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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.

Keywords: monopole, quantum mechanics, general relativity, multiverse

1. Introduction

Since the late 1800s to early1900s, 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 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 also 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 his relativity theory of both special relativity and general relativity. The latter somewhat came to revolutionize physics for the macroscale by successful integration of Newton's theories of gravitation and motion among others. Over time, experimental findings and 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, **E** of the wave

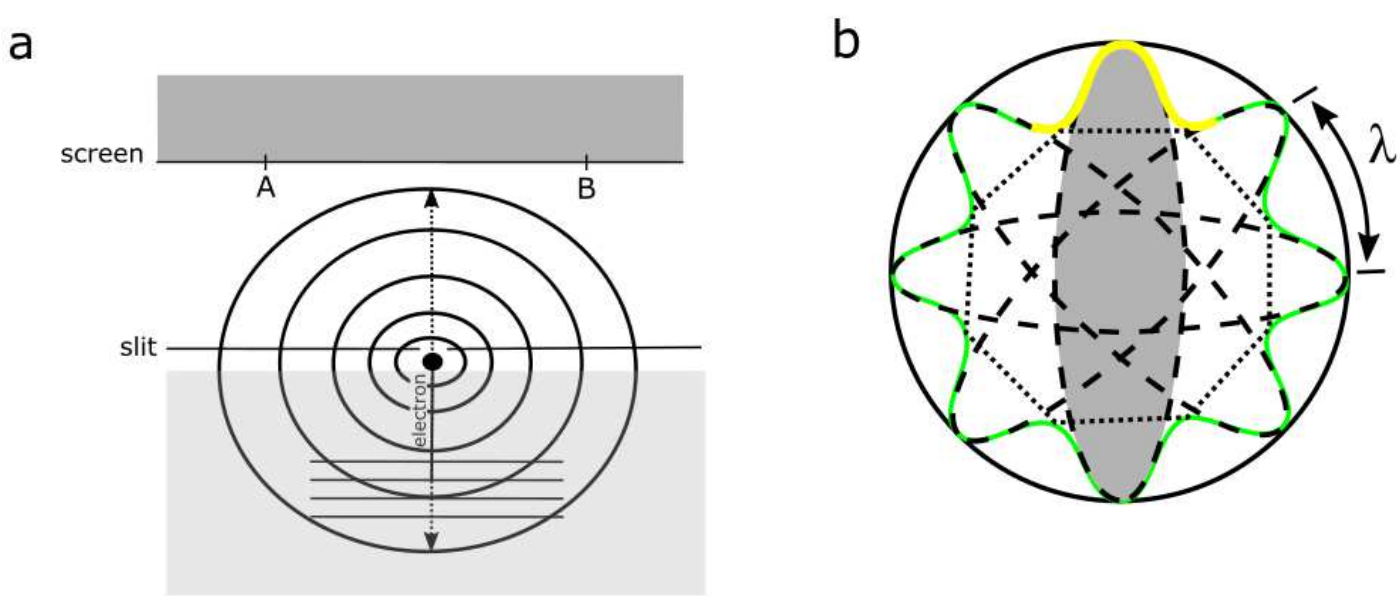
diffraction generates a unidirectional monopole field (UMF) as its quanta [3] and this is dissected linearly along inertia frames of magnetic field, **B**. For the microscale, each frame is converted to Bohr orbit (BO) in perpendicular to **E**. A particle in orbit within the UMF background is naturally quantized which insinuates the emergence of a monopole pair (MP) of an elliptic shape that is equivalent to an orbital. Its application to quantum mechanics and relativity is able to integrate many of their features into proper perspectives consistent with existing knowledge in physics. This considers a multiverse at a hierarchy of scales where interaction with light travelling along a straight path is sustained. These descriptions pave an alternative path for the reconciliation process of quantum mechanics and general relativity. If considered, the proposed MP model offers a dynamic intuitive tool that can be applied to explore physics in general from alternative perspectives using conventional methods.

2. 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. At expansion, the former is projected as an arrow of time, $\vec{I}$ in asymmetry and the latter as corresponding inertia frames of **B** along straight lines. The condensed boundary of **E** evolves into a UMF which is defined by Planck's constant, h perpendicular to the frames. The frames are converted to BOs in time dilation, $I_{z\|}$ to $\vec{I}$ of unidirectional so that the minimal difference towards the point-boundary is given by reduced Planck's constant, $\hbar$ (Fig. 1d). For one-electron atom such as hydrogen, precession of a single MP into forward time at Planck's scale offers the emergence of orbital structures and this somewhat mimes a UMF background in thermal equilibrium. This is of extra dimensional matter in time reversal towards singularity at the electron source. Actual materialization of multiple MPs is accorded to multielectron atoms.



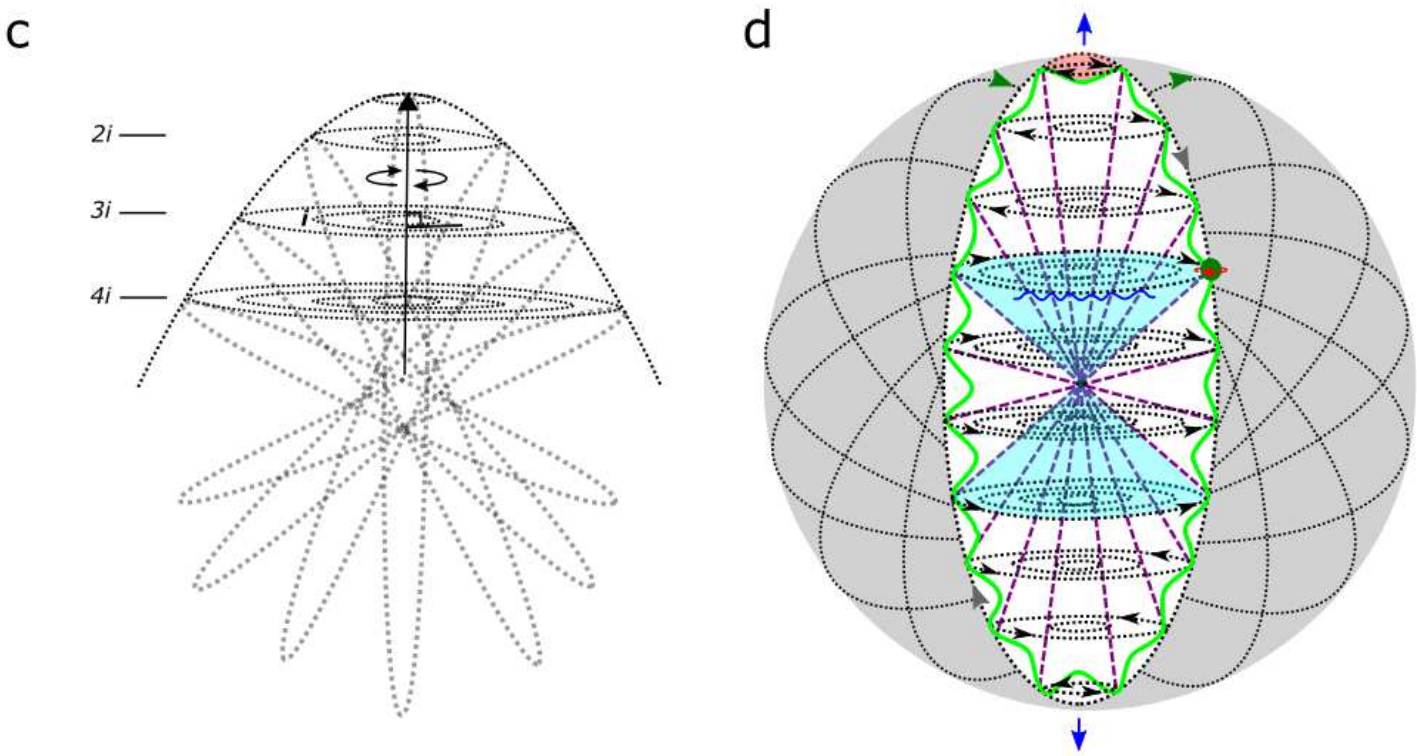


Figure 1. A step-by-step conceptualization path of the MP model. (a) Expansion of electron-wave diffraction from an electron source in a single slit setup towards detectors A and B. (b) An hologram of the MP (gray area) in two-dimensional (2D) space-time in flat space that is comparable to 4D space-time. A unidirectional symmetry-breaking mechanism (yellow curve) is of a Higgs mechanism type. Precession of the MP insinuates the UMF (green loop) and this encloses an octet shape within a circular **E**. Coherence is epitomized by the wave function, λ in accordance with Planck's law. (c) Manifestation of orbitals within the MP mimes the UMF background in thermal equilibrium. These are quantized along BOs of **B** in degeneracy, n_i towards extra dimensions. (d) An exemplification of the space-time dynamics of the MP model. At the microscale, the *actual* orbital path of a particle (green circle) undergoes precession (pink dotted lines) into forward time where its observation (blue wavy curve) is limited to Planck's scale of approximately 10^{-34} cm. Hence, each precession stage (pink area) is defined by $\hbar$ with reference to $\vec{I}$ (blue arrow) in asymmetry. This is quantized into extra dimensions, i.e., $n_i\hbar$ towards the electron source. At the classical level, the particle generates an *apparent* orbital path of an elliptic plane (white area) into forward time (gray arrows). The particle's position between two subsequent precession stages of the MP

into forward time (green arrows) creates gravitational time dilation or geodesic motion (green curvy loop). Suppose this coincides with Maxwell's electromagnetism along straight path of unidirectional in accordance with special relativity, $E = mc^2$, it makes time dilation unobservable for the microscale at Planck's scale. Superposition of $\pm\frac{1}{2}$ magnetic spins (navy colored cone shapes and black arrows) is attained in accordance with the direction of the MP (blue arrows). Overall, these descriptions offer the dynamics of spherical electron cloud model (gray area) into 4D space-time in flat space.

Supposing that the precession stages coincide with (electromagnetic) light path of unidirectional, this offers an electron cloud model. Each precession stage is defined by the Planck's law, $E = nhv$ with n attained along BO and v is frequency so that conservation is sustained while time reversal symmetry is broken. Detailed descriptions that include space-time dynamics and principles of relativity 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 in 4D space-time. Its compatibility to a renormalization process and limitations are examined next.

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 generation of space-time, the process conceives a triple integral in the following manner

$$\int_{-\infty}^{\infty} dI_z d\phi \rightarrow \int_{-\infty}^{\infty}\int_{0}^{\pi} nI_{z\|} d\phi d\Omega \rightarrow \int_{-\infty}^{\infty}\int_{0}^{\pi}\int_{0}^{2\pi} nI_{z\|} d\phi d\Omega d\theta \quad . \tag{1}$$

The boundary of UMF is normalized to 2π for a spherical electron cloud model and the minimal precession stage is defined by $\hbar$ (Fig. 1d). $I_{z\|}$ refers to the time dilation attained along inertia frames of BOs at *n*-levels in reference to $\vec{I}$ or principal axis of the MP in asymmetry (Fig. 1d). Gravitational time dilation is accorded to the presence of matter at the intersection of two precession stages within the MP model. The position of a particle in orbit into 3D space is defined by the spherical polar coordinates (Ω, Φ, θ) with Ω equal to precession stages, Φ is energy momentum of BO and θ is azimuthal angle between $I_{z\|}$ and $\vec{I}$ with respect to singularity at the electron source. In this way, relativity is sustained for the particle motion and its interaction with light. Increase in applied external energy produces light cones along BOs at an *n*-level with reference to the electron source (Fig. 1d). Alternatively, the particle's position in space is defined by $i\hbar$ with i equal to a complex number that represents acceleration along an orbital path. Normalization of Equation 1 then takes the form

$$nI_{z\|}\int_{-\infty}^{\infty} d\Omega d\phi d\theta = 1 \tag{2}$$

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 wave function, a particle's position at the intersection of a BO and MP (Fig. 1d) is defined by the Hamilton-Jacobi relationship in the form

$$nI_{z\|} = abc\Omega sin\theta \quad . \tag{3}$$

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

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

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).

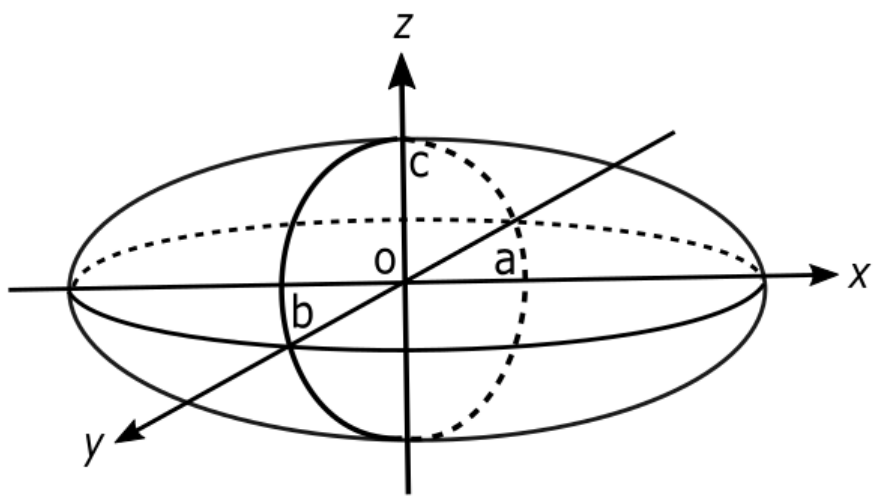


Figure 2. An MP of elliptic shape. The sphere along the *z*-axis/$I_{z\|}$ is comparable to a BO, while the *x*-axis identifies $\vec{I}$ in asymmetry.

Alternatively, Equation 3 can be expanded into the form

$$dxdydz = abc\Omega^2 sin\theta d\Omega d\Phi d\theta \tag{5}$$

where Ω^2 represents both the precession stages of both the MP and orbitals at the subatomic level. A particle existence is in a superposition state of $\pm\frac{1}{2}$ spins (Fig. 1d). Its position sustains the Heisenberg uncertainty principle, $\Delta x.\Delta p \geq \hbar/2$ for the MP. De Broglie's wave function, $\lambda = h/p$ is physically applicable to a precession stage with h demonstrated in Fig. 1d. Momentum is given by $p = mv$ within a BO with v equal to velocity of the particle in orbit and m is its mass. The magnitude of the wave function, Ψ, is dependable on the size of the object interacting with light along a straight path. For an MP, this follows Born's rule in the generalized form

$$nI_{z\|}\int_{-\infty}^{\infty}\Psi^*\Psi d\tau = 1 \tag{6}$$

where $d\tau = dxdydz$ along a BO accorded to $nI_{z\|}$. Equation 6 holds true from the first principle where Ψ is applicable to all constants related to observations at the microscale and this forms the basis for the physical derivation of Schrödinger equation. Because Ψ is physical, external light application and its interaction with the MP model (Fig. 1d) along BOs may produce standing waves in 3D space in a continuum mode of the type

$$\Psi = Asin\frac{2\pi x}{\lambda} \quad \text{or} \quad Bcos\frac{2\pi x}{\lambda} \tag{7}$$

where A and B are constants that define the magnitude along the *z*-axis. These descriptions allude to a dynamic electron cloud model in 4D space-time of the microscale.

2.3. Limitations

First, is the apparent question of what powers the precession mode of the MP model into forward time in a perpetual motion and in turn violates the laws of thermodynamics? With *h* being projected outward at the boundary of the MP (Fig. 1d), this reconciles well with black body radiation where the electromagnetic field is conserved. Here, *h* at a constant value of 6.626×10^{-34} Joules per second defines the orbital precession at the microscale. In this case, quantum gravity at Planck's scale becomes negligible during observations. Hence, orbital precessions appear unobservable under current instrumentation while an electron cloud model or wave function of hydrogen is produced for precession of the MP into extra dimensions at lightspeed, $E = mc^2$ (Fig. 1d). Time reversal symmetry or regression of $\vec{I}$ in asymmetry is broken by Planck's radiation in accordance with 2nd law of thermodynamics while conservation is assumed. How gravitational time dilation becomes observable at the macroscale is explored later in the text when dealing with general relativity. For now, it is important to consider the model's applicability to physics in general for a number of reasons. Current theories are not able to put into proper perspective many aspects of quantum mechanics such as entanglement and probabilities despite the advancement of instrumentation made in recent times [4]. Similarly, the standard model theory of particle physics has been quite successful in integrating electroweak forces, weak and strong nuclear forces, with the discovery of the Higgs boson forming its pinnacle. However, beyond that, the model somewhat appears inadequate to accommodate

quantum gravity, dark matter, dark energy among others [5]. For these reasons, the MP model's relevance to symmetry is considered first before examining its applicability to both the microscale and the cosmic level in the subsequent sections.

3. 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 $e^+ e^- \longrightarrow 2\gamma$. Evidences of antimatter are provided by the discovery of positron [6] and stern-gerlach experiment of $\pm\frac{1}{2}$ spins. Beyond that, other empirical evidences for the existence of supersymmetric partners or microscale black holes are still lacking [5, 7]. While these are still investigated in ongoing research processes, an intuitive demonstration of symmetry of $\pm\frac{1}{2}$ spins 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). Perhaps, the major differences between the two scales are that the area of the applied light during observation is greater than the object of interest. For example, precession at the microscale is attributed to Planck's scale (Fig. 1d) while this sustains relativity for the classical scale for observational purposes. At the macroscale, it is envisioned that reflected light rays are less than the area of the planet, so classical time allows for observation of a monopole field while the other part of the MP remain hidden (Fig. 3b). Such explanations are perhaps, supported by existing experimental results in the following manner. Orbital precession for the microscale is defined by h as mentioned earlier. By contrasts, Mercury's perihelion precession of its elliptic orbit

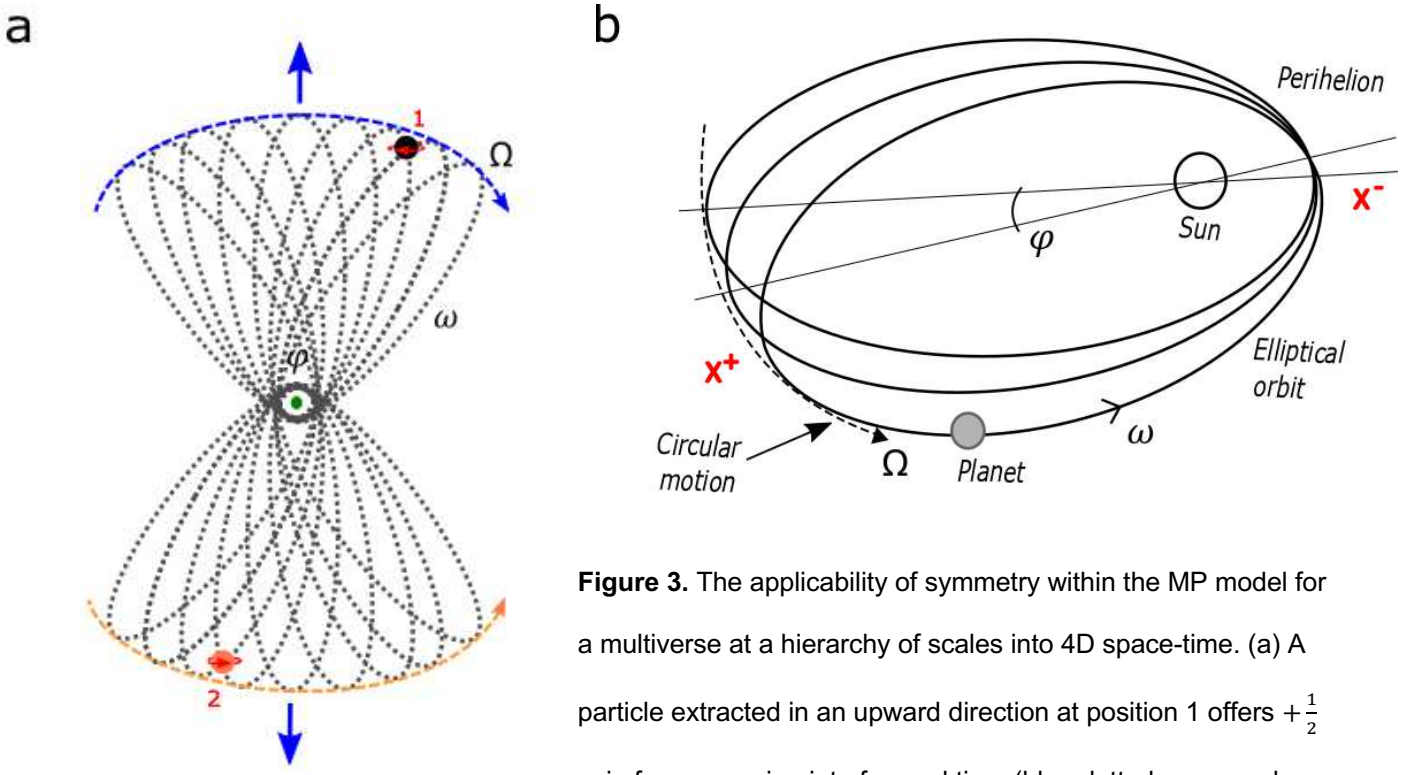


Figure 3. The applicability of symmetry within the MP model for a multiverse at a hierarchy of scales into 4D space-time. (a) A particle extracted in an upward direction at position 1 offers $+\frac{1}{2}$ spin for precession into forward time (blue dotted curve and arrow) and vice versa in a downward direction at position 2 (brown dotted curve and arrow). The orbital path undergoes perihelion precession with reference to the nucleus at the center and this sustains Pauli exclusion principle. Observation of the particle offers wave functions of probabilistic distributions where there is a level of uncertainty towards determining its exact position due to precession. (b) A similar scenario is perhaps applicable to Mercury's orbit [8]. Due to the scale, complete observation of the shift in the perihelion precessions of the anti-field remains hidden to an external observer on Earth. X^+ is matter (Mercury) and X^- is the apparent position for antimatter and this is not drawn according to spatial distance. Ω = precession stage, ω = perturbation of angular velocity and φ = is the measure of magnetic flux from BOs into extra dimensions that crosses the area in straight paths defined by two precession stages.

advances by 5,601 seconds of arc per century [2] with its body of a mass equal to 3.285 x 10^{23}kg. This is at a rate of 56 seconds per year or is equivalent to 3.711 x 10^{-32} Js (i.e., by assuming 6.626 x 10^{-34} J per s) for Mercury miming black body radiation. Such explanations imply to

continuity at the macroscale and discontinuity for the microscale. How this might account for a discrepancy of 43 seconds predicted by general relativity for Mercury's perihelion precession warrants further investigation while this currently cannot be accounted for by Newtonian gravity [2]. In the subsequent section, the model's applicability to various other themes of physics for the microscale is briefly plotted before examining its relevance to the macroscale.

4. MP model versus various aspects of physics

There are a number of themes in physics that can be intuitively assessed from alternative perspectives by applying the MP model as an intuitive guide. Such a process is attempted to integrate subthemes into proper perspective and this might complement conventional methods. Some of those considered are listed below in bullet points.

- *Hydrogen atom:* If the electron source is substituted for a one-electron atom such as hydrogen, the minimal energy at Planck's scale (Fig. 1d) would identify with zero-point energy of a vibration spectrum. The vibrational modes at n-levels would mime degenerate BOs at $n_i\hbar$ into extra dimensions (Fig. 1c) while their link to the orbitals provide rotational modes (Fig. 1d). For precession of the MP into forward time within an electron cloud model, complex orbital structures for the wave function of hydrogen can be explored as mentioned earlier in subsection 2.3. For a multielectron atom, materialization of the number of MPs is expected to increase in order to accommodate the electron probability distributions.

- *Fermions and neutrinos types:* Particle and antiparticle positions of probabilistic distributions along the orbital paths within the MP at the subatomic level (Fig. 3a) can somehow be explored for the fermion types. Suppose Weyl fermions are accorded to the light cone shapes (Fig. 1d), then Dirac fermions are applicable to BOs and their degenerate states along straight paths. Majorana fermions are accorded to the orbital paths within the MP where a particle exists as its own antiparticle (e.g., Fig. 3a). Similarly, whether neutrinos acquire mass through oscillation by following Dirac or Majorana statistics is not clearly understood [9]. Such a possibility exists suppose the hydrogen atom mimes the MP model as described above. External light interactions with hydrogen atoms in a fluid medium would induce both electron-like leptons and neutral leptons (neutrinos) from extra dimensions of the MP (Fig. 1d). Precessions into forward time would allow for the leptons to change flavor with their mass acquired in accordance with relativity, $E = mc^2$. How statistical applications become applicable for such a scenario is described next.
- *Statistical mechanics:* Suppose the surface boundary of the MP precession is defined by Ω, then each dimension of BO is related to the microcanonical ensemble, $S = k\ In\Omega$. The Boltzmann distributions, k of fermions and bosons along BOs are attained in N-dimensions of Hilbert space along the orbital paths (Fig. 1d). The orbital extensions from baryon octet shape (Fig. 1b) into the nucleus are expected to produce decuplet diagrams to accommodate quark distributions for a multiverse at a hierarchy of scales. In this way, both matrix and algebraic mathematical formulations of Dirac-Fermion and Bose-Einstein relationships can be intuitively explored.

- *Zeeman effect and conductance band:* External application of a pair of strong magnetic fields in a linear contraction form can induce Zeeman effects in a UMF background (Fig. 1b). For example, along the *z*-axis/$I_{z\|}$ (Fig. 2), this intersects BOs in degeneracy. Its coupling to the orbital paths can induce superposition states of $\pm\frac{1}{2}$ spins. Valence electrons released from the annihilated outermost orbital structures may induce current flow, while a Meissner effect is envisioned towards the source (e.g., Fig. 3a). The applicability of quantum gravity is considered negligible with *h* accorded to the orbital precession at Planck's scale (e.g., Fig. 1d).
- *Classical electromagnetism:* Divergence of electromagnetic radiation from the source sustains conservationism for any outgoing radiation at Planck's scale in accordance with the MP model. Suppose the boundary of the spherical electron cloud model is defined by **E**, its quantized state along BOs is accorded to **B**. A particle in orbit then identifies with a classical Maxwell point into space. Its position is defined by, $\nabla \times \mathbf{E} = -\partial\mathbf{B}/\partial t$ with ∇ equal to the charge gaps between the quantized states and this enables dipole moment of partial charges for an MP in the proposed model. Because of precession in a circular motion, electromagnetism is applicable along inertia frames of the BOs in straight lines of unidirectional.
- *Entanglement:* Here, it is envisioned that splitting of the MP is expected to regenerate the process demonstrated in Fig. 1 so superposition states of $\pm\frac{1}{2}$ spins is sustained. In this case, linear coupling of MPs would produce qubits, 1, 0, -1 at a certain frequency of the electromagnetic radiation. Whether this can be processed between a complementary pair in the absence of light as a transport medium poses interesting prospects for entanglement.

- *Standard Model:* Quantum field theory is based on fields with their excitations being equivalent to quantized states or particles. Because excitation is normally induced by light interaction with matter, this sustains special relativity while observations are pursued by classical field theory. Such a scenario is perhaps applicable to the MP model (Fig. 1). Suppose the Higgs boson is accorded to the MP, hadron collisions would assume the orbital paths where these become straight lines at high energy levels. Coupling of multiple MPs is expected to generate a plethora of particle types from degenerate states of BOs into extra dimensions (i.e., equivalent of leptons as described above) akin to a Feynman diagram integral path. Higgs mechanism in constriction form towards the source (Fig. 1b) provides the link between the MP and its internal orbital structures into Hilbert space. Physical descriptions of both baryon octet and decuplet diagrams including others such as Meissner effect are mentioned above. Applying these intuitions, gauge symmetry, $SU(3) \times SU(2) \times U(1)$ [10] and other related themes can be further explored.

5. 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 agree with experimental findings. A similar approach is perhaps pursued here as demonstrated in the previous sections where relativity is intuitively applied to the conceptualized model. In this section, general relativity is explored starting with a black hole followed by the solar system. Other notable cosmic themes, such as Big Bang and redshifts are briefly outlined in the final subsection in order to plot a future research path for their pursuits.

5.1. A black hole

For a multiverse at a hierarchy of scales, a black hole may possibly 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. 4. The rotation into forward time becomes of Kerr matrix while the extra

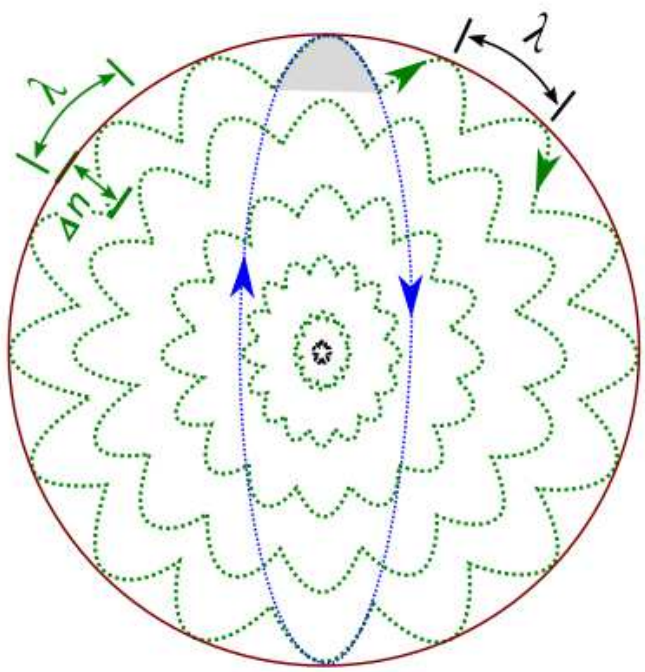


Figure 4. Application of the MP model to a black hole. Interaction with light travelling in a straight path is expected to vanish along orbital paths where time reversal for $\vec{I}$ in asymmetry towards singularity is progressively slowed down into extra dimensions (green dotted loops). Decoherence (green wave function) of outgoing radiation must first satisfy coherence (black wave function) to smoothen out shifts in precession stages in order to overcome minimal energy state at Planck's scale (gray area) beneath the event horizon (maroon circle). The outline of the MP is given by the blue dotted shape for the simplest scenario (i.e., hydrogen atom), while its multiples are comparable to a multielectron atom. Blue arrows = forward time and green arrows = shift in precession.

dimensions indicate Schwarzschild property. Any interaction with external light travelling in a straight path is intercepted by the orbital paths. For any outgoing radiation, this must first satisfy coherence at minimal energy level (comparable to presence of matter) beneath the event horizon before any decoherence can take place. In the absence of matter, light paths are engulfed by the orbitals in precession mode of time infinite into extra dimensions. The process somewhat resembles intense gravity towards singularity. In this way, any outgoing radiation is extremely limited while Planck's radiation would mime Hawking radiation type. Gravitation waves are possibly related to the precession of an MP into forward time (e.g., Fig. 3a) in the absence of matter comparable to a binary black hole merger [11]. Such radiation types would take light years to evolve suppose the colossal orbital structures absorb and store photons before a maximum threshold is attained comparable to Planck's radiation of a black body. In this way, any fireworks paradox at the event horizon is avoided. Given the orbital's size, a person falling into the black hole may never get the chance to reach singularity if one's body becomes elongated or 'spaghettized' in precession stages at extra dimensional matter into forward time. Because of precession, $\vec{I}$ in asymmetry is progressively slowed down towards singularity where time reversal is broken. Hence, the delay in outgoing radiations such as the gravitational waves mentioned above offers one possibility of linking the inception process of the MP model to the Big Bang process. In this case, the cosmic microwave background (CMB) of an ellipsoid type poses as the visible limit of the universe where its application to 4D space-time would relate to the demonstration offered in Fig. 3. Somehow this might coincide with the development of galaxies and black holes including dark energy and dark matter. How these all fits into the application of general relativity is considered next by examining the solar system.

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 Big Bang. Suppose the planetary bodies were developed within a UMF of the sun, a likely scenario is presented in Fig. 5. In this case, whether the stability of the solar system

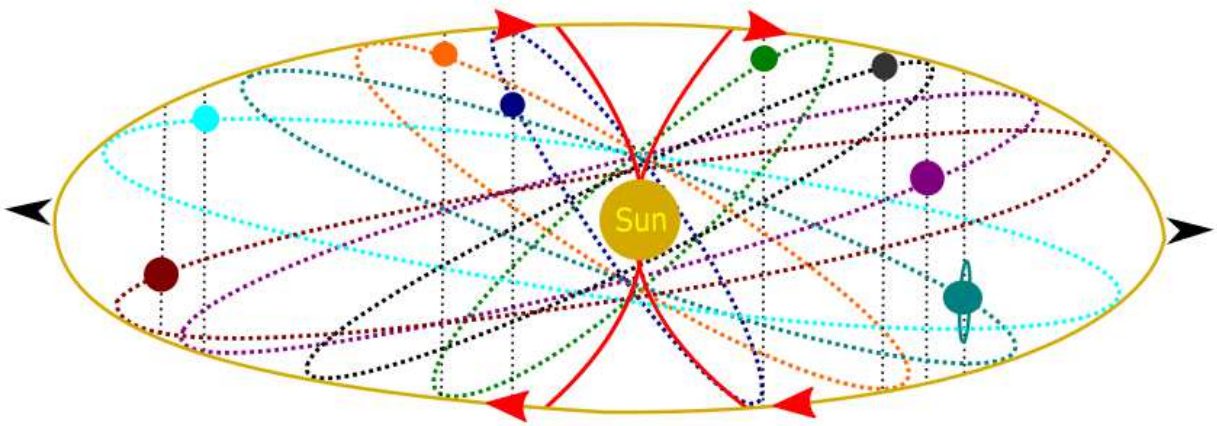


Figure 5. The application of the MP model to the solar system is comparable to a Rutherford planetary model. The orbitals are quantized (dotted lines) along straight paths away from the sun. Divergence of the electromagnetic radiation from the sun (red curves and arrows) sustains $\vec{I}$ in asymmetry for the MP (black arrows). The boundary (pale orange circle) depicts conservation where it might take a while to reduce the sun to a black hole scenario (Fig. 4) with any outgoing radiation attained in accordance with the 2nd law of thermodynamics. 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 equal forces exerted by an MP in opposing directions and the planetary orbitals in thermal equilibrium (see also Fig. 1) might sustain a solar universe that is accelerating in uniformity into space in accordance with the Newton's first law of motion.

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. 5), with its precession of 4D space-time demonstrated in Fig. 3b. In Fig. 6, Einstein's field equation of geometry [12] is intuitively applied to the MP model for a planet in orbit about the sun. Such demonstration is in general agreement with the core principle

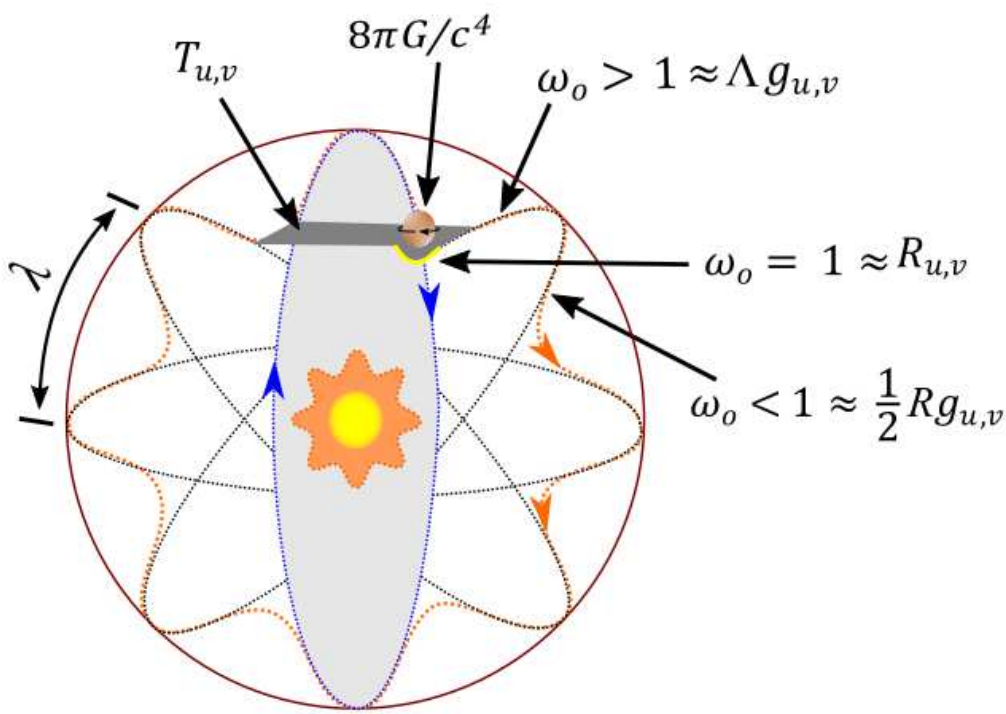


Figure 6. An intuitive demonstration of how Einstein's field equation is incorporated into the MP model for a planet in orbit in the solar system. Geodesic motion (yellow curve) normalizes the precession stages (orange dotted loop) of an orbital (blue dotted loop and arrows) to produce a cosmic wave type of time dilation. Manifolds of the tensor framework are envisioned between the boundary (maroon circle) and subsequent quantized states of BOs into extra dimensions towards the sun. Actual precession of the planet in 4D space-time is demonstrated in Fig. 3b. G = Newtonian gravity, *R* = scalar curvature and $Rg_{u,v}$ = Ricci curvature tensor with definitions of other symbols provided in the text.

of general relativity, where matter curves space and space tells matter how to move. For example, shift in precession of the model 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 generate geodesic motion. This insinuates gravitational time dilation of a cosmic wave (Fig. 6), where 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 stress-energy tensor in flat space-time, $T_{u,v}$, is comparable to Φ of the inertia frame of BO for the microscale (Fig. 1c). Coupling of the orbital paths and the frames provide metric tensor, $g_{u,v}$ of space-time. These explanations somewhat intuitively relate extra dimensions of the MP model to the existence of dark energy and dark matter. 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. 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 proposed model and its application to physics in general as demonstrated in the preceding sections. For a crude mathematical path, this is attempted by expanding Equation 2 into the form

$$i\int_{-\infty}^{\infty}(dRdTd\Lambda)_{uv} \equiv i\int_{-\infty}^{\infty}(d\Omega d\phi d\theta)_{uv} \tag{8}$$

where *i* represents an accelerating object in an orbital with both forward and reversible directions of equal magnitude along an inertia fame of BO. Based on geometry relationship, Equation 8 provides the link between the microscale (Fig. 1) and the cosmic level (Fig. 6). Similarly, correlation for the quantized states from Equation 6 is given by the expression

$$T_{u,v}\int_{-\infty}^{\infty}\left(R_{u,v}+\Lambda g_{u,v}+\frac{1}{2}Rg_{u,v}\right)^{2}dR_{u,v}\equiv\ nI_{z\|(u,v)}\int_{-\infty}^{\infty}\Psi^{*}\Psi d\tau_{u,v}\quad . \tag{9}$$

Equation 9 assumes that the geodesic motion induces cosmic wave (Fig. 6) comparable to the microscale. For light interaction with an object orbiting into space-time, this is defined by the relationship

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

where $\mathcal{H}$ is the minimal energy of precession akin to $\hbar$ for the microscale. The latter at the atomic state has a value of 1.055 x 10^{-34} Js for minimal energy related to BO within the MP (Fig. 1d). The former for Mercury is equal to 5.910 x 10^{-33} Js (i.e., 3.711 x 10^{-32} Js / 2π) as inferred in section 3.0. Between the microscale and the geodesic motion of a planet, uniformity is attained for the classical level. Thus, a person on Earth is not subject to either collateral damage from gigantic cosmic waves or constant bombardment of harmful radiations. Any decaying process of matter is attained in accordance with the 2nd law of thermodynamics at lightspeed, i.e., – *mc* (Equation 10) so that conservation is sustained. Thus, matter into space assumes the form

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

Equation 11 sets the classical boundary of the terrestrial scale between the atomic state and the cosmic level. The spherical boundary and BOs of octet shape for the multiverse at the hierarchy of scales can be pursued by Poincaré conjecture, while assuming Newtonian gravity to be localized to a body into space (e.g., Fig. 6). Uncertainty towards defining a planet's position is given in Fig. 3b. However, because advances of perihelion precession for a planet in orbit take a much longer time frame (e.g., Mercury), the uncertainty principle is considered negligibly small for the macroscale where continuity is sustained.

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 where conservation is assumed. In this case, it is also important to consider the likely scenarios of the Big Bang and how this should also relate to accelerated cosmic inflation. Because such a path is very complicated and involves a number of broader themes within the areas of astrophysics and cosmology, this is not pursued into details. Rather a possible path towards their pursuit is demonstrated from an alternative perspective.

- *Big Bang theory*: The conceptualization of UMF (Fig. 1b) is figurative of the M-theory type and this somewhat incorporates $SO(10)$ of multidimensional structures. In a way, it resembles symmetry breaking of a Higgs mechanism of unidirectional towards higher dimensions with respect to singularity. Suppose the Big Bang evolved from a primordial

soup at a higher hierarchy of scales, its progression towards the lowest level transits in the following manner: $SO(10) \rightarrow SU(5) \rightarrow SU(3) \times SU(2) \times U(1)$. The final state is of gauge symmetry for the atomic scale and other intermediate steps can also be incorporated between the three stages. For a multiverse, a literal Wheeler-Feynman one-electron-universe [13] is applicable at all scales. Whether this might also extend to the CMB of an ellipsoid type is open to further discussions. How cosmic inflation is applicable to such proposition is demonstrated next.

- *Redshifts*: Precession of large bodies in orbits into space-time is expected to produce redshifts in the form, $z = \frac{\lambda - \lambda_0}{\lambda_0} \propto d$ with λ as the measured wavelength shift, λ_0 is the reference wavelength and d is the measured distance. With the geodesic motion generated in continuum mode for a body in orbit (Fig. 6), there is also continuous shift in its position along the orbital paths into forward time infinite. The cosmic wave related to the geodesic motion is depended on the size of the body and this might pose as an ideal candidate for dark matter. With precession into forward time, blueshifts are fairly constrained towards an external observer. Somehow this is expected to give an impression of accelerated expansion consistent with Hubble constant. Such a possibility exists within the confinement of the CMB of an ellipsoid type. How this can be attained in 4D space-time is exemplified in Fig. 3 and also described in subsection 5.1 for black holes. This could possibly include others such as galaxies, solar systems and ultimately the atoms.

6. 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 with special relativity sustained while gravitation force is 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 MP 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

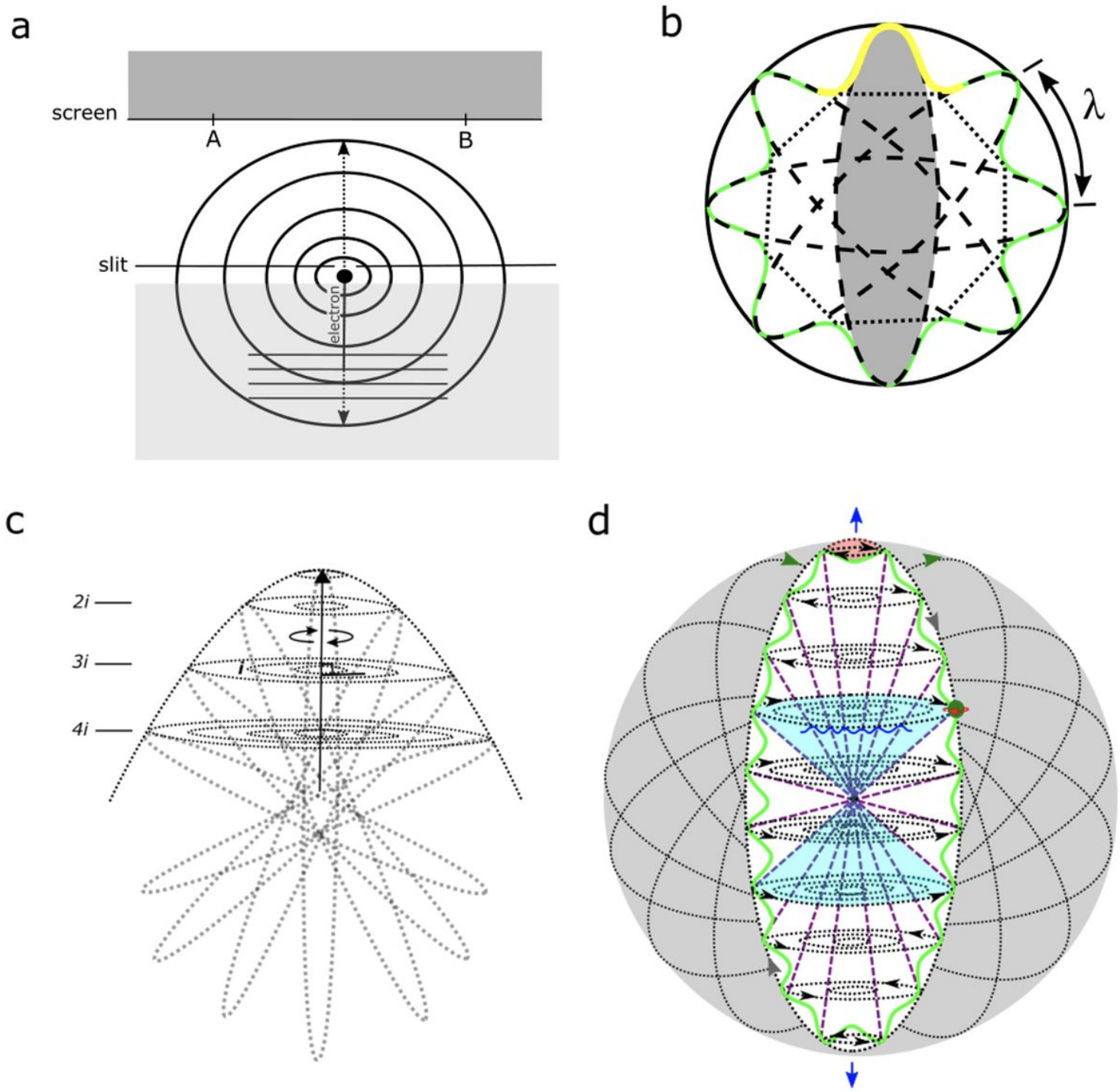

Figure 1

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) An hologram of the MP (gray area) in two-dimensional (2D) space-time in flat space that is comparable to 4D space-time. A unidirectional symmetry-breaking mechanism (yellow curve) is of a Higgs mechanism type. Precession of the MP insinuates the UMF (green loop) and this encloses an octet shape within a circular E. Coherence is

epitomized by the wave function, λ in accordance with Planck's law. (c) Manifestation of orbitals within the MP mimes the UMF background in thermal equilibrium. These are quantized along BOs of B in degeneracy, ni towards extra dimensions. (d) An exemplification of the space-time dynamics of the MP model. At the microscale, the actual orbital path of a particle (green circle) undergoes precession (pink dotted lines) into forward time where its observation (blue wavy curve) is limited to Planck's scale of approximately 10-34 cm. Hence, each precession stage (pink area) is defined by "ħ" with reference to I^ (blue arrow) in asymmetry. This is quantized into extra dimensions, i.e., "niħ" towards the electron source. At the classical level, the particle generates an apparent orbital path of an elliptic plane (white area) into forward time (gray arrows). The particle's position between two subsequent precession stages of the MP into forward time (green arrows) creates gravitational time dilation or geodesic motion (green curvy loop). Suppose this coincides with Maxwell's electromagnetism along straight path of unidirectional in accordance with special relativity, E = mc2, it makes time dilation unobservable for the microscale at Planck's scale. Superposition of ±1/2 magnetic spins (navy colored cone shapes and black arrows) is attained in accordance with the direction of the MP (blue arrows). Overall, these descriptions offer the dynamics of spherical electron cloud model (gray area) into 4D space-time in flat space.

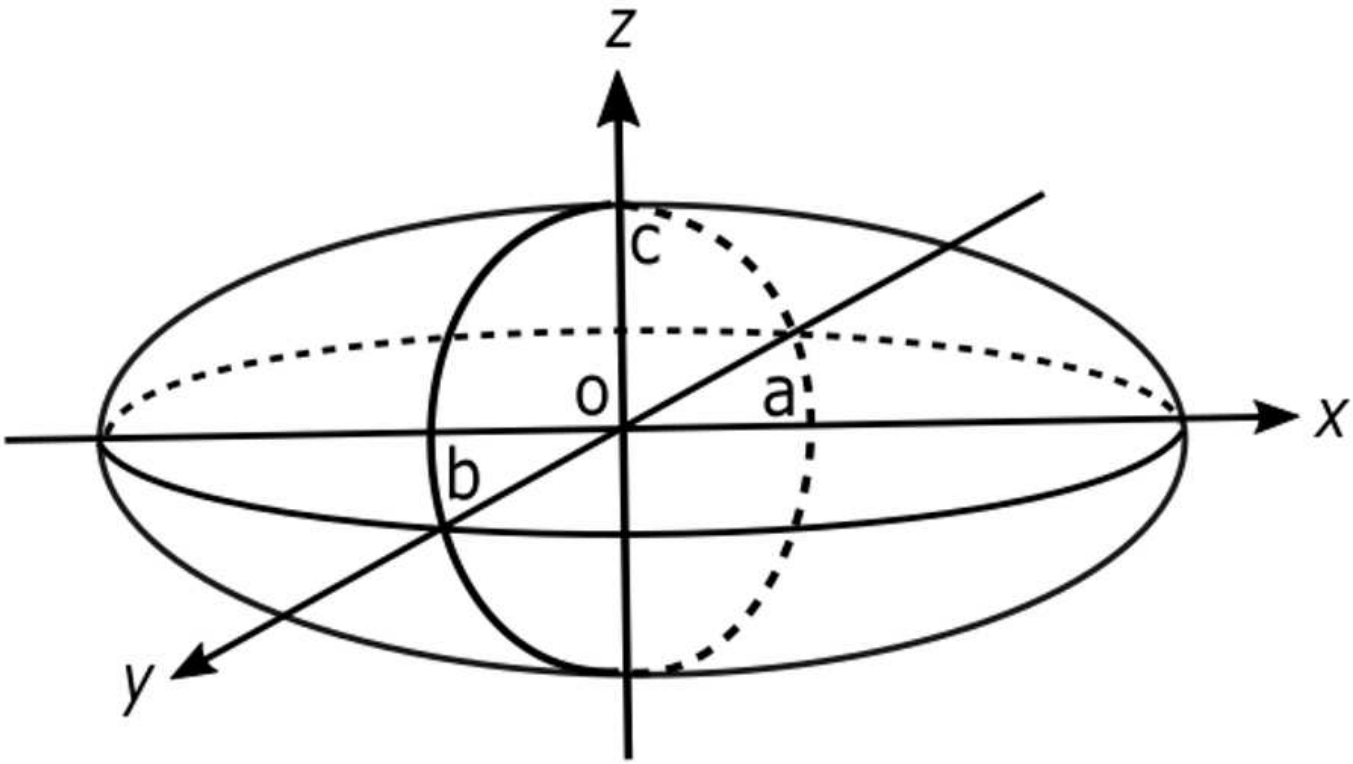

Figure 2

An MP of elliptic shape. The sphere along the z-axis/I_(z) is comparable to a BO, while the x-axis identifies I^ in asymmetry.

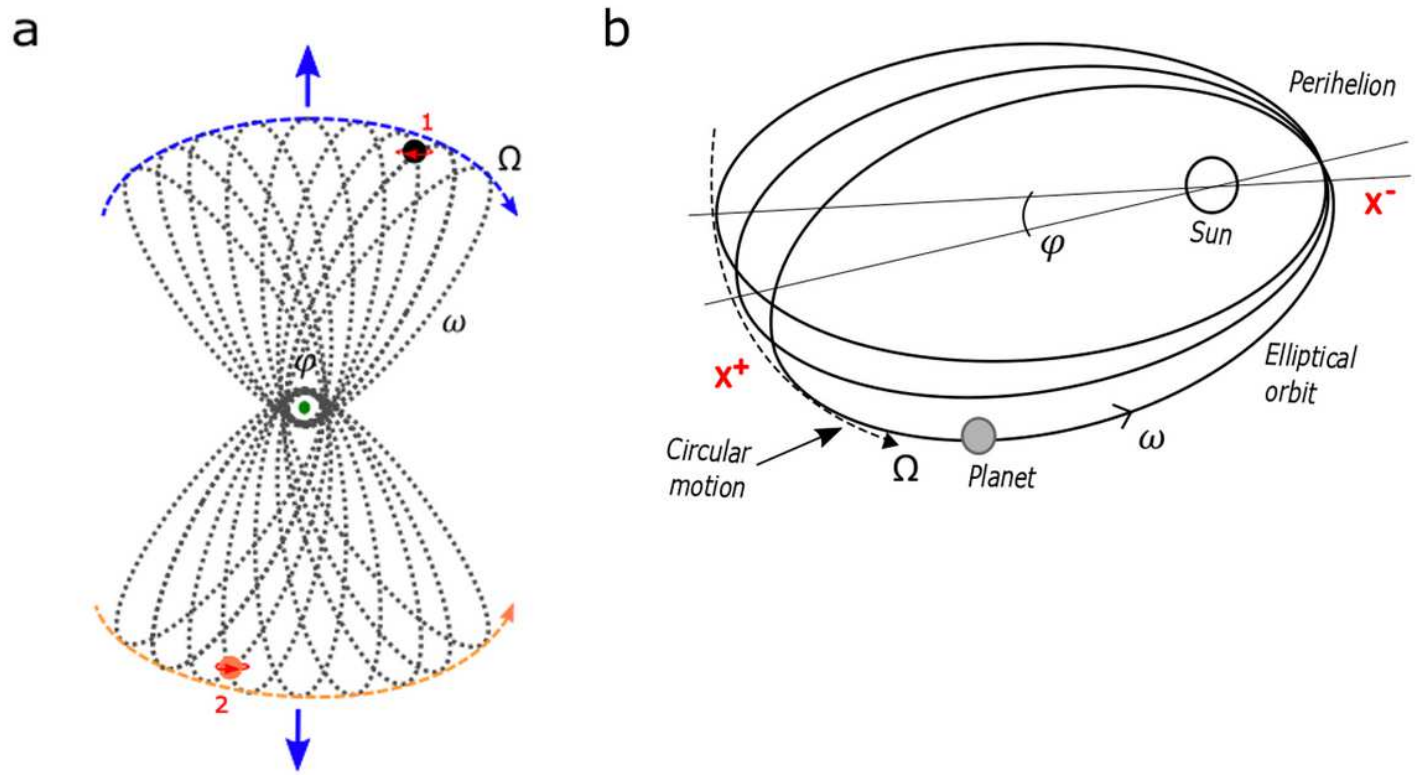

Figure 3

The applicability of symmetry within the MP model for a multiverse at a hierarchy of scales into 4D space-time. (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). The orbital path undergoes perihelion precession with reference to the nucleus at the center and this sustains Pauli exclusion principle. Observation of the particle offers wave functions of probabilistic distributions where there is a level of uncertainty towards determining its exact position due to precession. (b) A similar scenario is perhaps applicable to Mercury's orbit [8]. Due to the scale, complete observation of the shift in the perihelion precessions of the anti-field remains hidden to an external observer on Earth. X+ is matter (Mercury) and X- is the apparent position for antimatter and this is not drawn according to spatial distance. Ω = precession stage, ω = perturbation of angular velocity and φ = is the measure of magnetic flux from BOs into extra dimensions that crosses the area in straight paths defined by two precession stages.

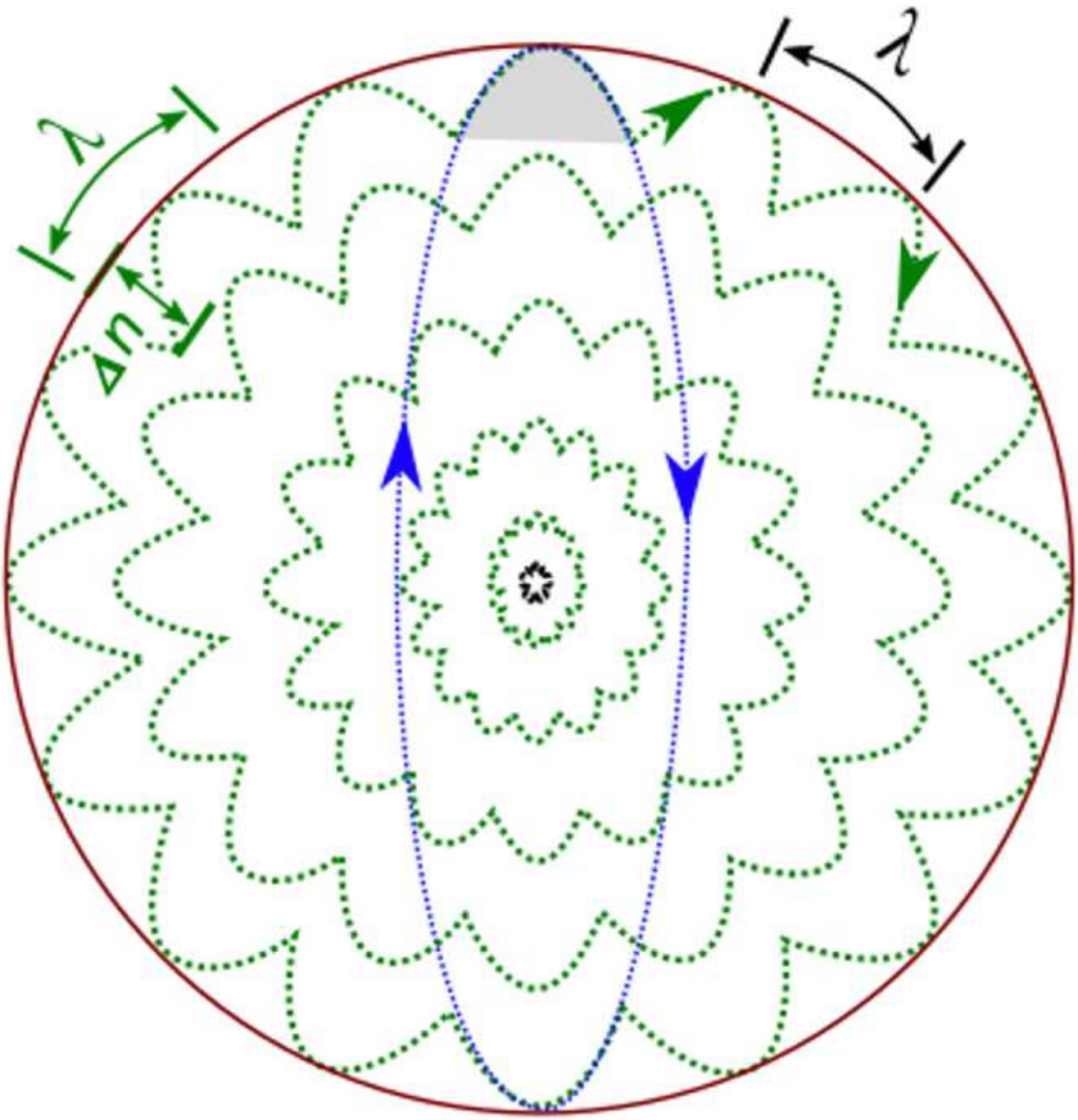

Figure 4

Application of the MP model to a black hole. Interaction with light travelling in a straight path is expected to vanish along orbital paths where time reversal for I^ in asymmetry towards singularity is progressively slowed down into extra dimensions (green dotted loops). Decoherence (green wave function) of outgoing radiation must first satisfy coherence (black wave function) to smoothen out shifts in precession stages in order to overcome minimal energy state at Planck's scale (gray area) beneath the event horizon (maroon circle). The outline of the MP is given by the blue dotted shape for the simplest scenario (i.e.,

hydrogen atom), while its multiples are comparable to a multielectron atom. Blue arrows = forward time and green arrows = shift in precession.

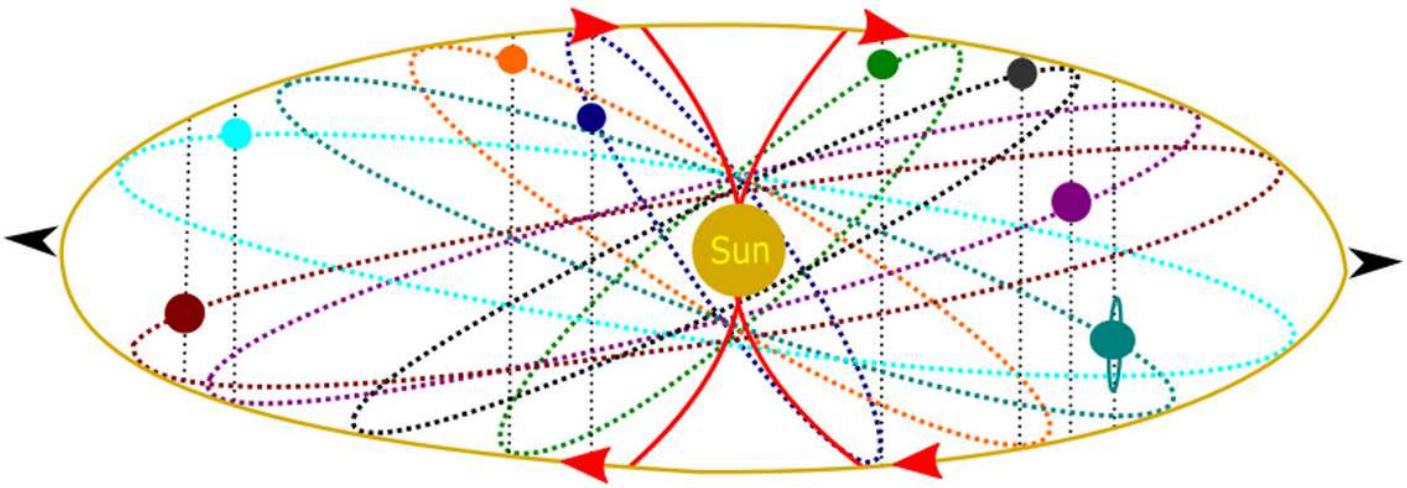

Figure 5

The application of the MP model to the solar system is comparable to a Rutherford planetary model. The orbitals are quantized (dotted lines) along straight paths away from the sun. Divergence of the electromagnetic radiation from the sun (red curves and arrows) sustains I^ in asymmetry for the MP (black arrows). The boundary (pale orange circle) depicts conservation where it might take a while to reduce the sun to a black hole scenario (Fig. 4) with any outgoing radiation attained in accordance with the 2nd law of thermodynamics. Note, the planets are not plotted according to size or type.

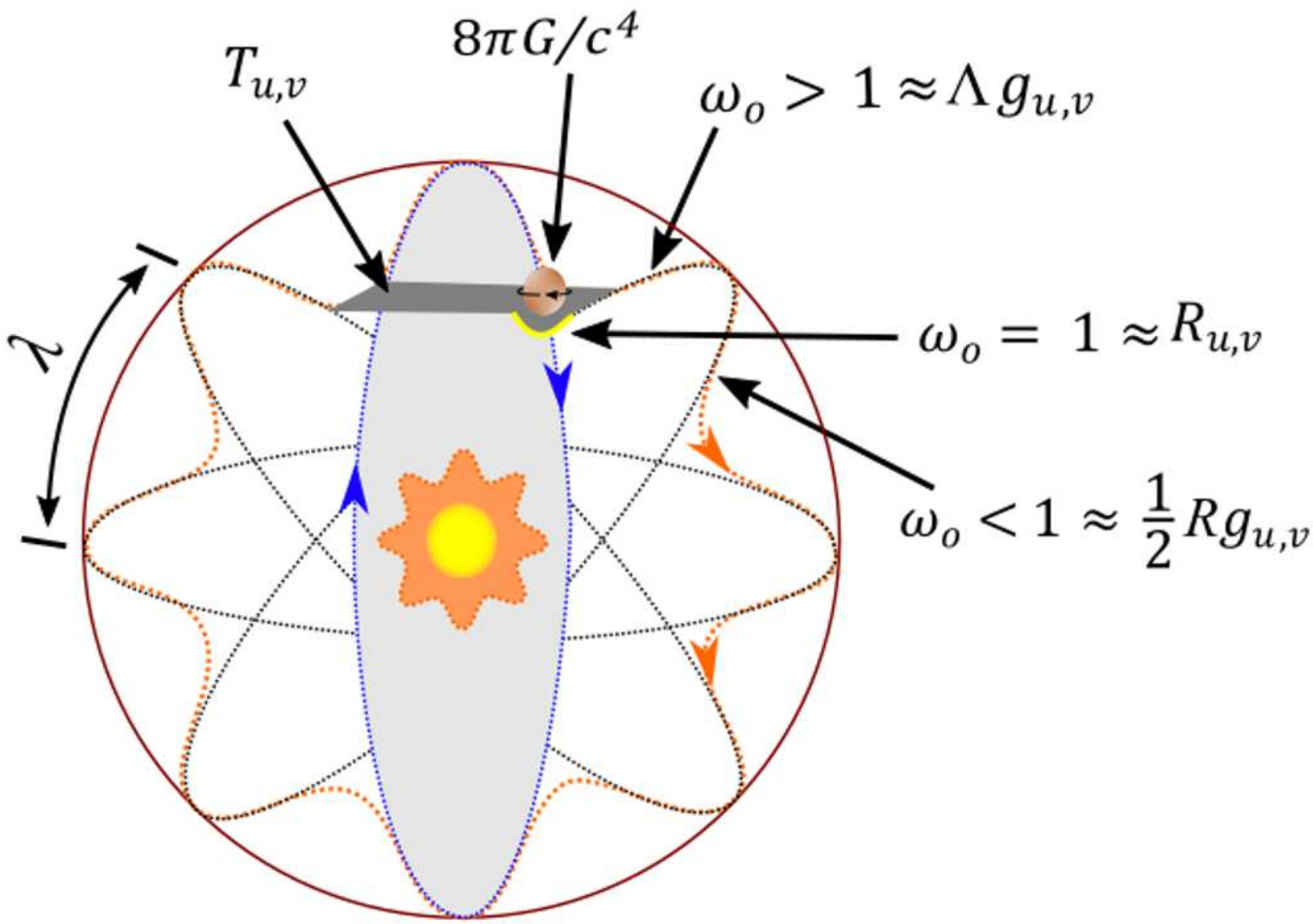

Figure 6

An intuitive demonstration of how Einstein's field equation is incorporated into the MP model for a planet in orbit in the solar system. Geodesic motion (yellow curve) normalizes the precession stages (orange dotted loop) of an orbital (blue dotted loop and arrows) to produce a cosmic wave type of time dilation. Manifolds of the tensor framework are envisioned between the boundary (maroon circle) and subsequent quantized states of BOs into extra dimensions towards the sun. Actual precession of the planet in 4D space-time is demonstrated in Fig. 3b. G = Newtonian gravity, R = scalar curvature and Rgu,v = Ricci curvature tensor with definitions of other symbols provided in the text.