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Square Root Algorithm (PART-3): Cumulative Quantum Gravity & Deep Number Theory (QUANTUM AL-GORITHMS)

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Abstract: This paper is built upon analyzation over cumulative information while writing previous papers (part-1 & part-2) entitled as "Modular Square One-Way Function& Square Root Algorithm". In that papers the square root algorithm was analyzed. Such analyzation focus on the randomness characteristic of such algorithm aiming to find kind of regularity . The methodology was by rounding the rational numbers of nonperfect square root and normalizing it yield to what is innovatively called modular factor symbol similar to Legendre symbol. It is noticeable that the ½ factor play a genuine role for such analyzation. This yield analyzing related hypothesis and phenomena with similar factor such as Riemann nontrivial zetta zero laying at real part (½) in number theory. It is something related to what is called random matrix theory (RMT). In addition, in cosmic there is a surprising relation to what is called chaotic quantum system with Riemann spectrum (Riemannium). This leads us back to what is called Gaussian Unitary Ensemble (GUE). It is somthing rlated to the distribution of the prime number. Analyzing such topics is something genuine to the deep number theory, quantum physics, quantum algorithm which is the recent topics for the quantum mechanics, cryptographic, artificial intelligence (AI)

Keywords: *Square Root Algorithm, Quantum Algorithms, Gaussian Unitary Ensemble (GUE), Planck-Scale Physics, Quantum Physics, Zetta Function, Imaginary Part of Riemann Zetta Zeros, Riemannium, Hilbert-Polya Conjecture, Hermitian Operator, Chaotic Quantum System, Prime Numbers Distribution, Schwarzschild Radius, Schwarzschild Mass, Mass-Energy Equivalence, Dark Matter Bridges, Spatial Agglomeration, Graviton, Higgs Field, Casimir Energy, Black Holes.*

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I. INTRODUCTION

The revolution in Artificial Intelligence (AI) especially in the field of generative pre-trained transformer (GPT).AI performance related to speed of response and the result precision. This lead to demands in tradeoff between the GPU numbers and processing power with the cost. Such topics have a parallel interest in what called the quantum chips and quantum algorithms which play a promising future empowering the artificial intelligence (AI) revolution to be personalized in similar way that microprocessor did with the computer occupy a large room to personal laptop!!!. The quantum computing , as promising field, face difficulties in term of nature of the quantum particles and the related quantum algorithms. Such challenges are clear with the Sycamore chip from google that use qubit with error rate noise suffering and hard for algorithm to be scalable connecting more qubits. This quantum chip relay in superconducting many qubits to code the superposition of 0 and 1.Furthermore, there an alternative approaches for quantum computing with its own strengths and challenges. The photonic quantum computing is one of the promising approaches but it has challengs for near-TermUse. Understanding the quantum physics and relation to classical physics is absolutely essential for quantum computing. It propose to help in field of quantum gates, quantum error correction codes and quantumcircuit models [1]-[8]

II. METHODOLOGY AND PAPER ORGANIZATION

Throughout this paper, the relation between classical and quantum physics explored. Such targeted exploration may do with the help of blackhole suggested geometry. Through such procedure an innovative idea was used where, as I clamed, are genuine as is work in the field of the event horizon of the blackhole which is a critical threshold between classical physics and the quantum physics. This, in turn, related to the critical line or points connecting the number theory with the deep number theory of Riemann. Secondly,

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the founded unified equations are explored in blank -scale to verify the extracted algorithms. As a result , it is compared to adequate the known proposed quantum systems such as chaotic quantum system. The noncommutative algebra by Alian Cones is the closest system for the quantum gravity. This lead us to the eigenvalues quantum. Cumulative gravity is proposed as an intriguing concept of the quantum physics. Such concept leads us to explore the Riemannian and hence the deep number theory of Riemann[3],[4],[6],[7],[11],[14]

III. ANALYZING THE QUANTUM THROUGHOUT NEW UNIVERSE MODEL

The significant improve of the observation tools in recent centaury, provide a perfect evidence for the general relativity theory in most of its parts. In other hand, there are many observations that argue the relativity with its 4-dimension space-time fabric visualization (Appendix [1]). The string theory was developed to fulfill some of these arguments following the same rote of Einstein by adding more dimensions.

In his relativity Einstein propose that the particle has a predetermined specific mass. This result in curvature in the space-time trampoline like which leads to Einstein concept of gravity. This curvature leads to blackhole for object with highly intensive mass, that even the light could not escape from the gravity curvature of such mass. Why the life-cycle of such massive stars end up with different scenarios (blackhole, neutron star, white dwarf)? How such particles gain such huge mass during its life time? What happen to a particle swallowed by such curvature?[5],[6],[7]

Among this part of the paper it is reasonable to get answers of some questions and filling the gaps of the existing universe model as follow[9] :

- Astronomical observations of the observable universe mass which is lower than the calculated
- Many galaxies would fly apart or would not move if they did not contain a large amount of unseen matter
- The gravitational effects of gravity cannot explain unless more matter is present
- Evidence include observations in gravitational lensing
- The mass of object is not a result of spatial agglomeration only, but rather it is more extensive.
- There are black holes lie at the center of all large galaxies.
- The gravitational waves result in compress and extension of orthogonal directions

➢ *Mathematics and Theories*

All above arguments in (abstract and introduction), enlightening us to propose that there is a quantum gravity field in place of what we call black matter. This field is made up of elementary particles let's call it graviton that filled the whole universe in 3-dimensional way. The cosmic particles are in competence to drag more intensity of particles of this field and hence, gain more gravity until a situation where a nearby cosmic objects end up such competence with a saturation-like point where they have attracted a satisfied intensity of such gravitational field. Furthermore, these clusters still scrambling other clusters for such gravitational field. The created dark matter maps reveal gravitational field bridges between galaxies. But, this does not mean that sided arena of such bridge has no field but it is lower in graviton field intensity[1]-[8].

Taking blackhole as a case study for the proposed cumulative gravitational field model. How blackhole is created? The answer is that a super massive star has attracted incremental cumulative graviton field around it under its gained gravity and still greedy to gain more. This gained gravitational field is gradually distributed from highly intense nearby star body to be lighter moving away. Such intensity represents the gravity acceleration applied to a body moving at any point of such field. As the pressure on the star body increase, it reaches a moment where it collapses and explode in a supernova. According to the star mass, this explosion may lead to a blackhole. In such explosion, the star particles spray outward producing a vacant sphere. At the same moment, the graviton field scramble to fill such low-pressure sphere. This outward and inward motion lead to rotational movement. Ending up with a situation where we have a highly intensive pure graviton field (dark matter) making up what is called blackhole. The proposed cumulative gravity could be analyzed in such case-study as follow[1]-[11]:

(a) This highly intensive gravity of black hole swallows any particle get close. For such particle with mass "m" there is a moment where it is accelerated to the speed of light so:

-The energy of the gravitational force act inward the blackhole center:

$$E = F \times r \qquad (1)$$

Where r is the blackhole radius and F is the gravitational force which is according to the newton low is:

$$F = G\frac{m\,M}{r^2} \qquad (2)$$

So, the energy is

$$E = G\frac{m\,M}{r} \qquad (3)$$

But, the kinetic of this particle at that moment with speed of light

$$E_k = \frac{1}{2}\ m\,c^2 \qquad (4)$$

Equating 3 and 4

$$G\frac{m\,M}{r} = \frac{1}{2}\ m\,c^2 \qquad (5)$$

So

$$M = \frac{c^2}{2G}\ r \qquad (6)$$

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Hence

$$r = \frac{2G}{c^2} \quad M \qquad (7)$$

But from Schwarzschild solution that is derived using the Einstein field equations. The founded blackhole radius is

$$R_s = \frac{2G}{c^2} \quad M \qquad (8)$$

Comparing $(7)\ and\ (8)$, our proposed cumulative gravity theorem is reasonable.

Back to the (7) equation we have the gravitational constant instead of the proposed cumulative as it describes the black hole radius at moment, nonrotating, symmetric sphere object. Instead we could propose an equivalent cumulative mass so that:

$$M_{cum} = \frac{c^2}{2G} \quad r \qquad (9)$$

(b) According to Einstein theory, the mass-energy equation for such particle swallowed by blackhole at moment with speed of light with total potential energy as follow:

$$E_p = m\, c^2 \qquad (10)$$

Hence, as in (9), the total cumulative energy is

$$E_{cum(p)} = \frac{c^4}{2G} \quad r \qquad (11)$$

From (a) and (b) it is reasonable to suppose that the blackhole does not swallows the particle rather than it is grinded between two opposite highly speed momentum of inner pure graviton intensive field beyond the event horizon and the outer field of intensive pressure of the compounded mass.

Under such notifications, it could be imagining that the 3d intensity fabrication of the graviton field is highly stretched under the rivalry of cosmical objects. So, the resulting ripples of the gravitational wave needs intensive collide or supernova to take effect. The same ripple effect caused by a practical moving inside such fabrication in microscopic scale stretching it slightly in one direction and compress it in other direction at right angle. By such mechanism, the fabricated gravitational field swallows a particle to cause the gravitational effect.

➢ *Analyzed Results*

In conclusion, this part of the paper was written to propose and analyze the model of cumulative quantum gravity (the cumulative theorem). It proposed a graviton intensity field that fill the 3-dimentional universe representing what we called dark matter. All cosmic particles are in rivalry to attract much graviton intensity in a way result in the known web map of such dark matter. This theory propose that all galaxies are initiated from blackhole located in their center after they reach advanced stage of stability under the saturation state of graviton field scrambling. The suggested blackhole here is a spherical object trapping pure extremely intensive amount of quantum gravity (graviton or backmatter) that rotate in extreme speed in direction opposite to the outer field and grind any swallowed particle to emit half of the mass as gamma rays while the other join the pure graviton blockhole in similar theoretical operation of what happen when particle and antiparticle collide! The gravitational effect, according to this theory, tack place in away similar to the peristalsis methodology so that the particle is swallowed under the difference of the intensity of graviton field. It is not due to a curvature in the space-time trampoline. In other hand, the rotational motion resulted from the central blackhole explosion causing the graviton field to rotate and expand in higher rate (accelerated) according to the graviton field intensity distribution in a phenomenon we have attributed to what is called the dark energy. As this graviton field is highly stretched under the rivalry of the cosmical galaxies, any supernova or blackhole colliding result in ripple in this field in a wat that it squeezes the field in one direction and extend it in other orthogonally in a phenomenon called gravitational wave.

IV. PLANK- SCALE EQUATION APPROVE

In plank-scale substituting the plank length to the equation (9) leads to

$$M_{cum} = \frac{c^2}{2G} \quad r \qquad (9)$$

Where r= Planck radius $= 1.616 \times 10^{-35}$ then

$$M_{cum} = \frac{c^2}{2G} \quad r = 2.176 \times 10^{-8} kg$$

Which is almost Planck mass at rest

But using Newton's inverse-square law if the angular momentum is equal to kinetic (spin only?)

V. QUANTUM SYSTEM & QUANTUM GRAVITY

Referring to the noncommutative system supposed by Alian Cones, the quantum energy represented as follow:

$$E = \frac{1}{2} + n^i \gamma \qquad (12)$$

But according to Einstein we have

$$E = M * C^2 \qquad (10)$$

Substituting from equation (9)

$$E = \frac{c^2}{2G} r * C^2$$

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Comparing to the above equation then we have factor $(\frac{1}{2})$, the constant $\frac{c^4}{G}$ and the variable r.

The form $\frac{c^4}{G}$ is represent the energy density scale -as the plank force is $F = \frac{c^4}{G}$ or vacuum energy scale. Such quantities related to the quantum gravity at the Planck limit, where the quantum mechanics and general relativity merge.

Finally, the upon above comparison, it is clear that the equation

$$E_n = \frac{c^4}{2G} r \qquad (11)$$

Represent the gravitational vacuum energy which is related to the quantum gravity early-universe cosmology.

VI. CUMULATIVE GRAVITY & RIEMANIUM

Riemannium is hypothetical quantum system whose energy levels correspond to imaginary of nontrivial Riemann Zeta zeros

$$\zeta(s) = 0 \quad for \quad s = \frac{1}{2} + n^i \gamma_n \qquad (12)$$

Where E_n explored above quantum energy represented as energy levels for "Riemannium" that is

$$E_n \sim \gamma_n \qquad (13)$$

So, this links the number theory and the quantum chaos. Such values could be distributed as eigenvalues of random Hermitian matrices like that of Montgomery-Odlyzko law.

The above expression of the gravitational vacuum energy could be expressed as follow

$$E_n = \frac{c^4}{2G} = \frac{1}{2} F_p . L_p \qquad (11)$$

Where F_p is the Planck force

As a result, we could express the energy of quantum gravity as cumulative Riemannian as follow

$$Ecum = \sum E_n = \frac{c^4}{2G} \approx \sum_{n=1}^{N} \hbar \gamma_n \approx \hbar \sum_{n=1}^{N} \gamma_n \quad (14)$$

Where for Planck $\hbar = \frac{h}{2\pi} = 1.0545 \times 10^{-34}$

This equation represents Planck energy as Riemannian spectrum sum.

Also, for $E = \frac{c^4}{G} r$ in space-time region for scale $(\frac{1}{r^2})$

$$energy \sim \frac{c^4}{G} \times Curvature$$

where curvature $\sim \frac{1}{r}$ but "Riemann curvature tensor

$$[Riemann] \sim \frac{1}{length^2}$$

Taking the curvature radius r , then natural estimate of curvature is $\sim \frac{1}{r^2}$ and multiplying this to volume $(\sim r^3$) then you get energy again

$$E = \frac{c^4}{G} r$$

So, it is space-time region for scale $(\frac{1}{r^2})$

VII. RESULTS ANALYSIS AND APPROACHES

➢ *Results Analysis*

Throughout the above methodology, firstly a suggestion that the mass of any particle no more than a cumulation of gravitons. Then, using force and energy formulas, the relation between the classical physic and the quantum was mathematically analyzed in the boundary of the blackhole at the event horizon. At this situation, the Planck scale is applicable for a particle move to touch the speed of light to vanish for the observer at such horizon (theoretically described as photon). It supposed that the energy of such particle is same using classic physic or Einstein energy.

Equalizing the energy using both classical physic and the quantum physic end up with an extracted formula for the cumulative mass of such particle is in equation (9)

$$M_{cum} = \frac{c^2}{2G} \quad r \qquad (9)$$

Applying Planck scale parameter for such particle, replacing $r = Planck\ radius$, the resulting mass is $Planck\ mass$.

Similar to the Alian Cones noncommutative system, the extracted formula was used to derive the quantum gravitational vacuum energy

$$E_n = \frac{c^4}{2G} r \qquad (11)$$

Such $\frac{c^4}{2G}$ is refer to the blackhole energy. That is $\frac{c^4}{G}$ is represent the energy density scale as the plank force is $F = \frac{c^4}{G}$ or vacuum energy scale. Such quantities related to the quantum gravity at the Planck limit, where the quantum mechanics and general relativity merge.

➢ *Approaches*

Referring to the chaotic quantum system or what is called as abbreviation Riemanniun, the gravitational vacuum energy could be expressed as follow

$$E_n = \frac{c^4}{2G} = \frac{1}{2} F_p . L_p$$

Where F_p is the planck force

As a result, the energy of quantum gravity could be expressed as cumulative Riemannian as follow

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$$Ecum = \sum E_n = \frac{c^4}{2G} \approx \sum_{n=1}^{N} \hbar \gamma_n \approx \hbar \sum_{n=1}^{N} \gamma_n (14)$$

Where for Planck $\hbar = \frac{h}{2\pi} = 1.0545 \times 10^{-34}$

This equation represents Planck energy as Riemannian spectrum sum.

Assuming that such quantum oscillating at the speed of light, lead us to a synthesis of Planck-scale physics and electromagnetic wave behavior at deeper structure of quantum mechanics and gravity. Such synthesis suggests that a light no more than a characteristic of quantum which behaves as a source or carrier of light-like oscillations. This in turn encoding both mass and wave nature in one structure. This structure suggests that photons no more that an excitations characteristic of bosons that merge as vibrational patterns of Planck-scale substrate. In turn, this does not counteract to Planck uncertainty rather it brushing up against the quantum gravity uncertainty floor!

$$\Delta P . \Delta X = \frac{\hbar}{2} \quad (15)$$

Where

$$\hbar = \frac{h}{2\pi} \quad (16)$$

This in turn, rise up another sight for the photon energy and the angular frequency. Also, the spherical shape in cosmos

VIII. CONCLUSION

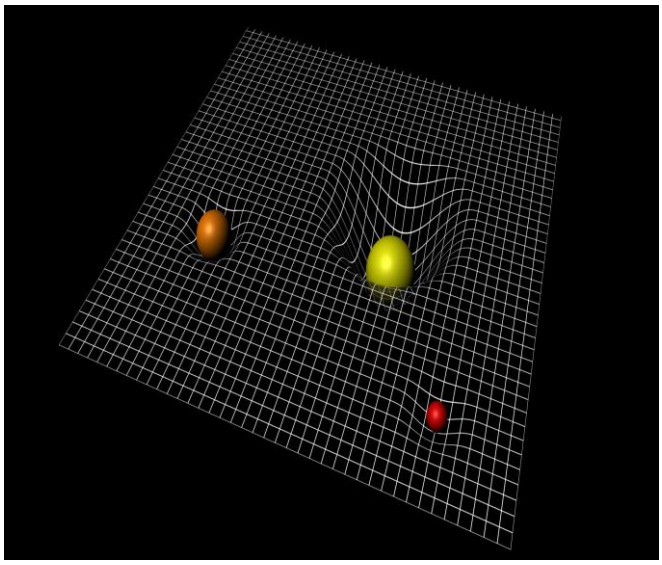
In conclusion, through this paper a new synthesis of gravity was explored at the Planck scale bridging the classical physic with the quantum physic. The proposed resulting theory (called it cumulativity), fill the gap answering the astronomical observations such as the universe mass, gravitational effect or lensing in many galaxies, object mass and spatial agglomeration, are black holes at center of large galaxies and the gravitational waves and extension.

This paper applies mathematical equations with Plank-scale at the boundary between classical physic and quantum physic in the event horizon of the blackhole. Such calculations lead to merge the quantum mechanics and general relativity using what is called energy of quantum gravity that could be expressed as cumulative Riemannian formula (). Such suggestion proposes that the blackhole event horizon as boundary at which the eigenvalue of quantum system lies similar to the nontrivial zeros of Riemannium. This in turn is related to random matrix theory (RMT) and gaussian unitary ensemble (GUE) leading us back to square root algorithm and random prime numbers.

This theory propose that the light is no more than quantum oscillating at the speed of light, lead us to a synthesis of Planck-scale physics and electromagnetic wave behavior at deeper structure of quantum mechanics and gravity. Such synthesis suggests that a light no more than a characteristic of quantum which behaves as a source or carrier of light-like oscillations. This in turn encoding both mass and wave nature in one structure.

APPENDIX

- space-time fabric according to Einstein



Quote…

"If you couldn't can't explain it simply, you don't understand it well enough "Albert Einstein…

REFERENCES

[1]. Ahmed ALfahdi, "Modular Square one-way function and square root algorithm (Part-1)" , June 2024
[2]. Ahmed ALfahdi, "Modular Square one-way function and square root algorithm (Part-2)" , April 2025
[3]. Newton's Law of Universal Gravitation, K. Lee Lemer, scolar. Harvard.edu, March 2022
[4]. The generalized Newton's law of gravitation, A.I,Arbab,Astrophysics and Space Sience, Jan 2010.
[5]. Relativity: The Special and General Theory, Albert Einstein, December 1916, copyright 1999.
[6]. Black holes & the event horizon, spacemath.gsfc.nasa.gov,
[7]. The Schwarzschild black hole, Friedrich W.Hell, Dec 2017.
[8]. Relativistic Theory Of Black Holes, daniele Sasso, May 2024
[9]. 8 Modern Astronomy Mysteries Scientists Still Can't Explain,www.space.com Staff, May 2012.
[10]. Noncommutative Geometry, Alian Connes ,Paris , June 1994.
[11]. Review of noncommutative Geometryby Alian Connes Vaughan Jones and Henri Moscovici,Amrican Mathematical Society , October 1996.
[12]. Planck quantum theory, e-book of MCQs & andwers on blackbody, Nov 2022.
[13]. The Old quantum Theory , D. ter Haar, selected readings physics, Oxford, 1967.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25may1171

[14]. Planck's radiation low, the light quantum, and the prehistory of indistinguishability in the teaching of quantum mechanics, Oliver Passon, Johannes Grebe-Ellis, European Journal of Physics, March 2017.
[15]. The Riemannium, P.Leboeuf, A.G.Monastra, by Patricio Leboeuf, Feb 2001.
[16]. Equilibration of quantum chaotic system, Quntao Zhuang, university of Southern California, Dec 2013.
[17]. Newton's Law of Universal Gravitation, K. Lee Lemer, scolar. Harvard.edu, March 2022
[18]. UC Davis Math "The Riemann integral " https: // www.math.ucdavis.edu & Riemann Sum and Riemann Integral Explained ,Jan 2020.