Journal of Multidisciplinary Engineering Science and Technology (JMEST)
ISSN: 2458-9403
Vol. 9 Issue 12, December - 2022

The Gravi-Magnetic Theory Of The Space-Time Fabric

Carson T.N$_1$. Rapando B.W$_2$*

1. Year 10 student, Brookhurst International school P.O Box Nairobi
2. Senior lecturer, Department of physics, Masinde Muliro University of Science and Technology P.O Box 190-50100 Kakamega

* Correspondence email: brapando@mmust.ac.ke
Postal Address: Bernard Wakhu Rapando
Masinde Muliro University of Science and Technology. P.O Box 190-50100, Kakamega, Kenya.

***Abstract*—We formulate a theory that gives a precise description of the source and nature of gravity in the space-time fabric, namely, the gravi-magnetic theory. It is shown that the space-time fabric is either a manifestation of energy or particle space points, a result that is governed by the speed of the space points. The stationary state gravi-magnetic field strength is obtained as $\mathbf{K = 2.982 \times 10^5 Kg/ms}$, which increases to infinitely high levels as space point velocities approach that of light. Uniquely, it is discovered that space points are entangled through the gravi-magnetic field regardless of their distances of separation, leading us to a universal constant we have called the Universal Gravi-magnetic Field Intensity (UGFI) whose value is $\mathbf{K = 2.98 \times 10^7 Kg/ms}$. Consequently, we predict the existence of areas in the space-time fabric with very intense field arising from coupled space points in relativistic motion.**

Keywords—manifestations, space points, space-time fabric, energy density, Universal Gravi-magnetic Field Intensity

1.0 INTRODUCTION

In Einstein's theory of special relativity, the laws of physics and speed of light are similar for all uniformly moving frames regardless of the state of relative motion. He alluded that space and time are converted into each other in such a way as to keep the speed of light constant; basically the fabric has to curve to compensate for the speed of light to be maintained.[4]

Hermann Minkowski studied space-time and came up with a light cone:

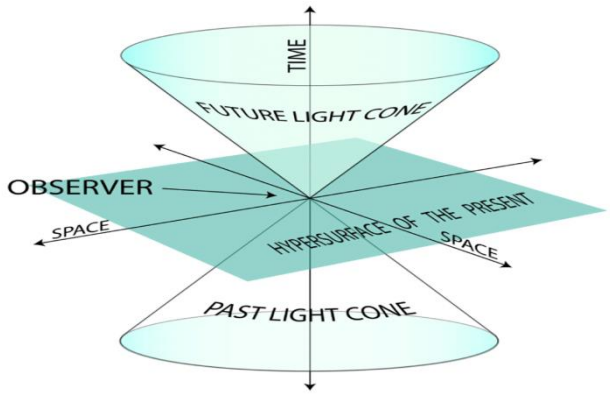

Fig.1: The light cone (https://en.wikipedia.org/wiki/Light_con)

The light cone is centred on the x axis as space and y axis as time. The surface of the cone was considered as a light ray revolved around the time y axis with the centre at intersection of time and space with the future above the space axis and the past below the space axis. The present is the intersection between the space and time axes. In this theory, past events were brought to the present. [2].

In Einstein's equivalence principle gravity was considered as a property of space-time and that

gravity is equivalent to acceleration because it doesn't depend on properties of the body.

In our gravi-magnetic theory of the space-time fabric, we consider the space-time fabric as an inter play between energy and particulate matter. The existence of manifestations in particle or wave form is dependent on the speeds of travel hence a property of time prompting us to discard wave-particle duality. A manifestation can materialize either as a particle or energy (wave). The distinct mass of the manifestations contrary to the space-time points results in a reaction in which the space-time points exert more pressure on manifestations to restore balance. This may lead to collisions that convert space-time points into manifestations, the process ***manifestatio e* temere commercium*** , which is Latin for manifestation from random interaction**,** leading to the formation of the graviton. This is somehow similar to the endothermic reaction in which water in liquid form converts to gaseous state due to an imbalance of kinetic energy between the particles. We partly concur with Democritus [3] who perceives space- time fabric as nothing but atoms and empty space and asserts that of the four fundamental interactions, one that nothing seems to evade, even dark matter and dark energy, is gravitational interactions.

2.0 METHODS

In our formulation, we used Einstein's theory of mass-energy relations applied to charged space points moving in a Coulombic field. The total energy as a result of mass conversion and magnetic field intensity was obtained. This energy was assumed to be equal to the gravi-magnetic energy of the space point. The equation of the energies enabled us to obtain the gravi-magnetic field intensity as a function of space point speed and distance of separation from the attractive potential.

3.0 THEORETICAL FORMULATIONS.

The concept of space and especially its constituents may be difficult to understand. However, it is widely agreed that space may be made of energy in form of physical matter, radiations and dark matter. In our theory, space time fabric is hereby envisaged to constitute physical mass and energy conversions. In these conversions, matter depending on its speed may manifest as a particle or energy. According to Lorenz FitzGerald, [1] the length of matter in motion reduces

$$l = l_o\sqrt{\left(1 - \frac{v^2}{c^2}\right)} \qquad 1$$

and its mass increases

$$m = \frac{m_o}{\sqrt{\left(1-\frac{v^2}{c^2}\right)}} \qquad 2$$

According to Einstein, when $v \ll c$, mass is significant and matter manifests as a particle, but when $v = c$, mass is converted into energy [7]

$$E = mc^2 \qquad 3$$

The transition between matter and energy causes pressure which when computed in a unit area causes gravi-magnetic force field. Of importance to us are Coulombic particles that exhibit attractive behaviour, including neutrons at very low temperatures [5]. So we consider a charged particle, for example an electron as a constituent part of space. The particle has both mass (m) and charge (e). The charge on it radiates electric energy, whose energy density is given by [6] $U = \frac{\varepsilon_0}{2}\left|\vec{E}\right|^2$ 4

where $\vec{E}$ is electric field strength:

$$\vec{E} = \left(\frac{1}{4\pi\varepsilon_0}\right)\frac{Q}{r^2} \quad 5$$

the electric field energy density will thus be

$$U = \frac{\varepsilon_0}{2}\left|\vec{E}\right|^2 = \frac{Q^2}{32\pi^2\varepsilon_0 r^4} \quad 6$$

We allow the electron to move towards another space point providing a positive potential. This motion is facilitated by the electric field between the two space points. As it begins to move, it radiates magnetic field and at $v = c$, its mass is converted into energy. The energy density due to mass will be:

$$\frac{E}{A} = \frac{mc^2}{A} \quad 7$$

hence total energy density contributed to the space-time

$$E_T = \frac{mc^2}{A} + \frac{Q^2}{32\pi^2\varepsilon_0 r^4} = \frac{\varepsilon_0 Q^2 A + 32\pi^2\varepsilon_0 r^4 mc^2}{32\pi^2\varepsilon_0 r^4 A} \quad 8.$$

This Interaction can be termed as a gravi-magnetic interaction since the mass, a measure of classical gravity, has been consumed into energy coupled with the magnetic energy radiated as a result of motion. The energy density of a gravi-magnetic interaction is given by [6]

$$U_{GM} = \frac{\beta}{2}\left|\vec{K}\right|^2 \quad 9$$

where

$$\beta = \frac{4\pi}{c^2} \quad 10$$

γ is gravimagnetic field constant and K is gravimagnetic field strength. This energy is equal to the total electron field energy hence:

$$U_{GM} = E_T \quad 11$$

$$\frac{4\pi}{c^2}\gamma_{GM}\left|\vec{K}_{GM}\right|^2 = \frac{8\pi\varepsilon_0 r^4 mc^2 + Q^2 A}{8\pi\varepsilon_0 A r^4} \quad 12$$

We recall that m is relativistic mass, hence equation 12 becomes

$$\frac{4\pi}{c^2}\gamma_{GM}\left|\vec{K}_{GM}\right|^2 = \frac{8\pi\varepsilon_0 r^4 \frac{m_o}{\sqrt{\left(1-\frac{v^2}{c^2}\right)}}c^2 + Q^2 A}{8\pi\varepsilon_0 A r^4} \quad 13$$

Making $\vec{K}_{GM}$ the subject

$$\vec{K}_{GM} = \sqrt{\frac{8\pi\varepsilon_0 r^4 \frac{m_o}{\sqrt{\left(1-\frac{v^2}{c^2}\right)}}c^2 + Q^2 A}{8\pi\varepsilon_0 A r^4}\left(\frac{c^2}{4\pi\gamma_{GM}}\right)} \quad 14$$

Equation 14 gives us the gravimagnetic field strength of the space-time fabric.

4.0 ANALYSIS AND DISCUSSION

3.1 Variation of Gravi-magnetic field, $\vec{K}$ with the speed of space point, v

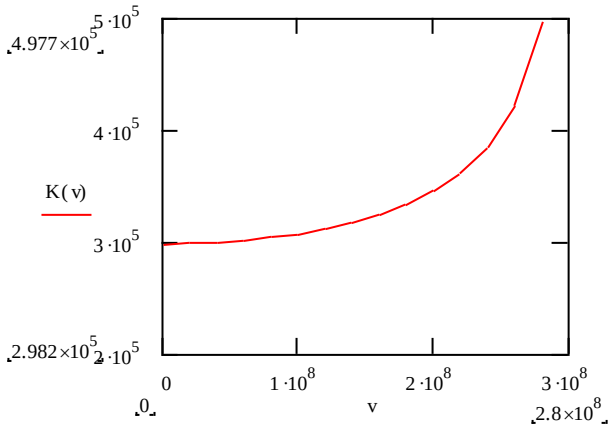

Fig.2: Rate of change of gravi-magnetic field strength with velocity of space points

Figure 2 shows that when all the space points are stationary and thus in particle form, there exists minimum gravi-magnetic field intensity $K = 2.982 \times 10^5 Kg/ms$ when the space point is 1m from the attractive potential. This is gravitational field strength separated from magnetic field since the charged particles aren't in motion and thus magnetic field radiated is zero. The field on the space point is mainly electrostatic in nature. When the space point is set into motion, the electric field energy reduces as it is absorbed into vacuum [6] while the magnetic field comes into existence. Motion of the particles increases the gravi-magnetic field strength as the gravitational mass is converted to gravi-energy to couple with the magnetic energy radiated as a result of motion of the charged space point. The rate of increase is too small in the velocity range $0 - 1.9 \times 10^8$ m/s. Rapid rate of increase of field is observed from electronic speeds ($2.0 \times 10^8 m/s$) and is infinitely large at the speed of light ($3.0 \times 10^8\ m/s$). In the space-time fabric where space points are moving with the speed of light, gravity is infinitely large because the mass at this point is also hypothetically infinitely large according to equation 2. Such an area in the space-time fabric could constitute a black hole, capable of attracting all matter and radiation.

Our theory partly agrees well with Einstein's equivalence principle, which considers gravity as a property of space-time and that gravity is equivalent to acceleration since it is independent of the properties of interacting bodies. True to the point, our findings reveal that accelerated space points give rise to increasing gravi-magnetic field. But we differ on the claim that the field is independent of the properties of the system. Clearly, $\vec{K}$ is dependent on inertial mass m_o and charge, Q of the space point (eq. 14).

3.2 The gravi-magnetic field strength and separation distance of space points

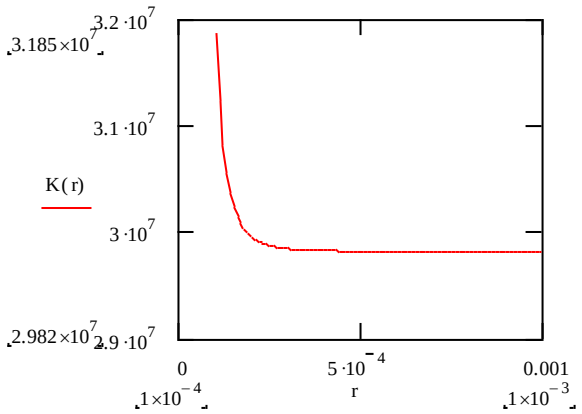

Fig. 3: Effect of separation distance of space points on gravi-magnetic field intensity

Figure 3 reveals very high gravi-magnetic field intensity in the vicinity of the space point providing the attractive potential, $r \to 0m$. The sharp rise in field is constrained in a hollow shell of internal radius $r = 1.0 \times 10^{-4}m$ and external radius $r = 2.0 \times 10^{-4}m$ containing the attractive potential at the centre. Outside this shell, the field intensity falls to a constant value of $K = 2.98 \times 10^{7}Kg/ms$. We call this value, the Universal Gravi-magnetic Field Intensity (UGFI) since it has no regard for distance of separation of space points. This finding is two pronged in terms of its relevance. On one hand, it is evidence of the quantum entanglement theory applied in space. Quantum entanglement theory proposes the existence of quantum relation between any two systems regardless of their separation distance, such that any measurement taken on one system affects the other. Since there exists field between particles in space regardless of their distance of separation, then we propose that physical matter in space is in an entangled state. On the other hand, two factors, namely speed and separation distance of space- time fabric points are hereby observed to raise gravi-magnetic field strength infinitely. This suggests the fact that regions in the space- time fabric with immense gravi-magnetic field e.g. black holes must constitute coupled space points either moving as a unit or revolving each other at relativistic speeds. Though physical matter in the space is rare, (approximately 4%), the behaviour, nature and structure of space-time fabric owes its origin to this physical matter.

In support of our theory, Turtur [6] suggests that there exists in space, an energy circuit within which every charged space point is supported with energy from space. The space point converts this energy into electrostatic field and space itself takes back this energy from the field during its propagation. Hence, the so called vacuum or empty space is a space-time fabric constituting the manifestation of energy and space points that communicate through gravi-magnetic field, regardless of their distance of separation.

Lately, a lot of attention is being paid to the sea of energy that pervades all space. Most agree that there exists virtual particle fluctuation in space linked to physical matter by weak van de Waals forces. Space could offer unlimited source of energy for space travel and even homes and cars back on earth.

Conclusion

In the space-time fabric, there exists gravi-magnetic field whose origin and strength is determined by the speed and distance between space points. We envisage regions in space with infinitely high field as being composed of coupled space points moving at relativistic speeds. Quantum entanglement among space points is predicted as there exists gravi-magnetic field between space points regardless of the distance of separation, a constant we have called Universal Gravi-magnetic Field Intensity (UGFI) whose value is $K = 2.98 \times 10^7 Kg/ms$.

Acknowledgement

We acknowledge Masinde Muliro university of Science and Technology in which this research was conducted. We sincerely appreciate Professor Valarie Palapala of the United States International University for facilitating the publication of this article.

References

[1]. Angelo T., Matteo L.R. (2003). Lorentz contraction and accelerated systems *Eur.J.Phys.* 24 215.

[2]. https://en.wikipedia.org/wiki/Light_con

[3]. ROBERT L. O (1998). Speculations-in-Science-and-Cell-Motility.21(1):37-44

[4]. James Overduin, Hamna Ali, and Francis Walz (2021). Constraints on Space-Time-Matter Theory in the Framework of the Standard-Model Extension. *Galaxies.* Vol. 9(2), 26

[5]. Rapando B.W, Mang'are P.A, Isoe W, Ayodo Y. (2018). Internal Pressure And Speed Of Sound In Neutron Stars. *JMEST*. 5(10).Pg. 8880-8884.

[6]. Turtur Claus W. (2009). Conversion of the Vacuum-Energy into Mechanical Energy. *The general Science journal.* 1-10

[7]. Ying-Qiu Gu. (2017).Test of Einstein's Mass-Energy Relation. Applied Physics Research. Vol. 10(1). 1-4