Universal and Unified Field Theory

2. World Equations, Event Operations, and Quantum Mechanics

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Abstract: Extend to the *Universal Topology* [1], this manuscript presents that the principles of *World Equations*, *World Events* and *Motion Operations* institute a set of *Universal Equations* and inaugurate the holistic foundations general to all dynamic fields. Defined as the ***First Universal Field Equations***, its application to Quantum Mechanics demonstrates and derives, but are not limited to, *Conservation of Energy-Momentum, Schrödinger Equation, Dirac Equation, Spinor Fields, and Weyl Spinor*.

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INTRODUCTION

In the universal environment, the world event and their operational actors drive all natural phenomena, align with a duality of the two-dimensional world planes, and perform a pair of the dark energy steams for life entanglements. The event processes interact with the potential fields, conduct the motion flows, process the evolutions, and maintain the geodesic curvatures through communication of potential fields.

I. HORIZONS

Throughout the universal framework, various horizons are defined as, but not limited to, timestate, microscopic and macroscopic regimes, each of which is in a separate zone and 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 mathematical expression of the tangent vectors defines and gives rise to each of the horizons. To ease observations, it is essential to scope these horizons as the following event operations:

a) First Horizon: the field behaviors of individual objects or particles have their potentials of the timestate functions in form of, but not limited to, the dual densities:

$$\rho^+_\phi = \phi(\hat{x},\lambda)\,\varphi(\check{x},\lambda) \qquad : \phi^+ \equiv \phi(\hat{x},\lambda),\ \varphi^- \equiv \varphi(\check{x},\lambda) \tag{1.1}$$

$$\rho^-_\phi = \phi(\check{x},\lambda)\,\varphi(\hat{x},\lambda) \qquad : \phi^- \equiv \phi(\check{x},\lambda),\ \varphi^+ \equiv \varphi(\hat{x},\lambda) \tag{1.2}$$

This horizon is confined by its neighborhoods of the ground fields and second horizons, which is characterizable by the scalar objects of $\phi^\pm$ and $\varphi^\pm$ fields of the ground horizon, individually, and reciprocally.

b) Second Horizon: the effects of aggregated objects has their commutative entanglements of the microscopic functions in form of, but not limited to, the dual vector fields, defined as *Fluxion Fields*:

$$\mathbf{f}^+_n = \kappa^+_\mathbf{f}\dot{\partial}\rho^+_\phi = \frac{\hbar c}{2E^+_n}[\hat{\partial},\check{\partial}]^+_n = \frac{\hbar c}{2E^+_n}\left(\varphi^-_n\dot{x}^\nu\partial^\nu\phi^+_n + \phi^+_n\dot{x}_\nu\partial_\nu\varphi^-_n\right) \tag{1.3}$$

$$\mathbf{f}^-_n = \kappa^-_\mathbf{f}\dot{\partial}\rho^-_\phi = \frac{\hbar c}{2E^-_n}[\check{\partial},\hat{\partial}]^-_n = \frac{\hbar c}{2E^-_n}\left(\varphi^+_n\dot{x}_m\partial_m\phi^-_n + \phi^-_n\dot{x}^m\partial^m\varphi^+_n\right) \tag{1.4}$$

where $\kappa^+_\mathbf{f}$ or $\kappa^-_\mathbf{f}$= is the coefficient $\hbar c/(2E^\pm_n)$. This horizon summarizes the timestate functions $\mathbf{f}^\pm = \sum \mathbf{f}^\pm_n$, which is confined by its neighborhoods of the first and third horizons, and is characterizable by two pairs of scalar $\{\phi^\pm, \varphi^\pm\}$ and their vector $\{\dot{\partial}\phi^\pm, \dot{\partial}\varphi^\pm\}$ fields.

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

$$\mathbf{F}^\pm = \kappa^\pm_\mathbf{F}\int \rho_a\dot{\partial}\mathbf{f}^\pm d\Gamma \qquad : \dot{\partial} \in \{\check{\partial}_\lambda, \hat{\partial}^\lambda\} \tag{1.5}$$

where $\kappa^+_\mathbf{F}$ or $\kappa^-_\mathbf{F}$ is a coefficient. This horizon is confined by its neighborhoods of the second and fourth horizons and characterizable by the tensor fields of $\dot{\partial}\mathbf{f}_m$ and $\dot{\partial}\mathbf{f}^\mu$.

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

$$\iiiint \cdots \rho_c\dot{\partial}\int \rho_b\dot{\partial}\mathbf{F}^\pm d\Gamma \mapsto \mathbf{W}^\pm_x \tag{1.6}$$

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

II. WORLD EQUATIONS

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

$$f(\lambda) = f(\lambda_0) + f'(\lambda_0)(\lambda-\lambda_0)\cdots + \frac{f^n(\lambda_0)(\lambda-\lambda_0)^n}{n!} \tag{2.1}$$

known as the *Taylor* and *Maclaurin* series [2], 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. Therefore, it naturally extends the above equation to the following formula:

$$f(\lambda) = f_0 + \kappa_1\dot{\partial}_{\lambda_1} + \kappa_2\dot{\partial}_{\lambda_1}\dot{\partial}_{\lambda_2} + \kappa_3\dot{\partial}_{\lambda_1}\dot{\partial}_{\lambda_2}\dot{\partial}_{\lambda_3}\ \cdots + \kappa_n\dot{\partial}_{\lambda_1}\dot{\partial}_{\lambda_2}\ldots\dot{\partial}_{\lambda_n} \tag{2.2}$$

$$\kappa_n = \frac{f^n(\lambda_0)}{n!}, \qquad \dot{\lambda} \in \{\dot{\partial}\}=\{\check{\partial}_\lambda, \check{\partial}^\lambda, \hat{\partial}^\lambda, \hat{\partial}_\lambda\} \tag{2.3}$$

where κ_n is the coefficient of each order n. For any event operation $\dot{\lambda} \mapsto \dot{\partial}$ as the functional derivatives of the above equation, the event states of world planes are open sets and can either rise as subspaces transformed from the other horizon or remain confined as independent existences within their own domain, as in the settings of Y^- or Y^+ manifolds of physical or virtual world planes.

Assuming each of the 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 state functions of ϕ^+_n or ϕ^-_n confineable to the respective manifold $Y^\pm$. Therefore, the horizon functions of the system can be expressed by:

$$W_a = f(\lambda)\rho_n \qquad : \rho_n = \phi^+_n(\hat{x},\lambda)\phi^-_n(\check{x},\lambda) \tag{2.4}$$

$$W_b = \sum_n h_n W_a \qquad : h_n = \frac{N^\pm_n}{N} \tag{2.5}$$

$$W_c = k_w\int W_b\, d\Gamma \qquad : \hat{x},\check{x} \subset Y^\pm\{\mathbf{r} \mp i\mathbf{k}\} \tag{2.6}$$

where h_n is a horizon factor, $N^\pm_n/N$ are percentages of the Y^-Y^+ particles, and k_w is defined as a world constant. During space and time dynamics, the density $\phi^-_n\phi^+_n$ is incepted at $\lambda=\lambda_0$ and followed by a sequence of the evolutions $\lambda_n = \dot{\partial}_{\lambda_n}$. This process engages and applies a series of the event operations of equation (2.2) to the equations of (2.6) in form of the following expressions, named as ***World Equations***:

$$W = k_w\int d\Gamma\sum_n h_n\left[W^\pm_n + \kappa_1\dot{\partial}_{\lambda_1} + \kappa_2\dot{\partial}_{\lambda_2}\dot{\partial}_{\lambda_1}\cdots\right]\phi^+_n\phi^-_n \tag{2.7}$$

$$\dot{\lambda}_n \in \{\check{\partial}_\lambda, \check{\partial}^\lambda, \hat{\partial}^\lambda, \hat{\partial}_\lambda\} \tag{2.8}$$

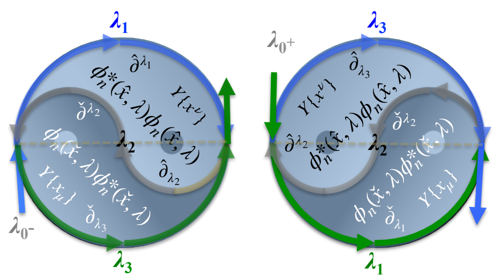
where $W^\pm_n \equiv W(\hat{x}\,|\,\check{x},\lambda_0)$ is the Y^+ or Y^- ground environment or an initial potential of a system, respectively. This equation demonstrates that our world in the state equilibrium is operated by the global events of $\dot{\lambda}_n \mapsto \dot{\partial}_{\lambda_n}$, each representable by the dual manifolds $Y^{\pm}\{\mathbf{r} \mp i\mathbf{k}\}$, simultaneously and respectively. Because an event process λ_n is operated in complex composition of the virtual and physical coordinates, it yields a linear function in a form of operational addition: $f(\partial_\kappa + \partial_r) = f(\partial_\kappa) + f(\partial_r)$, where the $\{\mathbf{r}, \mathbf{k}\}$ vectors of each manifold $Y^{\mp}\{\mathbf{r} \pm i\mathbf{k}\}$ constitute their orthogonal coordinate system $\mathbf{r} \cdot \mathbf{k} = 0$.

The framework of World Equation (2.7) scopes out the first horizon in form of W_a, the equation of (2.4); the second horizon of World Equation in form of W_b, the equation of (2.5); and the third horizon of World Equation in form of W_c, the equation of (2.6), respectively.

III. WORD EVENTS

Illustrated in the Y^-Y^+ flow diagram of Figure 3.1, the potential entanglements consists of the Y^+ supremacy (white background) at a top-half of the cycle and the Y^- supremacy (black background) at a bottom-half of the cycle. Each part is dissolving into the other to form an alternating stream of dynamic flows. Their transformations in between are bi-directional antisymmetric and transported crossing the dark tunnel through a pair of the end-to-end circlets on the center line. Both of the top-half and bottom-half share the common global environment of the state density ρ_n that mathematically represents the ρ_n^+ for the Y^+ manifold and its equivalent ρ_n^- for the Y^- manifold, respectively.

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



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

Figure 3.1: Event Flows of Y^-Y^+ Evolutional Processes

1. Visualized in the left-side of Figure 3.1, the transitional event process between virtual and physical manifolds involves a cyclic sequence throughout the dual manifolds of the environment: incepted at λ_{0^-}, the event actor produces the virtual operation $\hat{\partial}_{\lambda_1}$ in $Y\{x^\nu\}$ manifold (the left-hand blue curvature) projecting $\hat{\partial}^{\lambda_2}$ to and transforming into its physical opponent $\check{\partial}^{\lambda_2}$ (the tin curvature transforming from left-hand into right-hand), traveling through $Y\{x_\mu\}$ manifold (the right-hand green curvature), and reacting the event $\check{\partial}_{\lambda_3}$ back to the actor.
2. As a duality in the parallel reaction, exhibited in the right-side of Figure 3.1, initiated at λ_{0^+}, the event actor generates the physical operation $\check{\partial}_{\lambda_1}$ in $Y\{x_\mu\}$ manifold (the right-hand green curvature) projecting $\check{\partial}^{\lambda_2}$ to and transforming into its virtual opponent $\hat{\partial}^{\lambda_2}$ (the tin curvature transforming from right-hand into left-hand), traveling through $Y\{x^\nu\}$ manifold (the left-hand blue curvature), and reacting the event $\hat{\partial}_{\lambda_3}$ back to the actor.

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

$$W^+ : (\hat{\partial}^{\lambda_1} \to \hat{\partial}_{\lambda_2}), (\check{\partial}^{\lambda_2} \to \check{\partial}_{\lambda_3}) \tag{3.1}$$

$$W^- : (\check{\partial}_{\lambda_1} \to \check{\partial}^{\lambda_2}), (\hat{\partial}^{\lambda_2} \to \hat{\partial}_{\lambda_3}) \tag{3.2}$$

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

IV. MOTION OPERATIONS

As a natural principle of motion dynamics, one of the flow processes dominates the intrinsic order, or development, of virtual into physical regime, while, at the same time, its opponent dominates the intrinsic annihilation or physical resources into virtual domain. Applicable to World Equations of (2.7), the principle of least-actions derives a set of the *Motion Operations*:

$$\check{\partial}^-\left(\frac{\partial W}{\partial(\hat{\partial}^+\phi)}\right) - \frac{\partial W}{\partial \phi} = 0 \quad : \check{\partial}^- \in \{\check{\partial}_\lambda, \check{\partial}^\lambda\},\ \hat{\partial}^+ \in \{\hat{\partial}^\lambda, \hat{\partial}_\lambda\} \tag{4.1}$$

$$\hat{\partial}^+\left(\frac{\partial W}{\partial(\check{\partial}^-\phi)}\right) - \frac{\partial W}{\partial \phi} = 0 \quad : W \in \{W^\mp\},\ \phi \in \{\phi_n^\pm, \varphi_n^\pm\} \tag{4.2}$$

This set of dual formulae extends the philosophical meaning to the *Euler-Lagrange* [3] *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 formulations from each of the motion extrema, simultaneously driving a duality of physical and virtual dynamics.

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

$$\ddot{x}^\mu + \overset{+}{\Gamma}{}^\mu_{\alpha\beta}\dot{x}^\alpha\dot{x}^\beta = 0 \qquad \ddot{x}_m + \overset{-}{\Gamma}{}^m_{ab}\dot{x}_a\dot{x}_b = 0 \tag{4.3}$$

This set extends a duality to and is known as *Geodesic Equation* [4], 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 a geodesic is either unchanged or parallel transport as a massless object moving along the world planes that creates the inertial transform generators and twist transport torsions to emerge a reality of the real world.

V. UNIVERSAL FIELD EQUATIONS

The potential entanglements is a fundamental principle of the real-life steaming 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 flows of Figure 3.1 and equations (3.1)-(3.2) can be shown by and underlined in the sequence of the following processes:

$$W^+ : (\hat{\partial}^{\lambda_1} \to \underline{\hat{\partial}_{\lambda_2}}), (\check{\partial}^{\lambda_2} \to \underline{\check{\partial}_{\lambda_3}});\ W^- : (\check{\partial}_{\lambda_1} \to \underline{\check{\partial}^{\lambda_2}}), (\hat{\partial}^{\lambda_2} \to \underline{\hat{\partial}_{\lambda_3}}) \tag{5.1}$$

From the event actors $\hat{\partial}_{\lambda_2}$ and $\check{\partial}_{\lambda_3}$, the *World Equations* (2.4) becomes:

$$W_a^+ = \left(W_n^+ + \kappa_1 \underline{\hat{\partial}_{\lambda_2}}\right)\phi_n^+\phi_n^- + \kappa_2 \underline{\check{\partial}_{\lambda_3}}\left(\phi_n^+\hat{\partial}_{\lambda_2}\phi_n^- + \phi_n^-\hat{\partial}_{\lambda_2}\phi_n^+\right)\ldots \tag{5.2}$$

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

$$W_a^{+^*} = \left(W_n^+ + \kappa_1\hat{\partial}^{\lambda_1}\right)\varphi_n^+\varphi_n^- + \kappa_2\check{\partial}^{\lambda_2}\left(\varphi_n^+\hat{\partial}^{\lambda_1}\varphi_n^- + \varphi_n^-\hat{\partial}^{\lambda_1}\varphi_n^+\right)\cdots \tag{5.3}$$

where $W_n^+ = W_n^+(\mathbf{r}, t_0)$ are the time invariance potentials. Rising from the opponent fields of ϕ_n^- or φ_n^-, the dynamic reactions under the Y^- manifold continuum give rise to the *Motion Operations* of the Y^+ fields ϕ_n^+ or φ_n^+ approximated at the first and second orders of perturbations in term of the above *World Equation*, as an example:

$$\frac{\partial W_a^+}{\partial \phi_n^-} = W_n^+ \left(\mathbf{x}, t_0\right) \phi_n^+ + \kappa_1 \hat{\partial}_{\lambda_2} \phi_n^+ + \kappa_2 \check{\partial}_{\lambda_3} \hat{\partial}_{\lambda_2} \phi_n^+ \tag{5.4}$$

$$\check{\partial}^{\lambda 2}\left(\frac{\partial W_a^+}{\partial(\hat{\partial}_{\lambda_2}\phi_n^-)}\right) = \left(\kappa_1 + \kappa_2 \check{\partial}_{\lambda_3}\right) \underline{\check{\partial}^{\lambda 2}} \phi_n^+ \tag{5.5}$$

$$\hat{\partial}_{\lambda_3}\left(\frac{\partial W_a^+}{\partial(\check{\partial}_{\lambda_3}\phi_n^-)}\right) = \underline{\hat{\partial}_{\lambda_3}} \left(\kappa_2 \hat{\partial}_{\lambda_2} \phi_n^+\right) \tag{5.6}$$

where the potentials of $\hat{\partial}_{\lambda_2}\phi_n^-$ and $\check{\partial}_{\lambda_3}\phi_n^-$ give rise simultaneously to their opponent's reactors of the physical to virtual transformation $\check{\partial}^{\lambda 2}$ and the physical reaction $\hat{\partial}_{\lambda_3}$, respectively. From these interwoven relationships, the motion operations of (4.1)-(4.2) determine a partial differential equation of the Y^-Y^+ state fields ϕ_n^+ and φ_n^+ under the supremacy of virtual dynamics at the $Y\{x^\nu\}$ manifold:

$$\kappa_1 \left(\check{\partial}^{\lambda 2} - \hat{\partial}_{\lambda_2}\right)\phi_n^+ + \kappa_2 \left(\check{\partial}_{\lambda_3}\check{\partial}^{\lambda 2} + \hat{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2} - \check{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2}\right)\phi_n^+ = W_n^+\phi_n^+ \tag{5.7}$$

$$\kappa_1 \left(\check{\partial}_{\lambda_1} - \hat{\partial}^{\lambda 1}\right)\varphi_n^+ + \kappa_2 \left(\check{\partial}^{\lambda 2}\check{\partial}_{\lambda_1} + \hat{\partial}^{\lambda 2}\hat{\partial}^{\lambda 1} - \check{\partial}^{\lambda 2}\hat{\partial}^{\lambda 1}\right)\varphi_n^+ = W_n^+\varphi_n^+ \tag{5.8}$$

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

In the events of the physical supremacy in parallel fashion, a chain of the event actors in the flows of Figure 3.1 can be shown by the similar sequence of the following processes:

$$W^- : (\underline{\check{\partial}_{\lambda_1}} \to \check{\partial}^{\lambda 2}), (\underline{\hat{\partial}^{\lambda 2}} \to \hat{\partial}_{\lambda_3})\ ;\ W^+ : (\underline{\hat{\partial}^{\lambda 1}} \to \hat{\partial}_{\lambda_2}), (\underline{\check{\partial}^{\lambda 2}} \to \check{\partial}_{\lambda_3}) \tag{5.9}$$

$$W_a^- = \left(W_n^- + \kappa_1 \underline{\check{\partial}_{\lambda_1}}\right)\ \phi_n^+\phi_n^- + \kappa_2 \underline{\hat{\partial}^{\lambda 2}} \left(\phi_n^+\check{\partial}_{\lambda_1}\phi_n^- + \phi_n^-\check{\partial}_{\lambda_1}\phi_n^+\right)\cdots \tag{5.10}$$

$$W_a^{-*} = \left(W_n^+ + \kappa_1 \check{\partial}^{\lambda 2}\right)\varphi_n^+\varphi_n^- + \kappa_2 \hat{\partial}_{\lambda_3} \left(\varphi_n^+\check{\partial}^{\lambda 2}\varphi_n^- + \varphi_n^-\check{\partial}^{\lambda 2}\varphi_n^+\right)\cdots \tag{5.11}$$

where $W_n^- = W_n^-(\mathbf{r}, t_0)$ are the time invariance potentials in Y^- manifold. Rising from its opponent fields of ϕ_n^+ or φ_n^+ in parallel fashion, the dynamic reactions under the Y^+ manifold continuum give rise to the *Motion Operations* of the Y^- state fields ϕ_n^- or φ_n^-, which determines a linear partial differential equation of the state function ϕ_n^- or φ_n^- under the supremacy of physical dynamics at the $Y\{x_\mu\}$ manifold:

$$\kappa_1 \left(\hat{\partial}^{\lambda 1} - \check{\partial}_{\lambda_1}\right)\phi_n^- + \kappa_2 \left(\hat{\partial}^{\lambda 2}\hat{\partial}^{\lambda 1} + \check{\partial}_{\lambda_2}\check{\partial}_{\lambda_1} - \hat{\partial}^{\lambda 2}\check{\partial}_{\lambda_1}\right)\phi_n^- = W_n^-\phi_n^- \tag{5.12}$$

$$\kappa_1 \left(\hat{\partial}_{\lambda_2} - \check{\partial}^{\lambda 2}\right)\varphi_n^- + \kappa_2 \left(\hat{\partial}_{\lambda_3}\hat{\partial}_{\lambda_2} + \check{\partial}^{\lambda 3}\check{\partial}^{\lambda 2} - \hat{\partial}_{\lambda_3}\check{\partial}^{\lambda 2}\right)\varphi_n^- = W_n^-\varphi_n^- \tag{5.13}$$

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

The two pairs of the motion fields (5.7)-(5.8) and (5.12)-(5.13) are operated generically by the first horizon of the World Events. Therefore, the four formulae together are named as ***First Universal Field Equations***. Throughout the rest of this manuscript, the application of these evolutionary processes to contemporary physics will derive quantum mechanics.

VI. QUANTUM FIELDS

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 first W_a horizon, which scopes out the first degree of *World Equation*, confined by its neighborhoods of the ground and second horizons. Due to the duality nature of virtual and physical coexistences, particle fields appear as quantization in mathematics, known as *Quantum Fields*.

A homogeneous system is defined such that the source of the fields appears as a point object and has the uniform properties 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 torsion. Mathematically, homogeneity is commutative under invariance, as all components of the equation have the same degree of value, each of these components has a trace of diagonal elements and is scaled to different values for the cumulative distribution. Under this environment, an observer is positioned external to or outside of the objects.

For a heterogeneous system, the horizon fields is at a situation where the duality of virtual annihilation and physical reproduction are balanced to form the mass enclave. It stretches the surface with oscillating angular momentum, represented by the off-diagonal elements of tensors.

Artifacts 1: Conservation of Energy-Momentum. Under a homogeneous environment, the field tensors become a trace of diagonal form. The Y^+ reciprocal Quantum Fields (5.8) is equivalent to the following equations, observed under the Y^- manifold:

$$\kappa_2 \hat{\partial}^\lambda \hat{\partial}^\lambda \varphi_n^+ - W_n^+ \left(\mathbf{x}, t_0\right) \varphi_n^+ = 0 \qquad : \hat{\partial}^\lambda \mapsto \dot{x}^\mu \partial^\mu \tag{6.1}$$

$$-\frac{\partial^2 \varphi_n^+}{\partial x_0^2} + \nabla^2 \varphi_n^+ - \frac{m}{\hbar^2} E_n \varphi_n^+ = 0 \qquad : \kappa_2 = \frac{(\hbar c)^2}{2E_n} \tag{6.2}$$

$$W_n^+ = E_n c^2, E_n = m c^2, \dot{x}^\mu = \{-ic, \mathbf{u} = c\} \tag{6.3}$$

As a result, the above equation represents the virtual dynamics of the Y^+ quantum fields rising from its opponent in the Y^- interactions during the time and space evolutions. For a free particle, the energy is known as the Einstein mass-energy equivalence of $E = mc^2$, introduced in 1905 [5]. Whereas, alternative to the sign of the first term for the *Klein–Gordon equation* [4], introduced in 1928. Following the above equation, It demonstrates our *First Universal Field Equation* is naturally applicable to the empirical approach of the energy-momentum conservation of:

$$\mathbf{P}/c = i\hat{\mathbf{p}} = \hbar \nabla \mapsto -i\hbar \mathbf{k} \qquad E = i\hbar \frac{\partial}{\partial t} \mapsto \pm \hbar\omega \tag{6.4}$$

$$(\mathbf{P} + iE)(\mathbf{P} - iE) = m^2c^4 \quad \mapsto \quad E^2 = \hat{\mathbf{p}}^2c^2 + m^2c^4 \tag{6.5}$$

known as the relativistic invariant relating an object's rest or intrinsic mass m at its total energy E and momentum **P**. As a duality of alternating actions, one operation $\mathbf{P} + iE$ is a process for physical reproduction or animation, while another $\mathbf{P} - iE$ is a reciprocal process for virtual annihilation or creation. Together, they comply with and are governed by the law of Universal Topology: $W = P \pm iV$.

Artifacts 2: Schrödinger Equation. For a homogeneous system with its transportation speed c, the field tensors are in trace of diagonal form. The Y^- Quantum Fields (5.12) derives the following equations:

$$\left(-2\dot{x}_\kappa \kappa_1 \partial_\kappa + 3\kappa_2 \dot{x}_\kappa^2 \partial_\kappa^2 + \kappa_2 \dot{x}_r^2 \nabla^2 - W_n^-\right)\phi_n^- = 0 \quad : \kappa_1 = -i\frac{\hbar c^2}{2} \tag{6.6}$$

$$i\hbar \frac{\partial \phi_n^-}{\partial t} + \frac{3\hbar^2}{2\mu}\frac{\partial^2 \phi_n^-}{c^2 \partial t^2} + \frac{\hbar^2}{2\mu_n^*}\nabla^2 \phi_n^- - \hat{V}(\mathbf{r}, t_0)\phi_n^- = 0 \quad : \tag{6.7}$$

$$\kappa_2 = \frac{(\hbar c)^2}{2E_n}, \qquad E_n = \mu_n^* c^2, \qquad W_n^- = c^2 \hat{V}(\mathbf{r}) \tag{6.8}$$

where ħ is the Planck constant, introduced in 1900 [6], μ_n^* is the reduced mass, and $\hat{H}$ is defined as the classic operator known as Hamiltonian, introduced in 1834 [4]. For the first order of the internal energy and kinetic-energy, the above equation emerges as *Schrödinger* equation, introduced in 1926 [7], in form of:

$$i\hbar \frac{\partial \phi_n^-}{\partial t} = \hat{H}\phi_n^- \qquad \hat{H} \equiv -\frac{\hbar^2}{2\mu_n^*}\nabla^2 + \hat{V}(\mathbf{r}, t_0) \tag{6.9}$$

It represents the dual manifold dynamics as the function of physical Y^- fields arises from its opponent in the virtual Y^+ interactions during the virtual and physical evolutions.

Artifacts 3: Dirac Equation. Under a heterogeneous environment, one of the characteristics of spin is that the events in the Y^+ or Y^- manifold transform into their opponent manifold in form of bispinors of special relativity, reciprocally. For this heterogeneous system, an observer is positioned internal to or inside within the objects. The equations of (5.7) and (5.13) can be reformulated into the following compact form:

$$\frac{\hbar^2}{m}\hat{\partial}_\lambda^2\phi_n^+ - \left(\frac{\hbar^2}{m}\check{\partial}_\lambda + \frac{i\hbar c^2}{2}\right)\left(\check{\partial}^\lambda - \hat{\partial}_\lambda\right)\phi_n^+ = mc^4\phi_n^+ \tag{6.10}$$

$$\frac{\hbar^2}{m}\hat{\partial}_\lambda^2\varphi_n^- + \left(\frac{\hbar^2}{m}\check{\partial}^\lambda - \frac{i\hbar c^2}{2}\right)\left(\check{\partial}^\lambda - \hat{\partial}_\lambda\right)\varphi_n^- = mc^4\varphi_n^- \tag{6.11}$$

$$\tilde{E}_n^\mp = \pm\, mc^2,\ W_n^\mp = c^2\tilde{E}_n^\mp \tag{6.12}$$

The first terms are homogeneous or the trace of diagonal elements while the second terms are form of the heterogeneous or off-diagonal field tensors. The right-side, $W_n^\pm = c^2\tilde{E}_n^\pm$, is an energy constant in all forms. Therefore, it emanates that the bi-directional transformation has two rotations one with left-handed $\phi_n^+ \mapsto \phi_n^L$ pointing from the Y^+ source to the Y^- manifold, and the other with right-handed $\varphi_n^- \mapsto \phi_n^R$ reacting from the Y^- back to the Y^+ manifold. Both fields are alternating into one another under a parity operation with relativistic preservation during their interweaving communications. From the architecture framework $\check{\partial}^\lambda = \dot{x}^\alpha J_{m\alpha}^- \partial_m$ and $\hat{\partial}_\lambda = \dot{x}_\alpha J_{\mu\alpha}^+ \partial^\mu$, the above equation has the heterogeneous or off-diagonal components in the following form, approximately to the first order ($mc^2 \gg \hbar\hat{\partial}_\lambda \sim \hbar\check{\partial}^\lambda$).

$$i\frac{\hbar}{2}\left(\dot{x}^\alpha J_{\mu\alpha}^- \partial_\mu - \dot{x}_\alpha J_{\mu\alpha}^+ \partial^\mu\right)\psi \mp mc^2\psi = 0 \tag{6.13}$$

Because of the transformational characteristics, it can be further reformulated into the following compact form:

$$\left(i\hbar\gamma^\nu\partial_\nu \mp mc\right)\psi = 0 \qquad : \psi = \begin{pmatrix}\phi^L \\ \varphi^R\end{pmatrix} = \begin{pmatrix}\phi_n^+ \\ \varphi_n^-\end{pmatrix} \tag{6.14}$$

$$c\gamma^\nu\partial_\nu = \dot{x}^\alpha J_{\mu\alpha}^- \partial_\mu - \dot{x}_\alpha J_{\mu\alpha}^+ \partial^\mu \tag{6.15}$$

These equations philosophically extend to and are mathematically known as *Dirac Equation*, introduced in 1925 [8]. The gamma matrix γ^ν represents the commutations and converts to a set of the four matrices of the *Lorentz* transforms. In particle physics, the *Dirac* equation is one of the most profound discoveries of modern physics and the first theory to account fully for special relativity in the context of quantum mechanics. The *Dirac* equation, modified to include the appropriate terms for an electron in the electrostatic field of a proton, provides a fantastically accurate description of the energy levels and characteristics of the hydrogen atom.

Artifacts 4: Spinor Fields. From *Spin Generators*, the equations (5.4) and (5.5) at the reference [1], the respective boost transformations of spinors are given straightforwardly by the following matrixes:

$$\phi_n^L = exp\left\{\frac{1}{2}\left(\sigma_0\hat{\theta}_0 - i\sigma_1\hat{\theta}_1\right) + \frac{1}{2}\left(\sigma_3\hat{\theta}_3 - i\sigma_2\hat{\theta}_2\right)\right\}\phi_n^+ \tag{6.16}$$

$$\phi_n^R = exp\left\{\frac{1}{2}\left(\sigma_0\check{\theta}_0 + i\sigma_1\check{\theta}_1\right) + \frac{1}{2}\left(\sigma_3\check{\theta}_3 + i\sigma_2\check{\theta}_2\right)\right\}\varphi_n^- \tag{6.17}$$

Each of the first terms is the transformation matrix of the two-dimensional world planes, respectively. Each of the second terms is an extension to the additional dimensions for the physical freedoms. The quantities are irreducible, preserve full parity (invariant with respect to the physical change $\check{\theta}_i \rightarrow -\hat{\theta}_i$, and represent spin-up and spin-down positrons for all particles.

Artifacts 5: Weyl Spinor. Historically, in the chiral representation, the matrix expression γ^ν, created by W. K. Clifford [9] in the 1870s, is given by the following

$$\gamma^0 = \begin{pmatrix}I_2 & 0 \\ 0 & -I_2\end{pmatrix},\quad \gamma^\alpha = \begin{pmatrix}0 & \sigma_\alpha \\ -\sigma_\alpha & 0\end{pmatrix} \qquad : \gamma^\alpha\gamma^\alpha = 1 \tag{6.18}$$

$$\mathbf{s} = -\frac{i}{2}\sigma\times\sigma = \frac{1}{2}\sigma \qquad : \sigma = \{\sigma_1, \sigma_2, \sigma_3\},\ \sigma_i^2 = I \tag{6.19}$$

$$\sigma_0 = \begin{pmatrix}-1 & 0 \\ 0 & 1\end{pmatrix}, \sigma_1 = \begin{pmatrix}0 & 1 \\ 1 & 0\end{pmatrix}, \sigma_2 = \begin{pmatrix}0 & i \\ -i & 0\end{pmatrix}, \sigma_3 = \begin{pmatrix}1 & 0 \\ 0 & 1\end{pmatrix} \tag{6.20}$$

Similar to the equations (6.16) and (6.17), this group involves the *Pauli* spin σ_k matrices, introduced in 1925 [10]. In the limit as m → 0, the equation (6.14) reduces to the following formula in describing the relativistic massless spin particles:

$$\sigma^\mu\partial_\mu\psi = 0, \quad or \quad I_2\frac{1}{c}\frac{\partial\psi}{\partial t} + \sigma_x\frac{\partial\psi}{\partial x} + \sigma_y\frac{\partial\psi}{\partial y} + \sigma_z\frac{\partial\psi}{\partial z} = 0 \tag{6.21}$$

known as Weyl equation introduced in 1918 [11]. In classic physics, particularly quantum field theory, the Weyl equation is a relativistic wave equation for describing massless spin-1/2 particles called Weyl fermions, which are massless chiral fermions that play an important role in quantum field theory. They are considered a building block for fermions and were predicted from a solution to the Dirac equation.

CONCLUSION

As a part of the *Universal Topology*, the world events naturally evolve and transport across multi-zones of the worlds that defines a set of the laws, which unfolds and discovers the natural intrinsics of:

1) ***Horizon*** activities define or delineate a scope of natural behaviors or operations in the bi-directional transformation seamlessly and alternately between the virtual and physical worlds.

2) ***World Equations*** align a series of the infinite sequential actions concisely with potential-steams of the natural dynamics that overcome the limitations of *Lagrangian* mechanics.

3) ***Law of World Events*** lies at the heart of the field entanglements reciprocally and consistently as the fundamental flows of interactions among the dark field energies.

4) ***Motion Operations*** are imperatively regulated on and performed with a new theoretical foundation of the dual events intimately mimic the operational actions on the geodesic covertures, extend the meaning to the *Euler-Lagrange Motion Equation*.

5) ***First Universal Field Equations*** are discovered as a set of general potentials, which lies at the heart of and is grounded for all horizon fields.

6) ***Quantum Mechanics*** is derived as an application of the evolutionary processes to contemporary physics, and demonstrated by the empirical artifacts of, but not limited to, *Conservation of Energy-Momentum, Schrödinger Equation, Dirac Equation, Spinor Fields, and Weyl Spinor*.

As a result, it has laid out the first foundation towards a unified physics that will give rise to the fields of photon, graviton, and beyond.

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