WAVE-FUNCTION (ψ_{sol}) OF THE SOLAR SYSTEM

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ABSTRACT

This paper presents an alternative approach and a possible way forward to combine Gravity, Electromagnetism and Quantum Physics, by deriving analogy between 'parameters of Hydrogen Atom' ($\boldsymbol{\alpha, a_0, r_e, e, m_e}$ **and** $\boldsymbol{\lambda_c}$) and 'derived parameters of Solar System' ($\boldsymbol{\alpha_{sol}, a_{sol}, r_{sol}, e_s, m_{sol}}$ **and** $\boldsymbol{\lambda_{sol}}$) using postulated Root Mean Square Velocity ($\mathbf{v_{rms}}$) of Solar System. It is shown that derived parameters can be used to write wave function $\boldsymbol{\psi_{sol}}$ of the solar system and Hamiltonian $\mathbf{H\psi_{sol}}$ to show that it is equal to $\mathbf{-\frac{1}{2}m_{sol}V_{rms}^2}$.Where $\mathbf{m_{sol}}$ is the total mass of the planets.

Further it is shown that $\boldsymbol{\alpha_{sol}(= v_{rms}/c)}$ which is the structure constant of the solar system, could be used to derive a dimensionless Gravitational Constant ($\mathbf{G_0 = \alpha_{sol}^2/8\pi}$) equivalent in value to well-known **G** with dimension $m^3kg^{-1}s^{-2}$. Similar interesting relationship has been derived with other cosmological parameters to interpret a Mathematical Universe evolving from unities of wave function, embedded within structure constants of its constituents.

(نبذة مختصرة)

تقدم هذه الورقة منهجًا بديلاً وطريقاً محتملاً للمزج بين الجاذبية والكهرومغناطيسية والفيزياء الكوانتية ، وذلك عن طريق التشبيه بين "معلمات ذرة الهيدروجين" و "المعلمات المشتقة للنظام الشمسي" باستخدام الجسيمات المفترضة لسرعة الجذور في النظام الشمسي. يتبين أن المعلمات المشتقة يمكن استخدامها لكتابة الدالة الموجية للنظام الشمسي وهاملتونى لإظهار أنها تساوي الطاقة السلبية الحركية.

علاوة على ذلك ، يتبين أن ثابت البنية في النظام الشمسي ، يمكن استخدامه لاشتقاق مكافئ ثابت ثلاثي الأبعاد ثابت في القيمة إلى ثابت جاذبية معروف جيدًا. وقد اشتقت علاقة مثيرة للاهتمام مماثلة مع المعلمات الكونية الأخرى لتفسير عالم رياضي يتطور من الوحدة من وظيفة موجة

1. INTRODUCTION

The possibility of finding a wave function of Solar System, originated from the clues obtained from calculation of mean kinetic energy of the solar system by Ruud Loeffen and vision by Tufail Abbas of a 'Cubic Lattice Structure of the Universe'[1]

Julian Schwinger [2] stated that the mass of the body produces a change in Mass-Energy. He was especially occupied by calculating Lorentz Transformation of Mass Energy (LTME) by high speed quantum effects for single particles as observed in cyclotrons as the Cosmotron. Ruud Loeffen applied the LTME in calculations about the acceleration at the surface of big masses in our solar system. He proposed [3] that a special Velocity $\mathbf{V_{LTME}}$ (=12278 m/s) must exist within our universe that might explain the value of Gravitational Constant G. The velocity v_{rms} is very close to orbital velocity (13 km/s) of Jupiter, a major planet, and also close to the escape velocity of the earth 11 km/s.

Authors noted that total kinetic energy of the solar planets based upon orbital velocities is very close to $\mathbf{\frac{1}{2}m_{sol}V_{LTME}^2}$, which gave them the reason to postulate that $\mathbf{V_{LTME}}$ is the actual root mean

square velocity of solar planets so this velocity was renamed as root mean square velocity $\mathbf{v_{rms}}$ which satisfies below equations 1.1, 1.2, 1.3, and 1.4.

$\frac{1}{2}m_{sol}v_{rms}^2=(\gamma_{rms}-1)m_{sol}c^2=4\pi G_0 m_{sol}c^2$	Equation 1.1: Total Kinetic Energy of Solar Planets

$\gamma_{rms}=\frac{1}{\sqrt{1-v_{rms}^2/c^2}}$	Equation 1.2: Lorentz Factor from v_{rms}

Although the calculated root mean square velocity (12191 m/s) based upon known planets differ slightly from v_{rms} (= 12278 m/s), authors postulated that $\mathbf{v_{rms}}$ is the actual root mean square velocity shall given by equation 1.3, and a mass correction is proposed in section 3 to account for the difference in value.

$\frac{1}{2}\sum_1^n m_n v_n^2=\frac{1}{2}\sum_1^n m_n v_{rms}^2$	Equation 1.3: Meaning of v_{rms}

One of many reasons to postulate as above was dimensionless gravitational constant obtained from equations 1.4.

$G_0=\frac{\gamma_{rms}-1}{4\pi}$	Equation 1.4: Dimensionless Gravitational Constant

$\mathbf{v_{rms}}$ is used in this paper to derive the analogy between solar system and hydrogen atom. It follows that a wave-function of Solar System $\boldsymbol{\psi_{sol}}$ must exist which is proposed in the paper and it is shown that it satisfies analogous proposed schrodinger wave equation.

Further it is shown that $\boldsymbol{\alpha_{sol}(=v_{rms}/c)}$ which is the structure constant of the solar system, could be used to derive a dimensionless Gravitational Constant $\boldsymbol{(G_0=\alpha_{sol}^2/8\pi)}$ equivalent in value to well-known[3] G of dimension $m^3kg^{-1}s^{-2}$.

Similarly, interesting relations between $\boldsymbol{\alpha_{sol}}$ and other cosmological parameters like κ(Einsteinian Constant Kappa), H_0(Hubble Parameter), and R_u(Radius of Universe), with strange units are noted, to interpret a possible mathematical universe made of dimensionless numbers, resolved into reality of complex numbers for inhabitant to observe. Indeed the resolution into complex numbers is necessary as it is impossible to observe the dimensionless (numbers).

2. ANALOGY BETWEEN SOLAR SYSTEM AND HYDROGEN ATOM

FINE STRUCTURE CONSTANT AND v_{rms}/c

Authors have found that term $\mathbf{v_{rms}/c}$ is analogous to Fine Structure Constant of Hydrogen Atom. Hence we define $\boldsymbol{\alpha_{sol} = v_{rms}/c}$ as structure constant of the solar system. Reasons for analogy is explained below:

For Hydrogen Atom[4]

Classical Radius of Electron = $\mathbf{r_e}$
Bohr Radius of Electron = $\mathbf{a_0}$
$\boldsymbol{\alpha}$ = Fine Structure Constant
Relation is $\mathbf{r_e = a_0\alpha^2}$
Compton Wavelength of Electron $\boldsymbol{\lambda_e = 2\pi a_0\alpha}$

For Solar Atom

Classical radius of electron is defined as the radius at which Potential Energy equals to $\mathbf{mc^2}$. By the same definition, classical radius of solar electron (if sun is considered nucleus) shall be the radius at which gravitational potential energy of orbiting mass becomes equal to mc^2.

Therefore,

$r_{sol} = \frac{GM}{c^2}$	Equation 2.2: Classical Radius of Solar Electron

In case of electron as a particle, the mass is concentrated at a point. However in Quantum Physics, for the electron revolving around the nucleus, the position shall be better described as probability distribution with the most probabilistic radius at $\mathbf{a_0}$.

Bohr radius of Hydrogen is the most probabilistic radius of the electron, derived by formula $\mathbf{a_0 = r_e/\alpha^2}$ **.** Using the same definition we shall define $\mathbf{a_{sol}}$ as per equation 2.3.

$a_{sol} = \frac{r_{sol}}{\alpha_{sol}^2}$	Equation 2.3: Bohr radius of solar electron.

In case of Solar System the planets that orbit is not one particle but mass distributed across space. For further derivation of analogy it is considered that sum total of all orbiting mass of Solar System is the mass of distributed solar electron $\mathbf{m_{sol}}$

$m_{sol} = \sum_{1}^{n} m_n$	Equation 2.4: Mass of solar electron.

As per Sommerfield Interpretation [5], Fine Structure Constant is ratio of Velocity of the electron in the first circular orbit of the Bohr model of the atom to speed of light.

Therefore for Solar Atom to be consistent with this Sommerfield Interpretation, total kinetic energy of the solar electron shall be ½ of the potential energy at the radius $\mathbf{a_{sol}}$. Which is analogous to bohr radius of hydrogen atom.

$\frac{1}{2}m_{sol}v_{rms}^2 = \frac{GMm_{sol}}{2a_{sol}}$	Equation 2.5: Kinetic and - ½ of potential energy

Hence it concluded that $\boldsymbol{\alpha_{sol} = v_{rms}/c}$ is analogous to Fine Structure Constant $\boldsymbol{\alpha}$ of the Hydrogen System. That means, whatever physical meaning that $\boldsymbol{\alpha}$ carry with respect to Hydrogen Atom, the same meaning shall be carried by $\boldsymbol{\alpha_{sol}}$ with respect to Solar System.

From further derivation of this analogy we get similar to Compton Wavelength $\boldsymbol{\lambda_e = 2\pi a_0 \alpha}$ of hydrogen atom, a value of $\boldsymbol{\lambda_{sol}}$ related to solar electron as given by equation 2.6.

$\lambda_{sol} = 2\pi\alpha_{sol}a_{sol}$	Equation 2.6: Compton Wavelength of solar electron.

Similarly the analogous angular momentum $\mathbf{h_{sol}}$ is given by equation 2.7.

$h_{sol} = m_{sol}v_{rms}a_{sol}$	Equation 2.7: Angular momentum of solar electron.

Corresponding reduced angular momentum shall be $\boldsymbol{\hbar_{sol} = h_{sol}/2\pi}$.

Analogous solar charge e_s is given by equation 2.8.1.

$e_s = \sqrt{2\varepsilon\alpha_{sol}h_{sol}c}$	Equation 2.8.1: Electrical charge of solar electron.

Charge contributed by each Planet shall be given by equation 2.8.2

$e_n = e_s\sqrt{m_n/m_{sol}}$	Equation 2.8.2: Electrical charge of planets

Authors have calculated that a magnetic field given by equation 2.8.3, could be the basis for creating a Lorentz Force given by equation 2.8.4 may be the cause of gravitation.

$\boldsymbol{B_{sol} = \mu\omega_{sol}e_s/2r_{sol}}$	Equation 2.8.3: Solar Magnetic Field

$\boldsymbol{\omega_{sol} = v_{rms}/a_{sol}}$

$\mathbf{F_n = B_{sol} e_n v_n/\sqrt{2}}$	Equation 2.8.4: Lorentz Force on Planets (RMS Value of sinusoidal signal)

SCHRODINGER WAVE EQUATION OF SOLAR SYSTEM.

Since an analogy has been derived between hydrogen atom and solar system, a wave function $\boldsymbol{\psi_{sol}}$ should also exist that should satisfy the Schrodinger wave equation[6] of the form 2.9.1.

$-\frac{\hbar_{sol}^2}{2m_{sol}}\frac{\partial^2\psi_{sol}}{\partial r^2}+V\psi_{sol}=\hat{q}\hbar_{sol}\frac{\partial\psi_{sol}}{\partial t}$	Equation 2.9.1: Schrodinger wave equation for solar electron.

This wave function shall be the linear combination of individual states of each planets represented by wave function $\boldsymbol{\psi_n(r,t)}$ as per equation 2.9.2

$\psi_{sol}(r,t)=\sum_1^n c_n\psi_n(r,t)=\psi_{sol}(r)f_{sol}(t)$	Equation 2.9.2: Wavefunction of solar electron.

Richard Muller [7] stated *"The progression of time can be understood by assuming that the Hubble expansion takes place in 4 dimensions rather than in 3. The flow of time consists of the continuous creation of new moments, new nows, that accompany the creation of new space".*

Coordinates **r** and **t** of equation 2.9.1 shall also be construed as two orthogonal vectors changing/moving with respect to each other. However, r is contributing to increase in volume of the Universe, whereas the other one **t** does not results in any increase in volume but new moments/nows.

Such an orthogonality accompanied by an increase in volume can be understood by movements of time **t** along circumference and movement of space **r** along axis of a cylinder in **Figure 1**. If the rate of increase of both dimension is same as, where **n** is the number of cycles and ***c*** is the circumference then **t = c.n** and **r = qc.n**. Hence **c**, **t** and **r** are in the dimension of length (*Note: c in this para is not necessarily the speed of light)*. The volume of cylinder shall become $\mathbf{nc^3/4\pi^2}$.

In physical terms, movement in time may be construed as intrinsic spin of the mass particles (excluding massless particles like photons, gluons etc) and **r** as field of those particles which locally results in into circular gravitational motion at smaller distances, whereas at larger distance it contributes to expansion of universe due to addition in volume $\mathbf{nc^3/4\pi}$ contributed by it.

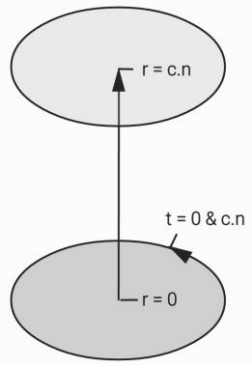

Figure 1: Orthogonality of Increasing Time and Space

Since **r** and **t** are intended to be movement in respective single coordinate system, divergence operator ∇of the original Schrodinger Equation is replaced with $\partial^2/\partial \mathbf{r}^2$ in the equation 2.9.1. Moreover, in this paper we have used quaternion operator/number q instead of imaginary operator **i**, to represent the orthogonality between increase in space and increase in time as intended by Figure 1. Therefore the wave-function expressed in terms of these parameters in this shall be construed in a purely mathematical sense to appreciate that they are the solution of Schrodinger wave equations. Discovery of the physical meaning or another physically consistent wave-function shall be supported and advanced in view of the interpretation in section 5.

In a similar way that we wrote Equation 2.9.1 for overall solar system, for individual discrete states of planets as well, we can write Equation 2.9.3.

$-\frac{\hbar_{sol}^2}{2m_{sol}}\frac{\partial^2\psi_n}{\partial r^2}+V\psi_n=\hat{q}\hbar_{sol}\frac{\partial\psi_n}{\partial t}$	Equation 2.9.3: Schrodinger wave equation for planets.

Wave-function of each of planet is represented as equation 2.9.4

$\psi_n(r,t)=\psi_n(r)f_n(t)$	Equation 2.9.4: Wavefunction of planets

Component functions $\psi_n(r)$, $f_n(t)$, that should satisfies equations 2.9.3 , are proposed equations 2.10.1, 2.10.2

$\psi_n(r)=e^{-\hat{q}\frac{2\pi F_n r}{E_{sol}}}$	Equation 2.10.1: Space dependent part

$E_{sol} = -\frac{1}{2}m_{sol}v_{rms}^2$ is the total energy of each all Planets

$\mathbf{f_n(t) = e^{-\hat{q}\frac{2\pi E_n t}{h_{sol}}}}$	Equation 2.10.2: Time dependent part.

$\mathbf{E_n = -\frac{1}{2}m_n v_n^2}$ is the total energy of each Planet

Hence the wave function $\boldsymbol{\psi_n(r, t)}$ for each planet can be written as 2.10.3

$\mathbf{\psi_n(r,t) = e^{-\hat{q}\left(\frac{2\pi F_n r}{E_{sol}} + \frac{2\pi E_n t}{h_{sol}}\right)}}$	Equation 2.10.3: Wave-function of Planets

$\mathbf{F_n}$ is the Lorentz Force given by equation 2.8.4.

Using above functions, we get kinetic energy and Hamiltonian of each states using equation 2.11.1 and 2.11.2.

$\boldsymbol{H\psi_n = \hat{q}\hbar_{sol}\frac{\partial \psi_n}{\partial t}}$	Equation 2.11.1: Hamiltonian of planets

$\boldsymbol{T\psi_n = -\frac{\hbar_{sol}^2}{2m_{sol}}\frac{\partial^2 \psi_n}{\partial r^2}}$	Equation 2.11.2: Kinetic energy of planets

It can be checked by solving equation 2.11.1 that $\mathbf{-\frac{1}{2}m_n v_n^2}$ is eigenvalue of $\mathbf{H\psi_n}$ Eigenvalue expression of $\mathbf{T\psi_n}$ that we get from solving equation 2.11.2 is $\mathbf{F_n^2/m_{sol}\omega_{sol}^2}$. Appendix D shows the calculations that thevalue returned by this expression is same as $\mathbf{\frac{1}{2}m_n v_n^2}$

For $\boldsymbol{\psi_{sol}(r)}$ and $\mathbf{f_{sol}(t)}$ of combined waveform equations 2.12.1 and 2.12.2 are Hamiltonian and Kinetic Energy.

$\boldsymbol{H\psi_{sol} = \hat{q}\hbar_{sol}\frac{\partial \psi_{sol}}{\partial t}}$	Equation 2.12.1: Hamiltonian of solar electron

$\boldsymbol{T\psi_{sol} = -\frac{\hbar_{sol}^2}{2m_{sol}}\frac{\partial^2 \psi_{sol}}{\partial r^2}}$	Equation 2.12.2: Kinetic Energy of solar electron

Expressions of $\boldsymbol{\psi_{sol}(r, t)}$ are proposed as equation 2.13, that fulfills the intended requirements.

$\psi_{sol}(r,t) = \sum_{1}^{n} c_n e^{-\hat{q}\left(\frac{2\pi F_n r}{E_{sol}} + \frac{2\pi E_n t}{h_{sol}}\right)}$ $\psi_{sol}(r,t) = e^{-\hat{q}\left(\frac{2\pi F_{sol} r}{E_{sol}} + \frac{2\pi E_{sol} t}{h_{sol}}\right)}$ $\psi_{sol}(r,t) = e^{\hat{q}\left(\frac{2\pi r}{a_{sol}} + \frac{\pi t}{T_{rms}}\right)}$	Equation 2.13: Wave-function of solar electron

$\mathbf{T_{rms} = 2\pi a_{sol}/v_{rms}}$ in above equation is the time period of solar electron electron.

It can be checked by solving equation 2.12.1 that $\mathbf{-\frac{1}{2}m_{sol}v_{sol}^2}$ is eigenvalue of $\mathbf{H\psi_{sol}}$ and by solving equation 2.12.2. that $\mathbf{\frac{1}{2}m_{sol}v_{sol}^2}$ is eigenvalue of $\mathbf{T\psi_{sol}}$

Remaining objective is to find the complex numbers $\mathbf{c_n}$ **.**

$\mathbf{c_n}$ shall be a complex number expressed by the equation of the form $\mathbf{= |c_n|exp[q_n\phi/2],}$ where q_n are unit vectors oriented in different direction**.** Although r is linearly proportional to t, but it has a direction in space which may orient as 3D Vectors. Hence it should be possible, to get some solution of the form $\mathbf{c_n\psi_n(r_n,t) = [m_n/m_{sol}]\psi_{sol}(r,t),}$ where $\mathbf{c_n}$ shall be contributed by the physical internal structure (or chemical composition) of each wave-function by the virtue of which it exist at a particular distance from the sun. For example, we may find more or different chemical elements or different proportion of same elements on other planets, and that is why they may orbit where they orbit. Anyhow, further derivations, meaning and physical explanation of $\mathbf{c_n}$ is a topic of further research which shall be advanced by scientific institutions.

Nevertheless , it follows from the derived analogy between 'parameters of Hydrogen Atom' $\mathbf{(\alpha, a_0, r_e, e, m_e}$ **and** $\mathbf{\lambda_c}$) and 'parameters of Solar System' $\mathbf{(\alpha_{sol}, a_{sol}, r_{sol}, e_s, m_{sol}}$ **and** $\mathbf{\lambda_{sol}),}$ that a wave-function of solar system must exist Equations 2.13 is one of those possible wave-function.

3. MASS CORRECTION WITH A PLANET X

As mentioned in previous sections of this paper, calculated root mean square velocity (12,191 m/s), differs slightly from V_{rms} (= 12278 m/s) as also noted from small difference in actual kinetic energy RMS kinetic energy .Refer Appendix D.

It is proposed that the difference is due to some missing mass of solar system which is yet to be discovered. Let us call this missing mass as Planet-X with a mass $\mathbf{m_x}$ orbiting at Velocity $\mathbf{V_x}$ at radius $\mathbf{R_x}$ from Sun.

Accordingly, equations 3.1, 3.2 are formulated to calculate the possible values of $\mathbf{m_x}$, $\mathbf{V_x}$, $\mathbf{R_x}$

$m_d = m'_{sol} - \sum_{1}^{n-1} \frac{m_n a_{sol}}{R_n}$	Equation 3.1

$\mathbf{m'_{sol}}$ is total known mass of solar planets

$\mathbf{m_x = m_d / (a_x/R_x - 1)}$	Equation 3.2

If the Planet is yet to be discovered then it is in the region of space which is difficult to observe. Equation 3.2 return a negative value of mass for $R_x > a_{sol}$. Hence it should be nearer to Sun than Jupiter. Difficult to observe regions are:

1. directly opposite sun at earth orbit.
2. very close to Sun beyond the mercury.

Though it's fascinating to think that a new planet may be located very close to earth or sun, we are not suggesting that any such planet should necessarily exist. The required missing mass can also be explained by set of possibilities of planets, or possibly by comets that are bonded to our solar system and they pass very close to sun. So we intend to propose a mass correction, to satisfy the postulate that $\mathbf{v_{rms}}$ is the root mean square velocity of the planets of the solar system, based upon which analogy between hydrogen atom and solar system has been derived in section 2. In this analogy the corrected mass is necessary to obtain the value of angular momentum $\mathbf{h_{sol}}$ and charge $\mathbf{e_s}$ (refer equations 2.7 and 2.8.1) which eventually is essential to present the interpretation in section 4, 5 and conclusion in section 6.

4. STRANGE UNITS OF DERIVED COSMOLOGICAL PARAMETERS

GRAVITATIONAL CONSTANT AND α_{sol}

So far it was so good. Now the most interesting story of $\mathbf{V_{rms}}$ and $\boldsymbol{\alpha_{sol}}$ shall begin.

Authors have noted that in the expression $\mathbf{G = a_{sol}V_{rms}^2/M,}$ if $\mathbf{a_{sol}}$ is substituted with $\mathbf{M/8\pi c^2}$, then we get a dimensionless Gravitational Constant $\mathbf{G_0 = \alpha_{sol}^2/8\pi,}$ which **is** equal in value to Gravitational Constant[3] $\mathbf{G = 6.67408\times10^{-11}\ kg^{-1}m^3s^{-2}}$

$\mathbf{\alpha_{sol}^2/8\pi = 6.67408\times10^{-11}\ kg^0m^0s^0}$	Equation 4.1: Dimensionless G

EINSTEINIAN CONSTANT (κ) KAPPA [1] AND α_{sol}

Similarly the expression $\boldsymbol{\alpha_{sol}^2/c^2}$ has dimension $m^{-2}s^2$. However it shall be noted that value of this expression is same as the Einsteinian Constant Kappa which is $\boldsymbol{\kappa = 1.86634 \times 10^{-26}\ m.kg^{-1}}$

$\boldsymbol{\alpha_{sol}^2/c^2 = 1.86634 \times 10^{-26}\ m^{-2}s^2}$	Equation 4.2.2: Strange units of $\boldsymbol{\kappa}$

HUBBLE PARAMETER [8] H AND α_{sol}

The expression $\boldsymbol{\pi\alpha_{sol}^2/8c}$ have dimension $m^{-1}s$. However it shall be noted that value of this expression is same as Hubble Parameter $\boldsymbol{H = 2.19723\times10^{-18}\ s^{-1}}$

$\boldsymbol{\pi\alpha_{sol}^2/8c = 2.19723\times10^{-18}\ m^{-1}s}$	Equation 4.3: Strange units of **H**

CRITICAL DENSITY [9] ρ_c OF UNIVERSE AND α_{sol}

The expression $\boldsymbol{3\pi^2\alpha_{sol}^2/64c^2}$ have dimension $\boldsymbol{m^{-2}s^2}$ However it shall be noted that value of this expression is same as Mean Mass Density of Universe $\boldsymbol{\rho_c = 8.63437\times 10^{-27}\ kg/m^3}$

$\boldsymbol{3\pi^2\alpha_{sol}^2/64c^2 = 8.63437\times 10^{-27}\ m^{-2}s^2}$	Equation 4.4: Strange unit of $\boldsymbol{\rho_c}$

RADIUS OF UNIVERSE AND α_{sol}

The expression $\boldsymbol{8c^2/\pi\alpha_{sol}^2}$ have dimension $\boldsymbol{m^2s^{-2}}$. However, it shall be noted that value of this expression is same as Radius of Universe $\boldsymbol{R_u = 1.36443 \times 10^{26}\ m}$

$\boldsymbol{8c^2/\pi\alpha_{sol}^2 = 1.36443 \times10^{26}\ m^2s^{-2}}$	Equation 4.5.2: Strange unit of $\boldsymbol{R_u}$

INTERPRETATION OF STRANGE UNITS.

If the proportionality between a_{sol} and $M/8\pi c^2$ is actually underpinned by some physical factor, then G turns out to be a dimensionless constant of our Solar System. Similar is the case with the strange units of **H**, $\boldsymbol{R_u}$, $\boldsymbol{\kappa}$,$\boldsymbol{\rho_c}$ derived from $\boldsymbol{\alpha_{sol}}$.

It is rather strange to note that a parameter $\boldsymbol{\alpha_{sol}}$ of the Solar System which is local parameter, could possibly define cosmological parameters which are universal.

Since Gravitational Constant is a value measured near the earth, is it the time to reconsider our assumptions about universality of G and other physical constants like electrical charge, mass of electron/ proton/ neutron, Planck's constant, velocity of light. as they are all values measured on or near solar system?

It is well established by Einstein theory of relativity that mass varies [1] with speed as $m' = \gamma m$; where m is the rest mass and m' is relativistic mass.

If everything in this universe is continuously in motion along some direction or the other, then the only meaning which can be confidently assigned to rest mass, is that it is the mass of particle measured on earth.

Electron, proton and neutron do have rest mass, but they differ in value. Whereas the quanta of angular momentum for all of these ½ spin particles are same, though they rotate at different radii.

It is probable that these differences in mass of these particles is due to difference in speed at which they are travelling in the void, along a different curved path, so that resultant observed velocity of all three kind particles are same. Speed of any particle is a function of relative position with respect to other particles.

So certain questions that are worth exploring are as follows:

1. Is it possible to bring electron proton and neutron to an absolute reference frame so that mass of all of these particles becomes equal?
2. Is it possible to find/calculate the equal mass of these three particles in such absolute reference frame?
3. Is the Gravitational Force is of same order of magnitude as is the Electromagnetic Force in the absolute reference frame.

If answers to above questions are yes, then the value of G, and all other physical constants shall be the function of our own relative position and velocity with respect to universal dance of matter.

In other words, the value of physical constants that we observe on earth are the functions of relative positions at which we exists and relative velocities at which we are moving.

4.RELATED INTERPRETATIONS

THERMODYNAMICS AND V_{rms}

In thermodynamics root mean square velocity[10] v_r of gas is given equation 5.1

$v_r = \sqrt{\frac{3k_b T}{m}}$	Equation 5.1: RMS Velocity of Gas

m is the mass of one molecule of gas
k_B is boltzmann constant
T is Temperature

Let's assume we keep a gas or say plasma of electron/positron at the temperature of cosmic microwave background radiation [11] then the value of root mean square velocity that we will obtain would be given by equation 5.2

$v_{cmb} = \sqrt{\frac{3k_b T_0}{m_e}}$	Equation 5.2:

It shall be noted that calculated $\mathbf{v_{cmb}}$ **= 11,130 m/s** is of the same order of magnitude as compared to $\mathbf{v_{rms}}$ (= 12278 m/s) though they differ in value by 9%.

If at all $\mathbf{v_{rms}}$ is related to $\mathbf{v_{cmb}}$ as described above, then one of the following reasons could explain the difference of 9%

1. Temperature of 2.7255 Kelvin is calculated value of CMB based upon spectral radiance observed from radio telescope, pointed toward outer part of sky away from sun and galactic plane. A temperature of 3.31 Kelvin will make $\mathbf{v_{rms}}$ equal to $\mathbf{v_{cmb}}$. It could be a possibility that 3.31 Kelvin only corresponds to a part of sky out of total set of possibilities, which is of significance for getting a value of $\mathbf{v_{cmb}}$ equal to v_{ms}
2. Or $\mathbf{v_{cmb}}$ is dependent upon the rest mass of electron in absolute reference frame as defined in section 4. For example, mass of electron of 7.48958×10^{-31} kg will make v_{rms} equal to $\mathbf{v_{cmb}}$. Refer to Section 4 to appreciate the possibility of a different base value of mass of electron.
3. Or it could be a combination of both the possibility of difference in Temperature and difference in mass of electron.

Above suggestions shall be considered as probable, to possibly provide a good direction for further research

MATHEMATICAL UNIVERSE AND α_{sol}

Mathematics and physics are so closely related that it is very difficult to separate one from the other. Possibly Mathematics and Physics are not different but different side of the same coin of reality, such that mathematics being the Design and Physics the Monument.

The Design of the architect first emerges in his mind and then he draws it on a paper. But then the design in the mind is the same as that on the paper (unless forgotten). However if design itself embodies as structure, even this distinction between the two kind will be difficult to make. To put in perspective, let's take the example of equation of 5.2 to put this in perspective.

$1 = \frac{1}{2} + \frac{1}{2} = \left(\frac{1}{\sqrt{2}} + \hat{q}\frac{1}{\sqrt{2}}\right)\left(\frac{1}{\sqrt{2}} - \hat{q}\frac{1}{\sqrt{2}}\right)$ $= \left(\frac{1}{\sqrt{2}} + \hat{q}\frac{1}{\sqrt{2}}\right)\left(\frac{1}{\sqrt{2}} + \hat{q}\frac{1}{\sqrt{2}}\left(e^{k\frac{\pi}{4}} \times \hat{i}\right).\left(e^{i\frac{\pi}{4}} \times \hat{j}\right).\left(e^{j\frac{\pi}{4}} \times \hat{k}\right)\right)$ $= \left(\frac{1}{\sqrt{2}} + \hat{q}\frac{1}{\sqrt{2}}\left(e^{-k\frac{\pi}{4}} \times \hat{i}\right).\left(e^{-i\frac{\pi}{4}} \times \hat{j}\right).\left(e^{-j\frac{\pi}{4}} \times \hat{k}\right)\right)\left(\frac{1}{\sqrt{2}} - \hat{q}\frac{1}{\sqrt{2}}\right)$ q is a Unit Quaternion. i, j ,k are three space vectors	Equation 5.2: Evolution of Unities

Please note that left hand side (LHS) is dimensionless = 1, but right hand side (RHS) is full of dimensions/ vectors [12] (q,i,j,k) . All dimensions already exist within the 1, but for determination of a particular dimension of 1, we just need the KNOWLEDGE of correct mathematical operator, and focus on particular portion of the equation, which is our reference frame.

In the last expression on RHS, only dimensionless number that we can see is $1/\sqrt{2}$. So, if we focus on a part, we will see dimensions (q,i,j,k) as separate from dimensionless. But if we do have the knowledge of all mathematical operators then we know that dimensions have emerged out of the dimensionless as LHS = RHS.

Despite the resolution of 1 into so many dimensions on the RHS, we shall note that it is still not possible to separate 1 from any of its components as it is already multiplied and kept preserved as a factor with every dimension despite the division into sub-set. This 1 that is factor of every dimensions on RHS can be further divided into more dimensions. In this way RHS of the equation keeps on evolving becoming bigger and bigger, whereas LHS is still the constant of original 1.

Evolving unities of the right hand side can be thought as wave function similar to wave functions of Quantum Mechanics and accordingly in the equations of an evolving unity, unities of RHS may possibly be replaced with new wave-functions ψ_1, ψ_2, ψ_3, ψ_4.

$1 = ½ + ½ = \psi^*(r,t)\psi(r,t) = \langle\psi|\psi\rangle$
$= ½ [\psi_1 + q\psi_2]x[\psi_3 - q\psi_4]$

Usually when we deal with equations of physical dimension (i.e. space, time etc.), we multiply a dimensionless number to an unit/dimension to derive the full meaning. This is based upon expressing the numerical value of a physical quantity compared to convenient magnitude of same kind which has been taken as a unit. Kilogram is that convenient magnitude accepted as standard unit of measurement. Similarly we have meter as unit of length and second as unit time.

This choice of a **convenient** magnitude or defining a standard unit is completely arbitrary. Everytime a new physical quantity is discovered, a new convenient magnitude is required for that quantity. The new convenient magnitude in most cases can also be expressed in terms of more fundamental units. For example, Joule is unit of energy in SI system but at the same time Joule can be expressed as kilogram. meter^2.second^{-2}**.** However, every new physical quantity discovered does not follow this rule and it may happen it is not possible to express it in terms of previously known fundamental units.

During the early period of development of electromagnetism, scientists encountered this problem when they tried to express convenient magnitude for electricity and magnetism in terms of already defined fundamental units. Andrew Gray [13], discussed this issue in details and proposed methods to recognize new physical parameters in terms of kg, meter and second. Later on the necessity to introduce a new fundamental unit was realized. Nowadays, in SI system that new fundamental unit is Ampere, which is defined [14], as:

> *The ampere is that constant current which, if maintained in two straight parallel conductors of infinite length, of negligible circular cross-section, and placed 1 metre apart in vacuum, would produce between these conductors a force equal to 2 x 10^{-7} newton per metre of length*

It follows that necessity for more than one kind of unit arise from our inability to define a **common convenient magnitude** to compare all kind of physical quantities. And if such a **common convenient magnitude** exist, then it would also become necessary to explore and understand, how through measurements we observe these this magnitude as different physical quantities.

It is well established in Quantum Mechanics that all observable physical quantities are mathematical operations on complex numbers embedded in wave functions. Wave-functions are understood as probability density , which in simple language can also be said as **numbers per unit volume.** Only reasonable interpretation that can be derived from such a strange definition of wave-function is that physical reality is actually made of numbers.

These numbers are spread across the void as physical structures of complex numbers, in which it is possible to define all physical quantities in terms of a **common convenient magnitude**. However it is still possible to differentiate between two physical quantities due by trajectory of their propagation and source from which they originate.

This is similar to case of x, y, z axis divided by equal intervals but moving in three different directions from **origin**. Unit or interval along every axis is 1, still they are three different unities expressed as i, j and k to express their vector orientation.

Therefore, is it possible that space and time are itself unique numbers with cyclic properties (i.e. complex numbers), and matter a dimensionless number as a subset of original 1 as described by equation 5.2 of Evolution of Unities. Could it be possible that physical reality is a function of a set of unity consisting of five unique numbers [1, q, i, j, k] equivalent to [mass, time, x, y, z], finding meaning and expressions through physical mathematical operations of +, -, ×,÷, exponentiation, differentiation , integration, etc.

To add some more perspective, it shall be noted that instead of imaginary number i, we have used q the quaternion operator for Hamiltonian in section 2 which is.

$$H\psi_{sol} = q\hbar_{sol}\partial\psi_{sol}/\partial t$$

From the proposed equivalence between q and unit time in above paragraph, ∂t shall be proportional to unit quaternion q, which means that for system under observation the length ∂t is integer multiple of smallest unit of time for the Universe, which is unit quaternion q or unit time of Universe. Similarly ∂x, ∂y, ∂z are unit space for the system under observation as compared to Universal Frame of reference for which units space are complex numbers i, j and k. So that

$\partial t = n.q$
$\partial x = n_x.i$
$\partial y = n_y.j$

$\partial z = n_z.k$

where n, n_x, n_x and n_x are integers.

In a nutshell , in this interpretation, a physics shall be developed without dimensional units (kg, meter, second). Instead these units should be replaced by integers and complex numbers, which is same as replacing [mass, time, x , y, z] with [1, q, i, j , k]. And then we would need the operators of incremental and decremental change, like n, n_x, n_y, n_z

Absolute reference frame in such a reality is ***physically existing mathematical structure of complex number***s, which we observe through mathematical operations caused due to local anisotropy of relative positions of matter. In this way RHS of the equation of unity keeps on evolving becoming bigger and bigger, whereas LHS is still the constant of original 1.

Dimensionless Gravitational Constant $\mathbf{G_0}$ and strange units for $\mathbf{R_u}$, **H** and **κ** and $\boldsymbol{\rho_c}$ (equations 4.2, 4.3, 4.4 and 4.5) are derived from $\boldsymbol{\alpha_{sol} = v_{rms}/c}$. Since $\mathbf{v_{rms}}$ has a physical meaning which is Root Mean Square Velocity, it cannot be disregarded as a purely mathematical construct lacking physical significance. Therefore the equivalence of values and differences of dimensions in amazingly fitting equations, is a **possible hint** toward a physical reality, in which dimensions of space/ time/ matter are the constructs from dimensionless numbers, which are **structure constants** of the constituents of the Universe.

Fine structure constant **α** is the well-known dimensionless constant of the hydrogen atom. As illustrated in this paper gravitational constant G itself could be a dimensionless constant based upon structure constant $\boldsymbol{\alpha_{sol}}$ of the solar system. It should not be a big surprise if we will discover in future that speed of light **c** is some dimensionless constant related to structure of the Milky Way galaxy, where we exist. Or possibly we may discover that structure constant of perfectly isotropic and homogeneous Universe is the number **1**.

6. CONCLUSION AND WAY FORWARD

It is demonstrated in this paper that by using root mean square velocity of the solar planets v_{rms} (= 12278 m/s), it was possible to derive parameters of Solar System (α_{sol}, a_{sol}, $r_{sol,}$ e_s,m_{sol} and λ_{sol}) which are analogous to corresponding parameters of hydrogen atom(α,a_0,r_e, e, m_e and λ_c). As explained in section 2 of this paper, the analogy derived between Solar System and Hydrogen atom, may provide the basis for discovering the Wave Function of Solar System. A possible wave function ψ_{sol} has been proposed that satisfies analogous Schrodinger Equation based upon the derived parameter of Solar System.

The expression of cosmological parameters **G**, $\mathbf{R_u}$, **H** and **κ** and $\boldsymbol{\rho_c}$ in terms $\boldsymbol{\alpha_{sol}}$ in section 4, and associated strange units along with finding a dimensionless gravitational constant is a **possible hint** toward a physical reality, in which dimensions of space/ time/ matter are the constructs from dimensionless numbers, which are **structure constants** of the constituents of the Universe. It should not be a big surprise if we will discover in future that speed of light c is some dimensionless constant related to structure of the Milky Way galaxy, where we exist, or possibly we may discover

that structure constant of perfectly isotropic and homogeneous University Universe is the number **1**.

In Quantum Mechanics all observables are operators on complex numbers. The physical reality could be a function of a set of unity consisting of five unique numbers [1, q, i, j, k], Which are itself equivalent to [mass, time, x , y, z], finding meaning and expressions through mathematical operation between them. In this interpretation, a physics shall be developed without dimensional units (kg, meter, second) replaced by integers and complex numbers.

Moreover, in section 5, an attempt has been made to understand the implications of $\mathbf{v_{rms}}$ for thermodynamics, by relating it to temperature of cosmic microwave background radiation, which could be a vision in good direction.

It is recommended through this paper further research to elaborate, improve and modify $\boldsymbol{\psi_{sol}(r,t)}$ is the good direction toward combining Gravity, Electromagnetism and quantum mechanics. It shall be appreciated that particles in labs are not visible to naked eyes. However planets are clearly visible (through telescope). Hence finding a proof for $\boldsymbol{\psi_{sol}}$ shall be instrumental in understanding the physical meaning of the equations of quantum mechanics as well

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8. INTERESTING VIDEOS AND WEB-LINKS

1. Quantum Levitation (https://youtu.be/VyOtIsnG71U),
2. Heliospheric current Sheet1 (https://youtu.be/134Cw5ESnYA),
3. Heliospheric Current Sheet 2 (https://youtu.be/2434rAbImf0),
4. Helical Model of Solar System (https://youtu.be/0jHsq36_NTU)
5. Composition of the solar system (http://solarviews.com/eng/solarsys.htm),
6. Gravitational Constant of Cubic Lattice (http://vixra.org/abs/1706.0482?ref=9868515),
7. Meaning of Gamma Factor by Ruud Loeffen (https://www.academia.edu/36204656/The_meaning_of_the_GAMMA_FACTOR)

9.ACKNOWLEDGEMENT

This proposal is an outcome of effort that lasted for a time equivalent to more than one trip around the Sun. During this period we engaged in meaningful discussions with learned participants from **Physics List** and **Task Force Gravitation** on the topic of Gravitation. Valuable insights and theories on nature of physical laws from the members of both the groups were instrumental to prepare this proposal.

ABOUT TASK FORCE GRAVITATION: Task Force Gravitation was founded in 2016 A.D. by a group of curious, creative and motivated professionals (6 nos at inception) of diverse disciplines from six different countries on the globe, who volunteered to work together with a focused objective of discovering the Foundation for Gravitation.

PHYSICS LIST: Physics List is an Online Discussion Group, convened by Arend Lammertink by inviting scientists and scholars from by Jean de Climont List and some others. Jean de Climont List is a directory that lists names of more than 8000 names of scientists, doctors or engineers

along with a very short description of their position and works wherever applicable. There are more than 1000 theories, all amazingly very different from one another. Physics List is a short group consisting of about 20 active members, who agreed to participate in online discussions, share their theories and to find a possible connection between diverse theories.

Cooperation among scholars is the road to prosperity

التعاون بين العلماء هو الطريق إلى الازدهار

Appendix A: Values [4][8][11][15][16] of Physical Constants/ Parameters

Symbol	Value	Dimension	Description
c	2.99792×10^{8}	ms^{-1}	Speed of light
G	6.67408×10^{-11}	$kg^{-1}m^{3}s^{-2}$	Gravitational Constant.
M	1.98850×10^{30}	kg	Mass of the Sun
R_s	2.95329×10^{03}	m	Sun's schwarzschild radius
H	2.19720×10^{-18}	s^{-1}	Hubble's Parameters based on 67,8 km/s/Mpc
R_u	1.36443×10^{26}	m	Radius of Universe = c/H
ρ_c	8.63437×10^{-27}	$kg^{1}m^{-3}$	Critical mass density $= 3H^2/8\pi G$
κ	186634×10^{-26}	m/kg	Einsteinian Kappa $= 8\pi G/c^2$
ε	8.85419×10^{-12}	$kg^{-1}m^{-3}s^{4}A^{2}$	Permittivity of free space
k_B	1.38065×10^{-23}	$kgm^{2}s^{-2}K^{-1}$	boltzmann constant
T_0	2.7255	K	Temperature of cosmic background radiation
m_e	9.10938×10^{-31}	kg	Mass of electron
μ	1.25664×10^{-6}	$kg.m.s^{-2}A^{-2}$	Permittivity of free space

Appendix B: Radius, Mass and Velocities and Charge of Solar Planets [15][16]

Planet	Orbital Radius R_n	Mass m_n	Orbital Velocity (v_n)	Charge $en= e_s(m_n/m_{sol})^{1/2}$
Mercury	5.7900×10^{10}	$3.30110x10^{23}$	47360	$2.78533x10^{16}$
Venus	1.0820×10^{11}	$4.86750x10^{24}$	35020	$1.06955x10^{17}$
earth	1.4960×10^{11}	$5.97230x10^{24}$	29780	$1.18473x10^{17}$
Mars	2.2790×10^{11}	$6.41710x10^{23}$	24070	$3.88345x10^{16}$
Jupiter	7.7860×10^{11}	$1.89819x\ 10^{27}$	13060	$2.11212x10^{18}$
Moons Jupiter	7.7860×10^{11}	$3.93015x\ 10^{23}$	13060	$3.03915x10^{16}$
Hildas and trojans	7.7860×10^{11}	$5.96550x10^{19}$	13060	$3.74431x10^{14}$
Saturn	1.4335×10^{12}	$5.68340x10^{26}$	9680	$1.15572x10^{18}$
Moons Saturn	1.4335×10^{12}	$1.40507x\ 10^{23}$	9680	$1.81718x10^{16}$
Uranus	2.8725×10^{12}	$8.68130x10^{25}$	6800	$4.51690x10^{17}$
Neptune	4.4951×10^{12}	$1.024134x10^{26}$	5430	$4.90598x10^{17}$
Moons of Neptune	4.4951×10^{12}	$2.14926x10^{22}$	5430	$7.10710x10^{15}$
Pluto	5.9064×10^{12}	$1.30300x10^{22}$	4670	$5.53376x10^{15}$
Eris	1.4406×10^{13}	$1.66046x10^{22}$	3434	$6.24686x10^{15}$
Subtotal (m'_{sol})		**$2.66815x10^{27}$**		
Planet X	$1.49647x10^{11}$	$7.78132x10^{24}$		$1.35230x10^{17}$
Total (m_{sol})		**$2.66860x10^{27}$**		

Appendix C: Derived Parameters of Solar System

Symbol	Value	Dimension	Description
$\mathbf{v_{rms}}$	$1{,}22782 \times 10^{04}$	ms^{-1}	rms velocity of solar system
$\boldsymbol{\alpha_{sol}}$	$4{,}09558 \times 10^{-5}$	$kg^0m^0s^0$	structure constant of solar electron
$\mathbf{r_{sol}}$	1.47664×10^{03}	m	classical radius of solar electron
$\boldsymbol{\lambda_{sol}}$	2.26537×10^{08}	m	compton wavelength of solar system
$\mathbf{a_{sol}}$	8.80328×10^{11}	m	bohr radius of solar electron.
$\mathbf{m_{sol}}$	2.66815×10^{27}	kg	mass of solar electron
$\mathbf{m'_{sol}}$	2.66860×10^{27}	kg	mass of solar electron with planet X
$\mathbf{h_{sol}}$	2.88446×10^{43}	kgm^2s^{-1}	angular momentum of solar electron
$\mathbf{h_{sol}/2\pi}$	4.59076×10^{42}	kgm^2s^{-1}	Reduced angular momentum of solar electron
$\mathbf{e_s}$	2.50776×10^{18}	C	charge of solar electron
$\mathbf{B_{sol}}$	14.8827	$kgs^{-2}A^{-1}$	Rotating Magnetic Field of Solar System
$\boldsymbol{\omega_{sol}}$	1.39474×10^{-08}	s^{-1}	Angular frequency at $\mathbf{v_{rms}}$

Appendix D: Kinetic Energy and Lorentz Force on Planets

Planet	**Kinetic Energy** $\frac{1}{2} m_n v_n^2$	**RMS Kinetic Energy** $\frac{1}{2} m_n v_{rms}^2$	**Lorentz Force** $B_{sol} e_n v_n / \sqrt{2}$	**Eigenvalue of** $\psi_n = F_n^2 / m_{sol} \omega_{sol}^2$
Mercury	3.70213×10^{32}	2.48829×10^{31}	1.38821×10^{22}	3.70213×10^{32}
Venus	2.98475×10^{33}	3.66901×10^{32}	3.94170×10^{22}	2.98475×10^{33}
earth	2.64826×10^{33}	4.50178×10^{32}	3.71287×10^{22}	2.64826×10^{33}
Mars	1.85892×10^{32}	4.83706×10^{31}	9.83694×10^{21}	1.85892×10^{32}
Jupiter	1.61881×10^{35}	1.43081×10^{35}	2.90287×10^{23}	1.61881×10^{35}
Moons Jupiter	3.35170×10^{31}	2.96246×10^{31}	4.17698×10^{21}	3.35170×10^{31}
Hildas and trojans	5.08749×10^{27}	4.49665×10^{27}	5.14614×10^{19}	5.08749×10^{27}
Saturn	2.66274×10^{34}	4.28401×10^{34}	1.17732×10^{23}	2.66274×10^{34}
Moons Saturn	6.58294×10^{30}	1.05911×10^{31}	1.85114×10^{21}	6.58294×10^{30}
Uranus	2.00712×10^{33}	6.54376×10^{33}	3.23233×10^{22}	2.00712×10^{33}
Neptune	1.50982×10^{33}	7.71965×10^{33}	2.80344×10^{22}	1.50982×10^{33}
Moons of Neptune	3.16854×10^{29}	1.62006×10^{30}	4.06125×10^{20}	3.16854×10^{29}
Pluto	1.42085×10^{29}	9.82171×10^{29}	2.71959×10^{20}	1.42085×10^{29}
Eris	9.78922×10^{28}	1.25162×10^{30}	2.25738×10^{20}	9.78922×10^{28}
Subtotal	$\mathbf{1.98255 \times 10^{35}}$	$\mathbf{2.01118 \times 10^{35}}$		$\mathbf{1.98255 \times 10^{35}}$
Planet X	3.45043×10^{33}	5.86538×10^{32}	4.23805×10^{22}	3.45043×10^{33}
Total	$\mathbf{2.01706 \times 10^{35}}$	$\mathbf{2.01706 \times 10^{35}}$		$\mathbf{2.01706 \times 10^{35}}$