

# ***THE FRAMEWORK OF EVERYTHING (FOE)***

## ***The Laws of Existence and the Structure of Our Universe***

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### ***ABSTRACT***

This article establishes that the Dirac delta function must be continuous and non-zero over some  $\epsilon > 0$  of its domain rendering it logically incompatible for use with point particles, and demonstrates that strings, 0-branes, 1-branes, and 2-branes cannot possess properties that make them indistinguishable from non-existence. Additionally, this work argues that general relativity (GTR) gives the correct answer but for the wrong reason giving an incorrect understanding of the geometry of our universe. Beginning with fundamental axioms, each argument is rigorously deduced, leading to a negation of many current physics theories (or interpretations). The article offers a theory that explains the experimental outcomes in GTR and quantum mechanics (QM) without paradoxes, asserting that observations like entanglement, superposition, wave-particle duality, gravitational waves, and black holes are consistent with formal logic. This work introduces the Laws of Existence, which mathematically define what it means to exist. The theory proposed herein is analyzed in the context of the Michelson-Morley Experiment (MME) and proposes a concept for quantum gravity.

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## 1. INTRODUCTION AND INTENT

The purpose of this article is not to diminish the contributions of previous researchers but to build upon the ideas and equations they have developed. While some theories and concepts may need to be reconsidered entirely, this work suggests that many simply require refinement. At times, this article may present interpretations of physics that differ from the conventional viewpoints held by physicists. In such instances, these interpretations reflect what must logically follow for a given theory to remain consistent. For example, one cannot interact with something that does not exist; thus, for spacetime to interact with matter, spacetime must first exist as a physical entity. Although some may contend that spacetime is merely the geometry of space, the Isomorphism Theorem of Space establishes that this interpretation is not feasible.

With that said, mathematics is fundamentally built upon the principles of formal logic. For instance, foundational concepts like  $A = A$  and  $A \vee \neg A$  are essential for constructing proofs by contradiction. Since physics relies on mathematics, it inherently depends on mathematical logic. Consequently, if a theory in physics is developed based on assumptions that contradict the axioms of the mathematics it employs, it inevitably leads to a paradox. That is:

$$[Formal\ logic \rightarrow (some)\ Math \rightarrow (Some)\ Theories \rightarrow \neg Formal\ Logic] \rightarrow \perp$$

Thus, this work identifies several logical contradictions in modern physics, explains how these contradictions still lead to correct predictions, and presents a theory that makes the same predictions without the paradoxes.

With that said, it is assumed herein that all well established scientific experimental results are true, and these experimental results are used to establish a set of logical propositions. Formal logic is then applied to this set of propositions to conclude a structure of our universe in which there aren't any paradoxes. Mathematics is then applied to this structure resulting in a theory that is both scientifically accurate and logically sound. Specifically, the process used herein is as follows:

1. Evidence:  $\beta = \{\textit{Gravitational lensing, gravitational time dilation, Lorentz time dilation, invariance in the measurement of c, cosmic expansion, gravitational waves, quantization, superposition, entanglement, tunneling, wave-particle duality, and uncertainty}\}$
2. Structure:  $[Framework \wedge Formal\ Logic \wedge \beta] \rightarrow Structure$
3. Theory:  $[Math \wedge Structure] \rightarrow Theory$ .

OR JUST

$$[Math \wedge Framework \wedge Formal\ Logic \wedge \beta] \rightarrow Theory$$

It follows that the Singularity Problem, Schrödinger's Cat Paradox, EPR Paradox, Fermi Paradox, Grandfather Paradox, Information Paradox, Olbers' Paradox, Black Hole Firewall Paradox do not occur within this theory.

It is important to clarify that any viable theory must be compatible with experimental results and scientific observations, but it does not have to align with widely accepted postulates or current theories of physics (although it does seem like it would through a transitive property). With that said, this paper formally establishes the following:

1. Empty space (distinct from spacetime) is isomorphic to the vector space  $\mathbb{R}^n$  for some  $n \geq 3$ : Informally, if an existence  $Z$  is positioned at point  $(p)$  in space, then  $(p)$  is well-defined, and if an existence doesn't exist at  $(p)$ , then nothing exists at  $(p)$  to prevent  $Z$  from moving to  $(p)$ . Thus, empty space is smooth and continuous. It is the fact that empty space does not exist that prevents it from constraining anything that does.
2. A point particle cannot exist.
3. Strings, 0-branes, 1-branes, and 2-branes, as defined in String Theory and M-Theory, do not exist: Since empty space is isomorphic to some  $\mathbb{R}^n$ , each point on a string is well defined. Since there isn't an area for flux to pass through, nothing holds a string together, and thus they do not exist. This same thought process holds for 0-1-2 branes as shown below. Thus, like the point particle, strings, 0-1-2 branes are great approximations but they do not exist.
4. Even though a volumetric entity might be conceptualized as a collection of strings or 0-, 1-, or 2-branes that do not exist independently, a volumetric entity can still exist in part because flux can pass through it, binding it together.
5. GTR gives an incorrect understanding of our universe.
6. All observations pertaining to GTR are modeled by equation 14 in 3-space Euclidean, and it is done in such a way as to be compatible with the observations of QM.

With that said, many results in physics are obviously very accurate, but the model used to obtain the answer does not fully capture the underlying reality. This is why even the most popular physicists provide seemingly abstract answers regarding quantum particles, black holes, and other advanced topics as the complete picture of reality isn't captured in their model. This framework and theory explains what occurs in quantum processes, what time is, and what it means to exist, thus allowing physicists to provide logical answers to these types of questions.

Consider an object  $O$  with a measurable quantity ( $u$ ), such as mass or charge. The true value of ( $u$ ) is given by  $Val(u) = M(u) + Err(u)$ , where  $M(u)$  is the measured value and  $Err(u)$  represents the measurement error. Since every measurement includes some error,  $|Val(u) - M(u)| = |Err(u)| > 0$ . Now we can say that the speed of light is known to be constant, the laws of physics are invariant, or that point particles are known to exist, but this contradicts the fact that  $|Err(u)| > 0$  (logically:  $|Err(u)| < 10^{-k}$  doesn't imply that  $|Err(u)| < 10^{-k-1}$  for some  $0 \leq k < \infty$ ). Thus these are only assumptions, and should be treated as such. It should be clarified that any logical theory working within the confines of  $Err(u)$  is therefore consistent with known physics.

As you read this article, you might begin to see that much of modern physics lacks a means of truly being feasible. A good analogy might be that physics gives us the differential equation that models the motion of a pendulum, but the structure of the universe to which it applies makes the existence of the rope impossible. A scientific theory is only developed herein to the point of establishing the fact that all observations in QM and GTR can be aligned with Formal Logic, and described in 3-space Euclidean. As established further in the text, the following must hold true:

- A. (By the Laws of Existence below) You cannot interact with something that doesn't exist. Since space doesn't exist, space therefore cannot interact with light to produce gravitational lensing/redshifting, etc. Thus, there must be something present in space that does exist, and that can interact with photons.
- B. (By the Laws of Existence below) Only something that exists can propagate information. Since space doesn't exist, space does not contain information, but information can be transferred through space by an existing entity.
- C. What we perceive as empty space actually contains a multitude of quantized existences (think of a lattice) that exist in a subset of space. These existences have properties that do not interact directly with objects like stars or photons, making them inherently undetectable (directly). Together, these existences constitute the Field Ether (FE) that permeates our observable universe, with all observable objects existing within it. These existences operate within their own causal loops, and occasionally a set of these entities superimpose, creating a net property that interacts with our environment, manifesting as what we recognize as a particle. Per equation 14, the FE is compatible with the results of the MME, gravitational and Lorentz time dilation, etc..
- D. In this theory, quantum mechanics models the interactions between the FE and quantum particles. When a particle is observed, it remains intact acting as a particle. However,

when not observed, it can decompose into its individual components, which then interact as they transition through their own causal loops giving rise to wave-like behavior. This establishes a means for wave-particle duality within formal logic, as well as ensuring that the particles of the standard model are not fundamental. Since the components of the FE are not directly measurable, it cannot be assumed that they follow our known laws of physics and thus they cannot be assumed to be bound by the speed of light: this establishes a means for communication to be propagated through the FE “instantaneously” explaining quantum entanglement logically. Likewise, an electron can dissociate into its respective existences (which are not bound by our known laws of physics) and pass a potential barrier, thus quantum tunneling. Due to our inability to know the causal loop of each existence that makes up a particle, uncertainty in our measurement is guaranteed, establishing the fact that quantum mechanics must be modeled statistically even though it is deterministic. As we can see, QM is not that mysterious when examined in light of this framework. Even the results of the Quantum Eraser can be explained.

- E. Since the components of the FE exist, they can alter the index of refraction of space, leading to gravitational lensing and redshift without the need for spacetime. Time, in this view, does not exist but is instead a measurement based on the distance that an existence travels as it transitions through its causal loop. For instance, as a photon transitions through its causal loop, it propagates at what we define as the speed of light,  $c$ . However, when using a light clock to measure this "speed of light," both the light within the clock and the light being measured slow down proportionally, resulting in  $c$  being a geometric constant. This ensures that all reference frames measure the same value. Similarly, all force carriers interact with the FE in a way that even atomic clocks experience such time dilation. Furthermore, because the FE exists, gravitational waves can propagate through it, and it provides a means for explaining dark energy by which the components of the FE, due to not being constrained by our known physical laws, drive the expansion of our universe at speeds faster than  $c$ . As shown herein, interactions between a photon and the FE are responsible for the speed of light appearing invariant, thus aligning with the results of the Michelson-Morley experiment and subsequent modern versions.
- F. Particles, by their nature, contain information that can be distributed through the elements of the FE, resulting in what we observe as fields, thus fields are discrete. When another existence interacts with one of these fields, it acquires information, often resulting in a force. These interactions explain everything from the gravitational and coulomb fields, to the quantum field.

## 2. DEFINITIONS

These definitions are philosophically based, allowing for a purely conceptual understanding. Building on these foundations, equations are introduced in the following sections to refine these concepts, making them scientifically rigorous.

**Formal Logic** is a system for reasoning that deals with propositions (true/false statements), logical operators (AND ( $\wedge$ ), OR ( $\vee$ ), NOT ( $\neg$ ), IMPLIES ( $\rightarrow$ ), etc.), mathematics, and truth tables. It allows for constructing valid deductive arguments where the conclusion necessarily follows from true premises. As used herein, it does not include multivalued, fuzzy, or quantum logic.

A **property** is an intrinsic, non-trivial attribute of an entity independent of subjective perception or geometrical characteristics (i.e. a square has the property of being square but that is a geometrical characteristic and thus does not satisfy the specific definition. Likewise, an imagined entity can have the property of change within the mind, but this is subjective and thus also does not satisfy the intended definition.).

**Existence** refers to the state or condition of possessing at least one property that distinguishes an entity from non-existence. It implies the actuality or reality of an entity, independent of subjective perception or mental constructs (in this context, epistemological existence is ignored). The word existence, or **existences**, is used to reference an entity that possesses a property and thus also therefore exists.

An **entity** is an object or concept that either exists or it doesn't. Entities can possess properties that contribute to their existence and define their identity (i.e. an imagined sphere is an entity, but it does not possess a property, thus it cannot exist. An electron can exist because it has the property of charge.).

**Property density** is the quantified magnitude of a property possessed by an entity divided by the entity's length, area, or volume as specified by the context.

**Binding Property** is any property that binds an existing entity together. A binding property, like all properties, must have an internal flux.

**Flux** is the measure of how much of a property of an entity passes through a boundary. It indicates the flow, transfer, or influence of the property across or through the specified area or region, regardless of whether the property physically moves or not.

A **transition** involves altering an entity's property or spatial extent.

A **volumetric** geometry occupies empty space and excludes regions that are strictly a point, area, or length (i.e. Two spheres connected by a line is not a volumetric geometry, whereas the two spheres sharing some volume is.).

**Space** is the expanse that contains the universe's matter and energy, in addition to the matter and energy itself. If dimensionality is defined beyond the universe, space includes that as well. **Empty Space** references the same but without the presence of any existence.

To **constrain** means to impose limits or conditions.

**Information** is a quantifiable and interpretable representation of the state or properties of a system, whether physical or logical.

**Causality** is the principle that specifies a cause-effect relationship between events such that the state of a system at one point determines its state at another point, consistent with the governing laws of the system.

A **Causal Loop** is a sequence of events in which each event is both a cause and an effect of another event in the sequence, forming a closed loop.

### ***3. FOUNDATIONAL PRINCIPLES***

The following are assumed true in developing this work:

Formal Logic [4]:

1. Law of Identity ( $A \equiv A$ )
2. The law of Non-Contradiction ( $\neg(p \wedge \neg p)$ ).
3. The Transitive law ( $(A \rightarrow B) \wedge (B \rightarrow C) \rightarrow (A \rightarrow C)$  )
4. The law of Excluded Middle ( $(p \vee \neg p)$  )
5. The law of Contraposition ( $(p \rightarrow q) \leftrightarrow (\neg q \rightarrow \neg p)$  )
6. De Morgan's laws ( $\neg(p \wedge q) \leftrightarrow \neg p \vee \neg q$  and  $\neg(p \vee q) \leftrightarrow \neg p \wedge \neg q$  )

Applied Mathematics:

1. Local Homeomorphism Theorem.
2. Whitney Embedding Theorem [5].
3. The principles and methodologies of general mathematics, particularly calculus, differential geometry, real analysis, and calculus of variations.
4. The Finite Precision Theorem (Infinite precision is not obtainable on a continuous spectrum).

Scientifically verified experimental results and observations:

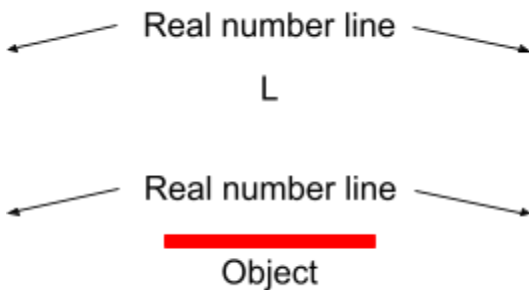
Gravitational lensing, gravitational time dilation, Lorentz time dilation, invariance in the measurement of  $c$ , cosmic expansion, gravitational waves, quantization, superposition, entanglement, quantum tunneling, wave-particle duality, uncertainty



## 4. FRAMEWORK - THE LAWS OF EXISTENCE

In order to develop a robust framework, it is imperative to derive Laws of Existence that define the boundaries of all possibilities. This framework can then be applied to any given theory in physics as a gauge or test of feasibility. It is claimed herein that if  $Z$  is an entity with properties that produce a logical contradiction, then  $Z$  doesn't exist. Thus, everything that exists is subject to the rules of formal logic.

### 4.1 The general concept of existence



**Fig 1** shows the distinction between an entity having a property, and thus existing; and an entity not having a property, and therefore not existing. At the top, entity  $L$  does not have a property that allows it to be distinguished from the real number line and thus  $L$  represents an entity that does not exist. At the bottom is an entity that has a property that allows it to be distinguished from non-existence, and in this case said property causes the entity to appear red.

Imagine the real number line  $\mathbb{R}$  positioned in space, and let  $L$  denote the imagined line segment  $[0,1]$ . This example is depicted at the top of **Fig 1**, where both  $\mathbb{R}$  and  $L$  are represented as being invisible since they do not exist outside of one's mind. That is, both  $\mathbb{R}$  and  $L$  have a geometry, but having a geometry is not sufficient for establishing existence.

At the bottom of **Fig 1** is a depiction of the same imagined number line, but with  $L$  replaced by an object of a similar length. This object has a property that allows it to be distinguished from non-existence, and in this case said property results in the object appearing red.

With that said,  $\mathbb{R}$ ,  $L$ , and the object all have a geometry, but only the object has a property that results in its existence. For this reason, the word property, as used herein, excludes geometric properties. Additionally,  $L$  could be morphed into a circle in one's mind, and thus the definition of property also excludes the property of change. In the following theorems it is my intention to show that existence necessitates a type of geometry (like the geometry of the object), in conjunction with a property (like that which allows the object to appear red) that distinguishes it from that which doesn't exist. The following theorems establish the laws of existence.

### 4.2 The Laws of Existence

Define the following for an entity  $Z$ :

$P(Z)$ : The entity  $Z$  has a property.

$S(Z)$ :  $Z$  has the property of self-causation, suggesting  $Z$  can cause its own existence.

$C(Z)$ :  $Z$  has the property of constraining.

$E(Z)$ : The existence of  $Z$  can arise from non-existence.

$B(Z)$ :  $Z$  began to exist indicating a transition into existence.

$O(Z)$ :  $Z$  was formed from at least one already existing entity.

$I(Z)$ : Z possesses the property of having information.

#### 4.2.1 Property Law

By the definition of existence, if Z exists then it has a property, and if Z has a property, then it exists. Thus:

$$[Def. of Existence] \rightarrow [P(Z) \leftrightarrow Z]$$

#### 4.2.2 Self-Causation Negation

By the definition of S(Z),  $S(Z) \rightarrow P(Z)$ ; and by the Definition of Existence,  $P(Z) \rightarrow Z$ . Thus, by the transitive law  $S(Z) \rightarrow Z$ , and by its contrapositive  $\neg Z \rightarrow \neg S(Z)$ . Thus, if Z doesn't exist, it cannot cause itself to exist. Thus:

$$\neg S(Z) \quad (\text{Self Causation Negation})$$

Therefore, Z cannot be self-causing. To clarify, if two pre-existing entities combine to form Z, it is the interaction between these two entities that results in the formation of Z, rather than Z causing its own existence.

#### 4.2.3 Constraint Law

By the definition of C(Z),  $C(Z) \rightarrow P(Z)$ . Combined with the Definition of Existence, the antecedent of the transitive law is  $[C(Z) \rightarrow P(Z)] \wedge [P(Z) \rightarrow Z]$ . Thus:

$$C(Z) \rightarrow Z \quad (\text{Constraint Law})$$

Thus, for Z to be constrained, Z must first exist. By the contrapositive of the Constraint Law, if Z does not exist, it cannot be constrained to begin existing (from non-existence). It should be clarified that the converse of the Constraint Law is not necessarily true. That is:

$$\diamond(Z \nrightarrow C(Z)) \quad (\text{Non-Biconditional Constraint Law})$$

Thus it is possible that two entities exist that cannot constrain each other, and are thus able to occupy the same spatial coordinates. It should be noted that the Non-Biconditional Constraint Law is used as a reference for clarity, not as part of the logical argument.

#### 4.2.4 Law of Ontological Continuity

By the Self Causation Negation, Z cannot cause itself to exist; and by the contrapositive of the Constraint Law, Z cannot be constrained to exist (out of non-existence). That is  $\neg S(Z) \wedge [\neg Z \rightarrow \neg C(Z)] \rightarrow \neg E(Z)$ , thus:

$$\neg E(Z) \quad (\text{Law of Ontological Continuity})$$

Therefore, Z cannot be produced from non-existence. This implies that if Z began to exist, it must have formed from pre-existing entities. Conversely, if Z was formed from such entities, then Z transitioned into existence. Thus:

$$B(Z) \leftrightarrow O(Z) \quad (\text{Existence Law})$$

#### 4.2.5 Information Law

By definition, if Z possesses information, then Z exists. That is:

$$I(Z) \rightarrow Z \quad (\text{Information law})$$

Thus, consider two existences,  $Z_1$  and  $Z_2$ , in an otherwise empty space, separated by a distance  $\varepsilon > 0$ . By the contrapositive of the Information Law ( $\neg Z \rightarrow \neg I(Z)$ ), regardless of how small  $\varepsilon$  is made, neither entity can have any information about the other unless an existence is transferred (or shared) between them. Thus, suppose that existence  $\gamma$  is transferred from  $Z_1$  to  $Z_2$ . Consequently,  $Z_2$  can have information about  $Z_1$ , but  $Z_1$  cannot have information about  $Z_2$ .

#### 4.2.6 Fields and point particles

Particles are often associated with a field, and since these fields contain information about the particle, by the Information Law, the field must exist. If one argues that the field is part of the particle itself, then the particle cannot be considered point-like. Conversely, if the field is asserted to be separate from the particle, what is being modeled is the existence of the field, not the particle directly. Similarly, if the field is said to consist of virtual photons, those photons are distinct from the particle itself. Therefore, a particle cannot possess any non-zero property outside of itself, implying that a point particle cannot have a non-zero valued property beyond its point.

#### 4.2.7 Time-Existence Relation

According to the Information Law, time can only be conveyed through the presence of an existence. In the absence of an existence, there would be nothing to measure with a clock or to move through time, rendering the concept of time as undefined. Thus:

$$Time \rightarrow Existence \quad (\text{Time-Existence Relation})$$

#### 7.2.8 The Zero-Infinity Limit Theorem

It is important to clarify that infinity is not a number but a concept representing something that is unbounded or without limits. That is,  $\forall x \in \mathbb{R}, x \neq \infty$ . For example, if we are to pick  $x = 10^{1000}$ , we would see that x is not unbounded and thus does not satisfy the definition of being infinite. For this reason, statements like  $0 \cdot \infty = 0$  are undefined or in an indeterminate form. To resolve this issue, mathematicians have adopted the notation

$\lim_{x \rightarrow \infty} 0 \cdot x = 0$ , meaning that as x becomes arbitrarily large,  $0 \cdot x = 0$ . The truthfulness of

this statement is made apparent by the fact that for  $\forall x > 0$ ,  $0 \cdot x$  can be mapped to the area of

a line segment, and the area of a line is always zero by definition. This statement can thus be generalized as the following theorem.

$$\forall g(x) \in C^k \text{ for some } k \geq 0 \mid \lim_{x \rightarrow \infty} g(x) \rightarrow \infty, \lim_{x \rightarrow \infty} 0 \cdot g(x) = 0$$

#### 4.2.9 The Point-Particle Limit Theorem

**Statement:** Limits cannot be applied to point particles to produce a non-zero value.

**Proof:** Let  $f(x), g(x) \in C^k$  for some  $k \geq 0 \mid \lim_{x \rightarrow \infty} f(x) \rightarrow 0$  and  $\lim_{x \rightarrow \infty} g(x) \rightarrow \infty$ .

Suppose that:

$$\lim_{x \rightarrow \infty} f(x)g(x) \neq 0$$

By the Zero-Infinity Limit Theorem, it follows that:

$$\lim_{x \rightarrow \infty} f(x)g(x) \neq \lim_{x \rightarrow \infty} 0 \cdot g(x)$$

Thus:

$$\lim_{x \rightarrow \infty} f(x) \neq 0$$

That is,  $\lim_{x \rightarrow \infty} f(x)$  approaches zero but is never identical to it, and thus  $f(x)$  cannot be

applied to a point particle. As an example,  $\forall x \in \mathbb{R}, \frac{1}{x} \neq 0$  as demonstrated by the fact that  $1 \neq 0x$ , yet we still write  $\lim_{x \rightarrow \infty} \frac{1}{x} = 0$  when such nuances are not relevant.

However, when dealing with point particles, such details must be preserved, and unfortunately doing so makes limits entirely useless in relation to point particles. For clarification,  $f(x)g(x)$  can be mapped to the area of some geometry, and as soon as  $f(x)$  becomes identically zero, regardless of how this occurs the area becomes that of a line.

QED

#### 4.2.10 The Point-Particle Delta Function Theorem

According to the Zero-Infinity Limit Theorem and the Point-Particle Limit Theorem, it has been established that limits applied to a point particle cannot yield a non-zero value. According to the Field section, a point particle cannot have a non-zero value exterior to said point. Therefore, it is essential to investigate whether a spike, such as that represented by the Dirac delta function, can result in a non-zero value for a point particle. Thus, consider the Dirac delta function  $\delta(x - \alpha)$  informally defined as [2]:

$$\delta(x - \alpha) \equiv 0 \text{ when } x \neq \alpha$$

$$\delta(x - \alpha) = \infty \text{ when } x = \alpha$$

$$\int_{\alpha^-}^{\alpha^+} \delta(x - \alpha) dx = 1$$

In this case the width of the spike is identically  $\Delta x \equiv 0$ , thus the geometry of the spike is that of a line segment. By the Zero-Infinity Limit Theorem, the area is thus 0 not 1, thus:

$$[\int_{\alpha^-}^{\alpha^+} \delta(x - \alpha) dx = 1] \wedge [\delta(x - \alpha) \equiv 0 \text{ when } x \neq \alpha] \rightarrow \perp$$

That is, this informal definition of the Dirac delta function is a logical contradiction, and simply defining it in this manner doesn't make it logically possible. Therefore:

$$\int_{\alpha^-}^{\alpha^+} \delta(x - \alpha) dx = 0$$

Now the main purpose of the delta function is to sift out the value of a function at a point, so its formal definition is just that  $\delta(x - \alpha)$  satisfies the property [2]:

$$\int_{-\infty}^{\infty} \delta(x - \alpha) f(x) dx = f(\alpha)$$

In this case, the delta function is a distribution that picks out specific value(s) of  $f(x)$  such that the property holds. This leads us to the following proof.

**Statement:** The Dirac delta function cannot be applied to a point particle to produce a non-zero value.

**Proof:** Typically we don't care specifically what the shape of the distribution is, but in this case it is necessary to analyze it. Suppose that the Dirac delta function is non-zero only at specific points. That is:  $\delta(x - \alpha) = 0$  except at  $x = \{\alpha_1, \alpha_2, \dots\}$ . In this case, the formal definition of the Dirac delta function reduces to the informal definition above as follows:

$$\begin{aligned} \int_{-\infty}^{\infty} \delta(x - \alpha) f(x) dx &= \int_{\alpha_1^-}^{\alpha_1^+} [\delta(x - \alpha_1) f(x)] dx + \int_{\alpha_2^-}^{\alpha_2^+} [\delta(x - \alpha_2) f(x)] dx \dots \\ &= f(\alpha_1) \int_{\alpha_1^-}^{\alpha_1^+} \delta(x - \alpha_1) dx + f(\alpha_2) \int_{\alpha_2^-}^{\alpha_2^+} \delta(x - \alpha_2) dx \dots \\ &= f(\alpha_1) \cdot 0 + f(\alpha_2) \cdot 0 \dots \\ &= 0 \end{aligned}$$

Likewise, if  $f(x) = 0$  except at  $x = \{\alpha_1, \alpha_2, \dots\}$ , then the same result occurs. Thus, by contradiction  $\exists D_{\delta f} \subset D_{\delta} \cap D_f \mid D_{\delta f}$  is continuous and  $\delta(x - \alpha)$  and  $f(x)$  are non-zero over  $D_{\delta f}$ . So while the Dirac delta function is a distribution, the property ( $D_{\delta f}$ ) that is necessary to prevent a logical contradiction, is also what prevents the Dirac delta function from being applicable to point particles. Since  $D_f = \{\alpha_1\}$  for a point particle,

$$\int_{-\infty}^{\infty} \delta(x - \alpha) f(x) dx = 0.$$

QED

Now consider the Gaussian distribution defined as  $G(x, \beta) = |\beta| e^{-(x\beta)^2}$  in which

$$\int_{-\infty}^{\infty} G(x, \beta) dx = \int_{-\infty}^{\infty} [f(x) = e^{-(x\beta)^2}] [g(x) = |\beta|] dx = \sqrt{\pi} \quad \forall |\beta| > 0.$$

It follows that

$$\lim_{\beta \rightarrow \infty} [f(x) = e^{-(x\beta)^2}] [g(x) = \beta] \neq 0,$$

and thus, by the Point-Particle Limit Theorem, the Gaussian distribution doesn't apply to a point particle.

With this said, it is important to explain why the Dirac delta function, and the Gaussian distribution can produce the correct results in physics for the wrong reason. By l'hospital's Rule,

$$\forall x \neq 0 \quad \lim_{\beta \rightarrow \infty} |\beta| e^{-(x\beta)^2} = \lim_{\beta \rightarrow \infty} 1/(2\beta x^2 e^{(x\beta)^2}) = 0. \text{ Thus:}$$

$$G(x \neq 0, \beta \rightarrow \infty) = 0$$

At the point  $x = 0$ ,  $G(0, \beta) = |\beta| e^{-(0\beta)^2} / \sqrt{\pi} = |\beta| / \sqrt{\pi}$ , and thus:

$$G(0, \beta \rightarrow \infty) \rightarrow \infty$$

That is,  $G(x, \beta \rightarrow \infty)$  models the first two conditions of the informal definition of the delta function, but by the Point-Particle Limit Theorem it never actually matches it perfectly since

$$f(x) \text{ is never identical to zero. Notice that } \int_{-\infty}^{\infty} G(x, |\beta| < \infty) / \sqrt{\pi} dx = \int_{-\infty}^{\infty} \delta(x) dx = 1, \text{ thus the}$$

delta function produces the correct value by assuming non-point particles to have the geometry of a point.

#### 4.2.11 The Point Entity Theorem

**Statement:** A point entity can't exist.

**Proof:** Let Z be a point entity. Define the following:

$V(Z)$ : Length, area, or volume of  $Z$ .

$\rho(Z)$ : Corresponding (to  $V(Z)$ ) average linear, area, or volume property density of  $Z$ .

$Point(Z)$ : Denotes that  $Z$  is a point entity.

1. By the Fields section,  $Z$  being a point entity implies that  $V(Z)$  is identically zero.

$$Fields\ section \wedge Point(Z) \rightarrow V(Z) \equiv 0$$

2. By the Fields section, every property of a point particle has a zero (or undefined) value exterior to said point. By the Point-Particle Limit Theorem (PPLT), limits cannot be applied to a point particle to produce a non-zero value. By the Point-Particle Delta Function Theorem (PPDFT), the Dirac delta function cannot be applied to a point particle to produce a non-zero value. By the Zero-Infinity Limit Theorem (ZILT), even if the property density is infinite at a point, the product of the property density and volume is zero.

$$1. \wedge PPLT \wedge PPDFT \wedge ZILT \rightarrow \rho(Z)V(Z) \equiv 0$$

3. The product of the volume and the property density being identically zero, implies that  $Z$  doesn't have a property.

$$2. \rightarrow \neg P(Z)$$

4. Without a property, by the definition of existence,  $Z$  cannot exist.

$$\neg P(Z) \wedge [Def. of Existence] \rightarrow \neg Z$$

QED

Considerations regarding the Point Entity Theorem: In quantum mechanics, fundamental particles are often considered point-like, and high energy experimentation affirms that no (currently) detectable structure exists [1]. However, the Point Entity Theorem shows that such particles cannot exist. This conflict between Formal Logic and observation will be addressed later in the article.

It is necessary to derive a metric for space that can then be used to define the geometries of entities that exist within it. This leads to the Isomorphism Theorem of Space.

#### 4.2.12 Isomorphism Theorem of Space (ITS)

**Statement:** Space is isomorphic to the vector space  $\mathbb{R}^n$ , for some  $n \geq 3$ . In the context where points in space are represented as vectors, empty space is isomorphic to the vector space  $(\mathbb{R}^n, \mathbb{R}, +, \cdot)$  for some  $n \geq 3$ , where  $\mathbb{R}^n$  denotes an  $n$ -dimensional Euclidean space over the field of real numbers  $\mathbb{R}$ , and  $+$  and  $\cdot$  denote vector addition and scalar multiplication, respectively.

**Proof:** Let  $S$  represent points in space, and  $\mathbb{R}^n$  be the  $n$ -dimensional Euclidean space for some  $n \geq 3$ . Define  $\phi: \mathbb{R}^n \rightarrow S$  by  $\phi(\langle v \rangle) = (v)$ , where each vector  $\langle v \rangle \in \mathbb{R}^n$  is mapped to a corresponding point  $(v) \in S$ .

By the Local Homeomorphism Theorem, for any manifold  $M$  of dimension  $m$ , any point  $(v_{origin})$  locally resembles  $\mathbb{R}^m$ . Therefore it is established that for  $M$ , representing the geometry of space,  $(v_{origin}) = (0, 0, 0...) \in S$ , and  $\langle 0, 0, 0... \rangle \in \mathbb{R}^n$ , and thus at least one point in  $S$  corresponds to a vector in  $\mathbb{R}^n$ .

By the Law of Excluded Middle, existence either exists at  $(v)$ , or it doesn't. If existence exists at  $(v)$ , then  $(v)$  must first be well-defined. If existence doesn't exist at  $(v)$ , then by the contrapositive of the Constraint Law, nothing exists at  $(v)$  to prevent existence from existing at  $(v)$ . Therefore,  $\forall \langle v \rangle \in \mathbb{R}^n$ ,  $(v)$  is well-defined.

Let  $\langle v_1 \rangle, \langle v_2 \rangle \in \mathbb{R}^n$ :

1. **Injective:** Suppose that  $\phi(\langle v_1 \rangle) = \phi(\langle v_2 \rangle)$ . It follows that  $(v_1) = (v_2)$ , and thus  $\langle v_1 \rangle = \langle v_2 \rangle$ . Therefore  $\phi$  is injective.
2. **Surjective:** For any point  $(v_i) \in S \exists \phi^{-1}(v_i) = \langle v_i \rangle \in \mathbb{R}^n$ . Thus  $\phi$  is also surjective.
3. **Linear:**  $\phi(\langle v_1 + v_2 \rangle) = (v_1 + v_2) = \phi(\langle v_1 \rangle) + \phi(\langle v_2 \rangle)$ , and  $\phi(c \langle v_1 \rangle) = c(v_1) = c\phi(\langle v_1 \rangle)$  and thus  $\phi$  preserves vector addition and scalar multiplication.

Since  $\phi$  is bijective and preserves vector operations, it is an isomorphism between  $\mathbb{R}^n$  and  $S$ .  
QED

Considerations regarding the ITS: According to the Isomorphism Theorem of Space, space is smooth, continuous and infinite in all its defined dimensions with a Euclidean metric. Every point in space either contains existence or nothing exists there to prevent existence from existing there. Thus, space itself cannot be quantized or discrete. Therefore, for any manifold  $M$  representing the real structure of the universe, each point on  $M$  can be described as a point in  $\mathbb{R}^n$  for some  $n \geq 3$ . This is very similar to the Whitney Embedding Theorem (WET) stating that a smooth manifold of dimension  $n/2$  can be embedded into  $\mathbb{R}^n$  [5], but the WET doesn't guarantee that there will not be deformations whereas the ITS does (for space).

Now that a metric has been defined for space, it can be used to represent additional geometries of any entity existing within it. This leads to the following theorem.

#### 4.2.13 The 1-D Entity Theorem

**Statement:** A 1-dimensional entity cannot exist.

**Proof:** Let  $Z$  be a 1-dimensional entity in space.



1. Let  $x$  be a point on  $Z$  such that  $x$  is not an endpoint:  

$$x \in Z \wedge x \notin \text{endpoints}(Z)$$
2. By the Isomorphism Theorem of Space, each point  $x$  on  $Z$  is well-defined:  

$$[ITS] \rightarrow \forall x \in Z, \text{well-defined}(x)$$
3. Since  $x$  is not an endpoint,  $x$  divides  $Z$ :  

$$1. \rightarrow x \text{ divides } Z$$
4. Since  $x$  divides  $Z$ , and  $x$  is a point, flux does not pass through  $x$ .  

$$3. \wedge \text{Point}(x) \rightarrow \neg \text{flux through}(x)$$
5. Without flux, there isn't a binding property holding  $Z$  together at  $x$ .  

$$4. \rightarrow \neg(\text{binding property}(x))$$
6. Since  $x$  is arbitrary, this applies to all internal points on  $Z$ :  

$$5. \wedge x \text{ is arbitrary} \rightarrow \forall x \in Z, \neg(\text{binding property}(x))$$
7. Without a binding property,  $Z$  cannot exist:  

$$6. \rightarrow \neg Z$$

Since each point  $x$  on  $Z$  divides  $Z$ , and  $x$  is a point entity, flux cannot pass through  $x$  to bind  $Z$  together. Therefore,  $Z$  lacks any property that could bind its segments together. Consequently,  $Z$  cannot exist.

*As a clarification, suppose that the flux of  $Z$  goes around the point  $x$ , to bind  $Z$  together. In this case, such flux is either 1 dimensional and thus bound by this theorem, or such flux is higher dimensional in which the following theorems apply.*

**QED**

**Considerations regarding the 1-D Entity Theorem:** In string theory, a string is theorized as a one-dimensional entity propagating in spacetime. These strings are hypothesized to be the fundamental constituents of the universe, replacing point-like particles of the Standard Model [1]. However, even if you consider a string as collectively being fundamental, by the 1-D Entity Theorem, there isn't a means for such entities to possess a property, and thus they do not exist. This is independent of the number of dimensions, presumably 10 or 11, in which the string would propagate. This leads to the following Theorem:

#### 4.2.14 The 2-D Entity Theorem

**Statement:** A 2-dimensional entity cannot exist.

**Proof:** Let  $Z$  be a 2-dimensional entity in space.

1. Let  $x$  be a 1-d entity on  $Z$  such that  $x$  divides  $Z$  into two sections:  

$$x \text{ divides } Z$$
2. By the Isomorphism Theorem of Space, each point  $y$  on  $Z$  is well-defined:  

$$[ITS] \rightarrow \forall y \in Z, \text{well-defined}(y)$$
3. Since  $x$  divides  $Z$ , and  $x$  is 1-d, flux does not pass through  $x$ .  

$$1. \wedge [x \text{ is 1d}] \rightarrow \neg \text{flux through}(x)$$
4. Without flux, there isn't a binding property holding  $Z$  together at  $x$ .  

$$3. \rightarrow \neg(\text{binding property}(x))$$
5. Since  $x$  is arbitrary, this applies to all 1-d entities on  $Z$ :

4.  $\wedge x \text{ is arbitrary} \rightarrow \forall x \in Z, \neg(\text{binding property}(x))$   
 6. Without a binding property,  $Z$  cannot exist:  
 5.  $\rightarrow \neg Z$

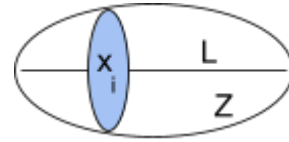
QED

Considerations regarding the 2-D Entity Theorem: In the context of M-Theory, a 0-brane, 1-brane, and 2-brane cannot exist. This leads us to the 3-D Entity Theorem.

#### 4.2.15 The 3-D Entity Theorem

**Statement:** It is possible that a 3-D entity exists.

**Fig 2** represents a 3-d entity  $Z$ , with the longest possible line segment  $L$  positioned inside such that both ends of  $L$  are on  $Z$ . The cross-section  $x_i$  is perpendicular to  $L$ , and divides  $Z$ .



**Proof:** To establish the existence of a 3-d entity, it is necessary to first demonstrate that the same logic preventing the existence of lower-dimensional entities does not prevent the existence of a 3-d entity. Define the following in relation to the **Fig 2**:

$Z$ : A 3-d entity.

$L$ : The longest possible line segment through  $Z$ .

$|L|$ : The length of  $L$ .

$x_i$ : A cross-section of  $Z$  perpendicular to  $L$ .

1. By the 2-D Entity Theorem,  $x_i$  does not exist (DNE).

$$[2\text{-D Entity Theorem}] \rightarrow \forall x_i \in Z, DNE(x_i)$$

2. By the Constraint Law,  $x_i$  cannot prevent flux from passing through it.

$$[Constraint Law] \wedge DNE(x_i) \rightarrow \neg Prevent Flux(x_i)$$

3.  $x_i$  has an area,  $x_i$  cannot prevent flux from passing through it, thus a binding property can pass through  $x_i$ .

$$Area(x_i) \wedge 2. \rightarrow Z \text{ can have binding property}(x_i)$$

4. Since  $x_i$  is arbitrary, this applies for all  $x_i \in Z$ .

$$3. \wedge x_i \text{ is arbitrary} \rightarrow \forall x_i \in Z, Z \text{ can have binding property}(x_i)$$

Therefore, the same logic that prevents a 1-d, or 2-d entity from existing, doesn't apply to a 3-d entity.

It is necessary to establish that, although a 3-dimensional entity can be considered a set of points, lines, or areas representing entities that do not individually exist, this does not prevent the existence of the 3-dimensional entity itself. That is.  $\forall x_i \in Z, x_i$  does not exist, yet  $Z$  can exist. To prove this, consider  $y: [0, \infty] \rightarrow [0, |L|]$ , defined as

$y(x_i) = |L|/(1 + x_i)$ . For each  $x_i$ , the thickness  $l_i$  is zero, but the total length of  $Z$  is  $|L| > 0$ . Therefore, by tying the property of  $Z$  to the thickness  $l_i$ , such that  $P_i = \beta x_i l_i$  for some  $\beta \neq 0$ , a property of  $Z$  can be recovered with  $|L|$ . Thus  $\sum_{i=0}^{\infty} P_i = \beta \sum_{i=0}^{\infty} x_i l_i = \beta V(Z)$ , and therefore, a 3-D entity can exist, even though the individual point, length and area entities comprising it do not exist.  
QED

#### 4.2.16 The Missing Geometry Theorem

By the Point, 1-D, and 2-D entity theorems, if an entity has a geometry in which any portion is not volumetric, that portion does not exist. Consequently, enclosing an existing entity within a larger entity does not confer existence to the larger entity. Therefore, if two entities are not connected volumetrically, or such volume doesn't have a property, the two entities exist independently.

#### 4.2.17 The Mathematical Definition of Existence

The Point Entity, 1-D Entity, 2-D Entity, and 3-D Entity Theorems establish the criteria for an entity  $Z$  to exist. Such criteria can be explicitly defined using the following sets:

$$\begin{aligned} G &= \{g | g \text{ is volumetric}\} \\ P &= \{p | p \text{ is a property}\} \end{aligned}$$

In which the existence of  $Z$  is established as:

$$Z = (g, p) \quad (\text{Mathematical definition of existence})$$

Therefore, the set  $\xi$  comprising the entirety of everything that exists is defined as:

$$\xi = \{Z\} \quad (\text{Set of everything that exists})$$

This formulation encapsulates the idea that an existing entity  $Z$  is characterized by a volumetric geometry  $g$ , and at least one property  $p$ . By the law of Excluded Middle, anything that doesn't satisfy the definition of existence does not exist. Therefore, the set  $N$  of everything that does not exist is defined below. It should be clarified that neither  $N$  nor  $\xi$  exist, and thus to avoid Russell's Paradox, they are excluded from  $N$ . That is:

$$N = \{Y | g \notin G \vee p \notin P\} \setminus N, \xi \quad (\text{Set of everything that doesn't exist})$$

It follows that an entity that has spatial extent but lacks a property belongs to  $N$ . Therefore space, despite its spatial nature, does not exist. That is:

$$Space \in N$$

This makes sense intuitively because an existence can move without constraint within empty space. By definition, everything that exists, exists in infinite space. That is:

$$\forall Z \in \xi, Z \text{ exists in infinite space} \quad (\text{Law of Spatial Existence})$$

Now that the geometry  $g$  for existence is established, this leads to the following theorem regarding the potential for infinite divisibility.

#### 4.2.18 The Existence Divisibility Theorem

**Statement:** Any existing entity can be infinitely divided into multiple existing entities, provided that a property doesn't prevent such division.

**Proof:** Let  $Z$  be an existing entity. By the Finite Precision Theorem, any process external to  $Z$  cannot divide or compress  $Z$  with perfect precision so as to produce  $Z_i \subset Z \mid Z_i$  has the geometry of a point, line, or area. Thus,  $\forall Z_i \subset Z$ , the volume  $V(Z_i) > 0$ . Therefore, let  $L_i$  be the longest possible line segment such that both endpoints are positioned on  $Z_i$ . Now suppose that  $Z_i$  is divided into  $k$  equal-length segments sliced perpendicular to  $L_i$  such that  $|L_i| = k(\frac{|L_i|}{k})$  for some  $k \in \mathbb{N}$ . If for some  $k$ ,  $\frac{|L_i|}{k} = 0$ , then  $|L_i| = 0k$  contradicting the premise that  $|L_i| > 0$ . It follows by contradiction that,  $\frac{|L_i|}{k} > 0 \forall k$ , and thus  $Z$  is infinitely divisible unless a property prevents it.

QED

#### 4.2.19 The total existence in space

It follows from the Existence Divisibility Theorem that if  $Z$  exists, a subset of  $Z$  cannot be reduced to non-existence; and according to the Law of Ontological Continuity,  $Z$  cannot be produced from non-existence. Therefore, although  $Z$  may be added to another existing entity, divided into multiple entities, or permuted:

*The total existence  $|\xi|$  in space is constant and has [always] existed*

#### 4.2.20 States of existence and interactions

Assume that the total existence of  $Z$  is fixed. According to the Existence Divisibility Theorem, each point on  $Z$  can be sheared, allowing  $Z$  to deform and “vibrate” like elements of String Theory. Now, suppose  $Z$  exists in the  $S_z^i$  state. Since  $Z$  is assumed to be vibrating, there is some other state  $S_z^{i-1}$  in which  $Z$  has existed. If  $Z$  were to become non-existent temporarily between the states of  $S_z^{i-1}$  and  $S_z^i$ , then by the Law of Ontological Continuity,  $Z$  could not begin existing again contradicting the premise. Therefore, the state function  $S_z$  of  $Z$  is continuous, and can thus be expressed as  $S_z = S_z(\chi)$  for some parameter  $\chi$ . Since the total existence of  $Z$  is fixed,

by the contrapositive of the Existence Law,  $Z$  did not have a beginning. Thus, the domain of  $S_z(\chi)$  can be represented as the entirety of the real number line.

Since causality presumably always holds,  $S_z(\chi)$  is necessarily a causal loop in which each state of  $Z$  causes the next. It follows that if two existences  $Z_1$  and  $Z_2$  interact, their interaction  $\tilde{I}(Z_1, Z_2)$  results in a state that is determined by the applicable laws and the respective states during interaction so as to not violate causality.

#### 4.2.21 Physical Laws and Free-Will

A physical law is information, and thus only an existence can have the property of a law. That is, a law is intrinsic to an existence. Therefore, suppose that  $Z$  has a law that determines each preceding state  $S_z(\chi)$  such that causality is never violated. In this case it follows that  $Z$  is deterministic. Now suppose that  $Z$  does not have an intrinsic law other than that which requires it to change states. In this case,  $Z$  is required to change states, but there isn't an intrinsic law that establishes which state  $Z$  must transition into. It follows that at each transition,  $Z$  has a choice introducing the notion of free-will. That is:

$$[Z \text{ is required to change states}] \wedge [Z \text{ doesn't have a deterministic law}] \rightarrow [Free \text{ will}]$$

#### 4.2.22 Spacetime, and the meaning of time

By the Constraint Law, in order for spacetime to be deformed by the presence of mass and energy, spacetime must first exist. This is consistent with the Time-Existence Relation, necessitating that in order for time to be defined at each point in spacetime, each point must have an existence. By the mathematical definition of existence, spacetime must therefore have a geometry  $g$  and a property  $p$ . Spacetime is a 4-d manifold and thus it has a hyper-volumetric geometry  $g$ , and since each point in spacetime is represented by the coordinates  $(x_0, y_0, z_0, t_0)$  a property is necessarily that of time. That is, at each point in spacetime, time must be defined. By the Isomorphism Theorem of Space, spacetime exists in infinite space that is isomorphic to  $\mathbb{R}^n$  for some integer  $n \geq 3$ . Since spacetime is not isomorphic to  $\mathbb{R}^n$ , there is infinite space beyond the bounds of spacetime producing problems related to Olber's Paradox. Now this paper doesn't argue in favor of spacetime so these are just requirements for those in support of it.

By the Isomorphism Theorem of Space, space is isomorphic to  $\mathbb{R}^n$  for some integer  $n \geq 3$ , and by the contrapositive of the Constraint Law, nothing exists in empty space to constrain an existence from freely moving. Therefore, an existence  $Z$  existing in open space is free to move indefinitely in all defined dimensions without the need for a temporal one. That is, since  $Z$  exists, it automatically has the ability for change that we associate with the concept of time. Therefore:

$$\textit{The ability for change is a property of existence}$$

Assuming spacetime, everything within our observable universe moves through the temporal dimension. Consequently, there must be a mechanism within spacetime that ensures uniform movement through time. It is not entirely clear if advocates of spacetime have a definitive understanding of what this mechanism is. In the proposed model, there is a similar mechanism referred to as the FE, but rather than ensuring everything moves through time uniformly, such a mechanism ensures that the distances traveled by each existence within the observable universe are linked together. That is, rather than dealing with time, we deal with distances.

To explain this, consider two existences  $Z_1$  and  $Z_2$  moving towards a third existence  $Z_3$  in otherwise empty space. Time doesn't exist, so the only way to relate the 3 existences is through the concept of distances. Therefore, we can say that the distances that  $Z_1$  and  $Z_2$  move respectively (relative to  $Z_3$ ) are  $d_1$  and  $d_2$ , and they are related by some equation such as  $d_1 = 4d_2$ . In the context of time, this means that  $d_1$  is traveling 4x faster than  $d_2$ . Now, rather than directly relating  $d_1$  to  $d_2$ , a fourth existence  $Z_4$  can be introduced, and  $d_4$  can then be compared separately to  $d_1$  and  $d_2$ . As an example,  $d_4 = 12d_2$ , and  $d_4 = 3d_1$ .

In this context,  $d_4$  represents our concept of time. To explain this, imagine  $Z_4$  as a photon, and  $d_4$  is the distance that the photon moves between two events occurring. Since the distance  $d_4$  is typically very large, we have invented devices called light clocks that allow us to instead measure the number of passes from mirror to mirror. If we now use the light clock to measure the "speed of light", the light in both the clock and the experiment change proportionally so the measurement is a geometry relation resulting in all reference frames measuring the same value. That is, the "speed" of light is measured as constant independent of it actually being constant, and the distance that light travels in one reference frame relative to another is interpreted as time dilation. Now one might argue that light requires time to propagate, but this is not true: Light propagates due to its causal loop  $S_\gamma(\chi)$ , and we measure time based on the distance that it travels.

This concept of time being a relationship between events, and the distance that light travels between them needs further clarification. Suppose that you have an atomic clock. In order for the existences making up the atom to function cohesively, by the Information Law, existences need to be exchanged between the components. Such existences represent the force carriers of the standard model. With that said, the same FE that causes the photon to move less distance in one area of space than another, also causes all force carriers to do essentially the same. Thus, the atomic clock time dilates like the light clock (even without the presence of a photon).

With that said, take a 3-d slice of spacetime. Now again, we are not advocating for spacetime so this is merely exemplary. Since that slice is volumetric, by the Missing Geometry Theorem, in order for spacetime to exist that slice has to also exist. If we now say that everything that we observe in that slice is free to move independent of a temporal dimension, then there must exist a mechanism that ensures consistency throughout such that everything that we observe moves as if transitioning through time. That mechanism is the FE. To clarify, everything that we observe exists within the FE, and moves independent of a temporal dimension. The FE

regulates how far each object in the universe moves in relation to others giving the illusion of moving through time. Since the FE exists, it can deform under the influence of mass and energy as objects move producing the results attributed to GTR. Thus, only the slice of spacetime would need to exist, implying that spacetime itself would simply be a plot of its worldlines.

Now, although the slice of spacetime is 3-d, it occupies a higher dimensional space. Since there isn't any indication that higher dimensional space is possible, we want to restrict the metric to that of Euclidean 3-space such that black holes, gravitational waves, etc still occur. We shall therefore loosely define the FE as being an existence, or set of existences, that can deform under the presence of mass and energy to produce the results of GTR, such that the FE is a subset of space isomorphic to  $\mathbb{R}^3$ .

Putting this all together, everything that we observe within the universe exists within the FE. Without the FE present, an existence  $Z$  transitions through its causal loop  $S_z(\chi)$  freely moving indefinitely in any direction. With the FE present, the interactions  $\tilde{I}(CE, Z)$  regulate the distance traveled by  $Z$ . Thus the FE merely regulates how far objects move within it relative to each other giving the illusion of time. As matter moves through the FE, the FE deforms producing the results attributed to GTR.

## ***5. THE STRUCTURE OF THE UNIVERSE***

It is necessary to establish a structure for the universe that is consistent with the Laws of Existence, and known scientific observations. Such a structure is established as follows.

Define the following:

**FE(M):** This is the universe's structure represented by the manifold  $M$ . Within the context of GTR,  $M$  serves as the spacetime manifold that models the universe, but  $M$  is not the universe itself. For the sake of completeness, if  $FE(M)$  is composed of distinct existences that perhaps interact like a lattice, then by the Missing Geometry Theorem,  $FE(M)$  references those distinct existences.

**Deform(FE):**  $FE(M)$  is constrained to deform by the presence of mass and energy.

**Exists(FE):**  $FE(M)$  exists.

**FE\_AE:**  $FE(M)$  has either always existed, or it is composed of entities that have.

**FE\_DirUnmeas:**  $FE(M)$  is an existence, or is composed of existences, that have a property that is not directly measurable by current standards.

1. By the Constraint Law, an entity must first exist before it can be constrained.  $FE(M)$  is constrained to deform under the presence of mass and energy to produce the effects of gravitational lensing, gravitational time dilation etc. Thus:

$$[Constraint\ Law] \wedge Deform(FE) \rightarrow Exists(FE)$$

2.  $FE(M)$  exists, yet we can only measure it indirectly through gravitational waves, gravitational lensing, and even quantum processes, etc.

$$1. \wedge [Can't\ directly\ measure\ FE(M)] \rightarrow FE\_DirUnmeas$$

3. The existence of  $FE(M)$  implies that it is an element in the set of everything that exists. Thus:

$$1. \rightarrow FE(M) \in \xi$$

4. By the Law of Spatial Existence, and the Isomorphism Theorem of Space:

$$FE(M) \text{ exists in Space and Space is isomorphic to } \mathbb{R}^n \text{ for some } n \geq 3$$

5. By the Law of Ontological Continuity,  $FE(M)$  has either always existed, or it is composed of entities that have. Thus:

$$1. \wedge [Law\ of\ Ontological\ Continuity] \rightarrow FE\_AE$$

Thus, it is established that  $FE(M)$  is a set of entities that exist in infinite space. Furthermore, these entities are not directly measurable. Notice that thus far, the only physics necessary to establish the theorems and logic of this framework is that which is necessary for determining that  $Exists(FE)$ : namely gravitational waves, or gravitational lensing ironically predicted by GTR. By additionally incorporating experimental results from QM, further improvements to the theory can be made as follows.

In the vacuum of space, before the emergence of any virtual particles, the only existence is the existence of a subset of  $FE(M)$  that we cannot directly measure. By the Existence Law, it follows that any virtual particles that emerge in the vacuum of space must therefore be formed/created out of  $FE(M)$  itself. That is, virtual particles must be produced from the only existence that exists in the vacuum of space: namely  $FE(M)$ . The only way this is possible is if the components of  $FE(M)$  that form a particle, have individual properties that are not directly measurable, but when combined their properties superimpose so as to produce a measurable property. Thus:

**VPE:** Virtual particles emerge in the vacuum of space.

**OEIV:** The only existence in the vacuum of space, prior to the emergence of the virtual particles, is that which composes  $FE(M)$ .

**QP:** The quantum process of virtual particle pair production and annihilation models an exchange in which existences composing  $FE(M)$ , superimpose to produce measurable particles and vice versa.



$$OEIV \wedge VPE \wedge [Existence\ Law] \rightarrow QP$$

**FE\_MP:** FE(M) is composed of multiple existences (think of a uniform lattice), with a variety of unmeasurable properties. When combinations of such existences interact, their properties superimpose, sometimes producing a net property that we can measure, thus forming what we call a particle.

$$QP \rightarrow FE\_MP$$

**FP\_NF:** The particles of the standard model are not fundamental.

$$FE\_MP \wedge QP \rightarrow FP\_NF$$

**QuantAndMult\_Lattice:** The multiple existences from FE\_MP are discrete and quantized forming a uniform lattice-like structure. Thus FE(M) is lattice-like.

$$FE\_MP \wedge [QM\ is\ quantized] \rightarrow QuantAndMult\_Lattice$$

**ApproxZeroVol:** The volume of the individual existences in QuantAndMult\_Lattice cannot be zero, but they can be smaller than detectable range.

$$\diamond (Point\ Entity\ Theorem \wedge [Existence\ Divisibility\ Theorem] \rightarrow ApproxZeroVol)$$

Since particles are formed from combinations of existences that do not individually have measurable properties, it follows that the existences composing FE(M) need not individually be bound by our physical laws. Thus there isn't a reason to assume that they are bound by the speed of light, resulting in a logical explanation as to how entanglement can occur. Thus:

**FEisNotBound:** The individual existences  $u_i$  composing FE(M) are not necessarily bound by our physical laws until they superimpose producing a particle that can be measured. Thus such existences should not be assumed to be bound by the speed of light, or constrained by any other known law other than those of logic.

$$Existences\ in\ FE\_MP\ are\ not\ measurable \rightarrow FEisNotBound$$

**Entanglement:** There is an existence that is not directly measurable, that propagates the information between some particles at a speed that is not bound by c.

$$[Information\ Law] \wedge [FEisNotBound] \wedge [Entanglement\ occurs] \rightarrow Entanglement$$

**Tunneling:** There is a non-zero probability that a particle dissociates into its respective existences (each a respective  $u_i$ ), and can thus bypass a potential well, recombining on the exterior potentially faster than c.

$$FEisNotBound \wedge [Tunneling\ Occurs] \rightarrow Tunneling$$

By the Existence Law, the total existence of a particle cannot be produced from non existence, and thus a particle cannot exist in multiple states at once. According to this model, two forms of superposition are allowed:

**ExistencesInteract:** The individual existences  $u_i$  composing a particle can dissociate such that their individual states  $S(\chi)$  superimpose.

**WavesPropFE:** The particle produces a series of waves that propagate through FE(M) and those waves give the illusion of the particle being in a superposition of states.

**WaveParticleDuality:** The existences making up a particle can collectively act as both a wave and a particle.

$$([Existence\ Law] \wedge [Superposition]) \rightarrow (ExistencesInteract \vee WavesPropFE)$$

However, if WavesPropFE is true, then there isn't any means for there to be a distinction between when a particle is observed and when it is not. However, if ExistencesInteract is true, then the particle can dissociate when not observed, and remain as a particle when observed. Thus:

$$ExistencesInteract \rightarrow WaveParticleDuality$$

It is thus also established that this framework is compatible with observations in QM: namely quantum tunneling, superposition, entanglement, and wave-particle duality. When a particle is observed, the existences making up the particle remain intact causing the particle to “act as a particle”. When a particle is not observed, it dissociates into the individual existences  $u_i$  that it is composed of, and as each  $u_i$  transitions through its causal loop, they superimpose causing the particle to act as a wave. With that said, in reality, everything follows Formal Logic, but with a lack of knowledge about the state function  $S_z(\chi)$  uncertainty emerges.

## **6. THE FIELD ETHER (FE) - A THEORY BASED ON THE ABOVE FRAMEWORK AND STRUCTURE**

The FE theory is established based on the aforementioned framework and structure such that it acts as a set of generalized equations used to predict the results of GTR within 3-space in a manner that is consistent with observations pertaining to QM. Since this theory was produced using the framework, there aren't any paradoxes.

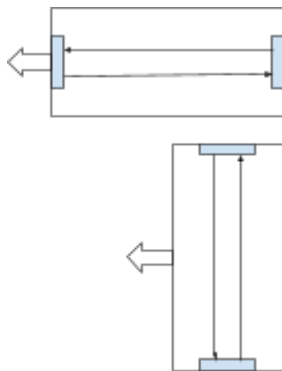
## 6.1 General concepts

QuantAndMult\_Lattice posits that the universe is structured as a lattice of quantized entities, while FE\_MP suggests that these existences possess properties that are not directly measurable individually. However, when they are superimposed, their combined properties can manifest as measurable particles. Therefore, loosely define the Field Ether (FE) as the lattice that pervades the universe, consisting of the particles described by QuantAndMult\_Lattice and FE\_MP. Every existence  $Z_i$  within the universe exists within the FE, and transitions through its own causal loop  $S_z(\chi)$ , thereby replacing the concept of time as a dimension. Interactions  $\tilde{I}(Z_i, FE)$  regulate the causal loop giving the illusion that everything in the universe is passing through time uniformly. It should be clarified that, according to the Missing Geometry Theorem, objects such as stars and planets do not exist as distinct entities: what exists are the individual existences that constitute these objects.

It is thus necessary to establish that the FE is able to produce the observations attributed to GTR such as black holes, time dilation, and gravitational lensing. Define an existence density  $\rho$ , of the existences making up the FE per unit volume. It is also necessary to define a weak interaction  $\tilde{I}(\gamma, FE)$  between the FE, and a photon that is traversing through it ( $\tilde{I}(\gamma, FE)$  will be discussed in another section in more detail). Said interaction must be weak so that over small distances the total interaction is not detectable thus resulting in the speed of light being the same in all directions (within detectable means), yet over vast distances these interactions result in gravitational lensing/redshifting.

With that said, as speed increases through the FE, the number of interactions  $\tilde{I}(\gamma, FE)$  also increases. Thus, increasing speed through the FE, is similar to being stationary in a region of the FE that has a higher  $\rho$ . Therefore, in order for Lorentz time dilation to be compatible with that of gravitational time dilation:

*The presence of mass and energy increases  $\rho$ , and velocity increases  $\tilde{I}(\gamma, FE)$*



**Fig 3** represents a modification to the Michelson-Morley experiment in which two distinct light clocks are positioned perpendicular to each other, and moved through space in the direction of the arrows.

In **Fig 3**, two light clocks are oriented perpendicular to each other similar to the apparatus used in the Michelson-Morley Experiment. Due to  $\tilde{I}(\gamma, FE)$  being weak, the photons move at the speed of light  $c$  in both directions as if the FE were not present. Now suppose that each light clock is increased in length to vast distances, say that between the earth and the sun. The weak interactions  $\tilde{I}(\gamma, FE)$  would then add up to be sufficient to show that the speed of light is not perfectly invariant. It follows that the concept of time, as measured by the light clocks, becomes more and more distorted the larger the apparatus becomes due to a difference in reading between the vertical and the horizontal clocks. Notice that this isn't a paradox or a contradiction since time doesn't exist. This is just a measurement problem.

With that said, it is necessary to establish a light clock  $K$  positioned at a point in the FE that has the smallest existence density  $\rho$ , and interactions  $\tilde{I}(\gamma, FE)$ . It follows that  $K$  measures time to be equal to or faster than any other point within the FE, therefore acting as an upper limit for the rate at which time can be measured. It should be noted that when the time in another location of the FE is compared to  $K$ , it is not implied that a measurement is possible, but rather it is being established that in reality there is a relationship with or without a measurement being feasible.

When a photon is produced near  $K$  from the components of the FE in accordance with  $FE\_MP$ , the net property necessarily includes the photon moving in the direction of emission. That is, the state function  $S_\gamma(\chi)$  of the photon results in its motion. Time is then measured, based on the distance the light travels inside of the light clock. As the number of interactions  $\tilde{I}(\gamma, FE)$  increases, the slower the local speed of light relative to  $K$ , and thus time dilation occurs. However, since time is based on the distance that light travels, all reference frames measure the speed of light to be the same. That is, using a light clock to measure the speed of light implies that such measurement will produce the same results in all reference frames. Therefore:

*The speed of light is not constant universally (relative to  $k$ )  
but in each reference frame it is measured to be  $c$ .*

*Time is a function of the distance light travels.*

Since  $\rho$  increases in the presence of mass and energy, the number of interactions  $\tilde{I}(\gamma, FE)$  increases near massive objects resulting in a slower speed of light relative to  $K$ . However, as stated above, such a reference frame still measures the same value for  $c$ . Likewise, when speed through the FE increases, the same result occurs. Thus this model is compatible with both gravitational and Lorentz time dilation, and the invariance in the *measurement* of the speed of light (over small distances).

Since the speed of light decreases near a massive object, two things are implied: there can exist a point in which the speed of light becomes zero accounting for the concept of black holes; and the FE has a varying index of refraction accounting for the concept of gravitational lensing.

By FEisNotBound, the FE is not bound by our physical laws, and thus it is not limited by the speed of light. Thus the FE can drive the expansion of the universe faster than  $c$  in accordance with Hubble's Law.

Since the FE exists, it is conceivable that waves can propagate through it and in doing so, they alter the interactions  $\tilde{I}(\gamma, FE)$  locally producing a detectable shift in the interferometer at LIGO [6].

## 6.2 Advanced concepts

By the Isomorphism Theorem of Space, space is isomorphic to the vector space  $\mathbb{R}^n$ , for some  $n \geq 3$ . Thus, define a Euclidean Coordinate System in otherwise empty space, and define a geometry  $S$  in relation to it such that:

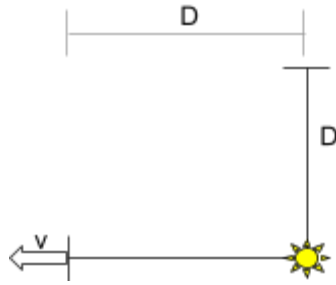
$$S = \{(x, y, z) | x^2 + y^2 + z^2 \leq R^2, R \in \mathbb{R}\}$$

$$U \subseteq \xi | \forall u_i \in U, P(u_i) \text{ is directly undetectable and } u_i \text{ is quantized}$$

$$FE = \{u_i | u_i \subseteq U, u_i \exists \in S, U \text{ is uniformly distributed}\} \quad (\text{Definition of the FE})$$

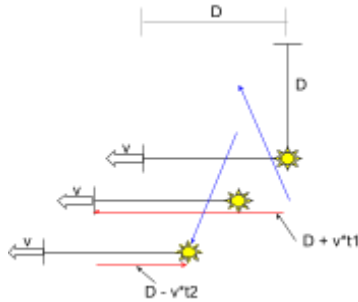
According to FEisNotBound,  $dR/dt$  (the rate of change of the universe's radius) is not restricted by the speed of light, nor are the individual existences  $u_i$ , which allows for the universe's expansion in line with Hubble's Law. Based on FE\_MP, the individual existences  $u_i$  are not directly measurable, but their properties can combine to form a net measurable property, resulting in the formation of particles. These existences  $u_i$  transition through their causal loop  $S_{ui}(\chi)$ , leading to random interactions  $\tilde{I}(u_i, FE)$ . Occasionally, these interactions lead to the formation of virtual particle pairs. As discussed earlier, quantum mechanics describes these processes where particles emerge from and annihilate back into the FE.

The Michelson-Morley Experiment (MME) is perhaps the most notoriously referenced scientific measurement establishing the speed of light to be constant. However, there is a slight nuance that needs to be clarified. That is, according to the MME, and several modern day versions, the speed of light  $c$  is invariant at least within detectable ranges. This does not imply that it is perfectly invariant as established by the fact that  $|Err(c)| > 0$ .



**Fig 4** illustrates the Michelson-Morley Experiment (MME) apparatus moving through empty space.

With that said, suppose that the MME apparatus is placed in otherwise empty space as depicted in **Fig 4**. Since nothing else exists, by the contrapositive of the Constraint Law, nothing exists to interact with the photons. Additionally, there isn't any reference frame to establish the velocity  $v$ . Hence, the velocity of the photons relative to the apparatus is always  $c$  in all directions. That is, the equations of motion for the photons in both directions of each arm is just  $D = ct$ . This is consistent with foundational principles of GTR in which the speed of light is invariant.



**Fig 5** illustrates the Michelson-Morley Experiment (MME) apparatus moving to the left through a Medium. The three stages depicted correspond to photon emission, photon reflection, and photon return. The total path length traveled by each photon is shown in red and blue, respectively.

Now suppose that, like the sound wave, a photon needed a medium to propagate as shown in **Fig 5**. As the apparatus moves through such medium at velocity  $v$ , the equation of motion for the first horizontal photon is:

$$D_{\leftarrow} = (c - v)t_1$$

Therefore, if the photon doesn't require a medium the equation of motion is  $D = ct$ , and if it does require a medium the equation is  $D_{\leftarrow} = (c - v)t_1$ . It follows that if the photon doesn't

need a medium, but instead has a weak interaction  $\tilde{I}(\gamma, FE)$  as it propagates, then the equation of motion must be  $D_{\leftarrow} = (c - \alpha v)t_1$ , where  $|\alpha| \ll 1$  establishes that the interaction is weak.

That is,  $\alpha v$  just changes the speed of light slightly. The equations are as follows for some  $\alpha_h = \alpha_h(v)$  and  $\alpha_v = \alpha_v(v)$ :

$$D = (c - \alpha_h v)t_1 = (c + \alpha_h v)t_2 \quad (\text{Time components})$$

$$\Rightarrow t_1 = D/(c - \alpha_h v) \quad \text{and} \quad t_2 = D/(c + \alpha_h v)$$

$$\begin{aligned}\Rightarrow T &= t_1 + t_2 \\ &= 2Dc/(c^2 - \alpha_h^2 v^2) \quad (\text{Total time (horizontal photon), 1})\end{aligned}$$

So the total distance traveled by the horizontal photon is:

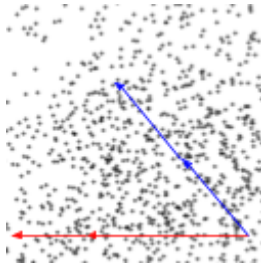
$$\begin{aligned}D_h &= (D + \alpha_h v t_1) + (D - \alpha_h v t_2) \\ &= 2D + \alpha_h v(t_1 - t_2) \\ &= 2D + \alpha_h v(D/(c - \alpha_h v) - D/(c + \alpha_h v)) \\ &= 2D + \alpha_h v D((c + \alpha_h v) - (c - \alpha_h v))/((c - \alpha_h v)(c + \alpha_h v)) \\ &= 2D + 2\alpha_h^2 v^2 D/(c^2 - \alpha_h^2 v^2) \\ &= (2Dc^2 - 2D\alpha_h^2 v^2 + 2D\alpha_h^2 v^2)/(c^2 - \alpha_h^2 v^2) \\ &= 2Dc^2/(c^2 - \alpha_h^2 v^2) \quad (2)\end{aligned}$$

And the total distance traveled by the vertical photon (blue) is:

$$\begin{aligned}D_v &= 2[D^2 + (\alpha_v v T/2)^2]^{1/2} \\ &= 2[D^2 + (\alpha_v v Dc/(c^2 - \alpha_h^2 v^2))^2]^{1/2} \\ &= 2[D^2(c^4 - 2c^2\alpha_h^2 v^2 + \alpha_h^4 v^4) + \alpha_v^2 v^2 D^2 c^2]^{1/2}/(c^2 - \alpha_h^2 v^2) \\ &= 2D[(c^4 - c^2 v^2(2\alpha_h^2 - \alpha_v^2) + \alpha_h^4 v^4)]^{1/2}/(c^2 - \alpha_h^2 v^2) \\ &= (2Dc^2/(c^2 - \alpha_h^2 v^2))[1 - v^2(2\alpha_h^2 - \alpha_v^2)/c^2 + \alpha_h^4 v^4/c^4]^{1/2} \\ &= D_h[1 - v^2(2\alpha_h^2 - \alpha_v^2)/c^2 + \alpha_h^4 v^4/c^4]^{1/2} \quad (3)\end{aligned}$$

Notice that  $\lim_{\alpha_h \rightarrow 0} D_h = \lim_{(\alpha_h, \alpha_v) \rightarrow (0,0)} D_v = 2D$ , so the weaker the interaction  $\tilde{I}(\gamma, FE)$ , the closer

the result gets to that of GTR. Also notice that if  $D$  is made large enough, then for  $\alpha \neq 0$ , and  $v \neq 0$ , the error becomes measurable. Thus, the speed of light is very close to being invariant over small distances, but over vast distances, such as those between earth and the sun, its variance will become apparent.



**Fig 6** is a diagram that represents the total path length of each photon respectively through the FE.

Assuming a uniform density  $\mathbf{q}$  as shown in **Fig 6**, the number of interactions  $\tilde{I}(\gamma, CE)$  is proportional to the path length traversed by each photon, not the length of each arm. With that said, the total time of travel for each photon is not  $T$  above, but rather:

$$\mathbf{T}_h = D_h/c + nt_{int} = 2D/c_h \quad (\text{horizontal photon, 4})$$

$$\mathbf{T}_v = D_v/c + nt_{int} = 2D/c_v \quad (\text{vertical photon, 5})$$

where  $(n)$  is the number of interactions  $\tilde{I}(\gamma, FE)$ ,  $t_{int}$  is the time each interaction takes to occur,  $2D$  is the distance traveled by the photon relative to the clocks reference frame, and  $c_h$  and  $c_v$  are the speed of light in the horizontal and vertical directions respectively, relative to  $K$ . Solving equation 4 for  $c_h$  yields:

$$\begin{aligned} D_h/c + nt_{int} &= 2D/c_h \\ c_h(D_h + nt_{int}c) &= 2Dc \\ c_h &= 2Dc/(D_h + [n]t_{int}c) \\ c_h &= 2Dc/(D_h + [\mathbf{q}D_h]t_{int}c) \\ c_h &= 2Dc/[D_h(1 + [\mathbf{q}]t_{int}c)] \\ c_h &= 2Dc/[\{2Dc^2/(c^2 - \alpha_h^2 v^2)\}(1 + [\mathbf{q}]t_{int}c)] \\ c_h &= \frac{c(1 - \alpha_h^2 v^2/c^2)}{(1 + [\mathbf{q}]t_{int}c)} \quad (\text{Horizontal Light Dilation, 6}) \end{aligned}$$

Likewise, solving equation 5 for  $c_v$  yields:

$$\begin{aligned} D_v/c + nt_{int} &= 2D/c_v \\ c_v(D_v + nt_{int}c) &= 2Dc \\ c_v &= 2Dc/(D_v + [n]t_{int}c) \\ c_v &= 2Dc/(D_v + [\mathbf{q}D_v]t_{int}c) \\ c_v &= 2Dc/[D_v(1 + [\mathbf{q}]t_{int}c)] \\ c_v &= 2Dc/[\{D_h[1 - v^2(2\alpha_h^2 - \alpha_v^2)/c^2 + \alpha_h^4 v^4/c^4]^{1/2}\}(1 + [\mathbf{q}]t_{int}c)] \\ c_v &= 2Dc(c^2 - \alpha_h^2 v^2)/[\{2Dc^2[1 - v^2(2\alpha_h^2 - \alpha_v^2)/c^2 + \alpha_h^4 v^4/c^4]^{1/2}\}(1 + [\mathbf{q}]t_{int}c)] \\ c_v &= c_h/[1 - v^2(2\alpha_h^2 - \alpha_v^2)/c^2 + \alpha_h^4 v^4/c^4]^{1/2} \quad (\text{Vertical Light Dilation, 7}) \end{aligned}$$

From equations 4 and 5:

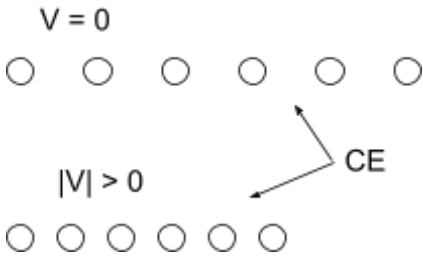
$$c_v T_v = c_h T_h$$



$$T_v = c_h T_h / c_v$$

$$= T_h [1 - v^2 (2\alpha_h^2 - \alpha_v^2) / c^2 + \alpha_h^4 v^4 / c^4]^{1/2} \quad (8)$$

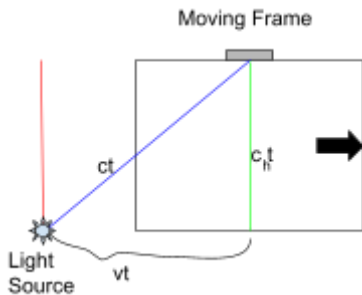
Equations for  $D_h$ ,  $D_v$ ,  $c_h$ ,  $c_v$ ,  $T_h$ , and  $T_v$  have therefore been established, but it is also necessary to derive equations for  $\alpha_h$ ,  $\alpha_v$ , and  $\mathbf{q}$ . To do this, let's go back to the MME apparatus moving through otherwise empty space. Each photon travels through its causal loop  $S_\gamma(\chi)$  at speed  $c$  relative to the apparatus.



**Fig 7** illustrates the existences of the FE as perceived by a photon. At the top, the MME apparatus is stationary relative to the FE resulting in an emitted photon perceiving the FE as spread out. As the velocity of the apparatus increases, the FE appears bunched up resulting in a change of  $\alpha$ .

If the FE is now introduced, the photon is still emitted at speed  $c$ , but the interactions  $\tilde{I}(\gamma, FE)$  change the average speed. As shown at the top of **Fig 7**, when the velocity of the MME apparatus is zero through the FE, from the photons perspective the existences making up the FE are spread out maximally. As the apparatus increases in speed relative to the FE, from the photons perspective, the existences making up the FE appear bunched as shown at the bottom of **Fig 7**. Hence why  $\alpha = \alpha(v)$ .

We shall now derive the equations for  $\alpha_h$  and  $\alpha_v$  in which  $\mathbf{q} = 0$  (corresponding to no other mass present). As claimed above, time is a function of the distance that light travels through its causal loop. Therefore, in order for this theory to produce the results of Lorentz time dilation, the speed of light (relative to K) must dilate similar to how time dilates in special relativity.



**Fig 8.**

Consider a light source that is stationary relative to the FE as shown in **Fig 8**. At the moment a moving reference frame reaches the light source, a flash occurs (same setup as that in special relativity). Since time doesn't exist, by the contrapositive of the Constraint Law, it cannot dilate and thus  $c_h$  dilates instead. Thus:

$$\begin{aligned} c_h^2 + v^2 &= c^2 \\ c_h^2 &= c^2 - v^2 \\ c_h &= c\sqrt{1 - (v/c)^2} \quad (9) \end{aligned}$$

Comparing this result to equation 6 (with  $\mathbf{e} = 0$ ) yields:

$$\begin{aligned} c\sqrt{1 - (v/c)^2} &= c(1 - \alpha^2 v^2/c^2) \\ \alpha_h^2 v^2/c^2 &= (1 - \sqrt{1 - (v/c)^2})^2 \\ \alpha_h(v) &= [(1 - \sqrt{1 - (v/c)^2})c^2/v^2]^{1/2} \quad (|v| \ll c, 10) \end{aligned}$$

With that said, notice that equations 3, 7, and 8 have the same coefficient function of  $[1 - v^2(2\alpha_h^2 - \alpha_v^2)/c^2 + \alpha_h^4 v^4/c^4]^{1/2}$ . That is, if  $1 - v^2(2\alpha_h^2 - \alpha_v^2)/c^2 + \alpha_h^4 v^4/c^4 = 1$  then  $D_v = D_h$ ,  $T_v = T_h$ , and  $c_v = c_h$  meaning that both the horizontal and vertical photons travel the same distance in the same time, resulting in them staying in phase. This is only possible because the weak interaction  $\tilde{I}(\gamma, FE)$  causes the vertical photons path to curve such that  $D_v = D_h$ , and this curve is modeled herein as a delay. That is, rather than having to model the curve of the vertical photon's path due to the interactions  $\tilde{I}(\gamma, FE)$ , its path is modeled as straight with a time delay at each interaction. Equations 2 and 3 ensure that the path lengths and time are the same in a constant density  $\mathbf{e} = 0$ , and equation 7 ensures that this remains true with gravitational effects accounted for ( $\mathbf{e} \neq 0$ ). Thus:

$$\begin{aligned} 1 - v^2(2\alpha_h^2 - \alpha_v^2)/c^2 + \alpha_h^4 v^4/c^4 &= 1 \\ - (2\alpha_h^2 - \alpha_v^2)c^2 + \alpha_h^4 v^2 &= 0 \\ \alpha_v^2 c^2 &= 2\alpha_h^2 c^2 - \alpha_h^4 v^2 \\ \alpha_v^2 c^2 &= (2c^2 - \alpha_h^2 v^2)\alpha_h^2 \\ \alpha_v^2 c^2 &= (2c^2 - [(1 - \sqrt{1 - (v/c)^2})c^2/v^2]v^2)[(1 - \sqrt{1 - (v/c)^2})c^2/v^2] \\ \alpha_v^2 c^2 &= c^2(2 - (1 - \sqrt{1 - (v/c)^2}))[ (1 - \sqrt{1 - (v/c)^2})c^2/v^2] \end{aligned}$$

$$\begin{aligned}
\alpha_v^2 &= (1 + \sqrt{1 - (v/c)^2})[(1 - \sqrt{1 - (v/c)^2})c^2/v^2] \\
\alpha_v^2 &= (1 - (1 - (v/c)^2))c^2/v^2 \\
\alpha_v^2 &= (v/c)^2 c^2/v^2 \\
\alpha_v &= 1 \quad (11)
\end{aligned}$$

Equations 2-7 are simplified below with the appropriate substitutions for  $\alpha_v$  and  $\alpha_h$ :

$$D_h = D_v = \frac{2D}{\sqrt{1-(v/c)^2}} \quad (12)$$

$$T_h = T_v = \frac{2D(1+[\mathbf{e}]t_{int}c)}{c\sqrt{1-(v/c)^2}} \quad (13)$$

$$c_h = c_v = \frac{c\sqrt{1-(v/c)^2}}{(1+[\mathbf{e}]t_{int}c)} \quad (\text{Light and Time dilation, 14})$$

It should be specified that  $c_h$  and  $c_v$  are the average speeds of light in the horizontal and vertical directions respectively, not the speed of light along the curved paths. Thus it is not necessarily true that  $D_h = T_h c_h$  as shown in equation 4. Thus, equations 12-14, with  $\mathbf{e} = 0$ , will produce the exact same results as the MME, with the exact same time dilation of special relativity, all within 3-space. By producing an equation for  $\mathbf{e}$ , gravitational effects can also be incorporated. Now, it should be clarified that nothing states that the speed of light is perfectly invariant since  $|Err(c)| > 0$ , but in order to satisfy those that require the laws of physics be invariant, this assumption is made.

Notice that there isn't a need for length contraction in this scenario, even though equation 12 may resemble the length contraction equation from special relativity. To clarify, imagine a muon emerging at the Earth's horizon and traveling at relativistic speeds toward the surface. Normally, one would argue that in the muon's reference frame, time dilates and length contracts. However, in this model, the speed of light in the muon's reference frame dilates along with all fundamental forces as explained earlier. This slowing down of the fundamental forces leads to a longer decay process. Length contraction is unnecessary because there is no violation if the muon perceives itself as moving faster than the speed of light ( $c$ ) due to its slower clock. As long as the muon's speed, relative to clock K, does not exceed  $c$ , it can perceive its own speed as infinite without any known violations. Therefore, length contraction is not required (but is still possible within the FE if desired). One might argue that a moving charge generates a force due to length contraction, but that is not the case herein. The force carriers of the moving charges experience are slowed down producing the effect attributed to length contraction.

Now consider an existence Z placed in the FE. By the 3-D entity theorem Z must therefore occupy some volume  $V > 0$ . We can therefore say that the amount of information ( $I$ ) that Z has is proportional to its volume such that  $I = kV$  for some  $k \in \mathbb{R}$ . Now, just as a magnet placed near a ferromagnetic material aligns the dipoles of the material producing a stronger field, the information that Z contains aligns the properties of the existences composing the FE to produce what we call fields. That is, the information that Z has gets spread out over the FE, and therefore any secondary existence placed in that field obtains information about Z. It follows that fields do not produce particles contrary to Quantum Field Theory, but instead the information an existence Z (such as a particle) has gets distributed over the FE producing field(s) in the FE.

With that said, wrap Z in a spherical shell of area  $4\pi r^2$ , and weigh the distribution of the information from Z at each radii as  $W(r)$ . It therefore follows that:

$$kV = 4\pi \int_{a>0}^{\infty} W(r) \cdot r^2 dr \quad (\text{Information Distribution Law, 15})$$

Now, if we restrict  $W(r)$  to the form  $A/r^q$ , in order for equation 15 to converge,  $q > 3$  for some  $q \in \mathbb{R}$ . Thus:

$$kV = 4\pi A \int_{a>0}^{\infty} \frac{1}{r^{q-2}} dr \quad (\text{Assuming } W(r) = A/r^q, 16)$$

It follows that the information pertaining to a field F at any distance (r) is simply the integrand in equation 16, and the total information throughout the FE due to Z is  $kV$ . Thus:

$$F = \frac{4\pi A}{r^{q-2}} \quad (\text{Field equation when } W(r) = A/r^q, 17)$$

Notice that for  $A = Gm_1/(4\pi)$ , and  $q = 4$ , equation 17 reduces to Newton's gravitational field.

In general, all fields in physics are represented as:

$$F = 4\pi W(r)r^2 \quad (\text{All fields, 18})$$

Now suppose that there is a massive object O placed within the FE. By equation 15, the information that O has is distributed over the existences making up the FE producing a field described in equation 18. When a photon then propagates over that field, it obtains information about O that is proportional to the field strength at that point. It follows that:

$$\mathbf{e} = 4\pi W(r)r^2 \quad (19)$$

By QuantAndMult\_Lattice, the FE is a quantized lattice. This means that all of the subatomic particles making up objects such as stars and planets can exist between the elements of the FE, rather than occupying their same spatial coordinates. That is, subatomic particles can “fill the gap” between the existences composing the FE eliminating the need for the possibility of the Non-Biconditional Constraint Law. Now it should be clarified that by the 3-D Entity Theorem, an existence Z has a non-zero volume and thus it is impossible for singularities to exist. Since the Non-Biconditional Constraint Law is not necessary in this model, and singularities cannot exist, it is reasonable to assume that existences (at least within our universe) cannot occupy the same spatial coordinates. Thus, everything that exists in our universe has a type of boundary, and you can compress these existences together, but you can’t ever reduce the total volume of existence. Eventually, after compressing enough existences together, the influence that the object has on the FE prevents light from escaping nearby. If we therefore confine a black hole to a spherical shape, the amount of information is  $I = kV = 4\pi k r_{EH}^3 / 3$  where  $r_{EH}$  is the radius of the event horizon. It follow that:

$$r_{EH} = [3I/(4\pi k)]^{1/3} \quad (\text{Radius of a spherical black hole, 20})$$

Thus, information is never lost resolving the Black Hole Information Paradox, and singularities do not exist resolving the Singularity Problem. As a speculation, by FEisNotBound it is possible that the FE is not subject to gravity itself, and thus as a black hole forms, it pushes the FE out of the way: by QP, this would imply that quantum processes do not occur inside of a black hole. Without quantum processes occurring inside of a black hole, the following proposed model of quantum gravity would produce a force of zero inside the event horizon, while still contributing information that produces the gravitational field in the FE. In this case, an existence Z inside of the event horizon would not feel any substantial force, but would still contribute to the gravitational pull of the black hole.

With the index of refraction (n) defined as  $c = nc_0$ , using equation 6,  $c = n \frac{c\sqrt{1-(v/c)^2}}{(1+[e]t_{int}c)}$ .

Thus:

$$n = \frac{(1+[e]t_{int}c)}{\sqrt{1-(v/c)^2}} \quad (\text{Index of refraction of the FE, 21})$$

Using Fermat’s Principle, the action  $S = \int_a^b n\sqrt{r^2 + (r')^2} d\theta$  where  $r = r(\theta)$  is the path that

light takes when modeled in polar coordinates. Assuming that  $n = n(r, v)$ , the integrand is not explicitly dependent on  $\theta$ , thus we can use the Beltrami Identity resulting in:

$$n\sqrt{r^2 + (r')^2} - r' \frac{\partial}{\partial r'} (n\sqrt{r^2 + (r')^2}) = \text{const}$$

$$\begin{aligned}
n\sqrt{r^2 + (r')^2} - r'(nr'/\sqrt{r^2 + (r')^2}) &= \text{const} \\
nr^2 + n(r')^2 - n(r')^2 &= \text{const}\sqrt{r^2 + (r')^2} \\
nr^2 &= \text{const}\sqrt{r^2 + (r')^2} \\
n^2 r^4 &= \text{const}^2 r^2 + \text{const}^2 (r')^2 \\
\sqrt{n^2 r^4 - \text{const}^2 r^2} / |\text{const}| &= \frac{dr}{d\theta} \\
\theta &= \int_a^b \frac{|\text{const}| dr}{\sqrt{n^2 r^4 - \text{const}^2 r^2}} + B \quad (\text{Gravitational Lensing, 22})
\end{aligned}$$

### 6.3 FE and GTR comparison

In GTR the metric equation is  $cdt_0 = \sqrt{g_{\mu\nu} dx^\mu dx^\nu}$ . As explained above, the speed of light herein dilates like time in GTR, and therefore  $c_h dt = c dt_0$ . It follows that:

$$c_h dt = \sqrt{g_{\mu\nu} dx^\mu dx^\nu} \quad (\text{GTR analog})$$

To explain this, in GTR there is a dimension of time that dilates. In this proposed theory, a photon transitions through its own causal loop  $S_\gamma(\chi)$  and the interactions  $\tilde{I}(\gamma, FE)$  slow it down resulting in what we perceive as time dilation. As claimed herein, we measure time based on the distance that light travels, and the interactions that cause light to slow down also cause the other fundamental forces to slow down, resulting in even atomic clocks undergoing time dilation. In the GTR analog, the time component is in relation to the parameter  $\chi$  which is not a universal dimension and does not exist. By slowing down the speed of light (relative to  $\chi$ ), the illusion of time dilation occurs. By dividing the GTR analog by  $dt$  yields:

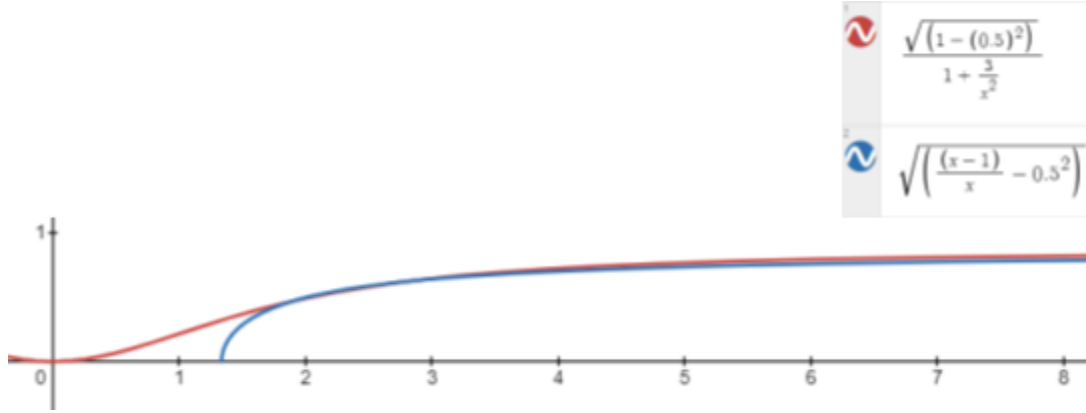
$$c_h = \sqrt{g_{\mu\nu} \frac{dx^\mu}{dt} \frac{dx^\nu}{dt}} \quad (\text{GTR analog})$$

Using the Schwartzchild metric in the GTR analog without rotational velocities yields:

$$c_h = \sqrt{\frac{r-r_s}{r} c^2 - \frac{r}{r-r_s} \left(\frac{dr}{dt}\right)^2} \quad (\text{GTR-SM analog})$$

If we set  $\frac{dr}{dt} = 0$ ,  $c_h = \sqrt{\frac{r-r_s}{r}} c$  meaning that the speed of light slows down in a gravitational field, and this results in time also slowing down. Compare this to the gravitational time dilation

of GTR-SM:  $dt_0 = \sqrt{\frac{r-r_s}{r}} dt$ .



**Fig 9** shows a comparison between equation 23 and the GTR-SM analog.

We are now ready to compare the FE theory to the GTR analog. Using  $3/r^2$  as an approximation (described above),  $\mathbf{q} = 3/r^2$ . Equation 6 becomes:

$$c_h \approx c \sqrt{1 - (v/c)^2} / (1 + [3/r^2] t_{int} c) \quad (23)$$

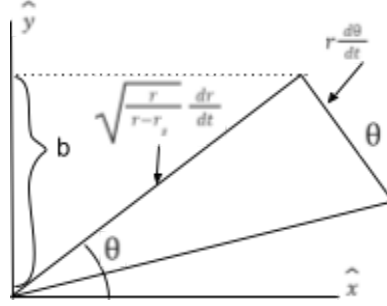
**Fig 9** is a comparison between the GTR analog and equation 23 with  $v = 0.5c$ . Now  $\mathbf{q}$  is just being approximated: with a more precise equation for  $\mathbf{q}$ , the results of GTR can be perfectly aligned with the FE theory.

## 7. The Quantum Nature of Gravity

This section is intended to provide a proof of concept as to the cause of the gravitational force, based on the index of refraction of the FE described by equation 21. As illustrated above, this model very closely parallels the results of GTR and since the redshift equation of FE has not yet been derived, we shall use the Schwartzchild metric.

## 7.1 The gravitational redshift equation

**Fig 10** shows how the components of the Schwarzschild Metric fit geometrically for a photon initially traveling tangentially to the related mass.



For a photon traveling in a plane in which  $\phi = 0$ , the Schwartzchild metric [7] yields the following equation:

$$\frac{r-r_s}{r}c^2 - \frac{r}{r-r_s} \left(\frac{dr}{dt}\right)^2 - r^2 \left(\frac{d\theta}{dt}\right)^2 = 0 \quad (24)$$

Where  $r_s = \frac{2GM}{c^2}$  is the Schwartzchild radius. Adding up the components from **Fig 10** in the  $\hat{x}$  and  $\hat{y}$  directions yields:

$$\left\langle \frac{\partial x}{\partial t} = \sqrt{\frac{r}{r-r_s}} \frac{dr}{dt} \cos(\theta) - r \frac{d\theta}{dt} \sin(\theta), \frac{\partial y}{\partial t} = \sqrt{\frac{r}{r-r_s}} \frac{dr}{dt} \sin(\theta) + r \frac{d\theta}{dt} \cos(\theta) \right\rangle \quad (25)$$

Dividing the x-component of equation 25 by  $\partial x$ , squaring both sides, and multiplying by  $\partial^2 E$  yields:

$$\left[ \sqrt{\frac{r}{r-r_s}} \frac{dr}{dt} \cos(\theta) - r \frac{d\theta}{dt} \sin(\theta) \right]^2 \frac{\partial^2 E}{\partial x^2} = \frac{\partial^2 E}{\partial t^2} \quad (26)$$

Since the  $\hat{x}$  direction corresponds to  $\theta = 0$ , equation 26 reduces to:

$$\left[ \sqrt{\frac{r}{r-r_s}} \frac{dr}{dt} \right]^2 \frac{\partial^2 E}{\partial r^2} = \frac{\partial^2 E}{\partial t^2} \quad (27)$$

Notice the similarity between equation 27 and the wave equation  $c^2 \frac{\partial^2 E}{\partial x^2} = \frac{\partial^2 E}{\partial t^2}$ . From equation

24,  $\frac{r}{r-r_s} \left(\frac{dr}{dt}\right)^2 = \frac{r-r_s}{r} c^2$ , and thus equation 27 can be written as:

$$\frac{r-r_s}{r} c^2 \frac{\partial^2 E}{\partial r^2} = \frac{\partial^2 E}{\partial t^2} \quad (28)$$

Setting  $E = R(r)T(t)$  in equation 28, and solving for  $R(r)$  yields:

$$\frac{d^2 R(r)}{dr^2} = - \left[ k^2 \frac{r}{r-r_s} \right] R(r) \quad (29)$$



Therefore the wavelength of the photon in equation 29 is related by the equation:

$$k\sqrt{\frac{r}{r-r_s}} = \frac{2\pi}{\lambda}$$

Thus, the wavelength  $\lambda$  as observed at radius  $r$  is related to the wavelength  $\lambda_\infty$  at infinity by [8]:

$$\lambda = \frac{2\pi}{k}\sqrt{\frac{r-r_s}{r}} = \lambda_\infty\sqrt{\frac{r-r_s}{r}} \quad (30)$$

## 7.2 Quantum Gravity

In a relatively stationary reference frame: The momentum  $p$  of a photon is  $\frac{h}{\lambda}$  [9]. Using equation 30, for  $k$  number of photons, this can be written as:

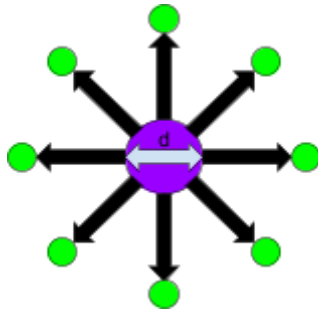
$$\begin{aligned} M(p) &= \frac{hk}{\lambda_\infty\sqrt{\frac{r-r_s}{r}}} \\ &= \frac{hk}{\lambda_\infty}\sqrt{\frac{r}{r-r_s}} \end{aligned}$$

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

$$\begin{aligned} M(F) &= \frac{hk}{\lambda_\infty} \frac{d}{dt} \left( \sqrt{\frac{r}{r-r_s}} \right) \\ &= \frac{hk}{2\lambda_\infty} \left( \frac{dr}{dt} = c \right) \left( \frac{1}{\sqrt{r(r-r_s)}} - \frac{\sqrt{r}}{(r-r_s)^{1.5}} \right) \\ &= \frac{hkc}{2\lambda_\infty} \left( \frac{r-r_s}{\sqrt{r(r-r_s)}^{1.5}} - \frac{r}{\sqrt{r(r-r_s)}^{1.5}} \right) \\ &= \frac{hkc}{2\lambda_\infty} \left( \frac{-r_s}{\sqrt{r(r-r_s)}^{1.5}} \right) \end{aligned}$$

Therefore:

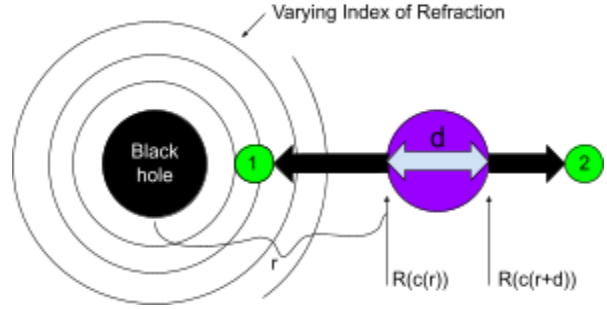
$$M(F) = \frac{-GMhk}{c\lambda_\infty} \left( \frac{1}{\sqrt{r(r - \frac{2GM}{c^2})}^{1.5}} \right) \quad (31)$$



**Fig 11** represents an object  $O$  (purple) of diameter  $d$ , that 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.

In **Fig 11**, the mathematical framework is illustrated in which an object O, of diameter d, radiates a uniform field of virtual photons in all directions. At this point we are not concerned about conservation laws, as we are just working with concepts. This radiation results in a net force of zero acting on O.

**Fig 12** shows object O placed into a non-uniform index of refraction 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 repulsion.



In **Fig 12**, object O is placed into the non-uniform index of refraction expressed by equation 21. From equation 31, 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:

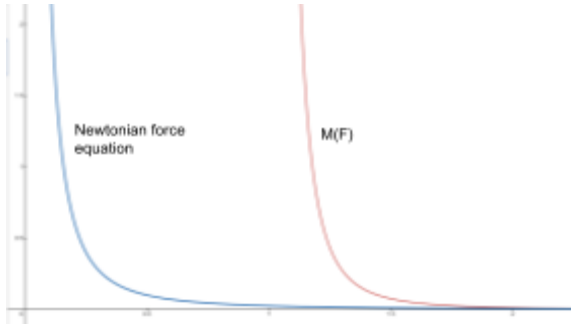
$$M(F_2) = \frac{-GMhk}{c\lambda_\infty} \left( \frac{1}{\sqrt{r+d(r+d - \frac{2GM}{c^2})}^{1.5}} \right)$$

The magnitude of the net force is therefore the difference:

$$\begin{aligned} |M(F_{net})| &= \frac{GMhk}{c\lambda_\infty} \left( \frac{1}{\sqrt{r(r - \frac{2GM}{c^2})}^{1.5}} - \frac{1}{\sqrt{r+d(r+d - \frac{2GM}{c^2})}^{1.5}} \right) \\ &= \frac{GMhk}{c\lambda_\infty} \left( \frac{1}{\sqrt{r(r - \frac{2GM}{c^2})}^{1.5}} - \frac{1}{\sqrt{r+d(r+d - \frac{2GM}{c^2})}^{1.5}} \right) \quad (32) \end{aligned}$$

Notice that equation 32 is zero for a point particle since  $d = 0$ . Also notice that this force actually pushes O away from the black hole. This is resolved if the photons are emitted and absorbed internally rather than externally, and this change makes it possible for conservation laws to then be applied. That is, the photons are emitted and absorbed by the same object and thus the total existence of the object remains constant. Since the speed of light is dilated due to interactions with the FE, one could argue that the change in energy of the photons is stored in the FE, and thus it is also conserved.

This model for gravitation does not suggest a new particle, but rather it acts as a concept in which to consider known particles as producing the force of gravity within the nucleus of atoms. For the sake of clarity, equation 32 is not considered complete.



**Fig 13** is a graph of the Newtonian gravitational force equation (blue) vs  $M(F)$  (red). The two functions have a very similar shape, with  $M(F)$  shifted to the right by the distance equal to the Schwartzchild radius ( $r_s = 1$  unit as shown in the graph). This shows that up until close to the event horizon, the two functions model a similar force.

In **Fig 13**,  $M(F_{net})$  is modeled in red, and the Newtonian gravitational force equation  $Gm/r^2$  is modeled in blue. The two functions are very similar aside from  $M(F_{net})$  being shifted to the right by the distance  $r_s$ . That is, the two equations produce an almost identical force up until about 2 Schwartzchild radii away from the blackholes center. It is important to note that at some point object O must break apart due to the extreme conditions near the event horizon. Once O breaks apart into small enough particles,  $d$  becomes approx. zero resulting in a reduced force, therefore providing a means for the gravitational force to be finite at the event horizon.

## 8. AUTHORS COMMENTS

Formal Logic, mathematics, and physics are the most crucial tools that we have for understanding the universe, in that order. As clarified above, models such as quantum field theory, GTR, String Theory and M-Theory can all be fantastic theories with phenomenal predictive power, but they do not provide a complete/correct understanding of our universe. We should never again be confused by QM, time, or existence.

By the Transitive Law,  $[(G \vee \neg G) \rightarrow H] \wedge [H \rightarrow I] \rightarrow [(G \vee \neg G) \rightarrow I]$ . In this analogy,  $H$  represents the physical properties of the universe that are described by our laws of physics,  $I$  represents all scientific observations, and  $G$  represents God. Thus all scientific observations remain true if God gave the universe its physical properties that cause it to organize itself. When a simulation is produced it is based on equations that determine how everything in the simulation is to be displayed. While the equations of physics are descriptive not prescriptive, everything in the universe follows mathematical principles as if it were a simulation, making it consistent with intelligent design (ID). A universe that doesn't have laws would perhaps be unlikely to harbor life, but it would not be consistent with an intelligent design process since it would not be possible to declare "the end from the beginning". Thus the fact that our universe is deterministic is a necessity for it to be consistent with ID. Imagine if we could produce a set of laws causing everything that we needed to create itself: this is the ultimate of ultimates in engineering. Since existence cannot be produced from non-existence, existence has always existed, and thus if it is possible for God to exist, then statistically it is guaranteed that God exists somewhere in infinite space. With that said, if it is true that God gave the universe its physical properties that cause it to evolve in such a way as to produce a desired outcome, then it follows that everything that is dependent on these laws is evidence of ID, including science. ID therefore encapsulates all of

science and also allows for personal experiences rendering ID far superior to that of science. ID eliminates any complications associated with Olber's Paradox.

The (FOE) not only guides the development of theories but also serves to establish the attributes of God. According to the Laws of Existence, God must be bound by the rules of formal logic, implying that God is rational and coherent (omnipotent within the bounds of logic). By the Law of Ontological Continuity, God can be eternal. By the Existence Divisibility Theorem God can possess unlimited knowledge. Statistically an eternal being has an infinite data set in which to base moral laws granting God ultimate authority to establish right and wrong. The very FE that makes our universe possible ironically opens the door for God to work miracles.

## ***CONCLUSION***

All of the processes of the universe such as time dilation, and superposition, are predictable from a purely logical framework in 3-space implying that in reality they all adhere to formal logic. Experimentation then determines which of the processes actually occur, and to what extent, and therefore logic coupled with experimentation produces the complete picture regarding The Laws of Existence and the Structure of Our Universe.

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## ***STATEMENTS AND DECLARATIONS***

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