potentials $\{\phi_n^+, \varphi_n^-\}$ is not only mapped the Y^+ fluxion to their symmetric commutation at second horizon and continuity at the third horizon, but also associated with an Y^- asymmetric accelerator $\mathbf{g}_a^-$. In a parallel fashion, another dual state fields $\{\phi_n^-, \varphi_n^+\}$ in the dynamic equilibrium can be rewritten:

$$\kappa_2 \varphi_n^+ \left(\hat{\partial}^{\lambda_2} \hat{\partial}^{\lambda_1}\right) \phi_n^- = \varphi_n^+ W_n^- \phi_n^- + \varphi_n^+ \kappa_1 \left(\check{\partial}_{\lambda_1} - \hat{\partial}^{\lambda_1}\right) \phi_n^- - \kappa_2 \left(\check{\partial}^{\lambda_2} - \hat{\partial}^{\lambda_2}\right) \check{\partial}_{\lambda_1} \phi_n^- \qquad (2.9.4)$$

$$\kappa_2 \phi_n^- \left(\check{\partial}_{\lambda_2} \check{\partial}_{\lambda_1}\right) \varphi_n^+ = \phi_n^- W_n^+ \varphi_n^+ - \phi_n^- \kappa_1 \left(\check{\partial}_{\lambda_1} - \hat{\partial}^{\lambda_1}\right) \varphi_n^+ + \kappa_2 \check{\partial}^{\lambda_2} \left(\hat{\partial}^{\lambda_1} - \check{\partial}_{\lambda_1}\right) \varphi_n^+$$
$$+ \kappa_2 \phi_n^- \left(\check{\partial}_{\lambda_2} \check{\partial}_{\lambda_1}\right) \varphi_n^+ - \kappa_2 \phi_n^- \left(\hat{\partial}^{\lambda_2} \hat{\partial}^{\lambda_1}\right) \varphi_n^+ \qquad (2.9.5)$$

Adding the two formulae, we institute another density continuity of the Y^- fluxion in forms of the Y^- general formulation:

$$\dot{\partial}_\lambda \mathbf{f}_s^- = \langle \check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda \rangle_s^- = \langle W_0^- \rangle + \kappa_1 \left[\check{\partial}_{\lambda_1} - \hat{\partial}^{\lambda_1} \right]_s^- + \kappa_2 \left\langle \check{\partial}_{\lambda_1} \left(\hat{\partial}^{\lambda_2} - \check{\partial}^{\lambda_2} \right) \right\rangle_s^- + \mathbf{g}_a^+ / \kappa_g^+ \quad (2.9.6)$$

where $\mathbf{g}_a^+$ is an Y^+ asymmetric accelerator. The entangle bracket $\dot{\partial}_\lambda \mathbf{f}_s^- = \langle \check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda \rangle_s^-$ of the general dynamics features the Y^- continuity for their scalar potentials.

Consequently, driving the field dynamics at the second horizons, the system of N particles aggregates into fluxion domain associated with continuity at the second horizon developing the density commutation into the third horizon. These processes represent a set of the universal laws as the following,

1. *Incepted in the virtual world, the events not only generate its opponent reactions but also create and conduct the real-life objects in the physical world, because the element embeds the bidirectional reactions $\hat{\partial}_\lambda$ and $\check{\partial}^\lambda$ entangling between the Y^-Y^+ manifolds, symmetrically and asymmetrically.*
2. *Initiated in the physical world, the events have to leave a life copy of its mirrored images in the virtual world without an intrusive effect into the virtual world, because the asymmetric element doesn't have the reaction $\hat{\partial}_\lambda$ to the Y^- manifold. In other words, the virtual world is aware of and immune to the physical world.*
3. *The fluxions are developed or operated by the symmetric commutative dynamics $[\ ]^\pm$ that give rise to the flux continuity $\langle\ \rangle^\pm$ of the next horizon and associate the accelerators $\mathbf{g}_a^\pm$ asymmetrically.*

Because the virtual resources are massless, the accelerator might appear as if it were nothing or at zero resources $\mathbf{g}_a^+ \mapsto 0^+$, unlike the $\mathbf{g}_a^-$ as a physical accelerator. The Y^- or Y^+ supremacy of the flux continuity operates the symmetric commutation and continuity internally as well as the asymmetric acceleration of the system observable externally.

10. Third Universal Field Equations

As the twin, a pair of the above Y^- and Y^+ symmetric scalar or vector fields accompanies and generalizes asymmetric dynamics. Integrating commutation of fluxions with second universal field equations, we arrive at *Third Universal Field Equations*:

$$\mathbf{g}_a^-/\kappa_g^- = \left[\check{\partial}^\lambda \check{\partial}^\lambda, \hat{\partial}_\lambda \hat{\partial}_\lambda\right]_x^+ + \zeta^+ \qquad : \zeta^+ = \left(\hat{\partial}_{\lambda_2} \check{\partial}^{\lambda_2} - \hat{\partial}_{\lambda_2} \check{\partial}_{\lambda_3}\right\rangle^+ \tag{2.10.1}$$

$$\mathbf{g}_a^+/\kappa_g^+ = \left[\check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda\right]_x^- + \zeta^- \qquad : \zeta^- = \left(\check{\partial}^{\lambda_2} \hat{\partial}^{\lambda_1} - \hat{\partial}^{\lambda_2} \check{\partial}_{\lambda_1}\right\rangle^- \tag{2.10.2}$$

$$\left[\check{\partial}^\lambda \check{\partial}^\lambda, \hat{\partial}_\lambda \hat{\partial}_\lambda\right]_x^+ \equiv \phi_n^+ \left[\check{\partial}^\lambda \check{\partial}^\lambda, \hat{\partial}_\lambda \hat{\partial}_\lambda\right] \varphi_n^- \qquad \left[\check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda\right]_x^- \equiv \phi_n^- \left[\check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda\right] \varphi_n^+ \tag{2.10.3}$$

where the index x refers to either of the scalar or vector potential and the symbol [ ] is a commutator of *Lie* bracket. Named as the *General Asymmetric Equations*, introduced at 2:00am September 3rd 2017 *Washington, DC* USA, the general formulae are balanced by a pair of commutation of the asymmetric Y^-Y^+ entanglers $\zeta^\mp$ that constitutes the laws of conservations universal to all types of Y^-Y^+ interactive motions, curvatures, dynamics, forces, accelerations, transformations, and transportations on the world lines of the dual manifolds.

Apparently, a force is represented as and given by an asymmetric accelerator. Since the physical world is riding on the world planes where the virtual world is primary and dominant, the acceleration at a constant rate in universe has its special meaning different from the spacetime manifold. Mathematically when $\mathbf{g}_a^\pm = 0$, the above formulae can develop further applications without the $\phi_n^\pm$ potentials, because they are canceled out from the equations. Therefore, connected seamlessly to *Riemannian* geometry, they are essential to our cosmology of the universe.

Harnessed with the *Philosophy of Nature*, *Universal Topology*, *Mathematical Framework* and *Universal Field Equations* are discovered scientifically and comprehensively. Therefore, a broad range of applications to both classical and contemporary physics prevails throughout the rest of the chapters.

Quantum Fields

CHAPTER 3

In this chapter, the previous contexts are unfolded into further details to testify empirically how and why the *Infrastructure of Universe* can prevail numerous of groundbreakings over our contemporary quantum physics and declare the *Quantum fields* as a part of *Universal and Unified Field Theory*.

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 or operated for tunneling between the Y^- and Y^+ domains at both local residual and relativistic interaction among virtual dark and physical massive energies, which is mathematically describable by local invariances and relativistic commutations of entanglements cycling reciprocally and looping consistently among the *Quadrant-States* of potential fields of the dual manifolds.

1. Generators

In the infrastructure of the 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 $\hat{\partial}^{\lambda} \circlearrowleft \hat{\partial}_{\lambda} \rightleftharpoons \check{\partial}^{\lambda} \circlearrowright \check{\partial}_{\lambda}$ with a set of the metric signatures, local originators, and horizon commutators. At the third horizon *SU*(3) or higher, a set of the *Lorentz Generators* institutes the infrastructure of spacetime, 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*. The Y^{-} parallel entanglement represents another essential principle of natural behaviors - *Law of Conservation of Physical Animation and Reproduction*.

2. Boost Generators

On the world planes at a constant speed *c*, this event flow naturally describes and concisely derives a set of the *Boost* matrix tables as the *Quadrant-State*:

$$S_2^+ = \frac{\partial x^\nu}{\partial x^m} = \begin{pmatrix} 1 & -i \\ i & 1 \end{pmatrix} \equiv s_0 + is_2 \qquad : \hat{\partial}^\lambda = \dot{x}^m S_2^+ \partial^\nu \tag{3.2.1}$$

$$S_1^+ = \frac{\partial x^\nu}{\partial x_m} = \begin{pmatrix} -1 & -i \\ -i & 1 \end{pmatrix} \equiv s_3 - is_1 \qquad : \hat{\partial}_\lambda = \dot{x}_m S_1^+ \partial^\nu \tag{3.2.2}$$

$$S_1^- = \frac{\partial x_m}{\partial x^\nu} = \begin{pmatrix} -1 & i \\ i & 1 \end{pmatrix} \equiv s_3 + is_1 \qquad : \check{\partial}^\lambda = \dot{x}^\nu S_1^- \partial_m \tag{3.2.3}$$

$$S_2^- = \frac{\partial x_m}{\partial x_\nu} = \begin{pmatrix} 1 & i \\ -i & 1 \end{pmatrix} \equiv s_0 - is_2 \qquad : \check{\partial}_\lambda = \dot{x}_\nu S_2^- \partial_m \tag{3.2.4}$$

The $S_1^\pm$ matrices are a duality of the horizon settings for transformation between the two-dimensional world planes. The $S_2^\pm$ matrices are the local or residual settings for Y^- or Y^+ transportation within their own manifold, respectively. Defined as the *Infrastructural Boost Generators*, this s_κ group consists of the distinct members, shown by the following:

$$s_\kappa = \left[\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}_0, \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}_1, \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}_2, \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}_3 \right] \tag{3.2.5}$$

Intuitively simplified to a group of the 2x2 matrices, the infinite (2.6.1) loops of entanglements compose an integrity of the boost generators s_n that represents law of conservation of life-cycle transform continuity of motion dynamics, shown by the following:

$$[s_a, s_b] = 2\varepsilon_{cba}^{-} s_c \qquad \langle s_a, s_b \rangle = 0 \qquad : a, b, c \in \{1,2,3\} \tag{3.2.6}$$

where the *Levi-Civet* connection ε_{cba}^{-} represents the right-hand chiral. In accordance with our philosophical anticipation, the non-zero commutation reveals the loop-processes of entanglements, reciprocally. The zero continuity illustrates the conservations of virtual supremacy virtually that are either extensible from or degradable back to the global two-dimensions of the world planes at the horizon without physical mass.

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

$$\sigma_\kappa = \left[\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}_0, \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}_1, \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}_2, \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}_3 \right] \tag{3.2.7}$$

$$\sigma_0 = s_0 \qquad \sigma_1 = s_1 \qquad \sigma_2 = i s_2 \qquad \sigma_3 = -s_3 \qquad \sigma_n^2 = I \tag{3.2.8}$$

$$[\sigma_a, \sigma_b]^- = 2i\varepsilon_{cba}^{-}\sigma_c \qquad [\sigma_a, \sigma_b]^+ = 0 \qquad : a, b, c \in (1,2,3) \tag{3.2.9}$$

known as *Pauli* spin matrices, introduced in 1925. 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.

3. 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:

$$ds^2 = (d\tilde{r} + i\tilde{r}d\tilde{\vartheta})(d\tilde{r} - i\tilde{r}d\tilde{\vartheta}) = d\tilde{r}^2 + \tilde{r}^2 d\tilde{\vartheta}^2 \qquad : x^m \in \check{x}\{\tilde{r}, +i\tilde{\vartheta}\},\ x^\nu \in \hat{x}\{\tilde{r}, -i\tilde{\vartheta}\} \qquad (3.3.1)$$

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

$$\check{g}_{\nu\mu} = \hat{g}^{\nu\mu} = \begin{pmatrix} 1 & 0 \\ 0 & \tilde{r}^2 \end{pmatrix}, \quad \check{g}^{\nu\mu} = \hat{g}_{\nu\mu} = \begin{pmatrix} 1 & 0 \\ 0 & \tilde{r}^{-2} \end{pmatrix} \qquad (3.3.2)$$

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

$$R_2^+ = x^\mu \overset{+}{\Gamma}_{\nu\mu a} = x^\mu \begin{pmatrix} 0 & \tilde{r} \\ \tilde{r} & -\tilde{r} \end{pmatrix} \equiv \tilde{r}^2\epsilon_0 + i\epsilon_2\tilde{r}\tilde{\vartheta} \qquad : \hat{\partial}^\lambda = \dot{x}^m R_2^+ \partial^\nu \qquad (3.3.3)$$

$$R_1^+ = x^\mu \overset{+}{\Gamma}{}^{\nu}_{\mu a} = x^\mu \begin{pmatrix} 0 & 1/\tilde{r} \\ 1/\tilde{r} & -\tilde{r} \end{pmatrix} \equiv \tilde{r}^2\epsilon_3 - i\epsilon_1\tilde{r}\tilde{\vartheta} \qquad : \hat{\partial}_\lambda = \dot{x}_m R_1^+ \partial^\nu \qquad (3.3.4)$$

$$R_1^- = x_s \overset{-}{\Gamma}{}^{m}_{s\alpha} = x_s \begin{pmatrix} 0 & 1/\tilde{r} \\ 1/\tilde{r} & -\tilde{r} \end{pmatrix} \equiv \tilde{r}^2\epsilon_3 + i\epsilon_1\tilde{r}\tilde{\vartheta} \qquad : \check{\partial}^\lambda = \dot{x}^\nu R_1^- \partial_m \qquad (3.3.5)$$

$$R_2^- = x_m \Gamma^-_{nma} = x_m \begin{pmatrix} 0 & \tilde{r} \\ \tilde{r} & -\tilde{r} \end{pmatrix} \equiv \tilde{r}^2 \epsilon_0 - i\epsilon_2 \tilde{r} \tilde{\vartheta} \qquad : \check{\partial}_\lambda = \dot{x}_\nu R_2^- \partial_m \qquad (3.3.6)$$

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

$$\epsilon_\kappa = \left[\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}_0, \begin{pmatrix} 0 & 0 \\ 0 & -1 \end{pmatrix}_1, \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix}_2, \frac{1}{\tilde{r}^2} \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}_3 \right] \qquad (3.3.7)$$

As a group of the 2x2 matrices, the infinite (3.3.3-6) loops of entanglements institute an integrity of the spiral generators ϵ_n sourced by the transport generators ϵ_0, shown by the following:

$$[\varepsilon_2, \varepsilon_1] = 0 = [\varepsilon_1, \varepsilon_0] \qquad \text{: Independent Freedom} \qquad (3.3.8)$$

$$[\varepsilon_2, \varepsilon_3] = \frac{1}{\tilde{r}^2} s_2 = [\varepsilon_3, \varepsilon_1] \qquad \text{: Force Exposions} \qquad (3.3.9)$$

$$[\varepsilon_2, \varepsilon_0] = s_2 = [\varepsilon_0, \varepsilon_1] \qquad \text{: Commutation Invariance} \qquad (3.3.10)$$

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

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

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

$$\langle \varepsilon_3, \varepsilon_0 \rangle = \frac{2}{\tilde{r}^2} s_0 \qquad \langle \varepsilon_2, \varepsilon_1 \rangle = 2\varepsilon_1 \tag{3.3.11}$$

$$\langle \varepsilon_2, \varepsilon_3 \rangle = \varepsilon_3 = -\langle \varepsilon_3, \varepsilon_1 \rangle \qquad \langle \varepsilon_2, \varepsilon_0 \rangle = \varepsilon_0 = -\langle \varepsilon_0, \varepsilon_1 \rangle \tag{3.3.12}$$

It demonstrates the commutative principles among the torque generators:

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

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

4. Conservation of Superposed Torsion

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

$$\nabla \cdot R_2^- = \frac{1}{\tilde{r}}\frac{\partial}{\partial \tilde{r}}\left(\epsilon_0 \tilde{r}^2\right) - \frac{1}{\tilde{r}}\frac{\partial}{\partial \tilde{\vartheta}}\left(\epsilon_2 \tilde{r}\tilde{\vartheta}\right) = 2\epsilon_0 - \epsilon_2 \tag{3.4.1}$$

$$\nabla \cdot R_1^- = \frac{1}{\tilde{r}}\frac{\partial}{\partial \tilde{r}}\left(\epsilon_3 \tilde{r}^2\right) + \frac{1}{\tilde{r}}\frac{\partial}{\partial \tilde{\vartheta}}\left(\epsilon_1 \tilde{r}\tilde{\vartheta}\right) = \epsilon_1 \tag{3.4.2}$$

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.

$$Y^- : \nabla \cdot (R_1^- + R_2^-) = 2\begin{pmatrix} 0 & 1 \\ 1 & -i \end{pmatrix} \tag{3.4.3}$$

$$Y^+ : \nabla \cdot (R_1^+ + R_2^+) = 2\begin{pmatrix} 0 & 1 \\ 1 & +i \end{pmatrix} \tag{3.4.4}$$

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

a. *Modulated by the superphase $2\tilde{\vartheta}$-chirality, bi-directionally,*

b. *Operated at independence of spatial $\tilde{r}$-coordinate, respectively,*

c. *Streaming with its residual and opponent, commutatively, and*

d. *Entangling a duality of the reciprocal spirals, simultaneously.*

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

5. Gamma and Chi Matrices

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

$$\zeta^\nu = \gamma^\nu + \chi^\nu \qquad \zeta_\nu = \gamma_\nu + \chi_\nu \tag{3.5.1}$$

$$\gamma^\nu = \left[\begin{pmatrix} \sigma_0 & 0 \\ 0 & -\sigma_0 \end{pmatrix}_0, \begin{pmatrix} 0 & \sigma_1 \\ -\sigma_1 & 0 \end{pmatrix}_1, \begin{pmatrix} 0 & \sigma_2 \\ -\sigma_2 & 0 \end{pmatrix}_2, \begin{pmatrix} 0 & \sigma_3 \\ -\sigma_3 & 0 \end{pmatrix}_3 \right] \tag{3.5.2}$$

$$\chi^\nu = \left[\begin{pmatrix} \varsigma_0 & 0 \\ 0 & -\varepsilon_0 \end{pmatrix}_0, \begin{pmatrix} 0 & \varsigma_1 \\ -\varsigma_1 & 0 \end{pmatrix}_1, \begin{pmatrix} 0 & \varsigma_2 \\ -\varsigma_2 & 0 \end{pmatrix}_2, \begin{pmatrix} 0 & \varsigma_3 \\ -\varsigma_3 & 0 \end{pmatrix}_3 \right] \tag{3.5.3}$$

$$\varsigma_0 = \tilde{r}^2 \epsilon_0 \qquad \varsigma_1 = \tilde{r}\tilde{\vartheta}\epsilon_1 \qquad \varsigma_2 = i\tilde{r}\tilde{\vartheta}\epsilon_2 \qquad \varsigma_3 = \tilde{r}^2\epsilon_3 \tag{3.5.4}$$

The superphase $\mathrm{d}\vartheta$ of polar coordinates extends into the circumference-freedom of sphere coordinates.

$$\mathrm{d}\vartheta^2 = (\mathrm{d}\theta + i \sin\theta \, \mathrm{d}\phi)(\mathrm{d}\theta - i \sin\theta \, \mathrm{d}\phi) \mapsto \mathrm{d}\theta^2 + \sin^2\theta \, \mathrm{d}\phi^2 \qquad : \mathrm{d}\vartheta \mapsto \mathrm{d}\theta \pm i \sin\theta \, \mathrm{d}\phi \tag{3.5.5}$$

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 Y^- or Y^+ local states together, we have a duality of the states expressed by or degenerated to the formulae of event operations:

$$\check{\partial} = \check{\partial}_\lambda + \hat{\partial}_\lambda = \dot{x}_\nu \zeta_\nu D_\nu = \dot{x}_\nu \, \zeta_\nu \left(\partial_\nu + i \frac{e}{\hbar} A_\nu + \tilde{\kappa}_2^- \partial_\nu A_\mu + \cdots \right) \tag{3.5.6}$$

$$\hat{\partial} = \hat{\partial}^\lambda + \check{\partial}^\lambda = \dot{x}^\mu \zeta^\mu D^\mu = \dot{x}^\mu \zeta^\mu \left(\partial^\mu - i \frac{e}{\hbar} A^\mu - \tilde{\kappa}_2^+ \partial^\mu A^\nu - \cdots \right) \tag{3.5.7}$$

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.

6. Quantum Field Equations

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

Under a steady environment of the energy fluxions $W_n^\pm$, the equations (2.8.10) can be reformulated into the compact forms for the Y^+ supremacy of the entanglements: the Y^+ Quantum Field Equations

$$\frac{-\hbar^2}{2E_n^+}\hat{\partial}_\lambda\hat{\partial}_\lambda\phi_n^+ - \frac{\hbar}{2}\left(\hat{\partial}_\lambda - \check{\partial}^\lambda\right)\phi_n^+ + \frac{\hbar^2}{2E_n^+}\check{\partial}_\lambda\left(\hat{\partial}_\lambda - \check{\partial}^\lambda\right)\phi_n^+ = \frac{W_n^+}{c^2}\phi_n^+ \tag{3.6.1}$$

$$\frac{\hbar^2}{2E_n^-}\check{\partial}^\lambda\check{\partial}^\lambda\varphi_n^- - \frac{\hbar}{2}\left(\check{\partial}^\lambda - \hat{\partial}_\lambda\right)\varphi_n^- + \frac{\hbar^2}{2E_n^-}\left(\check{\partial}_\lambda - \hat{\partial}_\lambda\right)\check{\partial}^\lambda\varphi_n^- = \frac{W_n^-}{c^2}\varphi_n^- \tag{3.6.2}$$

$$\kappa_1 = \hbar c^2/2 \qquad \kappa_2 = \pm(\hbar c)^2/(2E_n^\mp) \qquad W_n^\pm = c^2 E_n^\pm \qquad E_n^\mp = \pm\, imc^2\ (\hbar\omega \rightleftharpoons mc^2) \tag{3.6.3}$$

where $E_n^\pm$ is an energy state of a virtual object or a physical particle. given by equation (1.4.1). This pair of the fields emerges that the bi-directional transformation has two rotations one with left-handed $\phi_n^+ \mapsto \phi_n^L$ acting from the Y^+ source to the Y^- manifold, and the other right-handed $\varphi_n^- \mapsto \phi_n^R$ reacting from the Y^- back to the Y^+ manifold. Both fields are alternating into one another under a parity operation with relativistic preservation.

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

1. *The operational action $\hat{\partial}^\lambda$ of virtual supremacy results in the physical effects as the parallel and reciprocal reactions or emanations $\check{\partial}_\lambda$ in the physical world;*

2. *The virtual world transports the effects $\hat{\partial}_\lambda \hat{\partial}_\lambda$ emerging into or appearing as the creations of the physical world, even though the bi-directional transformations seem balanced between the commutative operations of $\hat{\partial}_\lambda$ and $\check{\partial}^\lambda$; and*
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.

As a reciprocal process, another pair of the equations (2.8.20) simultaneously formulates the following components for the Y^- supremacy of entanglements: *the Y^- Quantum Field Equations*

$$\frac{\hbar^2}{2E_n^-}\check{\partial}^\lambda \check{\partial}_\lambda \phi_n^- - \frac{\hbar}{2}\left(1 + \frac{\hbar}{E_n^-}\hat{\partial}^\lambda\right)\left(\check{\partial}_\lambda - \hat{\partial}^\lambda\right)\phi_n^- = \frac{W_n^-}{c^2}\phi_n^- \tag{3.6.4}$$

$$\frac{-\hbar^2}{2E_n^+}\hat{\partial}^\lambda \hat{\partial}^\lambda \varphi_n^+ - \frac{\hbar}{2}\left(1 - \frac{\hbar}{E_n^+}\check{\partial}^\lambda\right)\left(\hat{\partial}^\lambda - \check{\partial}_\lambda\right)\varphi_n^+ = \frac{W_n^+}{c^2}\varphi_n^+ \tag{3.6.5}$$

The Y^- parallel entanglement represents another essential principle of Y^- natural behaviors - ***Law of Horizon 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 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.

7. Superphase Fields

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

$$\check{\partial}_\lambda\phi^- + \hat{\partial}_\lambda\varphi^+ = \dot{x}_\nu\tilde{\zeta}_\nu\Big[\begin{pmatrix}\partial_\nu \\ \partial^\nu\end{pmatrix}' \pm i\frac{e}{\hbar}\begin{pmatrix}A_\nu \\ A^\nu\end{pmatrix}'\Big]\psi^- \qquad : \psi^- = \begin{pmatrix}\phi^- \\ \varphi^+\end{pmatrix} \tag{3.7.1}$$

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

$$\hat{\partial}^\lambda\phi^+ + \check{\partial}^\lambda\varphi^- = \dot{x}^\nu\tilde{\zeta}^\nu\Big[\begin{pmatrix}\partial^\nu \\ \partial_\nu\end{pmatrix}' \mp i\frac{e}{\hbar}\begin{pmatrix}A^\nu \\ A_\nu\end{pmatrix}'\Big]\psi^+ \qquad : \psi^+ = \begin{pmatrix}\phi^+ \\ \varphi^-\end{pmatrix} \tag{3.7.2}$$

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

$$\tilde{\zeta}^\nu = \tilde{\gamma}^\nu + \tilde{\chi}^\nu \qquad \tilde{\zeta}_\nu = \tilde{\gamma}_\nu + \tilde{\chi}_\nu \tag{3.7.3}$$

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

$$\check{\partial}\psi^- \equiv \check{\partial}_\lambda\phi^- + \hat{\partial}_\lambda\varphi^+ = \dot{x}_\nu\tilde{\zeta}_\nu D_\nu\psi^- \qquad : D_\nu = \partial_m + i\frac{e}{\hbar}A_m \tag{3.7.4}$$

$$\hat{\partial}\psi^+ \equiv \hat{\partial}^\lambda\phi^+ + \check{\partial}^\lambda\varphi^- = \dot{x}^\nu\tilde{\zeta}^\nu D^\nu\psi^+ \qquad : D^\nu = \partial^\nu - i\frac{e}{\hbar}A^\nu \tag{3.7.5}$$

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

8. 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 (3.5.6-7), we add (3.6.1-5) or put together (3.7.4-5) to formulate the simple compartment:

$$\frac{\hbar}{2}\left(\dot{x}_\nu \zeta_\mu D_\nu - \dot{x}^\mu \zeta^\mu D^\mu\right)\psi_n^\pm \mp E_n^\pm \psi_n^\pm = 0 \quad \text{(3.8.1)}$$

$$\psi_n^+ = \begin{pmatrix}\phi_n^+ \\ \varphi_n^-\end{pmatrix}, \quad \overline{\psi}_n^- = \overline{\kappa}\begin{pmatrix}\varphi_n^- \\ \phi_n^+\end{pmatrix}, \quad \psi_n^- = \begin{pmatrix}\phi_n^- \\ \varphi_n^+\end{pmatrix}, \quad \overline{\psi}_n^+ = \overline{\kappa}\begin{pmatrix}\varphi_n^+ \\ \phi_n^-\end{pmatrix} \quad \text{(3.8.2)}$$

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:

$$\tilde{\mathscr{L}}_D^+ = \overline{\psi}_n^- \gamma^\mu\left(i\hbar c\partial^\mu + eA^\mu\right)\psi_n^+ + mc^2\overline{\psi}_n^-\psi_n^+ \to 0 \quad \text{(3.8.3)}$$

$$\tilde{\mathscr{L}}_D^- = \overline{\psi}_n^+ \gamma_\nu\left(i\hbar c\partial_\nu - \ eA_\nu\right)\psi_n^- - mc^2\overline{\psi}_n^+\psi_n^- \to 0 \quad \text{(3.8.4)}$$

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

$$\left(\gamma^\mu D^\mu\right)\left(\gamma_\nu D_\nu\right) = D^\mu D_\nu + \frac{i}{4}[\gamma^\mu, \gamma^\nu]F_{\mu\nu}^{-n} \quad \text{(3.8.5)}$$

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

9. Schrödinger Equation

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

$$\check{\partial}_\lambda - \hat{\partial}^\lambda = \dot{x}_\nu S_2^- \partial_m - \dot{x}^m S_2^+ \partial^\nu = 2ic \begin{pmatrix} \partial_\kappa \\ -\partial^\kappa \end{pmatrix} \tag{3.9.1}$$

Referencing the (2.2.4-5) equations, we decode the quantum fields of (3.6.4-5) into the following formulae:

$$-i\hbar\frac{\partial}{\partial t}\phi_n^- - \frac{i\hbar^2}{2E_n^-}\frac{\partial^2\phi_n^-}{\partial t^2} = -i\frac{(\hbar c)^2}{2E_n^-}\nabla^2\phi_n^- + V^-\phi_n^- \equiv \hat{H}\phi_n^- \tag{3.9.2}$$

$$-i\hbar\frac{\partial}{\partial t}\varphi_m^+ + \frac{i\hbar^2}{2E_m^+}\frac{\partial^2\varphi_m^+}{\partial t^2} = -i\frac{(\hbar c)^2}{2E_m^+}\nabla^2\varphi_m^+ + V^-\varphi_m^+ \equiv \hat{H}\varphi_m^+ \tag{3.9.3}$$

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

$$-i\hbar\frac{\partial}{\partial t}\psi = \hat{H}\psi \qquad\qquad \hat{H} \equiv -i\frac{(\hbar c)^2}{2E_n^-}\nabla^2 + V^- \tag{3.9.4}$$

Remarkably, it reveals that the entanglement lies between the first and second horizon of the event operations.

10. Pauli Theory

In the gauge fields, a particle of mass *m* and charge *e* can be extended by the vector potential $\mathbf{A}$ and scalar electric potential ϕ in the form of $A^\nu = \{\phi, \mathbf{A}\}$ such that the (3.8.4) equation is conceivable by (3.5.6-7) as the following gauge invariant:

$$-i\hbar\zeta^0 D^\kappa \varphi^+ = -\frac{\hbar^2}{2m}(\zeta^r D^r)(\zeta^r D^r)\varphi^+ + \hat{V}\varphi^+ \qquad : D^\nu = D^\kappa + D^r \tag{3.10.1}$$

$$D^\kappa = \partial^t - i\frac{e}{\hbar}\phi,\ D^r = \partial^r - i\frac{e}{\hbar}\mathbf{A} \qquad : A^\nu = \{\phi, \mathbf{A}\} \tag{3.10.2}$$

Since $\gamma^r = (\sigma_x, \sigma_y, \sigma_z) \equiv \boldsymbol{\sigma}$, the *Schrödinger* Equation (3.9.4) becomes the general form of *Pauli Equation*, formulated by *Wolfgang Pauli* in 1927:

$$i\hbar\frac{\partial}{\partial t}|\varphi^+\rangle = \left\{\frac{1}{2m}\left[\boldsymbol{\sigma}\cdot\left(\mathbf{p} - e\mathbf{A}\right)\right]^2 + e\phi + \hat{V}\right\}|\psi\rangle \equiv \check{H}|\varphi^+\rangle \tag{3.10.3}$$

$$\mathbf{p} = -i\hbar\partial^r, \qquad \boldsymbol{\sigma} = (\sigma_x, \sigma_y, \sigma_z) \qquad : \chi^\nu \mapsto 0,\ \partial^t = -\partial_t \tag{3.10.4}$$

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

$$(\boldsymbol{\sigma}\cdot\mathbf{a})(\boldsymbol{\sigma}\cdot\mathbf{b}) = \mathbf{a}\cdot\mathbf{b} + i\boldsymbol{\sigma}\cdot(\mathbf{a}\times\mathbf{b}) \qquad : \gamma^r = (\sigma_x, \sigma_y, \sigma_z) \equiv \boldsymbol{\sigma} \tag{3.10.5}$$

to obtain the standard form of *Pauli Equation*, introduced in 1927.

$$i\hbar\frac{\partial}{\partial t}|\psi\rangle = \left\{\frac{1}{2m}\left(\mathbf{p} - e\mathbf{A}\right)^2 - \frac{e\hbar}{2m}\boldsymbol{\sigma}\cdot\mathbf{B} + \tilde{V}\right\}|\psi\rangle \equiv \check{H}|\psi\rangle \tag{3.10.6}$$

where $\mathbf{B} = \nabla \times \mathbf{A}$ is the magnetic field and $\tilde{V} = \hat{V} + e\phi$ is the total potential including the horizon potential $e\phi$. The *Stern–Gerlach* term, $e\hbar\boldsymbol{\sigma} \cdot \mathbf{B}/(2m)$, acquires the spin orientation of atoms with the valence electrons flowing through an inhomogeneous magnetic field. As a result, the above equation is implicitly observable under the Y^+ characteristics. The experiment was first conducted by the *German* physicists *Otto Stern* and *Walter Gerlach*, in 1922. Analogously, the term is responsible for the splitting of quantum spectral lines in a magnetic field anomalous to *Zeeman* effect, named after *Dutch* physicist *Pieter Zeeman* in 1898.

11. Lorentz Generators

Superphase Fields of Second Horizon - As the superphase function from the second to third horizon, the vector field A^{ν} bonds and projects its potentials superseding with its conjugator, arisen by or acting on its opponent A_{ν} through a duality of reciprocal interactions dominated by boost $\tilde{\gamma}$ and twist $\tilde{\chi}$ fields, evolution into the second ($\tilde{\zeta} \mapsto \zeta$) horizon. Under the Y^{-} or Y^{+} primary, the event operates the third terms of (3.5.6-7) in a pair of the relativistic entangling fields:

$$F_{\nu\mu}^{-n} = \left(\zeta_{\nu}\partial_{\nu}A_{\mu} - \zeta^{\mu}\partial^{\mu}A^{\nu}\right)_{n} = -F_{\mu\nu}^{+n} \qquad : \tilde{F}_{\nu\mu}^{\pm n}(\tilde{\zeta}) \mapsto F_{\mu\nu}^{\pm n}(\zeta) \tag{3.11.1}$$

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

Giving rise to the third horizon, the generators contract with the ζ infrastructure (3.5.1) and evolve into the four-dimensional matrices $SU(2)_{s_1} \times SO(3)_{s_2}$, shown by the following:

$$J_1 = \begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -1 \\ 0 & 0 & 1 & 0 \end{pmatrix}, \quad J_2 = \begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{pmatrix}, \quad J_3 = \begin{pmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \tag{3.11.2}$$

$$K_1 = \begin{pmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}, \quad K_2 = \begin{pmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}, \quad K_3 = \begin{pmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix} \tag{3.11.3}$$

$$L_\nu^- = K_\nu + iJ_\nu \quad L_\nu^+ = K_\nu - iJ_\nu \tag{3.11.4}$$

$$[J_1, J_2]^- = J_3 \quad [K_1, K_2]^- = -J_3 \quad [J_1, K_2]^- = K_3 \tag{3.11.5}$$

known as *Generator* of the *Lorentz* group, discovered since 1892 or similar to *Gell-Mann* matrices. 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 or higher horizons, a duality of reciprocal interactions dominated by boost γ and twist χ fields is developed into the third ($\zeta \mapsto L$) horizon.

$$T_{\nu\mu}^{-n}(L) = \left(L_{\nu\mu}^- \partial_\nu A_\mu - L_{\mu\nu}^+ \partial^\mu A^\nu\right)_n \quad : F_{\nu\mu}^{\pm n}(\gamma) \mapsto T_{\mu\nu}^{\pm n}(L) \tag{3.11.6}$$

$$\Upsilon_{\nu\mu}^{-n}(L) = \left(L_{\nu\mu}^- \partial_\nu V_\mu - L_{\mu\nu}^+ \partial^\mu V^\nu\right)_n \quad : F_{\nu\mu}^{\pm n}(\chi) \mapsto \Upsilon_{\mu\nu}^{\pm n}(L) \tag{3.11.7}$$

where $T_{\mu\nu}^{\pm n}(L_\nu^\pm)$ is electromagnetic fields and $\Upsilon_{\mu\nu}^{\pm n}(L_\nu^\pm)$ is gravity fields. Under the Y^- or Y^+ primary, the event operates the third terms of (3.5.6-7) in a pair of the relativistic entangling fields.

12. Mass Acquisition or Annihilation

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

$$\tilde{H} = \sum_{n=1}^{N} \frac{\hat{p}_n^2}{2m} + \frac{1}{2} m \omega_n^2 r_n^2 \qquad : \hat{p}_n = -i\hbar \frac{\partial}{\partial r_n} \tag{3.12.1}$$

Developed by *Paul Dirac*, the "ladder operator" method introduces a duality of the reciprocal operators:

$$\tilde{H} = \sum_{n=1}^{N} \hbar \omega_n \left(\tilde{a}_n^{\pm} \tilde{a}_n^{\mp} \mp \frac{1}{2} \right) \qquad : \tilde{a}_n^{\mp} = \sqrt{\frac{m\omega_n}{2\hbar}} \left(r_n \pm \frac{i}{m\omega_n} \hat{p}_n \right) \tag{3.12.2}$$

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

$$\varphi_n^+(r_n) = \frac{1}{\sqrt{2^n\, n!}} \left(\frac{m\omega_n}{\pi\hbar} \right)^{1/4} e^{-\frac{m\omega_n r_n^2}{2\hbar}} H_n\!\left(\sqrt{\frac{m\omega_n}{\hbar}} r_n \right) \tag{3.12.3}$$

$$\phi_{nlm}^-(r_n, \theta, \phi) = N_{nl} r^l e^{-\frac{m\omega_n}{2\hbar} r_n^2} L_n^{(l+1/2)}\!\left(\frac{m\omega_n}{\hbar} r_n^2 \right) Y_{lm}(\theta, \phi) \tag{3.12.4}$$

$$N_{nl} = \left[\left(\frac{2\nu_n^3}{\pi} \right)^{1/2} \frac{2^{n+2l+3}\, n!\, \nu_n^l}{(2n+2l+1)!} \right]^{1/2} \qquad : \nu_n \equiv \frac{m\omega_n}{2\hbar} \tag{3.12.5}$$

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

Laguerre polynomials 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}^-.

Based on the above artifact at the n=0 ground level $H_0 = L_0 = Y_{00} = 1$, the energy potentials embody the full mass enclave $\phi_n^- \varphi_n^+ \propto m$ that splits between the potential $\varphi_n^+ \propto m^{1/4}$ in the second horizon and $\phi_n^- \propto m^{3/4}$ in the third horizon. The density emerges from the second to third horizon for the full-mass acquisition:

$$\rho^- \approx \phi_0^- \varphi_0^+ = 2\frac{m\omega}{\pi\hbar} exp\left[-\frac{m\omega}{2\hbar}(r_s^2 + r_w^2)\right] \qquad (3.12.6)$$

$$\phi_0^- = 2\left(\frac{m\omega}{\pi\hbar}\right)^{3/4} e^{-\frac{m\omega}{2\hbar}r_s^2}, \qquad \varphi_0^+ = \left(\frac{m\omega}{\pi\hbar}\right)^{1/4} e^{-\frac{m\omega r_w^2}{2\hbar}} \qquad (3.12.7)$$

where the radius r_s or r_w is the interactive range of the strong or weak forces, respectively. Therefore, the energy embodies its mass enclave in a process from its ¼ to ¾ core during its evolution of the second to third horizon, progressively. Vice versa for the annihilation.

Remarkably, the operations represent not only a duality of the creation and annihilation, but also the seamless transitions between the virtual world planes and the real spacetime manifold. For example, the *Sun* is the star at the center of the solar system between the virtual galaxy center of the second horizon and the physical planets of the third or higher horizons. The Sun rotates in the quantum layers with the innermost 1/4 (or higher to include the excited levels at n>0) of the core radius at the second and lower horizons. Between this core radius and 3/4 of the radius, it forms a "radiative zone" for energy embodied at the full mass enclave by means of photon radiation. The rest of the physical zone is known as the “convective zone” for massive outward heat transfer.

13. Physical Torque Singularity

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

$$\check{g}_{\nu\mu} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & r^2 & 0 \\ 0 & 0 & r^2 sin^2\theta \end{pmatrix}, \qquad \check{g}^{\nu\mu} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & r^{-2} & 0 \\ 0 & 0 & r^{-2} sin^{-2}\theta \end{pmatrix} \tag{3.13.1}$$

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

$$\Gamma^{-r}_{\nu\mu} = \begin{pmatrix} 0 & 0 & 0 \\ 0 & -r & 0 \\ 0 & 0 & -rsin^2\theta \end{pmatrix}, \Gamma^{-\theta}_{\nu\mu} = \begin{pmatrix} 0 & 1/r & 0 \\ 1/r & 0 & 0 \\ 0 & 0 & -sin\theta cos\theta \end{pmatrix}, \quad \Gamma^{-\varphi}_{\nu\mu} = \begin{pmatrix} 0 & 0 & 1/r \\ 0 & 0 & cot\theta \\ 1/r & cot\theta & 0 \end{pmatrix} \tag{3.13.2}$$

$$\Gamma^{-}_{r\nu\mu} = \Gamma^{-r}_{\nu\mu} \qquad \Gamma^{-}_{\theta\nu\mu} = r^2\Gamma^{-\theta}_{\nu\mu}, \qquad \Gamma^{-}_{\varphi\nu\mu} = r^2 sin^2\theta\Gamma^{-\varphi}_{\nu\mu} \tag{3.13.3}$$

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

$$\nabla \cdot R_1^- = \frac{1}{r^2}\frac{\partial}{\partial r}(r^2\Gamma^{-r}_{\nu\mu}) + \frac{1}{rsin\theta}\left[\frac{\partial}{\partial\theta}(sin\theta\Gamma^{-\theta}_{\nu\mu}) + \frac{\partial}{\partial\varphi}(\Gamma^{-\varphi}_{\nu\mu})\right] \tag{3.13.4}$$

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

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

14. Speed of Light

At an event $\lambda = t$, the observable light speed in a free space or vacuum has the relativistic effects of transformations. A summation of the right-side of the four (7.2) equations represents the motion fluxions:

$$\mathbf{f}_c^+ = \psi_c^- \begin{pmatrix} \hat{\partial}^\nu \\ \check{\partial}^\nu \end{pmatrix}' \psi_c^+ = \psi_c^- \dot{x}^\nu \tilde{\gamma}^\nu \begin{pmatrix} \partial^\nu \\ \partial_\nu \end{pmatrix}' \psi_c^+ \mapsto C_{\nu\mu}^+ \psi_c^- \nabla \psi_c^+ \qquad (3.14.1)$$

$$\mathbf{f}_c^- = \psi_c^+ \begin{pmatrix} \check{\partial}_\nu \\ \hat{\partial}_\nu \end{pmatrix}' \psi_c^- = \psi_c^+ \dot{x}_\nu \tilde{\gamma}_\nu \begin{pmatrix} \partial_\mu \\ \partial^\mu \end{pmatrix}' \psi_c^- \mapsto C_{\nu\mu}^- \psi_c^+ \nabla \psi_c^- \qquad (3.14.2)$$

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

$$C_{\nu\mu}^+ = \dot{x}^\nu \gamma^\nu e^{-i\vartheta}, \quad C_{\nu\mu}^- = \dot{x}_\nu \gamma_\nu e^{i\vartheta} \qquad : \vartheta = \vartheta^- - \vartheta^+ \qquad (3.14.3)$$

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

$$C_{rr}^\pm = ce^{\mp i\vartheta} \qquad : \textit{Speed of Light} = |C_{rr}^\pm| = c \qquad (3.14.4)$$

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

15. Speed of Gravitation

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

$$\mathbf{f}_g^+ = \psi_g^- \begin{pmatrix} \hat{\partial}^\nu \\ \check{\partial}^\nu \end{pmatrix}' \psi_g^+ = \psi_g^- \dot{x}^\nu \tilde{\chi}^\nu \begin{pmatrix} \partial^\nu \\ \partial_\nu \end{pmatrix}' \psi_g^+ \mapsto G_{\nu\mu}^+ \psi_g^- \nabla \psi_g^+ \qquad (3.15.1)$$

$$\mathbf{f}_g^- = \psi_g^+ \begin{pmatrix} \check{\partial}_\nu \\ \hat{\partial}_\nu \end{pmatrix}' \psi_g^- = \psi_c^+ \dot{x}_\nu \tilde{\chi}_\nu \begin{pmatrix} \partial_\mu \\ \partial^\mu \end{pmatrix}' \psi_g^- \mapsto G_{\nu\mu}^- \psi_g^+ \nabla \psi_g^- \qquad (3.15.2)$$

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

$$G_{\nu\mu}^+ = \lim_{r\to 0} (x^\nu \dot{x}^\nu \chi^\nu e^{-i\vartheta}) = x^\nu \dot{x}^\nu \epsilon_3 e^{-i\vartheta} = c_g s_1 e^{-i\vartheta} \qquad : \quad s_1 = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \qquad (3.15.3)$$

$$G_{\nu\mu}^- = \lim_{r\to 0} (x_\nu \dot{x}_\nu \chi_\nu e^{i\vartheta}) = x_\nu \dot{x}_\nu \epsilon_3 e^{i\vartheta} = c_g \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} e^{i\vartheta} \qquad (3.15.4)$$

$$\textit{Speed of Gravitation} = |G_{\mu\nu}^\pm| = c_g \qquad : \mu \neq \nu \qquad (3.15.5)$$

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

Thermodynamics

CHAPTER 4

In this chapter, the previous contexts are unfolded into further details to testify empirically how and why *Fluxion Fields* can prevail a series of groundbreakings over our classic *Thermodynamics* to declare *Photon and Graviton Fields* as a part of *Universal and Unified Field Theory*.

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

1. Duality of Thermal Densities

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

$$dS = \frac{\partial S}{\partial E}dE + \frac{\partial S}{\partial E}\frac{\partial E}{\partial V}dV + \frac{\partial S}{\partial E}\sum_n \left(\frac{\partial E}{\partial N_n^{\pm}}dN_n^{\pm}\right) = \frac{1}{T}\left(dE + PdV - \sum_n \mu_n dN_n^{\pm}\right) \tag{4.1.1}$$

$$\frac{1}{T} = \frac{\partial S}{\partial E} \qquad P = \left(\frac{\partial E}{\partial V}\right)_T \tag{4.1.2}$$

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

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

$$S_\rho = -k_s \int \rho_\psi dV = -k_s \int \frac{d\rho_E - Td\rho_s - \sum_i \mu_i d\rho_{n_i}}{T\rho_s + \sum_i \mu_i \rho_{n_i} - (P + \rho_E)} dV \tag{4.1.3}$$

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

$$Y^- : d\rho_E^- = Td\rho_s^- + \sum_i \mu_i d\rho_{n_i}^- \tag{4.1.4}$$

$$Y^+ : P + \rho_E^+ = T\rho_s^+ + \sum_i \mu_i \rho_{n_i}^+ \tag{4.1.5}$$

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

At the arisen horizon, a macroscopic state consists of pairs of $Y^-\{\rho^-, \varrho^+ = \rho^{-*}\}$ and $Y^+\{\rho^+, \varrho^- = \rho^{+^*}\}$ thermal density fields. By mapping $\phi_n^\pm \mapsto \rho^\pm$, $\varphi_n^\pm \mapsto \varrho^\pm$ and $x_0 \mapsto \beta$, the same mathematical framework in deriving (3.8.4) can be reapplied to formulate a duality of the thermal densities, shown by the following:

$$-i\frac{\partial \rho^-}{\partial \beta} = \hat{H}\rho^- \qquad -h_\beta \frac{\partial^2 \rho}{\partial \beta^2} = \hat{H}\rho \qquad : \hat{H} \equiv -h_\beta \nabla^2 + \hat{U}(\mathbf{r}, \beta_0) \tag{4.1.6}$$

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

2. Flux Propagation

At both of the boost and twist transformations at a constant speed, the (3.6.1-2) equations obey the time-invariance, transform between virtual and physical instances, and transport into the third horizon *SU*(3). For the external observation, the diagonal elements can be converted into a pair of dynamic fluxions of the Y^-Y^+ energy flows:

$$\hbar^2\check{\partial}_\lambda\check{\partial}^\lambda\phi_n^+ = 2E_n^-E_n^+\phi_n^+ \rightarrow \frac{1}{c^2}\frac{\partial^2\phi_n^+}{\partial t^2} - \nabla^2\phi_n^+ = 2\frac{E_n^-E_n^+}{(\hbar c)^2}\phi_n^+ \quad (4.2.1)$$

$$\hbar^2\hat{\partial}_\lambda\hat{\partial}_\lambda\varphi_n^- = 2E_n^-E_n^+\varphi_n^- \rightarrow \frac{1}{c^2}\frac{\partial^2\varphi_n^-}{\partial t^2} + \nabla^2\varphi_n^- = 2\frac{E_n^-E_n^+}{(\hbar c)^2}\varphi_n^- \quad (4.2.2)$$

where the (2.2.4-5) equations are applied. It extends and amends the *Klein–Gordon* equation, introduced in 1926, by a factor of 2. Adding φ_n^- times the first equation and ϕ_n^+ times the second equation, one has an observable flux-continuity of the Y^+-primacy entanglement.

$$\Diamond_n^+ = 2\frac{E_n^-E_n^+}{(\hbar c)^2}\varphi_n^-\phi_n^+ \qquad : \Diamond_n^+ \equiv \left\langle\frac{1}{c^2}\frac{\partial^2}{\partial t^2}\right\rangle_n^+ - \left[\nabla^2\right]_n^+ \quad (4.2.3)$$

Correspondingly, the diagonal elements of the (3.6.2) equation can be similarly reformulated to the Y^--primacy flux-continuity.

$$\Diamond_n^- = 2\frac{E_n^-E_n^+}{(\hbar c)^2}\varphi_n^+\phi_n^- \qquad : \Diamond_n^- \equiv \left\langle\frac{1}{c^2}\frac{\partial^2}{\partial t^2}\right\rangle_n^- + \left[\nabla^2\right]_n^- \quad (4.2.4)$$

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

$$\Diamond_n \equiv \Diamond_n^+ + \Diamond_n^- = 4\frac{E_n^- E_n^+}{(\hbar c)^2}\Phi_n \qquad : \Phi_n = \frac{1}{2}\left(\varphi_n^- \phi_n^+ + \varphi_n^+ \phi_n^-\right) \qquad (4.2.5)$$

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

3. Energy-Momentum Conservation

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

$$\hat{E}^2 = \hat{\mathbf{P}}^2 + 4m^2c^4 \;\; \rightarrow \qquad \left(\hat{\mathbf{P}} + i\hat{E}\right)\left(\hat{\mathbf{P}} - i\hat{E}\right) = 4E_n^+E_n^- \qquad (4.3.1)$$

$$\hat{E} = -\, i\hbar\partial_t, \qquad \mathbf{P} = ic\,\hat{\mathbf{p}}, \qquad \hat{\mathbf{p}} = -\, i\hbar\,\nabla \qquad (4.3.2)$$

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

$$\nabla^2\Phi_n^- - \frac{1}{c^2}\frac{\partial^2\Phi_n^-}{\partial t^2} = 4\frac{E_n^-E_n^+}{\left(\hbar c\right)^2}\Phi_n^- \qquad (4.3.3)$$

Therefore, besides the (4.3.1), we demonstrate an alternative approach to derive and amend the *Klein–Gordon* equation, introduced in 1926 or manifestly *Lorentz* covariant symmetry described as that the feature of nature is independent of the orientation or the boost velocity of the laboratory through spacetime.

4. Entropy

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

$$\mathcal{S}_a = \mathcal{S}^+ + \mathcal{S}^- = 4\mathcal{S}_A \qquad : \mathcal{S}^{\pm} = \kappa_s\left[\hat{\partial}_\lambda\hat{\partial}_\lambda, \check{\partial}^\lambda\check{\partial}^\lambda\right]^{\pm} \qquad (4.4.1)$$

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

In reality, the above flux-continuities are a pair of virtual and physical energies in each of the asymmetric entanglements to give rise to the strong forces at higher horizons of *SU*(2) and *SU*(3). Therefore, under a trace of the diagonalized tensors, we can represent a pair of the *Lagrangians* as a duality of the area flux-continuities:

$$\mathcal{L}_{Flux}^{\pm SU1} \equiv \Diamond_n^{\pm} = 2\frac{E_n^{\pm}E_n^{\pm}}{(\hbar c)^2}\Phi_n^{\pm} \qquad : \Phi_n^{\pm} = \varphi_n^{\mp}\phi_n^{\pm} \qquad (4.4.2)$$

$$\mathcal{L}_{Flux}^{SU1} = \Diamond_n^+ + \Diamond_n^- = -4\frac{E_n^{\mp}E_n^{\pm}}{(\hbar c)^2}\Phi_n \qquad : \Phi_n = \frac{1}{2}\left(\Phi_n^+ + \Phi_n^-\right) \qquad (4.4.3)$$

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

External to observers at constant speed, a system is describable fully by the coherent entropy $\mathcal{S}_a$ of blackhole radiations to represent the law of conservation of the area fluxions or the time-invariance. As a total energy density travelling on the two-dimensional word planes $\{\mathbf{r} \pm i\mathbf{k}\}$, it is equivalent to a fluxion of blackhole density scaling at entropy $\mathcal{S}_a$ of an area flux continuity (4.4.3) for the potential radiations in a free space or vacuum, or the law of conservation of the area fluxions:

$$S_A = 4\frac{E_n^-E_n^+}{(\hbar c)^2}\Phi_n \tag{4.4.4}$$

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

5. Spacetime Metric

Giving rise from the second horizon to the third horizon, the events of world lines evolute into the four-dimensional spacetime manifolds. At the third horizon, given rise to the freedom of the extra rotations, the world planes are further evolved into *Spacetime* manifolds, where the torque fields are transited to gravitational forces with a central-singularity.

As a part of the *Spacetime Evolution*, a spacetime of the third horizon is manifested and given rise from the second horizon to gain the extra freedom and evolution into three-dimensions of a physical space. The event operation of evolution is mathematically describable through transitioning functions from the tilde-zeta-matrices of the first horizon to the zeta-matrices $\tilde{\zeta} \mapsto \zeta$ of the second horizon, to the *Lorentz*-matrices $\zeta \mapsto L_{\nu}^{\pm}$ (3.11.6-7) of the third horizon. Dependent on their $Y^{-}Y^{+}$ commutations or continuities through the tangent curvatures of potentials, the entangling processes develop the dark fluxions of fields, forces and entanglements to evolve the physical spacetime, prolific ontology, and eventful cosmology.

The metric solution for spacetime is exterior to a spherically symmetric, static body of radius r_s and mass M. Therefore, spacetime is limited at the scope of $r > r_s$ where energies are embodied as or enclaved in the physical massive objects. In order words, the events on the world lines are massless for the spacial $r \le r_s$ regime under two-dimensional world planes. During the inauguration of mass enclave at the third horizon, appearing as if there were from nothing at the second horizon, fluxions of the superphase entanglement exert the gravity fields in a spacetime manifold.

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

$$\mathrm{d}\Sigma^2 = \mathrm{d}r^2 + S_k(r)^2\,\mathrm{d}\vartheta^2 \qquad : \mathrm{d}\vartheta^2 = \mathrm{d}\theta^2 + \sin^2\theta\,\mathrm{d}\phi^2 \qquad (4.5.1)$$

$$S_k(r) = r\,\mathrm{sinc}(r\sqrt{k}) = \begin{cases} \sin\left(r\sqrt{k}\right)/\sqrt{k}, & k > 0 \\ r, & k = 0 \\ \sinh\left(r\sqrt{|k|}\right)/\sqrt{k}, & k < 0. \end{cases} \tag{4.5.2}$$

Apparently, it represents the virtual ($k < 0$) and physical ($k > 0$) of the “hyperspherical coordinates” bridged by the polar coordinate system ($k = 0$), which emerges into the third horizon to gain the extra two-coordinates. Therefore, it evidently supports a proof to our full description of the evolutionary process coupling the horizons between the two-dimensional *World Planes* and the three-dimensional physical spacetime manifold.

Analytic solutions of Einstein's equations are hard to come by. It's easier in situations that exhibit symmetries. In 1916, *Karl Schwarzschild* sought the metric describing the static, spherically symmetric spacetime surrounding a spherically symmetric mass distribution. A static spacetime is one for which there exists a time coordinate such that

i. All the components of $g_{\mu\nu}$ are independent of time events

ii. The line element ds^2 is invariant under the entanglement $\pm ict$

A spacetime that satisfies (i) but not (ii) is called stationary. An example is a rotating azimuthally symmetric mass distribution. The metric for a static spacetime has the expressions

$$d\mathbf{s}^2 = A(r)c^2dt^2 - d\mathbf{l}^2 \qquad \mathrm{d}\mathbf{l}^2 = B(r)dr^2 + r^2(\mathrm{d}\theta^2 + \sin^2\theta\,\mathrm{d}\phi^2) \tag{4.5.3}$$

where $\mathrm{d}\mathbf{l}^2$ is a time independent spatial metric. Cross-terms are missing because their presence would violate condition (ii). To preserve spherical symmetry, $\mathrm{d}\mathbf{l}^2$ can be distorted from the flat-space metric only in the radial direction. In flat space, the r is the distance from the origin and $4\pi r^2$ is the area of a sphere. Considering the week gravity obeys newton’s gravity law, the *Schwarzschild* metric is derive as

$$A(r) = 1 - \frac{r_s}{r} \qquad B(r) = 1/A(r) \qquad : r_s = \frac{2GM}{c^2} \tag{4.5.4}$$

The *Schwarzschild* metric describes any spherically symmetric spacetime at the third horizon outside the mass-energy distribution $r > r_s$, even if the distribution moves. Therefore, r is known as the area distance. As $r \rightarrow \infty$, the metric becomes *Minkowskian* or known as asymptotic flatness. The measuring distances at “collapsed” states for the *Sun* at r_s=2.9km and the *Earth* at r_s=0.88 cm imply the *Sun* is the resources of energy supplier.

Obviously, since *Schwarzschild* metric represents a static spacetime or physical stationary at the “collapsed” states, its scope is limited to the regime of classical physics or at the third or higher horizons. Only at the second or lower horizons, the nature has the mysterious dark energy. In a philosophical view, the dark energy lies at the heart of the fundamental nature of potential fields, event operations, and the superphase modulations.

6. Photon

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

$$S_A(\omega_c, T) = \frac{\hbar\omega_c^3}{4\pi^3 c^2 k_B T}\left(e^{\hbar\omega_c/k_B T} - 1\right)^{-1} \simeq \frac{\omega_c^2}{4\pi^3 c^2} \qquad (4.6.1)$$

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

As a fluxion flow of light, it balances statistically at each of the states $E_n^{\mp} : mc^2 \rightleftharpoons \hbar\omega$, where $\hbar\omega$ is known as the *Planck* matter-energy, introduced in 1900. Therefore, at a minimum, light consists of two units, a pair of *Photons*. For a total of mass-energy $4m^2c^4$, the equation presents a conservation of photon energy-momentum and relativistic invariance. Because the potential fields on a pair of the world planes are a triplet quark system at $2\varphi_a^+(\phi_b^- + \phi_c^-) \approx 4\varphi_a^+\phi_{b/c}^-$, it is about four times of the density for the wave emission. Applicable to the equation of conservation above and mass annihilation (3.12.6), an area energy fluxion of the potentials is equivalent to the entropy of the electro-photon radiations in thermal equilibrium and mass annihilation:

$$S_{A1}(\omega_c, T) = 4\left(\frac{\omega_c^2}{4\pi^3 c^2}\right) = \eta_c \left(\frac{\omega_c}{c}\right)^2 \qquad : \eta_c = \pi^{-3} \qquad (4.6.2)$$

where the factor 4 of the first entropy is given by (4.4.1) that has compensated to account for one blackbody with the dual states at minimum of two physical Y^- and one virtual Y^+ quarks. Apparently, the electromagnetic radiation $\eta_c = \pi^{-3}$ is trivial for a blackhole to emit photons.

Horizon Energy Radiation - In a free space or vacuum for the mass enclave of equation (3.12.6), an area density is equivalent to the entropy of the dark radiations in thermal equilibrium during the mass acquisition:

$$S_{A2}(\omega_c, T) = 2\frac{m\omega_c}{\pi c} = \eta_h \left(\frac{\omega_c}{c}\right)^2 \qquad : \eta_h = \frac{2}{\pi} \qquad (4.6.3)$$

Remarkably, the *Horizon Radiation* $\eta_c = \frac{2}{\pi} = 63.7\,\%$ implies that the even operational radiations emit photons at approximately 2/3 ratio.

A summation of the above equivalences results in the total entropy to derive a pair of the complex formulae, known as photon:

$$S_A(\omega_c, T) = S_{A1}(\omega_c, T) + S_{A2}(\omega_c, T) = (\eta_c + \eta_h)\left(\frac{\omega_c}{c}\right)^2 \mapsto 4\frac{E_c^- E_c^+}{(\hbar c)^2} \qquad (4.6.4)$$

$$E_c^{\pm} = \mp \frac{i}{2}\hbar\omega_c \qquad \eta_c = \pi^{-3} = 3.22\,\%, \qquad \eta_h = \frac{2}{\pi} = 63.7\,\% \qquad (4.6.5)$$

Introduced at 20:00 August 19 of 2017, the coupling constant at η_c or η_h implies that the triplet quarks institute a pair of the photon energies $\mp i\hbar\omega_c/2$ for a blackhole to emit light, dominantly. Accompanying lightwave radiation, it reveals that dark energy can be transformed to (creation) or emitted by (annihilation) the triplet quarks: an electron, a positron and a gluon.

7. Conservation of Light

As the remarkable nature of virtual energy, besides the primary properties of visibility, intensity, propagation direction, wavelength spectrum and polarization, the light can be characterized by the law of conservation, shown by the chart.

Law of Conservation of Light

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

In summary, photon exhibits wave–particle duality, propagates under $Y^{-}Y^{+}$ entanglements, and obeys *Law of Conservation of Light*. It is mediated by inertial boost for transformation and behaves like a particle with definite and finite measurable position or momentum, though not both at the same time. A pair of photons can be emitted by mass objects, transported massless without electric charge, absorbed in photon amounts, refracted by an object or interfered with themselves.

8. Graviton

Gravitation exhibits wave–particle duality such that its properties must acquire characteristics of both virtual and physical particles. Inherent to the blackhole thermal radiance, gravitational fluxion (4.3.3) has the transportable commutation of area entropy S_A and conservable radiations of a *Schwarzshild* blackbody (4.5.4) with radius $r_s = 2GM/c^2$, derived in 1916. An area entropy S_A of the quantum-gravitational radiance is given by frequency at an absolute temperature *T* and constant speed c_g as the following:

$$S_A(\omega_g, T) = \frac{c_g^3}{4\hbar G} \tag{4.8.1}$$

where G is the gravitational constant, known as *Bekenstein-Hawking* radiation, introduced in 1974. This formula is applicable to generate *Graviton* in gravitational radiations. It is equivalent to associate the above radiation with:

$$S_A(\omega_g, T) = 4\left(\frac{c_g^3}{4\hbar G}\right) = 4\frac{E_g^- E_g^+}{(\hbar c_g)^2} \quad \rightarrow \quad E_g^{\pm} = \mp \frac{i}{2}\sqrt{\hbar c_g^5 / G} \tag{4.8.2}$$

where the number 4 is factored for a dual-state system, given by (4.4.1). Consequently, the gravitational energies $E_g^{\pm}$ contain not only a duality of the complex functions but also an irreducible unit: ***Graviton***, introduced at 21:30 November 25 of 2017, as a pair of graviton units:

$$E_g^{\pm} = \mp \frac{i}{2} E_p \quad : E_p = \sqrt{\hbar c_g^5 / G} \tag{4.8.3}$$

where E_p is the *Planck* 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. Similar to a pair of photons emitted by dark energy, the nature of graviton is associated with the superphase modulation of the $Y^{-}Y^{+}$ energy or dark energy entanglement for all particles. In the center of entanglement, the colliding duality has no net momentum, whereas gravitons always have the temperature sourced from their spiral torques and modulated by superphase of the nature.

9. Conservation of Gravitation

Similar to acquisition of *Conservation of Light*, we represent the characteristics of gravitation, shown by the chart. Under the superphase modulations, the feature of nature is independent of the orientation and the boost transformation or spiral torque invariance throughout the world lines.

Law of Conservation of Gravitation

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

Together with law of conservation of light, the initial state of the universe is conserved or invariant at the horizon where the inception of the physical world is entangling with and operating by the virtual supremacy. As an area density streaming, gravitational fields are superposing potentials and interweaving entanglements that might be interfered with themselves.

10. Statistical States

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

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

$$\Omega(E) = \prod \Omega(E_n) = \prod \frac{N!}{N_n^\pm!(N - N_n^\pm)!} \qquad : N_n^\pm = \frac{E_n}{|E_n^\pm|} \tag{4.10.1}$$

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

$$S(E) = \sum_n S(E_n) = -k_B \sum_n \log \frac{N!}{(N_n^\pm)!(N - N_n^\pm)!} \tag{4.10.2}$$

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

$$log\,(N!) = N \log(N) - N + \frac{1}{2}\log(2\pi N) + \Re(1/N) \tag{4.10.3}$$

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

$$S(N_n^{\pm}) = -k_B N\Big[\Big(1-\frac{N_n^{\pm}}{N}\Big)\log\Big(1-\frac{N_n^{\pm}}{N}\Big)+\frac{N_n^{\pm}}{N}\log\Big(\frac{N_n^{\pm}}{N}\Big)\Big] \tag{4.10.4}$$

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

$$\frac{1}{T} \equiv \sum_n \frac{\partial S_n}{\partial E_n} = \sum_n \frac{\mp i k_B}{E_n^{\pm}}\log\Big(\frac{NE_n^{\pm}}{E_n}-1\Big) \qquad : k_BT \in (0, \pm iE_n^{\pm}) \tag{4.10.5}$$

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

$$E_n = NE_n^{\pm}h_n = \frac{NE_n^{\pm}}{e^{\pm iE_n^{\pm}/k_BT}+1} = k_BTN_n^{\pm}\log\Big(\frac{N}{N_n^{\pm}}-1\Big) \tag{4.10.6}$$

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

$$h_n^{\pm} = \frac{N_n^{\pm}}{N} = \frac{1}{e^{\pm\beta E_n^{\pm}}+1} \qquad : \beta = \frac{i}{k_BT} \tag{4.10.7}$$

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

11. Boltzmann Distribution

Fundamental to the statistical mechanics, we recall that all accessible energy states are equally likely. This means the probability that the system sits in state |n⟩ is just the ratio of this number of states to the total number of states, emerged and reflected in the above equations at the state probabilities, $p_n^{\pm} = p_n(h_n^{\pm})$, to form the macroscopic density and to support the equations of (2.7.1-8) by the following expression:

$$p_n^{\pm} = \frac{h_n^{\pm}}{\sum h_\nu} = \frac{e^{\pm\beta E_n^{\pm}}}{Z} \qquad : Z \equiv \sum_\nu e^{\pm\beta E_\nu^{\pm}} = \frac{e^{\pm\beta E_\nu^{\pm}/2}}{1 - e^{\pm\beta E_\nu^{\pm}}} \qquad (4.11.1)$$

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

$$\tilde{E}^{\pm} = -i\frac{d\log(Z)}{d\beta} = \pm\frac{iE_n^{\pm}}{2} \pm \frac{iE_n^{\pm}}{e^{\pm\beta E_n^{\pm}} - 1} \qquad : E_n^{\pm} = \mp imc^2 \qquad (4.11.2)$$

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

12. Chemical Potential and Heat Capacity

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

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

$$= -\sum_n \left[E_n^{\pm} - k_B T\left(1 + e^{\pm\beta E_n^{\pm}}\right)\right] \quad (4.12.1)$$

Its heat capacity can be given by the following definition:

$$C_V \equiv \sum_n \left(\frac{\partial E_n}{\partial T}\right)_{V,N_n^{\pm}} = k_B \sum_n \frac{N\left(E_n^{\pm}\right)^2 e^{\pm\beta E_n^{\pm}}}{\left[k_B T\left(e^{\pm\beta E_n^{\pm}} + 1\right)\right]^2} \quad (4.12.2)$$

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

13. Conclusions

As one of the crucial implication of the law of conservation of light, the nature of lights is propagated at or appeared between where the two objects interrupts potentially at near third horizon. Although the superphase modulation is at all levels of horizons, the transformation, transportation as well as interruption on the world lines are independent to or free from the degrees of freedom in physical space of the redundant coordinates such as $\{\theta, \varphi\}$.

Therefore, *Aether* theory, introduced by Isaac Newton in 1718, has correctly sensed that there is something existence but incorrectly defined by the interpretation: "the existence of a medium, named as the aether, is a space-filling substance or field, necessary as a transmission medium for the propagation of electromagnetic or gravitational forces." The replacement of *Aether* in modern physics is *Dark Energy,* defined as "an unknown form of energy which is hypothesized to permeate all of space, tending to accelerate the expansion of the universe." Both of the key words, "space-filling" or "all of space" contradicts the law of neither conservation of light nor conservation of gravitation.

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

Because of its dependence on temperature and area, *Planck* and *Schwarzschild* radiations (4.5.4) are said to be thermal radiation obeying area entropies. The higher the temperature or area of a body the more radiation it emits at every wave-propagation of light and entangling-transportation of gravitation. Since a blackhole acts like an ideal blackbody at the second or lower horizons, it reflects no light and absorbs full gravitation.

Symmetric Fields

CHAPTER 5

In this chapter, the previous contexts are unfolded into further details to testify empirically how and why *Quantum Fields* can prevail a series of groundbreakings over our classic *Electromagnetism and Gravitation* to declare *Symmetric Fields* as a part of *Universal and Unified Field Theory*.

As the functional quantity of an object, a set of the vector fields forms and projects its potentials to its surrounding space, arising from or acting on its opponent through a duality of reciprocal interactions dominated by both *inertial Boost* and *spiral Torque* of the *Lorentz* generators at the third horizon between the dual spacetime manifolds. As a result, it constitutes the general symmetric fields of gravitation, electromagnetism and thermodynamics.

For the four fundamental interactions, commonly called forces, in nature, *Electromagnetism* or *Graviton* constitute all type of physical interaction that occurs between electrically charged or massive particles, although they appear as independence or loosely coupled at the third or fourth horizons. The electromagnetism usually exhibits a duality of electric and magnetic fields as well as their interruption in light speed. The graviton represents a torque duality between the virtual and 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.

1. Symmetry and Antisymmetry

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*. 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 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.

2. Flexion Continuity

In mathematics, *World Equations* of (2.4.5) can be written in term of the scalar, vector, and higher orders tensors, shown as the following:

$$W_b = W_0^{\pm} + \sum_n h_n \left\{ \kappa_1 \langle \dot{\partial}_\lambda \rangle^{\pm} + \kappa_2 \dot{\partial}_{\lambda_2} \langle \dot{\partial}_{\lambda^1} \rangle_s^{\pm} + \kappa_3 \dot{\partial}_{\lambda_3} \langle \dot{\partial}_{\lambda^2} \rangle_v^{\pm} \cdots \right\} \tag{5.2.1}$$

where κ_n is the coefficient of each order *n* of the event $\lambda^n = \lambda_1 \lambda_2 \cdots \lambda_n$ aggregation. The above equations are constituted by the scalar fields: $\phi^{\pm}$ and $\varphi^{\mp}$ at the second and third horizon (index s), their tangent vector fields $T_\nu^{\pm}$ and $\Upsilon_\nu^{\pm}$ at the fourth horizon (index v), and their tensor fields at higher horizons.

For *Second Universal Field Equations* (2.9.3, 2.9.6) without asymmetric entanglements or symmetric dynamics that does not have the asymmetric flux transportation spontaneously, the fluxions satisfy the residual conditions of symmetric interweavement.

$$\dot{\partial}_\lambda \mathbf{f}_\nu^{+} = \langle W_0^{+} \rangle - \kappa_1 \left[\check{\partial}^{\lambda_2} - \hat{\partial}_{\lambda_2} \right]_\nu^{+} + \kappa_2 \left\langle \check{\partial}_{\lambda_3} \left(\hat{\partial}_{\lambda_2} - \check{\partial}^{\lambda_2} \right) \right\rangle_\nu^{+} \qquad : \mathbf{g}_a^{-} = 0 \tag{5.2.2}$$

$$\dot{\partial}_\lambda \mathbf{f}_\nu^{-} = \langle W_0^{-} \rangle + \kappa_1 \left[\check{\partial}_{\lambda_1} - \hat{\partial}^{\lambda_1} \right]_\nu^{-} + \kappa_2 \left\langle \check{\partial}_{\lambda_1} \left(\hat{\partial}^{\lambda_2} - \check{\partial}^{\lambda_2} \right) \right\rangle_\nu^{-} \qquad : \mathbf{g}_a^{+} = 0 \tag{5.2.3}$$

At the third horizon, a pair of the flux continuity above can derive the horizon forces, giving rise to the electromagnetic and gravitational fields.

3. Symmetric Field Tensors

As the function quantity from the second to third horizon, a vector field F_ν forms and projects its potentials to its surrounding space, arisen by or acting on its opponent potential φ^+ through a duality of reciprocal interactions dominated by *Lorentz Generators*. Under the Y^- primary given by the generator of (3.11.2-3), the event processes institute and operate the entangling fields:

$$\check{T}^{-n}_{\mu\nu} \equiv \frac{\hbar c}{2E^-}\left\langle \hat{\partial}^\lambda - \check{\partial}^\lambda \right\rangle^-_\gamma \mapsto \frac{\hbar c}{2E^-}\left\langle \dot{x}^\mu L^+_\mu \partial^\mu - \dot{x}^\nu L^-_\nu \partial_\nu \right\rangle^-_v \tag{5.3.1}$$

$$\check{T}^{-n}_{\mu\nu} = \begin{pmatrix} \xi_0 & \beta_1 & \beta_2 & \beta_3 \\ -\beta_1 & \xi_1 & -e_3 & e_2 \\ -\beta_2 & e_3 & \xi_2 & -e_1 \\ -\beta_3 & -e_2 & e_1 & \xi_3 \end{pmatrix}_\times = \begin{pmatrix} 0 & \mathbf{B}^-_q \\ -\mathbf{B}^-_q & \frac{\check{\mathbf{b}}}{c} \times \mathbf{E}^-_q \end{pmatrix} + \xi_\nu \tag{5.3.2}$$

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

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

$$\hat{T}^{+n}_{\mu\nu} \equiv \frac{\hbar c}{2E^+}\langle \hat{\partial}_\lambda - \check{\partial}^\lambda \rangle^+_\gamma \mapsto \frac{\hbar c}{2E^+}\langle \dot{x}_\mu L^+_\mu \partial^\mu - \dot{x}^\nu L^-_\nu \partial_\nu \rangle^+_v \tag{5.3.3}$$

$$\hat{T}^{+n}_{\nu\alpha} = \begin{pmatrix} \xi^0 & d^1 & d^2 & d^3 \\ -d^1 & \xi^1 & h^3 & -h^2 \\ -d^2 & -h^3 & \xi^2 & h^1 \\ -d^3 & h^2 & -h^1 & \xi^3 \end{pmatrix}_{\times} = \begin{pmatrix} 0 & \mathbf{D}^+_q \\ -\mathbf{D}^+_q & \frac{\mathbf{u}}{c^2} \times \mathbf{H}^+_q \end{pmatrix} + \xi^\nu \tag{5.3.4}$$

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

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

$$\check{\Upsilon}^{-a}_{\mu\nu} \equiv \frac{\hbar c}{2E^-} \left\langle \hat{\partial}^\lambda - \check{\partial}^\lambda \right\rangle^-_\chi \mapsto \begin{pmatrix} 0 & \mathbf{B}^-_g \\ -\mathbf{B}^-_g & \frac{\check{\mathbf{b}}}{c} \times \mathbf{E}^-_g \end{pmatrix} = -\check{\Upsilon}^{+a}_{\nu\mu} \tag{5.3.5}$$

$$\hat{\Upsilon}^{+a}_{\nu\mu} \equiv \frac{\hbar c}{2E^+} \left\langle \hat{\partial}_\lambda - \check{\partial}^\lambda \right\rangle^+_\chi \mapsto \begin{pmatrix} 0 & \mathbf{D}^+_g \\ -\mathbf{D}^+_g & \frac{\mathbf{u}}{c_g^2} \times \mathbf{H}^+_g \end{pmatrix} = -\hat{\Upsilon}^{-a}_{\mu\nu} \tag{5.3.6}$$

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

4. Horizon Forces

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

Under physical primacy, the Y^- fluxion generates acceleration tensor $\mathbf{g}_\times^-$ and represents the time divergence of the forces acting on the opponent objects. This divergence, $\check{\partial}_{\lambda=t} = \left(ic\partial_\kappa \quad \mathbf{u}^-\nabla\right)$, appears at the *Two-Dimensional* world plane acting on the 2x2 tensors and extend to the 4x4 spacetime tensors. Substituting the equations (5.3.2, 5.3.5) into symmetric (5.2.3) fluxion, we have the matrix formula in a pair of the vector formulation for the internal fields:

$$\frac{\hbar c}{2E^-}\left\langle \check{\partial}_\lambda\left(\hat{\partial}^\lambda - \check{\partial}^\lambda\right)\right\rangle_v^- = c\left(ic_\kappa\partial_\kappa \quad \mathbf{u}^-\nabla\right)\begin{pmatrix} 0 & \mathbf{B}^- \\ -\mathbf{B}^- & \frac{\check{\mathbf{b}}}{c}\times\mathbf{E}^- \end{pmatrix} \tag{5.4.1}$$

$$\mathbf{B}^- = \mathbf{B}_q^- + \mathbf{B}_g^- \quad \mathbf{E}^- = \mathbf{E}_q^- + \frac{c}{c_g}\mathbf{E}_g^- \tag{5.4.2}$$

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

In a parallel fashion, the symmetric Y^+ fluxion (5.2.2) generates acceleration tensor $\bar{\mathbf{g}}^+$ under virtual primacy for the tensors (5.3.2, 5.3.4) $\hat{T}_{\mu\nu}^{+a}$ and (5.3.5-6) $\hat{\Upsilon}_{\mu\nu}^{+a}$. At the third horizon, one has the matrix formula in another pair of the vector formulation for the internal fields:

$$-\frac{\hbar c}{2E^+}\left\langle \check{\partial}_\lambda\left(\hat{\partial}_\lambda - \check{\partial}^\lambda\right)\right\rangle_v^+ = c\check{\partial}_\lambda\mathbf{F}^+ \qquad : \check{\partial}_{\lambda=t} = \left(ic\partial_\kappa \quad \mathbf{u}^-\nabla\right) \tag{5.4.3}$$

$$\mathbf{F}^+ = \kappa_x^+ \begin{pmatrix} 0 & \mathbf{D}_q^+ + \mathbf{D}_g^+ \\ -\mathbf{D}_q^+ - \mathbf{D}_g^+ & \frac{\mathbf{u}_q}{c^2} \times \mathbf{H}_q^+ + \frac{\mathbf{u}_g}{c_g^2} \times \mathbf{H}_g^+ \end{pmatrix} \tag{5.4.4}$$

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

Apparently, the field of equation (5.4.3) has a force that gives rise to the next field of the horizons. Projecting on the spacetime manifold, it emerges and acts as the flux forces on objects. With charges or masses, this force is imposed on the physical lines of the world planes and projecting to spacetime manifold at the following expressions:

$$\mathbf{F}_q^+ = Q\mu_e\left(c^2\mathbf{D}_q^+ + \mathbf{u}_q \times \mathbf{H}_q^+\right) \qquad : \kappa_q^+ = Qc^2\mu_e,\ \ c^2 = \frac{1}{\varepsilon_q\mu_q} \tag{5.4.5}$$

$$\mathbf{F}_g^+ = M\mu_g\left(c_g^2\mathbf{D}_g^+ + \mathbf{u}_g \times \mathbf{H}_g^+\right) \qquad : \kappa_g^+ = Mc_g^2\mu_g,\ c_g^2 = \frac{1}{\varepsilon_g\mu_g} \tag{5.4.6}$$

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

In a free space or vacuum, the constitutive relation (5.4.5) results in a summation of electric and magnetic forces:

$$\mathbf{F}_q = Q\left(\mathbf{E}_q^- + \mathbf{u}_q \times \mathbf{B}_q^-\right) \qquad : \mathbf{D}_q^+ = \varepsilon_e\mathbf{E}_q^-,\ \ \mathbf{B}_q^- = \mu_e\mathbf{H}_q^+ \tag{5.4.7}$$

known as *Lorentz Force*, discovered in 1889. Because the fluxion force $\dot{\partial}_\lambda \mathbf{f}_s^+$ is proportional to $(\hat{\partial}_\lambda - \check{\partial}^\lambda)$, the force is statistically aggregated from or arisen by *Dirac Spinors* (3.8.1), symmetrically.

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

$$\mathbf{F}_g = M\mu_g\left(c_g^2\mathbf{D}_g^+ + \mathbf{u}_g \times \mathbf{H}_g^+\right) = M\left(\mathbf{E}_g^- + \mathbf{u}_g \times \mathbf{B}_g^-\right) \tag{5.4.8}$$

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

5. General Symmetric Fields

Balanced at the steady states, integrality of the virtual and physical environment is generally at constant or $\mathbf{g}_0^{\pm} = 0$, and the Y^+ asymmetric accelerator $\mathbf{g}_a^+$ is under eternal states normalizable to zero 0^+. Therefore, a pair of the Y^+ and Y^- continuity of the equations (5.2.2-3) institutes a general expression of conservations of symmetry:

$$\frac{\hbar c}{2E^-}\left\langle \check{\partial}_\lambda\left(\hat{\partial}^\lambda - \check{\partial}^\lambda\right)\right\rangle_v^- = \bar{\mathbf{g}}^- - \frac{c}{2}\left[\check{\partial}_\lambda - \hat{\partial}^\lambda\right]_v^- = 0^+ \tag{5.5.1}$$

$$-\frac{\hbar c}{2E^+}\left\langle \check{\partial}_\lambda\left(\hat{\partial}_\lambda - \check{\partial}^\lambda\right)\right\rangle_v^+ = \bar{\mathbf{g}}^+ - \frac{c}{2}\left[\hat{\partial}_\lambda - \check{\partial}^\lambda\right]_v^+ \equiv \mathbf{J}_x \tag{5.5.2}$$

The first equation presents invariance of Y^-Y^+ local commutation $\left[\check{\partial}_\lambda - \hat{\partial}^\lambda\right]_v^- \mapsto 0^+$. The second equation reveals that the Y^- resources of the bulk fluxion are characterizable by density $\rho_x\mathbf{u}_x$ and current $\mathbf{J}_x$:

$$\mathbf{J}_x \equiv \mathbf{J}_q^- - \mathbf{J}_g^- \quad : \mathbf{J}_q^- = \left\{\mathbf{u}_q\rho_q, \mathbf{J}_q\right\},\ \mathbf{J}_g^- = 4\pi G\left\{\mathbf{u}_g\rho_g, \mathbf{J}_g\right\} \tag{5.5.3}$$

where the $\mathbf{u}_q$ is a negative charged object and $\mathbf{u}_g$ appears moving in an opposite direction, and *G* is *Newton's* gravitational constant. The total sources comprise multiple components to include both of the $Y^\mp$ fluxion forces, thermodynamics, as well as asymmetric suppliers.

Sourced by the virtual time operation $\lambda = t$, the dark fluxion of Y^- boost fields has the Y^+ conservation resources. Combined with (5.4.1), the equation (5.5.1) is equivalent to a pair of the expressions:

$$\left(\mathbf{u}_q\nabla\right)\cdot\mathbf{B}_q^- + \left(\mathbf{u}_g\nabla\right)\cdot\mathbf{B}_g^- = 0 \tag{5.5.4}$$

$$\frac{\partial}{\partial t}\left(\mathbf{B}_q^- + \mathbf{B}_g^-\right) + \left(\frac{\mathbf{u}_q}{c}\nabla\right)\times\mathbf{E}_q^- + \left(\frac{\mathbf{u}_g}{c_g}\nabla\right)\times\mathbf{E}_g^- = 0 \tag{5.5.5}$$

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

Continuing to operate the equation (5.4.3) through the time events $\lambda = t$, sustained by the resources (5.5.3), the derivative $\check{\partial}_{\lambda=t}$ to the fields evolves and gives rise to the dynamics of next horizon, shown by the Y^+ field relationships:

$$\mathbf{u}_q \nabla \cdot \mathbf{D}_q^+ + \mathbf{u}_g \nabla \cdot \mathbf{D}_g^+ = \mathbf{u}_q \rho_q - 4\pi G \mathbf{u}_g \rho_g \quad (5.5.6)$$

$$\frac{\mathbf{u}_q \cdot \mathbf{u}_q}{c^2} \nabla \times \mathbf{H}_q^+ + \frac{\mathbf{u}_g \cdot \mathbf{u}_g}{c_g^2} \nabla \times \mathbf{H}_g^+ - \frac{\partial \mathbf{D}_q^+}{\partial t} - \frac{\partial \mathbf{D}_g^+}{\partial t}$$
$$= \mathbf{J}_q - 4\pi G \mathbf{J}_g + \mathbf{H}_q^+ \cdot \left(\frac{\mathbf{u}_q}{c} \nabla \right) \times \frac{\mathbf{u}_q}{c} + \mathbf{H}_g^+ \cdot \left(\frac{\mathbf{u}_g}{c_g} \nabla \right) \times \frac{\mathbf{u}_g}{c_g} \quad (5.5.7)$$

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

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

$$\nabla \cdot \left(\mathbf{B}_q^- + \eta \mathbf{B}_g^- \right) = 0^+ \qquad : \eta = c_g / c \quad (5.5.8)$$

$$\nabla \cdot \left(\mathbf{D}_q^+ + \eta \mathbf{D}_g^+ \right) = \rho_q - 4\pi G \eta \rho_g \quad (5.5.9)$$

$$\nabla \times \left(\mathbf{E}_q^- + \mathbf{E}_g^- \right) + \frac{\partial}{\partial t} \left(\mathbf{B}_q^- + \mathbf{B}_g^- \right) = 0^+ \quad (5.5.10)$$

$$\nabla \times \left(\mathbf{H}_q^+ + \mathbf{H}_g^+ \right) - \frac{\partial}{\partial t} \left(\mathbf{D}_q^+ + \mathbf{D}_g^+ \right) = \mathbf{J}_q - 4\pi G \mathbf{J}_g \quad (5.5.11)$$

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

6. Electromagnetism

At the constant speed *c* and $\zeta^\mu \rightarrow \gamma^\mu$, the *General Symmetric Fields* (5.5.8-11) emerge in a set of classical equations:

$$\nabla \cdot \mathbf{B}_q = 0 \qquad : \mathbf{B}_q \equiv \mathbf{B}_q^- \tag{5.6.1}$$

$$\nabla \cdot \mathbf{D}_q = \rho_q \qquad : \mathbf{D}_q \equiv \mathbf{D}_q^+ \tag{5.6.2}$$

$$\nabla \times \mathbf{E}_q + \frac{\partial \mathbf{B}_q}{\partial t} = 0 \qquad : \mathbf{E}_q \equiv \mathbf{E}_q^- \tag{5.6.3}$$

$$\nabla \times \mathbf{H}_q - \frac{\partial \mathbf{D}_q}{\partial t} = \mathbf{J}_q \qquad : \mathbf{H}_q \equiv \mathbf{H}_q^+ \tag{5.6.4}$$

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

Taking a spherical surface in the integral form of (5.6.2) at a radius r, centered at the point charge Q, we have the following formulae in a free space or vacuum:

$$\mathbf{E}(\mathbf{r}) = \frac{Q}{4\pi\varepsilon_0}\frac{\hat{\mathbf{r}}}{r^2} \qquad \mathbf{F}(\mathbf{r}) = q\mathbf{E}(\mathbf{r}) \tag{5.6.5}$$

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

7. Gravitation

For the charge neutral objects, the equations (5.5.8-11) become a group of the pure *Gravitational Fields*, shown straightforwardly by:

$$\left(\mathbf{u}_g \nabla\right) \cdot \mathbf{B}_g^- = 0 \tag{5.7.1}$$

$$\mathbf{u}_g \nabla \cdot \mathbf{D}_g^+ = -4\pi G \mathbf{u}_g \rho_g \tag{5.7.2}$$

$$\frac{\partial}{\partial t}\mathbf{B}_g^- + \left(\frac{\mathbf{u}_g}{c_g}\nabla\right) \times \mathbf{E}_g^- = 0 \tag{5.7.3}$$

$$\frac{\mathbf{u}_g \cdot \mathbf{u}_g}{c_g^2}\nabla \times \mathbf{H}_g^+ - \frac{\partial \mathbf{D}_g^+}{\partial t} = -4\pi G \mathbf{J}_g + \mathbf{H}_g^+ \cdot \left(\frac{\mathbf{u}_g}{c_g}\nabla\right) \times \frac{\mathbf{u}_g}{c_g} \tag{5.7.4}$$

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

For the charge neutral objects, the equations (5.7.2) become straightforwardly as:

$$\nabla^2 \psi_g^+ = 4\pi G \rho_g \qquad : \mathbf{D}_g^+ = -\nabla \psi_g^+ \tag{5.7.5}$$

$$\mathbf{F}^- = -m \nabla \psi_g^+ = m G \rho_g \frac{\mathbf{b}_r}{r^2} \tag{5.7.6}$$

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

Natural Cosmology

CHAPTER 6

As an application of *Universal and Unified Field Theory*, the *Natural Cosmology* is harvested as a new theory prevailing over the current "*Physical Cosmology*" by transcending both *Einstein*'s field equations and *Friedmann* equations with the *ontological field equations* and *horizon field equations.* Positioned at the third horizon of spacetime manifold, our *cosmological field equation has not only* substituted "general relativity", but also extended the cosmological constant to the matrices of superphase modulations, dark energy waves and blackhole emissions.

Consequently, secrets of *Natural Cosmology are* revealed exceptionally with horizon infrastructure, superphase modulation, entropy of dark energy, and lightwave or gravitation fields in the forms of dispersive or non-dispersive wave-packets, which orchestrate all types of life events essential to the operations and processes of creation, annihilations, reproduction and communication for natural formations and evolutions.

1. Overview of Physical Cosmology

In November of 1915, *Albert Einstein* culminated in the presentation to the *Prussian Academy of Science* of what are now known as the *Einstein Field Equations*. These equations specify how the geometry of space and time is influenced by matter as a moving object, and form the core of *Einstein's* general theory of relativity. Two years later in 1917, cosmology began with Einstein's postulating "cosmological considerations on the general theory of relativity" under the philosophical principles of a homogenous, static, and spatially curved universe.

$$R_{\mu\nu} - \frac{R}{2} g_{\mu\nu} + \Lambda g_{\mu\nu} = G_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu} \qquad (6.1.1)$$

The cosmological constance Λ was originally introduced to counterbalance the effects of gravity and achieve the model of a static universe. From the special theory of relativity in 1905, this "physical cosmology" took about ten years with numerous detours and false starts that fundamentally based on a simple thought experiment for an observer in free fall. Evidently, this stereotype has missed the truth of nature by a large margin. However, the theory has been excessively respected as one of the most profound discoveries of the twentieth-century physics to account for general commutation in the context of classical forces.

During 1920s, *Alexander Friedmann, Georges Lemaître, Howard Robertson and Arthur Walker* (FLRW) derived a set of equations that govern the universe with the expansion of space in all directions (isotropy) and from every location (homogeneity) within the context of general relativity. The FLRW model declares the cosmological principle as that a universe is in homogeneous, isotropic, and filled with ideal fluid. For a generic synchronous metric in that universe, a solution to *Einstein's* field equations in a spacetime is expressed as a pair of the *Friedmann* equations with *Hubble* parameter:

$$ds^2 = (cdt)^2 - a(t)^2 \left[\frac{dr^2}{1 - kr^2} + r^2 d\vartheta^2 \right] \qquad : d\vartheta^2 = d\theta^2 + \sin^2\theta \, d\phi^2 \qquad (6.1.2)$$

$$\frac{3}{c^2}\left(\frac{\dot{a}}{a}\right)^2 + 3\frac{k}{a^2} = \Lambda + \frac{8\pi G}{c^2}\rho \tag{6.1.3}$$

$$\frac{2}{c^2}\frac{\ddot{a}}{a} + \frac{1}{c^2}\left(\frac{\dot{a}}{a}\right)^2 + \frac{k}{a^2} = \Lambda - \frac{8\pi G}{c^4}p \tag{6.1.4}$$

$$v_r = H(t_0)D, \qquad H(t) \equiv \frac{\dot{a}}{a} \qquad : H_0 = H(t_0),\ v_r = cz,\ z = \frac{\lambda_{obsv} - \lambda_{emit}}{\lambda_{emit}} \tag{6.1.5}$$

In cosmological observation, the movement rate of the universe is hypothetically interpreted by the model of time-dependent *Hubble* parameter $H(t)$ to describe a galaxy at distance *D* given by *Hubble Law*: $v_r = H_0 D$. Remarkably, for a constant cosmological constant Λ, the equation (6.1.3) includes a single originating event, the mass density ρ. This is what appear as if the universe were not an explosion but the abrupt appearance of expanding spacetime metric.

At *Pasadena* from January to February 1931, *Edwin Hubble* showed *Einstein* the redshifted nebular spectra and convinced him that the universe was in a state of expansion, and the cosmological constant was superfluous. Meanwhile, *Lemaître* went further and suggested that all the mass of the universe was concentrated into a single point, a "primeval atom" where and when the fabric of time and space came into existence. In January 1932, Einstein and *Willem de Sitter* teamed up to write what would be known as the *Einstein-de Sitter* universe, in which *Einstein* set the cosmological constant to zero $\Lambda = 0$ in the *Friedmann* equations, resulting in a model of the expanding universe known as the *Friedmann-Einstein* universe.

In the 1920s and 1930s, almost every major cosmologist preferred an eternal steady state universe. However, the above historical activities led to a hypothetical universe, the "*Big Bang*", such that its inception were immediately (within 10^{-29} seconds) followed by an exponential expansion of space by a scale multiplier of 10^{27} or more, declared as cosmic inflation. From then on, the above equations become the basis of the standard *Big Bang* model as a key prediction.

In 1949, Thirty-four years after discovery of *General Relativity*, *Einstein* claimed, “The general theory of relativity is as yet incomplete .... We do not yet know with certainty, by what mathematical mechanism the total field in space is to be described and what the general invariant laws are to which this total field is subject.” Next year in 1950, he restated “... all attempts to obtain a deeper knowledge of the foundations of physics seem doomed to me unless the basic concepts are in accordance with general relativity from the beginning.” It turns out to be impossible to find a general definition for a seemingly simple property such as a system's total mass (or energy), photon or graviton; and proves to be fundamentally impossible to localize that energy. Indeed, for about a century, no *Nobel Prizes* have ever been awarded to these hypotheses as a “physical cosmology”.

Since the discovery of cosmic microwave background by *Arno Penzias* and *Robert Wilson* in 1964, many of alternative models have been in proposals such as the *Lambda Cold Dark Matter* (ΛCDM) model in the 1980s, *MOND* theory in 1983, *TeVeS* theory in 2005 or *MOG* theory in 2006. By reinventing gravity, astronomers and astrophysicists attack the dark matter portions from the perspective of galaxy formation models that require modification to the *Einstein* field equations and the *Friedmann* equations. Obviously, today, the philosophical interpretation has remained a challenge or scientific problems are unsolved.

Philosophically, limited in its decoherence interpretations or physical existence only, a duality of the physical-virtual dynamics and their event interweaving have been hidden in our current physics. Therefore, the hypothetical model of *Big Bang* has the apparent blindness to the following artifacts:

1. *Cosmological field equation - Evidenced by the observable universe empirically, the Einstein's field equation (6.1.1) is incomplete, because the outright equations must interpret the obvious characteristics or emissions of cosmic waves from gravitons, photons, dark or quantum energies. Lack of a profound philosophy and limited by the free-fall thought experiments, the newborn equation had been improperly led to unrealistic interpretations and especially carried on to its inherit models: Friedmann equations.*

2. *Horizon structure - Although the FLRW (6.1.2-4) is well developed to align with the conceptual horizons between the regimes of world planes and spacetime, a physical reality is hardly modeled as a hierarchical structure, wherein every possible outcome is not realized or rising from horizons, gracefully. For example, states of matter are aged or timeworn from the two-dimensional coordinates on World Planes to the tetrad-coordinates on Spacetime Manifolds, but may not be uniformly on both.*
3. *Single metric - Similar to the entire practice of current physics, almost all theories have sticked to one choice of a single metric (+ – – –) regardless of the other (– + + +), although both are discovered since 1908. Consequently, any behaviors with the two "relative states" is "collapsed" at its physical state with the same collapsed or static outcome, or simply without interweaving dynamics.*
4. *Ironically, blindness to the fact that General Relativity (6.1.1) can be given by the commutator at its statically frozen state, its solution of the FLRW model has led to hypotheses: Big Bang, which is dynamically Inflation and ever expanding! Obviously, it is the contradict theory by itself!*
5. *Cosmic Singularity and Inflation - Since the mathematical principles is ambiguous, enigmatic or contradict among themselves in current physics, it might be superfluous in deliberating the affection to what means to the early universe dating to the epoch of recombination. Especially under the inexplicable philosophy, one has invented an incredible burst expansion at temperatures from 100 nonillion (10^{32}) Kelvin down to 1 billion (10^{9}) Kelvin, imagined inflation of the universe, and attempted to reconcile the cosmic data with the Big Bang hypothesis from the flawed foundation of singularity.*

Apparently, the current approaches have resulted in and limited itself towards the decoherence interpretations or physical existence only. Without the most distinctive features of the universe, it deviates significantly from the *Universe Topology* of the horizon hierarchy and of the Y^-Y^+ interwoven operations that lies at the heart of all life streams of events, instances or objects, essential to the workings of our universe. In mathematics, this means that, instead of a single manifold, a oneness of the real world of our universe must be modeled by a duality of the conjugate $\{\mathbf{r} \pm i\mathbf{k}\}$ *World Planes*. However, the entanglement of world lines is collapsed to the equation of (2.3.1b) as the following:

$$(i\Delta s)^2 = (\Delta r - i\Delta k)(\Delta r + i\Delta k) \mapsto (\Delta r)^2 - (c\Delta t)^2 \qquad : k = ict \qquad \textit{(6.1.6)}$$

where i represents a virtual state of matter or instance. Besides, more critically, the current physics has the total ignorance to the basic principles of the *Operational Events between the virtual and physical* reality.

2. World Equations of Asymmetry

In reality, the laws of nature strike aesthetically a harmony of duality not only between $Y^{-}Y^{+}$ symmetries, but also between symmetry and asymmetry. Because of the $Y^{-}Y^{+}$ duality, a symmetric system naturally consists of asymmetric ingredients or asymmetric constituents. Symmetry that exists in one horizon can be cohesively asymmetric in the other simultaneously without breaking its original ground symmetric system that coexists with its reciprocal opponents. A universe finely tuned, almost to absurdity, is a miracle of asymmetry and symmetry together that give rise to the next horizon where a new symmetry is advanced and composed at another level of consistency and perpetuation. Similar to the $Y^{-}Y^{+}$ flux commutation and continuity of potential densities, a duality of symmetry and asymmetry represents the cohesive and progressive evolutions aligning with the working of the topological hierarchy of our nature.

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

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

theory required for sets of formulation and constitution of the relationships between motion and dynamics, and between universal conformity and hierarchy.

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

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 Y^-Y^+ 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^+ operation is another part of components for the dual asymmetric fluxions of the base infrastructure consistently aligning with the underlying Y^- or Y^+ symmetry.*

5. *Both of the Y^- and Y^+ asymmetries have the laws of conservation consistently and perpetually, that orchestrate their respective continuity locally and harmonize each other's movements externally in progressing towards the next level of symmetry.*

The *World Equations* of (2.4.5) can be updated and generalized in terms of a pair of the Y^- and Y^+ asymmetric scalar fields, vector fields, matrix fields, and higher orders of the tensor fields, shown straightforwardly as or named as the third *World Equations*:

$$W_b = W_0^\pm + \sum_n h_n \left\{ \kappa_1 \left(\dot{\partial}_{\lambda^1} \right\rangle^\pm + \kappa_2 \dot{\partial}_{\lambda_2} \left(\dot{\partial}_{\lambda^1} \right\rangle_s^\pm + \kappa_3 \dot{\partial}_{\lambda_3} \left(\dot{\partial}_{\lambda^2} \right\rangle_v^\pm \cdots \right\} \qquad (6.2.1)$$

where κ_n is the coefficient of each order n of the λ^n event. Defined by (2.7.6-8), the symbol $(\ \rangle_o^\mp$ implies asymmetry of a Y^--supremacy or a Y^+-supremacy with the lower index *s* for scalar fields, *v* for vector fields and $_M$ for matrix tensors:

$$\left(\dot{\partial}_\lambda \right\rangle_s^+ \equiv \psi_n^+ \dot{\partial}_\lambda \psi_n^-, \qquad \left(\dot{\partial}_\lambda \right\rangle_s^- \equiv \psi_n^- \dot{\partial}_\lambda \psi_n^+ \qquad (6.2.2)$$

$$\left(\dot{\partial}_\lambda \right\rangle_v^+ \equiv \psi_n^+ \dot{\partial}_\lambda V_n^-, \qquad \left(\dot{\partial}_\lambda \right\rangle_v^- \equiv \psi_n^- \dot{\partial}_\lambda V_n^+ \qquad (6.2.3)$$

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

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

For example, most of galaxies have its topological hierarchy that operates interruption between physical and virtual worlds. Our milky way for example, the galactic center communicates with *Earth* through *Sun* of solar system. This is because *Sun* is at a horizon of the topology between *Earth* and the center blackhole. Topologically, a galactic center is virtually at the first horizon, the *Sun* is semi-virtually at the second horizon, and the *Earth* is physically at the third horizon. Because, between the second and third horizon, *Riemannian* curvature is $\mathscr{R}^{\sigma}_{\nu ms} \neq 0$, our *Sun* is orbiting its center of *Milky* way, and so is the *Earth* orbiting in solar system, dynamically.

However, between the first and second horizon, *Riemannian* curvature is zero $\mathscr{R}^{\sigma}_{\nu ms} = 0$ or disappeared. Therefore, our galaxy center is naturally eternal and dynamically *YinYang*-steady, shown by the following picture.

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

3. Universal Equations of Asymmetry

For asymmetric fluxions, the entangling invariance requires that their fluxions are conserved with motion acceleration, operated for creation and annihilation, or maintained by reactive forces. Normally, the divergence of Y^- fluxion is conserved by the virtual forces 0^+ and the divergence of Y^+ fluxion is balanced by physical motion of dynamic curvature. Together, they maintain each other's conservations and commutations cohesively, reciprocally or complementarily.

Under the environment of both Y^-Y^+ manifolds for a duality of fields, the event λ initiates its parallel transport and communicates along a direction at the first tangent vectors of each Y^+ and Y^- curvatures. Following the tangent curvature, the event λ operates the effects transporting $(\check{\partial}^\lambda, \hat{\partial}_\lambda)$ into its opponent manifold through the second tangent vectors of each curvature, known as *Normal Curvature or* perpendicular to the fist tangent vectors. The scalar communicates are defined by the *Commutator* and continuity *Bracket* of the (2.7.1-3) equations. From two pairs of the scalar fields (6.2.3), asymmetric fluxions consist of and operate a pair of the commutative entanglements consistently and perpetually. Based on the *Third Universal Field Equations*, the Y^-Y^+ acceleration fields contrive a pair of the following commutations, equivalent to equations (2.10.1-2).

$$\mathbf{g}_a^-/\kappa_g^- = \left[\check{\partial}^\lambda\check{\partial}^\lambda, \hat{\partial}_\lambda\hat{\partial}_\lambda\right]_x^- + \zeta^+ \qquad : \zeta^+ = \left(\hat{\partial}_\lambda(\check{\partial}^\lambda - \check{\partial}_\lambda)\right\rangle_x^+ \qquad (6.3.1)$$

$$\mathbf{g}_x^+/\kappa_g^+ = \left[\check{\partial}_\lambda\check{\partial}_\lambda, \hat{\partial}^\lambda\hat{\partial}^\lambda\right]_x^+ + \zeta^- \qquad : \zeta^- = \left(\hat{\partial}^\lambda(\check{\partial}^\lambda - \check{\partial}_\lambda)\right\rangle_x^- \qquad (6.3.2)$$

where the index x refers to the scalar or vector potentials. Known as ***General Asymmetric Field Equations***, the formulae is balanced by a pair of commutation of the asymmetric Y^-Y^+ entanglers $\zeta^\mp$ that constitutes the laws of conservations universal to all types of Y^-Y^+ interactive motions, curvatures, dynamics, forces, accelerations, transformations, and transportations on the world lines of the dual manifolds.

As the horizon quantity of an object, a vector field forms and projects its motion potentials to its surrounding space, arisen by or acting on its opponent through a duality of reciprocal interactions. Because of the vector transportation, both of the boost and spiral communications give rise to various tensors of the horizon fields aligned with the motions of dynamic curvatures and beyond. When an object has a rotation on the antisymmetric manifolds of the world $\{\mathbf{r} \pm i\mathbf{k}\}$ planes, the event naturally operates, constitutes or generates Torsions, twisting on the dual dynamic resources and appearing as the *Centrifugal* or *Coriolis* compulsion on the objects such as triplets of particles, earth, and solar system. At the third horizon, acting upon the vector fields of $\zeta^\mu D^\mu$ and $\zeta_\nu D_\nu$, the event operates and gives rise to the tangent curvatures and vector rotations of the communications, defined by the commutators of the (2.7.7-8) equations.

4. Framework of Commutations

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

$$\check{\partial}_\lambda \check{\partial}_\lambda \psi^- = \dot{x}_m \left(\partial_m - \overset{-}{\Gamma}{}^s_{nm}\right) \dot{x}_s \partial_s \psi^- \quad (6.4.1)$$

$$\hat{\partial}^\lambda \hat{\partial}^\lambda \psi^+ = \dot{x}^\nu \left(\partial^\nu - \overset{+}{\Gamma}{}^\sigma_{m\nu}\right) \dot{x}^\sigma \partial^\sigma \psi^+ \quad (6.4.2)$$

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

$$\hat{\partial}^\lambda : \dot{x}^\nu \mapsto \hat{\partial}_\lambda : \dot{x}_a \zeta^\nu \qquad \check{\partial}_\lambda : \dot{x}_m \mapsto \check{\partial}^\lambda : \dot{x}^\alpha \zeta_m \quad (6.4.3)$$

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

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

$$\check{\partial}_\lambda \check{\partial}_\lambda V_m = \dot{x}_\nu \left(\partial_\nu - \overset{-}{\Gamma}{}^n_{\mu\nu}\right) \dot{x}_n \left(\partial_n V_m - \overset{-}{\Gamma}{}^s_{mn} V_s\right) \quad (6.4.4)$$

$$\hat{\partial}^\lambda \hat{\partial}^\lambda V^\mu = \dot{x}^n \left(\partial^n - \overset{+}{\Gamma}{}^\nu_{mn}\right) \dot{x}^\nu \left(\partial^\nu V^\mu - \overset{+}{\Gamma}{}^\sigma_{\mu\nu} V^\sigma\right) \quad (6.4.5)$$

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

5. Scalar Commutation

For entanglement between $Y^{-}Y^{+}$ manifolds, considering the parallel transport of a *Scalar* density of the fields $\rho = \psi^{+}\psi^{-}$ around an infinitesimal parallelogram. The chain of this reactions can be interpreted by (6.4.1-5) to formulate a commutation framework of *Physical Ontology*. This entanglement consists of a set of the unique fields, illustrated by the following components of the *entangling commutators,* respectively:

$$\left[\check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda\right]_s^- = \dot{x}_\nu \dot{x}_m \left(P_{\nu m} + G_{m\nu}^{\sigma s}\right) \tag{6.5.1}$$

$$P_{\nu m} \equiv \frac{1}{\dot{x}_\nu \dot{x}_m} \left[(\dot{x}_\nu \partial_\nu)(\dot{x}_m \partial_m), (\dot{x}^\nu \partial^\nu)(\dot{x}^m \partial^m)\right]_s^- \tag{6.5.2}$$

$$G_{m\nu}^{\sigma s} = \frac{1}{\dot{x}_\nu \dot{x}_m} \left[\dot{x}^\nu \overset{+}{\Gamma}{}_{m\nu}^{\sigma} \dot{x}^\sigma \partial^\sigma, \dot{x}_m \overset{-}{\Gamma}{}_{nm}^{s} \dot{x}_s \partial_s\right]_s^- \tag{6.5.3}$$

$$\left[\hat{\partial}_\lambda \hat{\partial}_\lambda, \check{\partial}^\lambda \check{\partial}^\lambda\right]_s^+ : \quad (\hat{\partial}^\lambda, \dot{x}^\nu) \mapsto (\hat{\partial}_\lambda, \dot{x}_a \zeta^\nu), \;\; (\check{\partial}_\lambda, \dot{x}_m) \mapsto (\check{\partial}^\lambda, \dot{x}^\alpha \zeta_m) \tag{6.5.4}$$

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

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

$$\left[\check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda\right]_s^- = \dot{x}_\nu \dot{x}_m \left(\frac{R}{2} g_{\nu m} + G_{m\nu}^{\sigma s}\right) \;\; : \{\phi^-, \varphi^+\} \tag{6.5.5}$$

$$P_{\nu m} = R_{\nu m} = \frac{R}{2} g_{\nu m} \tag{6.5.6}$$

$$R_{\nu m} = \left[(\dot{x}_\nu \partial_\nu)(\dot{x}_m \partial_m), (\dot{x}^\nu \partial^\nu)(\dot{x}^m \partial^m)\right]_s^- \equiv R_{\nu m}(\hat{\partial}^\lambda, \check{\partial}_\lambda) \tag{6.5.7}$$

$$G^{s\sigma}_{m\nu} = \Gamma^{+s}_{m\nu}\partial^{s} - \Gamma^{-\sigma}_{nm}\partial_{\sigma} \equiv G^{s\sigma}_{m\nu}(\hat{\partial}^{\lambda}, \check{\partial}_{\lambda}) \tag{6.5.8}$$

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

$$\left[\hat{\partial}_{\lambda}\hat{\partial}_{\lambda}, \check{\partial}^{\lambda}\check{\partial}^{\lambda}\right]^{+}_{s} = \dot{x}_{\nu}\dot{x}_{m}\left(\tilde{R}_{\nu m} + \tilde{G}^{s\sigma}_{\nu m}\right) \quad : \{\phi^{+}, \varphi^{-}\} \tag{6.5.9}$$

$$\tilde{R}_{\nu m} = R_{\nu m}(\hat{\partial}_{\lambda}, \check{\partial}^{\lambda}) \qquad \tilde{G}^{\sigma s}_{\nu m} = G^{\sigma s}_{\nu m}(\hat{\partial}_{\lambda}, \check{\partial}^{\lambda}) \tag{6.5.10}$$

$$\hat{\partial}_{\lambda} = X^{\sigma}{}_{\nu}\partial^{\sigma}, \qquad \check{\partial}^{\lambda} = X_{\sigma}{}^{\nu}\partial_{\sigma} \tag{6.5.11}$$

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

6. Vector Commutation

In cosmology, the vector communications under physical primacy generally involve both boost and spiral movements entangling between the Y^-Y^+ manifolds. Considering the parallel transport around an infinitesimal parallelogram under the dual *Vector* fields of V^μ and V_m, the entanglements are given by (6.4.4-5) as the following formulae:

$$\left[\check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda\right]_v^- = \dot{x}_\nu \dot{x}_n \left(P_{\nu n} - R^\sigma_{n\nu s} + G^{s\sigma}_{n\nu} + C^{s\sigma}_{n\nu}\right) \tag{6.6.1}$$

$$P_{\nu n} = \frac{1}{\dot{x}_\nu \dot{x}_n}\left[(\dot{x}_\nu \partial_\nu)(\dot{x}_n \partial_n),\ (\dot{x}^n \partial^n)(\dot{x}^\nu \partial^\nu)\right]_v^- \tag{6.6.2}$$

$$R^\sigma_{n\nu s} = \frac{1}{\dot{x}_\nu \dot{x}_n}\left[\dot{x}_\nu \partial_\nu (\dot{x}_n \overset{-}{\Gamma}{}^s_{\nu n}),\ \dot{x}^n \partial^n (\dot{x}^\nu \overset{+}{\Gamma}{}^\sigma_{n\nu})\right]_v^- \tag{6.6.3}$$

$$G^{s\sigma}_{n\nu} = \frac{1}{\dot{x}_\nu \dot{x}_n}\left[\dot{x}^\nu \overset{+}{\Gamma}{}^\sigma_{n\nu} \dot{x}_n \partial_n,\ \dot{x}_n \overset{-}{\Gamma}{}^s_{\nu n} \dot{x}^\nu \partial^\nu\right]_v^- \tag{6.6.4}$$

$$C^{s\sigma}_{n\nu} = \frac{1}{\dot{x}_\nu \dot{x}_n}\left[\dot{x}_\nu \overset{-}{\Gamma}{}^\alpha_{n\nu} \dot{x}_n \overset{-}{\Gamma}{}^s_{\nu n},\ \dot{x}^n \overset{+}{\Gamma}{}^a_{\nu n} \dot{x}^\nu \overset{+}{\Gamma}{}^\sigma_{n\nu}\right]_v^- \tag{6.6.5}$$

$$\left[\hat{\partial}_\lambda \hat{\partial}_\lambda, \check{\partial}^\lambda \check{\partial}^\lambda\right]_v^+ : \quad (\hat{\partial}^\lambda, \dot{x}^\nu) \mapsto (\hat{\partial}_\lambda, \dot{x}_a \zeta^\nu),\ \ (\check{\partial}_\lambda, \dot{x}_m) \mapsto (\check{\partial}^\lambda, \dot{x}^\alpha \zeta_m) \tag{6.6.6}$$

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

Consider an object observed externally and given by the (6.4.4-5) equations that actions of the commutation are dominant towards the residual entanglement $\left[\check{\partial}_\lambda\check{\partial}_\lambda, \hat{\partial}^\lambda\hat{\partial}^\lambda\right]_v^-$. Following the similar commutation infrastructure of the above equations, the event operations contract directly to the manifold communications and the commutation relations of equation (6.6.1-6) are simplified to:

$$\left[\check{\partial}_\lambda\check{\partial}_\lambda, \hat{\partial}^\lambda\hat{\partial}^\lambda\right]_v^- = \dot{x}_n\dot{x}_\nu\left(\frac{R}{2}g_{n\nu} - R^\sigma_{n\nu s} + G^{\sigma s}_{n\nu} + C^{s\sigma}_{n\nu}\right) \tag{6.6.7}$$

$$R_{\nu m} = \left[(\dot{x}_\nu\partial_\nu)(\dot{x}_m\partial_m), (\dot{x}^\nu\partial^\nu)(\dot{x}^m\partial^m)\right]_s^- = \frac{R}{2}g_{\nu m} \tag{6.6.8}$$

$$R^\mu_{n\nu\sigma} = -\left(\partial_\nu\overset{-}{\Gamma}{}^\mu_{a\sigma}\partial_a\overset{+}{\Gamma}{}^\mu_{\nu\sigma} + \overset{-}{\Gamma}{}^\rho_{a\sigma}\overset{+}{\Gamma}{}^\mu_{\nu\rho} - \overset{+}{\Gamma}{}^\rho_{\nu\sigma}\overset{-}{\Gamma}{}^\mu_{a\rho}\right) \equiv R^\mu_{n\nu\sigma}(\hat{\partial}^\lambda, \check{\partial}_\lambda) \tag{6.6.9}$$

$$G^{s\sigma}_{n\nu} = \overset{+}{\Gamma}{}^s_{n\nu}\partial^s - \overset{-}{\Gamma}{}^\sigma_{\nu n}\partial_\sigma \equiv G^{s\sigma}_{n\nu}(\hat{\partial}^\lambda, \check{\partial}_\lambda) \tag{6.6.10}$$

$$C^{s\sigma}_{n\nu} = \overset{-}{\Gamma}{}^s_{m\nu}\overset{+}{\Gamma}{}^\sigma_{\nu n} - \overset{+}{\Gamma}{}^\sigma_{\nu n}\overset{-}{\Gamma}{}^s_{m\nu} \equiv C^{s\sigma}_{n\nu}(\hat{\partial}^\lambda, \check{\partial}_\lambda) \tag{6.6.11}$$

$$\left[\hat{\partial}_\lambda\hat{\partial}_\lambda, \check{\partial}^\lambda\check{\partial}^\lambda\right]_v^+ = \dot{x}_n\dot{x}_\nu\left(\tilde{R}^-_{n\nu} - \tilde{R}^\sigma_{n\nu s} + \tilde{G}^{s\sigma}_{n\nu} + \tilde{C}^{s\sigma}_{n\nu}\right) \tag{6.6.12}$$

$$\tilde{R}^-_{\nu m} = R^-_{\nu m}(\hat{\partial}_\lambda, \check{\partial}^\lambda),\ \tilde{R}^\sigma_{n\nu s} = R^\sigma_{n\nu s}(\hat{\partial}_\lambda, \check{\partial}^\lambda) \qquad : \hat{\partial}_\lambda = L^+_{\sigma\nu}\partial^\sigma \tag{6.6.13}$$

$$\tilde{G}^{s\sigma}_{\nu m} = G^{s\sigma}_{\nu m}(\hat{\partial}_\lambda, \check{\partial}^\lambda),\ \tilde{C}^{s\sigma}_{\nu m} = C^{s\sigma}_{\nu m}(\hat{\partial}_\lambda, \check{\partial}^\lambda) \qquad : \check{\partial}^\lambda = L^-_{\sigma\nu}\partial_\sigma \tag{6.6.14}$$

where $L^\mp_{\sigma\nu}$ is the *Lorentz* group (3.11.2-4). More precisely, the event presences of the Y^-Y^+ dynamics manifests infrastructural foundations and transportations of the potential, curvature, stress, torsion, and contorsion, which give rise to the interactional entanglements through the center of an object by following its geodesics of the underlying virtual and physical commutations. Generally, transportations between Y^-Y^+ manifolds are conserved dynamically.

7. General Relativity

For a statically frozen or inanimate state, the two-dimensions of the world line can be aggregated in the expression $R^{\sigma}_{n\nu s} \mapsto R_{n\nu}$, $C^{s\sigma}_{n\nu} \mapsto C_{n\nu}$ and $G^{s\sigma}_{n\nu} \mapsto G_{n\nu}$. Therefore, the equation (6.6.7) formulates *General Relativity*:

$$G_{n\nu} = R_{n\nu} - \frac{1}{2} R g_{n\nu} \quad : \left[\check{\partial}^{\lambda}\check{\partial}^{\lambda}, \hat{\partial}_{\lambda}\hat{\partial}_{\lambda}\right]^{+}_{v} = 0,\ C_{n\nu} = 0,\ G_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu} \qquad (6.7.1)$$

or

$$R_{\mu\nu} + \Lambda g_{\mu\nu} = \tfrac{1}{2} R g_{\mu\nu} + G_{\mu\nu} \quad : \left[\check{\partial}^{\lambda}\check{\partial}^{\lambda}, \hat{\partial}_{\lambda}\hat{\partial}_{\lambda}\right]^{+}_{v} = \Lambda g_{\mu\nu},\ C_{n\nu} = 0 \qquad (6.7.2)$$

known as the *Einstein* field equation, 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. Thirty-four years after Einstein's discovery of *General Relativity*, he claimed, "The general theory of relativity is as yet incomplete .... We do not yet know with certainty, by what mathematical mechanism the total field in space is to be described and what the general invariant laws are to which this total field is subject." Next year in 1950, he restated "... all attempts to obtain a deeper knowledge of the foundations of physics seem doomed to me unless the basic concepts are in accordance with general relativity from the beginning."

It turns out to be impossible to find a general definition for a seemingly simple property such as a system's total mass (or energy). The main reason is that the gravitational field—like any physical field—must be ascribed a certain energy, but that it proves to be fundamentally impossible to localize that energy. Apparently, for a century, the philosophical interpretation had remained a challenge or unsolved, until this *Universal Topology* was discovered since 2016, representing an integrity of philosophical and mathematical solutions to extend further beyond general relativity to include the obvious phenomenons of cosmological photon and graviton transportation, blackhole radiation, and dark energy modulation.

8. Classical Physical Cosmology

During 1920s, *Alexander Friedmann, Georges Lemaître, Howard Robertson and Arthur Walker* (FLRW) derived a set of equations that govern the universe the expansion of space in all directions (isotropy) and from every location (homogeneity) within the context of general relativity. The FLRW model declares the cosmological principle as that a universe is in homogeneous, isotropic, and filled with ideal fluid. For a generic synchronous metric in that universe, a solution to *Einstein's* field equation in a spacetime is expressed as a pair of the *Friedmann* equations with *Hubble* parameter:

$$ds^2 = (cdt)^2 - a(t)^2\left[\frac{dr^2}{1-kr^2} + r^2(d\theta^2 + \sin^2\theta\, d\phi^2)\right] \tag{6.8.1}$$

$$\frac{3}{c^2}\left(\frac{\dot{a}}{a}\right)^2 + 3\frac{k}{a^2} = \Lambda + \frac{8\pi G}{c^2}\rho \tag{6.8.2}$$

$$\frac{2}{c^2}\frac{\ddot{a}}{a} + \frac{1}{c^2}\left(\frac{\dot{a}}{a}\right)^2 + \frac{k}{a^2} = \Lambda - \frac{8\pi G}{c^4}p \tag{6.8.3}$$

$$v_r = H(t_0)D, \qquad H(t) \equiv \frac{\dot{a}}{a} \qquad : H_0 = H(t_0),\ v_r = c\left(1 - \frac{\lambda_{emit}}{\lambda_{emit}}\right) \tag{6.8.4}$$

In cosmological observation, the movement rate of the universe is described by the model of time-dependent *Hubble* parameter $H(t)$ to describe a galaxy at distance *D* given by *Hubble Law*: $v_r = H_0 D$. For a constant cosmological constant Λ, the equation (6.8.2) includes a single originating event, the mass density ρ. This is what appear as if that the universe were not an explosion but the abrupt appearance of expanding spacetime metric.

9. Ontological Potential Equations

The asymmetric commutation is operated by one of the interpretable, residual features exchanging the information carried by the scalar fields (6.3.1-2):

$$\left[\check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda\right]_s^- = -\left(\hat{\partial}^\lambda(\check{\partial}^\lambda - \check{\partial}_\lambda)\right\rangle_s^- \quad : \{\phi^-, \varphi^+\} \qquad (6.9.1)$$

$$\left[\check{\partial}^\lambda \check{\partial}^\lambda, \hat{\partial}_\lambda \hat{\partial}_\lambda\right]_s^- = -\left(\hat{\partial}_\lambda(\check{\partial}^\lambda - \check{\partial}_\lambda)\right\rangle_s^+ \quad : \{\phi^+, \varphi^-\} \qquad (6.9.2)$$

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

From definitions of the γ^ν-*Matrices* (3.5.2), one can convert each of the right-side equations of the above asymmetric scalar entanglers explicitly under the second horizon at the constant speed:

$$\mathcal{O}_{\nu m}^{+\sigma} \equiv -\dot{x}^\sigma \zeta^0 \partial^\sigma \left(\dot{x}^\nu \zeta_2 \partial_\nu - \dot{x}_m \zeta_3 \partial_m\right\rangle_s^- \quad : \{\phi^-, \varphi^+\} \qquad (6.9.3)$$

$$\mathcal{O}_{\nu m}^{-\sigma} \equiv -\dot{x}_\sigma \zeta^1 \partial^\sigma \left(\dot{x}^\nu \zeta_2 \partial_\nu - \dot{x}_m \zeta_3 \partial_m\right\rangle_s^+ \quad : \{\phi^+, \varphi^-\} \qquad (6.9.4)$$

The $\mathcal{O}_{\nu m}^{\pm\sigma}$ is the Y^+ or Y^- ontological modulators. Illustrated by equations of (6.5.5, 16.18), the ontological dynamics can now be fabricated in the covariant form of asymmetric ontology:

$$\frac{R}{2} g_{\nu m} + G_{\nu m}^{\sigma s} = \mathcal{O}_{\nu m}^{+\sigma} \quad : \zeta_\nu = \gamma_\nu + \chi_\nu \qquad (6.9.5)$$

$$\tilde{R}^{\nu m} + \tilde{G}_{\nu m}^{\sigma s} = \mathcal{O}_{\nu m}^{-\sigma} \quad : \zeta^\nu = \gamma^\nu + \chi^\nu \qquad (6.9.6)$$

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

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

Considering the Infrastructural Matrices $\zeta = \gamma + \chi$, $\gamma^0\gamma^\nu = \gamma^\nu$, $\gamma^1\gamma^2 = i\gamma^3$ and $\gamma^1\gamma^3 = i\gamma^2$, the property for the gamma matrices to generate a Clifford algebra is the continuity relation $\langle \gamma^\nu, \gamma^\mu \rangle = 2\eta^+ I_4$. One can convert the ζ-matrix explicitly into the asymmetric scalar entanglers. The (6.9.3-4) equations can be shown by the vector matrixes:

$$\mathcal{O}_{\nu\mu}^{+\sigma} = \mathcal{O}_d^+ - \kappa_o^+ \left(\partial^t \quad \mathbf{u}^+ \nabla\right) \begin{pmatrix} 0 & \mathbf{D}_a^+ \\ -\mathbf{D}_a^* & \frac{\mathbf{u}^+}{c^2} \times \mathbf{H}_a^+ \end{pmatrix} \qquad (6.9.7)$$

$$\mathcal{O}_{\nu\mu}^{-\sigma} = \mathcal{O}_d^- - \kappa_o^- \left(\partial^t \quad \mathbf{u}^- \nabla\right) \begin{pmatrix} 0 & \mathbf{B}_a^- \\ -\mathbf{B}_a^* & \frac{\check{\mathbf{b}}}{c} \times \mathbf{E}_a^- \end{pmatrix} \qquad (6.9.8)$$

where $\kappa_o^\pm$ is a pair of the constants. The $\mathbf{D}_a^*$, $\mathbf{D}_a^+$, $\mathbf{E}_a^-$, $\mathbf{B}_a^*$, $\mathbf{B}_a^-$ and $\mathbf{H}_a^+$ fields are not only the complex functions but also the intrinsic modulations in the form of a duality of asymmetry cohesively and and implicitly. It might appear similar to but functionally different from the electromagnetic fields in the form of a duality of symmetry. The vector components can be expressed as the area flow of energy density and current:

$$\mathcal{O}_{\nu\mu}^{+\sigma} = \mathcal{O}_d^{+} - \kappa_o^{+}\begin{pmatrix} -(\mathbf{u}^{+}\nabla)\cdot\mathbf{D}_a^{*} \\ \frac{\partial}{\partial t}\mathbf{D}_a^{+} + \frac{\mathbf{u}^{+}}{c}\nabla\left(\frac{\mathbf{u}^{+}}{c}\times\mathbf{H}_a^{+}\right) \end{pmatrix} \tag{6.9.9}$$

$$\mathcal{O}_{\nu\mu}^{-\sigma} = \mathcal{O}_d^{-} - \kappa_o^{-}\begin{pmatrix} -(\mathbf{u}^{-}\nabla)\cdot\mathbf{B}_a^{*} \\ \frac{\partial}{\partial t}\mathbf{B}_a^{-} + \frac{\mathbf{u}^{-}}{c}\nabla\times\mathbf{E}_a^{-} \end{pmatrix} \tag{6.9.10}$$

Apparently, the ontological process, $\left(\partial^{\nu} + ieA^{\nu}/\hbar\right)$ and $\left(\partial_{\nu} - ieA_{\nu}/\hbar\right)$ is primarily the superphase A^{ν} and A_{ν} operations as the resource supplier or modular of the off-diagonal matrices for the asymmetric dynamics. Meanwhile, it generates the light and gravitational waves $\lozenge^{\pm}$ from their diagonal elements. The $Y^{-}Y^{+}$ events conjure up the entanglements of eternal fluxions as another perpetual streaming for transportations on the world-line curvatures. The vector components in the above matrices are source of the area flow of energy density and current:

$$\nabla\cdot\mathbf{D}_a^{*} = 4\pi G\rho_a \qquad : \kappa_o^{+} = 2/c^3 \tag{6.9.11}$$

$$4\pi G\mathbf{J}_a^{+} = \frac{\partial}{\partial t}\mathbf{D}_a^{+} - \nabla\times\mathbf{H}_a^{+} \tag{6.9.12}$$

where the formula, $\nabla\cdot(\mathbf{u}\times\mathbf{H}) = \mathbf{H}\cdot(\nabla\times\mathbf{u}) - \mathbf{u}\cdot(\nabla\times\mathbf{H})$, is applied at the constant speed. The torque transportation between the complex manifolds of the $Y^{-}Y^{+}$ world planes redefines the rotational quantities of how commutations between the dual spaces are entangled under the conjugation framework in two referential frames traveling at a consistent velocity with respect to one another. These equations are the transport dynamics affiliated with the physical Reproduction and Animation of the ontological processes. At the constant speed $\mathbf{u}^{\pm} = \mp c$, the ontological dynamics implies the two-dimensional motion curvatures be operated at the second horizon giving rise to the third horizon and transporting the entangling forces $\tilde{\chi}^{\nu} \mapsto \chi^{\nu}$ at the four-dimensional spacetime manifold.

10. Conservation of Cosmic Ontology

At a free space or vacuum, the above equations derives the commutative formulae:

$$\frac{R}{2}\mathbf{g}^- + \mathbf{G} = \mathbf{O}^+ \qquad : \mathbf{g}^- = g_{\nu m}, \quad \mathbf{G} = G_{\nu m}^{\sigma s}, \quad \mathbf{O}^+ = \mathcal{O}_{m\nu}^{+\sigma} \qquad (6.10.1)$$

$$\tilde{\mathbf{R}}^+ + \tilde{\mathbf{G}} = \mathbf{O}^- \qquad : \tilde{\mathbf{R}}^+ = \tilde{R}^{\nu m}, \quad \tilde{\mathbf{G}} = \tilde{G}_{\nu m}^{\sigma s}, \quad \mathbf{O}^- = \mathcal{O}_{m\nu}^{-\sigma} \qquad (6.10.2)$$

As expected, the ontological *gamma*- and *chi*-fields are similar to or evolve into electromagnetic fields and gravitational fields. As the processes of the nature of being, the equations (6.9.3-4) uncoil explicitly the compacted covariant formulae. Generally, the above conservation of ontological dynamics describe the following principles:

1. *The ontological dynamics is conserved and carried out by the area densities for creations or annihilations, which serve as Law of Conservation of Cosmic Ontology.*
2. *In the world planes, the curvature R and stress tensor $G_{\nu m}^{\sigma s}$ is dynamically sustained during the asymmetric modulations over a spiral gesture of movements.*
3. *Without the Riemannian curvature $\mathfrak{R}^{\pm} = 0$, it indicates that the system (such as a galactic center) is spiraling on the world lines and entangling through a modulation of the $\mathbf{O}^{\pm}$ matrix between the Y^-Y^+ manifolds at the second horizons.*
4. *Operated and maintained by the superphase potentials, the conservation of energy fluxions supplies the resources, modulates the transform, and transports potential messages or forces, alternatively.*
5. *The commutation fields of the superphase potentials transform and entangle between manifolds as the resource propagation of the asymmetric dynamics.*
6. *The torque fields of the superphase potentials transport and entangle between manifolds as the force generators of the ontological processes of motion dynamics.*

Apparently, it represents that the resources are composited of, supplied by or conducted with the residual activators and motion modulators primarily in the virtual world. It implies that, in the physical world, the directly observable parameters are the coverture R, stress tensor $\mathbf{G}$ and wave propagation $\Diamond^{\pm}$. Aligning with the dual world-lines of the universal topology, the commutation of energy fluxions animates the resources, modulates messages of the potential transform and transports while performing actions or reactions.

11. Ontological Accelerations

Connected to the Y^- or Y^+ entanglement, the dynamic accelerations $\mathbf{g}_s^\pm$ of ontology are given by equations of (6.9.1-2) with the scalar potential as the following expression:

$$\mathbf{g}_s^-/\kappa_g^- = \left[\check{\partial}^\lambda \check{\partial}^\lambda, \hat{\partial}_\lambda \hat{\partial}_\lambda\right]_s^- - \mathbf{O}^+ \qquad : \kappa_g^- = \frac{\hbar c}{2E^-} \tag{6.11.1}$$

$$\mathbf{g}_s^+/\kappa_g^+ = \left[\check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda\right]_s^+ - \mathbf{O}^- \qquad : \kappa_g^+ = \frac{\hbar c}{2E^+} \tag{6.11.2}$$

where $\kappa_g = 1/(\hbar c)$ is a constance. For a system, its core center may absorb the objects when $\mathbf{g}_s^+ > 0$ and emits objects at $\mathbf{g}_s^+ < 0$. To maintain the stability at $\tilde{\mathbf{g}}_s = \mathbf{g}_s^+ + \mathbf{g}_s^-$, the accelerations of a system might be conserved: $\mathbf{g}_s^+ + \mathbf{g}_s^- = 0$ and usually has to balance both a black core absorbing energies and a white core exert energies. Because the resources are primarily supplied by the virtual world where operates the residual activators and motion modulators, any life activities appear to be favorable towards the Y^+ deceleration $\mathbf{g}_s^+ < 0$ for mass emission and balanced by the Y^- accelerations $\mathbf{g}_s^- > 0$, known as *Hubble's Law*. In other words, the energy conservation implies that the light emission at the second horizon might always be observable as the redshift or dispersive waves under a third horizon, which, however, is not *Doppler* shift. The conservation of virtual and physical dynamics balances the expansion or reduction of the universe at the scale of both virtual and physical spaces. It is a property of the entire universe as a whole rather than a phenomenon that applies just to one part of the universe observable physically.

Since the ontological dynamics at the second horizon is on world planes with two-dimensional coordinates, the *Ricci* scalar is given by

$$R = -2\left[\frac{1}{c^2}\frac{\ddot{a}}{a} + \frac{1}{c^2}\left(\frac{\dot{a}}{a}\right)^2 + \frac{k}{a^2}\right] \tag{6.11.3}$$

The energy momentum tensor $T_{\mu\nu}$ is similarly constraint as the *Ricci* scalar. It can only contain two independent functions of *t* and its components are

$$T_{00} = \rho_0(t), \qquad T_{0t} = 0 \qquad T_{\mu\nu} = p_0(t)g_{\mu\nu} \tag{6.11.4}$$

$$G_{tt} = \frac{8\pi G}{c^2}\rho_0, \qquad G_{rr} = \frac{8\pi G}{c^2}p_0 \tag{6.11.5}$$

The trace of the diagonal elements (6.9.11) of the equation (6.10.1) can be extracted and shown by the following:

$$\frac{\ddot{a}}{a} + \left(\frac{\dot{a}}{a}\right)^2 + \frac{kc^2}{a^2} = \mathcal{O}_d^+ + \frac{4\pi G}{c^2}(\rho c^2 - p) \tag{6.11.6}$$

$$\rho = 2\rho_0 + \rho_a \qquad \rho_a = \frac{1}{4\pi G}\nabla \cdot \mathbf{D}_a^* \tag{6.11.7}$$

$$p = 2p_0 + p_a \qquad p_a = c^2 Tr(\mathbf{J}_a^+) \tag{6.11.8}$$

$$4\pi G \mathbf{J}_a^+ = \frac{\partial}{\partial t}\mathbf{D}_a^+ - \nabla \times \mathbf{H}_a^+ \tag{6.11.9}$$

Named as *World-line Horizon Equations*, they serve as conservation between the second and third horizons. One can further convert them to the following form:

$$\tilde{H}_2^2 + \tilde{H}_2\tilde{H}_3 + \frac{kc^2}{a^2} = \mathcal{O}_d^+ + \frac{4\pi G}{c^2}(\rho c^2 - p) \tag{6.11.10}$$

$$\tilde{H}_2 = \frac{\dot{a}}{a}, \qquad \tilde{H}_3 = \frac{\ddot{a}}{\dot{a}} \qquad k = 0 \tag{6.11.11}$$

where $\tilde{H}_2$ or $\tilde{H}_3$ is named the second or third horizon function of world-line manifolds, respectively. Because, the *density* and the *horizon fields* are a collection of the *complex states* asymmetrically, it implies an eternal yinyang-steady state universe in form of a spiral galaxy that dynamically orchestrates the mass, density, photon, graviton, thermodynamics, weak and strong forces, packed all together.

At near the third horizon, the curvature *k* might be zero. The horizon field equation becomes a quadratic equation, resolvable for the second horizon function $\tilde{H}_2$. Solving the quadratic equation $\tilde{H}_2^2 + \tilde{H}_3\tilde{H}_2 - K_2 = 0$, one has the roots for the second and third horizon function $\tilde{H}_2$ for the parameters as he following:

$$\tilde{H}_2 = \frac{1}{2}\left(- \tilde{H}_3 \pm \sqrt{\tilde{H}_3^2 + 4K_2}\right) \tag{17.27}$$

$$K_2 \equiv K_2(\omega, T) = \mathcal{O}_d^+ + \frac{4\pi G}{c^2}(\rho c^2 - p) \tag{17.28}$$

Accordingly, because K_2 can be zero, or H_2 can be a complex function at the second horizon, the scalar metric $a(t)$ is a complex function, representing a harmonic duality of the Y^-Y^+ interwoven dynamics for life streams entangling on both of *World Planes*. Therefore, the equation (6.11.3) is contradict to the hypothesis that the universe described by the equation (6.8.2) implies abrupt appearance of expanding spacetime metric.

12. 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, shown by a pair of the commutative equations (6.3.1-2):

$$\left[\check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda\right]_v^- = -\left(\hat{\partial}^\lambda (\check{\partial}^\lambda - \check{\partial}_\lambda)\right\rangle_v^- \quad : \{\phi^-, V^+\} \tag{6.12.1}$$

$$\left[\check{\partial}^\lambda \check{\partial}^\lambda, \hat{\partial}_\lambda \hat{\partial}_\lambda\right]_v^- = -\left(\hat{\partial}_\lambda (\check{\partial}^\lambda - \check{\partial}_\lambda)\right\rangle_v^+ \quad : \{\phi^+, V^-\} \tag{6.12.2}$$

where the index *v* refers to the vector potentials. The first equation is the physical dynamics of cosmology, and the second equation is the virtual motion dynamics.

Aligning with the continuously arising horizons, the events determine the derivative operations through the vector potentials giving rise to the matrix fields for further dynamic evolutions at the Y^+-supremacy. From definitions of the *Lorentz-matrices* (3.11.6-7), one can convert the right-side equation (6.12.1) of the asymmetric vector entanglers explicitly into the following formulae, similar to the derivation of equation (6.9.7):

$$\Lambda_{\nu\mu}^{+\sigma} = \Lambda_d^+ - \kappa_\Lambda^+ \begin{pmatrix} -(\mathbf{u}^+\nabla)\cdot \mathbf{D}_v^* \\ \frac{\partial}{\partial t}\mathbf{D}_v^+ + \frac{\mathbf{u}^+}{c}\nabla\left(\frac{\mathbf{u}^+}{c}\times \mathbf{H}_v^+\right) \end{pmatrix} \tag{6.12.3}$$

where κ_Λ^+ is a constant, the lower index v indicates the vector potentials, the $\mathbf{D}_v^+$ and $\mathbf{H}_v^+$ fields are the intrinsic modulations in the form of a duality of asymmetry cohesively. The $\Lambda_{\nu\mu}^{+\sigma}$ is the Y^+ cosmological modulator that extends the classic cosmological constant to the matrix. Illustrated by equations of (6.6.7), the motion dynamics can now be fabricated in the covariant form of asymmetric equation:

$$\mathscr{R}_{\nu ms}^{-\sigma} + \Lambda_{\nu m}^{+\sigma} = \frac{R}{2} g_{\nu m} + G_{\nu m}^{s\sigma} + C_{\nu m}^{s\sigma} \tag{6.12.4}$$

$$\mathfrak{R}^- + \mathbf{\Lambda}^+ = \frac{R}{2}\mathbf{g}^- + \mathbf{G} + \mathbf{C}^- \qquad : \mathbf{\Lambda}^+ \equiv \Lambda^{+\sigma}_{\nu m} \qquad (6.12.5)$$

The *Riemannian* curvature $\mathfrak{R}^- \equiv \mathscr{R}^{-\sigma}_{\nu m\mu}$ associates the metric $\mathbf{g}^-$, relativistic stress $\mathbf{G}$ and contorsion $\mathbf{C}$ tensors to each world-line or spacetime points of the Y^- manifolds that measures the extent to the metric tensors from its locally isometric to its opponent manifold or, in fact, conjugate to each other's metric. Apparently, the dark dynamics is the sophisticated processes with the message transformations, relativistic commutations, and dynamic modulations that operate the physical motion curvature. This equation servers as *Law of Conservation of Y^- Cosmological Motion Dynamics*, introduced at 17:16 September 7th 2017 that the Y^- fields of a world-line curvature are constituted of and modulated by asymmetric fluxions, given rise from the Y^+ vector potential fields not only to operate motion geometry, but also to carry out messages for reproductions and animations. It implies that the virtual world supplies energy resources in the forms of area fluxions, and that the cosmological modulator $\mathbf{\Lambda}^+$ has the intrinsic messaging secrets of the dark energy operations, further outlined in the following statement:

1. *During the Y^-Y^+ entanglements between the world planes, the asymmetric potentials dynamically operate spacetime curvatures $\mathfrak{R}^-$ and supply the area energy at a horizon rising from symmetric fluxions of vector potentials.*
2. *The Y^- motion curvature $\mathfrak{R}^-$, stress $\mathbf{G}$ and contorsion $\mathbf{C}$ dynamically balance the transformation and transportation through the asymmetric fluxions entangling between the dual manifolds.*
3. *The Y^- asymmetric motions are internally adjustable or dynamically operated through the potentials of the Y^+ modulator $\mathbf{\Lambda}^+$ through the energy fluxions. In other words, a cosmic system is governed by the modulator $\mathbf{\Lambda}^+$ symmetrically and the commutation asymmetrically.*
4. *The $\mathbf{\Lambda}^+$ modulator evolves, generates and gives rise to the further horizons which integrate with the dynamic forces, motion collations, or symmetric entanglements.*

5. *Remarkably as its resources of symmetric counterpart, it associates the diagonal components that embed and carryout the horizon radiations, wave transportations, as well as the force generators spontaneously.*
6. *The trace of moderation tensor $Tr(\mathbf{\Lambda}_d^+)$ might be observable externally and might be dependent only to the frequency and temperature $\Lambda_d(\omega, T)$ in a free space. As expected, the smaller the Λ_d, the greater stability the universe.*
7. *Besides, the asymmetric strength $\mathbf{D}_v^+$, twisting $\mathbf{H}_v^+$ fields and $\mathbf{\Lambda}^+$ components are a part of the propagational entanglements throughout the system intrinsically, resourcefully, modularly, and gracefully.*

Usually, the matrix $\mathbf{\Lambda}^+$ institutes dynamic modulations internally while its asymmetric area fluxions and the reactors are observable externally to the system.

13. Conservation of Cosmic Dynamics

In a parallel fashion, by following the same approach, we can fabricate compactly the contravariant formula at the Y^--modulation and its conservation inherent in the *Virtual Dark Dynamics*.

$$\tilde{\mathcal{R}}^{+\sigma}_{\nu m\mu} + \Lambda^{-\sigma}_{\nu m} = \tilde{R}_{\nu m} + \tilde{G}^{\sigma s}_{\nu m} + \tilde{C}^{\sigma s}_{\nu m\mu} \qquad : \Lambda^{-\sigma}_{\nu m} = \Lambda^{-}_{d} - \kappa^{-}_{\Lambda} \begin{pmatrix} -(\mathbf{u}^{-}\nabla)\cdot\mathbf{B}^{*}_{v} \\ \frac{\partial}{\partial t}\mathbf{B}^{-}_{v} + \frac{1}{c}\mathbf{u}^{-}\nabla\times\mathbf{E}^{-}_{v} \end{pmatrix} \tag{6.13.1}$$

$$\tilde{\mathfrak{R}}^{+} + \mathbf{\Lambda}^{-} = \tilde{\mathbf{R}} + \tilde{\mathbf{G}} + \tilde{\mathbf{C}} \qquad : \mathbf{\Lambda}^{-} \equiv \Lambda^{-\sigma}_{\nu m}, \tag{6.13.2}$$

where the $\mathbf{B}^{-}_{v}$ and $\mathbf{E}^{-}_{v}$ fields are the intrinsic modulations in the form of a duality of asymmetry cohesively. The matrices are associated with the *Lorenz*-group at the third or higher horizon. The above equation also serves as *Law of Conservation of Y^+ Cosmological Field Dynamics* that associates curvature, stress and contorsion with commutator of area fluxions:

1. *At a horizon rising from commutations of vector potentials, this equation describes the outcomes between the internal entanglements and motion behaviors observable externally to the system though the Y^- modulation $\mathbf{\Lambda}^-$ of the activator.*
2. *The motion annihilation of metric $\mathbf{g}^+$, stress $\tilde{\mathbf{G}}$ and connector tensors $\tilde{\mathbf{C}}$ conserve the Riemannian curvature $\mathfrak{R}^+$ travelling over the world lines or spacetime and entangling through the actor $\mathbf{\Lambda}^-$ matrix between the Y^-Y^+ manifolds at the third or higher horizons.*
3. *The Y^+ motion curvature $\mathfrak{R}^+$, stress $\tilde{\mathbf{G}}$ and contorsion $\tilde{\mathbf{C}}$ dynamically balancing the transportation through the asymmetric fluxions may radiate the lightwaves, photons and gravitons associated with its symmetric counterpart.*
4. *The fluxion is entangling the vector potentials to propagate the resource modulator $\mathbf{\Lambda}^-$ of the asymmetric strength $\mathbf{B}^{-}_{v}$ and twisting $\mathbf{E}^{-}_{v}$ fields, conservatively and consistently.*

5. *The internal continuity of energy fluxion might be hidden and convertible to and interruptible with its Y^+ opponent fields for the dynamic entanglements reciprocally throughout and within the system.*
6. *The Λ_d^- is asymmetric fluxion for the force generator, classically known as the spontaneous symmetry breaking. As expected, the symmetry can be evolved gracefully for activities such that the entire system retains symmetry.*
7. *The asymmetric strength $\mathbf{E}_v^-$ and twisting $\mathbf{B}_v^-$ fields of the off-diagonal $\mathbf{\Lambda}^-$ components are a part of the propagational entanglements throughout the system intrinsically, resourcefully, modularly, and gracefully.*

At the Y^--supremacy, the asymmetric forces or acceleration is logically affiliated with the *virtual dynamics* while its physical motion curvature is driven by the Y^+-supremacy of the virtual world. For the accelerations at non-zero $\mathbf{g}_v^\pm \neq 0$, one has the following expression, similar to (6.11.1-2) of the ontological accelerations:

$$\mathbf{g}_v^- / \kappa_g^- = \left[\check{\partial}^\lambda \check{\partial}^\lambda, \hat{\partial}_\lambda \hat{\partial}_\lambda\right]_v^- - \mathbf{\Lambda}^+ \qquad : \kappa_g^- = \frac{\hbar c}{2E^-} \qquad \textit{(6.13.3)}$$

$$\mathbf{g}_v^+ / \kappa_g^+ = \left[\check{\partial}_\lambda \check{\partial}_\lambda, \hat{\partial}^\lambda \hat{\partial}^\lambda\right]_v^+ - \mathbf{\Lambda}^- \qquad : \kappa_g^+ = \frac{\hbar c}{2E^+} \qquad \textit{(6.13.4)}$$

where $\mathbf{g}_v^-$ or $\mathbf{g}_v^+$ is a normalized acceleration of cosmology. As a duality, a galaxy center may have a mixture of a black core absorbing objects and a white core radiating the photons and gravitons. For a blackhole, its core center may absorb the objects in order to maintain its activities for its motion stability of annihilation. Reciprocal to a blackhole, a galaxy center may have more radiations instead of absorbing objects, which results in a brightness of its core to stabilize its highly functioning activators and operating modulators - the nature of the mysterious dark energy.

14. Spacetime Horizon Equations

Since the cosmic dynamics at the third horizon is on spacetime manifold with four-dimensional coordinates, the FLRW metric in *Cartesian* coordinates has the *Riemann* curvature tensor at the components of the *Ricci* tensor:

$$R_{00} = -\frac{3}{c^2}\frac{\ddot{a}}{a}g_{00}, \qquad R_{0\nu} = 0 \qquad R_{\mu\nu} = \left[\frac{1}{c^2}\frac{\ddot{a}}{a} + \frac{2}{c^2}\left(\frac{\dot{a}}{a}\right)^2 + \frac{2k}{a^2}\right]g_{\mu\nu} \tag{6.14.1}$$

where as expected the isotropy and homogeneity of our metric leads to the vanishing of the vector $R_{0\nu} = 0$ and forces the spacial part to be proportional to the metric $R_{\mu\nu} \propto g_{\mu\nu}$. The *Ricci* scalar is given by

$$R = -6\left[\frac{1}{c^2}\frac{\ddot{a}}{a} + \frac{1}{c^2}\left(\frac{\dot{a}}{a}\right)^2 + \frac{k}{a^2}\right] \tag{6.14.2}$$

The energy momentum tensor $T_{\mu\nu}$ is similarly constraint as the *Ricci* scalar. It can only contain two independent functions of *t* and its components are

$$T_{00} = \rho_0(t), \qquad T_{0t} = 0 \qquad T_{\mu\nu} = p_0(t)g_{\mu\nu} \tag{6.14.3}$$

$$G_{tt} = \frac{8\pi G}{c^2}\rho_0 \qquad G_{rr} = \frac{8\pi G}{c^2}p_0 \tag{6.14.4}$$

From the equation (6.3.1) , it can be extracted and shown by the following:

$$H_2^2 + \frac{kc^2}{a^2} = c^2\Lambda_{tt}^+ + \frac{4\pi G}{3}\rho \qquad : \rho = 2\rho_0 + \rho_{tt} \tag{6.14.5}$$

$$3H_2H_3 = c^2\Lambda_{rr}^+ - \frac{4\pi G}{c^2}(\rho c^2 + 3p) \qquad : p = 2p_0 + \frac{1}{3}p_{rr} \tag{6.14.6}$$

$$H_2 = \frac{\dot{a}}{a}, \qquad H_3 = \frac{\ddot{a}}{\dot{a}}, \tag{6.14.7}$$

$$p_v = p_{tt} + p_{rr} = c^2 Tr(\mathbf{J}_v^+) \tag{6.14.8}$$

where H_2 or H_3 is named the second or third horizon function of spacetime manifolds, respectively. Representing the arisen ratios, these horizon functions extend the classical *Hubble* parameter H_2 into a hierarchy of the natural topology of universe. Named as *Spacetime Horizon Equations*, it serves as conservation of the third horizon and extends the *Friedmann* equations in to a duality of virtual-physical reality, shown as below:

$$\nabla \cdot \mathbf{D}_v^* = 4\pi G \rho_v \tag{6.14.9}$$

$$\frac{\partial}{\partial t}\mathbf{D}_v^+ - \nabla \times \mathbf{H}_v^+ = 4\pi G \mathbf{J}_v^+ \tag{6.14.10}$$

Because, the *Horizon Equations* are a collection of the *complex states*, it implies an eternal yinyang-steady state universe that, remarkably, the dark energy operates the resources and modulates the motion dynamics in form of the physical mass, virtual-energy density, photon, graviton, thermodynamics, weak and strong forces, packed all together. Therefore, the equations (6.14.5-6) are contradict to the hypothesis that the universe described by the equation (6.8.2-6.8.3) implies abrupt appearance of expanding spacetime metric.

15. Asymmetrical Wave propagation

A coherent wave is the synthesis of the state packet or specific oscillations, often described as a duality of the Y^-Y^+ dynamics most closely resembling the oscillatory behavior of wave propagations bidirectionally, representing a state in a system for which the ground-state wave-packet is displaced from the origin of the system. These states, for example, can be expressed as eigenvectors of the ladder operators to form an overcomplete family, or related to the solutions by a pair of the reciprocal oscillators with an amplitude equivalent to the classical progressive displacement. In the horizon infrastructure, two of remarkable characteristics of wave packet propagations are non-dispersive at the second horizon and dispersive at the third or higher horizons.

Non-dispersive packet is the wave-packet preserved from spreading that travels in one direction, multiplied by a plane wave traveling in the opposite direction, reciprocally. Especially suitable for photons and gravitons at the second horizon, it has the appealing features that the waves, undergo only local variations in the stabilizing envelopes, do not spread out as they propagate in free space, and travel with the speed of light in straight lines. This virtual behavior is under a Y^-Y^+ interweavement on the world planes that can be conveniently expressed natively by polar coordinates $\{r, \vartheta\}$, where r depicts the physical manifold as a whole aligned with its virtual twin and positioned at the natural superphase ϑ. On the two-dimensional world planes, this polar system simplifies the following formulae observable externally to the system.

$$\nabla^2\psi_n - \frac{1}{c^2}\frac{\partial^2}{\partial t^2} = 4\frac{E_n^- E_n^+}{(\hbar c)^2}N_n^c\eta_n\psi_n \qquad : \psi_n \in \{\varphi_n^-, \phi_n^+\} \qquad (6.15.1)$$

$$-i\hbar\frac{\partial}{\partial t}\psi_n = -\,i\frac{(\hbar c)^2}{2E_n^-}\nabla^2\psi_n + V(r,\vartheta)\psi_n \qquad (6.15.2)$$

$$\nabla^2 = \frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial}{\partial r}\right) + \frac{1}{r^2}\frac{\partial^2}{\partial\vartheta^2} \qquad : ict = rcos(\vartheta) \qquad (6.15.3)$$

where the η_n is the coupling efficiency. Given by the section V, the N_n^c=$N_n^{\pm}$ is for the particles at nonzero charges and N_n^c=$N^o = N - N_n^{\pm}$ for neutrinos at neutral charge. Under superphase modulation of the first equation, the second equation is the enhanced *Klein–Gordon* equation and the third equation is the one-dimensional *Schrödinger* equation. Because of the Y^-Y^+ duality, the wave function ψ_n contains two types of the packets $\psi_n \in \{\varphi_n^-, \phi_n^+\}$, where the scalar potential packet is the Y^-Y^+-wave propagating and interweaving simultaneously and reciprocally. As a result, under the second horizon, a solution to the *Horizon Field Equation* (6.11.6) and the above *Non-dispersive Packet Equations* is at a world plane as the virtual medium, characterizable simply by the two-dimensions of a polar coordinate system with one r for physical space and the other ϑ for virtual space. The carrier wave propagates at the phase speed, the modulation envelope propagates at the group speed that governs the propagation of information.

For the fields of dark energy in a free space, the right-side of the equation (6.15.1) might be considered as the resources of the dark energy. Multiplied by $\delta(r)$, it becomes a boundary condition of the emission source. Furthermore, the state of any virtual energy E_n^- or E_n^+ is an imaginary function with the wave-frequencies $E_n^{\pm}(\omega_n)$ of photon, graviton, neutrino, etc., illustrated by the following examples:

$$E_m^{\mp} = \pm\, imc^2\,,\ \hbar\omega \rightleftharpoons mc^2,\ \eta_m = 66.6\,\% \quad \text{: Mass acquisition} \quad (6.15.4)$$

$$E_c^{\pm} = \mp \frac{i}{2}\hbar\omega_c,\ \eta_c = 2/\pi = 63.7\,\% \quad \text{: Photon radiation of blackhole} \quad (6.15.5)$$

$$E_g^{\pm} = \mp \frac{i}{2}E_p,\ E_p = \sqrt{\hbar c_g^5 / G},\ \eta_g = 100\,\% \quad \text{: Graviton radiation of blackhole} \quad (6.15.6)$$

$$E_e^{\pm} = \mp \frac{i}{2}\hbar\omega_e,\ \eta_e = \pi^{-3} = 3.2\,\% \quad \text{: Planck Electron-photon radiations} \quad (6.15.7)$$

$$E_{pm}^{\pm} = \frac{\mp i\hbar^2 c}{2\sqrt{2\mu}}\left[cos\frac{\pi\nu}{2} + cos(\frac{\omega}{2} + \frac{\pi\nu}{4})sin\frac{\pi\nu}{2}\right]^{1/2\nu} \quad \text{: Electron capture in polar molecules} \quad (6.15.8)$$

In the last equation, the weakly bound states and electron energy is an example for the point dipole model of the polar molecule, classically known as scaling anomaly to the inverse square interaction or self-adjointness. Relevant to a relational $\{r, \vartheta\}$ model, such as $\psi(r, \vartheta) = R(r)\Theta(\vartheta)$ or $\psi(r, \vartheta) = e^{ikrcos(\vartheta)}\phi(r)$, the exact solutions to the (6.15.1-3) equations can be comprehensive in order to decompose the scalar waves into bidirectional, forward and backward, traveling plane wave-packets.

Approximated as blackbody ejections, the thermal state characterizes the radiation either spontaneously emitted by many ordinary objects or naturally operated by dark energies. In cosmology, a perfectly insulated enclosure is in thermal equilibrium internally, contains blackbody radiation, emits radiations at the second horizon, and has negligible effects upon the equilibrium at the spacetime horizon. In the equations of (6.15.1-3), three virtual states are the important ingredients: frequencies ω_n, temperature T, and chemical potential μ_n, each of which has a scope of its domain significance. For instance, at the second horizon, it features the well-known *Fermi–Dirac* statistics with $E_n^c = \epsilon_n - \mu_n$, introduced in 1926 by *Enrico Fermi* and *Paul Dirac*, independently, as the following:

$$N_n^c = h_n^c N = \frac{1}{e^{iE_n^c/k_B T} + 1} N \qquad : c \in \{-,0,+\}, \textit{ At a second horizon of world planes} \quad (6.15.9)$$

Because, in the second horizon, a superposing collection of indistinguishable objects may occupy a set of available discrete energy states at thermodynamic equilibrium, a distribution of particles over energy states in systems consists of many identical objects that obey the *Pauli* exclusion principle, introduced in 1925.

Dispersive packet is the wave-packet travelling in the third or higher horizon or a spacetime cluster as the physically three-dimensional medium. The propagation of waves in a dispersive medium is under the Y^- supremacy of a spacetime manifold with the bidirectional representation in connection with the boundary conditions as well.

$$\nabla^2\psi - \frac{1}{c^2}\frac{\partial^2}{\partial t^2}\psi = 4\frac{E_n^- E_n^+}{(\hbar c)^2} N_n^c \eta_n \psi \qquad : \nabla^2 = \frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2} \qquad (6.15.10)$$

$$-i\hbar\frac{\partial}{\partial t}\psi = \hat{H}\psi, \;\; \hat{H} \equiv -\,i\frac{(\hbar c)^2}{2E_n^-}\nabla^2 + V(\mathbf{r},t) \qquad (6.15.11)$$

$$\nabla^2 = \frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2\frac{\partial}{\partial r}\right) + \frac{1}{r^2\sin\theta}\frac{\partial}{\partial\theta}\left(\sin\theta\frac{\partial}{\partial\theta}\right) + \frac{1}{r^2\sin^2\theta}\frac{\partial^2}{\partial\varphi^2}, \qquad (6.15.12)$$

For thermodynamics, the average energy in a bulk mode can be expressed by the partition function of energies:

$$\tilde{E}^{\pm} = \pm\, iE_n^{\pm}\left(\frac{1}{2} + \frac{1}{e^{\pm iE_n^{\pm}/k_BT} - 1}\right)$$ *: At a third horizon of spacetime manifolds* *(6.15.13)*

The last term of this equation represents the well-known *Bose–Einstein* statistics with $E_n^{\pm} = \epsilon_n - \mu_n$, introduced by *Satyendra Nath Bose* in 1924. The aggregation in the same state is a bulk characteristic and accounts for the cohesive streaming fluxions of, for example, laser light and the frictionless creeping of superfluid helium. At the physical horizons, a solution to the *Cosmic Field Equation* (6.12.4) or *Dispersive Packet Equation* (6.15.10-11) is at a spacetime manifold as the physical medium, characterizable by the tetrad-dimensions with *Cartesian* or spherical coordinate system.

Travelling through a physical spacetime or a galaxy, light from its original path in non-dispersive packet becomes dispersive until it exists the physical horizon and continues on its deflection waves non-dispersively. Under this principle, since the dispersive packets behave like gravitational fields and interfere with spacetime manifold physically, the deflection wavelengths of intergalactic eclipse can reveal some characteristics of the spacetime galaxy such as its size, massive type, motion activity, or distance. In "physical cosmology", however, this is interpreted as the motion of undisturbed objects in a background curved geometry or alternatively as the response of objects to a force in a flat geometry, known as gravitational lensing. Under this classic interpretation, the observer has limited itself towards the decoherence features of the universe, such as the angle of deflection light in a simple form of either relativistic *Newtonian* or *Schwarzschild* radius $\theta = 2r_s/r$ of equation (4.5.4).

Cosmic waves, including all wavelength of lightwaves, can be either electromagnetic radiation or dark energy emission, or both. Without sufficient empirical or philosophical verifications, it becomes an inconceivable hypothesis that electromagnetic radiation be a remnant from an early stage of the universe when the universe began.

Mathematically, both of the dispersive and non-dispersive wave-packets have been researched extensively for the three-dimensional spherical coordinates in physical space. It can be as easy to evaluate asymptotically or numerically as those to be converted to the polar wave equations in virtual world planes. Besides, while a luminosity distance might be applicable within a spacetime only, it can be utilized to estimate the radius of a remote galaxy as well.

16. Natural Cosmology In a Nutshell

Powered by Horizon Topology philosophically, this manuscript prevails over both Einstein's field equation (6.1.1) and Friedmann equations (6.1.3-4) with *Natural Cosmology* of *Ontological Field Equation* (6.11.11) and *Horizon Field Equation* (6.11.3, 6.11.10). The second horizon function H_2 is reevaluated for the world-line metric (2.5.2) to extend the classical Hubble parameter. These solutions integrate the natural complex states together, demonstrating a duality of virtual and physical coexistence, the entropy of thermodynamics, radiation of photons, emission of gravitons, particle interactions. In addition, the "general relativity" is substituted by the Cosmic Field Equation (6.13.1) with the inconceivable cosmological matrix.

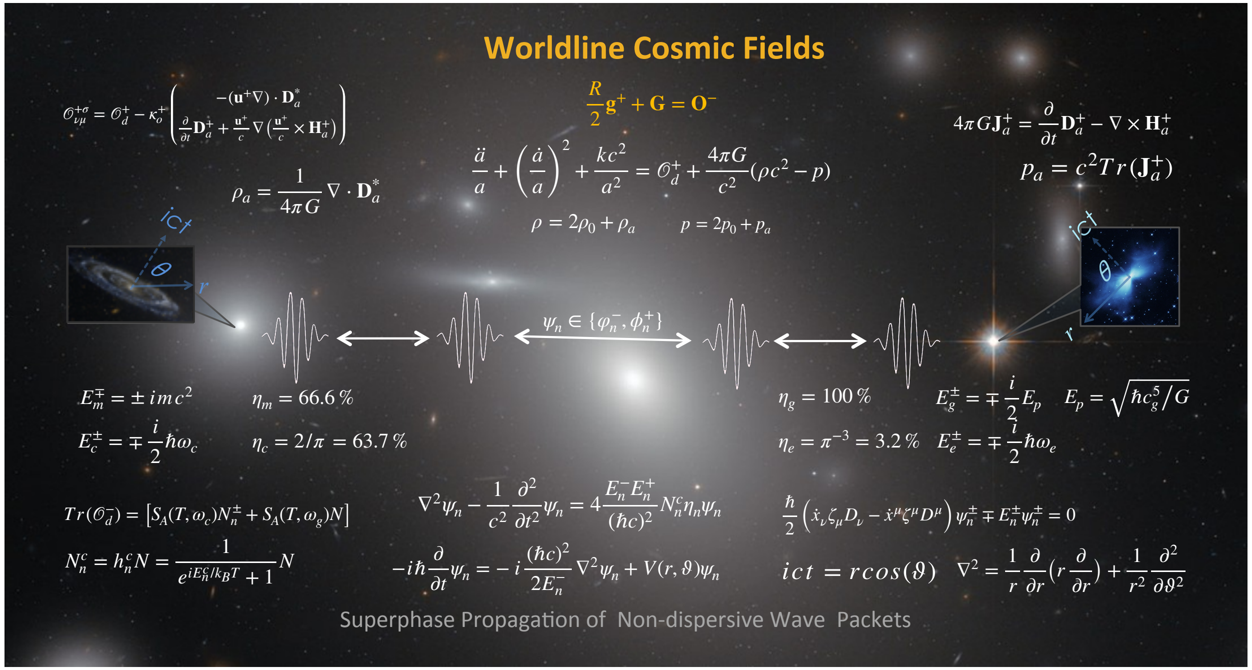

Figure 6.16.1: Intergalactic Virtual Commutations at Second Horizon of World Planes

For the second horizon, the figure above highlights the formulae of the cosmological field theory of ontological evolutions, which is mathematically epitomized on the two-dimensional world planes. At the second horizon, intergalactic commutations of the photon and graviton emissions are predominant in the polar fields without singularity, where the light traveling at non-dispersive is hardly relevant to the motion dynamics of its physical object at the third horizon. In fact, the redshift implies the dark energy was and has been continuously operating the physical dynamics at the ontological regime, a process of which is always accompanied by radiations of lightwaves and interweave of gravitations.

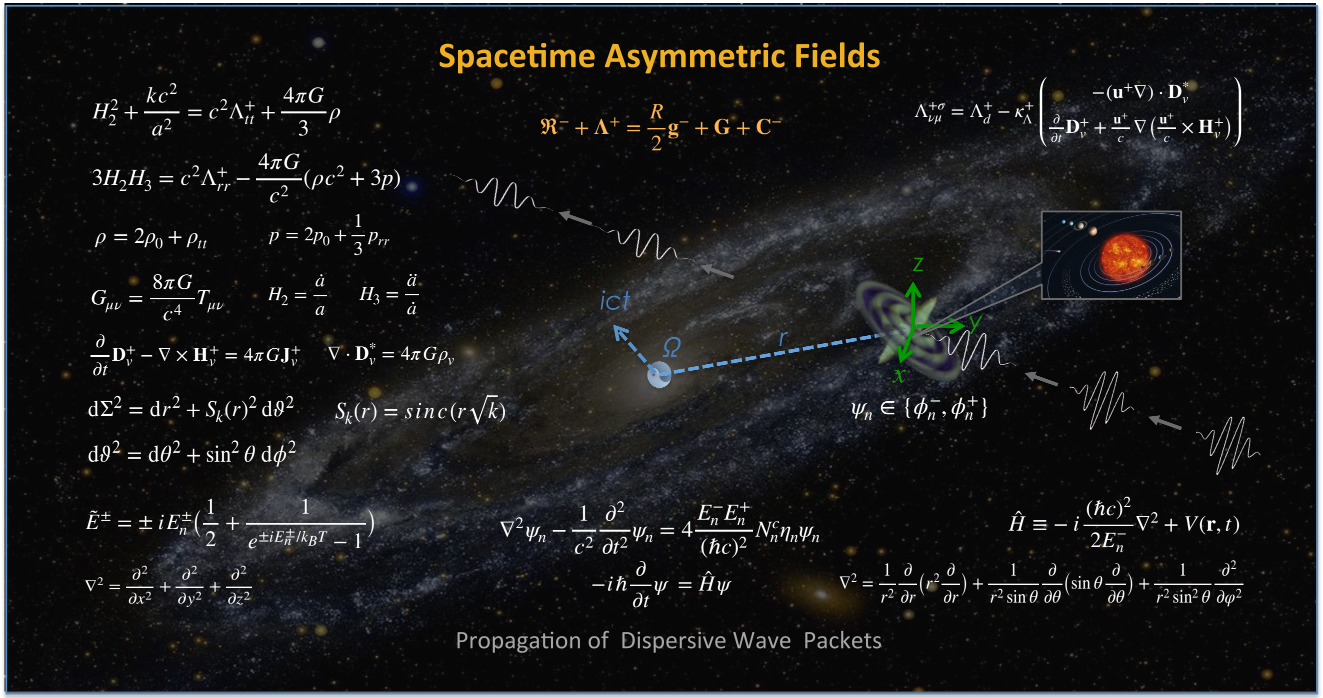

Figure 6.16.2: Heliosphere Physical Interactions at Third Horizon of Spacetime Manifolds

At the third horizon, the world planes are further evolved into *spacetime* manifolds, where the physical fields inaugurate the full mass enclave, acquire freedom of the extra rotations, and are transited to gravitational forces with a central-singularity. As another collection, the figure above highlights the formulae of the cosmological field theory of asymmetric dynamics, which is mathematically sketched on the tetrad-dimensions of spacetime manifolds. Because $Y^{-}Y^{+}$ entanglement is a part of mass enclave processes, the superphase fluxions exert a pair of the gravitational fields in a spacetime manifold, appearing as if there were from nothing with abrupt appearance of expanding spacetime metric. This was the course of how the “physical cosmology” has been misled to the flawed hypothesis that universe were expanding from the primordial "*Big Bang*". Since the dispersive lightwave packet is the known characteristics of physical medium in spacetime horizons, the redshift occurs at the conversion between the second and third horizon, which might appear as or equivalent to “expanding”. As expected, the time-lapse conversion to the physical horizons is equivalent to “expanding” or simply dispersive that is the known characteristics of the virtual world imposing or exposing on the physical world.

Our universe has a perfect environment, neither inflate nor deflation, pertaining to and suitable for a duality of the two-sidedness lying at the heart of all events or instances as they are interrelate, opposite or contrary to one another, each dissolving into the other in alternating streams that operates a life of creation, generation, or actions complementarily, reciprocally and interdependently. The nature consistently emerges as or dynamically entangles with a set of the $Y^{-}Y^{+}$ fields between matter interruptions that communicates and projects their interoperable states to its surrounding environment, alternatively arisen by or acting on its opponent through the reciprocal interactions.

In conclusion, the universe is naturally eternal and dynamically yinyang-steady. 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, which, in the current model of “physical cosmology”, is at the "collapsed" states of the interweaving dynamics. Therefore, our astronomers shall bid farewell to the “*Big Bang*” theory.

Ontological Evolution

CHAPTER 7

Under *Universal Topology* $W^{\mp} = P \pm iV$, a duality of the potential entanglements lies at the heart of all event operations as the natural foundation giving rise to and orchestrating relativistic transformations for photons and spiral transportations for gravitons. In addition, the superphase modulation conducts laws of evolutions and horizon of conservations, and maintains energy bonds, appearing as field entanglements of coupling weak and strong forces compliant to quantum chromodynamics and *Standard Model* of particle physics. It extends the unified physics stunning at exceptional remarks of the ontological specifics.

Consistently landing on classical and extending to modern physics, this manuscript uncovers a series of the groundbreaking philosophy and mathematics accessible and tested by the countless artifacts of modern physics.

1. Horizon Process

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

As a duality of nature, its counterpart is another process named the Y^{-} *Explicit Reproduction* $(\dot{x}_{\nu} D_{\nu})_j \wedge (\dot{x}^{\mu} D^{\mu})_k$. It requires a physical process of the Y^{-} reaction or annihilation for the *Animation*. Associated with the inception of a Y^{+} spontaneous evolution, the actions of the Y^{-} *Explicit* reproduction are normally sequenced and entangled as a chain of reactions to produce and couple the weak electromagnetic and strong gravitational forces symmetrically in massive dynamics between the second and third horizons. At the second horizon of the event evolutionary processes, the gauge fields yield the holomorphic superphase operation, continue to give rise to the next horizons, and develop a complex event operation (1.8.1) in term of an infinite sum of operations:

$$\check{\partial} = \dot{x}_{\nu} \zeta_{\nu} D_{\nu} = \dot{x}_{\nu} \zeta_{\nu} \partial_{\nu} + i \dot{x}_{\nu} \zeta_{\nu} \left(\Theta_{\nu} + \tilde{\kappa}_2^{-} \dot{\Theta}_{\mu\nu} + \cdots \right) \tag{7.1.1}$$

$$\Theta_{\nu} = \frac{\partial \vartheta(\lambda)}{\partial x_{\nu}}, \qquad \dot{\Theta}_{\nu\mu} = \frac{\partial A_{\mu}}{\partial x_{\nu}} - \frac{\partial A_{\nu}}{\partial x_{\mu}} = F_{\nu\mu}^{-n}, \qquad \tilde{\kappa}_2^{-} = 1/2 \tag{7.1.2}$$

$$\hat{\partial} = \dot{x}^{\nu} \dot{\zeta}^{\nu} D^{\nu} = \dot{x}^{\nu} \zeta^{\nu} \partial^{\nu} - i \dot{x}^{\nu} \zeta^{\nu} \left(\Theta^{\nu} + \tilde{\kappa}_2^{+} \dot{\Theta}^{\nu\mu} + \cdots \right) \tag{7.1.3}$$

$$\Theta^{\nu} = \frac{\partial \vartheta(\lambda)}{\partial \lambda}, \qquad \dot{\Theta}^{\nu\mu} = \frac{\partial A^{\mu}}{\partial x^{\nu}} - \frac{\partial A^{\nu}}{\partial x^{\mu}} = F_{\nu\mu}^{+n}, \qquad \tilde{\kappa}_2^{+} = (\tilde{\kappa}_2^{-})^{*} \tag{7.1.4}$$

The superphase Θ^ν is under a series of the event λ actions, giving rise to horizon of the vector potentials $F^{\pm n}_{\nu\mu}$. Therefore, the second and third horizon fields are emerged and unfold into the following expressions:

$$\check{\partial} = \dot{x}_\nu \zeta_\nu D_\nu = \dot{x}_\nu \zeta_\nu \partial_\nu + i \dot{x}_\nu \zeta_\nu \left(\frac{e}{\hbar} A_\nu + \frac{1}{2} F^{+n}_{\nu\mu} + \cdots \right) \tag{7.1.5}$$

$$\hat{\partial} = \dot{x}^\nu \dot{\zeta}^\nu D^\nu = \dot{x}^\nu \zeta^\nu \partial^\nu - i \dot{x}^\nu \zeta^\nu \left(\frac{e}{\hbar} A^\nu + \frac{1}{2} F^{-n}_{\nu\mu} + \cdots \right) \tag{7.1.6}$$

where e is a coupling constant of the bispinor fields. Naturally, defined as the event operation or similar to the classical *Spontaneous Breaking*, it involves the evolutionary and symmetric processes of the natural *Creation* and its complement duality known as *Annihilation*.

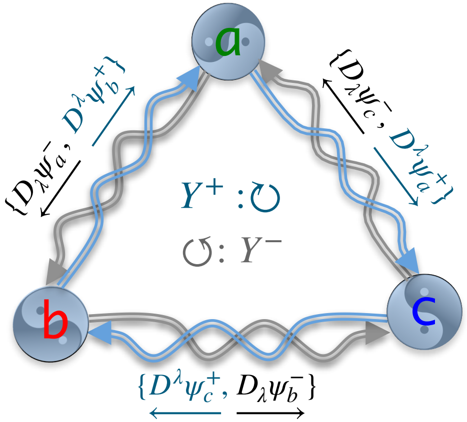

Figure 7.1: Two Implicit Loops of Triple Explicit Entanglements

As a part of infrastructure of universe, the principle of the chain of least reactions in nature is for three particles to form a loop. Confined within a triplet group, the particles jointly institute a double streaming entanglement with the three action states, illustrated in Figure 7.1, introduced in June 6th of 2018. The actions of double wedge circulations $\wedge$ in the above figure have the natural interpretation of the entangling processes:

$$\circlearrowleft : \ (D_\lambda \psi_a^- \to D_\lambda \psi_b^- \to D_\lambda \psi_c^-)^{\urcorner} \qquad \textit{: Right-hand Loop} \qquad (7.1.7)$$

$$\circlearrowright : \ {}^{\ulcorner}(D^\lambda \psi_b^+ \leftarrow D^\lambda \psi_c^+ \leftarrow D^\lambda \psi_a^+) \qquad \textit{: Left-hand Loop} \qquad (7.1.8)$$

$$\{D_\lambda \psi_a^-, D^\lambda \psi_b^+\}, \{D_\lambda \psi_b^-, D^\lambda \psi_c^+\}, \{D_\lambda \psi_c^-, D^\lambda \psi_a^+\} \qquad \textit{: Triple States} \qquad (7.1.9)$$

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

Essentially, an integration of the above formulae, the above principle of Evolutionary Processes outlined philosophically ($\hat{\partial}^\lambda \circlearrowleft \hat{\partial}_\lambda \rightleftharpoons \check{\partial}^\lambda \circlearrowright \check{\partial}_\lambda$) is concisely translatable into the equations of physics in mathematical formula:

$$S_2^+ + R_2^+ \circlearrowleft S_1^+ + R_1^+ \rightleftharpoons S_2^- + R_2^- \circlearrowright S_2^- + R_2^- \qquad (7.1.10)$$

This fundamental loop structure serves as the generators of the infrastructure. As a fascinating consequence, one can anticipate the following results:

1. *Applying the principle of Least Operations of Eq. (2.5.1-2) on World Equations, the events of the fundamental generators of the infrastructure to produce or give rise to Pauli Matrix, Direct Equation, Schrödinger Equation, Klein–Gordon Equation, etc., known as Quantum Physics.*
2. *With the principle of Double Loops of Triple Entanglements of Figure 7.1, 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 weak forces for partial physical interactions) and some have zero-mass (interactive virtually without force). Essentially, they are building blocks of a fully physical domain *SU*(3). Only at the third horizon, particles have their full mass (strong force interactions). Associated with the mass enclave, a force is natural in physical domain but not in virtual world.

2. Evolutionary Equations

From the first type of *World Equations* (2.4.2), the virtual superphase events under both of the Y^-Y^+ reactions $\psi^\pm$ evolve their density of the circular process, simultaneously:

$$\hat{W}_n = \left[\psi^+(\hat{x},\lambda) + \kappa_1^+\hat{\partial}\psi^+(\hat{x},\lambda)\cdots\right]\left[\psi^-(\check{x},\lambda) + \kappa_1^-\check{\partial}\psi^-(\check{x},\lambda)\cdots\right] = \psi^+\psi^- + k_J J_s + k_\wedge\left(\hat{\partial}\psi^+\right)\wedge\left(\check{\partial}\psi^-\right) \quad (7.2.1)$$

$$J_s = \frac{\hbar c^2}{2E^-}\left(\psi^+\check{\partial}\psi^- + \psi^-\hat{\partial}\psi^+\right) \quad (7.2.2)$$

where k_J or $k_\wedge$ is a constant. This equation is named as *Horizon Equations of Ontological Evolution.* The first term $\psi^+\psi^-$ is the ground density, and the second term is the probability current or flux J_s. Apparently, the third term constructs the horizon interactions. Since the tensor product has two symmetric types, the tensors react upon each other, symbolized by the wedge product $\wedge$ as the following:

$$\left(\hat{\partial}\psi_j^+\right)\wedge\left(\check{\partial}\psi_k^-\right) = \left(\dot{x}^\mu\zeta^\mu D^\lambda\psi_j^+\right)\wedge\left(\dot{x}_\nu\zeta_\mu D_\lambda\psi_k^-\right)$$
$$= \dot{x}^\mu\zeta^\mu\left(\partial^\mu - i\frac{e}{\hbar}A^\mu - \tilde{\kappa}_2^+F_{\mu\nu}^{+n}\right)\psi_j^+ \wedge \dot{x}_\nu\zeta_\nu\left(\partial_\nu + i\frac{e}{\hbar}A_\nu + \tilde{\kappa}_2^-F_{\nu\mu}^{-n}\right)\psi_k^- \quad (7.2.3)$$

Named as *Equations of Evolutionary Forces*, the above equation unifies all of the known forces of the weak, strong, gravitation and electromagnetism. The symbol $j,k \in \{a,b,c\}$ indicates a loop chain of three particles.

This can be conveniently expressed in forms of *Horizon Lagrangians* of virtual creation and physical reproduction. Considering the second orders of the ψ_n^- and ψ_n^+ times into (2.8.10, 2.8.21) equations, and substituting them into the *Lagrangians* (2.2.7), respectively, one comes out with the quantum fields that extend a pair of the first order *Dirac* equations of (3.8.3-4) into the second orders in the forms of Lagrangians respectively:

$$\tilde{\mathscr{L}}_s^\pm = -\frac{1}{c^2}\left[\hat{\partial}^\lambda\hat{\partial}^\lambda, \check{\partial}_\lambda\check{\partial}_\lambda\right]_s^\pm \quad (7.2.4)$$

$$\tilde{\mathscr{L}}_s^+ = \overline{\psi}_n^-\left(i\frac{\hbar}{c}\zeta^\mu D^\mu + m\right)\psi_n^+ - \frac{1}{c^2}\overline{\psi}_n^-\zeta^\mu\check{\partial}_\lambda\hat{\partial}_\lambda\psi_n^+ \tag{7.2.5}$$

$$\tilde{\mathscr{L}}_s^- = \overline{\psi}_n^+\left(i\frac{\hbar}{c}\zeta_\nu D_\nu - m\right)\psi_n^- - \frac{1}{c^2}\overline{\psi}_n^+\zeta_\nu\hat{\partial}_\lambda\check{\partial}^\lambda\psi_n^- \tag{7.2.6}$$

As a pair of dynamics, it defines and generalizes a duality of the interactions among spinors, electromagnetic and gravitational fields. The nature of the commuter $[\hat{\partial}_\lambda\check{\partial}^\lambda, \check{\partial}_\lambda\hat{\partial}_\lambda]^\pm$ is the horizon interactions (7.2.3) with the mapping $\hat{\partial}_\lambda\check{\partial}^\lambda \mapsto (\dot{x}^\mu\zeta^\mu D^\lambda\hat{\psi}) \wedge (\dot{x}^\nu\zeta^\nu D_\lambda\check{\psi})$. Applying the transform conversion (3.5.6-6), we generalize the above equations for a group of the triplet quarks in form of a set of the classic *Lagrangians*:

$$\tilde{\mathscr{L}}_h^a = \tilde{\mathscr{L}}_s^+ + 2\tilde{\mathscr{L}}_s^- = \mathscr{L}_D^{-a} + \left(\overline{\psi}_c^-\frac{\dot{x}_\nu}{c}\zeta^\nu D^\lambda\psi_a^+\right) \wedge \left(\overline{\psi}_b^+\frac{\dot{x}^\mu}{c}\zeta_\mu D_\lambda\psi_a^-\right) \tag{7.2.7}$$

$$\tilde{\mathscr{L}}_h^a \equiv \mathscr{L}_D + \mathscr{L}_\psi + \mathscr{L}_C + \mathscr{L}_F + \mathscr{L}_M \qquad : \psi_k^+\psi_j^- \to 1 \tag{7.2.8}$$

$$\mathscr{L}_D \equiv \overline{\psi}_k^\pm i\frac{\hbar}{c}\zeta^\mu D_\nu\psi_j^\mp \mp m_j \qquad : j,k \in \{a,b,c\} \tag{7.2.9}$$

$$\mathscr{L}_\psi = -\frac{1}{c^2}\left(\overline{\psi}_c^-\dot{x}_\nu\zeta^\mu\partial^\mu\psi_a^+\right)\left(\overline{\psi}_b^-\dot{x}^\mu\zeta_\nu\partial_\nu\psi_a^-\right) \qquad : \dot{x}^\nu\dot{x}^\mu = c^2 \tag{7.2.10}$$

$$\mathscr{L}_C = \frac{e}{2\hbar}\left\langle\zeta_\nu A_\nu\zeta^\mu F_{\mu\nu}^{+n}, \zeta^\mu A^\mu\zeta_\nu F_{\nu\mu}^{-n}\right\rangle_{jk}^- \qquad : \tilde{\kappa}_2^+ = \tilde{\kappa}_2^- = \frac{1}{2} \tag{7.2.11}$$

$$\mathscr{L}_F = i\frac{e}{\hbar}\left[\zeta^\nu\partial^\nu(\zeta_\mu A_\mu), \zeta_\mu\partial_\mu(\zeta^\nu A^\nu)\right]_{jk}^- - \frac{e^2}{\hbar^2}\left(\zeta^\mu A^\mu\zeta_\nu A_\nu\right)_{jk} \tag{7.2.12}$$

$$\mathscr{L}_M = \frac{i}{2}\left[\zeta^\nu\partial^\nu(\zeta_\nu F_{\nu\mu}^{-n}), \zeta_\mu\partial_\mu(\zeta^\mu F_{\mu\nu}^{+n})\right]_{jk}^- - \frac{1}{4}\left(\zeta^\nu F_{\nu\mu}^{+n}\right)_j\left(\zeta_\mu F_{\mu\nu}^{-n}\right)_k \tag{7.2.13}$$

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

At the infrastructural core of the evolution, it implies that a total of the three states exists among two $\tilde{\mathscr{L}}_s^-$ and one $\tilde{\mathscr{L}}_s^+$ dynamics to compose an integrity of the dual fields, revealing naturally the particle circling entanglement of three "colors", uncoiling the event actions, and representing an essential basis of the "global gauge." The *Standard Model*, developed in the mid-1960-70s breaks various properties of the weak neutral currents and the *W* and *Z* bosons with great accuracy.

Specially integrated with the superphase potentials, our scientific evaluations to this groundwork of ***Evolutionary Equations*** (7.2.7) might promote a way towards concisely exploring physical nature, universal messages, and beyond.

3. Yang-Mills Theory

Considering $\zeta^\mu \to \gamma^\mu$ and ignoring the higher orders and the coupling effects, we simplify the $\mathscr{L}_F$ and $\mathscr{L}_M$ for the Y^+ streaming of (7.2.12-13):

$$\mathscr{L}_F(\gamma) \approx -\frac{e^2}{\hbar^2}\left(\gamma^\mu A^\mu \gamma_\nu A_\nu\right)_{jk} \equiv -\frac{1}{4} W^{+j}_{\mu\nu} W^{-k}_{\nu\mu} \qquad (7.3.1)$$

$$\mathscr{L}_M(\gamma) \approx -\frac{1}{4}\left(\gamma^\nu F^{+n}_{\nu\mu} \gamma_\mu F^{-n}_{\mu\nu}\right)_{jk} = -\frac{1}{4} F^{+j}_{\nu\mu} F^{-k}_{\mu\nu} \qquad (7.3.2)$$

At the second horizon, the $\zeta^\mu \to \gamma^\mu$ is contributed to the weak isospin fields $W^{+j}_{\mu\nu} W^{-k}_{\nu\mu}$ of coupling actions. Meanwhile, at the third horizon, the gamma γ^μ fields are converted and accord to the hypercharge $F^{+j}_{\nu\mu} F^{-k}_{\mu\nu}$ actions of electroweak fields. Therefore, the *Lagrangian* $\tilde{\mathscr{L}}^a_h$ becomes $\tilde{\mathscr{L}}^a_h \approx \mathscr{L}_D + \mathscr{L}_F + \mathscr{L}_M \equiv \mathscr{L}^a_Y$, which, in mathematics, comes out as *Quantum Electrodynamics* (*QED)* that extends from a pair of the first order *Dirac* equations (3.8.1) to the second orders in the form of a *SU*(2) + *SU*(3) *Lagrangian*:

$$\mathscr{L}^a_Y = \left(\bar{\psi}^{\mp}_j i \frac{\hbar}{c} \gamma^\nu D_\nu \psi^{\pm}_i\right)_{jk} - \frac{1}{4} F^{+j}_{\nu\mu} F^{-k}_{\mu\nu} - \frac{1}{4} W^{+j}_{\mu\nu} W^{-k}_{\nu\mu} \qquad (7.3.3)$$

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

1. *The classic Asymptotic Freedom from a view of the physical coordinates;*
2. *A proof of the confinement property in the presence of a group of the triple-color particles; and*
3. *Mass acquisition processes symmetrically from the second to third horizon, describable by the (3.12.3-4) equations.*

Since the quanta of the superphase fields is massless with gauge invariance, *Yang–Mills* theory represents that particles are semi-massless in the second horizon, and acquire their full-mass through evolution of the full physical horizon. Extended to the philosophical interpretation, it represents mathematically: conservation of *Double Loops of Triple Entanglements*, or law of *Conservation of Evolutions of Ontology* philosophically illustrated by Figure 7.1.

4. Gauge Invariance

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

$$\mathscr{L}_F(\gamma) = i\frac{e}{\hbar}\left[\gamma_\mu \partial_\mu (\gamma^\nu A_a^\nu), \gamma^\nu \partial^\nu (\gamma_\mu A_\mu^a)\right]^- - \frac{e^2}{\hbar^2}\left(\gamma_\mu A_\mu^b \gamma^\nu A_c^\nu\right) \quad \textit{(7.4.1)}$$

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

$$\mathscr{L}_F(\gamma) \mapsto F_{\nu\mu}^a = \partial_\nu A_\mu^a - \partial_\mu A_\nu^a + g_\gamma f_\gamma^{abc} A_\nu^b A_\mu^c \quad \textit{(7.4.2)}$$

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

$$\partial^\mu(\zeta^\mu F_{\mu\nu}^a) + g f^{abc} \zeta^\mu A_\mu^b \zeta_\nu F_{\mu\nu}^c = -J_\nu^a \quad \textit{(7.4.3)}$$

where J_ν^a is the potential current. Besides, it holds an invariant principle of the double-loop implicit entanglements, or known as a *Bianchi or Jacobi* identity:

$$(D_\mu F_{\nu\kappa})^a + (D_\kappa F_{\mu\nu})^b + (D_\nu F_{\kappa\mu})^c = 0 \quad \text{(7.4.4a)}$$

$$[D_\mu, [D_\nu, D_\kappa]] + [D_\kappa, [D_\mu, D_\nu]] + [D_\nu, [D_\kappa, D_\mu]] = 0 \quad \text{(7.4.4b)}$$

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

Yang–Baxter Equation - In physics, the loop entanglement of Figure 7.1 involves a reciprocal pair of both normal particles 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

$$(R \otimes \mathbf{1})(\mathbf{1} \otimes R)(R \otimes \mathbf{1}) = (\mathbf{1} \otimes R)(R \otimes \mathbf{1})(\mathbf{1} \otimes R) \qquad : e^{i\vartheta} \mapsto e^{-i\vartheta} \quad \text{(7.4.5)}$$

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

5. Quantum Chromodynamics

Given the rise of the horizon from the scalar potentials to the vectors through the tangent transportations, the *Lagrangian* above can further give rise from transform-primacy $\zeta^\nu \approx \gamma^\nu$ at the second horizon $\gamma^\nu F^{\pm n}_{\nu\mu}$ to the strong torque at the third horizon, where the chi $\zeta^\nu \approx \chi^\nu$ fields correspond to the strength tensors $\chi^\nu F^{\pm n}_{\nu\mu}$ for the spiral actions of superphase modulation. Once at the third horizon, the field forces among the particles are associated with the similar gauge invariance of the $\gamma^\nu \to \chi^\nu$ transportation dynamics, given by (7.2.9) $\mathscr{L}_D$ and (7.2.12) for $G^a_{\nu\mu} \equiv \mathscr{L}_F(\chi)$ as the following:

$$\mathscr{L}_{QCD}(\chi) = \bar{\psi}^-_n\left(i\frac{\hbar}{c}\gamma_\nu D_\nu - m\right)\psi^+_n - \frac{1}{4}G^n_{\nu\mu}G^n_{\nu\mu} + \mathscr{L}_{_{CP}}(\chi) \tag{7.5.1}$$

$$G^a_{\nu\mu} = i\frac{e}{\hbar}\left[\chi_\mu\partial_\mu(\chi^\nu A^\nu_a), \chi^\nu\partial^\nu(\chi_\mu A^a_\mu)\right]^- - \frac{e^2}{\hbar^2}\left(\chi_\mu A^b_\mu \chi^\nu A^\nu_c\right) \tag{7.5.2}$$

where c is the strong coupling. Coincidentally, this is similar to the quark coupling theory, the *Standard Model*, known as classical *QCD,* discovered in 1973. Philosophically, the torque chi-matrix of gravitational fields plays an essential role in kernel interactions, appearing as a type of strong forces. It illustrates that the carrier particles of a force can radiate further carrier particles during the rise of horizons. The interactions, coupled with the strong forces, are given by the term of *Dirac* equation under the spiral torque of chi-matrix:

$$\mathscr{L}_{_{CP}}(\chi) = i\frac{\hbar}{c}\left(\bar{\psi}^+_n\chi_\nu D_\nu\psi^-_n\right)_{jk} \mapsto -\frac{e}{c}\left(\bar{\psi}^+_n\chi_\nu A_\nu\psi^-_n\right)_{jk} \tag{7.5.3}$$

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

$$\mathscr{L}_{_{CP}} = ig_s\left(\bar{\psi}_n^+\gamma^\mu G_\mu^a T^a \psi_n^-\right)_{jk} \quad : \chi_\nu A_\nu^a \mapsto \gamma^\mu G_\mu^a T^a \tag{7.5.4}$$

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

For a physical system in spatial evolution at any given time as *Time-Independent Horizon Infrastructure*, the equation (3.10.5) can be used to abstract the *Evolutionary Equations* (7.2.3) and its *Lagrangians* (7.2.7) to a set of special formulae:

$$\tilde{\mathscr{L}}_h^a = \tilde{\mathscr{L}}_s^+ + 2\tilde{\mathscr{L}}_s^- = \mathscr{L}_D^{-a} + \overline{\psi}_j\left(\hat{\partial} \wedge \check{\partial}\right)\psi_k \quad : \nu, \mu \in \{1,2,3\} \tag{7.5.5}$$

$$\hat{\partial} \wedge \check{\partial} = \dot{x}^\mu \dot{x}_\nu\left(\hat{D} \cdot \check{D} + i\zeta^\mu \cdot \hat{D} \times \check{D}\right) \quad : \tilde{\zeta}^\nu \mapsto \zeta^\nu = \gamma^\nu + \chi^\nu \tag{7.5.5}$$

$$\hat{D} \cdot \check{D} = \left(\partial^\mu - i\frac{e}{\hbar}A^\mu - \frac{1}{2}F_{\mu\nu}^{+n}\cdots\right) \cdot \left(\partial_\nu + i\frac{e}{\hbar}A_\nu + \frac{1}{2}F_{\nu\mu}^{-n}\cdots\right) \tag{7.5.6}$$

$$\hat{D} \times \check{D} = \left(\partial^\mu - i\frac{e}{\hbar}A^\mu - \frac{1}{2}F_{\mu\nu}^{+n}\cdots\right) \times \left(\partial_\nu + i\frac{e}{\hbar}A_\nu + \frac{1}{2}F_{\nu\mu}^{-n}\cdots\right) \tag{7.5.7}$$

Introduced at August 26th of 2018, this concludes a unification of the spatial horizon and operations of the quantum fields philosophically describable by the two implicit loops $\hat{D} \times \check{D}$ of triple explicit $\hat{D} \cdot \check{D}$ entanglements, concisely and fully pictured by Figure 7.1.

6. Forces of Field Breaking

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

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

7. *Entanglement of the alternating* $Y^{-}Y^{+}$ *superphase processes in the above actions can prevail as a chain of reactions that gives rise to each of the objective regimes.*

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

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

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

Normally, forces are composited of three correlatives: weaker forces of the off-diagonal matrix, stronger forces of the diagonal matrix, and coupling forces between the horizons. To bring together the original potentials and to acquire the root cause of the four known forces beyond the single variations of the *Lagrangian*, the entangling states in a set of *Lagrangians* (7.2.10-13) establish apparently the foundation to orchestrate triplets into the field interactions between the $Y^{-}Y^{+}$ double streaming among the bond confinement of triplet particles. Coupling with the techniques of the *Implicit Evolution, Explicit Breaking* and *Gauge Invariance*, the four universal fields (2.8.10, 2.8.21) embed the ground foundations and emerge the evolutionary intrinsics of field interactions for the weak and strong forces. Together, *field breaking* and its associated *Invariance* contributes to a part of *Horizon Evolutions*.

7. Strong Forces

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

G*iving rise to* the horizon *SU*(3), the processes of mass acquisition and annihilation function as and evolve into a sequential processes of the energy enclave as the strong mass forces in the double streaming of three entangling procedures (Figure 7.1), known as a chain of reactions:

1. *At the second horizon SU(2) under the gauge invariance, the gauge symmetry incepts the evolutionary actions implicitly:*

$$D_\nu = \partial_\nu + i\sqrt{\lambda_2/\lambda_0}\phi_c^-, \quad D^\nu = \partial^\nu - i\sqrt{\lambda_2/\lambda_0}\varphi_a^+ \tag{7.7.1}$$

2. *Extending into the third horizon, the mass acquisition (3.12.6) is proportional to $m\omega/\hbar$ during the potential breaking, spontaneously:*

$$\Phi_n^+ \mapsto \varphi_b^+ - \sqrt{\lambda_0}D^\nu\varphi_c^+/m^+ , \quad \Phi_n^- \mapsto \phi_a^- + \sqrt{\lambda_0}D_\nu\phi_b^-/m^- \tag{7.7.2}$$

Therefore, the potentials (4.4.3) of the SU(1) actions result in a form of Lagrangian forces at SU(2):

$$\mathscr{L}_{Force}^{SU1} \mapsto \mathscr{L}_{ST}^{SU2} \ \rightarrow \ \Phi_n^+\Phi_n^- \mapsto \lambda_0 D^\nu\varphi_b^+ D_\nu\phi_a^- - m^+m^-\varphi_c^+\phi_b^- \tag{7.7.3}$$

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

$$\mathscr{L}_{ST}^{SU3} = \kappa_f\Big(\lambda_0(\partial^\nu\varphi_b^+)(\partial_\nu\phi_a^-) - m^+m^-\phi_{bc}^2 + \lambda_2\phi_{bc}^2\phi_{ca}^2\Big) \tag{7.7.4}$$

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

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

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

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

$$\mathscr{L}_{Force}^{SU3} = \mathscr{L}_{QCD}(\chi) + \mathscr{L}_{ST}^{SU3} + \mathscr{L}_C(\chi) + \mathscr{L}_M(\chi) \qquad (7.7.5)$$

$$\mathscr{L}_C(\chi) = \frac{e}{2\hbar}\left\langle \chi_\nu A_\nu \chi^\mu F_{\mu\nu}^+, \chi^\mu A^\mu \chi_\nu F_{\nu\mu}^- \right\rangle_{jk}^- \qquad (7.7.6)$$

$$\mathscr{L}_M(\chi) = \frac{i}{2}\left[\partial^\nu(\chi_\nu F_{\nu\mu}^-), \partial_\mu(\chi^\mu F_{\mu\nu}^+)\right]_{jk}^- - \frac{1}{4}\left(\chi^\nu F_{\nu\mu}^+\right)_j \left(\chi_\mu F_{\mu\nu}^-\right)_k \qquad (7.7.7)$$

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

8. Ontological Evolutions

For entanglement between Y^-Y^+ manifolds, considering the parallel transport of a *Scalar* density of the fields ρ $=\psi^+\psi^-$ around an infinitesimal parallelogram. The chain of these reactions can be interpreted by the commutation framework integrated with the gauge potential or *Physical Ontology*. At the third horizon for asymmetric dynamics, the ontological expressions (6.4.1-2) have the gauge derivatives:

$$\check{\partial}_\lambda\check{\partial}_\lambda\psi^- = \dot{x}_m\left(D_m - \Gamma^{-s}_{nm}\right)\dot{x}_s D_s\psi^- \qquad : D_\nu = \partial_\nu + i\Theta_\nu \tag{7.8.1}$$

$$\hat{\partial}^\lambda\hat{\partial}^\lambda\psi^+ = \dot{x}^\nu\left(D^\nu - \Gamma^{+\sigma}_{m\nu}\right)\dot{x}^\sigma D^\sigma\psi^+ \qquad : D^\nu = \partial^\nu - i\Theta^\nu \tag{7.8.2}$$

where the Y^- and Y^+ superphase fields are defined by:

$$\Theta^\nu = \frac{e}{\hbar}A^\nu, \qquad \Theta_\nu = \frac{e}{\hbar}A_\nu \tag{7.8.3}$$

Similar to derive the equation (6.5.1), this gauge entanglement consists of a set of the unique fields, illustrated by the evolutionary components of the entangling commutators:

$$\left[\hat{\partial}^\lambda\hat{\partial}^\lambda, \check{\partial}_\lambda\check{\partial}_\lambda\right]^+_v = \dot{x}^\nu\dot{x}^m\left(P^+_{\nu\mu} + G^{+\sigma s}_{m\nu} + \Theta^{+\sigma s}_{\nu m}\right) \tag{7.8.4}$$

$$P^+_{\nu\mu} \equiv \frac{1}{\dot{x}^\nu\dot{x}^m}\left[(\dot{x}^\nu\partial^\nu)(\dot{x}^m\partial^m), (\dot{x}_\nu\partial_\nu)(\dot{x}_m\partial_m)\right]^+_s = \frac{R}{2}g^{\nu m} \tag{7.8.5}$$

$$G^{\pm\sigma s}_{m\nu} = \mp\frac{1}{\dot{x}^\nu\dot{x}^m}\left[\dot{x}^\nu\Gamma^{+\sigma}_{m\nu}\dot{x}^\sigma\partial^\sigma, \dot{x}_m\Gamma^{-s}_{nm}\dot{x}_s\partial_s\right]^\pm_s \tag{7.8.6}$$

$$\Theta^{\pm\sigma s}_{\nu m} = i\Xi^\pm_{\nu m} + i\frac{e}{\hbar}F^\pm_{\nu m} - i\eth^{\pm s\sigma}_{m\nu} - ⓢ^\pm_{\nu m} \tag{7.8.7}$$

$$\Xi^\pm_{\nu m} = \mp\frac{1}{\dot{x}^\nu\dot{x}^m}\left[\dot{x}^\nu\Theta^\nu\dot{x}^m\partial^m, \dot{x}_m\Theta_m\dot{x}_\nu\partial_\nu\right]^\pm_s \tag{7.8.8}$$

$$F_{\nu m}^{\pm} = \pm \frac{\hbar}{e} \frac{1}{\dot{x}^{\nu} \dot{x}^{m}} \left[\dot{x}^{\nu} \partial^{\nu} (\dot{x}^{m} \Theta^{m}), \dot{x}_{m} \partial_{m} (\dot{x}_{\nu} \Theta_{\nu}) \right]_{s}^{\pm} \tag{7.8.9}$$

$$ð_{m\nu}^{\pm s\sigma} = \pm \frac{1}{\dot{x}^{\nu} \dot{x}^{m}} \left[\dot{x}^{m} \overset{+}{\Gamma}{}_{\nu m}^{\sigma} \dot{x}^{\sigma} \Theta^{\sigma}, \dot{x}_{m} \overset{-}{\Gamma}{}_{m\nu}^{s} \dot{x}_{s} \Theta_{s} \right]_{s}^{\pm} \tag{7.8.10}$$

$$Ⓢ_{\nu m}^{\pm} = \pm \frac{1}{\dot{x}^{\nu} \dot{x}^{m}} \left[\dot{x}^{\nu} \Theta^{\nu} \dot{x}^{m} \Theta^{m}, \dot{x}_{m} \Theta_{m} \dot{x}_{\nu} \Theta_{\nu} \right]_{s}^{\pm} \tag{7.8.11}$$

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

Similar to derive the equations (6.9.5-6), the above motion dynamics of the field evolutions can be expressed straightforwardly for the asymmetric dynamics of quantum ontology,

$$\frac{R}{2} g_{\nu m} + G_{\nu m}^{-\sigma s} + \Theta_{\nu m}^{-\sigma s} = \mathcal{O}_{m\nu}^{+\zeta} \tag{7.8.12}$$

$$\frac{R}{2} g^{\nu m} + G_{\nu m}^{+\sigma s} + \Theta_{\nu m}^{+\sigma s} = \mathcal{O}_{m\nu}^{-\zeta} \tag{7.8.13}$$

where $\mathcal{O}_{\nu m}^{\pm\sigma}$ is the Y^{+} or Y^{-} ontological modulators, given by (6.9.7-8). The notion of quantum evolutionary equations is intimately tied in with another aspect of general relativistic physics. Each solution of the equation encompasses the whole history of the superphase modulations at both dark-filled and matter-filled reality. It describes the state of matter and geometry everywhere at every moment of that particular universe. Due to its general covariance combined with the gauge fixing, this *Evolutionary Field Equation* is sufficient by itself to determine the time evolution of the metric tensor and of the universe over time. This is done in "1+1+2" formulations, where the world plane of one time-dimension and one spatial-dimension is split into the extra space dimensions during horizon evolutions. The best-known example is the classic ADM formalism, the decompositions of which show that the evolutionary spacetime equations of general relativity are well-behaved: solutions always exist, and are uniquely defined, once suitable initial conditions have been specified.

Since the ordinary quantum fields forms the basis of elementary particle physics, the *Ontological Evolution* is an excellent artifact describing the behaviors of microscopic particles in weak gravitational fields like those found on *Earth*. Quantum fields in curved spacetime demonstrate its evolutionary 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 dark area fluxion (4.4.4) 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 graviton. As briefly mentioned above, this radiation plays an important role for the thermodynamics of blackholes.

9. Conclusions

Further in answering to modern and contemporary physics, this universal and unified field theory demonstrates its holistic foundations extendable and applicable to the well-known natural intrinsics of the evolutionary processes at the following remarks:

1. *As the foundation of particle physics, the process of Double Loops of Triple Entanglements is introduced that constitutes the horizon forces of Implicit Evolution and Explicit Reproduction with Gauge Invariance.*
2. *It reveals the laws of the symmetric processes of virtual creations and physical reproductions that give rise to a synergy of the weak, strong and medium forces crossing the horizon regimes, systematically, simultaneously and symmetrically.*
3. *The theory is further illustrated by the artifacts of Yang-Mills actions, Quantum Chromodynamics and the weak and strong forces of the Standard Model.*
4. *General infrastructure of Field Evolutions is derived and unified by a set of generic field equations in the forms of Lagrangians (7.2.10-13) rising from the Universal Fields (2.8.10, 2.8.21).*
5. *Finally, Quantum Ontology integrates general relativity, quantum curvature, and gravitational fields seamlessly together.*

Conclusively, this manuscript represents the *Universal and Unified Physics* as a holistic theory to include, but not be limited to, the topological infrastructure, horizon framework, superphase operations, loop evolutions, quantum ontology, cosmological dynamics, and beyond.

Essential Highlights

CHAPTER 8

Nature is systematically composed of building blocks, dualities, which take on an abstract form as simple as Yin and Yang, and as sophisticated as Virtual and Physical existence. Everywhere our world shines with a beautiful nature. In every fraction of every creature, we shall find the principles and laws of physics, biology, metaphysics, information technology, and all other sciences. Our ancestors discovered that duality orchestrated and harmonized their reality since 5000 years ago. This outlines our missions as our human development in this universal and unified field theory:

1. *Unified Fields - superseding and imposing an integrity of all empirical models of relativity, quantum, light, electromagnetism, graviton, gravitation, thermodynamics, cosmology, and others.*
2. *Universal Theory - evolving and prevailing a generality of all ubiquitous laws of topology, event, duality, horizon, conservation, continuity, symmetry, asymmetry, entanglement, and beyond.*

Visualized in the highlights, this chapter collects the essential functions as the overview comparison among classical, modern and universal field theories.

Universal and Unified Fields (I) - Topology

Category	Classical and Contemporary Physics		Universal and Unified Field Theory		
Contents	Description	Formulations	Elevations	Formulations	References
Manifold Topology	*Minkowski Spacetime*	$\{\mathbf{r}-\mathbf{k}\}$ $\mathbf{k}=\begin{cases}x_0=-ct\\x_0=ct\end{cases}$	*Dual Manifolds*	$w^+=r-ik=Re^{i\Omega}$ $\{\mathbf{r}\pm i\mathbf{k}\}$ $k=ic\lambda$ $w^-=r+ik=Re^{-i\Omega}$ $R\sin\Omega=ic\lambda$	Eq. (1.6.1) Eq. (1.6.2)
Scalar Fields	*A Pair of Scalar Fields*	ϕ,ϕ^*	*Two Pairs of Scalar Fields*	$\psi^+=\psi^+(\hat{x})\,exp[i\hat{\vartheta}(\lambda)]$ $\psi^+=\{\phi^+,\varphi^+\}$ $\psi^-=\psi^-(\check{x})\,exp[i\check{\vartheta}(\lambda)]$ $\psi^-=\{\phi^-,\varphi^-\}$	Eq. (1.7.1) Eq. (1.7.2)
Math Framework	*Math Operators*	$\partial_m\in\{\partial_x=\partial/\partial x_0,\partial_r=\nabla\}$	*(Boost and Torque)*	$\hat{\partial}^\lambda\psi=\dot{x}^\mu X^{\nu\mu}(\partial^\nu-i\Theta^\mu(\lambda))\psi$ $X^{\nu\mu}=S_2^++R_2^+$ $\check{\partial}_\lambda\psi=\dot{x}_m X_{nm}(\partial_n+i\Theta_m(\lambda))\psi$ $X_{nm}=S_2^-+R_2^-$	Eq. (2.6.2) Eq. (2.6.3)
Scalar Transformation	*N/A*		*Event Operations*	$\hat{\partial}_\lambda\psi=\dot{x}_a X^\nu{}_a(\partial^\nu-i\Theta^\nu(\lambda))\psi$ $X_m{}^a=S_1^-+R_1^-$ $\check{\partial}^\lambda\psi=\dot{x}^a X_m{}^a(\partial_m+i\Theta_m(\lambda))\psi$ $X^\nu{}_a=S_1^++R_1^+$	Eq. (2.6.5) Eq. (2.6.6)
Entangle Generators	*N/A*		*Boost /Torque Generators*	$S_2^+=\frac{\partial x^\nu}{\partial x^\mu}$ $S_2^-=\frac{\partial x_n}{\partial x_m}$ $S_1^+=\frac{\partial x^\nu}{\partial x_a}$ $S_1^-=\frac{\partial x_m}{\partial x^a}$ $R_2^+=x^\mu\Gamma^+_{\nu\mu a}$ $R_2^-=x_m\Gamma^-_{nma}$ $R_1^+=x^\mu\Gamma^{+\nu}_{\mu a}$ $R_1^-=x_s\Gamma^{-m}_{sa}$	Eq. (2.6.2)- Eq. (2.6.6)
Event Operations	*Loop Events*		*Yin Yang Operations*	$W^+:(\hat{\partial}^{\lambda_1}\to\hat{\partial}_{\lambda_2}),(\check{\partial}^{\lambda_2}\to\check{\partial}_{\lambda_3})$ $W^-:(\check{\partial}_{\lambda_1}\to\check{\partial}^{\lambda_2}),(\hat{\partial}^{\lambda_2}\to\hat{\partial}_{\lambda_3})$	Fig. 2.6 Eq. (2.6.1)
Motion Operation	*Euler-Lagrange Equation*	$\frac{\partial\mathscr{L}}{\partial f_i}-\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{\partial\mathscr{L}}{\partial f_i'}\right)=0,$	*Dual Motion Entanglements*	$\check{\partial}^-(\frac{\partial W}{\partial(\hat{\partial}^+\phi)})-\frac{\partial W}{\partial\phi}=0$ $\hat{\partial}^+(\frac{\partial W}{\partial(\check{\partial}^-\phi)})-\frac{\partial W}{\partial\phi}=0$	Eq. (2.5.1) Eq. (2.5.2)
Event Evolutions	*N/A*		*Event Sequence*	$f(\lambda)=f(\lambda_0)+f'(\lambda_0)(\lambda-\lambda_0)\cdots+f^n(\lambda_0)(\lambda-\lambda_0)^n/n!$	Eq. (1.8.1)
Generic Equations	*Lagrangians*	$\mathscr{L}(\varphi,\nabla\varphi,\partial\varphi/\partial t,\mathbf{x},t)$	*World Equations*	$\hat{W}_n=\psi_n^+(\lambda,\hat{x})\psi_n^-(\lambda,\check{x})$ $\psi_n^\mp(\lambda,x)=(1\pm\tilde{\kappa}_1\partial_{\lambda_1}\pm\tilde{\kappa}_2\partial_{\lambda_2}\partial_{\lambda_1}\cdots)\psi_n^\mp(\lambda,x)\vert_{\lambda=\lambda_0}$	Eq. (2.4.1) Eq. (2.4.2)
First Universal Fields (Yang)	*N/A*			$\kappa_1\left(\check{\partial}^{\lambda_2}-\hat{\partial}_{\lambda_2}\right)\phi_n^++\kappa_2\left(\check{\partial}_{\lambda_3}\check{\partial}^{\lambda_2}+\hat{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2}-\check{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2}\right)\phi_n^+=W_n^+\phi_n^+$	Eq. (1.8.10a)
	N/A			$\kappa_1\left(\check{\partial}_{\lambda_1}-\hat{\partial}^{\lambda_1}\right)\varphi_n^++\kappa_2\left(\check{\partial}^{\lambda_2}\check{\partial}_{\lambda_1}+\hat{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1}-\check{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1}\right)\varphi_n^+=W_n^+\varphi_n^+$	Eq. (2.8.21a)
First Universal Fields (Yin)	*N/A*			$\kappa_1\left(\hat{\partial}^{\lambda_1}-\check{\partial}_{\lambda_1}\right)\phi_n^-+\kappa_2\left(\hat{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1}+\check{\partial}^{\lambda_2}\check{\partial}_{\lambda_1}-\hat{\partial}^{\lambda_2}\check{\partial}_{\lambda_1}\right)\phi_n^-=W_n^-\phi_n^-$	Eq. (2.8.21b)
	N/A			$\kappa_1\left(\hat{\partial}_{\lambda_2}-\check{\partial}^{\lambda_2}\right)\varphi_n^-+\kappa_2\left(\hat{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2}+\check{\partial}_{\lambda_3}\check{\partial}^{\lambda_2}-\hat{\partial}_{\lambda_3}\check{\partial}^{\lambda_2}\right)\varphi_n^-=W_n^-\varphi_n^-$	Eq. (1.8.10b)

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Universal and Unified Fields (II) – Quantum Fields

Category	Classical and Contemporary Physics		Universal and Unified Field Theory		
Contents	Description	Formulations	Elevations	Formulations	References
General Quantum Equations (First Universal Field Equations)	*Operators*	$\hat{\mathbf{p}} = -i\hbar\nabla \quad \hat{E} = i\hbar\partial/\partial t$		$\frac{-\hbar^2}{2E_n^+}\hat{\partial}_\lambda\hat{\partial}_\lambda\phi_n^+ - \frac{\hbar}{2}\left(\hat{\partial}_\lambda - \check{\partial}^\lambda\right)\phi_n^+ + \frac{\hbar^2}{2E_n^+}\check{\partial}_\lambda\left(\hat{\partial}_\lambda - \check{\partial}^\lambda\right)\phi_n^+ = \frac{W_n^+}{c^2}\phi_n^+$	Eq. (3.6.1)
	N/A			$\frac{\hbar^2}{2E_n^-}\check{\partial}^\lambda\check{\partial}^\lambda\varphi_n^- - \frac{\hbar}{2}\left(\check{\partial}^\lambda - \hat{\partial}_\lambda\right)\varphi_n^- + \frac{\hbar^2}{2E_n^-}\left(\check{\partial}_\lambda - \hat{\partial}_\lambda\right)\check{\partial}^\lambda\varphi_n^- = \frac{W_n^-}{c^2}\varphi_n^-$	Eq. (3.6.2)
	N/A			$\frac{\hbar^2}{2E_n^-}\check{\partial}^\lambda\check{\partial}_\lambda\phi_n^- - \frac{\hbar}{2}\left(1 + \frac{\hbar}{E_n^-}\hat{\partial}^\lambda\right)\left(\check{\partial}_\lambda - \hat{\partial}^\lambda\right)\phi_n^- = \frac{W_n^-}{c^2}\phi_n^-$	Eq. (3.6.4)
	N/A			$\frac{-\hbar^2}{2E_n^+}\hat{\partial}^\lambda\hat{\partial}^\lambda\varphi_n^+ - \frac{\hbar}{2}\left(1 - \frac{\hbar}{E_n^+}\check{\partial}^\lambda\right)\left(\hat{\partial}^\lambda - \check{\partial}_\lambda\right)\varphi_n^+ = \frac{W_n^+}{c^2}\varphi_n^+$	Eq. (3.6.5)
Dynamic Equations	*Lagrangians*	$\mathscr{L}(\varphi, \nabla\varphi, \partial\varphi/\partial t, \mathbf{x}, t)$	*Yin Yang Lagrangians*	$\check{\mathscr{L}}_L^\pm = -\frac{1}{c^2}\left[\hat{\partial}^\lambda\check{\partial}^\lambda, \check{\partial}_\lambda\check{\partial}_\lambda\right]_x^\pm$ $\check{\mathscr{L}}_I^\pm = -\frac{1}{c^2}\left[\hat{\partial}_\lambda\hat{\partial}_\lambda, \check{\partial}^\lambda\check{\partial}^\lambda\right]_x^\pm$	Eq. (2.2.7) Eq. (2.2.8)
Mass Energy	*Einstein Equation*	$E = mc^2$	*Virtual Duality*	$E_n^\mp = \pm imc^2$	Eq. (1.4.1)
Generators	*N/A*		*Boost*	$\iota_v = \left[\begin{pmatrix}1 & 0\\0 & 1\end{pmatrix}_0, \begin{pmatrix}0 & 1\\1 & 0\end{pmatrix}_1, \begin{pmatrix}0 & -1\\1 & 0\end{pmatrix}_2, \begin{pmatrix}-1 & 0\\0 & 1\end{pmatrix}_3\right]$	Eq. (3.2.5)
	N/A		*Spiral*	$\varsigma_v = \left[\begin{pmatrix}0 & 1\\1 & 0\end{pmatrix}_0, \begin{pmatrix}0 & 0\\0 & -1\end{pmatrix}_1, \begin{pmatrix}0 & 0\\0 & 1\end{pmatrix}_2, \frac{1}{r^2}\begin{pmatrix}0 & 1\\1 & 0\end{pmatrix}_3\right]$	Eq. (3.3.7)
	Pauli Matrix	$\sigma_v = \left[\begin{pmatrix}1 & 0\\0 & 1\end{pmatrix}_0, \begin{pmatrix}0 & 1\\1 & 0\end{pmatrix}_1, \begin{pmatrix}0 & -i\\i & 0\end{pmatrix}_2, \begin{pmatrix}1 & 0\\0 & -1\end{pmatrix}_3\right]$		*Derived the Same*	Eq. (3.2.7)
Relativistic Wave Equation	*Dirac Equation*	$(i\hbar\gamma^\nu\partial^\nu - mc)\varphi_n^- = 0$	*Generator Fields*	$\frac{\hbar}{2}\left(\dot{x}_\nu\zeta_\mu D_\nu - \dot{x}^\mu\zeta^\mu D^\mu\right)\psi_n^\pm \mp E_n^\pm\psi_n^\pm = 0$	Eq. (3.8.1)
Spinor Fields	*Pauli Equation*	$i\hbar\frac{\partial}{\partial t}\lvert\psi\rangle = \left\{\frac{1}{2m}(\mathbf{p} - e\mathbf{A})^2 - \frac{e\hbar}{2m}\boldsymbol{\sigma}\cdot\mathbf{B} + \hat{V}\right\}\lvert\psi\rangle \equiv \hat{H}\lvert\psi\rangle$	*Spinor Fields*	*Derived the Same*	Eq. (3.10.6)
Wave-Practical Equation	*Schrödinger Equation*	$i\hbar\frac{\partial\psi_n}{\partial t} = \hat{H}\psi_n \quad \hat{H} \equiv -\frac{\hbar^2}{2m}\nabla^2 + \hat{V}(\mathbf{r})$	*Yin Interaction*	*Derived the Same*	Eq. (3.9.4)
Energy-Momentum	*Klein–Gordon*	$\frac{1}{c^2}\frac{\partial^2\phi_n}{\partial t^2} - \nabla^2\phi_n + \left(\frac{mc}{\hbar}\right)^2\phi_n = 0$	*Yin Yang Propagation*	$-\frac{1}{c^2}\frac{\partial^2\Phi_n^-}{\partial t^2} + \nabla^2\Phi_n^- = 4\frac{E_n^- E_n^+}{(\hbar c)^2}\Phi_n^-$	Eq. (4.4.3)
Mass Acquisition	*N/A*		*YinYang Density*	$\phi_0^- = 2\left(\frac{m\omega}{\pi\hbar}\right)^{3/4} e^{-\frac{m\omega}{2\hbar}r_i^2} \quad \varphi_0^+ = \left(\frac{m\omega}{\pi\hbar}\right)^{1/4} e^{-\frac{m\omega r^2}{2\hbar}}$	Eq. (3.12.7)
Speed of Energy	*Light*	c	*Photon Graviton*	$C_{rr}^\pm = ce^{\mp i\vartheta} \quad G_{\nu\varphi}^- = c_g\begin{pmatrix}0 & 1\\1 & 0\end{pmatrix}e^{i\vartheta}$	Eq. (3.14.4) Eq. (3.15.4)

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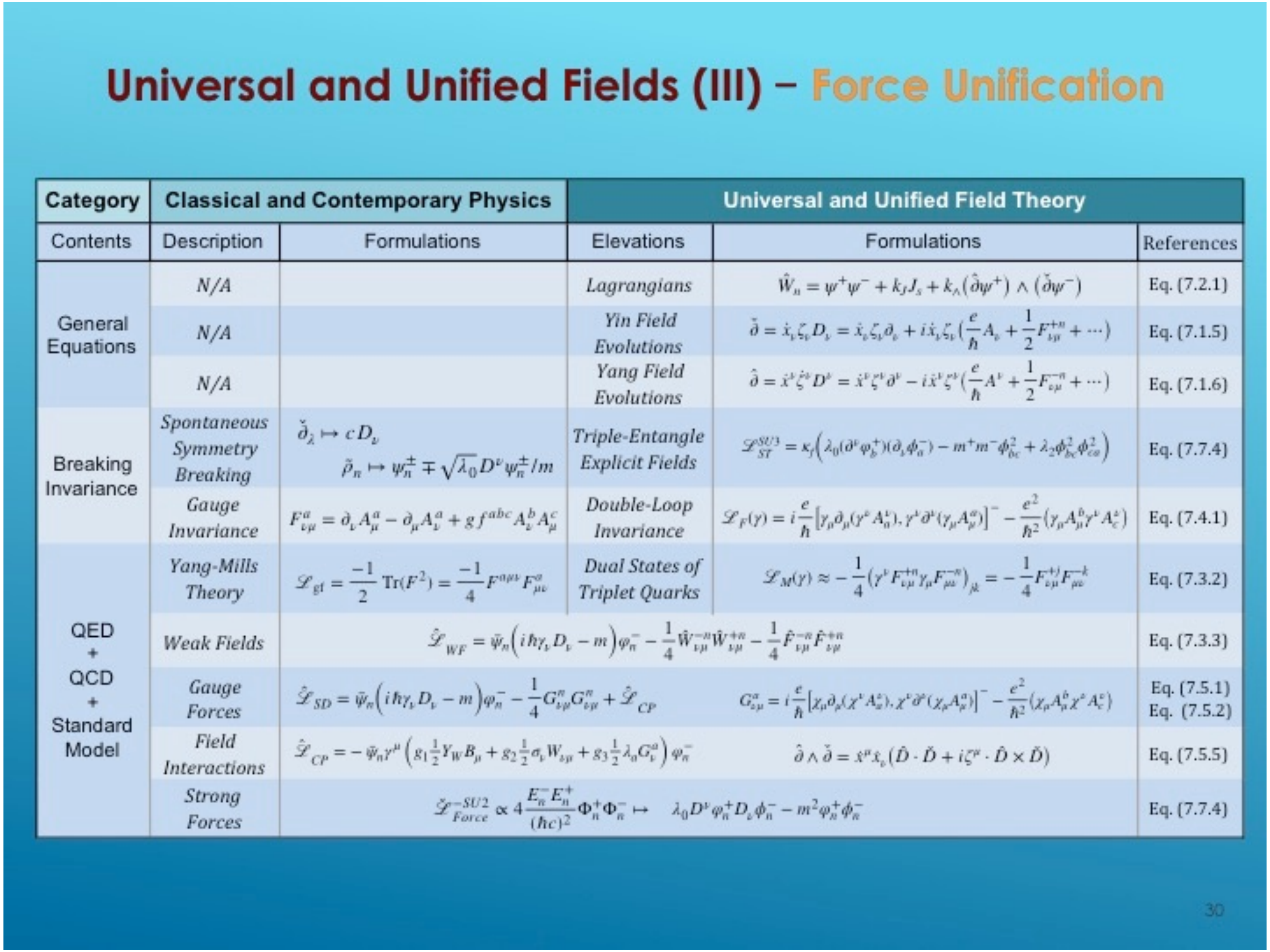

Universal and Unified Fields (III) – Force Unification

Category	Classical and Contemporary Physics		Universal and Unified Field Theory		
Contents	Description	Formulations	Elevations	Formulations	References
General Equations	*N/A*		*Lagrangians*	$\hat{W}_n = \psi^+\psi^- + k_J J_s + k_\wedge(\hat{\partial}\psi^+) \wedge (\check{\partial}\psi^-)$	Eq. (7.2.1)
	N/A		*Yin Field Evolutions*	$\check{\partial} = \dot{x}_\nu \zeta_\nu D_\nu = \dot{x}_\nu \zeta_\nu \partial_\nu + i\dot{x}_\nu \zeta_\nu (\frac{e}{\hbar} A_\nu + \frac{1}{2} F^{+n}_{\nu\mu} + \cdots)$	Eq. (7.1.5)
	N/A		*Yang Field Evolutions*	$\hat{\partial} = \dot{x}^\nu \dot{\zeta}^\nu D^\nu = \dot{x}^\nu \zeta^\nu \partial^\nu - i\dot{x}^\nu \zeta^\nu (\frac{e}{\hbar} A^\nu + \frac{1}{2} F^{-n}_{\upsilon\mu} + \cdots)$	Eq. (7.1.6)
Breaking Invariance	*Spontaneous Symmetry Breaking*	$\check{\partial}_\lambda \mapsto cD_\nu$ $\tilde{\rho}_n \mapsto \psi_n^\pm \mp \sqrt{\lambda_0} D^\nu \psi_n^\pm / m$	*Triple-Entangle Explicit Fields*	$\mathscr{L}^{SU3}_{ST} = \kappa_f\left(\lambda_0(\partial^\nu \varphi_b^+)(\partial_\nu \phi_a^-) - m^+ m^- \phi_{bc}^2 + \lambda_2 \phi_{bc}^2 \phi_{ca}^2\right)$	Eq. (7.7.4)
	Gauge Invariance	$F^a_{\upsilon\mu} = \partial_\nu A^a_\mu - \partial_\mu A^a_\nu + g f^{abc} A^b_\nu A^c_\mu$	*Double-Loop Invariance*	$\mathscr{L}_F(\gamma) = i\frac{e}{\hbar}\left[\gamma_\mu \partial_\mu(\gamma^\nu A^\nu_a), \gamma^\nu \partial^\nu(\gamma_\mu A^a_\mu)\right]^- - \frac{e^2}{\hbar^2}(\gamma_\mu A^b_\mu \gamma^\nu A^\nu_c)$	Eq. (7.4.1)
QED + QCD + Standard Model	*Yang-Mills Theory*	$\mathscr{L}_{gl} = \frac{-1}{2}\mathrm{Tr}(F^2) = \frac{-1}{4} F^{a\mu\nu} F^a_{\mu\nu}$	*Dual States of Triplet Quarks*	$\mathscr{L}_M(\gamma) \approx -\frac{1}{4}(\gamma^\nu F^{+n}_{\upsilon\mu} \gamma_\mu F^{-n}_{\mu\upsilon})_{jk} = -\frac{1}{4} F^{+j}_{\upsilon\mu} F^{-k}_{\mu\upsilon}$	Eq. (7.3.2)
	Weak Fields	$\hat{\mathscr{L}}_{WF} = \bar{\psi}_n\left(i\hbar\gamma_\nu D_\nu - m\right)\varphi_n^- - \frac{1}{4}\hat{W}^{-n}_{\upsilon\mu}\hat{W}^{+n}_{\upsilon\mu} - \frac{1}{4}\hat{F}^{-n}_{\upsilon\mu}\hat{F}^{+n}_{\upsilon\mu}$			Eq. (7.3.3)
	Gauge Forces	$\hat{\mathscr{L}}_{SD} = \bar{\psi}_n\left(i\hbar\gamma_\nu D_\nu - m\right)\varphi_n^- - \frac{1}{4} G^n_{\upsilon\mu} G^n_{\upsilon\mu} + \hat{\mathscr{L}}_{CP}$		$G^a_{\upsilon\mu} = i\frac{e}{\hbar}\left[\chi_\mu \partial_\mu(\chi^\nu A^\nu_a), \chi^\nu \partial^\nu(\chi_\mu A^a_\mu)\right]^- - \frac{e^2}{\hbar^2}(\chi_\mu A^b_\mu \chi^\nu A^\nu_c)$	Eq. (7.5.1) Eq. (7.5.2)
	Field Interactions	$\hat{\mathscr{L}}_{CP} = -\bar{\psi}_n \gamma^\mu\left(g_1 \frac{1}{2} Y_W B_\mu + g_2 \frac{1}{2} \sigma_\nu W_{\upsilon\mu} + g_3 \frac{1}{2} \lambda_a G^a_\nu\right)\varphi_n^-$		$\hat{\partial} \wedge \check{\partial} = \dot{x}^\mu \dot{x}_\nu (\hat{D} \cdot \check{D} + i\zeta^\mu \cdot \hat{D} \times \check{D})$	Eq. (7.5.5)
	Strong Forces	$\check{\mathscr{L}}^{-SU2}_{Force} \propto 4\frac{E_n^- E_n^+}{(\hbar c)^2} \Phi_n^+ \Phi_n^- \mapsto \quad \lambda_0 D^\nu \varphi_n^+ D_\nu \phi_n^- - m^2 \varphi_n^+ \phi_n^-$			Eq. (7.7.4)

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Universal and Unified Fields (IV) – Electromagnetism

Category	Classical and Contemporary Physics		Universal and Unified Field Theory		
Contents	Description	Formulations	Elevations	Formulations	References
Electromagnetic Fields	*Continuity*	$c\partial_\nu F^{\nu\mu} = j^\mu$ $j^\mu = ec\bar{\phi}\gamma^\mu\partial_\nu\varphi$	*Yin Continuity*	$-\frac{\hbar c}{2E^+}\langle\check{\partial}_\lambda(\check{\partial}_\lambda - \check{\partial}^\lambda)\rangle_\nu^+ = c\check{\partial}_\lambda \mathbf{F}^+$	Eq. (10.2)
	Lorenz Gauge	$-\frac{1}{c^2}\frac{\partial^2 A_\nu^+}{\partial t^2} + \nabla^2 A_\nu^+ = \frac{e}{c}\bar{\phi}_n\gamma^\nu\hat{\partial}^\lambda\varphi_n^-$	*Conservation of Yang Fluxion*	$\check{\partial}_\lambda\hat{\partial}^\lambda A_\nu^+ = \check{\partial}_\lambda\hat{F}_{\nu\mu}^{-n}$	Eq. (10.13)
	Magnetic Flux	$\nabla\cdot\mathbf{B}_q = 0$	*Yin Continuity*	$(\mathbf{u}\nabla)\cdot\mathbf{B}_q^- = 0$	Eq. (5.5.8)
	Farads's Law	$\nabla\times\mathbf{E}_q + \frac{\partial\mathbf{B}_q}{\partial t} = 0$		$\frac{\partial\mathbf{B}_q^-}{\partial t} + \left(\frac{\mathbf{u}}{c}\nabla\right)\times\mathbf{E}_q^- = 0$	Eq. (5.5.9)
	Electric Flux	$\nabla\cdot\mathbf{D}_q = \rho_q$	*Yang Continuity*	$(\mathbf{u}\nabla)\cdot\mathbf{D}_q^+ = \mathbf{u}\rho_q$	Eq. (5.5.10)
	Ampère's Circuital Law	$\nabla\times\mathbf{H}_q - \frac{\partial\mathbf{D}_q}{\partial t} = \mathbf{J}_q$		$\frac{\mathbf{u}\cdot\mathbf{u}}{c^2}\nabla\times\mathbf{H}_q^+ - \frac{\partial\mathbf{D}_q^+}{\partial t} = \mathbf{J}_q + \mathbf{H}_q^+\cdot\left(\frac{\mathbf{u}}{c}\nabla\right)\times\frac{\mathbf{u}}{c}$	Eq. (5.5.11)
	Lorentz Force	$\mathbf{F}_q = Q\left(\mathbf{E}_q^- + \mathbf{u}_q\times\mathbf{B}_q^-\right)$	*Yin Fluxion Force*	*Derived the Same*	Eq. (5.4.7)
Photon	*Planck's Law*	$S_A(\omega_c, T) = \left(\frac{\omega_c^2}{4\pi^3 c^2}\right)$	*Area Entropy*	$S_A(\omega_c, T) = \eta_c\left(\frac{\omega_c}{c}\right)^2 \mapsto 4\frac{E_c^- E_c^+}{(\hbar c)^2}$	Eq. (4.6.2)
	Planck and Einstein Relations	$E = mc^2 \rightleftharpoons \hbar\omega$	*Dual States of Triplet Quacks*	$E_c^\pm = \mp i\frac{1}{2}\hbar\omega_c \qquad \eta_c = \pi^{-3} \approx 33\,\%$	Eq. (4.6.5)
Conservation of Light	*Constant Speed*	c	*YinYang Boost Entanglements*	*Law of Conservation of Light*	Ch 4, Sec 7

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Universal and Unified Fields (V) – Gravitation

Category	Classical and Contemporary Physics		Universal and Unified Field Theory		
Contents	Description	Formulations	Elevations	Formulations	References
Weak Fields	*Lorentz's Theory (LITG)*	$\nabla \cdot \mathbf{\Omega} = 0$	*Conservation of Yin Fluxion*	$\left(\mathbf{u}_g \nabla\right) \cdot \mathbf{B}_g^- = 0$	Eq. (5.7.1)
		$\frac{\partial \mathbf{\Omega}}{\partial t} + \nabla \times \mathbf{\Gamma} = 0$		$\frac{\partial}{\partial t}\mathbf{B}_g^- + \left(\frac{\mathbf{u}_g}{c_g}\nabla\right) \times \mathbf{E}_g^- = 0$	Eq. (5.7.2)
		$\nabla \cdot \mathbf{\Gamma} = -4\pi G\rho$	*Conservation of Yang Fluxion*	$\mathbf{u}_g \nabla \cdot \mathbf{D}_g^+ = -4\pi G \mathbf{u}_g \rho_g$	Eq. (5.7.3)
		$\nabla \times \mathbf{\Omega} = \frac{1}{c_g^2}\left(-4\pi G\mathbf{J} + \frac{\partial \mathbf{\Gamma}}{\partial t}\right)$		$\frac{\mathbf{u}_g \cdot \mathbf{u}_g}{c^2}\nabla \times \mathbf{H}_g^+ - \left(\frac{c_g}{c}\right)^2 \frac{\partial \mathbf{D}_g^+}{\partial t} = -4\pi G\mathbf{J}_g + \mathbf{H}_g^+ \cdot \left(\frac{\mathbf{u}_g}{c}\nabla\right) \times \frac{\mathbf{u}_g}{c}$	Eq. (5.7.4)
Gravitational Force	*Lorentz's Theory (LITG)*	$\mathbf{F}_m = m\left(\mathbf{\Gamma} + \mathbf{v}_m \times \mathbf{\Omega}\right)$	*Yin Fluxion Force*	$\mathbf{F}_g = M\mu_g\left(c_g^2\mathbf{D}_g^+ + \mathbf{u}_g \times \mathbf{H}_g^+\right) = M\left(\mathbf{E}_g^- + \mathbf{u}_g \times \mathbf{B}_g^-\right)$	Eq. (5.4.8)
Continuity of Gravitation	*N/A*		*Conservation of YinYan Fluxion*	$-\frac{1}{c_g^2}\frac{\partial^2 \Phi_g^-}{\partial t^2} + \nabla^2 \Phi_g^- = 4\frac{E_g^- E_g^+}{(\hbar c_g)^2}\Phi_g^-$	Eq (4.4.3)
Black Hole Entropy	*Bekenstein-Hawking*	$S_A(\omega_g, T) = 4\left(\frac{c_g^3}{4\hbar G}\right)$	*YinYang Area Entanglements*	$\mathcal{S}_g = 4\frac{E_g^- E_g^+}{(\hbar c_g)^2}\Phi_g$	Eq. (4.8.1)
Graviton	*N/A*		*A pair of Gravitons*	$E_g^\pm = \mp i\frac{1}{2}E_p \qquad E_p = \sqrt{\hbar c_g^5/G}$	Eq. (4.8.3)
Conservation of Gravitation	*N/A*		*Law of Conservation*	*Law of Conservation of Gravitation*	Ch. 4 Sec. 9
Force of Gravity	*Newton's Law of Gravity*	$\mathbf{F}^- = -m\nabla\Phi_g = -mG\rho_g\frac{\mathbf{r}}{r^2}$	*Restricted Law of Conservation*	*Derived the Same*	Eq. (5.7.6)

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Universal and Unified Fields (VI) – Symmetric Fields

Category	Classical and Contemporary Physics		Universal and Unified Field Theory		
General Equations	*N/A*		*Second Universal Field Equations*	$\dot{\partial}_\lambda \mathbf{f}_v^+ = \langle W_0^+ \rangle - \kappa_1 [\breve{\partial}^{\lambda_2} - \hat{\partial}_{\lambda_2}]_v^+ + \kappa_2 \langle \breve{\partial}_{\lambda_1} (\hat{\partial}_{\lambda_2} - \breve{\partial}^{\lambda_2}) \rangle_v^+$	Eq. (5.2.2)
	N/A			$\dot{\partial}_\lambda \mathbf{f}_v^- = \langle W_0^- \rangle + \kappa_1 [\breve{\partial}_{\lambda_1} - \hat{\partial}^{\lambda_1}]_v^- + \kappa_2 \langle \breve{\partial}_{\lambda_1} (\hat{\partial}^{\lambda_2} - \breve{\partial}^{\lambda_2}) \rangle_v^-$	Eq. (5.2.3)
Symmetric Commutation	*Commutator, Anti-commutator*	$[A_1, A_2] \quad \langle A_1, A_2 \rangle$	*Commutator and Density Fluxion*	$[\ ]^\mp \qquad \langle\ \rangle^\mp$	Eq. (2.7.1)-Eq. (2.7.8)
Asymmetric Commutation	*Quantum State*	$\langle m \| \lambda \| n \rangle$	*Asymmetry & Anti-asymmetry*	$(\dot{\lambda})^\pm = \varphi_n^\mp \acute{\lambda} \phi_n^\pm \qquad \langle \dot{\lambda} \rangle^\pm = \phi_n^\pm \acute{\lambda} \varphi_n^\mp$	Eq. (2.7.6)-Eq. (2.7.8)
Field Entanglements	*The 4-potential*	$\partial_\nu D_\mu - \partial_\mu D_\nu$	*Boost Generator*	$T_{\nu\mu}^{-n}(L) = \left(L_{\nu\mu}^- \partial_\nu A_\mu - L_{\mu\nu}^+ \partial^\mu A^\nu\right)_n$	Eq. (3.11.6)
	N/A		*Torque Generator*	$\Upsilon_{\nu\mu}^{-n}(L) = \left(L_{\nu\mu}^- \partial_\nu V_\mu - L_{\mu\nu}^+ \partial^\mu V^\nu\right)_n$	Eq. (3.11.7)
General Symmetric Dynamics	*N/A*		*Boost Transform and Spiral Transport*	$\nabla \cdot \mathbf{B}_s^- = 0^+ \qquad \mathbf{B}_s^- = \mathbf{B}_q^- + \eta \mathbf{B}_g^- \qquad \eta = c_g / c$	Eq. (5.5.4)
	N/A			$\nabla \cdot \mathbf{D}_s^+ = \rho_q - 4\pi G \eta \rho_g \qquad \mathbf{D}_s^+ = \mathbf{D}_q^+ + \eta \mathbf{D}_g^+$	Eq. (5.5.5)
	N/A			$\frac{\partial \mathbf{B}_s^-}{\partial t} + \nabla \times \mathbf{E}_s^- = 0^+ \qquad \mathbf{E}_s^- = \mathbf{E}_q^- + \eta \mathbf{E}_g^-$	Eq. (5.5.6)
	N/A			$\nabla \times \left(\mathbf{H}_q^+ + \eta^2 \mathbf{H}_g^+\right) - \frac{\partial}{\partial t}\left(\mathbf{D}_q^+ + \eta^2 \mathbf{D}_g^+\right) = \mathbf{J}_q - 4\pi G \mathbf{J}_g$	Eq. (5.5.7)
	Lorentz Force	$\mathbf{F}_q^+ = Q\left(\mathbf{E}_c^- + \mathbf{u} \times \mathbf{B}_c^-\right)$	*Motion and Torque Entanglements*	*Derived the Same*	Eq. (5.4.5)
	Lorentz's Theory (LITG)	$\mathbf{F}_m = m\left(\mathbf{\Gamma} + \mathbf{v}_m \times \mathbf{\Omega}\right)$		$\mathbf{F}_g = M\mu_g \left(c_g^2 \mathbf{D}_g^+ + \mathbf{u}_g \times \mathbf{H}_g^+\right) = M\left(\mathbf{E}_g^- + \mathbf{u}_g \times \mathbf{B}_g^-\right)$	Eq. (5.4.6)
Thermo-Dynamics	*Boltzmann Distribution*	$p_n^\pm = \frac{h_n^\pm}{\sum h_m} = \frac{e^{i\beta E_n}}{Z} \quad Z \equiv \sum_m e^{i\beta E_m}$	*Horizon Factor*	$h_n^\pm = \frac{N_n^\pm}{N} = \frac{1}{e^{\pm\beta E_n^\pm} + 1}$	Eq. (4.10.7)
	Thermal Eq.	$dS = \frac{1}{T}\left(dE + PdV - \sum_n \mu_n dN_n^\pm\right)$	*Maximum Yin Supremacy*	$d\rho_E^- = Td\rho_s^- + \sum_i \mu_i d\rho_{n_i}^-$	Eq. (4.1.4)
			Minimum Yang Supremacy	$P + \rho_E^+ = T\rho_s^+ + \sum_i \mu_i \rho_{n_i}^+$	Eq. (4.1.5)
	Bloch Density Equations	$-i \frac{\partial \rho^-}{\partial \beta} = \hat{H}\rho^- \quad -h_\beta \frac{\partial^2 \rho}{\partial \beta^2} = \hat{H}\rho$	*Density of Yang Supremacy*	*Derived the Same*	Eq. (4.1.6)

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Universal and Unified Fields (VII) – Asymmetric Fields

Category	Contemporary Physics		Universal and Unified Field Theory		
General Asymmetric Equations	*N/A*		*Third Universal Field Equations*	$\mathbf{g}_a^-/\kappa_g^- = [\check{\partial}^\lambda\check{\partial}^\lambda, \hat{\partial}_\lambda\hat{\partial}_\lambda]_x^+ + \zeta^+ \quad \zeta^+ = \langle\hat{\partial}_{\lambda_2}\check{\partial}^{\lambda_2} - \hat{\partial}_{\lambda_2}\check{\partial}_{\lambda_3}\rangle^+$ $\mathbf{g}_a^+/\kappa_g^+ = [\check{\partial}_\lambda\check{\partial}_\lambda, \hat{\partial}^\lambda\hat{\partial}^\lambda]_x^- + \zeta^- \quad \zeta^- = \langle\check{\partial}^{\lambda_2}\hat{\partial}^{\lambda_1} - \hat{\partial}^{\lambda_2}\check{\partial}_{\lambda_1}\rangle^-$	Eq. (2.10.1) Eq. (2.10.2)
Scalar Commutation	*Stress Tensor*	$G^\mu_{n\nu\sigma} \equiv \Gamma^{-\mu}_{\sigma n}\partial_\nu - \Gamma^{+\mu}_{\sigma\nu}\partial_n$	*Yin Entanglement*	$[\check{\partial}_\lambda\check{\partial}_\lambda, \hat{\partial}^\lambda\hat{\partial}^\lambda]_s^- = \dot{x}_\nu\dot{x}_m\left(\frac{R}{2}g_{\nu m} + G_{\nu m}\right)$	Eq. (6.5.5) Eq. (6.5.8)
Vector Commutation	*Riemannian Ricci Tensors*	$R^\mu_{n\nu\sigma} \quad R_{n\nu} = \frac{1}{2}g_{n\nu}R$	*Yang Entanglement*	$[\hat{\partial}_\lambda\hat{\partial}_\lambda, \check{\partial}^\lambda\check{\partial}^\lambda]_v^+ = \dot{x}_n\dot{x}_\nu\left(\frac{R}{2}g_{n\nu} - R^\mu_{n\nu\sigma} + G^\mu_{n\nu\sigma} + C^{n\mu}_{\nu\sigma}\right)$	Eq. (6.6.7)
Ontology of Cosmic Fields and Modulators	*N/A*		*Yin Cosmic Fields*	$\frac{R}{2}g_{\nu m} + G^{\sigma s}_{\nu m} = \mathcal{O}^{+\sigma}_{\nu m} \quad \mathcal{O}^{+\sigma}_{\nu\mu} = \mathcal{O}^+_d - \kappa^+_o(\partial^t \;\; \mathbf{u}^+\nabla)\begin{pmatrix} 0 & \mathbf{D}^+_a \\ -\mathbf{D}^+_e & \frac{\mathbf{u}^+}{c^2}\times\mathbf{H}^+_s \end{pmatrix}$	Eq. (6.9.5) Eq. (6.9.7)
	N/A		*Yang Comic Fields*	$\bar{R}^{\nu m} + \bar{G}^{\sigma s}_{\nu m} = \mathcal{O}^{-\sigma}_{\nu m} \quad \mathcal{O}^{-\sigma}_{\nu m} = \mathcal{O}^-_d - \kappa^-_o(\partial^t \;\; \mathbf{u}^-\nabla)\begin{pmatrix} 0 & \mathbf{B}^-_a \\ -\mathbf{B}^+_a & \frac{\mathbf{b}}{c}\times\mathbf{E}^-_e \end{pmatrix}$	Eq. (6.9.6) Eq. (6.9.8)
	N/A		*Ontological Fields*	$\frac{R}{2}g_{\nu m} + G^{-\sigma s}_{\nu m} + \Theta^{-\sigma s}_{\nu m} = \mathcal{O}^{+\zeta}_{m\nu}$	Eq. (7.8.12)
(World Planes 2-Dimensions)	*N/A*		*Ontological Modulators*	$\Theta^{\pm\sigma s}_{\nu m} = i\Xi^\pm_{\nu m} + i\frac{e}{\hbar}F^\pm_{\nu m} - i\eth^{\pm s\sigma}_{m\nu} - \circledS^\pm_{\nu m}$	Eq. (7.8.7)
	N/A		*Acceleration*	$\mathbf{g}_s^-/\kappa_g^- = [\check{\partial}^\lambda\check{\partial}^\lambda, \hat{\partial}_\lambda\hat{\partial}_\lambda]_s^- - \mathbf{O}^+$	Eq. (6.11.1)
Cosmology	*General Relativity*	$R_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{R}{2}g_{\mu\nu} + G_{\mu\nu}$	*Yin Fields*	$\mathscr{R}^{-\sigma}_{\nu m s} + \Lambda^{+\sigma}_{\nu m} = \frac{R}{2}g_{\nu m} + G^{s\sigma}_{\nu m} + C^{s\sigma}_{\nu m}$	Eq. (6.12.4)
	Cosmological Constant	Λ	*Off-diagonal Modulator*	$\Lambda^{+\sigma}_{\nu\mu} = \Lambda^+_d - \kappa^+_\Lambda\begin{pmatrix} -(\mathbf{u}^+\nabla)\cdot\mathbf{D}^+_\nu \\ \frac{\partial}{\partial t}\mathbf{D}^+_\nu + \frac{\mathbf{u}^+}{c}\nabla(\frac{\mathbf{u}^+}{c}\times\mathbf{H}^+_\nu) \end{pmatrix}$	Eq. (6.12.3)
(Spacetime 4-Dimensions)	*Horizon Equations*	$H_2^2 + \frac{kc^2}{a^2} = c^2\Lambda^+_{tt} + \frac{4\pi G}{3}\rho \quad H_2 = \frac{\dot{a}}{a} \quad H_3 = \frac{\ddot{a}}{\dot{a}} \quad \rho = 2\rho_0 + \rho_{tt} \quad p = 2p_0 + \frac{1}{3}p_{rr} \quad \nabla\cdot\mathbf{D}^+_\nu = 4\pi G\rho_\nu$ $3H_2H_3 = c^2\Lambda^+_{rr} - \frac{4\pi G}{c^2}(\rho c^2 + 3p) \quad p_\nu = p_{tt} + p_{rr} = c^2Tr(\mathbf{J}^+_\nu) \quad \frac{\partial}{\partial t}\mathbf{D}^+_\nu - \nabla\times\mathbf{H}^+_\nu = 4\pi G\mathbf{J}^+_\nu$			Eq. (6.14.5)-Eq. (6.14.10)
	N/A		*Cosmic Emissions*	$\nabla^2\psi_n - \frac{1}{c^2}\frac{\partial^2}{\partial t^2} = 4\frac{E^-_nE^+_n}{(\hbar c)^2}N^c_n\eta_n\psi_n$	Eq. (6.15.1)
	N/A		*Acceleration*	$\mathbf{g}_\nu^-/\kappa_g^- = [\check{\partial}^\lambda\check{\partial}^\lambda, \hat{\partial}_\lambda\hat{\partial}_\lambda]_\nu^- - \mathbf{\Lambda}^+$	Eq. (6.13.3)

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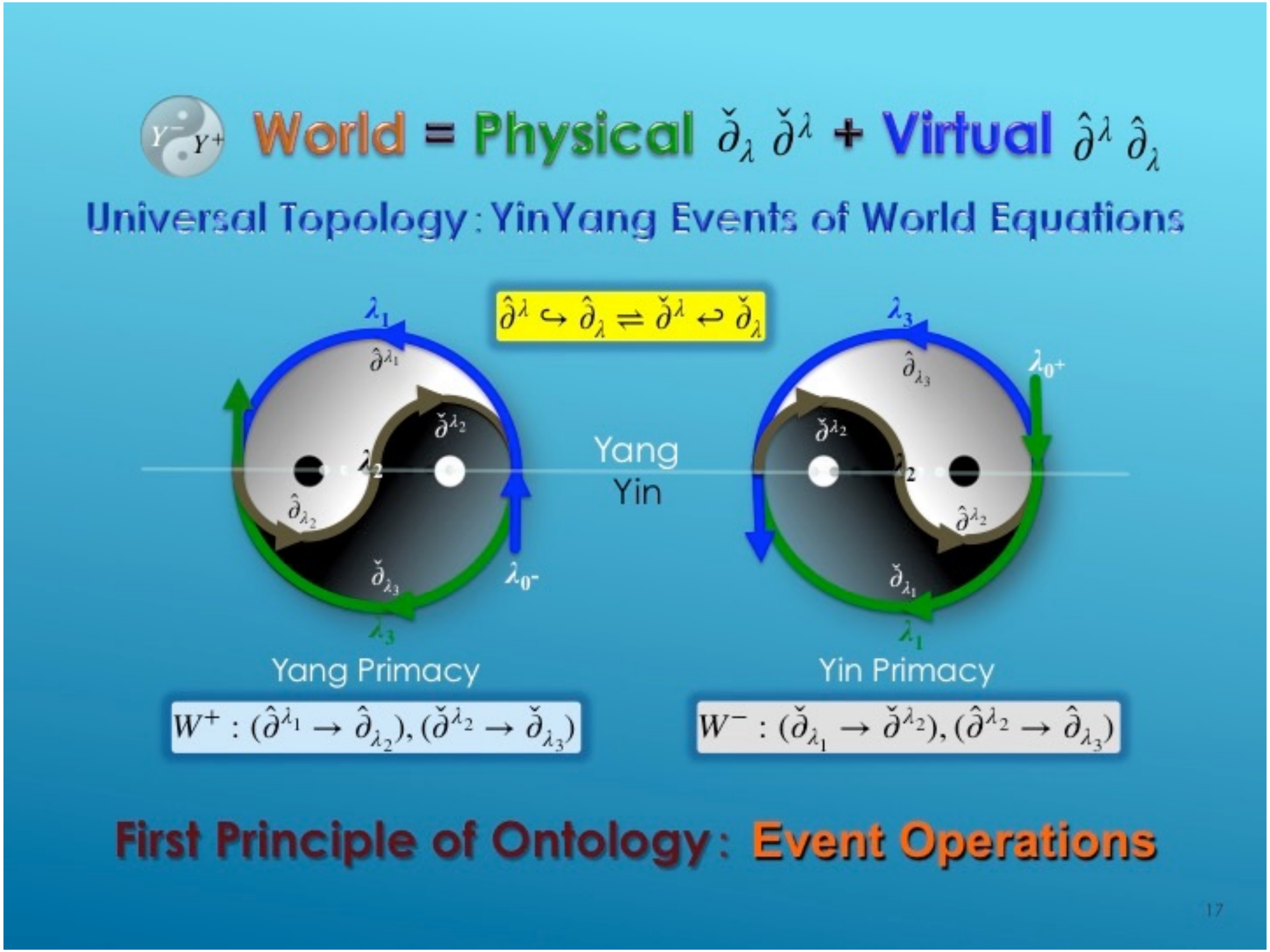
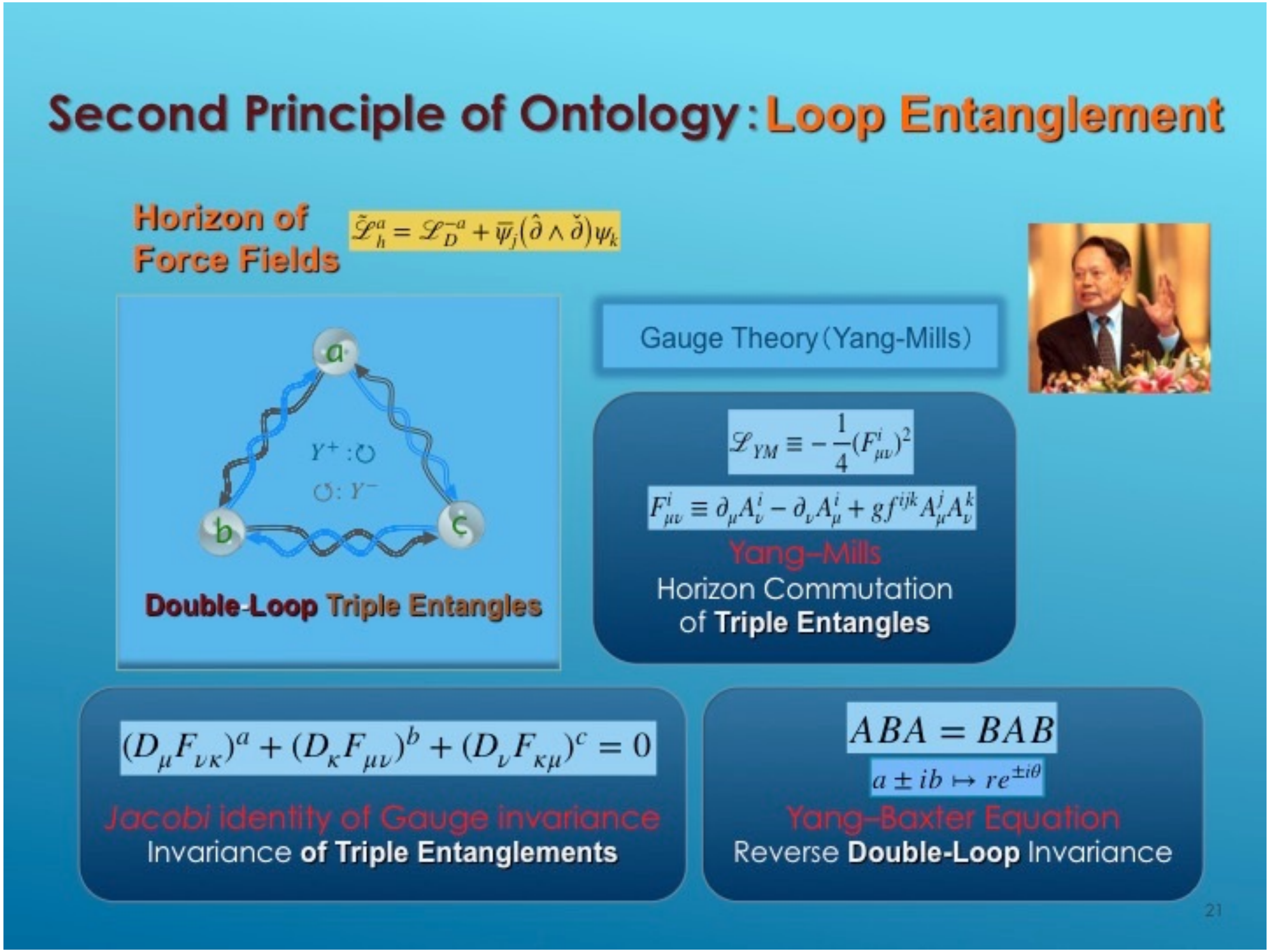
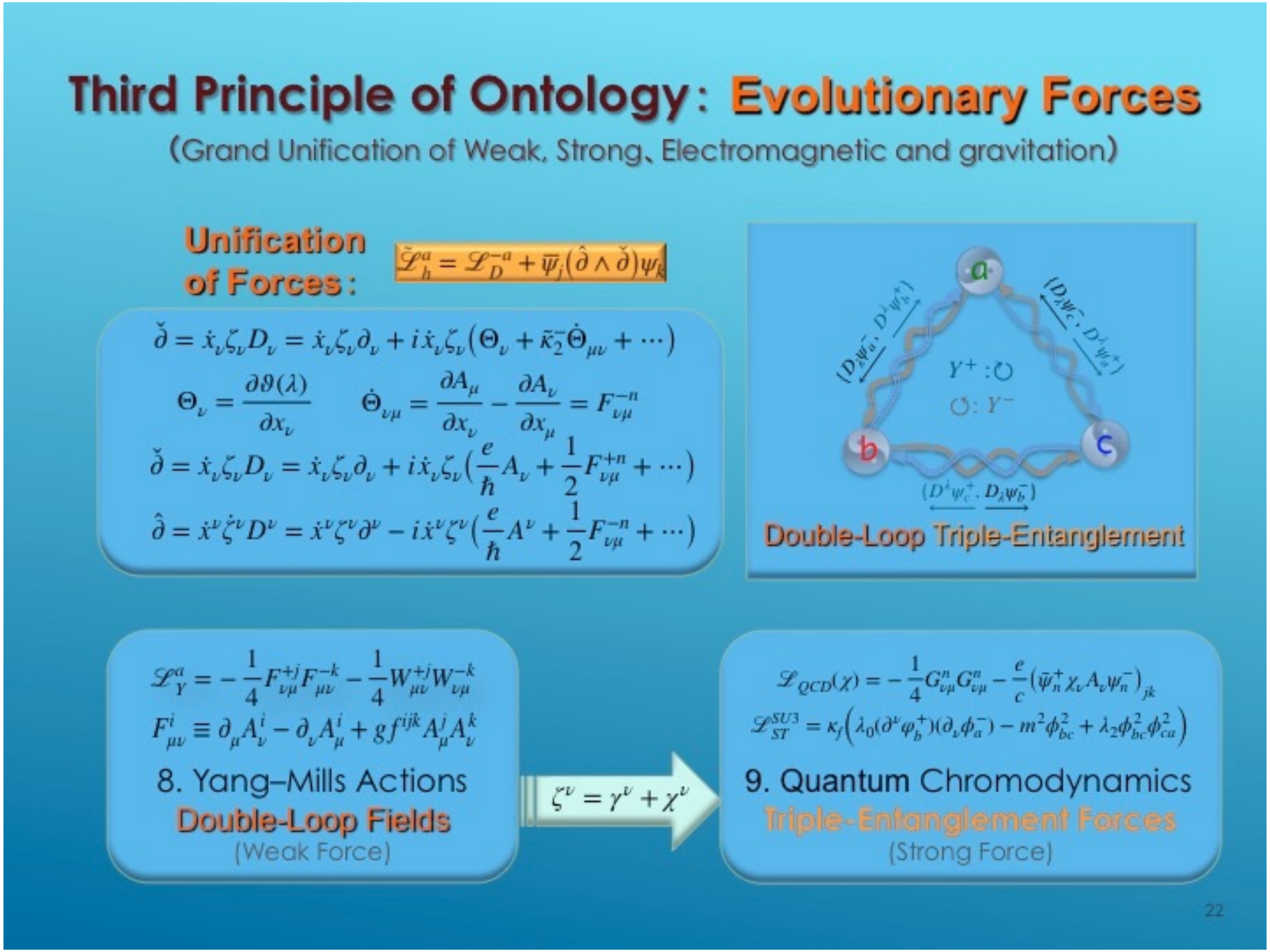
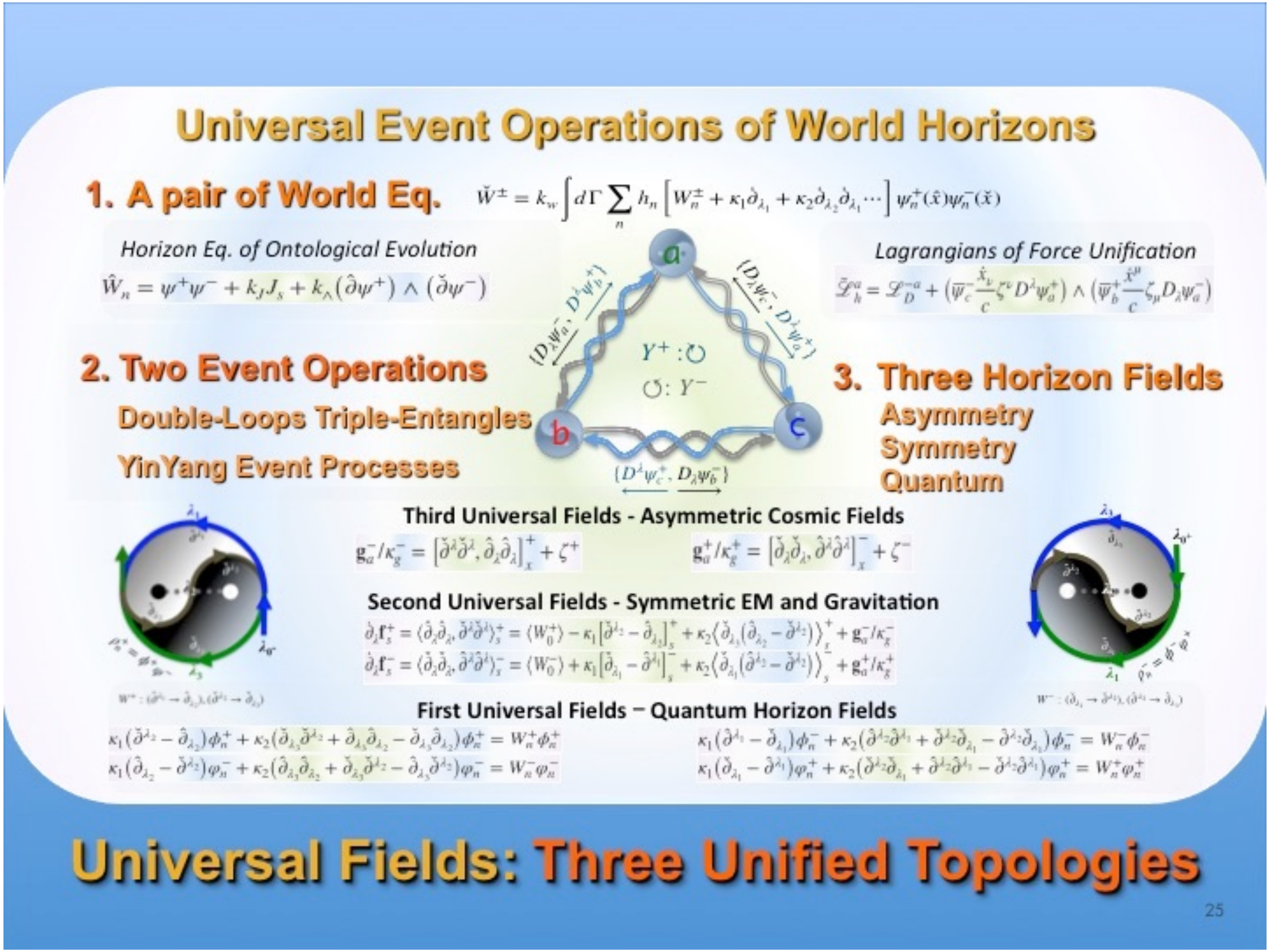
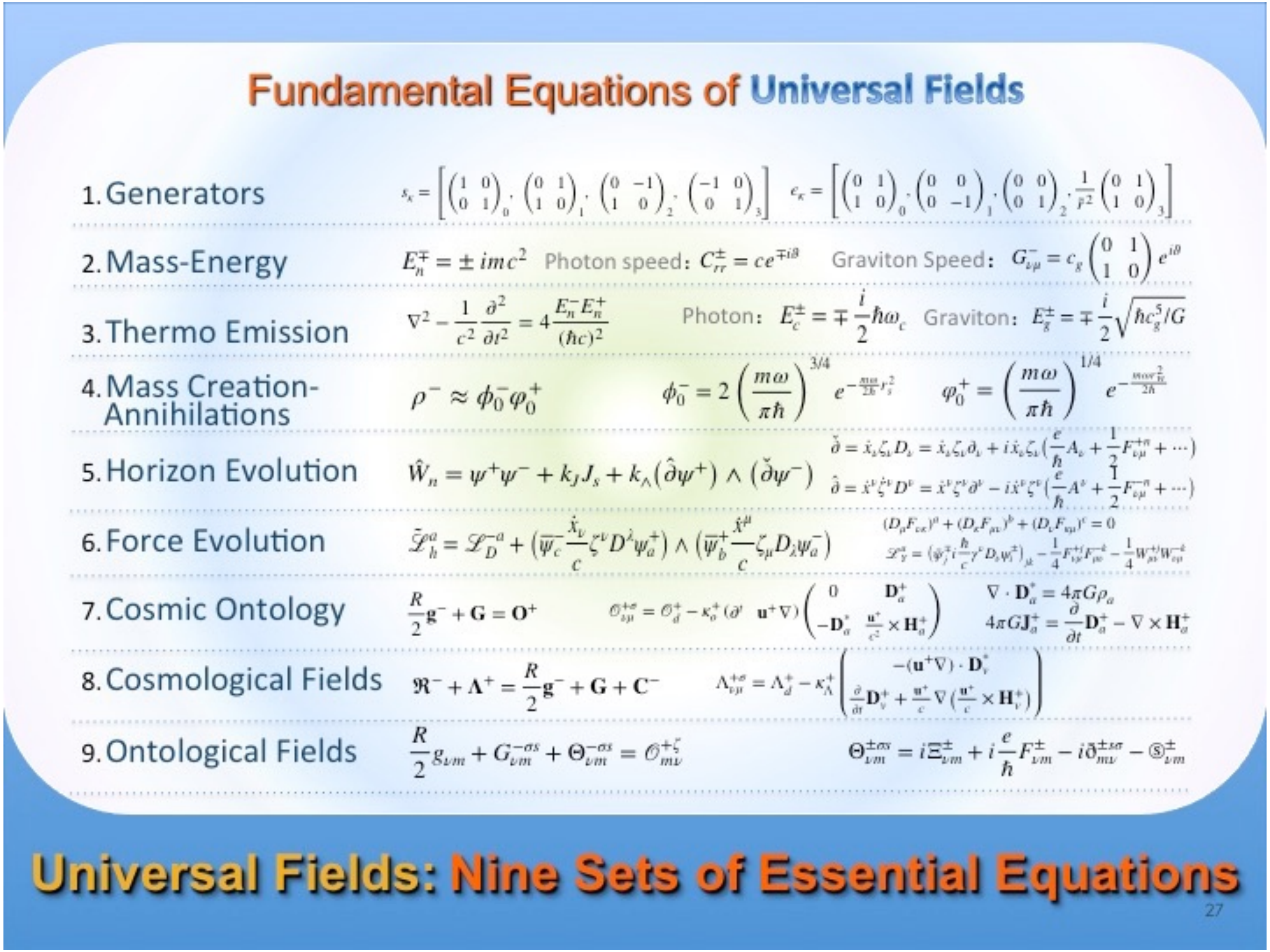


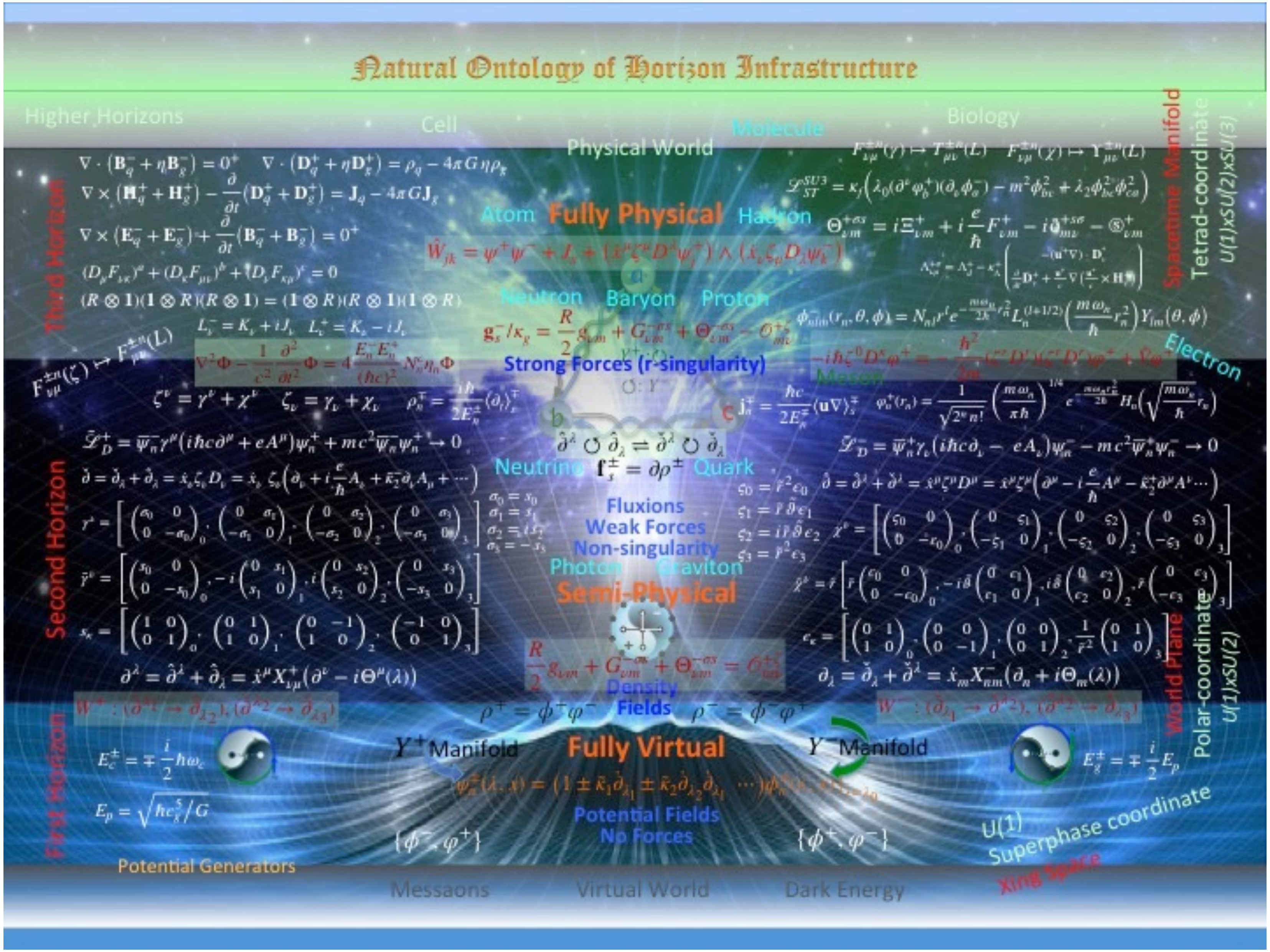
World = Physical $\check{\partial}_\lambda \check{\partial}^\lambda$ + Virtual $\hat{\partial}^\lambda \hat{\partial}_\lambda$
Universal Topology : YinYang Events of World Equations
$\hat{\partial}^\lambda \hookrightarrow \hat{\partial}_\lambda \rightleftharpoons \check{\partial}^\lambda \hookleftarrow \check{\partial}_\lambda$
Yang
Yin
Yang Primacy
$W^+ : (\hat{\partial}^{\lambda_1} \to \hat{\partial}_{\lambda_2}), (\check{\partial}^{\lambda_2} \to \check{\partial}_{\lambda_3})$
Yin Primacy
$W^- : (\check{\partial}_{\lambda_1} \to \check{\partial}^{\lambda_2}), (\hat{\partial}^{\lambda_2} \to \hat{\partial}_{\lambda_3})$
First Principle of Ontology : Event Operations
17


Second Principle of Ontology : Loop Entanglement
Horizon of Force Fields
$\tilde{\mathscr{L}}_h^a = \mathscr{L}_D^{-a} + \overline{\psi}_j(\hat{\partial} \wedge \check{\partial})\psi_k$
a
b
c
$Y^+ : ⟲$
$⟳ : Y^-$
Double-Loop Triple Entangles
Gauge Theory (Yang-Mills)
$\mathscr{L}_{YM} \equiv -\frac{1}{4}(F^i_{\mu\nu})^2$
$F^i_{\mu\nu} \equiv \partial_\mu A^i_\nu - \partial_\nu A^i_\mu + g f^{ijk} A^j_\mu A^k_\nu$
Yang-Mills
Horizon Commutation
of Triple Entangles
$(D_\mu F_{\nu\kappa})^a + (D_\kappa F_{\mu\nu})^b + (D_\nu F_{\kappa\mu})^c = 0$
Jacobi identity of Gauge invariance
Invariance of Triple Entanglements
$ABA = BAB$
$a \pm ib \mapsto re^{\pm i\theta}$
Yang–Baxter Equation
Reverse Double-Loop Invariance
21


Third Principle of Ontology: Evolutionary Forces
(Grand Unification of Weak, Strong、Electromagnetic and gravitation)
Unification of Forces:
$\breve{\mathscr{L}}_{\hbar}^{a} = \mathscr{L}_{D}^{-a} + \overline{\psi}_j(\hat{\partial} \wedge \check{\partial})\psi_k$
$\check{\partial} = \dot{x}_\nu \zeta_\nu D_\nu = \dot{x}_\nu \zeta_\nu \partial_\nu + i\dot{x}_\nu \zeta_\nu (\Theta_\nu + \bar{\kappa}_2^- \dot{\Theta}_{\mu\nu} + \cdots)$
$\Theta_\nu = \frac{\partial \vartheta(\lambda)}{\partial x_\nu} \qquad \dot{\Theta}_{\nu\mu} = \frac{\partial A_\mu}{\partial x_\nu} - \frac{\partial A_\nu}{\partial x_\mu} = F_{\nu\mu}^{-n}$
$\check{\partial} = \dot{x}_\nu \zeta_\nu D_\nu = \dot{x}_\nu \zeta_\nu \partial_\nu + i\dot{x}_\nu \zeta_\nu (\frac{e}{\hbar} A_\nu + \frac{1}{2} F_{\nu\mu}^{+n} + \cdots)$
$\hat{\partial} = \dot{x}^\nu \dot{\zeta}^\nu D^\nu = \dot{x}^\nu \zeta^\nu \partial^\nu - i\dot{x}^\nu \zeta^\nu (\frac{e}{\hbar} A^\nu + \frac{1}{2} F_{\nu\mu}^{-n} + \cdots)$
a
b
c
$Y^+ : \circlearrowright$
$\circlearrowleft : Y^-$
Double-Loop Triple-Entanglement
$\mathscr{L}_Y^a = -\frac{1}{4} F_{\nu\mu}^{+j} F_{\mu\nu}^{-k} - \frac{1}{4} W_{\mu\nu}^{+j} W_{\nu\mu}^{-k}$
$F_{\mu\nu}^i \equiv \partial_\mu A_\nu^i - \partial_\nu A_\mu^i + g f^{ijk} A_\mu^j A_\nu^k$
8. Yang–Mills Actions
Double-Loop Fields
(Weak Force)
$\zeta^\nu = \gamma^\nu + \chi^\nu$
$\mathscr{L}_{QCD}(\chi) = -\frac{1}{4} G_{\nu\mu}^n G_{\nu\mu}^n - \frac{e}{c} (\bar{\psi}_n^+ \chi_\nu A_\nu \psi_n^-)_{jk}$
$\mathscr{L}_{ST}^{SU3} = \kappa_f \left(\lambda_0 (\partial^\nu \varphi_b^+)(\partial_\nu \phi_a^-) - m^2 \phi_{bc}^2 + \lambda_2 \phi_{bc}^2 \phi_{ca}^2 \right)$
9. Quantum Chromodynamics
Triple-Entanglement Forces
(Strong Force)
22


Universal Event Operations of World Horizons
1. A pair of World Eq.
Horizon Eq. of Ontological Evolution
Lagrangians of Force Unification
2. Two Event Operations
Double-Loops Triple-Entangles
YinYang Event Processes
3. Three Horizon Fields
Asymmetry
Symmetry
Quantum
Third Universal Fields - Asymmetric Cosmic Fields
Second Universal Fields - Symmetric EM and Gravitation
First Universal Fields – Quantum Horizon Fields
Universal Fields: Three Unified Topologies
25


Fundamental Equations of Universal Fields
1. Generators
2. Mass-Energy
Photon speed:
Graviton Speed:
3. Thermo Emission
Photon:
Graviton:
4. Mass Creation-Annihilations
5. Horizon Evolution
6. Force Evolution
7. Cosmic Ontology
8. Cosmological Fields
9. Ontological Fields
Universal Fields: Nine Sets of Essential Equations
27


Natural Ontology of Horizon Infrastructure
Higher Horizons
Cell
Molecule
Biology
Physical World
Atom
Fully Physical
Hadron
Third Horizon
Spacetime Manifold
Tetrad-coordinate
U(1)xSU(2)xSU(3)
Neutron
Baryon
Proton
Electron
Strong Forces (r-singularity)
Meson
Neutrino
Quark
Fluxions
Weak Forces
Non-singularity
Photon
Graviton
Semi-Physical
Second Horizon
World Plane
Polar-coordinate
U(1)xSU(2)
Density
Fields
First Horizon
Y+ Manifold
Fully Virtual
Y− Manifold
Potential Fields
No Forces
U(1)
Superphase coordinate
Xing Space
Potential Generators
Messaons
Virtual World
Dark Energy

1. **First Generation: Classical Physics**
   - From Euclidean space to Newtonian mechanics in 1687: Motion and Force, Space and time are individual parameters without interwoven relationship
   - Basic concept for *Real Existence* of space and *Virtual Existence* of time without expression of virtual reality
   - **Unification** – *Maxwell's Equations* of Analytical Physics in 1861
2. **Second Generation: Modern Physics**
   - Limited to physical existence only, Quantum and Relativity are pioneered since 1838 without using the interwoven continuum of quantum state fields
   - Coupled virtual existence of time with real existence of space into an interwoven continuum: spacetime Manifold *introduced* in1905.
   - **Unification** - *Virtual and Physical Entanglements* of *Topological Duality in* 2018
3. **Third Generation: *New Era* of Physics**
   - *Virtual Formation* of elementary particles (e.g. quarks, leptons, bosons) in 1961
   - *Virtual Massage Compositions*, introduced as "*Universal Messaons*" in 2012
   - Biophysical Formulations and Metaphysical Reformulation ...

GENERATIONS OF PHYSICS

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NATURAL COSMOLOGY, AND

ONTOLOGICAL EVOLUTION

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