A MATHEMATICAL FRAMEWORK FOR A UNIFIED THEORY OF EVERYTHING THAT MODELS THE EXPERIMENTAL RESULTS OF GENERAL RELATIVITY, QUANTUM MECHANICS, AND MAXWELL'S EQUATIONS WITHOUT THE NEED FOR MORE THAN 3 DIMENSIONS

The 3-D Grid Theory (3DG) - v2

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ABSTRACT

This paper proposes a novel conceptual framework for understanding the fundamental nature of the universe, based on the idea of a three-dimensional grid like structure composed of fundamental particles. Departing from traditional notions of spacetime, this framework posits that the universe exists as a lattice of interconnected points, with entities and phenomena interacting within this grid. The presence of mass and energy compresses the grid, resulting in the variation in the propagation of the fundamental force carriers. This compression effect gives rise to a varying index of refraction, leading to gravitational lensing phenomena. Furthermore, the framework suggests that the speed of light remains constant locally while varying universally, as it dilates proportionally with the fundamental forces that operate the clock. By reducing the dimensionality of the universe down to 3, and providing a unified description of physical interactions with the grid, this theory offers a simpler and more elegant approach to understanding the universe in a way that unifies the various fields within physics. Starting from first principles, concepts such as time, and nothingness are derived in order to justify the proposed structure.

INTRODUCTION

Understanding the fundamental nature of the universe has been a central goal of physics for centuries. From the elegant equations of classical mechanics to the intricate mathematical

formalisms of quantum field theory and general relativity, physicists have strived to uncover the underlying principles governing the cosmos. However, existing theories often face challenges in reconciling the fundamental forces of nature and incorporating quantum phenomena into a unified framework. It is assumed that such complications arise from unnecessarily incorporating higher dimensions into the model.

In this paper, the author proposes a new conceptual framework that departs from traditional notions of spacetime and introduces a fundamentally different perspective on the structure of the universe. The theory posits that the universe exists as a three-dimensional gridlike structure, with each point on the grid representing a fundamental particle. This grid, composed of particles from a set R, forms the foundational fabric of our reality, within which all physical interactions occur. While this might appear counterintuitive, it is a logical necessity as derived herein.

One of the unique features of this framework is the concept of compression effects induced by the presence of mass and energy. As mass and energy interact with the grid, they compress its structure, leading to variations in the propagation of fundamental forces locally. This compression effect has profound implications, including the emergence of a varying index of refraction within the universe. Quantum processes can exchange information with the grid resulting in phenomena like wave-particle duality, virtual particles, and quantum tunneling. Likewise, gravitational waves propagate through the grid.

Furthermore, the theory suggests that the speed of light remains constant locally, despite variations universally. This is attributed to the dilation of light speed proportionally with the other fundamental force carriers that operate the clock, ensuring that the speed of light appears constant regardless of local conditions. In the following sections, we will explore the implications of this framework for gravitational lensing, black holes, gravitational waves, and the unification of fundamental forces, presenting a new perspective on the nature of reality.

HISTORY OF UNIFYING PHYSICS

General Relativity (GTR) predicts that the universe is four-dimensional, where time is integrally connected to three dimensions of space. In an endeavor to unify Quantum Mechanics (QM) with GTR, relativistic quantum mechanics (RQM) was developed by applying the principles of QM to the spacetime manifold. While RQM has exhibited remarkable success, it falls short in accurately modeling phenomena such as the gravitational force and high-temperature experimentation. Consequently, theories such as loop quantum gravity and string theory have been proposed to address these limitations.

During the time of Niels Bohr's investigation into atomic structure, the prevailing understanding in classical physics suggested that a moving electron would continually radiate energy, eventually collapsing into the nucleus. Bohr proposed a novel approach, suggesting that electrons could only occupy specific energy levels within the atom, during which they behaved

according to classical physics. This explained the discretization of matter and light that perplexed scientists of his time. By reconciling the electric and centripetal forces governing the hydrogen atom, Bohr's work laid the foundation for the derivation of what came to be known as the Bohr magneton which helped to explain certain phenomena observed in spectroscopy and the behavior of electrons in magnetic fields. Erwin Schrödinger, building upon Bohr's quantized states, developed the Schrödinger Equation, which forms the cornerstone of quantum mechanics. Despite its remarkable success, the equation posed challenging questions about the nature of particles. How could a particle exist in multiple states simultaneously? How can a particle exist without occupying any volume? How could it transition instantaneously between states? How could it tunnel through seemingly impassable barriers? These enigmas underscored the revolutionary yet perplexing nature of quantum mechanics. The perplexity surrounding quantum phenomena was epitomized by Richard Feynman, who famously remarked, "I think I can safely say that nobody understands quantum mechanics." Subsequently, numerous scientists opted to focus solely on the calculations, irrespective of whether the outcomes aligned with intuitive understanding or not. The inability to reconcile quantum events with formal logic has led many scientists to conclude that logical coherence may not always apply in the quantum realm. This paper contends that formal logic cannot be violated and therefore it remains consistent even at the quantum level.

In GTR, the concept of existence is intimately linked with the spacetime manifold. Consequently, if the universe has a beginning, it implies that existence itself originates at that point. This presents two possibilities: either the elements of R composing the universe are eternal, devoid of a temporal origin, or they emerge from a state of non-existence. Assuming the constancy of formal logic, an eternal universe appears as a plausible inference. However, the notion of an eternal universe inevitably leads to entropy-driven decay, resulting in the eventual demise of stars, galaxies, and life forms. To reconcile this issue, three potential scenarios have been proposed: Firstly, the universe may operate in a cyclic fashion, undergoing an infinite series of cycles, with our observable universe representing the current cycle. Alternatively, the universe might be part of a multiverse, where numerous universes emerge continuously, collectively forming the multiverse. Lastly, it is plausible that the universe was designed. This article aims to delve into the analysis of these three concepts.

DEFINITIONS

Existence: Ontological existence refers to the inherent state of being, independent of its observable or measurable characteristics. For the purposes herein, unless specified otherwise, existence refers to fundamental components, not some object comprised of them.

Suppose squareness is the sole measurable property: Four line segments of equal length may exist individually, yet their measurement remains indefinite until they converge. This illustrates why existence cannot be exclusively linked to measurability.

R:	R is the multiset $[a^i, a^j \ldots]$ of fundamental components comprising the entirety of everything that exists.
G:	G is the subset of R that forms the grid-like structure of the universe.
U:	U is the subset of R that forms matter and energy. Together, G + U constitute the entirety of the universe.
Free-Will:	The ability to act independent of physical laws (logic always holds though).
RF:	Reference Frame
S:	Is a coordinate RF (zero-g, zero-velocity).
A:	Any RF.
GTR:	General Theory of Relativity.
STR:	Special Theory of Relativity.
QM:	Quantum Mechanics
3DG:	The 3-D Grid theory disclosed herein.
t:	This is the time as it passes in the S RF.
c:	This is the measured speed of light in all RFs locally.
t_0:	This is the time as it passes in the A RF.
c_0:	This is the speed of light in the A RF (measured relative to t: $[c_0] = \frac{dist}{t}$).
M(z):	Measured value for the quantity z.
R(z):	Real value for the quantity z.

THE DERIVATION OF TIME, SUPERPOSITION, NOTHINGNESS, AND THE STRUCTURE OF THE UNIVERSE

Defining nothingness poses a formidable challenge across physics and philosophy. Despite its abstract nature, a thorough comprehension of nothingness holds profound potential to reshape our understanding of the universe. Therefore, deriving its meaning becomes imperative, prompting a meticulous exploration of its conceptual depths. Consider the case were only two particles a^i and a^j exist ontologically ($R = [a^i, a^j]$). If space itself is composed of elements of R, a "fabric of space" if you will, then there cannot be a void between the elements, thus

necessitating that everything that exists form one (solid) object: this does not match observation. On the contrary, if space itself is not composed of the elements of R, then it doesn't exist, and therefore:

$$Nothing\ (N) \equiv Empty\ Space$$

Notice that you cannot remove the spatial component of N without contradiction, and therefore it is necessary to describe it mathematically which is most easily done with vector spaces. To do so, suppose that $N \subsetneq \mathbb{R}^n$. It follows that $\mathbb{R}^n \backslash N$ is neither something (elements of R) nor nothing resulting in a contradiction. It follows that N is unbounded spatially, and therefore, for some $n \geq 3$:

$$N \equiv \mathbb{R}^n$$

Let $R = [a^i]$. In order for a^i to be produced from nothing, it must be constructed out of points in space. Since any collection of points in space don't form an ontological object, a^i cannot be produced from them. Thus, something cannot be produced from nothing. It follows that the elements of R can only be organized or rearranged to produce composite objects, therefore referencing them as fundamental is justified. It is important to note that something that only exists epistemologically cannot have an experience and thus the elements of the set R must exist ontologically. Furthermore, anything that exists, be it energy or something else, must be an element of the set R, or composed thereof, otherwise it doesn't exist.

If time were to commence at a specific point, denoted as $t_0 = 0$, then for the transition from $t_0 = undefined$ to $t_0 = 0$, a preceding property of change is necessary. Thus, change inherently characterizes existence. Alternatively, if time lacks a definitive beginning, coexisting with the elements of R, then existence persistently unfolds within time, further affirming change as an intrinsic property of existence. Since change is a property of existence, and the elements of R cannot be produced from nothing, this aligns logically with the concept of eternal time (T), where T is conceptualized not as a dimension but rather as a reference to perpetual existence.

Assuming the validity of general relativity, the spacetime manifold must consist of elements of R, arranged in a grid-like structure, to differentiate it from nothingness, otherwise it doesn't exist. Consequently, spacetime is inherently discrete, and entities within our observable universe, such as galaxies, planets, and photons, traverse this grid-like structure. Hence, even the apparent "empty space" between galaxies retains the elements of R comprising the manifold. Quantum processes can introduce or eliminate particles from this manifold, elucidating the presence of virtual particles in intergalactic space. Consequently, quantum processes operate exclusively within the confines of the manifold. While this article does not propose the spacetime manifold is necessary, this serves as an example illustrating that whatever the real structure of the universe is, it must be composed of the elements of R in a grid-like fashion that exists in infinite nothingness ($\mathbb{R}^n$).

Since existence exists, $R \neq [\,]$. Therefore, let $a^i \in R$; and let the state of a^i be $S^i(\boldsymbol{\chi})$ for some parameter $\boldsymbol{\chi}$, where $\boldsymbol{\chi}$ is not assumed to be synonymous with time. However, if a^i is in the state $S^i(\boldsymbol{\chi})$, then $\forall\, \varepsilon \in \mathbb{R}$, $S^i(\boldsymbol{\chi} + \varepsilon)$ must exist in order to adhere to the previous assertions preventing existence from nonexistence. It follows that $S^i(\boldsymbol{\chi})$ must be continuous, and $D_S = \mathbb{R}$. It is important to clarify that the parameter $\boldsymbol{\chi}$ doesn't have an axis within empty space, thus $\boldsymbol{\chi}$ doesn't exist ontologically.

There are two forms of superposition proposed by this model: **A)** $S^i(\boldsymbol{\chi})$ undergoes rapid changes, creating the impression of existing in a superposition of states. In this scenario, the various states produce waves along the grid which interfere with each other; **B)** Alternatively, a^i is composed of sub-components $a^{i,1}, a^{i,2} \ldots\, , a^{i,q}$, collectively being fundamental, wherein each corresponding sub-state $S^{i,1}(\boldsymbol{\chi}), S^{i,2}(\boldsymbol{\chi}) \ldots\, , S^{i,q}(\boldsymbol{\chi})$ contributes to $S^i(\boldsymbol{\chi})$ in a manner akin to how sines and cosines in a Fourier transform contribute to the value of a function. Particle a^i cannot exist in both $S^i(\boldsymbol{\chi}_1)$ and $S^i(\boldsymbol{\chi}_2)$ unless $S^i(\boldsymbol{\chi}_1) = S^i(\boldsymbol{\chi}_2)$ without violating the assertion that something cannot be produced from nothing.

Let $S^i(\boldsymbol{\chi}) = S^i(\boldsymbol{\chi} + P)\ \forall\, \boldsymbol{\chi} \in \mathbb{R}$ and some constant $0 < P < \infty$. Then the states of a^i form a causal loop. To prove this, let $\boldsymbol{\chi} = x + \frac{P}{n}$ for $n \in \mathbb{N}$. A discretized series of states S^i can be written as $S^i(x) \rightarrow S^i(x + \frac{P}{n}) \rightarrow S^i(x + \frac{2P}{n}) \ldots \rightarrow S^i(x + \frac{(n-1)P}{n}) \rightarrow [S^i(x + P) = S^i(x)]$, where each state cannot occur without the prior state first occurring (first meaning relative to x), and where the states form a cycle wherein each state directly or indirectly causes itself. Thus the discrete form satisfies the definition of a causal loop, and in the limit, $n \rightarrow \infty$, S^i also becomes continuous. Thus, a^i is self existing, and the states $S^i(\boldsymbol{\chi})$ are self-causing.

Suppose that $R = [a^i, a^j\,]$, where $S^i(\boldsymbol{\chi})$ and $S^j(\boldsymbol{\chi})$ are their respective states. In order to not violate causality, any interaction Ĩ between a^i and a^j must result in a^i and a^j being in states of their own causal loops. That is, the interaction $\tilde{I}(a^i, a^j)$: $[S^i(\boldsymbol{\chi}) \rightarrow S^i(\boldsymbol{\chi}_{1i})] \wedge [S^j(\boldsymbol{\chi}) \rightarrow S^j(\boldsymbol{\chi}_{1j})]$ for some $\boldsymbol{\chi}_{1i}, \boldsymbol{\chi}_{1j} \in D_S$: the interaction causes a skip in states. It follows that $S^i(\boldsymbol{\chi})$ and $S^j(\boldsymbol{\chi})$ represent all possible states of each respective element.

Since $0 < P < \infty$, and $D_S = \mathbb{R}$, the number of state cycles is infinite. Without any interaction Ĩ, $S^i(\boldsymbol{\chi}) = S^i(\boldsymbol{\chi} + P)\ \forall\, \boldsymbol{\chi} \in \mathbb{R}$, thus the order in which the states occur doesn't change. Statistically this isn't possible by chance, thus $\exists$ some law Ĺ acting on each state ensuring the preceding one. In this case Ĺ is also self existing (Ĺ must be intrinsic to a^i).

Suppose that $R = [a^m] \mid S^m(\boldsymbol{\chi}) \rightarrow \{ S^m(A) \vee S^m(B) \}$ where $S^m(A) \neq S^m(B)$. In this case, the law Ĺ DNE, and a choice is required at each state change. Therefore, the absence of law introduces the notion of free-will (FW). That is, if a particle has always existed, changes states, and does not have an intrinsic law, said particle has to make a choice at each state change introducing free-will. Now, it is not claimed that a particle exists that has free-will, only that if it does, this is why.

Removing the restriction that $P < \infty$ still results in each state either being determined by some law Ĺ, or by some free-will choice C. For this reason, the elements of R bound by Ĺ will be designated as a_L^i and all other elements will be designated as a_{FW}^i.

Define a_L^1 as having a causal loop of states $S_L^1(\boldsymbol{\chi}) \mid S_L^1(\boldsymbol{\chi})$ results in a forward motion of a_L^1 through $\mathbb{R}^n$. Furthermore, assume that a_L^2 also exists, and that the interaction $\tilde{I}(a_L^1, a_L^2)$ results in a_L^1 traveling less distance (relative to $\boldsymbol{\chi}$) then would otherwise occur. Therefore, the greater the particle density ρ in which a_L^1 is moving, the slower a_L^1 moves. A measurement between two events can be made by observing the distance D_1 that a_L^1 travels between their occurrence (i.e D_1 is the distance that a_L^1 travels between the start and finish of a race). Instead of using distances, a_L^1 can be reflected between two mirrors, and the number of reflections can be used as the measurement. This will be important in the assessment of time.

With that said, since light has the greatest speed within the context of the universe, define $a_L^1 \equiv Photon$, and $\boldsymbol{\chi} \equiv Time$ (notice that the equation of the photon is cyclic as $S_L^1(\boldsymbol{\chi})$ requires). It is important to clarify that a photon might not be fundamental and in such case a_L^1 would represent the composite. Since $\boldsymbol{\chi}$ DNE ontologically, time doesn't exist either, thus spacetime doesn't exist. Photons travel independent of time, yet we measure time based on the distance that they travel (or the number of passes inside of a light clock). This necessitates that all clocks are logically equivalent to light clocks in which all of the fundamental forces slow down proportionally with light speed dilation. Each RF measures their own local speed of light to be the same because both the light being measured, and the fundamental force carriers in the clock slow down proportionally. In order to explain observations pertaining to STR, GTR, and QM, the universe must have a manifold composed of the elements of R in a grid-like structure, in which the density ρ of the manifold itself changes as a function of energy density present, and this change in ρ results in light speed dilation due to a change in index of refraction of the grid. Black holes represent a region of space in which ρ is so great that statistically the number of interactions prevents forward motion of a photon. Thus the speed of light at the event horizon is, on average, zero.

There are many models of the multiverse: the many worlds interpretation posits that each possible outcome of a quantum measurement corresponds to a different universe within a single

overarching spacetime; the inflation model posits that each universe within the multiverse forms its own space time bubble, each having arbitrary laws of physics; and some multiverse theories do not depend on the framework of GTR. Regardless of the model, it is believed that the essence of all possibilities can be captured in the following statements.

The multiverse M is defined herein such that $M = \{U_1, U_2 \ldots U_q\}$ for some $q \in \mathbb{N}$, where U_i represents some universe within the multiverse $M \mid \forall\, U_i \subseteq M$, U_i is comprised of the elements $e_i \subseteq R$. Regardless of what exists in M, there is always an infinite amount of nothing beyond it. It follows that if one multiverse exists, an infinite number of multiverses exist within the entirety of nothingness. Therefore, define the set of multiverses $\dot{\mathrm{M}} = \{M_1, M_2, \ldots M_\infty\} \mid \forall\, M_i \subseteq \dot{\mathrm{M}}$, M_i is comprised of the elements $E_i \subseteq R$. Furthermore, define the boundary of each multiverse $\mid E_i \cap E_j = 0$ when $i \neq j$, and $E_1 \cup E_2 \ldots \cup E_\infty = R$. That is, all of the elements of R are contained in the elements of $\dot{\mathrm{M}}$ and no two multiverses contain the same specific element. It follows that the space between the elements of $\dot{\mathrm{M}}$ cannot contain any elements of R, and thus there isn't any form of Lorentzian manifold (or otherwise) separating them. Thus over the infinite period T, statistically the elements of $\dot{\mathrm{M}}$ cannot be causally separated. Applying the same logic within each multiverse results in each universe being causally connected to the others (any manifold is composed of the elements of R or it doesn't exist). Remarkably, these interactions have yielded no discernible evidence in cosmological data over the period T, a statistical anomaly if universes emerge solely through natural processes. Consequently, it is reasonable to infer that the emergence of our universe is a controlled, or "unnatural," process—occurring only by design, thereby explaining the absence of such data. While one might argue that a designer would face similar statistical contradictions as a naturally forming universe, dividing T into two infinite periods, T_1 and T_2, resolves this issue. In this model, T_1 precedes T_2, implying that a designer must statistically arise from the elements of R during T_1 to exist eternally through T_2. Such a scenario maintains logical coherence and aligns with cosmological data, offering a compelling explanation for the observed absence of evidence in cosmology.

THEORETICAL FRAMEWORK

The predictions of the General Theory of Relativity (GTR) consistently align with observational data. However, the four-dimensional spacetime manifold used in GTR is not fully compatible with quantum mechanics, and theories involving more than four dimensions can become overly complex. Therefore, it is necessary to explore the potential of producing the same predictions of GTR using a finite three-dimensional grid.

In this model, the grid is composed of the elements G ⊊ R, giving it an ontological existence that distinguishes it from nothingness. Everything observable to us is composed of the elements U ⊊ R that move within this grid, distorting it in such a way as to produce the same observable phenomena predicted by GTR. Since everything in the universe moves within the

grid, what is typically referred to as empty space still contains the particles of G, and therefore Quantum Mechanics (QM) models the exchange of visible particles U with those existing on said grid G. Wave-particle duality is thus modeled by a particle producing waves that propagate through the grid, and these waves interfere with each other, producing interference patterns when interacting with the particle right before hitting the screen. Quantum tunneling is an exchange of a real particle U with a particle(s) of G that is exterior to the potential well. Virtual particles emerge in a vacuum of space because of the ontological existence of G, suggesting that quantum processes are restricted to the grid as there isn't a means of exchange exterior to it.

As derived above, all the elements of R have always existed, and they each move through a change of state that is independent of a dimension of time (but T above still holds) and that forms a causal loop. These particles interact with each other, resulting in a skip in their causal loops, after which the particles continue as if nothing happened. Interactions between U and G result in a structured occurrence of events that we associate with the universe moving along the time dimension of the spacetime manifold. The grid therefore acts as a regulatory entity wherein the density ρ of the grid determines the propagation rate of all of the force carriers uniformly through the interactions $\tilde{I}(U, G)$. Therefore, when the electromagnetic force slows down, the other fundamental forces slow down proportionally as explained above. It is important to clarify that terms like "slow down" or "speed" do not actually describe what occurs: they are more of a convenience. As stated above, briefly consider using a light clock to measure the speed of light. Regardless of how much the speed of light changes locally, both the light in the clock and the light in the experiment change by the same amount, thus the number of passes inside of the light clock remains the same. Since all fundamental forces dilate proportionally, the same result occurs if you use an atomic clock or a watch. It follows that the measurement for the speed of light is a geometry relationship (the span between the mirrors relative to the length light travels in the experiment), not an actual measurement of a dimension. Particles move through their causal loop independent of a dimension of time, and we as humans have invented a means of measuring time based on the distance that such particles travel. Now take observer A in flat space, and observer B near an event horizon. The distance that light travels in the A RF is greater than the distance that light travels in the B RF. However, according to observer B, all events in their RF are occurring as if they too are in flat space, and this is caused by all fundamental forces slowing down proportionally for B. At the event horizon, everything in B's RF comes to a stop relative to A but according to B nothing changes (ignoring the fact that everything may get crushed). This explains why the amount of information contained in a black hole is proportional to the surface area of the event horizon as all of the information is "frozen" there relative to A.

In this model, the rationale behind the speed of light's value becomes clear when we examine it from the perspective of an external observer, represented by clock K, situated outside of the grid. From K's viewpoint, the speed of light must hold some value. However, since all

fundamental forces undergo proportional changes within the system, this particular value becomes inconsequential. The reason being that, despite any alterations, events within the system unfold consistently in the same sequence. This analogy likens the universe to a VHS tape, where, regardless of the VHS's play rate relative to K, the chronological order of events in the "movie" remains unchanged. This is not intended to imply the absence of free-will, it is just intended to show that regardless of the change in the speed of light relative to k, nothing is noticed by us within the grid. It is important to clarify that science is limited by measurement, and reality is not. Therefore it doesn't make any difference if the measurement of k can be made or not, as all that matters is what is.

Since our concept of time in this model is integrally connected to the distance that light travels, the speed of light must dilate in the same manner that time in GTR dilates. That is $c_0 dt = c\, dt_0$, and since $cdt_0 = \sqrt{g_{\mu\nu} dx^{\mu} dx^{\nu}}$ in GTR, it follows that:

$$c_0 dt = \sqrt{g_{\mu\nu} dx^{\mu} dx^{\nu}} \quad (1)$$

Now, as a photon moves through its forward motion producing causal loop there is a proportionality constant that people have invented that converts the distance traveled by the photon to our concept of time. That is, $t = \alpha X$ where X is the distance that light travels between the events in free space, and α is a scalar. Likewise, $t_0 = \alpha X_0$ where X_0 is the distance that light travels in the proper RF. From equation (1) it follows that:

$$c_0 = \frac{1}{\alpha} \sqrt{g_{\mu\nu} \frac{dx^{\mu}}{dX} \frac{dx^{\nu}}{dX}} \quad (2)$$

Where $dx^0 = \alpha dX$, [c] = [v] = [distance], and the geometry of space is time independent. Since $0 \leq c_0 \leq c$, and $0 \leq \sqrt{g_{\mu\nu} \frac{dx^{\mu}}{dX} \frac{dx^{\nu}}{dX}} \leq 1$, $\alpha = 1/c$. From equation (2) it follows that the index of refraction (n) of the grid is:

$$n = 1/\sqrt{g_{\mu\nu} \frac{dx^{\mu}}{dX} \frac{dx^{\nu}}{dX}} \quad (3)$$

Therefore, the grid has this non-local property that causes it to deform just right so as to produce an index of refraction that causes the results of GTR without the need for a dimension of time. This non-local behavior further aligns the theory with principles of quantum mechanics. When a photon transitions into a new medium with a different index of refraction, it undergoes absorption and re-emission with each interaction. This process alters the overall velocity of the light wave while the speed of light remains constant between interactions. As a result, the speed

of light through the medium is slower than in a vacuum, reflecting the cumulative effect of these absorption and re-emission events. It is not clear if this would be any different when the index of refraction of the grid changes, or if there is some other underlying reason for the fundamental forces to slow down.

Take the nucleus of an atom and envision it as a sphere in which virtual photons (instead of gluons) are exchanged from point to point internally. Just analyzing two photons opposing each other along the same diameter, it is easy to see that in free space, any exchange of momentum cancels out. Moving that same atom into the grid with a non-uniform index of refraction (n) results in an imbalance of the force produced, and this net force very closely models that of gravity. Since light tends to curve towards the higher index of refraction, the photon leaving a point closest to a massive object doesn't travel along the diameter: it curves resulting in even less force counteracting its initial push. If this theory is valid then the force of gravity is caused by the exchange of force carriers inside of a nonuniform grid, and these exchanges occur due to quantum processes, thus gravity is written in terms of quantum events.

It is important to clarify that if two theories A and B both match the evidence, then the evidence cannot be used to determine which of the two theories are valid regardless of which theory is universally accepted. In this case, all of the evidence supports GTR, but GTR sends us down a rabbit hole of seemingly infinite confusion. Perhaps the 3DG theory is worth a shot since it also matches the data and eliminates the complexity. 3DG, produces a framework in which all of the results of GTR are produced, and since GTR is compatible with Maxwell's equations when written using differential geometry, such equations are also compatible with 3DG. Additionally, 3DG defines time in which quantum particles are not restricted by it, and where quantum phenomena are modeled in a way that doesn't necessitate any violations of formal logic. Additionally, 3DG allows one to reproduce the force of gravity in terms of the other fundamental forces combined with quantum mechanics. It should also be clarified that this theory doesn't imply that other established theories like relativistic quantum mechanics are wrong as long as the time terms are dealt with in the metric as done above. This theory should be used to interpret time in these other theories, not necessarily negate them.

The 3-dimensional grid concept partially aligns with the idea of a quantum field in QFT. However, for this theory to be viable, each particle in the Standard Model must be composed of even more fundamental particles that constitute the grid. These fundamental particles emerge through quantum processes to form detectable particles, and similarly, detectable particles can revert back to these fundamental components. This process represents the virtual particle antiparticle pair production and annihilation.

THEORETICAL ASSESSMENT OF 3DG AND STR

Using the Schwartzchild metric without rotations, $c_0^2 = \frac{r-r_s}{r}c^2 - \frac{r}{r-r_s}\left(\frac{dr}{dt}\right)^2$. In zero-g this reduces to $c_0^2 = c^2 - v^2$, and restructuring yields:

$$\frac{c_0}{c} = \sqrt{1 - \left(\frac{v}{c}\right)^2} \quad (4)$$

so all experimental results of STR are recovered, they are just explained in terms of light speed dilation not time or length contraction. As an example, consider **muon decay**: When muons are produced in the atmosphere, using the non-relativistic decay equation suggests that they should decay before reaching earth's surface. However, observation is consistent with the notion that the muon undergoes both time and length contraction. In the 3DG model, the faster the muon travels, the slower all of the fundamental forces propagate in its RF, and thus it decays slower relative to earth. Light speed dilation therefore takes the place of both time and length contraction.

THEORETICAL ASSESSMENT OF 3DG AND GTR

Black Holes: When the local energy density becomes extremely high, the density ρ of the grid increases such that the interactions $\tilde{I}(U, G)$ result in an average particle velocity approaching zero. As particles move closer to the event horizon from the exterior, they increasingly approximate this state. For particles located inside the event horizon at the time of the black hole's formation, they are subject to an outward force that is assumed to be caused by the "ripping" of the grid. So gravity produces a force that pulls an object into the center of a BH, and this negative force pushes it away. These two forces are equal at the event horizon where a finite force traps everything until the black hole begins to evaporate through Hawking radiation. The details of these forces are derived below.

Holographic Principle: According to this principle, the information content of a black hole is proportional to the surface area of its event horizon. In this context, all the particles of a black hole are theorized to exist around the event horizon in a state where their average velocity is zero. This condition implies that each particle is essentially crushed to its smallest possible state, which is a logical consequence of the extreme gravitational forces at play. Under such conditions, it is reasonable to assume that the amount of information a particle holds is directly related to its minimal spatial configuration. This supports the idea that the total information content, or entropy, of the black hole is proportional to the area of the event horizon rather than the volume within the black hole. This resolves the **black hole information paradox**.

Gravitational Waves: Since the grid exists ontologically, it is not surprising that a wave can propagate through it.

Gravitational Redshift: Equation derived below.

Gravitational Lensing: The 3DG model produces the same geodesics as GTR.

Time Dilation: Since time is a linear function of the local speed of light, and light dilates proportionally to how time dilates in GTR, it follows that our concept of time in 3DG changes as predicted by GTR.

THEORETICAL ASSESSMENT OF 3DG AND QM

Quantum Tunneling: If the grid is composed of particles more fundamental than electrons, these fundamental components would likely be undetectable to us. When an electron is confined to a potential well, it could dissociate into these more fundamental components. This dissociation allows the electron to either:

1) Move Through the Barrier: The electron, now in the form of its more fundamental components, could traverse the potential barrier more easily, given that the barrier might be less restrictive for these components.
2) Cause a Grid Imbalance: Alternatively, the dissociation could create an imbalance in the grid. This imbalance might cause a kind of "buckling" or local distortion in the grid, allowing an electron to re-emerge on the other side of the barrier. This process would effectively transport an electron without it having to directly pass through the barrier in its usual form.

In this way, quantum tunneling can be understood as a process where the electron leverages the underlying structure of the grid and its fundamental components to bypass classical constraints.

Wave-Particle Duality and Superposition: As a particle moves along a path, the particle produces waves, similar to gravitational waves, that also propagate along the grid. If the particle changes states as it propagates, all of the waves superimpose giving the particle wave-like properties that cause the particle itself to appear in a superposition of states.

Wave Function Collapse: The universe has a grid-like structure where only particles adhering to specific physical laws exist, akin to how a building only has the necessary components to form its structure. While a building might consist of millions of parts, the universe comprises an immense but finite number of elements, estimated to be more than 10^{80} particles. Out of all possible elements in the set R, only those that interact with the grid "correctly" contribute to the formation of the universe. This suggests a remarkably ordered system that seems statistically improbable to have arisen by chance alone, hinting at the presence of some form of design. If this is the case, then perhaps the universe can be likened to a computer simulation, where the grid acts as the pixels. Similar to how a computer simulation operates, the code governing the universe determines the next piece of information only when required. This is analogous to how wave function collapse occurs only upon observation. Until an observation is made, the simulation does not need to specify the state of a particle, and doing so would be considered a waste of processing power. Therefore, 3DG explains wave function collapse in terms of how an intelligent programmer would optimize a simulation. “Until it is needed, a value isn’t computed.” This resolves **The Measurement Problem**.

ADDITIONAL PROBLEMS SOLVED BY 3DG

Grandfather Paradox: Time is not reversible because it doesn’t exist. This resolves the **arrow of time problem**.

Why is the speed of light what it is? As stated above, light has to have some speed relative to a clock k exterior to the grid. Since all of the fundamental force carriers propagate proportionally together, the value of the speed of light relative to k doesn't matter for the same reason that the rate at which you rotate the dials of a vhs doesn't change anything in the movie. So whatever the speed of light is relative to k, it goes unnoticed in the grid. Therefore, the speed of light relative to k is non-zero and the "video of the universe" plays out at that rate. As stated above, science is limited by measurement, and reality is not. Therefore it doesn't make any difference if the measurement of k can be made or not, as all that matters is what is.

Schrodinger's Cat: As explained above, just as a particle is not in multiple states at once, the cat cannot be in two states at once… The cat is either dead (exclusive or) alive, and cannot be thought of as being both dead and alive.

Matter-Antimatter Problem: As stated above, the structure of the universe is highly sophisticated and organized pointing at design. Asking why there are non-equal parts matter and antimatter is comparable to asking an engineer why he chose the design that he did. Regardless of the answer, it doesn't suggest a paradox.

Cosmological Constant: Since the elements of G are the only things that exist in the quantum vacuum, they are the only things that can contribute to the Cosmological Constant. This doesn't explain why and how these contributions are made by the grid, it only points at the cause.

The Fermi Paradox: Without spacetime, things like the warp drive, and wormholes cannot exist. It is therefore impossible for such civilizations to reach us in a reasonable time regardless of their technology. This is unfortunate but there is no escaping reality here.

The Information Paradox In De Sitter Space: Spacetime doesn't exist so this isn't an issue. Information is never lost even as it propagates beyond our cosmic horizon as it just begins to exist in another part of infinite nothingness (or the grid).

The Hierarchy Problem: Since the gravitational force is written in terms of other fundamental forces, this would explain why the gravitational force is so weak.

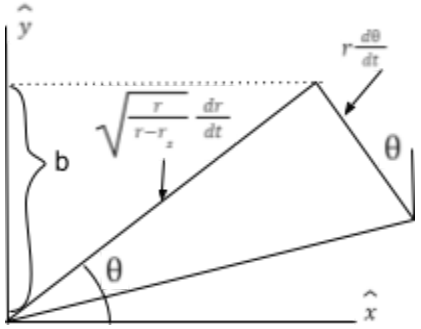
The Black Hole Firewall Paradox: You cannot fall into a black hole and thus the paradox is resolved.

The Olbers Paradox: The universe was designed… You are not dependent on statistical events when things are intentionally put into place…

The EPR Paradox: Without spacetime, there isn't a framework that prevents a particle that is more fundamental than a photon from exceeding the speed of light. Therefore, transmitting information faster than light is not impossible, we just do not have means of detecting it other than indirectly through the phenomena of quantum entanglement. Therefore the EPR paradox is resolved.

DERIVATION OF THE GRAVITATIONAL REDSHIFT EQUATION

Figure 1: This figure shows how the components of the Schwarzschild Metric fit geometrically. For a mass positioned at (0,0), a photon released in the x-direction from (x=0, y=b > 0) will curve downwards.



From the Schwarzschild Metric, for a photon traveling in a plane containing the COM of some object of mass M we get (φ = 0):

$$\frac{r-r_s}{r}c^2 - \frac{r}{r-r_s}\left(\frac{dr}{dt}\right)^2 - r^2\left(\frac{d\theta}{dt}\right)^2 = 0$$

From Figure 1, adding up the components in the $\hat{x}$ and $\hat{y}$ directions result in:

$$< \frac{dx}{dt} = \sqrt{\frac{r}{r-r_s}}\frac{dr}{dt}cos(\theta) - r\frac{d\theta}{dt}sin(\theta), \frac{dy}{dt} = \sqrt{\frac{r}{r-r_s}}\frac{dr}{dt}sin(\theta) + r\frac{d\theta}{dt}cos(\theta) > \quad (5)$$

where

$$\frac{dy}{dx} = \frac{\{\sqrt{\frac{r}{r-r_s}}\frac{dr}{d\theta}\}sin(\theta) + rcos(\theta)}{\{\sqrt{\frac{r}{r-r_s}}\frac{dr}{d\theta}\}cos(\theta) - rsin(\theta)} \quad (6)$$

The polar coordinate transformation dy/dx is:

$$\frac{dy}{dx} = \frac{\{\frac{dr}{d\theta_p}\}sin(\theta_p) + rcos(\theta_p)}{\{\frac{dr}{d\theta_p}\}cos(\theta_p) - rsin(\theta_p)} \quad \text{(polar, 7)}$$

Comparing equations (6) and (7), implies that $\frac{dr}{d\theta_p} = \sqrt{\frac{r}{r-r_s}}\frac{dr}{d\theta}$. Therefore:

$$\theta = \sqrt{\frac{r}{r-r_s}}\theta_p + B \quad (8)$$

$$r^2 = x^2 + y^2 \quad (9)$$

$$x = rcos(\theta_p) \quad (10)$$

$$y = rsin(\theta_p) \quad (11)$$

Dividing the x-component in equation (5) by dx, squaring both sides, and multiplying by $\partial^2 E$ yields:

$$\left[\sqrt{\frac{r}{r-r_s}}\frac{dr}{dt}cos(\theta) - r\frac{d\theta}{dt}sin(\theta)\right]^2 \frac{\partial^2 E}{\partial x^2} = \frac{\partial^2 E}{\partial t^2} \quad (12)$$

Notice that when $r_s = \theta = 0$ equation (12) yields $\frac{\partial^2 E_x}{\partial x^2} = \frac{1}{c^2}\frac{\partial^2 E_x}{\partial t^2}$. Repeating the same process for the y-component we get:

$$\left[\sqrt{\frac{r}{r-r_s}}\frac{dr}{dt}sin(\theta) + r\frac{d\theta}{dt}cos(\theta)\right]^2 \frac{\partial^2 E_y}{\partial y^2} = \frac{\partial^2 E_y}{\partial t^2} \quad (13)$$

Now, let us consider Maxwell's equations where the charge and current density are zero (since the S-metric pertains to such). The derivation of these equations does not depend on μ or ε being constant so we can start directly with Maxwell's Equations and calculate με. Therefore:

$$\nabla \cdot E = 0, \nabla \cdot B = 0, \nabla \times E = -\frac{\partial B}{\partial t}, \text{ and } \nabla \times B = \mu\varepsilon\frac{\partial E}{\partial t} \quad (14)$$

Deriving the wave equation in free space using equations (14) yields:

$$\nabla \times \{\nabla \times E\} = \nabla \times \{-\frac{\partial B}{\partial t}\}$$

$$\nabla\{\nabla \cdot E\} - \nabla^2 E = -\frac{\partial}{\partial t}\{\nabla \times B\}$$

$$\nabla^2 E = \frac{\partial}{\partial t}\{\mu\varepsilon\frac{\partial E}{\partial t}\}$$

$$= \frac{\partial(\mu\varepsilon)}{\partial t}\frac{\partial E}{\partial t} + \mu\varepsilon\frac{\partial^2 E}{\partial t^2} \quad (15)$$

Comparing equations (12), (13), and (15):

$$\frac{\partial(\mu\varepsilon)}{\partial t} = 0$$

$$\frac{1}{(\mu\varepsilon)_x} = \left[\sqrt{\frac{r}{r-r_s}}\frac{dr}{dt}cos(\theta) - r\frac{d\theta}{dt}sin(\theta)\right]^2 \quad \text{(x-direction, 16)}$$

$$\frac{1}{(\mu\varepsilon)_y} = \left[\sqrt{\frac{r}{r-r_s}}\frac{dr}{dt}sin(\theta) + r\frac{d\theta}{dt}cos(\theta)\right]^2 \quad \text{(y-direction, 17)}$$

Therefore, Maxwell's equations take the form of equations (14), subject to the constraint in equation (16) and (17), in which equations (8) - (11) convert variables into one coordinate system. Notice that, with $\Theta = 0$, equation (12) reduces to $\left[\sqrt{\frac{r}{r-r_s}}\frac{dr}{dt}\right]^2 \frac{\partial^2 E}{\partial r^2} = \frac{\partial^2 E}{\partial t^2}$. Using the Schwarzschild Metric, $\frac{r}{r-r_s}\left(\frac{dr}{dt}\right)^2$ can be replaced with $\frac{r-r_s}{r}c^2$, therefore:

$$\frac{r-r_s}{r}c^2\frac{\partial^2 E}{\partial r^2} = \frac{\partial^2 E}{\partial t^2}$$

Setting E = R(r)**T**(t), and solving for R(r) yields:

$$\frac{d^2R(r)}{dr^2} = -\left[k^2\frac{r}{r-r_s}\right]R(r) \quad (18)$$

Therefore:

$$k\sqrt{\frac{r}{r-r_s}} = \frac{2\pi}{\lambda} \quad (19)$$

Thus:

$$\lambda = \frac{2\pi}{k}\sqrt{\frac{r-r_s}{r}} = \lambda_\infty\sqrt{\frac{r-r_s}{r}} \quad (20)$$

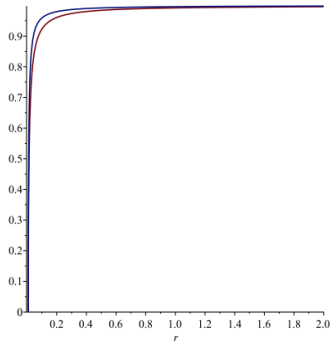


Figure 2 :This is a plot of $\lambda = \lambda_\infty\sqrt{\frac{r-r_s}{r+r_s}}$ from GTR (red) vs $\lambda = \lambda_\infty\sqrt{\frac{r-r_s}{r}}$ from 3DG (blue). The Schwartzchild radius used is 0.0088m.

In figure 2, the gravitational redshift equation of GTR ($\lambda = \lambda_\infty\sqrt{\frac{r-r_s}{r+r_s}}$) (red) is plotted alongside equation (20) for $r_s = 0.0088m$ (the Schwartzchild radius of earth).

ASSESSMENT OF 3DG AND GTR

Since every RF measures their own speed of light to be the same, even though the speed of light changes universally, there is this concept of real vs measured values. The measured speed of light M(c) = c when measured locally, while the real speed of light, relative to c, is $R(c) = c_0$. Using the Schwarzschild Metric, $R(c) = \sqrt{\frac{r-r_s}{r}}c = R(f)\lambda$, and using equation (20) yields:

$$R(f) = \frac{\sqrt{\frac{r-r_s}{r}}c}{\lambda_\infty\sqrt{\frac{r-r_s}{r}}}$$
$$= \frac{c}{\lambda_\infty} \quad (21)$$
$$= const$$

However, $M(c) = c = M(f)\boldsymbol{\lambda}$. Using equation (20) again, this results in:

$$M(f) = \frac{c}{\lambda_\infty\sqrt{\frac{r-r_s}{r}}}$$
$$= \frac{c}{\lambda_\infty}\sqrt{\frac{r}{r-r_s}} \quad (22)$$

It follows that the real and measured energy (E) are:

$$R(E) = \frac{c}{\lambda_\infty} h \quad (23)$$

$$M(E) = [\frac{c}{\lambda_\infty} h]\sqrt{\frac{r}{r-r_s}} \quad (24)$$

The $R(E)$ is constant: even though the wavelength decreases with a decrease in radius, R(c) slows down and those differences cancel. Notice that R(E) is quantized by h, and M(E) is smooth and continuous for $r > r_s$. This means that even though properties are quantized, they can appear smooth and continuous due to the variable speed of light. From equations (23) and (24), it follows that:

$$M(E) = R(E)\sqrt{\frac{r}{r-r_s}} \quad (25)$$

PROPERTY VALUES OF A **PHOTON** AS r DECREASES					
	Speed of light	Clock Speed	λ	f	Energy
Real (R_s RF)	Decrease $\sqrt{\frac{r-r_s}{r}}\,c$	Decrease $\mathrm{d}\boldsymbol{\tau} = \sqrt{\frac{r-r_s}{r}}\,dt$	Decrease $\lambda_\infty\sqrt{\frac{r-r_s}{r}}$	Constant $\frac{c}{\lambda_\infty}$	Constant $[\frac{c}{\lambda_\infty}h]$
Measured (R_s RF)	Constant c	Constant Change t	Decrease $\lambda_\infty\sqrt{\frac{r-r_s}{r}}$	Increase $\frac{c}{\lambda_\infty}\sqrt{\frac{r}{r-r_s}}$	Increase $[\frac{c}{\lambda_\infty}h]\sqrt{\frac{r}{r-r_s}}$

Table 1: Shows the relationship between the given quantities as r decreases. Notice that both the speed of light and the proper time scale the same.

How the real and measured quantities for a photon change with a decrease in r-value is clarified in table 1.

Balancing the gravitational and centripetal forces yields $\frac{M_{AS}(mv_\theta^2)}{r} = \frac{M_{AS}(GMm)}{r^2}$, therefore:

$$M_{AS}(v_\theta) = \sqrt{\frac{M_{AS}(GM)}{r^2}} \quad (26)$$

Using the fact that $R(v) = M(v)\frac{c_0}{c}$ yields:

$$R(v) = \sqrt{\frac{M_{AS}(GM)}{r^2}}\,\frac{c_0}{c}$$

This suggests that the real values for G and M are such that $R(GM) = M(GM)(\frac{c_0}{c})^2$ where the subscripts are dropped. Therefore either:

$$R(M) = M(M)\left(\frac{c_0}{c}\right)^2 \quad \text{(Case 1, 27)}$$

OR

$$R(G) = M(G)\left(\frac{c_0}{c}\right)^2 \quad \text{(Case 2, 28)}$$

Where $M(M)$ and $M(G)$ must be constant. It follows that the Einstein equations have to model the measurables, not the reals, otherwise G could not be considered constant in their derivation. We shall briefly consider each case, and some advantages to each:

Case 1: Mass is an emergent property in which the real value is determined by the local speed of light. This is interesting because if we insert equation (40) into the gravitational force equation, there are two points in which to evaluate $\frac{c_0}{c}$: one for M and one for m. It seems logical to assume that since $\frac{c_0}{c}\Big|_{r=r_s} = 0$, the force of gravity would need to be zero but this is not correct. Since $c_0 = v = 0$ at the EH, the mass never gets there and thus we can treat the $M\left(\frac{c_0}{c}\right)^2$ as constant non-zero in which the value of M has to be substantially greater than expected in order to account for the $\left(\frac{c_0}{c}\right)^2$ term. The real gravitational force becomes:

$$R(F_g) = \frac{G*R(Mm)}{r^2}$$

$$= \frac{G*M(Mm)}{r^2}\left(\frac{c_0(r1)}{c}\right)^2\left(\frac{c_0(r2)}{c}\right)^2 \quad (29)$$

If two masses are in a gravitational field, r1 is the radial component of mass M in the gravitational field, r2 is the radial component of mass m in the gravitational field, and r is the distance between them. Additionally, the measured gravitational force becomes:

$$M(F_g) = \frac{G*M(Mm)}{r^2} \quad (30)$$

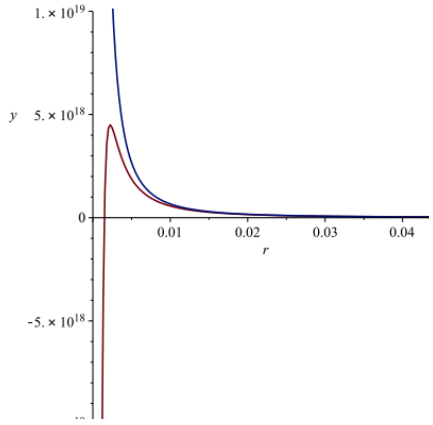


Figure 3: The real gravitational force (red) is plotted vs the measured gravitational force (blue). The real gravitational force tapers off, then drops to zero before becoming negative. Since the velocity at the event horizon is zero, particles never get there. Anything inside of the event horizon is pushed outwards.

A plot of equations (29) and (30) are shown in figure 3 with $(\frac{c_0(r1)}{c})^2 = 1$. Notice that if the particles could reach the event horizon, the real force (red) becomes zero. Additionally, the real force inside of the EH is negative meaning that any particle contained inside of the EH is forced outwards. This resolves any issues with singularities.

Additionally, in regards to QM, the real and measured energy values would be:

$$R(\bar{E}) = [M(M)(\frac{c_0}{c})^2]c^2$$
$$= [M(M)]c_0^2 \quad (31)$$

and

$$M(\bar{E}) = mc^2 \quad (32)$$

Case 2: In this case, the gravitational "constant" has a slight fudge factor resulting in:

$$R(F_g) = \frac{R(G)Mm}{r^2}$$
$$= \frac{M(G)Mm}{r^2}(\frac{c_0}{c})^2 \quad (33)$$

And

$$M(F_g) = \frac{M(G)Mm}{r^2} \quad (34)$$

Equations (33) and (34) produce the same curves as that in figure 3 so the real force becomes negative inside the EH pushing matter outwards, and the real force at the EH drops to zero. Thus, this case also resolves all of the conflicts at the singularities.

Since all of the matter inside of a black hole is forced outwards, all of the information inside of the black hole is at the event horizon. It therefore makes sense that the amount of information inside of a black hole is proportional to the surface area of the EH as Bekenstein suggested.

THE QUANTUM NATURE OF GRAVITY

Photons In A Relatively Stationary RF: The momentum p of a photon is $\frac{h}{\lambda}$. Using equation (20), the measured momentum of k photons is:

$$M(p) = \frac{hk}{\lambda_\infty\sqrt{\frac{r-r_s}{r}}}$$
$$= \frac{hk}{\lambda_\infty}\sqrt{\frac{r}{r-r_s}} \quad (35)$$

Therefore the measured force exerted by the photon as it is omitted from an object O is:

$$M(F) = \frac{hk}{\lambda_\infty}\frac{d}{dt}(\sqrt{\frac{r}{r-r_s}})$$

$$= \frac{hk}{2\lambda_\infty}\left(\frac{dr}{dt}\right)\left(\frac{1}{\sqrt{r(r-r_s)}} - \frac{\sqrt{r}}{(r-r_s)^{1.5}}\right)$$

$$= \frac{hk}{2\lambda_\infty}\left(\frac{dr}{dt}\right)\left(\frac{r-r_s}{\sqrt{r}(r-r_s)^{1.5}} - \frac{r}{\sqrt{r}(r-r_s)^{1.5}}\right)$$

$$= \frac{hk}{2\lambda_\infty}\left(\frac{dr}{dt}\right)\left(\frac{-r_s}{\sqrt{r}(r-r_s)^{1.5}}\right)$$

Since M(F) is a measurement, $\frac{dr}{dt} = c$. Additionally, since r_s is the Schwartzchild radius it can be replaced with $\frac{2GM}{c^2}$. Therefore:

$$M(F) = \frac{-GMhk}{c\lambda_\infty}\left(\frac{1}{\sqrt{r}(r-\frac{2GM}{c^2})^{1.5}}\right) \quad (36)$$

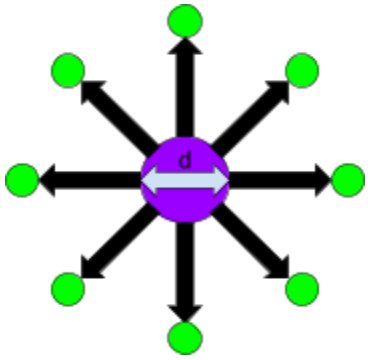


Figure 4: An object O (purple) of diameter d radiates a uniform field of virtual photons (green) in all directions. All of the photons produce the same momentum on O uniformly resulting in a net acceleration of zero for O.

In Figure 4, the mathematical framework is illustrated in which an object O, of diameter d, radiates a uniform field of virtual photons in all directions. This results in a force acting on O, but since the field is uniform the net force on O is zero.

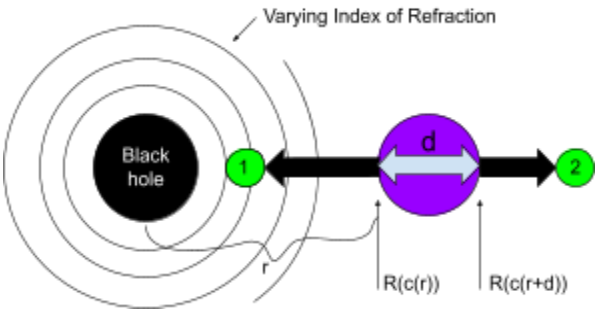


Figure 5: Object O from Figure 4 is placed into a non-uniform gravitational field that is produced by the presence of a black hole. The momentum produced by virtual particle 1 is greater than the momentum of virtual particle 2 producing a type of anti-gravity.

In Figure 5, object O is placed into a gravitational field. From equation (36), the measured force exerted on O due to virtual photon 1 being emitted is:

$$M(F_1) = \frac{-GMhk}{c\lambda_\infty}\left(\frac{1}{\sqrt{r}(r-\frac{2GM}{c^2})^{1.5}}\right)$$

And the force exerted on O due to virtual photon 2 being emitted is:

$$M(F_2) = \frac{-GMhk}{c\lambda_\infty}\left(\frac{1}{\sqrt{r+d}\left(r+d-\frac{2GM}{c^2}\right)^{1.5}}\right)$$

The magnitude of the net force is therefore the difference:

$$\left|M(F_{net})\right| = \frac{GMhk}{c\lambda_\infty}\left(\frac{1}{\sqrt{r}\left(r-\frac{2GM}{c^2}\right)^{1.5}} - \frac{1}{\sqrt{r+d}\left(r+d-\frac{2GM}{c^2}\right)^{1.5}}\right)$$

$$= \frac{GMhk}{c\lambda_\infty}\left(\frac{1}{\sqrt{r}\left(r-\frac{2GM}{c^2}\right)^{1.5}} - \frac{1}{\sqrt{r+d}\left(r+d-\frac{2GM}{c^2}\right)^{1.5}}\right) \quad (37)$$

Notice that $M(F_{net})$ is 0 for a point particle ($d \to 0$). Also notice that this force actually pushes O away from the black hole. This is resolved if the photons are omitted internally passing from side to side. Suppose that photon 1 is emitted traveling towards photon 2. The photon's wavelength increases as it moves towards 2 and thus its momentum is less upon absorption resulting in less force. Likewise, photon 2 decreases in wavelength resulting in a greater momentum upon absorption. While photons do not mitigate the strong force, applying this principle to the transfer of gluons within the nuclei might end up beneficial.

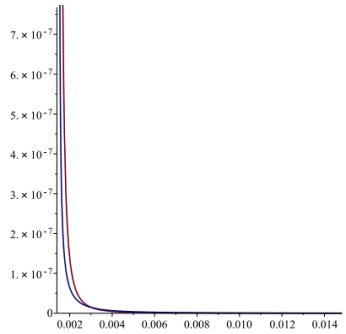


Figure 6: This graph shows $\left|M(F_{net})\right|$ (red) and $R(F_g)$ (blue). $\left|M(F_{net})\right|$ is not compatible as is with $R(F_g)$.

Figure 6 shows a comparison between the gravitational equation, and the force produced through these quantum processes. Please note that the values for the constants were selected not derived in order to make the graph fit. This was done simply to show the shape of the graph in a meaningful way.

AUTHORS NOTES

This theory was derived by assuming the framework implied in the Bible. The following points summarize the foundational assumptions:

God is eternal ⇒ T.
1 day with God is 1000 years for man ⇒ k.
Everything visible is made from what is invisible ⇒ the elements of R and the grid.
God is omnipotent ⇒ God writes and edits the simulation to achieve all things.
If time existed, it would be possible to erase the atonement ⇒ time doesn't exist.
God uses foolish things to confound the wise ⇒ Anything opposing the bible will result in confusion such as that caused by a dimension of time.

With the concept of a simulation introduced, the simulation could have begun 13.8 billion years ago with the Big Bang as science predicts, or it might have started when the bible says it did. In the latter scenario, all preceding events could have been encoded into the simulation, allowing us to learn and eventually reach the discovery of God through science. This ultimately means that evolution and the Big Bang are valid theories in terms of mechanics, but they never actually happened beyond modern experimentation.

CONCLUSION

In this proposed model, the multiset R represents the fundamental constituents of all existence. To maintain consistency, the concept of nothingness is defined as boundless empty space, contrasting with the manifold that constitutes the framework of our universe, composed of elements from set R. Quantum processes illustrate the interaction between observable particles and those existing within the manifold. Time as a dimension is nonexistent; each particle follows its individual causal loop, self-sufficient in its existence. This framework condenses the 4-dimensional spacetime manifold into 3 dimensions while yielding outcomes consistent with General Theory of Relativity (GTR), Special Theory of Relativity (STR), and Quantum Mechanics (QM), thereby resolving over 10 paradoxes in physics.