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Unconventional reconciliation path for quantum mechanics and general relativity

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Abstract

Physics in general is successfully governed by quantum mechanics at the microscale and principles of relativity at the macroscale. Any attempts to unify them using conventional methods have somewhat remained elusive for nearly a century up to the present stage. Here in this study, a classical gedanken experiment of electron-wave diffraction of a single slit is intuitively examined for its quantized states. A unidirectional monopole field as quanta of the electric field is pictorially conceptualized. Its application towards quantum mechanics and general relativity in accordance with existing knowledge in physics paves an alternative path towards their reconciliation process by assuming a multiverse at a hierarchy of scales. Such an outcome provides an approximate intuitive guide to examine physics in general from alternative perspectives using conventional methods.

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1.0 Introduction

Since the late 1800s to early 1900s, knowledge acquired in increments for the microscale with the advancement of proper experimentations has come to successfully form a fundamental theory of the atomic state known today as quantum mechanics. An unexhausted list of scientists that contributed to the development of the theory during this period of time can be found in any common textbook. It was only during the 1920s that the theory was fully construed in what came to be widely known as Copenhagen interpretation, a phrase attributed to Niels Bohr and Werner Heisenberg. Other alternative interpretations of quantum mechanics such as Everett's many-worlds interpretations and a few others exist but are not as popular as the previous one.

Coinciding with the development of quantum mechanics in which Albert Einstein also played a key role by defining the particle property of light, he also developed theories for both special relativity and general relativity. The relativistic theories somewhat came to revolutionize physics for the macroscale by successful integration of Newton's gravity among others. Over time, experimental findings and new theories have evolved to affirm the accepted general knowledge in both quantum mechanics and relativity as the two pillars of physics at two extreme scales. To date, any attempts to unify them using conventional methods in both experiments and theoretical applications since earlier attempts by Einstein [1] have somewhat remained elusive for nearly a century up to the present stage. Here, in this study, an unconventional approach is considered for the reconciliation process of quantum mechanics and general relativity.

A classical Einstein's gedanken experiment of electron-wave diffraction of a single slit [2] is pictorially examined for its quantized states. Condensed electric field, $\mathbf{E}$ of the wave diffraction generates a unidirectional monopole field (UMF) as its quanta [3] and this is dissected

linearly along inertia frames of magnetic field, $\mathbf{B}$. For the emergence of a monopole pair (MP) field of an elliptic shape or orbital type within the UMF background, each frame is converted to Bohr orbit (BO) in perpendicular to $\mathbf{E}$. A particle in orbit about the MP field is naturally quantized along degenerate states of BOs into extra dimensions. This insinuates a conceptualized MP model into four-dimensional (4D) space-time. Its application to quantum mechanics and general relativity is able to integrate many of their features into proper perspectives consistent with existing knowledge in physics. In doing so, Newtonian gravity is considered localized to an object into space in a multiverse at a hierarchy of scales, while special relativity, $E = mc^2$ for mass-energy equivalence is sustained. Such descriptions offer an alternative path for the unification process of quantum mechanics and general relativity. If considered, the proposed model presents a dynamic intuitive tool that can be applied to explore physics in general from alternative perspectives using conventional methods.

2.0 Conceptualization process of an MP model

The conceptualization path of the MP model is attempted from a classical gedanken experiment of electron-wave diffraction of a single slit. First, the process is devised using pictorial demonstrations. Second, the model is validated by applying a generalized renormalization process based on common knowledge in physics. Third, its notable limitations are examined with suggestions offered on how these can be intuitively improvised from general knowledge of physics applications. The final outcome offers a dynamic intuitive tool, and this is applied to explore physics in general from the microscale to the cosmic level wherever applicable.

2.1 A pictorial demonstration

An observer at a slit sees ripples of spherical waves receding into forward time for an emitting electron source (Fig. 1a). The electron possesses both isospin, I_z and energy-momentum, Φ . On expansion, the former is projected as an arrow of time, $\vec{I}$ in asymmetry of unidirectional and this is dissected perpendicularly by the latter along inertia frames of **B**. The condensed boundary of **E** evolves into a UMF of multiple MP fields that encloses $\vec{I}$ at a minimal energy equivalent to the Planck's constant, h (i.e., 6.626×10^{-34} joules per second) so that conservation is sustained. The emergence of orbital structures within a MP field somewhat mimes a UMF background in thermal equilibrium. The orbitals are quantized linearly along inertia frames of BOs defined by Φ . These are of degenerate states into extra dimensions in time dilation, $I_{z\parallel}$ to $\vec{I}$ of unidirectional with respect to singularity at the source and precession into forward time. Any outgoing radiation due to precession assumes Planck's law, $E = nh\nu$ at the Planck's scale of approximately 10^{-34} cm.

Figure 1. A step-by-step conceptualization path of the MP model. (a) Expansion of electron-wave diffraction from an electron source in a single slit setup towards detectors A and B. (b) Unidirectional symmetry-breaking of Higgs mechanism type (yellow curve) insinuates the emergence of a MP field (gray area) in 2D space. Multiple MP fields generates UMF (green loop) and this encloses an octet shape of inertia frames within a circular **E**. Coherence is epitomized by the wavelength, λ for conservationism. (c) Emergence of orbital structures within the MP mimics the UMF background in thermal equilibrium of 2D space-time. These are quantized along BOs of **B** in degeneracy into extra dimensions, n_i . (d) The MP field of 2D space-time is transformed into a 4D space-time of a hologram type with time defined by precession (green arrows) into forward motion. The orbital paths are of degenerate states (pink dotted lines) for a particle (green circle) in orbit such as an electron. The wave function, Ψ (blue wavy curve) into extra dimensions of neutrino types assumes gravitational time dilation towards singularity at the source. The electron transition between two orbitals from point $x \rightarrow \hat{x}$ (pink area) due to precession equates to $\pm\hbar$ for the MP (white area). This is bounded by continuous Ψ (green wavy loop) in equilibrium to $\vec{I}$ (blue arrows) in asymmetry. Expulsion of $\hbar$ to an external observer, unveils superposition of $\pm\frac{1}{2}$ magnetic spin

(m_s) (navy colored cones). This is attributed to both precession into forward time at lightspeed and effects of gravitational time dilation on the orbital paths towards singularity. All these descriptions allude to the dynamics of a MP model of a spherical electron cloud model (gray area) into 4D space-time in flat space.

The n -level is attributed to BO into extra dimensions and ν is frequency. The radiative process breaks time reversal symmetry and sustains the application of 2nd law of thermodynamics. Additional details including space-time dynamics are provided in the captions of Fig. 1a, b, c and d in a step-by-step process towards the conceptualization of the MP model. The final product mimics an electron cloud model into 4D space-time. This can be applied to either a one-electron atom such as hydrogen for a MP field or multielectron atoms for multiple MP fields where electrons are distributed in accordance with Pauli exclusion principle. In the following subsections, the model's compatibility to a renormalization process and limitations are explored.

2.2 A generalized renormalization process

In mathematical terms, the conceptualization path of the MP model can be conceived in accordance with common knowledge in physics. Commencing from the electron source towards the generation of space-time, the process conceives a triple integral in the following manner

$$\int_{-\infty}^{\infty} dI_z d\phi \rightarrow \int_{-\infty}^{\infty} \int_0^{\pi} nI_{z\parallel} d\phi d\Omega \rightarrow \int_{-\infty}^{\infty} \int_0^{\pi} \int_0^{2\pi} nI_{z\parallel} d\phi d\Omega d\theta \quad . \quad (1)$$

The boundary of the UMF is normalized to 2π for the spherical electron cloud model encompassing a MP field with precession defined by h (Fig. 1d). $I_{z\parallel}$ is attained along inertia frames of BOs in degeneracy at n -levels in reference to $\vec{I}$ or principal axis of the MP field in asymmetry (Fig. 1d). The position of a particle in orbit into 3D space is defined by the spherical polar coordinates (Ω, Φ, θ) with Ω equal to circular motion of the precession stages, Φ is energy momentum of BO and θ is azimuthal angle between $I_{z\parallel}$ and $\vec{I}$ with respect to the electron source. Increase in applied external energy is expected to produce light cones along BOs at an n -level by expulsion of minimal energy, h and leveling of degenerate states (Fig. 1d). Normalization of Equation 1 then takes the form

$$nI_{z\parallel} \int_{-\infty}^{\infty} d\Omega d\phi d\theta = 1 \quad (2)$$

where the integral incorporates the path covered by the particle in orbit, which is of time invariance for the MP. From the first principle of the quantum Ψ , a particle's position along the MP field of an elliptic type (Fig. 1d) is defined by the Hamilton-Jacobi relationship in the form

$$nI_{z\parallel} = abc\Omega \sin\theta \quad . \quad (3)$$

The parameters abc represent lengths of semiprincipal axes of a BO (Fig. 2). Renormalization then takes the standard form

$$\frac{a^2}{x^2} + \frac{b^2}{y^2} + \frac{c^2}{z^2} \leq 1 \quad (4)$$

where volume of the ellipsoid is given by $v = \frac{4\pi abc}{3}$. Projection of BO into extra dimensions along the x -axis or alternatively $\vec{I}$ generates quantized energy states at n -levels (Fig. 2).

Figure 2. An MP field of elliptic shape. The sphere along the z -axis/ $I_{z\parallel}$ is comparable to a BO, while the x -axis identifies $\vec{I}$ in asymmetry. If z -axis mimes **B**, y -axis equates to **E**.

Alternatively, Equation 3 can be expanded into the form

$$dxdydz = abc\Omega^2 \sin\theta d\Omega d\Phi d\theta \quad (5)$$

where Ω^2 encompasses the precession stages of both the MP and orbitals. To an external observer that causes minimal disturbance (i.e., expulsion of $\hbar$), a particle in orbit is in a superposition state of $\pm \frac{1}{2} m_s$ due to continuous precession of a circular motion and gravity

effects exerted on the orbital paths at singularity (Fig. 1d). The magnitude of the Ψ is depended on the size of the object interacting with light along a straight path. For the particle transition between two orbitals from point $x \rightarrow \hat{x}$ (Fig. 1d), this follows Born's rule in the generalized form

$$nI_{z\parallel} \int_{-\infty}^{\infty} \Psi^* \Psi d\tau = 1 \quad (6)$$

where $d\tau = dx dy dz$ along BO is defined by $nI_{z\parallel}$. Equation 6 holds true from the first principle where Ψ is applicable to all constants or existence of matter at the microscale and this forms the basis for the physical derivation of Schrödinger equation. External light application at a point or $\vec{l}$ of the MP field in precession into forward time (Fig. 1d) may produce standing waves in 2D space of a continuum mode (i.e., Euler's formula). This is defined by the relationships

$$\Psi = A \sin \frac{2\pi x}{\lambda} \quad \text{or} \quad B \cos \frac{2\pi x}{\lambda} \quad (7)$$

where A and B are constants along the y-axis, while λ is projected along x-axis. Such descriptions offered in this section allude to the dynamics of the MP model into 4D space-time.

2.3 Limitations

The most obvious question arises on from what powers the precession mode of the MP model into forward time in a perpetual motion and in turn violate the laws of thermodynamics? By

linking precession to $\pm\hbar$ for the MP field of time invariance along $\vec{l}$, time reversal symmetry is broken in accordance with 2nd law of thermodynamics, while conservation is sustained. Perpetual rotation in one direction then resembles a time clock possibly in response to the initial Big Bang scenario. Further details are provided in the final section of this paper.

Conversely, projection of the Planck's scale towards the boundary of the MP model somewhat severely constrains any observation of the actual orbital paths or quantum gravity towards the nucleus such as for one-electron atom like hydrogen. Thus, current computational models are limited to plots of approximate orbital structures for the Ψ of hydrogen atom without unveiling any quantum effects of gravity if any exist at all. Suppose we are to examine both the actual orbital paths and gravity all at once, unfortunately, this cannot be attained by conventional methods. Hence, the MP model provides a vital conceptualized tool to explore such a scenario towards the reconciliation process of quantum mechanics and general relativity. In the subsequent sections, the model's applicability to symmetry is considered first, followed by the microscale and the cosmic level based on current knowledge in physics.

3.0 MP model versus symmetry

Symmetry at the fundamental level is governed by the Noether theorem and this assumes energy conservation. Its applicability requires the existence of both matter and antimatter as first proposed by Dirac [3] in the process, $e^+ e^- \rightarrow 2\gamma$. Evidences of antimatter are provided by the discovery of positron [4] and stern-gerlach experiment of $\pm \frac{1}{2} m_s$. Beyond that, other empirical data for the existence of supersymmetric partners or microscale black holes are still lacking [5,

6]. While these are still being investigated in ongoing research programs, an intuitive demonstration of symmetry for $\pm \frac{1}{2} m_s$ from Fig. 1d is expounded in Fig. 3a. By assuming a multiverse at a hierarchy of scales, the process is applied to the solar system (Fig. 3b). Here, the

Figure 3. Observation of orbital structures during precession violates lightspeed possibly due to localization of gravity. (a) A particle extracted in an upward direction at position 1 offers $+\frac{1}{2}$ spin for precession into forward time (blue dotted curve and arrow) and vice versa in a downward direction at position 2 (brown dotted curve and arrow). Localization of gravity insinuates gravitational time dilation to the orbital paths towards singularity while precession is attained at lightspeed. This renders superposition of $\pm \frac{1}{2} m_s$. (b) Perhaps, similar process is applicable at a higher hierarchy of scale for Mercury's orbit [7]. Shifts in the perihelion precessions are more accessible to an external observer on Earth, while the anti-field remains hidden or vice versa depending on the instrumental set-up. X^+ represent matter (Mercury) and X^- is the apparent position for the antimatter. The latter is not drawn according to spatial distance. Ω = circular motion that encompasses the precession stages, ω = perturbation of angular velocity and ϕ = is the measure of magnetic flux or BOs into extra dimensions along inertia frames between two precession stages.

actual effects of gravitational time dilation are demonstrated and this allows for the observation of a $\pm$ monopole field at a time for the MP field. In turn, conservation of energy, magnetic momentum, angular momentum and center-of-mass is sustained with respect to the singularity at the center. Perhaps, the major differences between the two scales are that the area of the applied light during observation is either greater or less than the object. For example, for the microscale, superposition of $\pm \frac{1}{2} m_s$ is attained in probabilistic distribution at lightspeed (Fig. 3a). At the macroscale, the reflected light rays are less than the area of the planet and only a monopole field is observed, while the anti-field remains hidden or vice versa (Fig. 3b) depending on the instrumental set-up. Such differences can also be viewed from another perspective in the following manner.

The precession of the orbitals at the microscale is defined by h (Fig. 1d). By contrasts, Mercury's perihelion precession of its elliptic orbit advances by 5,601 seconds of arc per century [2] for a body of a mass equal to 3.285×10^{23} kg. Suppose the formation of the arc equates to the approximate time it takes for the emergence of a Ψ , this is attained at a rate of 56 seconds per year. Thus, the transition of the geodesic motion towards a planetary Ψ at a higher hierarchy of scales for a multiverse is considerably delayed or becomes of gravitational time dilation. Such a scenario considers Newtonian gravity to be localized to a body into space (e.g., Fig. 3a and b). Its sphere of influence then supports symmetry described above. Whether these explanations can possibly account for a discrepancy of 43 seconds predicted by general relativity [2] for Mercury's perihelion precession offers interesting prospect for further investigations.

The above descriptions somewhat appear contrary to the prediction offered by quantum mechanics such as De Broglie relationship for classical objects, where the Ψ is considered to be

negligibly small. As a consequence, the reconciliation path for quantum mechanics and general relativity using conventional methods has become fairly constrained with infinite mathematical terms. Similarly, quantum gravity at Planck's scale is widely considered to offer the most probable path for the unification process. For this study, an alternative perspective is considered by projecting Planck's scale towards the boundary of the conceptualized MP model (Fig. 1d). In order to further consolidate its rigor, the model's applicability to both the microscale and cosmic level is examined next in accordance with existing knowledge in physics.

4.0 MP model versus various aspects of physics

In this section, the model's intuitive application to both classical and quantum physics is presented. Such a process is expected to integrate many aspects of physics into proper perspective. At the moment, this is lacking from current observations and theories without any forthcoming new insights despite the advancement of instrumentation made in recent times [8]. Similarly, the Standard Model theory of particle physics has quite successfully integrated the electroweak forces, weak and strong nuclear forces. The discovery of the Higgs boson was the pinnacle of its final prediction. However, beyond that, the model appears somewhat inadequate to accommodate quantum gravity, dark matter and dark energy among others [5]. Hence, for these undertakings, a purely conceptualized path is pursued based on the adapted method.

In Fig. 4, the treatment of the MP model to various physics themes is offered. Some of these include Planck's radiation, wave function collapse, Euler's formulation, Schrödinger equation, Bohr's model, electromagnetism and so forth. These are briefly expounded below in bullet points.

- *Wave function collapse*: A light beam travelling on a straight path and its interaction with a precessing MP model into forward time registers standing waves of Euler's formulation with uniformity sustained (e.g., Equation 7). The presence of matter (an electron in orbit) smoothens out the precession stages of the MP field to insinuate a physical Ψ at lightspeed. During observation, this adds a spike to the standing waves in the quantized form, $E = nhv$ for the wave function collapse (Fig. 4). The output signal, λ equates to $\hat{x}$ or

Figure 4. The presence of matter within the MP model insinuates a wave function, Ψ . This is available for detection due to light-matter interaction (i.e., a wave function collapse scenario). How some of the major physics themes apply to the conceptualization process are physically incorporated and further explained in the text.

the expectant value and this diminishes with continual precession of the object in orbit into extra dimensions. For the electron, De Broglie relationship, $\lambda = h/p$ defines its wave-particle duality. Its momentum, $p = mv$ is attained along BO with m equal to mass and v is velocity while in orbit. The shift in the position of the electron between two orbitals into space, i.e., $x \rightarrow \hat{x}$ resembles $\Psi \rightarrow \Psi$ transition in accordance with Born's rule for complex probability amplitudes. A level of complexity is attained for the electron transition along the orbital paths into extra dimensions where this is also subjected to gravitational effects (e.g., Fig. 3a). The Heisenberg uncertainty principle, $\Delta x \cdot \Delta p \geq \hbar/2$ defines the electron's position, where $\hbar/2$ incorporates the orbital pair within the MP field (Fig. 4). Any information transfer between the electron and the photon also incorporates the quantum parameters, n , l , m and m_s values. Their applicability to the electron such as for one-electron atom like hydrogen is demonstrated in Fig. 4. For example, the n -level is related to the extra dimensions, l is defined by the orbital paths, m is attributed to BOs in degeneracy and m_s corresponds to the light cones for both the past and future scenarios. Normalization of precession at the point-boundary of the MP field (between two orbital paths) for the electron's position is defined by Euler's formulation (Fig. 4) and this offers a level of indeterminacy, i.e., $i\hbar$ (Fig. 1d). Because of decoherence, the past is not always equivalent to the future or vice versa. Such intuitions further imply that the electron can pass through both slits in a double slit experimentation because its motion is conserved. In addition, whether the information gained by the photon from its interaction with the electron is either conserved or destroyed through decoherence poses an interesting dilemma worth further considerations.

- *Bohr's model:* Quantization of the orbital paths in 2D space is related to the precession stages and this is depicted by the MP model in 4D space-time (Fig. 4). Because quantization epitomizes particle presence, the outgoing radiation translates to discrete forms, $E = nh\nu$ into extra dimensions for the wave function collapse. Thus, the electron is not expected to spiral inwards towards the nucleus with continual radiation at Planck's scale. Because the orbital paths are assumed to violate lightspeed due to both precession at lightspeed and gravitational time dilation effects (e.g., Fig. 3a), their modelling is assumed to mimic the Ψ of hydrogen for complex orbital structures. Applying these intuitions, degenerate BOs would relate to Zeeman effect and perhaps other odd spin types for continual precession into forward time and this warrants further investigations.
- *Schrödinger Equation:* According to Fig. 4, the position of the electron anywhere along the orbital paths into extra dimensions is defined by the Ψ or $i\hbar$ as mentioned above. Thus, shifts in the position are accommodated by the generalized equation, $i\hbar \partial/\partial t \Psi = \hat{H} \Psi$ where $\hat{H}$ is the Hamiltonian operator for both the kinetic and potential energies. The square root of -1 is given by i and this is incorporated into Euler's formulation. Change in time due to precession insinuates shifts in the position of the electron and hence Ψ into inertia frames of extra dimensions (Fig. 4). Such intuitions can be further explored for time independent and other related Schrödinger's equations by also taking into account the m_s for its cat narrative.
- *Electromagnetism:* Based on the conceptualization process (subsection 2.1), the spherical boundary of the MP model is defined by $\mathbf{E}$, while its quantization along BOs in degeneracy is of $\mathbf{B}$. This sustains conservation where a particle such as an electron in orbit into space becomes of a classical Maxwell point. Shifts in its position due to

precession are incorporated into the relationship, $\nabla \times \mathbf{E} = -\partial \mathbf{B} / \partial t$ with ∇ defined by the spacing at the boundary between two BOs into extra dimensions. Precession dictates time and this in turn influences the rotational of $\mathbf{B}$ along BOs. Any interaction with external light on a straight path at point, $i\hbar$ generates electromagnetic field of standing waves (Equation 7). Similarly, external application of magnetic fields during compression of the MP model into an electromagnetic field (Fig. 4) is expected to insinuate Casmir effect. Whether this can also shed some insights into the Meissner effect observed in superconductors at non-zero temperatures requires further investigations.

- *Entanglement:* Continual precession and gravitational time dilation effects induces violation of lightspeed along the orbital paths (Fig. 1d). This sustains superposition state of $\pm \frac{1}{2} m_s$ during observations (Fig. 3a). Hence, linear coupling of a complementary pair of MP models or $\pm \frac{1}{2} m_s$ is expected to produce qubits, 1, 0, -1. Whether the coupling process between a split pair of MP models or electrons can be attained in the absence of light as a transport medium poses an interesting prospect for quantum entanglement.
- *Statistical mechanics:* The precession stages of the orbitals are normalized to a circular motion defined by Ω in thermal equilibrium (Fig. 3a and b). Quantization of the orbitals along BOs provides the microcanonical ensemble for the entropy, S in the form, $S = k \ln \Omega$. The Boltzmann constant, k offers an approximate value to the distributions of both fermions and bosons along degenerate states of BOs into extra dimensions. This is attained in N -dimensions of Hilbert space where both matrix and algebraic relationships for both Dirac-Fermion and Bose-Einstein become applicable. Extension of the baryon octet shape of the orbitals (Fig. 1b) may also accommodate decuplet diagrams for quark distribution towards the nucleus. Such explanations can perhaps be explored for the

Standard Model where the coupling of multiple MP fields during hadron collisions may generate a plethora of particle types from the quantized states of BOs into Hilbert space.

- *Further experimental pursuits:* In summary, it is envisioned that the MP model exemplified in Fig. 4 can be designed and tested experimentally. By building a gyroscope that mimics the model in 4D space-time, its interaction with a light beam travelling along a straight path can be observed for a number of scenarios. 1) Lightspeed at less than the speed of the rotating gyroscope. 2) Lightspeed at almost equal to the speed of the gyroscope. 3) Lightspeed at faster than the gyroscope's speed. Any successful outcomes of such undertaking can perhaps ascertain some of the quantum features described above and this warrants further investigations.

5.0 MP model versus General Relativity

Relativistic theories in physics form the cornerstone for cosmic observations. Einstein's name is synonymous with their development and this involves more complex mathematical paths that are construed to generally comply with experimental findings. Perhaps, a similar approach is pursued here, where the application of the conceptualized model to existing knowledge in physics is intuitively examined. In this section, general relativity is explored in similar manner to those offered in the preceding sections, by first examining a black hole followed by the solar system. Other notable themes such as Big Bang and cosmic inflation are briefly outlined in the final subsection in order to pave a new research path for their pursuits.

5.1 A black hole scenario

For a multiverse at a hierarchy of scales, a black hole can exist as a quantum state of a galactic scale. In such a scenario, the applicability of the MP model to a black hole is demonstrated in Fig. 5. Rotation into forward time is defined by Kerr matrix whereas the extra dimensions along

Figure 5. Application of the MP model to a black hole. Interaction with light travelling in a straight path is expected to vanish along orbital paths. Light absorption is progressively slowed into extra dimensions (green dotted loops). Any decoherence (green wavelength) of minimal energy (gray area) beneath the event horizon (maroon circle) must first overcome coherent flow (black wavelength) by external application of high energy waves. The outline of the MP is given by the blue dotted shape for the simplest scenario (i.e., a hydrogen atom), while its multiples are comparable to a multielectron atom. Blue arrows = forward time and green arrows = shift in precession.

inertia frames are related to Schwarzschild property. Both are expected to have evolved in response to the Big Bang scenario and these are offered at the end of this section. Any interaction with external light travelling in a straight path is intercepted by the orbital paths. In the absence of matter, a coherent flow is sustained beneath the event horizon. In the absence of matter, it would take time infinite for the Ψ to evolve (see Fig. 4). In this case, perhaps the initiation of Ψ from point $x \rightarrow \hat{x}$ between two orbital paths become extremely of gravitational time dilation in light years. Whether any eventual outgoing radiation in such circumstances could account for gravitational waves noted [9] for a binary black hole merger warrants further investigations.

Comparably, a person falling into the black hole may never get the chance to reach singularity if one's body becomes elongated or 'spaghettized' along orbital paths into extra dimensions of forward time infinite. Any outgoing information is limited to external application of high energy waves such as gamma rays compared to the microscale (e.g., Fig. 4). These descriptions possibly rule out any existence of firewall paradox given the explanations offered for entanglement in the preceding section. Hawking radiation would mime $\pm\hbar$ for the microscale but its observation could be limited comparable to the emergence of Ψ described above. In subsequent subsections, the model's applicability to the solar system, a Big Bang scenario and cosmic inflation are examined.

5.2 The solar system in a multiverse

Based on the Nebular hypothesis, the solar system evolved from a cloud of dust and gases immediately after the Big Bang. Suppose the planetary bodies were formed within a UMF of the sun, a likely scenario is offered in Fig. 6. In this case, whether the stability of the solar system

Figure 6. The application of the MP model to the solar system is comparable to a Rutherford planetary model. The orbitals are quantized along straight paths (dotted lines) of BOs. Divergence of the electromagnetic radiation from the sun (red curves and arrows) sustains $\vec{l}$ in asymmetry for the MP field (black arrows) so that time reversal symmetry is broken. The boundary (pale orange circle) indicates conservation. Note, the planets are not plotted according to size or type.

into space is sustained from interactions with others of similar type remains an open question that is not pursued here. Perhaps the solar system in thermal equilibrium could be orbiting a galactic system. But due to gravity, this may not be obvious to an internal observer.

Based on Kepler's 2nd law, the area covered by apsidal precession of a planet's orbital is equivalent to its perihelion precession within the vicinity of the sun. In 2D space-time, the orbit is of an elliptic plane (Fig. 6), while precession insinuates a 4D space-time in flat space as shown in Fig. 7. Here, Einstein's field equation of geometry for the geodesic motion [10] is intuitively applied to a planet in orbit about the sun. Such demonstration is in general agreement with the core principle of general relativity, where matter curves space and space tells matter how to

Figure 7. The application of Einstein's field equation for the geodesic motion of a planet into 4D space-time. The initiation of the planetary Ψ (yellow curve) is naturally incorporated into the geodesic motion but is of gravitational time dilation (i.e., readily unavailable to observations at lightspeed). The process normalizes the precession stages (orange dotted loop) of a MP field (blue dotted loop and arrows) and this sustains conservation. Manifolds of the stress-energy tensor ($T_{u,v}$) framework is assumed into extra dimensions comparable to BOs at the microscale (e.g., Fig. 4). The actual precession of the planet (e.g., Mercury) due to gravitational effect is provided in Fig. 3b. G = Newtonian gravity, R = scalar curvature and $Rg_{u,v}$ = Ricci curvature tensor with definitions of other terms provided in the text.

move. For example, shifts in precession of the MP field into extra dimensions determine how matter should move into space. In turn, the gravitation force of the planet bends a ray of light traveling along a straight path to induce a geodesic motion. Because the initiation of the planetary Ψ is extremely of gravitational time dilation (Fig. 7), Λ equates to both the

cosmological constant and Einstein's original interpretation [2] of it representing the repulsion force for a static universe to balance out gravitational pull. The term, $T_{u,v}$, is related to the inertia frame of BO in degeneracy for the microscale (see Fig. 1c). The light paths in perpendicular to the degenerate BOs of unidirectional provide the metric tensor, $g_{u,v}$ into space-time. These explanations relate extra dimensions of the MP model to the existence of dark energy and dark matter at a hierarchy of scales for a multiverse with special relativity sustained. Applying such intuitions, the possible link between the microscale and the cosmic level is plotted next.

5.3 A probable reconciliation path

Pictorially, the MP model offers a tangible path towards the reconciliation process of quantum mechanics and general relativity based on the Ψ (e.g., Fig. 4 and 7). Such a path is extremely difficult to plot using conventional method because of the diverse themes of physics covered in the conceptualization process of the MP model and its application to physics in general as demonstrated in the preceding sections. For a crude mathematical path, Equation 2 is expanded into the form

$$i \int_{-\infty}^{\infty} (dRdTd\Lambda)_{u,v} \equiv i \int_{-\infty}^{\infty} (d\Omega d\phi d\theta)_{u,v} \quad (8)$$

where i represents an accelerating object in orbit of undefinable scale (∞) and this is incorporated by Euler's formulation (Fig. 4). The momentum of the object in both forward and reversible directions is of equal magnitude along the quantized states of BOs. Based on the geometry

relationship provided by the MP model, Equation 8 provides the link between the microscale and the cosmic level. From Equation 6, the Ψ for the multiverse is then given by the expression

$$T_{u,v} \int_{-\infty}^{\infty} \left(R_{u,v} + \Lambda g_{u,v} + \frac{1}{2} R g_{u,v} \right)^{\frac{8\pi G}{C^4}} dR_{u,v} \equiv n I_{z||}(u,v) \int_{-\infty}^{\infty} \Psi^* \Psi d\tau_{u,v} \quad . \quad (9)$$

The left side of Equation 9 considers that the geodesic motion somehow intuitively incorporates the planetary Ψ (Fig. 7). This is of gravitational time dilation with its magnitude defined by, $\frac{8\pi G}{C^4}$ for the localization of gravity. Thus, a person on Earth may not be subject to collateral damage from large λ or alternatively, Λ that is transiting from outer space unlike the microscale (e.g., Fig. 4). The uncertainty in the position of a planet into space is given by the relationship

$$(G\mathcal{H} - mc)_{u,v} \cong (i\hbar - mc)_{u,v} \quad (10)$$

where $\mathcal{H}$ equates to a minimal energy of precession akin to $\hbar$ for the microscale. Any outgoing radiation towards outer space is attained in accordance with the 2nd law of thermodynamics at lightspeed for mass-energy equivalence, i.e., $-mc$ (Equation 10). Equation 10 considers localization of gravity and this can be further reduced into the form

$$G\mathcal{H}_{u,v} \equiv i\hbar_{u,v} \quad . \quad (11)$$

Equation 11 accommodates shifts in the position of matter between orbital paths, i.e., $x \rightarrow \hat{x}$ at minimal precession stage (see also Fig. 1d). For a multiverse within a visible universe, its limit is

perhaps defined by the cosmic microwave background (CMB) of a MP field type. How these all fit into the Big Bang scenario is plotted next.

5.4 Other related cosmic themes

Based on the alternative version of general relativity offered above, dark matter and dark energy are somewhat intuitively incorporated within the extra dimensions of a multiverse at a hierarchy of scales, while special relativity is sustained. How the Big Bang and the accelerated cosmic inflation fits into such perspective is briefly outlined here in bullet points.

- *A probable Big Bang scenario:* The conceptualized UMF (Fig. 1b) is figurative of the M -theory type and this somewhat incorporates $SO(10)$ of multidimensional structures (Fig. 8). Its resemblance to Higgs mechanism of unidirectional is applicable to time reversal symmetry breaking during the Big Bang. Suppose the Big Bang evolved from a primordial soup in uniformity or singularity, its progression towards the lower hierarchy of scales would transits in the following manner: $SO(10) \rightarrow SU(5) \rightarrow SU(3) \times SU(2) \times U(1)$. The final stage is of the gauge symmetry for the atomic scale and other intermediate steps can be incorporated between the three stages. For the visible universe defined by the CMB of a MP field type (Fig. 8), a literal Wheeler-Feynman one-electron-universe [11] becomes applicable. In such illustration, how matter and time originated including whether there exists other multiverses beyond the one defined by the CMB appears to be philosophical questions not explored in here. Only how the cosmic inflation fits into such a setting is presented next.

Figure 8. An idealized scenario of the Big Bang. (a) Time reversal symmetry is broken during the Big Bang from an initial state of uniformity or singularity. Cooling and regression towards the center insinuates the emergence of multidimensional structures in equilibrium to the foundation state. Each subsequent dimension sets the stage for the evolution of galaxy, star, planet, atom and its constituents towards a black hole. (b) The available matter coalesces into respective dimensional zones to generate various types of cosmic bodies indicated in (a). The bodies either generate their own MP models or assumed an existing one in thermal equilibrium to the CMB. A galaxy formed may contain either some or all of the bodies developed at subsequent dimensions towards the lower hierarchy of scales. Similarly, the emergence of localized MP models at any of the dimensions and devoid of matter would form black holes (e.g., Fig. 5). Such descriptions could perhaps account for why ordinary matter constitutes only 5% of the visible universe compared to 25% of dark matter and 70% of dark energy. Suppose dark matter relates to quantized states of BOs along the orbital paths of the MP models in a multiverse, then dark energy is attained by the orbital paths with precessions at more than lightspeed (see also Fig. 3a and b). How these all fits into the cosmic inflation is offered in the text.

- Cosmic inflation:* Suppose an observer on Earth is aligned within the area defined by the CMB, away from it, the stars and galaxies would appear to undergo accelerated expansion at more than lightspeed (e.g., Fig. 8). One factor that contributes to such a scenario is the possible effects of gravitational time dilation from large bodies orbiting into space. In this case, the emergence of the Ψ is considerably retarded (e.g., Fig. 7) and its interaction with constant light paths is expected to be redshifted. Depending on the scale, the time frames can be of light years with continual precession into forward time. The redshift is defined by the generalized formula, $z = \frac{\lambda - \lambda_0}{\lambda_0} \propto d$ with λ as the measured wavelength shift, λ_0 is the reference wavelength and d is the measured distance. Thus, a body orbiting into space of a MP model at a higher hierarchy of scale would appear to be expanding in accelerated form at more than lightspeed in accordance with the Hubble constant. In this case, blueshifts become fairly constrained. Such a scenario offers interesting prospects for cosmology and astrophysics.
- Further experimental pursuits:* The explanations offered above though are speculative, they somehow provide an alternative version to the development of galaxies, stars, planets and atoms within the visible universe defined by the CMB since the Big Bang. Thus, comparable to the propositions offered for the microscale for further pursuits in the preceding section, similar approach should also be considered for the macroscale. In this case, the light beam should be applied at less than the area of the object embedded within a gyroscope for a number of scenarios. a) Lightspeed at less than the gyroscope speed, b) lightspeed equal to the gyroscope speed and c) lightspeed at more than the gyroscope

speed. Such undertakings should also incorporate the black hole scenario (Fig. 5) and the geodesic motion of a planet in orbit of the sun (Fig. 7).

6.0 Concluding remarks

The unconventional method adapted in this study for the proposed MP model and its application to physics in general provides one tangible path towards the reconciliation process of quantum mechanics and general relativity. This assumes a multiverse at a hierarchy of scales within the limits of the visible universe defined by the CMB, with special relativity sustained. Newtonian gravity is considered to be localized to a body into space. Such intuitions appear somewhat speculative, but the model is developed and applied in accordance with existing knowledge in physics and our general perceptions of the physical world. If considered, the model provides a valuable intuitive tool that can complement conventional methods, especially when attempting to integrate and consolidate many aspects of foundation physics into proper perspective both at the microscale and the cosmic level. This may provide the needed incentives to explore physics further into unknown realms.

Competing financial interests

The author declares no competing financial interests.

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Figures

Figure 1

A step-by-step conceptualization path of the MP model. (a) Expansion of electron-wave diffraction from an electron source in a single slit setup towards detectors A and B. (b) Unidirectional symmetry-breaking of Higgs mechanism type (yellow curve) insinuates the emergence of a MP field (gray area) in 2D space.

Multiple MP fields generates UMF (green loop) and this encloses an octet shape of inertia frames within a circular E. Coherence is epitomized by the wavelength, λ for conservationism. (c) Emergence of orbital structures within the MP mimes the UMF background in thermal equilibrium of 2D space-time. These are quantized along BOs of B in degeneracy into extra dimensions, n_i . (d) The MP field of 2D space-time is transformed into a 4D space-time of a hologram type with time defined by precession (green arrows) into forward motion. The orbital paths are of degenerate states (pink dotted lines) for a particle (green circle) in orbit such as an electron. The wave function, ψ (blue wavy curve) into extra dimensions of neutrino types assumes gravitational time dilation towards singularity at the source. The electron transition between two orbitals from point $\psi\psi\psi$ (pink area) due to precession equates to $\pm h$ for the MP (white area). This is bounded by continuous ψ (green wavy loop) in equilibrium to $\psi\psi$ (blue arrows) in asymmetry. Expulsion of h to an external observer, unveils superposition of $\pm 1/2$ magnetic spin (ms) (navy colored cones). This is attributed to both precession into forward time at lightspeed and effects of gravitational time dilation on the orbital paths towards singularity. All these descriptions allude to the dynamics of a MP model of a spherical electron cloud model (gray area) into 4D space-time in flat space.

Figure 2

An MP field of elliptic shape. The sphere along the z-axis/ $\psi\psi\psi$ is comparable to a BO, while the x-axis identifies $\psi\psi$ in asymmetry. If z-axis mimes B, y-axis equates to E.

Figure 3

Observation of orbital structures during precession violates lightspeed possibly due to localization of gravity. (a) A particle extracted in an upward direction at position 1 offers $+1/2$ spin for precession into forward time (blue dotted curve and arrow) and vice versa in a downward direction at position 2 (brown dotted curve and arrow). Localization of gravity insinuates gravitational time dilation to the orbital paths towards singularity while precession is attained at lightspeed. This renders superposition of $\pm 1/2$ ms. (b) Perhaps, similar process is applicable at a higher hierarchy of scale for Mercury's orbit [7]. Shifts in the perihelion precessions are more accessible to an external observer on Earth, while the anti-field remains hidden or vice versa depending on the instrumental set-up. X^+ represent matter (Mercury) and X^- is the apparent position for the antimatter. The latter is not drawn according to spatial distance. Ω = circular motion that encompasses the precession stages, ω = perturbation of angular velocity and ϕ = is the measure of magnetic flux or BOs into extra dimensions along inertia frames between two precession stages.

Figure 4

The presence of matter within the MP model insinuates a wave function, Ψ . This is available for detection due to light-matter interaction (i.e., a wave function collapse scenario). How some of the major physics themes apply to the conceptualization process are physically incorporated and further explained in the text.

Figure 5

Application of the MP model to a black hole. Interaction with light travelling in a straight path is expected to vanish along orbital paths. Light absorption is progressively slowed into extra dimensions (green dotted loops). Any decoherence (green wavelength) of minimal energy (gray area) beneath the event horizon (maroon circle) must first overcome coherent flow (black wavelength) by external application of high energy waves. The outline of the MP is given by the blue dotted shape for the simplest scenario (i.e., a hydrogen atom), while its multiples are comparable to a multielectron atom. Blue arrows = forward time and green arrows = shift in precession.

Figure 7

The application of Einstein's field equation for the geodesic motion of a planet into 4D space-time. The initiation of the planetary γ (yellow curve) is naturally incorporated into the geodesic motion but is of gravitational time dilation (i.e., readily unavailable to observations at lightspeed). The process normalizes the precession stages (orange dotted loop) of a MP field (blue dotted loop and arrows) and this sustains conservation. Manifolds of the stress-energy tensor ($T_{\mu\nu}$) framework is assumed into extra dimensions comparable to BOs at the microscale (e.g., Fig. 4). The actual precession of the planet (e.g., Mercury) due to gravitational effect is provided in Fig. 3b. G = Newtonian gravity, R = scalar curvature and $R_{\mu\nu}$ = Ricci curvature tensor with definitions of other terms provided in the text.

Figure 8

An idealized scenario of the Big Bang. (a) Time reversal symmetry is broken during the Big Bang from an initial state of uniformity or singularity. Cooling and regression towards the center insinuates the emergence of multidimensional structures in equilibrium to the foundation state. Each subsequent dimension sets the stage for the evolution of galaxy, star, planet, atom and its constituents towards a black hole. (b) The available matter coalesces into respective dimensional zones to generate various types of cosmic bodies indicated in (a). The bodies either generate their own MP models or assumed an existing one in thermal equilibrium to the CMB. A galaxy formed may contain either some or all of the bodies developed at subsequent dimensions towards the lower hierarchy of scales. Similarly, the emergence of localized MP models at any of the dimensions and devoid of matter would form black holes (e.g., Fig. 5). Such descriptions could perhaps account for why ordinary matter constitutes only 5% of the visible universe compared to 25% of dark matter and 70% of dark energy. Suppose dark matter relates to quantized states of BOs along the orbital paths of the MP models in a multiverse, then dark energy is attained by the orbital paths with precessions at more than lightspeed (see also Fig. 3a and b). How these all fits into the cosmic inflation is offered in the text.