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Engineering of Gravity and Time

Yousef Ramadan GabAllah
E-mail: yooungstar4@gmail.com, +20 01121752819

Abstract—Here we show a general new theory about gravity comparing it with the law of universal gravitation and with general relativity's vision about gravity. Discussions about a general law of objects' rotation are presented. The paper shows the effect of changing place on time measurement in a rotating scale wishing more accuracy in time measurement. The research explains how time works through rotation. It wishes to resolve the contradiction between general relativity and quantum mechanics. Author's mathematical equations expect some phenomena on both cosmic and atomic level. Some questions are wished to be answered such as "Why does Venus rotate inversely to Solar system planets?" and a vision about "Is time travel possible?" that might be new.

Index Terms—Gravity; gravitational waves; time; rotation; standard second; graviton; relativity.

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1 Introduction

Law of universal gravitation is inaccurate cause it missed the factor of rotational motion [2], Earth attracts Newton's apple and not vice versa. General relativity missed the factor of rotational motion too [3], space curvatures is not sufficient for gravity to work. Mass makes curvatures in space (to Einstein) which holds dependent objects from escaping, while main object's rotation makes dependent objects orbit it, so gravity is a mechanical phenomena and the graviton does not exist [4]. Rotational motion is a property of all masses, even nails, but we do not watch this because of the outer forces affect on it. Space (including space between electrons and nucleuses) is a dynamic system where constructive and destructive interferences of space curvatures occur. Time passing rate is not the same in Moscow, Washington, Cairo and Canberra and differs from sea level to Everest peak. Elementary particles' spin quantum number is not universal, it differs from a celestial object to another which agrees with superstring theory [5].

Rotational motion factor resolves the conflict between general relativity and quantum mechanics making a formula for the theory of everything. The paper seeks a full understanding of gravity and time, in addition it seeks a full accuracy in time measurement from a point to another. Therefore, the paper could be very important for all physicists and interesting for all community.

2 Methods

A basic research stands basically on deductive approach. The writer gives some hypothesis theories to explain some phenomena. He uses thought experiments, diagrams and mathematical equations (as possible) to explain and confirm his vision and results.

3 Results

1. The gravitational field strength of an object is directly proportional to the product of it's mass and rotational velocity, and inversely proportional to the square of the distance from it:

   $$F \alpha \frac{m\overrightarrow{\omega_{cyc}}}{d^2} \quad (1)$$

   In eq.2 , F is the gravitational field strength of an object whose mass is m, $\overrightarrow{\omega_{cyc}}$ is it's rotational velocity and d is the distance from it's center.

2. Gravitational attraction force between two objects equals:

   $$F = \mathrm{G}\frac{m_1\overrightarrow{\omega_{cyc1}}m_2\overrightarrow{\omega_{cyc2}}}{d^2} \quad (2)$$

   In eq. 2 , $m_1\&m_2$ are the masses of the two objects, $\overrightarrow{\omega_{cyc1}}\&\overrightarrow{\omega_{cyc2}}$ are their rotational velocities, d is the distance between their centers and G is the universal gravitational constant.

3. There is no existence of graviton.
4. Rotational velocity of an object is directly proportional to it's mass and inversely proportional to the gravitational field strength affects on it:

   $\overrightarrow{\omega_{cyc}} \; \alpha \; \frac{\mathrm{m}}{\mathrm{F}}$

   (3)

   In eq.3 , $\overrightarrow{\omega_{cyc}}$ is the rotational velocity of the dependent object, m is it's mass, and F is the gravitational field strength affects on it.
5. The probability of reaching the gravitational attraction force between the electron and the proton in a hydrogen atom a maximum value or a zero-value equals 1.3888×10^{-3}.
6. The path of free-falling objects is curve.
7. Time measurement inside a rotating sphere (the Earth, for instance) depends on the point we measure in, it subjects to the following equation:

   $\beta \mathrm{T} \propto \frac{1}{\mathrm{L}}$

   (4)

   In eq. 4, βT is time-passing rate and L is the circumference of the cross section perpendicular to the rotational axis of Earth.
8. Rotational angle varies from a celestial object to another because spin quantum number is not universal.

4 Discussion

Rotational motion of various celestial objects such as stars, planets, black holes, …etc is the reason why they have gravitational accelerations, so the earth attracts Newton's apple, while the apple does not, because it does not spin.

Experiment 1:

If we brought a 1kg–spherical metallic body on the earth and brought the same body on the moon to measure the alternate gravitational attraction force between them respectively, according to the law of universal gravitation in the same distance, then: the rate between the alternate gravitational force between the body and the earth, and the alternate gravitational force between the body and the moon (F_{earth} : F_{moon}) equals the rate between the mass of the earth and the moon respectively (m_{earth} : m_{moon}) which equals almost (81.3 : 1) [1]. Since the gravitational acceleration of a celestial object depends on it's mass, according to the law of universal gravitation, therefore (m_{earth} : m_{moon}) should commensurate with the gravitational acceleration of the earth and the moon respectively (g_{earth} : g_{moon}) which equals almost (6 : 1). If we brought the same body in the same distance on other planets such as Mercury, Jupiter and Saturn, then, we will not reach the same commensurateness.

In other words, according to the law of universal gravitation, the mass of an object should commensurate with the gravitational acceleration resulted from this mass, however, table 1 shows that we do not find this:

Table (1): The masses of celestial objects do not commensurate with their gravitational accelerations.

Object	**m(kg) ≡ g(m.s^{-2})**
Earth	$5.9724 \times 10^{24} \equiv 9.798$
Moon	$7.342 \times 10^{22} \equiv 1.62$
Mercury	$3.301 \times 10^{23} \equiv 3.70$
Jupiter	$1.8983 \times 10^{27} \equiv 24.79$
Saturn	$5.6836 \times 10^{26} \equiv 10.44$
Average	$4.946 \times 10^{26} \equiv 10.0696$

We result that $m \not\equiv \mathrm{g}$, while $m\overrightarrow{\omega_{cyc}} \equiv g$ in a constant distance (1), and:

$F \; \alpha \; \frac{m\overrightarrow{\omega_{cyc}}}{d^2}$

(1)

The writer supposes that the rotating main object (the sun, for instance) causes gravitational waves in space which attracts dependent objects. The main object make curvatures in space [6], the curvatures just hold dependent objects off escaping, to the writer, hence rotational motion's role is to activate these curvatures in space and make them move towards the main object, dependent objects are attracted as a result.

Spiral motion of space-time curvatures is nothing but "gravitational waves"(2).

If we have two objects of masses m_1&m_2, whose rotational velocities are $\overrightarrow{\omega_{cyc1}}$ & $\overrightarrow{\omega_{cyc2}}$ respectively, then gravitational force between them is:

$$F = \mathrm{G}\,\frac{m_1\overrightarrow{\omega_{cyc1}}m_2\overrightarrow{\omega_{cyc2}}}{d^2} \qquad (2)$$

where G is the universal gravitational constant and d is the distance between their centers.

In Eq. 2: if m_1=m_2 (or $m_1 \approx m_2$), $\overrightarrow{\omega_{cyc1}}$=$\overrightarrow{\omega_{cyc2}}$ (or $\overrightarrow{\omega_{cyc1}} \approx \overrightarrow{\omega_{cyc2}}$) and d were relatively small, then F depends on the direction of both $\overrightarrow{\omega_{cyc1}}$&$\overrightarrow{\omega_{cyc2}}$:

If $\overrightarrow{\omega_{cyc1}}$ & $\overrightarrow{\omega_{cyc2}}$ had the same direction, F will have the maximum value because of the constructive interference of gravitational waves.

If $\overrightarrow{\omega_{cyc1}}$ & $\overrightarrow{\omega_{cyc2}}$ had inverse direction, we will have a binary system, for instance, a double-star system and binary electrons.

Previously, we see that gravity is entirely a mechanical phenomena, therefore there is no existence of graviton, that is why gravity is much less weaker than other forces [7].

Eq. 2 predicts that there is a gravitational attraction between electrons and nucleons. If we projected the axis of symmetry on hydrogen nucleus, where (0,0) point is the center, and regarded every degree of the 360° as a sphrical path of the electron around the proton as fig. 1 shows, we would then have a probability of 1/360 of reaching the gravitational force between the electron and the proton a maximum value or a zero-value(3). However, the electron could be up-spin or down-spin [8] so, we have two more probabilities and the previous probable number should be doubled to be 1/720 or $1.3888{\times}10^{-3}$. This probable number could be the reason why atom's radius is inconstant [9].

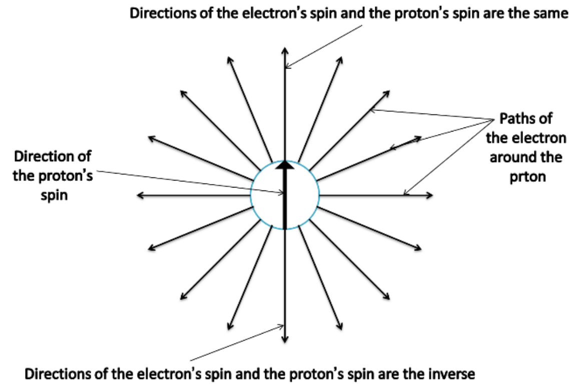

Fig 1: Probable paths of the electron around the proton in a hydrogen atom.

An evidence that supports the author's theory that all Solar System's planets orbit the sun in the same direction the sun rotates.

Experiment 2:

If we permitted a metallic spherical object to fall freely from a height 1000 meter, and estimated, in advance, the horizontal point a on the earth, we will find that the collision point is a, this means that the object's path during falling is curve, not linear, because of Earth's rotation. If the object's path were linear, the object would have fallen on the point b which lies in the east of point a, because the earth rotates from east to west as viewed from north star, as fig. 2 shows. Point b could be estimated through Trigonometry. However, we do not notice such curve paths because of the little distance between points a and b, in addition, we lie in the same rotational frame, so an observer on the moon can observe such curve paths better. Therefore, the path of freely-falling objects is curve.

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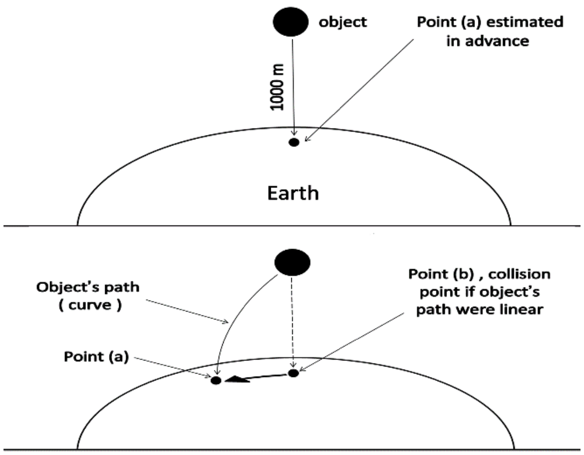

Fig. 2: The path of free-falling objects is curve, not linear.

Spin is a primary property of matter; we watch half-integer spin in fermions [10]. The writer assumes that celestial object's rotation is nothing but a reflection for the nucleons' spin (as hadrons), as primary components of celestial objects. As a result, rotational velocity of an object is directly proportional to it's mass (with an observation; only odd-odd, odd-even and even-odd nucleuses of which Earth is composed participate in causing Earth to rotate):

$$\overrightarrow{\omega_{cyc}} \propto \mathrm{m}$$

However, we watch that rotational velocity of Solar System's planets are not commensurate with their masses because of the external gravitational field affects on them makes them rotate slower. Evidences support the author's theory follow:

Regarding Earth's rotational velocity and mass as standard givens, we find that:

- Mercury's rotational velocity is small compared to it's mass which equals almost 5.53% Earth's mass, however, it's rotational velocity equals only 10.892 km/hr, instead of 92.545km/h; because of the strong gravitational field of the sun affects on it.
- Mars' rotational velocity is great compared to it's mass which equals almost 10.7% Earth's mass, it's rotational velocity equals 868.22km/h instead of 179.915 km/h because of it's, comparably, great distance from the sun.

Therefore:

$$\overrightarrow{\omega_{cyc}} \propto \frac{\mathrm{m}}{\mathrm{F}}$$

(3)

Eq. 3 works perfectly with all Solar System's planets except Venus; although Mercury's mass and distance from the sun are lower, it's rotational velocity is greater. The writer can explain this exception as follows:

Every celestial object has a gravitational field that is divided into zones as fig. 3 shows:

1. Near Gravitational Zone:
   The nearest zone to the object. It's extent in space is relatively small. It's gravitational field strength is relatively the greatest.
2. Distant Gravitational Zone:
   The farthest zone to the object. It's extent in space is the greatest and could be infinite. It's gravitational field strength is relatively the weakest.
3. Middle Gravitational Zone:
   It is located between the Near Gravitational Zone and the Distant Gravitational Zone. It's extent in space is relatively small. Because of the high difference in gravitational field strength of the previous and the following zones, field disturbances occur in this zone.

When we project the previous theory on the Solar System's planets we will find that:

- Mercury: Lies in the *Near Gravitational Zone*.
- Venus: Lies in the *Middle Gravitational Zone*.
- Earth, Mars, Jupiter, Saturn, Uranus and Neptune: lie in the *Distant Gravitational Zone*.

That is why Venus's rotational velocity is, relatively, too low. This predicts that we may find this case in other planetary systems.

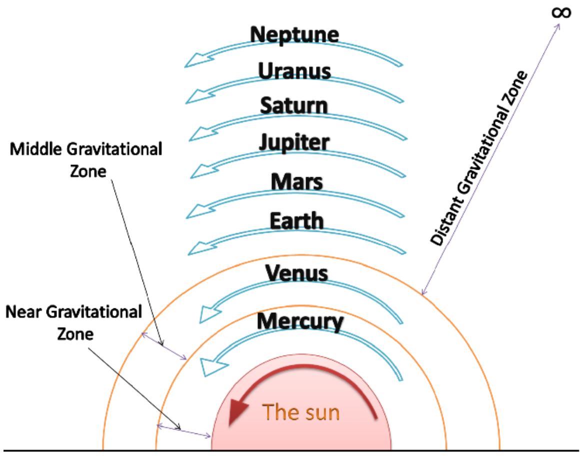

Fig 3: Gravitational zones of the sun.

Suggesting gravitational zones for every celestial object can be useful in predicting the rare case in which dependent objects orbit their main objects in the inverse direction the main object rotates based on the assumption that the great difference in strength in the *Near Gravitational Zone* and the *Distant Gravitational Zone* in the previous illustration causes disturbances leads to inverting the direction of the gravitational waves in the *Middle Gravitational Zone*.

Eq. 3 predicts that celestial object's rotational velocity varies along the year; it reaches it's greatest value in Aphelion, while reaches it's lowest value in Perihelion.

Experiment 3:

Regarding the day (almost 24 hours) as the unit of time measurement, then time measurement unit equals a complete turn of Earth around it's axis of rotation. In a 100-floor tower in the equator, it's height is x(m) from sea level. We are measuring time in the first floor (point A), in sea level, and in the 100^{th} floor (point B). More accurately, we are measuring time passing rate or day length in points A and B:

Projecting axis of symmetry on a cross section of Earth, where the point (0,0) is the center of it's rotation axis as figure 4 shows. If the circumference of the cross section in point A is L_1(m) and L_2(m) in point B, where: $L_1 = 2\pi r$ and $L_2 = 2\pi(r+x)$, regarding the perfect spherical circumstance of the cross section. When the tower cuts back the y-axis (one day passes), point A will cut the y-axis before point B, because $L_2 > L_1$, as fig. 4 shows. This means time passes slower in point B than point A.

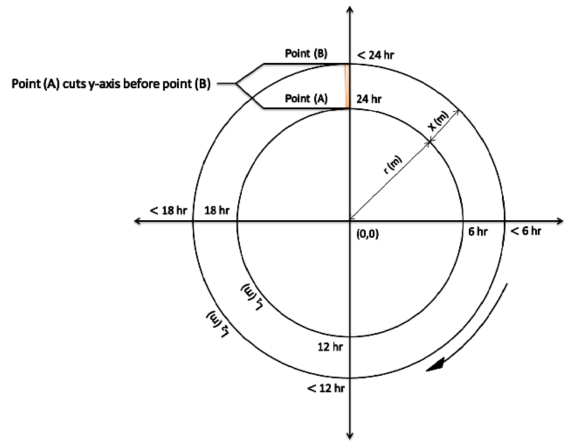

Fig 4: A cross section of Earth where (0,0) point is Earth's axis of rotation. It shows how time passing rate varies from a point to another inside a rotating sphere. $L_1 = 2\pi r$ and $L_2 = 2\pi(r+x)$.

Let time passing rate βT, it depends on the point we measure in. It is inversely proportional to the circumference of Earth's cross section perpendicular to it's rotational axis *L*:

$$\beta T \propto \frac{1}{L} \quad (4)$$

Despite rationality of eq. 4, it looks in contrast with special relativity; day is longer in point A than point B because of gravitational time dilation [11] thus, the writer suggests two kinds of "standard second":

1. Universal standard second: it is the one measured in the originally flat space-time, far away from any object. It subjects to special relativity.
2. Local standard second: it is the one measured in Earth's sea level. It should subject to eq. 4.

Therefore, our standard second is the *local standard second* though it behaves to gravitational time dilation. Thus, if one Earth day were consisted of universal standard seconds it would equal, say, 26 hours.

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Time goes forward with respect to us because all elementary particles always spin in the same direction, as a result, Earth, in addition to all celestial objects always rotate in the same direction. Therefore, if we wished to time travel backwards in the same rate, we would need some way to make all elementary particles in Earth and in our bodies to spin backwards in the same velocity, and that is impossible. As a result, time in antimatter passes backwards with respect to us, thus if a 30 year-old person were created from antimatter, they would celebrate their 29 year-old after one year!

We can imagine time-passing in our universe as a line number, as fig. 5 shows, where every celestial object has a point on it, +direction and –direction represent forward time-passing and backwards time-passing respectively with respect to us, and when time-passing rate increases or decreases, we go right or left respectively on it. Taking angle of rotation of every celestial object into account, the line number will be replaced by axis of symmetry.

Eq. 3 can explain how does gravity affect time; the greater gravitational field strength F, spin velocity of clock's elementary particles decreases and "ticks" number of the clock decreases per day, for instance, so time goes slower and vice versa.

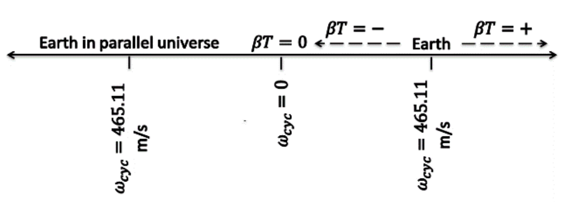

Fig 5: The position of Earth and it's duplicate in parallel universe in the line number of time.

Quantum mechanics is not universal(4), specifically spin quantum number is not universal because Supernovas cause great alteration in spin directions of the elementary particle's composing it. For this reason, both Venus and Uranus rotate inversely with respect to us and every planet has a fixed rotational angle(5), so if we brought a sample from Venus, we will find that spin quantum number of it's elementary particles does not exhibit Fermi-Dirac statics.

Hence remains the question "why should the matter of a neighboring planet be different from ours?". The particles composing the giant molecular cloud that formed Solar System's objects [12] [13] were different in spin quantum number. Alternate attraction among particles with the same spin quantum number was maximum (to eq. 2), so they united and formed, later, the elementary substance of every celestial object.

Author's model of parallel universe goes backwards in time, in the same rate, with respect to our universe. It is formed from our anti-matter which is the ordinary matter there. It's elementary particles spin inversely with respect to ours, and every celestial object there rotates and orbits inversely with respect to it's duplicate in our universe. It's Earth lies in the –direction in *the line number of time* with respect to us and vice versa as figure 5 shows.

5 Margins

(1) If we used the same mode to prove that the formula $(m\overrightarrow{\omega_{cyc}} \equiv g)$ is accurate in a constant distance, we will find that $(m\overrightarrow{\omega_{cyc}} \not\equiv g)$, because the value of either *m*, $\overrightarrow{\omega_{cyc}}$ or g is inaccurate though the formula is correct. Therefore, the following paragraphs mainly prove the writer's vision.

(2) It looks like if the sun is connected to Earth through a string, hence the string (space curvatures) only holds Earth off escaping but does not attract it to the sun. When the sun rotates, it drags the string and Earth is attracted as a result. Hence, the moving string is gravitational waves.

(3) This model is only valid when electron's angular momentum state is s ($l = 0$).

(4) This supposition agrees with Superstring theory.

(5) We should take into account the gravitational effects of the neighboring celestial objects as well.

6 Recommendations

1. The writer suggests using the formula ($m\overrightarrow{\omega_{cyc}} \equiv g$) for more accuracy of data, regarding m, $\overrightarrow{\omega_{cyc}}$ and g of Earth as standard data.
2. We can examine eq. 2 through experiment 4: We permit a spherical object to fall freely on Earth, and measure time interval till it reaches Earth in three cases:
   Case 1: The object spins in the same direction as Earth rotates.
   Case 2: The object does not spin.
   Case 3: The object spins in the inverse direction as Earth rotates.
   It is expected that time interval in case 3 is greater than time interval in case 2 which is greater than time interval in case 1.

7 Conclusion

The main purpose of this paper is to obtain a full understanding of how gravity and time work and resolve the contradiction between general relativity and quantum mechanics. It aims at answering some empirical questions as well. The research have a list of important applications, paving the way for generating real artificial gravity can be the most important one. Adumbrating some out of ordinary ideas such as non-universality of quantum mechanics and combining gravity and time with rotation in one frame can be a constructive means for understanding the universe deeper.

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Author
Undergraduate student at the faculty of agriculture, department of genetics, Kafrelsheakh University, Egypt.