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Review Article

A Quantization for the Toy Model of Black Hole and a Suggestion to the Unification Theory

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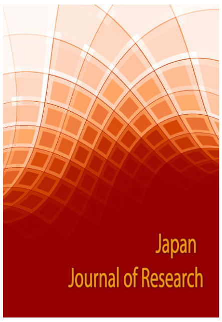

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Abstract

In my previous paper about the correlations between quantum mechanics and the four different natural forces, I suggested that there may be a fifth force or even the existence of a new particle. However, it remains a mystery to physicists, even after nearly a hundred years, that they cannot unify these four natural forces. This may be because there are indeed too many variables for them to consider. Also, there is a possibility that quantum mechanics may coexist with quantum field theory. In the present paper, this author proposes that there may be a misconception in the computational equation for relative time or gaps in the system for measuring time between quantum mechanics and general relativity. Hence, one may still not be able to unify these natural forces. This author suggests that we may need to rewrite parts of quantum mechanics – the Schrödinger equation – or even the general relativity equation. Additionally, this author proposes that there may be a bridge equation converting between quantum mechanics and general relativity.

Moreover, this author has employed the non-trivial zeta zeros to simulate the black hole or the so-called black hole toy model. In practice, there may be an electromagnetic field surrounding the boundary of the black hole, as well as the existence of a continuum along the boundary contour. This author hopes that, in such a case, we may decode those high-frequency electromagnetic waves into useful information and take a further step toward verifying Stephen Hawking's famous theory on black hole radiation and information entropy. In fact, this author has used the HKLam statistical model theory to express the electromagnetic field energy-stress tensor (with the possibility of quantization) to analogically establish a quantized model for the Einstein Gravitational Field Equation. Hence, the problem of quantum gravity may then be solved. Last but not least, this author also expects that humanity may finally find a way to unify quantum mechanics and general relativity through modifications to the current quantum gravity theory, such as my proposed bridge-converting equation, etc.

Introduction

There has been much discussion about Hawking radiation and the information paradox. However, none of the researchers have completely resolved the mystery. This author has attempted to tackle the problem in a different way—using the black hole toy model, the Riemann Zeta non-trivial zeros layers, and the electromagnetic field around the boundary or continuum for information restoration. This author hopes that the present paper may serve as a pioneering study for those interested in the question of the information paradox and related matters.

Literature Review

Quantum Mechanics – The Schrödinger Equation

TWhen one talks about the Schrödinger Equation or quantum mechanics, they often refer to the wave properties of a particle or the so-called wave equation [1], pp. 21-25 & [2], p. 22. This author will attempt to derive the equation from the wave nature of a particle. Let's first consider a quantum-mechanical particle with energy E and momentum p, and its corresponding wave frequency is:.

$$v = \frac{E}{h}$$

and the wavelength is: λ=h/p. By introducing the angular frequency ω and so as the wave number k, then we may have:

$$\omega \equiv 2\pi v = \frac{E}{\hbar}$$

where $\hbar = \frac{h}{2\pi}$

Since $E = p^2/2m$,

we may have $\omega = \frac{p^2}{2mh}$

Let us assume a particle with momentum ppp traveling in the positive x-direction. Then we will use a wave traveling in that positive x-direction. Hence, the corresponding harmonic waves are:

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$e^{(Ikx-I\omega t)}, e^{(-Ikx+I\omega t)}$, $sin(kx-\omega t)$ *and* $cos(kx-\omega t)$.

For the particle moving in the positive x-direction, we have:

$sin(kx - \omega t)$

For the particle moving in the negative x-direction, we have:

$sin(kx + \omega t)$

Thus, by the principle of superposition, the resulting wave is just the sum of the two waves:

$sin(kx - \omega t) + sin(kx + \omega t)$

Practically, the particle has equal probabilities of moving in both the positive xxx-direction and the negative xxx-direction. The resulting sine function is:

$2 \sin kx \cos \omega t$

which has a zero at t = π/2ω and is, therefore, not acceptable.

However, if we consider the wave function $e^{Ikx-I\omega t}$, then the superposition will be:

$$e^{Ikx-I\omega t} + e^{-Ikx-I\omega t} = 2e^{-I\omega t} \cos kx$$

which is non-zero everywhere and thus acceptable.

Assuming $e^{Ikx-I\omega t}$ to be the standard harmonic wave function describing a free particle with a given momentum, we may be interested in the wave equation that this wave function satisfies. Differentiating the above wave function with respect to position xxx and time ttt, we find that the first derivative with respect to time is proportional to the second derivative with respect to position. Hence, we get:

$$k^2 e^{(Ikx-I\omega t)} = -\omega e^{(Ikx-I\omega t)}$$

By considering the total energy (potential energy + kinetic energy) of the particle with mass mmm and momentum p, we have:

$$\frac{p^2}{2m} + v(x,t) = E$$

Therefore, using the Planck-Einstein relation, p = ℏk and multiplying the above equation by the wave function, we get:

$$\frac{-\hbar^2}{2m} k^2 e^{(Ikx-I\omega t)+} v(x,t) e^{(Ikx-I\omega t)} = \hbar\omega e^{(Ikx-I?t)}$$

(N.B. E = ℏω and p = ℏK)

But as $k^2 \to \frac{\partial^2}{\partial x^2}$ and $\omega \to I\frac{\partial}{\partial t}$, we obtain:

$$\frac{-\hbar^2}{2m} \frac{\partial^2}{\partial x^2} e^{Ikx-I\omega t} + v(x,t) e^{Ikx-I\omega t} = \hbar I \frac{\partial}{\partial t} e^{Ikx-I\omega t}$$

In a more generalized form, we have: [3]

$$\frac{-\hbar^2}{2m} \nabla^2 e^{Ikx-I\omega t} + v(x,t) e^{Ikx-I\omega t} = \hbar I \frac{\partial}{\partial t} e^{Ikx-I\omega t}$$

This is the famous Schrödinger Equation.

Einstein General Relativity Theory Equation

Next, we shall proceed to the derivation of Einstein's General Relativity Theory equation, also known as the field equation [4]. First, let us briefly review the basics of tensor operators [5]. A tensor can be viewed as a generalization of a matrix, but it uses more indices, which can be either upper or lower. For example, consider a 4×4×4×4×4 tensor:

$$T \equiv \left(T^{\alpha\beta}_{\gamma\delta\varepsilon}\right)_{0\le\alpha,\beta,\gamma,\delta,\varepsilon\le 3}$$

Practically, we may consider spacetime as a four-dimensional manifold, represented by t, x, y, and z. For convenience, we can denote these coordinates as: $x^0 = t, x^1 = x, x^2 = y, x^3 = z$. If we take a four-dimensional row vector with four components, $v = (v^0, v^1, v^2, v^3)$. the upper index will be denoted by a small Greek letter: $v \equiv (v^\alpha)_{0\le\alpha\le3}$. In fact, we can interpret the upper index of a tensor as representing the number of dimensions, and the lower index as representing the rank or position to locate the desired information or data [6].

If we differentiate the position 4-vector v, we get:

$$\frac{\partial}{\partial v} \equiv \frac{\partial}{\partial\left(v^\alpha\right)_{0\le\alpha\le3}} = \begin{pmatrix} \frac{\partial}{\partial x^0} \\ \frac{\partial}{\partial x^1} \\ \frac{\partial}{\partial x^2} \\ \frac{\partial}{\partial x^3} \end{pmatrix} = \begin{pmatrix} \frac{\partial}{\partial t} \\ \frac{\partial}{\partial x} \\ \frac{\partial}{\partial y} \\ \frac{\partial}{\partial z} \end{pmatrix}$$

Alternatively, we can propose a symbolic operator, such as "[∇]" similar to the Laplace operator:

$$\nabla = \frac{\partial}{\partial t} + \frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}$$

for the 4-dimensional position vector described above. That is,

$$\frac{\partial}{\partial v} \equiv \frac{\partial}{\partial\left(v^\alpha\right)_{0\le\alpha\le3}} = [\nabla](V) \quad or \quad [\nabla](V^\alpha)_{0\le\alpha\le3} \; etc.$$

To begin the derivation of the General Relativity Field Equation, we first introduce Gauss's Law for gravity, or the Gauss's Flux Theorem for gravity [8]. This law states that the gravitational flux (similar to magnetic or electric flux) over a closed surface is proportional to the mass enclosed within that surface. In practice, considering a mass, such as a rocket or spacecraft, that falls into the gravitational field of a larger mass, like a star, within the curved spacetime of the universe, we can express this relationship in differential form as follows:

$$\nabla \cdot g = -4\pi G\rho$$

(Note: Gauss's Law has another form expressed through integration; this author will not repeat it, as the difference lies only in the format of expression, while the concepts remain similar.)

Since the gravitational field has a zero curl, indicating that gravity is a conservative force, we can express gravity in terms of a scalar potential, commonly referred to as the gravitational potential Φ:

$$g = -\nabla\Phi.$$

When substituting into Gauss's Law for gravity, we obtain [9]:

$$\nabla^2 \Phi = 4\pi G\rho$$

where $\Phi = U/m = -GM/r$ and $U(r)$ is the potential energy due to the gravitational field [8].

In addition, we note that $4\pi G\rho$ is closely related to the energy-momentum tensor ($T^{\mu\nu}$ as it generally describes all forms of energy and matter. Furthermore, $\nabla^2 \Phi$ can be used to determine the curvature of spacetime and its relationship with gravity or energy.

This author wishes to highlight an interesting fact: matter is always described by the energy-momentum tensor T_{ab}, which represents energy conservation and must therefore satisfy the continuity equation, similar to fluid dynamics. In fact, conservation can be expressed by the equation $\partial_a j^a = 0$, where ja is the current. In the case of the energy-momentum tensor, the continuity equation is:

$$\nabla^a T_{ab} = 0.$$

Initially, Einstein proposed that the relationship between geometry and matter is described by the Ricci Tensor R_{ab}. Thus, the equation is:

$$R_{ab} = kT_{ab}$$

where k is a constant. In the case of a vacuum, where there is no gravitating matter, Tab vanishes, and the equation reduces to:

$$R_{ab} = 0.$$

On the other hand, in the presence of matter, the Ricci tensor must satisfy the contracted Bianchi identities:

$$\nabla^a R_{ab} = 1/2\, \nabla_b R,$$

This leads to a potential problem. By applying ∇^a to both sides of the equation $R_{ab} = kT_{ab}$, we find:

$$\nabla_a R = 0.$$

To ensure the conservation of energy, the scalar curvature must be constant everywhere. However, consider a very massive star: its neighboring curvature will be quite large, but as the distance from the star increases, the curvature may approach zero. This creates a contradiction with the requirement that the scalar curvature must be constant.

In practice, by rewriting the equation in its equivalent form, we have

$$\nabla^a\left(R_{ab} - \frac{1}{2}g_{ab}R\right) = 0$$

which satisfies the continuity equation $\nabla^a T_{ab}$. In other words,

$$\left(R_{ab} - \frac{1}{2}g_{ab}R\right) = \mathrm{k}T_{ab}$$

which yields consistent results. Hence, we define the Einstein Tensor as:

$$G_{ab} = \left(R_{ab} - \frac{1}{2}g_{ab}R\right)$$

For different kinds of metric tensors, these are used to capture all of the geometric and causal structures of space and time, such as time, distance, volume, curvature, and angle. In general, we have three types of metric tensors: the Minkowski metric for flat spacetime, the spherical coordinates for flat space, and the Schwarzschild metric for black holes. This author will focus on the black hole metric as follows:

$$ds^2 = -(1 - \frac{2GM}{rc^2})c^2dt^2 + (1 - \frac{2GM}{rc^2})^{-1}dr^2 + r^2 d\Omega^2,$$

The black hole metric can thus be represented as:

$$\begin{pmatrix} -\left(1 - \frac{2GM}{rc^2}\right) & 0 & 0 & 0 \\ 0 & \left(1 - \frac{2GM}{rc^2}\right)^{-1} & 0 & 0 \\ 0 & 0 & r^2 & 0 \\ 0 & 0 & 0 & r^2 sin\theta \end{pmatrix}$$

In reality, the Einstein constant is given by:

$$\mathrm{k} = \frac{8\pi G}{c^4}$$

Finally, we conclude that the Einstein Field Equation is:

$$R_{(\mu\nu)} - \frac{1}{2}g_{(\mu\nu)}R + \Lambda g_{(\mu\nu)} = kT_{(\mu\nu)}$$

Field Theory – Classical Vs Quantum

In classical field theory, such as general relativity, Einstein conceptualizes curved space-time as an infinite array of coupled harmonic oscillators, akin to a mass-spring system. To elaborate, one can imagine two or three masses connected by springs or an "infinite box spring." This means that the curved space is filled with a dense grid where each node represents a mass, and every mass is connected to its nearest neighbours by springs.

Physicists utilize this concept of the "infinite box spring" to describe wavelike phenomena that propagate through space when one of the point masses is "pinged" by an external object. This scenario raises questions about determinism: given known initial conditions of the field, the evolution of the field is fundamentally determined by its configuration at any given time.

On the other hand, in quantum field theory, one can similarly consider the "infinite box spring" analogy. The key difference lies in the fact that the random motion of this infinite box spring is driven by quantum mechanics. Specifically, a quantum harmonic oscillator exhibits random zero-point motion, resulting in a discrete spectrum of excitations above this random ground state.

To further illustrate this concept, one might envision a "quantum (randomness) box spring mattress" to depict the nature of a quantum field. In practice, each discrete spectrum of excitations for a quantum harmonic oscillator can be interpreted as particles in quantum field theory. In this context, it implies that the quantum field will achieve certain configurations based on probability amplitudes, expressed as P = Amp |A|2.

Obviously, for classical field theory, such as in the case of general relativity, it does NOT use quantum mechanics. Otherwise, when formulating the general relativity equation, it does NOT include any concepts of quantization or even quantum mechanics. Basically, classical field theory and quantum field theory are two types of box spring systems – infinitely (classical continuum for large-scale matter) vs. quantum (randomness), (quantum continuum for small-scale matter). Hence, it is very difficult to derive the formula for quantum gravity or "quantize gravity," as one may need to merge the small-scale aspects into the large-scale ones. My suggestion is to reformulate/re-establish either quantum mechanics, general relativity, or both kinds of equations. Thus, this author proposes a hybrid idea that (7) one may begin to subdivide the large curved space-time into a very small-scale quantized one, similar to the so-called "finite element method" in the engineering field or to this author's paper titled "A Rationalized Visit to Holy Land — Israel" [10]. That is, a mirror image of a mirror image, or an infinite number of large harmonic springs such that each individual spring contains some quantized small randomness springs. These small springs will oscillate discretely, randomly, quantized, spectrally, and harmonically in each individual section of the large spring, etc. In the mirror image way, the collection of these small quantized springs in the quantum field can make up the large individual spring in the classical field.

In brief, this author suggests that the relationship between quantum field theory and quantum mechanics is just like the two sides of a coin. To be precise, they are only the primal-dual business way of the simplex method for describing microscopic structures. Hence, analogically, this author proposes that string theory and loop quantum gravity may also be the primal-dual business way of depicting macroscopic phenomena in the universe.

Major Mathematical and Computational Results

From [11], we may have:

$\frac{1}{\xi'(x)} = \sum_{r\in\mathbb{Z}[1/2]\geq 2} b_r r^{-s}$ which is a generalized Dirichlet series.

Then one may get:

$$\int \frac{1}{\xi'(x)}dx = \int \sum_{r\in\mathbb{Z}[1/2]\geq 2} b_r r^{-s}$$

$$or \quad \int \frac{1}{\xi'(x)}dx = \int \frac{1}{\xi(x)} \frac{1}{\frac{\xi'(x)}{\xi(x)}}dx,$$

$$i.e. \quad \int \frac{1}{\xi'(x)}dx = \int \frac{1}{\xi(x)} \frac{1}{\partial(ln\xi(x))}$$

$$= \frac{1}{\xi(x)}\frac{1}{(ln\xi(x))} - \int \frac{1}{-ln(\xi(x))[\xi(x)]^2}\xi'(x)dx$$

$$= \frac{1}{\xi(x)}\frac{1}{(ln\xi(x))} + \int \frac{1}{ln(\xi(x))[\xi(x)]^2}\xi'(x)dx$$

$$= \frac{1}{\xi(x)}\frac{1}{(ln\xi(x))} + \int \frac{d(\xi(x))}{ln(\xi(x))(\xi^2(x))}$$

$$= 2[\frac{1}{\xi(x)}\frac{1}{(ln\xi(x))}] + \int \frac{(\xi(x))}{\partial[ln(\xi(x))(\xi^2(x))]}$$

$$= \ldots = n\left[\frac{1}{\xi(x)}\frac{1}{(ln\xi(x))}\right]$$

$$I.e. \quad \int \frac{1}{\xi'(x)}dx = n\frac{1}{\xi(x)}\frac{1}{(ln\xi(x))} ---------- \quad (1)$$

Case I: Use a Linear Equation to approximate $\int \frac{1}{\xi'(x)}dx$

$$\frac{1}{\xi(x)}\left[\frac{1}{(ln\xi(x))}\right]\left[ln(\xi(x))+1\right]$$

or

$$\int \frac{1}{\xi'(x)}dx = \int \sum_{r\in\mathbb{Z}[1/2]\geq 2} b_r r^{-s}$$

$$= \int\int b_r r^{-s}$$

$$\int \frac{1}{\xi'(x)}dx = \frac{1}{\xi(x)}\left[\frac{1}{(ln\xi(x))}\right]\left[ln(\xi(x))+1\right] = \int\int b_r r^{-s} J(x)\partial r\partial s$$

where $J(x)$ is the Jacobian matrix of the transformation from $\partial x\partial y$ normal planed coordinate to $\partial r\partial s$, or the curved (spherical) plane coordinate [12].

$$\frac{1}{\xi(x)}\left[\frac{1}{(ln\xi(x))}\right]\left[ln(\xi(x))+1\right] = \int\int b_r r^{-s} J(x)\partial r\partial s ------(*)$$

$$i.e. \frac{1}{\xi(x)}\left[\frac{1}{(ln\xi(x))}\right]\left[ln(\xi(x))+1\right] - \int\int b_r r^{-s} J(x)\partial r\partial s = 0$$

which is a linear equation in terms of $ln(\xi(x))$.

Indeed, the root of the left hand side in the equation (*) is: ln(ξ(x)) = -1 or $\frac{1}{(ln\xi(x))}$ = 0 or $\frac{1}{\xi(x)} = 0$, i.e. Sub-case I: when $\xi(x) = e^{-1}$ *or* $1/e$,

Sub-case II: when $(ln\xi(x)) = -\infty$ *or* $\xi(x) = 0$, x = trivial zeros (negative even integers) or non-trivial zeros

Sub-case III: when $\xi(x) = \infty$ *or* $x = 1$.

Moreover, $\xi(x) = e^{-1}$ is also one of the optimum value of the equation $[\iiint b_r r^{-s} J(x)\partial r\partial s]$'s outcome polynomial. $\xi(x) = 0$ when $\frac{1}{(ln\xi(x))}$ = 0, then x equals to the negative even integers or refer to those trivial zeros of the zeta function. Certainly, there may be those non-trivial zeros for the zeta function [13]. Or

$ln\ \xi(x) = -\infty$ when $\xi(x) = 0$. That says, we may approximate the singularity of the black hole toy model as the case $x = 1$ when $\frac{1}{\xi(x)} = 0$ *or* $\xi(x) = \infty$ by the linear equation $\frac{1}{\xi(x)}\left[\frac{1}{(ln\xi(x))}\right]\left[ln(\xi(x))+1\right]$. To be precise, the above result may imply the asymptotic safety in quantum gravity or also the non-trivial fixed point [14] etc.

Case II: Use a Quadratic Equation to Approximate $\int \frac{1}{\xi'(x)}dx$

$$\int \frac{1}{\xi'(x)}dx = \frac{1}{\xi(x)}\left[\frac{1}{(ln\xi(x))}\right]^2 \left(ln(\xi(x))-1\right)$$

or

$$\int \frac{1}{\xi'(x)}dx = \int \sum_{r\in\mathbb{Z}[1/2]\geq 2} b_r r^{-s}$$

$$= \int\int b_r r^{-s} J(x)\partial r\partial s$$

$$\int \frac{1}{\xi'(x)}dx = \frac{1}{\xi(x)}\left[\frac{1}{(ln\xi(x))}\right]^2 \left(ln(\xi(x))-1\right) = \int\int b_r r^{-s} J(x)\partial r\partial s$$

$$\frac{1}{\xi(x)}\left[\frac{1}{(ln\xi(x))}\right]^2 \left(ln(\xi(x))-1\right) = \int\int b_r r^{-s} J(x)\partial r\partial s$$

$$i.e \frac{1}{\xi(x)}\left[\frac{1}{(ln\xi(x))}\right]^2 + \frac{1}{\xi(x)}\frac{1}{(ln\xi(x))} - \int\int b_r r^{-s} J(x)\partial r\partial s = 0 ----(**)$$

which is a quadratic equation in terms of $\frac{1}{ln(\xi(x))}$

Thus, we have:

$$\frac{1}{ln(\xi(x))} = \{-\frac{1}{\xi(x)} \pm \left[(\frac{1}{\xi(x)})^2 - 4(-\frac{1}{\xi(x)})(-\int\int b_r r^{-s} J(x)\partial r\partial s\right]^{\frac{1}{2}} \ / \ [(2)(-\frac{1}{\xi(x)})]$$

$$= \frac{1}{2} \pm [\frac{1}{4} - \ \xi(x)\ (-\int\int b_r r^{-s} J(x)\partial r\partial s)]^{\frac{1}{2}}$$

$$(\frac{1}{ln(\xi(x))} - \frac{1}{2})^2 - \frac{1}{4} = \xi(x)\int\int b_r r^{-s} J(x)\partial r\partial s ---- \ (***)$$

Indeed, the optimum (maximum/minimum) point of the left hand side in the equation(***) is:

$\left(\frac{1}{2}, -\frac{1}{4}\right), or \frac{1}{ln(\xi(x))} = \frac{1}{2}, i.e$

when $\xi(x) = e^2$, $\iint b_r r^{-s} J(x)\partial r\partial s$ will attain its optimum (maximum/minimum) value. Moreover, the roots of (***) is also one of the optimum value(s) of the primitive function $[\iiint b_r r^{-s} J(x)\partial r\partial s]$*'s* outcome polynomial.

But if we integrate the left hand side of the equation (***) at $\xi(x) = e^2$, one may get:

$$\int \frac{1}{(\xi(x))}[(\frac{1}{ln(\xi(x))} - \frac{1}{2})^2 - \frac{1}{4}]dx = \int -\frac{1}{4}\frac{1}{e^2}dx = -\frac{1}{4}\frac{1}{e^2}x + c = \int\int\int b_r r^{-s} J(x)\partial r\partial s --(***)$$

Hence, we may evaluate the above triple integral directly from the simple definite integral. We also know the root of the equation $-\frac{1}{4}\frac{1}{e^2}x + C$ which is also the root of $\iiint b_r r^{-s} J(x)\partial r\partial s$. If we can transform $\iiint b_r r^{-s} J(x)\partial r\partial s$ into the form of Gauss's Divergence Theorem, i.e. $\iiint \nabla\cdot F\ dV = \iint F.\ n\ ds$, hen this implies that the flux passing through the surface S on the right side of the Divergence Equation is the same for the volume V over the object. Even in a higher dimension, we may get a similar argument for the famous generalized Stokes' Theorem: $\int_{\partial\Omega}\omega = \int_{\Omega} d\omega$ which is usually applied in the computation of the flows for the surface of the airplane object and internal structural stress, tension, and deformation, etc., for the airplane's fluid dynamics.

In addition, the flying object can also work with finite element analysis, the object's stiffness matrix together with my HKLam statistical model theory for prediction or other kinds of modeling, etc. In particular, with reference to [15], for a simple extension, the complex square contour (line integral) may then be reduced into the projection (or the dot product) of a coordinate point or function to the tangential vector space, which may actually be another type of the 1-form to the complex functions or complex numbered coordinates in the 2-dimensional differential geometry or a complex plane. This means a complex projective structure or a complex projective space (which may be considered as the complex manifold [16]). Indeed, the multi-dimensional complex manifolds may be used to determine the deformation or the curvature form of the complex structures, etc. To go forward a step, we may interpret such space as the quantum pure states of size n.

Actually, for my paper [15], there may be a path homotopy such that the MATLAB programming segment can lead to locating the non-trivial zeros of the Riemann Zeta function through the associated fixed-point theory (with category theory), etc. [17]. At the same time, for the complex contour integral to be zero, there must be a non-trivial root located in the MATLAB segmentation square [15]. However, the converse—that if a non-zero value is calculated for the complex contour integral, the implication about no zeta roots may NOT be true—suggests that one may need the path homotopic theories to search for such hidden non-trivial zeros for the convergence of the fixed-point spectral sequence(s) [18,19]. Any divergence evidence of such spectral sequences implies that there are NO non-trivial zeros for the complex contour integral over the homotopy path H. In fact, this author has once again turned the pure mathematics of algebraic topology into computational applied mathematics, following my undergraduate mathematics project that focused on the foundations of mathematics with applications in both language linguistics and symbolic computations, etc. This author wants to remark that two paths are path homotopic if and only if they have the same starting point and the same ending point [20]. Thus, intuitively and obviously, the square contour used in my MATLAB segment [21] is practically path homotopic.

In brief, we may approximate the integral $\int \frac{1}{\xi'(x)}dx$ using both linear and quadratic equations, similar to cases I and II. Thus, one may eventually derive a more generalized situation through the Taylor series of order 2 approximation by using the commercial mathematical software Maple, which will be shown in the coming section.

(N.B. Social category theory was once used in the Soviet Union and continues to be applied in some Eastern communist countries for the incorporation of different categories of people, such as men, women, and the elderly. However, from this author's perspective, technology or knowledge itself is neutral; its good or bad usage depends entirely on one's intentions. That said, if nuclear bomb technology had first been developed by the dictatorship leaders of the Axis powers during World War II (WWII) rather than by the liberal and democratic U.S.A., our free world history might have been completely inverted from the mid to late last century and even today.)

The Generalization – Use a Second Order Taylor Series to Approximate $\int \frac{1}{\xi'(x)}dx$ with Canada Maple (Soft: student licensed version, 2022)

In practice, what we want to compute is to find the optimum value(s) of $\int \frac{1}{\xi'(x)}dx$. By the Fundamental Theorem of Calculus, $\frac{\partial \int \frac{1}{\xi'(x)}dx}{\partial x}$ is just $\frac{1}{\xi'(x)}$. Hence, for the *ξ'(x)* to be maximum, then $\frac{1}{\xi'(x)}$ will attain its minimum or the vice versa.

Thus, by this author's previous paper [13], ξ(x) is only:

$$\sum\left[taylor\left(\frac{1}{x^{u+vi}}, x=a\right) a=1..\infty\right]$$

or

$$\sum_{k=1}^{\infty}\left(\frac{1}{e^{(u+vi)\ln(k)}} - \frac{(u+vi)(x-k)}{ke^{(u+vi)\ln(k)}} + \frac{\left(-\frac{u^2+2uvi+vi^2-u-vi}{2k^2}+\frac{(u+vi)^2}{k^2}\right)(x-k)^2}{e^{(u+vi)\ln(k)}} + \left(-\frac{u^3+3u^2vi+3uvi^2+vi^3-3u^2-6uvi-3vi^2+2u+2vi}{6k^3} + \frac{(u^2+2uvi+vi^2-u-vi)(u+vi)}{2k^3} - \frac{(u^2+2uvi+vi^2-u-vi)(u+vi)}{2k^3}\right)(x-k)^3 \Big/ e^{(u+vi)\ln(k)}\right)$$

Then ξ'(x) is just:

$$\sum_{k=1}^{\infty}\left(-\frac{(u+vi)}{ke^{(u+vi)\ln(k)}} + \frac{2\left(-\frac{u^2+2uvi+vi^2-u-vi}{2k^2}+\frac{(u+vi)^2}{k^2}\right)(x-k)}{e^{(u+vi)\ln(k)}} + 3\left(-\frac{u^3+3u^2vi+3uvi^2+vi^3-3u^2-6uvi-3vi^2+2u+2vi}{6k^3} + \frac{(u^2+2uvi+vi^2-u-vi)(u+vi)}{2k^3} - \frac{(u^2+2uvi+vi^2-u-vi)(u+vi)}{2k^3}\right)(x-k)^2 \Big/ e^{(u+vi)\ln(k)}\right)$$

Set ξ'(x) = 0 and hence solve for x, we have:

$$\frac{1}{u^2+2uvi+vi^2+3u+3vi+2}\left(\left(u^2+2uvi+vi^2+\sqrt{-u^2-2uvi-vi^2-4u-4vi-3}+4u+4vi+3\right)k\right)$$

or

$$\frac{1}{u^2+2uvi+vi^2+3u+3vi+2}\left(\left(-u^2-2uvi-vi^2-\sqrt{-u^2-2uvi-vi^2-4u-4vi-3}-4u-4vi-3\right)k\right)$$

as the optimum (minimum/maximum) values for ξ(x) or they are just the roots of ξ'(x).

For ξ'(x) to attain its optimum(maximum/minimum) values, we need to differentiate it once more and set it equals to zero, i.e.

$$\xi''(x) = \sum_{k=1}^{\infty}\left(\frac{2\left(-\frac{u^2+2uvi+vi^2-u-vi}{2k^2}+\frac{(u+vi)^2}{k^2}\right)}{e^{(u+vi)ln(k)}} + 6\left(-\frac{u^3+3u^2vi+3uvi^2+vi^3-3u^2-6uvi-3vi^2+2u+2vi}{6k^3} + \frac{(u^2+2uvi+vi^2-u-vi)(u+vi)}{2k^3} - \frac{(u^2+2uvi+vi^2+u+vi)(u+vi)}{2k^3}\right)(x-k) \Big/ e^{(u+vi)ln(k)}\right)$$

Solving the above equation w.r.t. x, we have:

$$x = \frac{(u+vi+3)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^2}\right)}{(u+vi+2)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^3}\right)}$$

as the optimum (maximum/minimum) value for the function ξ'(x). Or 1/ξ'(x) will attain its optimum value at

$$x = \frac{(u+vi+3)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^2}\right)}{(u+vi+2)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^3}\right)}$$

Hence, the root of $1/\xi'(x)$ is:

$$\left(x-\frac{(u+vi+3)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^2}\right)}{(u+vi+2)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^3}\right)}\right)=\pm\frac{\sqrt{-u^2-2uvi-vi^2-4u-4vi-3}}{(u+vi+2)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^3}\right)}$$

$$x=\frac{(u+vi+3)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^2}\right)}{(u+vi+2)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^3}\right)}\pm.\frac{\sqrt{-u^2-2uvi-vi^2-4u-4vi-3}}{(u+vi+2)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^3}\right)}\text{-------}(*****)$$

In practice, instead of difficult mathematical concepts with computations, this author have developed a general algorithm for finding the roots of *1/ξ'(x)* and hence the optimum value(s) of ∫ *1/ξ'(x) dx* by using the Canada's Maple (2022 student license):

Step 1: (Calling) MTM;

Step 2: Set t = ξ'(x) with order 2 Taylor Series;

Step 3: Solve t;

Step 4: Let g5:= Taylor(1/t, x = a);

Step 5: Set g5 with order 2 Taylor Series;

Step 6: (Calling) MTM;

Step 7: Solve (g5);

Step 8: Simplify the two roots.

According to [8], (*****) may become to the capacitance of the coaxial cable when:

$$c=\frac{2\pi\varepsilon}{log\left[\left(\left(\frac{(u+vi+3)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^2}\right)}{(u+vi+2)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^3}\right)}\right)\pm\frac{\sqrt{-u^2-2uvi-vi^2-4u-4vi-3}}{(u+vi+2)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^3}\right)}\right)^2\right]},$$

or

$$c=\frac{\pi\varepsilon}{log\left(\left(\frac{(u+vi+3)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^2}\right)}{(u+vi+2)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^3}\right)}\right)\pm\frac{\sqrt{-u^2-2uvi-vi^2-4u-4vi-3}}{(u+vi+2)\left(\sum_{k=1}^{\infty}\frac{1}{k^u k^{vi} k^3}\right)}\right)}$$

With reference to [2],
$ln(N+1).\le.ln\left(N^{s_2}+1\right).\le.\xi(s_2)\le.\xi(1).\leqslant\xi(s_1).\le 1+.ln(N).\le.1+ln\left(N^{s_1}\right)$,

where s2 .⩽. 1 .⩽. s1 . Thus, for any x of ξ(x),

$$ln(N+1)\ .\le.\ \xi(x)\ .\le.\ 1+ln(N)\ .$$

Hence, substitute back into (*),

$$\int e\left[1+\frac{1}{ln\left[1+ln(N)\right]}\right]dx.\le.\int\int\int b_r r^{-s}drds\le\int e\left[1+\frac{1}{ln\left[1+ln(N)\right]}\right]dx$$

If we go ahead for a step and approximate $\int\frac{1}{\xi'(x)}dx=\xi''(x)ln(\xi'(x))$ by the second order Taylor series, then one may get:

$$\xi''(x)ln(\xi'(x))=\xi''(x)(\xi'(x)-\frac{\xi'(x)^2}{2}$$

By applying the approximation (1+x)n = 1 + nx, we may have:

$$\int e\left[\frac{1}{ln(1+lnN)}\right]^2 dx\int\int\int b_r r^{-s}drds.\le.\int e\left[\frac{1}{ln(1+lnN)}\right]^2 dx$$

I.e. For a 4-dimensional space-time, f(x,y,z,t) of volume, it can be expressed as the volume of rotation of the reciprocal of the square of a log function for a toy model of a black hole. In particular, we may employ ∫.[1/ln(x)]^{2}dx for the purpose of approximating the black hole toy model.

Therefore, by the following Matlab segment program code, we get the simulated quantization [3] to such black hole toy model:

MatLab Scripting of plotting 3D Revolution of function "[1/log(x)]2"

```
x = linspace (1, 5, 20); %Creates 20 points between interval [1,5]
y = [1./log(x)].^2; %The revolution function
plot (x,y), axis equal % draw profile
xlabel("x"); ylabel("y");
[X,Y,Z] = cylinder(y);%use cylinder function to rotate figure
surf (X,Y,Z), axis square x label ("Z");y label("y");zl abel ("X")
```

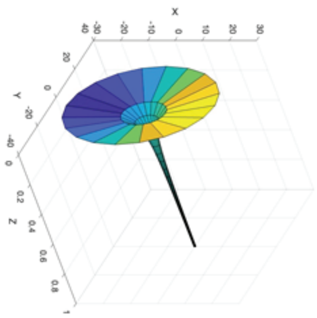


Figure 1: *A Matlab Simulated Quantization to the Toy Model of a Black Hole. A Gabriel's Horn with finite volume but infinite surface area and the converse is NOT true [61].*

Furthermore, as we have already known the root of $\int\int\int b_r\ r^{-s}$ *drds* is *1/e*, or , one may also approximate one of the root of the two squeezing inequalities or both of:

$$\int e\left[\frac{1}{ln(1+lnN)}\right]^2 dx \text{ and } \int e\left[\frac{1}{ln(lnN+1)}\right]^2 dx \text{ ---------- } (**)$$

Thus, we may even guess back/approximate the optimum point (maximum/minimum value) of the both squeezing inequalities (**) of the black hole toy model by substituting *ln(N) = 1*- and 1+ to approach the true value of root of the both squeezing inequalities in (**).

Mathematical Implications – A Conformal Mapping & a Jacobian Matrix

Consider the spherical mapping [8] & [23],

$$w=u+vi=e^z=e^{x+yi} \text{ where } 0<Im\ z<a,$$

with $u=e^x cos\ a$ ---------(eqt 1)

and

$$v=e^x sin\ a \text{ ---------(eqt 2)}$$

where $-\infty<x<\infty$ and $y=a$

which transforms the ordinary or normal rectangular square strip in the z-plane into the spherical strip to the w-plane.

In addition, (eqt 2)/(eqt 1) gives us a straight line v = u tan a, which passes through the origin in the w-plane. Then obviously, the aforementioned spherical conformal mapping can be applied for the transformation between $\int 1/\xi'(x)\, dx$ and $\int\int b_r r^s$. That says, the wanted Jacobian matrix is:

$$\begin{matrix} \frac{\partial u}{\partial x} & \frac{\partial u}{\partial y} \\ \frac{\partial v}{\partial x} & \frac{\partial v}{\partial y} \end{matrix}$$

Or by expanding the above matrix in its determinant form, we have the requirement:

$$\left[\frac{\partial u}{\partial x}\frac{\partial v}{\partial y} - \frac{\partial u}{\partial y}\frac{\partial v}{\partial x}\right] | x_0, y_0. \neq .0$$

for a one-to-one mapping.

Using the Cauch-Riemann equations $\frac{\partial v}{\partial y} = \frac{\partial u}{\partial x}$ *and* $\frac{-\partial u}{\partial y} = \frac{\partial v}{\partial x}$, we may then get:

$$\left[\frac{\partial u}{\partial x}^2 + \frac{\partial v}{\partial y}^2\right] | x_0, y_0 0$$

or if $f(z)$ is analytic and $f'(z0)\ .\neq .0$, then $w = f(z)$ provides a 1-1 mapping of a neighbourhood of z_0. Obviously both eqt (1) & eqt (2) are analytic and $w = u + vi = f(z)$ with its first derivative $(d w/d z = d e^z/d z = e^z)$ not equal to zero for all z in the z-plane, hence $w = f(z)$ provides a one-to-one conformal mapping from the w-plane to the z-plane [8]. Thus, the wanted Jacobian matrix for the above transformation should be:

$$\begin{matrix} e^x cosy & -e^x siny \\ e^x siny & e^x cosy \end{matrix}$$

Or we have the following approximation:

$$\int \frac{1}{\xi'(x)} dx = \frac{1}{\xi(x)}\left[\frac{1}{(ln\xi(x))}\right]^2 ln(\xi(x)) - 1$$

$$= \int\int b_r r^{-s} \begin{matrix} e^x cosy & -e^x siny \\ e^x siny & e^x cosy \end{matrix} \partial r \partial s$$

But both x and y are dummy variables, the result follows immediately:

$$\frac{1}{\xi(x)}\left[\frac{1}{(ln\xi(x))}\right]^2 ln(\xi(x)) - 1 = \int\int b_r r^{-s} \begin{matrix} e^r coss & -e^r sins \\ e^r sins & e^r coss \end{matrix} \partial r \partial s$$

Taylor Approximation of $\frac{1}{\xi(x)}\left[\frac{1}{(ln\xi(x))}\right]^2 ln(\xi(x)) - 1$

By using the concept of mirror image of the mirror image with the approximated substitution of $ln(x) = (x - x^2/2)$, we may get:

$$ln(\xi(x)) = (\xi(x) - \frac{\xi(x)^2}{2}) = (1/2)(2\xi(x) - \xi(x)^2)$$

thus,

$$\frac{1}{\xi(x)}\left[\frac{1}{(ln\xi(x))}\right]^2 [ln(\xi(x)) - 1] = \frac{1}{\xi(x)}\frac{1}{(ln\xi(x))} - \frac{1}{\xi(x)}\left[\frac{1}{(ln\xi(x))}\right]$$

$$= \frac{1}{\xi(x)}\left(\frac{2}{2\xi(x) - \xi(x)^2}\right) - \frac{1}{\xi(x)}\left(\frac{2}{2\xi(x) - \xi(x)^2}\right)^2 ------ (****)$$

But as

$$ln(N+1) \leqslant \sum_{n=1}^{N} \frac{1}{n^x} \leqslant 1 + lnN \ and \ ln(N) = (N - \frac{N^2}{2})$$

$$[(N+1) - \frac{(N+1)^2}{2}] \leqslant \sum_{n=1}^{N} \frac{1}{n^x} \leqslant +(N - \frac{N^2}{2})$$

By substituting $\sum_{n=1}^{N} \frac{1}{n^x} = [(N+1) - \frac{(N+1)^2}{2}]$ *and* $\sum_{n=1}^{N} \frac{1}{n^x} = (1 + \left(N - \frac{N^2}{2}\right))$ into (****) respectively, we may get:

$$\frac{1}{\left[1+\left(N-\frac{N^2}{2}\right)\right]}\frac{2}{2\left[1+\left(N-\frac{N^2}{2}\right)\right]-\left[1+\left(N-\frac{N^2}{2}\right)\right]^2} = \frac{1}{\left[1+\left(N-\frac{N^2}{2}\right)\right]}\frac{2}{2\left[1+\left(N-\frac{N^2}{2}\right)\right]-\left[1+2\left(N-\frac{N^2}{2}\right)\right]}$$

$$= 2\frac{1}{\left[1+\left(N-\frac{N^2}{2}\right)\right]} = 2\frac{1}{\left[\frac{\left[-(N-1)^2\right]}{2}+\frac{3}{2}\right]} . \leqslant \frac{4}{3}$$

Discussion – Quantization of a Black Hole by the Light Bending Rings and the Information Paradox

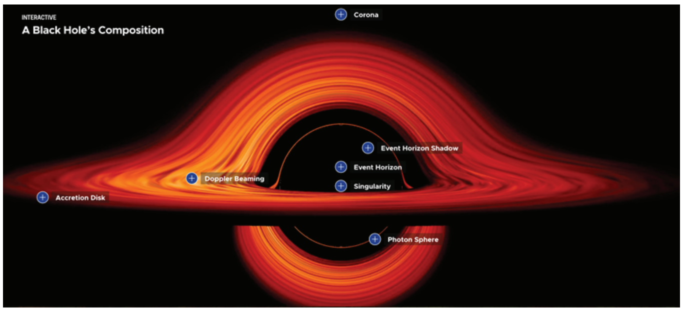


Figure 2: *A Black hole photo sample that is obtained from the U.S.A. NASA [25].*

In reality, there may be visible images of different light paths or rings of beams that are bent by the strong gravity of a black hole. Therefore, this author suggests an algorithm for the quantization of any visible black hole with bending light paths in the following manner:

1. Record the image data for the different bending paths (rings) of light from the targeted black hole.
2. Compute the corresponding contour integrals of the bending paths or rings of beams. According to Stokes' theorem [27-29], these integrals may imply different surface areas of the black hole of interest [32].
3. The calculated surface areas may then imply different energy entropy quantizations of the black hole [26].
4. Each computed area may correspond to its respective (area) energy (flux) quantization from the boundary of the different bending paths or rings of beams.
5. Complete the full quantization of the investigated black hole.

In practice, for the function $(1/lnx)^2$ to approximate the toy model of the black hole, we may quantize its surface area piecewise using the following method:

Accordingly, the surface area piece-wisely (SAPW) for any function is:

$$(SurfaceArea) SA = \int_a^b .[2\pi f(x)(1 + f'(x)^2)^{1/2}]dx$$

In the present toy black hole (PWTBH) model case:

$$SA_{PWTBH} = \int_{\zeta_{n-1}}^{\zeta_n} .[2\pi\left(\frac{1}{lnx}\right)^2 (1 + [d\left(\frac{1}{lnx}\right)^2 / dx]^2)^{1/2}]dx$$

$$= \int_{\zeta_{n-1}}^{\zeta_n} .[2\pi\left(\frac{1}{lnx}\right)^2 (1 + [\frac{-2}{x}\left(\frac{1}{lnx}\right)^3]^2)^{1/2}]dx$$

By using the Mathematica (Home Liscensed Version) and mkes the Taylor Expansion about a point "a" and integrate for the first two non-trivial Zeta Zeros, i.e. $\xi 1$ and $\xi 2$ we may get:

$$4.56854*10^9\left(\frac{864.}{\left(a^{12}\left(1+\frac{4}{\left(a^2 log[a]^6\right)}\right)^{2.5} log[a]^{26}\right)}+\frac{1512.}{\left(a^{12}\left(1+\frac{4}{\left(a^2 log[a]^6\right)}\right)^{2.5} log[a]^{25}\right)}+\frac{1080.}{\left(a^{12}\left(1+\frac{4}{\left(a^2 log[a]^6\right)}\right)^{2.5} log[a]^{24}\right)}+...\right)$$

In order to find the curvature of the desired logarithmic function, we first need to determine its corresponding arc length parametrization as follows:

(N.B. The arc length parametrization is given by $\sqrt{(1+[f'(x)]^2)}$ which is closely related to the arc length equation.)

Arc-Length Parametrization = $\int_0^t (1+\left[\frac{-2}{x}\left(\frac{1}{lnx}\right)^3\right]^2)^{1/2} dx$

In fact, the curvature k for the axis of rotation of a black hole toy model with function $f(t) = \left(\frac{1}{ln(t)}\right)^2$ is

$$k(t) = \frac{|f''(t)|}{\left[1+\left(f'(t)\right)^2\right]^{3/2}} = \frac{\left|\frac{6}{t^2(ln(t))^4}+\frac{2}{t^2(ln(t))^3}\right|}{\left[1+\left[\frac{-2}{t}\left(\frac{1}{ln(t)}\right)^3\right]^2\right]^{(3/2)}}$$

After employing Taylor Expansion by Mathematica (licensed Home Edition), we may get:

$$\frac{|f''(t)|}{\left[1+\left(f'(t)\right)^2\right]^{3/2}} = \frac{\left(\frac{0.75}{\left((ln(t))^4 t^6\right)}+\frac{0.25}{\left((ln(t))^3 t^5\right)}-0.28125(ln(t))^2 t^2-0.09375(ln(t))^3 t^3\right)}{\left(\frac{1}{\left((ln(t))^6 t^8\right)}\right)^{1.5}}$$

$= 0.75 + 0.25t(ln(t))-0.28125t^8(ln(t))^2-0.09375t^9(ln(t))^6$

Let $f(t)=0.75+0.25t(ln(t))-0.28125t^8(ln(t))^2-0.09375t^9(ln(t))^6$ and let $y = ln(t)$, then

$f(t,y) = 0.75 + 0.25t*y - 0.28125t^8y^2 - 0.09375t9y^6$

Solving by Mathematica (Home Liscensed version), we may get:

$-1.25713 < t < -1.13027$ *or* $t < -1.25713$ *or* $t > -0.0902479$.

As $t > -1.25713$ *or* $t < -1.25713$, this may imply $t = -1.25713$ and $y = 0.2288+3.1415i$. In fact, the complex value of y will give f(t) an imaginary-valued space curvature. This may be used to model the black hole's electromagnetic field. Furthermore, it may be theoretically possible to model the information contained in the associated high-frequency electromagnetic waves or radiation. We may also potentially decode the information from the emitted electromagnetic radiation. If the function contains complex variables, this implies that f(t) satisfies the Cauchy-Riemann equations or represents a mirrored image inverse. Indeed, f(t) may be a holomorphic function, which is analytic and infinitely differentiable.

In addition, $\left|\frac{\left|\frac{6}{t^2(ln(t))^4}+\frac{2}{t^2(ln(t))^3}\right|}{\left[1+\left[\frac{-2}{t}\left(\frac{1}{ln(t)}\right)\right]^2\right]^{(3/2)}}\right.$ will attain its minimal curvature or $1+\left[\frac{-2}{t}\left(\frac{1}{ln(t)}\right)\right]^2=1$ when $\left[\frac{-2}{t}\left(\frac{1}{ln(t)}\right)\right]^2=0$. I.e. When $t = \infty$, the minimal curvature of the black hole toy model is: $k = 0$.

As the parametric equation $\sqrt{(1+[f'(x)]^2)}$ is a planar curve, its torsion should be zero.

To delve deeper, for each level of non-trivial zeta zeros, there may exist a boundary between the non-trivial zeta zeros or a continuum (which requires further investigation beyond the current focus) around the bounded rectangle of each zeta zero for the proposed electromagnetic fields, as shown in the diagram:

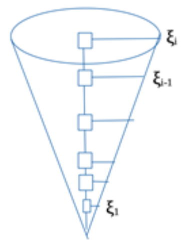


Figure 3: The mirror inverted cone (or the black hole toy model) with the non-trivial zeta zeros as the different quantized levels.

In practice, the electromagnetic boundary over the above ξ_i & ξ_j will be defined by the contour path integral around each individual ξ_i & ξ_j. We can intuitively express this as:

$$\frac{2i\pi I}{2j\pi I} = \frac{\oint_{\xi_i}\frac{1}{Zeta(z)}dz}{\oint_{\xi j}\frac{1}{Zeta(z)}dz} = \frac{\pi r_i^2}{\pi r_j^2} \quad \left(\begin{array}{l} by\ Stoke's\ Theorem\ or\ Green's\ theorem, \\ line\ integral\ is\ equal\ to\ surface\ integral \end{array}\right)$$

$$\frac{n_i}{n_j} = \frac{r_i}{r_j}$$

$$= \frac{i}{j} \qquad (for\ the\ i-th\ \&\ j-th\ non-trivial\ zeta\ zeros)$$

where I is the imaginary number $\sqrt{(-1)}$ *and* ξ_i, ξ_j are those non-trival zeros [14] that give out 2iπI and *2jπI.*

$$\frac{\oint_{\xi i}\frac{1}{Zeta(z)}dz}{\oint_{\xi j}\frac{1}{Zeta(z)}dz} = \frac{i}{j} = ratio\ of\ the\ corresponding\ surfaces\ integral$$

where εi and εj are the permittivities at the layers with zeta zeros ξi and ξj. We can also consider these integral numbers "i" and "j" as a form of quantization, as the electromagnetic field is, in fact, quantized. Furthermore, we may use these integral numbers as starting points to formulate a theory of quantum gravity. In fact, we may bridge the gap between quantized electromagnetic fields [49] and the area of quantized (black hole) gravity, similar to the case of $k = \frac{2\pi j_{x,y,z}}{L}$

where jx,y,z = ±1, ±2, ±3, ±4, ±5, … ±∞ and L is the length, k is the wave vector. In practice, as I have shown the existence of the magnetic monopoles around my black-hole toy model, according to the Maxwell's equation, there are also a Dirac strings. At the same time, the Dirac string can act as a solenoid in the Aharonov-Bohm effect, which implies the Dirac quantization rule:

"The product of a magnetic charge and an electric charge must always be an integral multiple of $\frac{n\hbar}{2}$."

Thus, with reference to the above contour path integral of $\frac{1}{zeta(\xi_i)} = constant\ k$ where the constant k can be divided by $\frac{n\hbar}{2}$.

Or $k = \frac{n\hbar}{2}k_1$

where k1 is an integer just like the above wave vector.

Indeed, the quantized vector potential, the electric field and the magnetic field are:

$$A(r) = \sum_{k,\mu}\sqrt{\frac{\hbar}{2\omega V \epsilon_0}}\{e^{(\mu)}a^{(\mu)}(k)eik.r + {}^{-(\mu)}a^{\dagger(\mu)}(k)e-ik.r\}$$

$$E(r) = \sum_{k,\mu}\sqrt{\frac{\hbar}{2\omega V \epsilon_0}}\{e^{(\mu)}a^{(\mu)}(k)eik.r - {}^{-(\mu)}a^{\dagger(\mu)}(k)e-ik.r\}$$

$$B(r) = I\sum_{k,\mu}\sqrt{\frac{\hbar}{2\omega V \epsilon_0}}\{(kx\ e^{(\mu)})\ a^{(\mu)}(k)e^{ik.r} - (kx\ {}^{-(\mu)})\ a^{\dagger(\mu)}(k)e-ik.r\}e$$

$$where\ \omega = c|k| = ck = c\left|\frac{2\pi j_{x,y,z}}{L}\right|$$

In practice, if we can establish an analogous model between the quantization of the gravitational field and the quantization of the electromagnetic field, then we can naturally quantize (black hole) gravity using the quantized electromagnetic field equations. Let us first quantize the Einstein field equations using the electromagnetic stress-energy tensor as follows:

$$R_{(\mu\nu)}-\frac{1}{2}g_{(\mu\nu)}R+\Lambda g_{(\mu\nu)}=kT_{(\mu\nu)}$$

In an usual situation, the electromagnetic stress-energy tensor is linear or

$$T_{(\mu\nu)}=\begin{pmatrix}\frac{1}{2}\left(\varepsilon_0E^2+\frac{1}{\mu_0}B^2\right) & \frac{1}{c}s_x & \frac{1}{c}s_y & \frac{1}{c}s_z\\ \frac{1}{c}s_x & -\sigma_{(xx)} & -\sigma_{(xy)} & -\sigma_{(xz)}\\ \frac{1}{c}s_y & -\sigma_{(yx)} & -\sigma_{(yy)}-\sigma_{(yz)} & -\sigma_{(yz)}\\ \frac{1}{c}s_z & -\sigma_{(zx)} & -\sigma_{(zy)} & -\sigma_{(zz)}\end{pmatrix}$$

where the energy-stress tensor can be quantized [50]. But the electromagnetic stress-energy tensor (decomposition) can also be expressed as the linear combination/regression of the following:

$$\begin{pmatrix}\frac{1}{2}\left(\varepsilon_0E^2+\frac{1}{\mu_0}B^2\right) & \frac{1}{c}s_x & \frac{1}{c}s_y & \frac{1}{c}s_z\\ \frac{1}{c}s_x & -\sigma_{(xx)} & -\sigma_{(xy)} & -\sigma_{(xz)}\\ \frac{1}{c}s_y & -\sigma_{(yx)} & -\sigma_{(yy)}-\sigma_{(yz)} & -\sigma_{(yz)}\\ \frac{1}{c}s_z & -\sigma_{(zx)} & -\sigma_{(zy)} & -\sigma_{(zz)}\end{pmatrix}\begin{pmatrix}1\\1\\1\\1\end{pmatrix}=\begin{pmatrix}\frac{1}{2}\left(\varepsilon_0E^2+\frac{1}{\mu_0}B^2\right)+\frac{1}{c}\left(s_x+s_y+s_z\right)\\ \frac{1}{c}s_x-\sigma_{(xx)}-\sigma_{(xy)}-\sigma_{(xz)}\\ \frac{1}{c}s_y-\sigma_{(yx)}-\sigma_{(yy)}-\sigma_{(yz)}\\ \frac{1}{c}s_z-\sigma_{(zx)}-\sigma_{(zy)}-\sigma_{(zz)}\end{pmatrix}$$

$$=\begin{pmatrix}\frac{1}{2}\left(\varepsilon_0E^2+\frac{1}{\mu_0}B^2\right)+\frac{1}{c}\left(s_x+s_y+s_z\right)-\delta_1\\0\\0\\0\end{pmatrix}+\begin{pmatrix}0\\ \frac{1}{c}s_x-\sigma_{(xx)}-\sigma_{(xy)}-\sigma_{(xz)}-\delta_2\\0\\0\end{pmatrix}+$$

$$\begin{pmatrix}0\\0\\ \frac{1}{c}s_y-\sigma_{(yx)}-\sigma_{(yy)}-\sigma_{(yz)}-\delta_3\\0\end{pmatrix}+\begin{pmatrix}0\\0\\0\\ \frac{1}{c}s_z-\sigma_{(zx)}-\sigma_{(zy)}-\sigma_{(zz)}-\delta_4\end{pmatrix}+\begin{pmatrix}\delta_1\\ \delta_2\\ \delta_3\\ \delta_4\end{pmatrix}$$

$$ie\quad R_{(\mu\nu)}-\frac{1}{2}g_{(\mu\nu)}R+\Lambda g_{(\mu\nu)}=kT_{(\mu\nu)}.\approx.(\begin{pmatrix}\frac{1}{2}\left(\varepsilon_0E^2+\frac{1}{\mu_0}B^2\right)+\frac{1}{c}\left(s_x+s_y+s_z\right)-\delta_1\\0\\0\\0\end{pmatrix}+$$

$$\begin{pmatrix}0\\ \frac{1}{c}s_x-\sigma_{(xx)}-\sigma_{(xy)}-\sigma_{(xz)}-\delta_2\\0\\0\end{pmatrix}+\begin{pmatrix}0\\0\\ \frac{1}{c}s_y-\sigma_{(yx)}-\sigma_{(yy)}-\sigma_{(yz)}-\delta_3\\0\end{pmatrix}+\begin{pmatrix}0\\0\\0\\ \frac{1}{c}s_z-\sigma_{(zx)}-\sigma_{(zy)}-\sigma_{(zz)}-\delta_4\end{pmatrix}$$

$$.\approx.k(\begin{pmatrix}\frac{1}{2}\left(\varepsilon_0E^2+\frac{1}{\mu_0}B^2\right)\\0\\0\\0\end{pmatrix})+\frac{1}{c}\begin{pmatrix}s_x\\0\\0\\0\end{pmatrix}+\frac{1}{c}\begin{pmatrix}s_y\\0\\0\\0\end{pmatrix}+\frac{1}{c}\begin{pmatrix}s_z-c\delta_1\\0\\0\\0\end{pmatrix}+\begin{pmatrix}0\\ \frac{1}{c}s_x\\0\\0\end{pmatrix}+\begin{pmatrix}0\\-\sigma_{(xx)}\\0\\0\end{pmatrix}+\begin{pmatrix}0\\-\sigma_{(xy)}\\0\\0\end{pmatrix}+$$

$$\begin{pmatrix}0\\-\sigma_{(xz)}-\delta_2\\0\\0\end{pmatrix}+\begin{pmatrix}0\\0\\ \frac{1}{c}s_y\\0\end{pmatrix}+\begin{pmatrix}0\\0\\-\sigma_{(yx)}\\0\end{pmatrix}+\begin{pmatrix}0\\0\\-\sigma_{(yy)}\\0\end{pmatrix}+\begin{pmatrix}0\\0\\-\sigma_{(yz)}-\delta_3\\0\end{pmatrix}+\begin{pmatrix}0\\0\\0\\ \frac{1}{c}s_z\end{pmatrix}+\begin{pmatrix}0\\0\\0\\-\sigma_{(zx)}\end{pmatrix}+\begin{pmatrix}0\\0\\0\\-\sigma_{(zy)}\end{pmatrix}+$$

$$\begin{pmatrix}0\\0\\0\\-\sigma_{(zz)}-\delta_4\end{pmatrix}$$

$$=\begin{pmatrix}\frac{1}{2}\left(\varepsilon_0E^2+\frac{1}{\mu_0}B^2\right) & \frac{1}{c}s_x & \frac{1}{c}s_y & \frac{1}{c}s_z-\delta_1\\ \frac{1}{c}s_x & -\sigma_{(xx)} & -\sigma_{(xy)} & -\sigma_{(xz)}-\delta_2\\ \frac{1}{c}s_y & -\sigma_{(yx)} & -\sigma_{(yy)}-\sigma_{(yz)} & -\sigma_{(yz)}-\delta_3\\ \frac{1}{c}s_z & -\sigma_{(zx)} & -\sigma_{(zy)} & -\sigma_{(zz)}-\delta_4\end{pmatrix}$$

or the reformation of the next matrix.

For the non-linear case of the electromagnetic stress-energy tensor, according to [51] & [52], we may have the following revised tensor:

$$P^{\mu\nu}:=\frac{\partial\mathcal{L}}{\partial F}F^{(\mu\upsilon)}+\frac{\partial\mathcal{L}}{\partial G}*F^{(\mu\upsilon)}$$

$$=\begin{pmatrix}0 & D_1 & D_2 & D_3\\ -D_1 & 0 & H_3 & -H_2\\ -D_2 & -H_3 & 0 & H_1\\ -D_3 & H_2 & -H_1 & 0\end{pmatrix}$$

In fact, the non-linear electromagnetic energy-stress tensor is:

$$T^{\mu\nu}=\frac{1}{4\pi}\left(2\frac{\partial\mathcal{L}}{\partial F}F_{(\mu\lambda)}F_{\nu}^{\lambda}+\frac{\partial\mathcal{L}}{\partial G}Gg_{(\mu\lambda)}-\mathcal{L}_{EM}g_{(\mu\lambda)}\right)$$

When we equate the Einstein Relativity Field Equation, one may get:

$$R_{(\mu\nu)}-\frac{1}{2}g_{(\mu\nu)}R+\Lambda g_{(\mu\nu)}=\frac{1}{4\pi}\left(2\frac{\partial\mathcal{L}}{\partial F}F_{(\mu\lambda)}F_{\nu}^{\lambda}+\frac{\partial\mathcal{L}}{\partial G}Gg_{(\mu\nu)}-\mathcal{L}_{EM}g_{(\mu\nu)}\right)$$

or:

$$R_{\mu\nu}=\frac{k}{2\pi}\frac{\partial\mathcal{L}}{\partial F}(\frac{\partial A_\lambda}{\partial x^\mu}-\frac{\partial A_\mu}{\partial x^\lambda})\frac{\partial A^\lambda}{\partial x_\mu}=\frac{k}{2\pi}\frac{1}{E_r}\frac{q}{4\pi r^2}(\frac{\partial A_\lambda}{\partial x^\mu}-\frac{\partial A_\mu}{\partial x^\lambda})\frac{\partial A^\lambda}{\partial x_\mu}$$

$$=\frac{k}{2\pi}\frac{1}{E_r}\frac{q}{4\pi r^2}\begin{pmatrix}\frac{\partial A_\lambda}{\partial x^\mu} & 1\\ \frac{\partial A_\mu}{\partial x^\lambda} & 1\end{pmatrix}\frac{\partial A^\lambda}{\partial x_\mu}$$

$$\Lambda g_{(\mu\nu)}=\frac{\partial\mathcal{L}}{\partial G}Gg_{(\mu\nu)}\quad i.e.\quad \Lambda=\frac{\partial\mathcal{L}}{\partial G}G=\frac{k}{2\pi}\frac{1}{G_r}\frac{m}{4\pi r^2}\beta^2\sqrt{|f_{\mu\nu}|}$$

$$\frac{1}{2}g_{\mu\nu}R=\frac{k}{4\pi}g_{(\mu\nu)}\mathcal{L}_{EM}\quad i.e.\quad R=\frac{k}{2\pi}\mathcal{L}_{EM}$$

Similarly, we may find the wanted electromagnetic anological energy-stress tensor model that is equivalent to (i.e. expressed in terms of) (gravitational) metric tensor as:

$$\begin{pmatrix}-\left(1-\frac{2GM}{rc^2}\right) & 0 & 0 & 0\\ 0 & \left(1-\frac{2GM}{rc^2}\right)^{-1} & 0 & 0\\ 0 & 0 & r^2 & 0\\ 0 & 0 & 0 & r^2sin\theta\end{pmatrix}\begin{pmatrix}1\\1\\1\\1\end{pmatrix}=\begin{pmatrix}-\left(1-\frac{2GM}{rc^2}\right)\\ \left(1-\frac{2GM}{rc^2}\right)^{-1}\\ r^2\\ r^2sin\theta\end{pmatrix}$$

$$=\begin{pmatrix}-\left(1-\frac{2GM}{rc^2}\right)\\0\\0\\0\end{pmatrix}+\begin{pmatrix}0\\ \left(1-\frac{2GM}{rc^2}\right)^{-1}\\0\\0\end{pmatrix}+\begin{pmatrix}0\\0\\r^2\\0\end{pmatrix}+\begin{pmatrix}0\\0\\0\\r^2sin\theta\end{pmatrix}$$

$$=\begin{pmatrix}-\left(1-\frac{2GM}{rc^2}\right)-\varepsilon_1\\0\\0\\0\end{pmatrix}+\begin{pmatrix}0\\ \left(1-\frac{2GM}{rc^2}\right)^{-1}-\varepsilon_2\\0\\0\end{pmatrix}+\begin{pmatrix}0\\0\\r^2-\varepsilon_3\\0\end{pmatrix}+\begin{pmatrix}0\\0\\0\\r^2sin\theta-\varepsilon_4\end{pmatrix}+\begin{pmatrix}\varepsilon_1\\ \varepsilon_2\\ \varepsilon_3\\ \varepsilon_4\end{pmatrix}$$

In the mirror image reverse way, we may find the gravitational metric tensor by:

$$\begin{pmatrix}-\left(1-\frac{2GM}{rc^2}\right)\\ \left(1-\frac{2GM}{rc^2}\right)\\ r^2\\ r^2sin\theta\end{pmatrix}=\begin{pmatrix}-\left(1-\frac{2GM}{rc^2}\right) & 0 & 0 & 0\\ 0 & \left(1-\frac{2GM}{rc^2}\right)^{-1} & 0 & 0\\ 0 & 0 & r^2 & 0\\ 0 & 0 & 0 & r^2sin\theta\end{pmatrix}$$

This author wishes to note something interesting: the inverse of the metric tensor multiplied by the electromagnetic tensor, or the mirror image converse, will still yield the same result—a zero vector—since these two tensors are complementary to each other in terms of their zero entries (linearly dependent rows/columns for the electromagnetic field tensor). Therefore, we cannot use the primal-dual simplex method, which expresses the potential for both the electromagnetic field and gravitational field in terms of matrices or tensors. We cannot simply multiply the matrix of the gravitational potential (V_{grav}) or the metric tensor by the inverse of the matrix of the electromagnetic potential (V_{elec}). The resulting matrix may then be approximated using this author's HKLam statistical model theory to obtain the desired linear regression model. Finally, we may achieve an analogous quantized model for the expected gravitational potential energy.

$$T^{\mu\nu}=\frac{1}{4\pi}(2\frac{1}{E_r}\frac{q}{4\pi r^2}(\frac{\partial A_\lambda}{\partial x^\mu}-\frac{\partial A_\mu}{\partial x^\lambda})\frac{\partial A^\lambda}{\partial x_\mu}+\frac{1}{G_r}\frac{m}{4\pi r^2}\beta^2\sqrt{|f_{\mu\nu}|}\begin{pmatrix}-\left(1-\frac{2GM}{rc^2}\right) & 0 & 0 & 0\\ 0 & \left(1-\frac{2GM}{rc^2}\right)^{-1} & 0 & 0\\ 0 & 0 & r^2 & 0\\ 0 & 0 & 0 & r^2 sin\theta\end{pmatrix}$$

$$(-\frac{1}{4}F_{\mu\nu}F^{\mu\nu})\begin{pmatrix}-\left(1-\frac{2GM}{rc^2}\right) & 0 & 0 & 0\\ 0 & \left(1-\frac{2GM}{rc^2}\right)^{-1} & 0 & 0\\ 0 & 0 & r^2 & 0\\ 0 & 0 & 0 & r^2 sin\theta\end{pmatrix})$$

$$T^{\mu\nu}=\frac{1}{4\pi}(2\frac{1}{E_r}\frac{q}{4\pi r^2}+\begin{pmatrix}\frac{\partial A_\lambda}{\partial x^\mu} & 1\\ \frac{\partial A_\mu}{\partial x^\lambda} & 1\end{pmatrix}\frac{\partial A^\lambda}{\partial x_\mu}+$$

$$\frac{1}{G_r}\frac{m}{4\pi r^2}\mathbf{E}\cdot\mathbf{B}\begin{pmatrix}-\left(1-\frac{2GM}{rc^2}\right) & 0 & 0 & 0\\ 0 & \left(1-\frac{2GM}{rc^2}\right)^{-1} & 0 & 0\\ 0 & 0 & r^2 & 0\\ 0 & 0 & 0 & r^2 sin\theta\end{pmatrix}$$

$$\frac{1}{2}\left(\mathbf{E}^2-\mathbf{B}^2\right)\begin{pmatrix}-\left(1-\frac{2GM}{rc^2}\right) & 0 & 0 & 0\\ 0 & \left(1-\frac{2GM}{rc^2}\right)^{-1} & 0 & 0\\ 0 & 0 & r^2 & 0\\ 0 & 0 & 0 & r^2 sin\theta\end{pmatrix})------- (*)$$

$$where\ F_{\mu\nu}=\begin{pmatrix}0 & E_x & E_y & E_z\\ E_x & 0 & -B_z & B_y\\ E_y & B_z & 0 & -B_x\\ E_z & -B_y & B_x & 0\end{pmatrix}$$

can also be approximated by HKLam Theory.

By the Completing Square Method, we may have:

$1/2\ (E^2 - B^2) = 1/2\ [(E - B)^2 + 2E\cdot B - 2B^2]g_{(\mu\nu)}$

The equation will attain its minimum when E = B. Hence, the energy-stress equation is reduced to:

$$\frac{1}{4\pi}(2\frac{1}{E_r}\frac{q}{4\pi r^2}(\frac{\partial A_\lambda}{\partial x^\mu}-\frac{\partial A_\mu}{\partial x^\lambda})\frac{\partial A^\lambda}{\partial x_\mu})+[(1+\frac{1}{G_r}\frac{m}{4\pi r^2})\mathbf{E}\cdot\mathbf{B}-\mathbf{B}^2]g_{(\mu\nu)}$$

Similarily, when $\frac{1}{G_r}\frac{m}{4\pi r^2}=-1$ (there may be another possible solution equal to 1 but the calculation is similar and this author will not repeat), the equation will be reduced to:

$$T^{\mu\nu}=\frac{1}{4\pi}(2\frac{1}{E_r}\frac{q}{4\pi r^2}(\frac{\partial A_\lambda}{\partial x^\mu}-\frac{\partial A_\mu}{\partial x^\lambda})\frac{\partial A^\lambda}{\partial x_\mu})-\mathbf{B}^2 g_{(\mu\nu)}$$

or

$$g_{(\mu\nu)}=[0-\frac{1}{4\pi}(2\frac{1}{E_r}\frac{q}{4\pi r^2}(\frac{\partial A_\lambda}{\partial x^\mu}-\frac{\partial A_\mu}{\partial x^\lambda})\frac{\partial A^\lambda}{\partial x_\mu}]/\mathbf{B}^2$$

$$=[0-\frac{1}{4\pi}(2\frac{1}{E_r}\frac{q}{4\pi r^2}(\frac{\partial A_\lambda}{\partial x^\mu}-\frac{\partial A_\mu}{\partial x^\lambda})\frac{\partial A^\lambda}{\partial x_\mu}]/\left(\frac{\partial A_z}{\partial y}-\frac{\partial A_y}{\partial z}\right)^2+\left(\frac{\partial A_x}{\partial z}-\frac{\partial A_z}{\partial x}\right)^2+\left(\frac{\partial A_y}{\partial x}-\frac{\partial A_x}{\partial y}\right)^2$$

When $\frac{\partial A_\lambda}{\partial x^\mu}=\frac{\partial A_\mu}{\partial x^\lambda}$, then the above equation is a zero and is a minimum for the (gravitational) metric tensor $g_{\mu\nu}$ equation expression. This fact implies the quantization of the electromagnetic field may also help us quantize the metric tensor $g_{\mu\nu}$ according to the quantized values of $\frac{\partial A_\mu}{\partial x^\lambda}$. Or according to the quantized vector potential equation $A(r)=\sum_{k,\mu}\sqrt{\frac{\hbar}{2\omega V \grave{o}_0}}\{e^{(\mu)}a^{(\mu)}(k)eik.r+{}^{-(\mu)}a^{\dagger(\mu)}(k)e-ik.r\}..$ In practice, the linear regression model (initial starting point or the pioneer) for the (quantized) $g_{\mu\nu}$ is:

$$\begin{pmatrix}\frac{\partial A_\lambda}{\partial x^\mu}+1\\ \frac{\partial A_\mu}{\partial x^\lambda}+1\end{pmatrix}=\begin{pmatrix}\frac{\partial A_\lambda}{\partial x^\mu}+1-\varepsilon_1\\ 0\end{pmatrix}+\begin{pmatrix}0\\ \frac{\partial A_\mu}{\partial x^\lambda}+1-\varepsilon_2\end{pmatrix}+\begin{pmatrix}\varepsilon_1\\ \varepsilon_2\end{pmatrix}$$

i.e. We may need to find the optimal value for the above regression model [53] and then solve the corresponding partial differential equations such as

$A\lambda = (\varepsilon_{opt\_1}-1)x^\mu + c_i$ or $A_\mu = (\varepsilon_{opt\_2}-1)x^\lambda + c_j$. Or a pair of the business primal-dual in the simplex method. If we further suppose there was a radiation field that looks as a plane wave and propagates in the z-direction and is linearly polarized in the x-direction, then the real part of the 4-potential plane wave is:

$A_\mu = f(z - t)\ (0,1,0,0)$ [55] & [56].

$$\frac{\partial A_\lambda}{\partial x^\mu}=f'(z-t)\begin{pmatrix}0&0&0&0\\1&0&0&-1\\0&0&0&0\\0&0&0&0\end{pmatrix}$$

$$=f'(z-t)\ [\begin{pmatrix}0\\1\\0\\0\end{pmatrix}+\begin{pmatrix}0\\-1\\0\\0\end{pmatrix}$$

or a pair of left-right handed spin-upwards electron spinors and

$$\frac{\partial A_\lambda}{\partial x^\mu}=f'(z-t)\begin{pmatrix}0&0&0&0\\-1&0&0&1\\0&0&0&0\\0&0&0&0\end{pmatrix}$$

$$=f'(z-t)\ [\begin{pmatrix}0\\-1\\0\\0\end{pmatrix}+\begin{pmatrix}0\\1\\0\\0\end{pmatrix}$$

or a pair of right-left handed spin-upwards electron spinors.

$$\begin{pmatrix}\frac{\partial A_\lambda}{\partial x^\mu} & 1\\ \frac{\partial A_\mu}{\partial x^\lambda} & 1\end{pmatrix}=\begin{pmatrix}1\\0\\0\\0\end{pmatrix}^T f'(z-t)\ [\begin{pmatrix}0\\1\\0\\0\end{pmatrix}+\begin{pmatrix}0\\-1\\0\\0\end{pmatrix}]+\begin{pmatrix}0\\1\\0\\0\end{pmatrix}^T f'(z-t)\ [\begin{pmatrix}0\\-1\\0\\0\end{pmatrix}+\begin{pmatrix}0\\1\\0\\0\end{pmatrix}+\begin{pmatrix}1\\0\\0\\0\end{pmatrix}+\begin{pmatrix}0\\1\\0\\0\end{pmatrix}$$

and hence we may reconstruct the corresponding (quantized) geometric spacetime [57]. According to the implications or proporties of the Dirac (quantum) equation that there should be a pair of electron-positron couple, hence the aformentioned tensor decomposed spinor equation for the positron will be also true as follow:

$$\begin{pmatrix}\frac{\partial A_\lambda}{\partial x^\mu} & 1\\ \frac{\partial A_\mu}{\partial x^\lambda} & 1\end{pmatrix}=\begin{pmatrix}0\\0\\1\\0\end{pmatrix}^T f'(z-t)\ [\begin{pmatrix}0\\0\\1\\0\end{pmatrix}+\begin{pmatrix}0\\0\\-1\\0\end{pmatrix}]+\begin{pmatrix}0\\0\\0\\1\end{pmatrix}^T f'(z-t)\ [\begin{pmatrix}0\\0\\-1\\0\end{pmatrix}+\begin{pmatrix}0\\0\\1\\0\end{pmatrix}+\begin{pmatrix}0\\0\\1\\0\end{pmatrix}+\begin{pmatrix}0\\0\\0\\1\end{pmatrix}$$

Actually, we can quantize the potential of the plane wave, referring to the results in [58]. Clearly, the paired electron-positron spinor equation may occur at the boundary of the black hole's event horizon or in the context of quantum entanglement phenomena. This author's results show that only electron pairs will be found under the electromagnetic field of my toy black hole model. The black hole may be swallowing the negative part of the electron-positron pair and losing mass due to the electron's negative energy. This finding is consistent with the predictions of the famous Hawking Information Paradox. In fact, the quantum no-hair theory may help resolve such a paradox.

Conversely, one may compute the value of the metric tensor gμν by observationally counting the number of boundary electrons from my HKLam statistical linear regression model, as presented above. This allows us to derive the quantized layers of gμν (as shown in Figure 2). In reality, we can obtain the optimal values of the above tensors based on the conceptual biological experiments mentioned in [54].

This author's HKLam statistical model theory computation suggests that we can express the Einstein Gravitational Field Equation in terms of a (non-)linear combination/ regression model equation, as there is also a non-linear type of electromagnetic stress-energy tensor. If the non-linear type of electromagnetic stress-energy tensor can also be quantized [50], then we will have successfully quantized the Einstein Gravitational Field Equation and established the corresponding analogous gravitational field equation model according to the quantization of the electromagnetic stress-energy tensor. (This author notes that non-linear regression can be converted into a linear form by taking the logarithm.) It is also true that the mirror image converse of the above model holds if we already know the gravitational field equation model, by reversing the matrix/tensor computation process.

In brief, observations indicate that there are quantum entanglements around the black hole's horizon, resembling a kind of butterfly effect or Lorenz chaos. In this context, this author suggests that we may apply my HKLam statistical model theory for further investigation whenever sufficient observational data are available.

$$\begin{pmatrix} \frac{1}{2}\left(\varepsilon_0 E^2 + \frac{1}{\mu_0}B^2\right) + \frac{1}{c}\left(s_x + s_y + s_z\right) - \delta_1 \\ 0 \\ 0 \\ 0 \end{pmatrix} + \begin{pmatrix} 0 \\ \frac{1}{c}s_x - \sigma_{(xx)} - \sigma_{(xy)} - \sigma_{(xz)} - \delta_2 \\ 0 \\ 0 \end{pmatrix} +$$

$$\begin{pmatrix} 0 \\ 0 \\ \frac{1}{c}s_y - \sigma_{(yx)} - \sigma_{(yy)} - \sigma_{(yz)} - \delta_3 \\ 0 \end{pmatrix} + \begin{pmatrix} 0 \\ 0 \\ 0 \\ \frac{1}{c}s_z - \sigma_{(zx)} - \sigma_{(zy)} - \sigma_{(zz)} - \delta_4 \end{pmatrix} =$$

$$\begin{pmatrix} \frac{1}{2}\left(\varepsilon_0 E^2 + \frac{1}{\mu_0}B^2 - \delta_1\right) + \frac{1}{c}\left(s_x + s_y + s_z\right) \\ \left(\frac{1}{c}s_x - \delta_2\right) - \sigma_{(xx)} - \sigma_{(xy)} - \sigma_{(xz)} \\ \left(\frac{1}{c}s_y - \delta_3\right) - \sigma_{(yx)} - \sigma_{(yy)} - \sigma_{(yz)} \\ \left(\frac{1}{c}s_z - \delta_4\right) - \sigma_{(zx)} - \sigma_{(zy)} - \sigma_{(zz)} \end{pmatrix}$$

$$= \begin{pmatrix} \frac{1}{2}\left(\varepsilon_0 E^2 + \frac{1}{\mu_0}B^2\right) - \delta_1 & \frac{1}{c}s_x & \frac{1}{c}s_y & \frac{1}{c}s_z \\ \frac{1}{c}s_x - \delta_2 & -\sigma_{(xx)} & -\sigma_{(xy)} & -\sigma_{(xz)} \\ \frac{1}{c}s_y - \delta_3 & -\sigma_{(yx)} & -\sigma_{(yy)} - \sigma_{(yz)} & -\sigma_{(yz)} \\ \frac{1}{c}s_z - \delta_4 & -\sigma_{(zx)} & -\sigma_{(zy)} & -\sigma_{(zz)} \end{pmatrix}$$

by decomposing each of the vector entry addition terms to form the individual entries of the desired electromagnetic stress-energy tensor. The similar mirror image processes continue until an optimal value of the modified electromagnetic stress-energy tensor is obtained. Finally, we can solve the Einstein Field Equation in a novel way by repeating the mathematical Taylor approximation procedure, as shown in the aforementioned section. In fact, such an optimal value may be achieved using the gradient descent procedure in conjunction with commercial mathematical software—Matlab—for both linear and non-linear optimization problems. However, such computations may fall within the field of engineering, which is beyond the focus of the present paper. This author may present the physical computations for the famous mathematical—Naviers-Stokes Equation problem when time or conditions permit, or if there are interested parties.

Actually, by considering,

$$Z = \frac{1}{\hbar}(i\hbar\frac{\partial A_\mu}{\partial x^\lambda}) \text{ which may give us us } Z - \frac{1}{\hbar}(P_\lambda A_\mu) = 0$$

$$\frac{Z}{A_\mu} - \frac{1}{\hbar}P_\lambda = 0$$

$$Z = \Psi\left(\frac{-1}{A_\mu} - \frac{1}{\hbar}i\partial_\lambda\right) = 0$$

$$\frac{-1}{A_\mu} = -\frac{\partial ln\left(A_\mu\right)}{\partial x_\lambda} = \frac{i}{\hbar}\partial_\lambda$$

$$ln\left(A_\mu\right) = \frac{i}{\hbar}x_\lambda + k_\mu$$

$$ln\left(A_\mu\right) = x_\lambda i\frac{\theta}{mc^2}t + k_\mu$$

which may be transformed into a Diric Equation.

When we take $\hbar = mc^2\frac{t}{\theta}$, then we may get the wanted Diric Equation of the Gravitational plane wave:

$$\Psi_A\left(t\right) = e^{\left(\pm i\frac{mc^2}{\hbar}\right)t + k_\lambda}$$

But according to the Einstein mass-energy equation – $E = mc^2$, then we may obtain:

$$A_\mu\left(t\right) = e^{\frac{x_\lambda}{E_n t}i\theta + k_\lambda}$$

Obviously, the above equation can be considered as an energy spectrum or a quantization through a suitable Fourier transform as well as a suggestion for the need of a quantization of time.

By reconsidering

$$\frac{\partial A_\mu}{\partial x^\lambda} = f'\left(z - t\right)\begin{pmatrix} 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} \quad and \ e^{i\pi} = -1, then$$

$$\frac{\partial A_\mu}{\partial x^\lambda} = f'\left(z - t\right)\begin{pmatrix} 0 & 0 & 0 & 0 \\ -1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix} = f'\left(z - t\right)\begin{pmatrix} 0 & 0 & 0 & 0 \\ e^{in\pi} & 0 & 0 & e^{i2n\pi} \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$

which may show the existence of the graviton as the $e^{in\pi}$ appears in the above tensor matrix while $(e^{in\pi})^2$ may be decomposed into two gravitons. But in some case, graviton is just its anti-particle; hence these two gravitons may be a pair of graviton and anti-graviton.

Moreover, with reference to [59], we may have only:

{Aλ(x,t), πλ(y,t)}D = δ(x-y)

and

{Aμ(x,t), πμ(y,t)}D = δ(x-y)

which is a kind of Dirac Quantization of Free Electrodynamics.

In brief, there may be a stress-energy tensor along with the electromagnetic field tensor applied in the mathematics of General Relativity. In this author's opinion, one can use both the forward and the mirror image reverse components to compute these tensors for calculating the solutions (various types) of the Einstein General Relativity Field Equation. The author has already demonstrated this method in the aforementioned sections and will not repeat it here. Last but not least, for all types of tensors, we can apply the HKLam statistical theory (both the forward and the mirror image reverse components) to obtain a linear regression/combination model for further research or study.

To go ahead step, we may consider:

$$Z = \frac{\Delta u}{c^2}$$

$$x_\mu - x_\lambda = \frac{\Delta u}{c^2}$$

$$\frac{\Delta\lambda}{\lambda} = \frac{g\Delta y}{c^2}$$

$$\frac{c^2}{g}\frac{\Delta\lambda}{\lambda} = \Delta y = x_\mu - x_\lambda$$

which is just a gravitational redshift and $\Delta\lambda/\lambda$ can be measured by observation and finally get the change in the metric tensor. Hence, we may quantize the space practically for:

$$g_{ij}(x)\frac{\partial x^i}{\partial y^k}\frac{\partial x^j}{\partial y^l}dy^k dy^l$$

In practice, this author suggests that we may reduce the high dimensional tensor by tensor decomposition and apply the gradient descent momentum of the Heavy Ball Method to find a optimized minimum as well as the space quantization like below:

$$x_{t+1} = x_t - \alpha\nabla f(x_t) + \beta(x_t - x_{t-1})$$

Actually, the quantum gravity is not concerning the quantization of the gravity but it is something about the quantizing of the space-time metric.

Or we may have the following algorithm / steps:

1. Apply the gradient descent to obtain the minimum / optimum metric tensor vector in the sense of data linear regression – an optimization process for the statistical linear regression data;
2. Combine and transform the metric tensor (that observed from the gravitational waves data) into the wanted one;
3. Apply the gradient descent to the optimum transformed metric tensor and find the best solution to the tensor equation Ax = b;
4. Decompose the transformed metric tensor into a low dimensional one;
5. Use my HKLam statistical model theory to obtain the corresponding (tensor) linear regression model and get the corresponding quantization or data clustering for the such particular space time from the observed Gravitational waves.;

In fact, according to Stokes' theorem, the line integral of a vector field is equal to the surface integral of the curl of that field over a surface bounded by a closed curve. If, in addition, the vector field is conservative, then the integral around the closed loop must be zero. Since the winding number of the contour integral is a multiple of 2π, the surface bounded by the prescribed curve has an undefined vector field at the non-trivial zero (say ξi) for the function $1/\zeta(z)$. In its mirror image reverse, the contour integral around ξi (or ξj etc.) for the function $\zeta(z)$ is zero, indicating that it is a conservative vector field. For a conservative vector field, it is indeed the gradient of some function (say ∇f). If we let the gradient of this function be $P=\nabla f$, it is known as the scalar potential. If we can find such a scalar potential P, we can determine the desired electric current $I=\Delta UI$ (or P). In practice, the electric charge itself is quantized, while each contour integral of the non-trivial zeta zeros for the function $1/\zeta(z)$ is also quantized by the ratio i/j for some ξi, ξj, etc.

At the same time, there may be a magnetic monopole existing between two consecutive ξi and ξj since the contour integral is always zero, or $\nabla\cdot B=0$. (In practice, rather than the engineering interpretation in the theoretical discussion of black-hole battery feasibility, the above zeta (ξ) function, together with $1/\zeta(\xi)$, forms a philosophical pair or a "duality," or, academically, the primal and dual problem of our simplex method in operational research [50-52].) However, there is no evidence of such monopoles in our currently known physical world, which may lead to a contradiction. Thus, either the implication of $\nabla\cdot B=0$ or $\oint B\cdot dA = 0$ is incorrect, indicating that the existence of a monopole or the computed Riemann non-trivial zeros is flawed. (N.B. In fact, the electric monopole does exist, but not the magnetic one. If a magnetic monopole were to exist, we would need to rewrite Maxwell's equations due to their incompleteness.) Theoretically, under high electromagnetic field conditions (along with electrodynamics theory) around the boundary of this author's toy black hole model, there may be a Schwinger effect occurring between the two non-trivial zeta roots, say ξi and ξj. According to [45], magnetic monopoles may also arise from the dual Schwinger effect under strong magnetic fields. Hence, in this author's toy black hole model, I have demonstrated the occurrence of magnetic monopoles in certain boundaries or areas. Ultimately, we may achieve a unified picture for the Schwinger effect, Hawking radiation, the gauge-gravity relation, and the dS/AdS duality issue, etc. [46]. This author wishes to clarify that the Schwinger effect is a phenomenon under high electromagnetic fields where positron-electron pairs are emitted.

(N.B. With reference to the rectangle of the boundary area in Diagram 3 and the integral form of Maxwell's equations, we may have:

$\oint E\cdot dA = (1/\varepsilon_0)\int \rho\, dv$ *implies*

$\oint \xi i\ Pdx + Qdy = 2\pi i$ *and*

$\oint \xi j\ Pdx + Qdy = 2\pi j$

Hence, $\dfrac{\oint_{\xi i}\frac{1}{Zeta(z)}dz}{\oint_{\xi j}\frac{1}{Zeta(z)}dz} = \dfrac{2\pi i}{2\pi j}\ or\ \dfrac{i}{j}.$

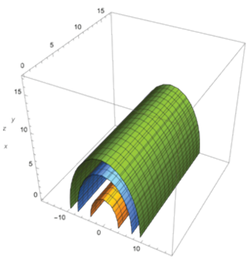
Moreover, based on the above results and the integral form of Maxwell's equations, there exists a space charge or a collection of excess electric charge around the boundary of any ξi within the prescribed rectangular curvature. This can be treated as a continuum of charge distributed in that particular region of space. Furthermore, the electric charge ratio for the

$$\frac{q_i\ for\ the\ rectangle\ of\ \xi_i}{q_j\ for\ the\ rectangle\ of\ \xi_j} = (1/\varepsilon_i)\int \rho_i dv \,/\, (1/\varepsilon_j)\int \rho_j dv$$

$$= \frac{\oint_{\xi_i}\frac{1}{Zeta(z)}dz}{\oint_{\xi_j}\frac{1}{Zeta(z)}dz} = \frac{i}{j})$$

where ε_i & ε_j are the permittivity at the layer with zeta zeros ξ_i *and* ξ_j

In addition, there are also the level curves' layers that are projected from the above mirror inverted cone diagram:



Mathematica Code for generating:

```
ContourPlot3D[x^2 + z^2, {x, -25, 25},
{y, 0, 25}, {z, 0, 25},
 Contours -> {Im[N[ZetaZero[1]]],
Im[N[ZetaZero[11]]],
  Im[N[ZetaZero[25]]]}, AxesLabel ->
{x, y, z}, MaxRecursion -> 2]
```

Figure 4. *The layered level curves that is projected from the mirror image inverted black hole toy model (or the inverted cone or the layered spherical black hole model) – may be further extended for the quantization of the model as well as the relation to the present (quantum) information entropy theory.*

Conclusions - A Disproof to the Unification of Classical Quantum Mechanics & General Relativity

In reality, quantum mechanics and general relativity arise from two different perspectives: the classical (Newtonian) absolute time frame of reference and the relative time frame of reference. These two perspectives are inherently inconsistent. Indeed, from classical quantum mechanics, we can cross over with Galilean relativity to obtain the desired (Galilean type) quantum gravity. This means one can take a further step to achieve the gravitational effects relevant to the quantization of low-speed particles or non-light-speed particles (i.e., quantum gravity for low-speed particles). Specifically, Galilean quantum field theory can be applied as a framework that combines classical field theory, Galilean relativity, and quantum mechanics. Simultaneously, there is also a relativistic quantum mechanics for (near) light-speed particles within the context of special relativity. One can advance further to obtain relativistic quantum mechanics for (near) light-speed particles in curved space and time, incorporating the effects of gravity—this is referred to as parametrized relativistic quantum mechanics [6] or even the pursuit of quantum gravity for (near) light-speed particles. Quantum field theory attempts to act as a framework that unites classical field theory, special relativity, and quantum mechanics. Thus, one can compare and contrast both Galilean quantum field theory (GQFT) and quantum field theory (QFT) [11]. In fact, the above results are consistent with the principles of Lorentz transformation, which is an essential component applied in Einstein's (special) relativity [7]:

$$t' = \gamma\left(t - \frac{vx}{c^2}\right)$$

or

$$t = \gamma\left(t + \frac{vx'}{c^2}\right)$$

where the above equations will reduce to the Galilean t = t' when x << ct together with v << c. We may assume both of *ct/x* and *c/v* equal to some big "M(s)" [9] by employing the technique(s) of business operational research in management or infinity for the Lorentz Transformation, i.e.

$$\frac{ct}{x} = M_1 ----------- \quad (1^*)$$

and

$$\frac{c}{v} = M_2 ----------- \quad (2^*)$$

where M1 and M2 are some very large numbers [10]. One may solve the above equations (1*) & (2*) into a partial differential equation with variables x and t.

Finally, we may solve the partial D.E. and have:

(1*) divided by (2*)

$$\frac{tv}{x} = \frac{M_1}{M_2}$$

$$\frac{(M_2)(v)}{x} = \frac{M_1}{t}$$

$$\frac{M_2}{x}\frac{\partial x}{\partial t} = \frac{M_1}{t}$$

$$M_2 \partial ln(x) = M_1 \partial ln(t)$$

$$x = t^{\frac{M_1}{M_2}} + k -------- \quad (3^*)$$

Then, in this context, Galilean relativity can advance further to merge with the desired classical quantum mechanics equations and thereby obtain the sought-after quantum gravity. In fact, M1 and M2 represent two different large numbers derived from the application of business operational research management methods, akin to the big-M method in one and two stages.

Indeed, the equation for the Galilean transformation of coordinates is:

$$v_{\frac{s'}{s}} = \frac{x}{t} = v ------ \quad (4^*)$$

(for x' = 0 and s, s' are two coordinate systems that used in Galilean Relativity).

Substitute (3*) into the (4*), one may obtain:

$$v_{\frac{s'}{s}} = v = t^{\frac{M_1}{M_2}-1} + \frac{k}{t} ------ \quad (5^*)$$

where (5*) may be the elementary conversion equation between the Lorentz Transformation and Galilean Transformation.

Then with reference to [30], we may have the Lorentz factor -- $\gamma = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$ we may get the following home edition licensed Mathematica scripts [30] & [31] together with some computed results:

Case I: For the zero-th ordered approximation,

Script Input:

y = 1/Sqrt[1 - v^2/c^2]

Series[y (x - vt), {v, 0, 0}]

Series[y (t - v/c^2 x), {v, 0, 0}]

Result Output:

(-vt + x) + $O[v]^1$

t + $O[v]^1$

Hence, the result after the substitution may be:

x' = x, t' = t, but $x = t^{\frac{M_1}{M_2}}$ for the x-coordinate

Case II: For the first ordered approximation,

Script Input:

y = 1/Sqrt[1 - v^2/c^2]

Series[y (x - vt), {v, 0, 1}]

Series[y (t - v/c2 x), {v, 0, 1}]

Result Output:

-(vt + x) + $O[v]^2$

t - (x v)/c^2 + $O[v]^2$

Hence, the result after the substitution $v = t^{\frac{M_1}{M_2}} + \frac{k}{t}$ may be:

$t' = t - (x)(t^{\frac{M_1}{M_2}-1} + \frac{k}{t})/c^2$ for the t-coordinate.

The aforementioned x′ and t′ may represent the precise or adjusted Taylor approximations of the x-coordinate and t-coordinate for the Galilean transformation [30]. To take a further step, we can compute the surface area or the electromagnetic flux by evaluating the line contour integral of the transformation using Green's theorem or Stokes' theorem. This implies that by computing the inverse of the above Taylor series [33], we obtain the corresponding contour line integral:

or -((2 c^2 t)/x),

i.e $2\left(c^{2}\right)/\left(t^{\frac{M_1}{M_2}-1}+\frac{k}{t}\right)$

for 0 < Θ < π, k is an integral constant.

Then, by applying Stokes' theorem, the result corresponds to the desired surface area or even the electromagnetic flux [32] for the Galilean transformation. In fact, according to Stokes' theorem, integrating the summation of all small pieces of these areas provides us with the corresponding line contour integral.

One may also observe that the elementary transformed velocity in Galilean relativity corresponds to the power indices for the ratio between the two large numbers minus 1, or $\frac{M_1}{M_2}-1$ of the time t.

In fact,

$$x' = x - vt = x - t^{\frac{M_1}{M_2}} + k \qquad (for \neq t^{\frac{M_1}{M_2}}, otherwise = 0)$$
$$or$$
$$x = x' + vt = x' + t^{\frac{M_1}{M_2}} + k$$

This implies that the paired equations are akin to the famous words of English poet and painter William Blake, who said, "I am in you, and you in me." We may theoretically quantize gravity according to Galilean relativity, referencing classical quantum mechanics within the absolute time frame, but we cannot quantize gravity using general relativity without appropriate conversion equations, as illustrated in the formula (5*). It is true that Galilean transformations provide a good approximation of Lorentz transformations when particles are moving at speeds lower than that of light. However, the key distinction between these two transformations lies in the absolute versus relative time reference frames. Therefore, we cannot unify quantum mechanics with general relativity.

Moreover, both quantum mechanics and Galilean transformations (or relativity) operate effectively under an absolute time frame, allowing us to derive the desired Galilean quantum gravity by addressing the incompatibility between these two time reference frames. To tackle this incompatibility, the focus should be on developing a conversion equation that bridges these two types of time reference frames. By doing so, we can reconcile the differences between them and transform the Galilean quantum gravity formula into the desired quantum gravity formula consistent with general relativity. Thus, we do not need to dwell solely on the incompatibility between these two time reference frames or the fact that the Galilean transformation is a good approximation of the Lorentz transformation for low-speed particles. Instead, we should concentrate on my proposed transformation conversion equations, utilizing the Big-M method from business operational management.

(N.B. 1. When $M_1 \rightarrow 1$ and $M_2 \rightarrow 1$, where $M_1 \neq M_2$, the Galilean transformation will revert to the Lorentz transformation. Therefore, I propose naming the ratio M_1/M_2 as the Galilean-Lorentz Conversion Power Indices or GLCPI.

2. In fact, for Einstein's twin paradox, there may be an implicit or hidden (universal or Newtonian) absolute time in both twins' perspectives. For sister A, who stays on the rocket, the Earth appears to move backward and become smaller relative to her. However, from sister A's perspective, she is stationary and has her own absolute time relative to the absolute universe or Newton's framework. Similarly, for sister B on Earth, she is stationary and has her own absolute time relative to the same universal standard. This can be expressed as:

$$\frac{\frac{RelTimeA}{AbsoluteUniverseTime}}{\frac{RelTimeB}{AbsoluteUniverseTime}}$$

where the absolute universe time may effectively cancel out in practice. Indeed, I understand that a quantum field theory for time could potentially be the final answer for the present research. However, time and space cannot currently be quantified using constants like Planck's constant for them to be quantized. Therefore, it is not feasible to assert that unification between quantum mechanics and general relativity is possible unless there is a breakthrough in the quantization of both space and time. In other words, the twin paradox problem may have connections to metaphysics and our studies in areas such as ontology, cosmology, and epistemology. It is worth noting that Einstein was, in practice, a philosophical scientist who differed from other scientific physicists of his time in the early to mid-20th century.

3. In reality, one may consider Galilean transformations as a control experiment for Lorentz transformations or Einstein's general relativity [20].

In brief, this author proposes the following algorithm for the quantization to the gravity:

1. Quantize gravity using both quantum mechanics and Galilean relativity through Galilean Quantum Field Theory (GQFT).
2. Convert Galilean relativity (transformation) to Einstein's special relativity (Lorentz transformation) using the conversion formula, noting the limits as M1 → 1 and M2 → 1;
3. Obtain the corresponding quantized gravity in Lorentz transformation from the previous conversion, referencing Quantum Field Theory (QFT).
4. Parametrize the computed quantum gravity (for general relativity) in curved space and time [6].
5. Finalize the desired quantum gravity model/equation.

However, if one insists on generalizing or unifying classical quantum mechanics with general relativity—or even aiming for a theory of everything—without any conversion, as in the Galilean-Lorentz Conversion Power Indices (GLCPI), this author suggests that the feasibility of such unification may be nonexistent. This is due to the conflicts between the assumptions of absolute time reference and relative time reference; they are simply not practically unified or compatible with these two contradictory perspectives. Only by developing a completely new view—perhaps a hybrid of absolute and relative time frames, similar to the cosmic microwave background rest frame or a universal frame—might one find opportunities for unification between classical mechanics and general relativity. In such a case, this author foresees that a new perspective could lead to the creation of a completely new theory, rather than becoming mired in the complexities of unifying classical quantum mechanics and general relativity.

Limitations and Suggestions

In this paper, the author may propose a way to quantize a toy model of the black hole by using a computer programming code. Hence, it may become easier or serve as a pioneer for those advanced researchers to quantize a real black hole. As it is well-known, one of the applications of quantum gravity (equation) may be the quantization of black holes. Thus, the present paper may, in a mirror reverse way, provide a method or background to help those interested scientists seek the wanted quantum gravity equation(s)/formulae. My suggestion is to make as much observational data as possible (especially from the gravitational wave data of various black hole(s)), together with machine learning and data mining methods, to compute the expected QG equation(s), model(s), or patterns. That is to say, one may need to set up a computer and information system in order to achieve advanced data processing for the LIGO data. It is no doubt that under the present technology, we may NOT have the ability to measure, find, or capture the expected graviton from the gravitational waves [12]. On the contrary, what we already know is the relationship between gravity, gravitational waves, and quantization from LIGO's observational data as detected [13]. Then we may compare this with the theoretical results obtained from the algorithm in the aforementioned conclusion section, make the necessary and essential adjustments, and hence generate some more accurate or indirect results. Certainly, the proposal of a fifth force, as discussed in my previous paper [62], may help establish the relationship between cosmic energy and black holes, or even explain the incompatibilities between general relativity and quantum mechanics, etc.

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