

Newton's Gravitation Law is Wrong!

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Abstract: The Gravitational constant G of the universal law of gravitation by Isaac Newton, also used by Einstein in his general relativity, is discovered to composed from angular velocity coefficients forming an odd formula, in which the square of orbital velocity of a planet is multiplied by its radial distance, the product is divided by the mass of the sun; when the constant G in the gravity formula is substituted by these parameters, the formula is transformed into Centripetal Force (F_C) formula, thus the formula for the gravitation force in essence represent a slightly distorted version of the Centripetal Force (F_C), the development of an alternative theory to replace the current one is an important process that would lead one day to a better understanding of the physical world and a theory explaining the force governing stars and orbiting planets.

Keywords: Gravitational Force; Gravitational constant G ; Centripetal Force.

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I. Introduction

The Gravitation is the least known force among the four forces of nature [1], the force the Earth exerts on the body is called gravity, gravitational pulls exist even though the bodies involved don't touch each other and every mass creates a gravitational pull on every other mass [2], Gravity, or gravitation, is a natural phenomenon by which all things with mass are brought toward (or *gravitate* toward) one another, including objects ranging from atoms to planets, stars, and galaxies, modern gravitational theory started with the work of Galileo Galilei in the late 16th and early 17th centuries, and he set the stage for Isaac Newton in 1687, to formulate the Newton's theory of gravity, or the inverse-square law of universal gravitation [3], the gravitational force is defined as "a force that attracts any two objects with mass," its *attractive* because it always tries to pull masses together, it never pushes them apart [4], since the gravity was articulated by Newton, great efforts were carried to conceive and understand the nature of gravity and to search for logical interpretation for the gravitational force, and the mechanical explanation of gravity, which was one of the most challenging problems for those who accepted the Principia as paradigm [5], to get a hint for that, Maxell suggested that, in order to produce the effect of attraction, the stress along the lines of gravitation force must be a pressure [6], while Faraday's concept of gravity is the simplest case of attraction; and appearing to have no relation to any physical process by which the power of the particles is carried on between them, it seems to be a pure case of attraction or action at a distance [7], but gravity was mainly interpreted as an innate attraction between every pair of particles of matter [5], although the gravitational force solved most problems, but nobody knows how it works, where gravity was the first force to be conceived as "action at a distance" [8], some scientists, like Poincar'e believed gravitation is of electromagnetic origin [9], and Faraday suggested that, if we calculate the lines of force in the neighborhood of two gravitating bodies, we shall find them the same in direction as those near two magnetic poles of the same name; but we know the mechanical effect is that of attraction instead of repulsion [6], Faraday also questioned whether gravitation requires time, because if it did so, this means it would show that a physical agency existed in the course of the line of force, although it is impossible to prove or disprove this point; since there is no capability of suspending, changing, or annihilating the power (gravity), or annihilating the matter in which the power resides [7], although Newton's work, indicated that the force between two unit masses at unit distance would be the same for all types of matter at all positions in the universe [5], and the action of gravity, was conceived by Faraday as a line of force in a straight line as far as can be tested through the resultant phenomena, it cannot be deflected, or even affected, in its course [7], and the gravitation constant G is thought to work with Newton's theory of universal gravitational attraction, and it also determines the gravitational attraction between any two masses in the universe [10], but Feynman stated categorically that "there is no model of the theory of gravitation today, other than the mathematical form." [11].

In this paper, we analyzed the relation between Gravitational Force (F_G) and the Centripetal Force (F_C), when both forces are balanced, through this we obtained the true parameters of the gravitational constant G , consisting from the orbital velocity of a planet, its radial distance and the mass of the sun; replacing these with the gravitational constant G in the formula of gravitational force, this resulted in the Centripetal Force (F_C), the odd formula for the gravitational constant G , is used to derived the constant G for each of the nine planets, the

result showed slight variation in magnitude for each planet, thus the G constant can increase for far away stars and galaxies, these findings showed the need for an alternative theory for the gravitational force, that can explain the true force responsible about the stability of planets around the stars, which is suggested in form of electromagnetic force [12], two decades ago a lecturer at the University of Nairobi asked me about gravity, my inner feeling at that time was “it’s something unconceivable, it’s the same feeling now, but for a different reason.”

Finally, in a debate about the standards legitimate to science, during the absorption of Galileo’s and Newton’s mechanics, it stated “When scientists disagree about whether the fundamental problems of their field have been solved, the search for rules gains a function that it does not ordinarily possess. While paradigms remain secure, however, they can function without agreement over rationalization or without any attempted rationalization at all” [5]; three hundred years elapsed, disagreement ceased to exist, and the paradigm is well secured!

II. The Gravitation Force Versus the Centripetal Force (F_C)

The law of universal gravitation envisioned by Isaac Newton in 1687 is based on the force of gravitation which is “proportional to the product of the masses m_1 and m_2 of the two interacting bodies, and varies as the inverse square of the distance r between the two bodies, and it’s an attractive force.” [13], the force is given by

$$F_G = G \frac{m_1 m_2}{r^2} \quad (1)$$

Where, m_1 is the first mass, m_2 the second mass, r is the distance between the two masses, the gravitational constant $G = 6.67408 \times 10^{-11} \text{ m}^3 \cdot \text{kg}^{-1} (\text{N} \cdot \text{m}^2 / \text{kg}^2)$ [14]

The Centripetal Force (F_C), is a well tested and known force, it’s a force that makes a body follow a curved path, its direction is always orthogonal to the motion of the body and towards the fixed point of the instantaneous center of curvature of the path [15], the unbalanced force acting on the planets is given by

$$F_C = \frac{m_p v_o^2}{r} \quad (2)$$

Where, m_p is mass of the planet, v_o is the orbital velocity of the planet and r is the radial distance to the center of the sun. Using Eq. (1) and Eq. (2) with NASA data [16], to establish Table, 1, from which it’s realized that, the Centripetal Force (F_C) given by Eq. (2) is greatly equal to the gravity Force (F_G) given by Eq. (1), thus the formula of the gravitational force derived by Sir Isaac Newton and published in his Principia in 1687, describing the attraction force between two objects, is nearly equal to the Centripetal Force (F_C), but dose the force given by Eq. (1) is the attractive force of the gravity or its merely a representation of the Centripetal Force (F_C) as given by Eq. (2)? Or in another word, what is the mechanism that can produce an attractive force from merely the existence of two bodies in space? Comparing both the gravitational and centripetal forces as a percentage as given in the column eight of Table. 1, it’s realized that both forces are not equal by 100%, and it varies by up to $\pm 3\%$ for some planets; hence to analyze both the Centripetal Force and the Gravity Force, we supposed both to be equal, hence

$$F_C = \frac{m_p v_o^2}{r} = F_G = G \frac{m_s m_p}{r^2} \quad (3)$$

From Eq. (3), the following is derived

$$\frac{m_p v_o^2}{r} = G \frac{m_s m_p}{r^2} \quad (4)$$

From Eq. (4), the Gravitation constant (G) is derived

$$G = \frac{m_p v_o^2 r^2}{m_p m_s r} \quad (5)$$

Solving Eq. (5) the Gravitational constant G is given by

$$G = \frac{r v_o^2}{m_s} \quad (6)$$

The gravitational constant (also known as the “universal gravitational constant”, the “Newtonian constant of gravitation”, or the “Cavendish gravitational constant”), denoted by the letter G , is an empirical physical constant involved in the calculation of gravitational effects in Sir Isaac Newton's law of universal gravitation and in Albert Einstein's general theory of relativity. In Newton's law, it is the proportionality constant connecting the gravitational force between two bodies with the product of their masses and the inverse square of their distance. In the Einstein field equations, it quantifies the relation between space-time topology and energy momentum, the measured value of the constant is known with some certainty to four significant digits [17], in SI units its value is approximately $6.67408 \times 10^{-11} \text{ N} \cdot \text{kg}^{-2} \cdot \text{m}^2$. [14], because of its central position

in physical theory, improved values of the gravitational constant have been the subject of repeated efforts ever since by a number of outstanding experimentalists [5], the constant G was measured many times by Cavendish, and found to be 6.67×10^{-11} [10], the current constant $G = 6.67408 \times 10^{-11} \text{ m}^3 \cdot \text{kg}^{-1} (\text{N} \cdot \text{m}^2 / \text{kg}^2)$ [14]. Using the given parameters [16] in Eq. (6), we drive Table. 1, and compared characteristics for each planet, where the Gravitational constant G is different for each planet, for earth its equal to $6.6792752136752136752136752136752 \times 10^{-11}$, the smallest derived magnitude is $6.5403420814479638009049773755656 \times 10^{-11}$ for mercury and the biggest is $6.7811973353443941679235796882856 \times 10^{-11}$ for Saturn in $\text{kg}^{-1} \cdot \text{m} \cdot \text{m}^2 / \text{s}^2$. ($\text{kg}^{-1} \cdot \text{m}^3 / \text{s}^2$), with these variations, we can't expect the magnitude of the derived gravitational force to be exactly as should be the Centripetal Force (F_C), this with lack of mechanism to understand the nature of gravitational force, in addition to the strange nature of the structure of the constant G given by Eq. (6), as it represents the multiplication of radial distance of a plant by the square of the orbital velocity divided by the mass of the sun! The unit gravitational force G given in Eq. (1) is ($\text{N} \cdot \text{m}^2 / \text{kg}^2$), while in Eq. (6), its ($\text{kg}^{-1} \cdot \text{m}^3 / \text{s}^2$). Thus by replacing G in Eq. (1), by G given by Eq. (6) the following is obtained

$$F_G = \left(\frac{rv_0^2}{m_s} \right) \left(\frac{m_s m_p}{r^2} \right) \tag{7}$$

Solving Eq. (7), the gravity is given by

$$F_G = \frac{v_0^2 m_p}{r} \tag{8}$$

But as resulted in Eq. (8), the insertion of the true components of the gravitational constant G given by Eq. (6) in Newton's formula of the gravity, resulted in the Centripetal Force (F_C) as given by Eq. (2), thus, the substitution of the natural components of the constant G lead to the disappearance of coefficients of the Gravitational Force F_G , therefore the usage of the numerical value of the constant G (6.67408×10^{-11}) as stipulated by Newton, is synonymous to that process, as it formed a magical deception concealing the true nature of the formula, like the Planck' constant, which had been deciphered [18], or the confusion of the photoelectric effect, which led Einstein to introduce quanta (photon) [19], instead of searching for the Radiation Magnetic Force (F_{mR}) formula [20]; wherein the deciphered of the gravitation constant G, showed its nature in reality, as originated from *the multiplication of the radial distance of any orbital plant by the square of its orbital velocity, the product is divided by the mass of the central object (sun)*, hence the ratio of constant existed in that constant! Although the components of this relation doesn't make any sense, but when replaced with the gravitational constant G in the gravitational formula given by Eq. (1), this resulted in Centripetal Force (F_C), therefore, since gravity is a mathematical in its expression [11], and according to data in Table. 1, and the resulted force given by Eq. (8); a conclusion is reached that, *"the gravitational formula presented by Newton in 1687 is a Centripetal Force (F_C) formula decoded by the constant G, to reflects gravitational coefficients, producing a slight distorted magnitude of the Centripetal Force (F_C) and has nothing to do with the perceived gravitational force."*

Therefore, the development of the Gravitational Force (F_G) to transformed into Centripetal Force (F_C), can be summarized by the following formula

$$F_C = (G) \left(\frac{m_s m_p}{r^2} \right) = \left(\frac{rv_0^2}{m_s} \right) \left(\frac{m_s m_p}{r^2} \right) = \left(\frac{m_p v_0^2}{r} \right) \tag{9}$$

Since the formula given by Eq. (1) is merely a representation of the Centripetal Force (F_C) as given by Eq. (2), which can only be obtained when a proper G magnitude, given by Eq. (6) is derived, and with the existence of anomalies in gravitation force thought to point to the need for better theories [3], these anomalies which forced Einstein to modify the Laws of Gravitation in accordance to his principles of relativity [11], thought to exist because the formula doesn't represent gravity as envisioned by Newton, and interpreted as an innate attraction between every pair of particles of matter [5]; and as Newton's theory of universal gravitational attraction stated that, by using the constant G, this determines the gravitational attraction between any two masses in the universe [10], something which can't be derive with the disclosed constant, leave alone the conclusion that, the *'formula has lost its physical value'*; and since what is required by the gravitational force is the knowledge of how objects and planets are stabilized and how they rotates around their stars [3], hence recalling suggestion by some that gravitation is of electromagnetic origin [9], therefore, a magnetic based gravity force is suggested [12].

No	Planet	Mass kg	Distance m	Orbital Velocity (km/s)	Gravity Force	Centripetal Force	Gravity ÷ Centripetal	G Constant Eq. (6)
1	Mercury	3.3×10^{23}	5.79×10^{10}	47,400	1.30672140030604848	1.28053678756476683	102.0448153458423	6.540342081447963800

No	Planet	Mass kg	Distance m	Orbital Velocity (km/s)	Gravity Force	Centripetal Force	Gravity ÷ C-G	G Constant Eq. (6)
					45230744449515x10 ²²	93782383419689x10 ²²	9992981949274658 %	9049773755656x10 ⁻¹¹
2	Venus	4.87x10 ²⁴	1.082x10 ¹¹	35,000	5.52205376625062781 66331261680806x10 ²²	5.51363216266173752 31053604436229x10 ²¹	100.1527414840242 9363612358067072	6.663901458019105077 928607340372x10 ⁻¹¹
3	Earth	5.97x10 ²⁴	1.496x10 ¹¹	29,800	3.54109302017501215 36217792902285x10 ²²	3.54384946524064171 12299465240642x10 ²²	99.92221890086851 1246422151336344	6.679275213675213675 2136752136752x10 ⁻¹¹
4	Mars	6.42x10 ²³	2.279x10 ¹¹	24,100	1.64086393230751576 72327666557371x10 ²¹	1.63615629662132514 26064063185608x10 ²¹	100.2877253044780 5794269897347744	6.654932076420311714 429361488185x10 ⁻¹¹
5	Jupiter	1.898x10 ²⁷	7.786x10 ¹¹	13,100	4.15617284544984447 50795571942474x10 ²³	4.18335191369124068 84151040328795x10 ²³	99.35030404321365 419559786852946	6.717724786324786324 7863247863248x10 ⁻¹¹
6	Saturn	5.68x10 ²⁶	1.4335x10 ¹²	9,700	3.66926545671496816 97202899039124x10 ²²	3.72815626089989536 10045343564702x10 ²²	98.42037725718309 2440973423281771	6.781134439416792357 96882856x10 ⁻¹¹
7	Uranus	8.68x10 ²⁵	2.8725x10 ¹²	6,800	1.39645145181544832 94589233003156x10 ²¹	1.39726092254134029 59094865100087x10 ²¹	99.94206727077253 878052526493626	6.677948717948717948 7179487179487x10 ⁻¹¹
8	Neptune	1.02x10 ²⁶	4.4951x10 ¹²	5,400	6.70112389599153006 01984199979182x10 ²⁰	6.61680496540677626 74912682698938x10 ²⁰	101.2743148849872 467441227498475	6.590101357466063348 4162895927602x10 ⁻¹¹
9	Pluto	1.46x10 ²²	5.9064x10 ¹²	4,700	5.55563027850477196 39707350143754x10 ¹⁶	5.46041582012731951 7811187864012x10 ¹⁶	101.7437217514916 7207624087416021	6.559697134238310708 8989441930618x10 ⁻¹¹

Table.1. Using parameters of the solar system by NASA (mass of Sun = 1.989x10³⁰ kg) [16], to drive the gravity and Centripetal Force for the nine planets ($G = 6.67408 \times 10^{-11} \text{ m}^3.\text{kg}^{-1} (\text{N}\cdot\text{m}^2/\text{kg}^2)$), using Eq. (1) and Eq. (2) respectively, the difference between gravity and Centripetal Force is derived in column eight in percentage. Column nine gives the precise magnitude of G constant for the nine planets using Eq. (6), each magnitude is different, the smallest is $6.5403420814479638009049773755656x10^{-11} \text{ kg}^{-1}.\text{m}^3/\text{s}^2$ for mercury and biggest is $6.7811973353443941679235796882856x10^{-11} \text{ kg}^{-1}.\text{m}^3/\text{s}^2$ for Saturn.

III. Results and Discussion

- The value of the Gravitational Force (F_G) and the Centripetal Force (F_C) for each of the nine planets are derived and given in Table. 1.
- Comparison between the two forces is made and found either slightly smaller or greater by small percentage shown in Table. 1.
- Since both the Gravitational Force (F_G) and Centripetal Force (F_C) were nearly equal, both were suggested to be equal, as the two forces could form the balance of orbital objects.
- When this balance is obtained, the resulted gravitational constant was derived and given by Eq. (6), and derived for each planet in Table. 1.
- The Gravitational constant G is found to represents the multiplication of the *radial distance of a planet by the square of its orbital velocity, divided by the mass of the sun* as given by Eq. (6).
- The magnitude of gravitational constant G for each planet is only accurate for the specific planet' own parameters, but differ with others.
- When parameters given in Table. 1, are used to derive the Gravitational constant G given by Eq. (6), each planet has its owned value, the smallest is that of mercury with magnitude of $.5403420814479638009049773755656x10^{-11} \text{ kg}^{-1}.\text{m}^3/\text{s}^2$ and the largest is of Saturn with magnitude of $6.7811973353443941679235796882856x10^{-11} \text{ kg}^{-1}.\text{m}^3/\text{s}^2$.
- The Gravitational constant G claimed to represents a universal constant is found to represent a constant for a star like our own sun, with some differences.
- When the right hand side of The Gravitational constant G' formula represented by the *radial distance, square of its orbital velocity and mass of the sun* as given by Eq. (6) are replaced with G constant in the gravitational formula given by Eq. (1), a formula for the Centripetal Force (F_C), similar to Eq. (2), is obtained.
- The unit of G in gravitational force given by Eq. (1) is $(\text{N}\cdot\text{m}^2/\text{kg}^2)$, while in Eq. (6), its $(\text{kg}^{-1}.\text{m}^3/\text{s}^2)$.
- Therefore, *the formula for the Gravity Force (F_G), given by Eq. (1), and published by Newton in 1687, is merely a slightly distorted form of Centripetal Force (F_C) given by Eq. (2)*, it's not a gravitational force, as the constant G eliminate coefficients of gravity.
- The discrepancy in the motion of the planet Mercury in early twenty century [11], is thought due to the smallness in magnitude of constant G for the planet shown in Table. 1.

- Albert Einstein who formulate general relativity due to discrepancy in the motion of the planet Mercury [11], supposed to know first the root cause of that discrepancy before coming with new suggestion.
- When the *universal gravitational constant*, used by Albert Einstein in his field equations of general theory of relativity [17], is replaced by Eq. (6) as the natural value of the constant, what would be the new relation between space-time topology and energy momentum?
- The formula given by Eq. (6) can determine the accuracy of the *radial distance* and *orbital velocity* for each planet, if such parameters are known accurately for a planet like our earth.
- Many asked, how does gravity look on a small scale? As those in the Quantum Theory of Gravity were trying to forge a theory [11], but we can state that, the non-existence of gravity on large scale means it doesn't exist on different scales.
- Interestingly, everyone think the ratio of gravitation force to electrical force is $\frac{1}{4.16 \times 10^{42}}$ [11]; but since electron velocity in hydrogen atom is $2,190,219.655 \text{ m.s}^{-1}$, its electrostatic radius is $0.528566407 \times 10^{-10} \text{ m}$ [26], proton mass is $1.6726231 \times 10^{-27} \text{ kg}$., thus G on that level is $= 1.5159218463431649444121590661997 \times 10^{29} \text{ kg}^{-1} \cdot \text{m}^3/\text{s}^2$, with electron mass is $9.1093897 \times 10^{-31} \text{ kg}$, therefore the gravitational force is $8.267326081204945871380177 \times 10^{-8} \text{ N}$, similar to centripetal, electrostatic and magnetic forces in hydrogen atom [26], which is in fact is the centripetal force, the role constant G plays is very clear in this example.
- Regarding the Cavendish experiment in 1797-1798 to measure the force of gravity in laboratory? [21], it contradict Eq. (8), hence the experiment need to be reviewed; the same for the light displaced by a star on May 29, 1919 [22], interpreted as prove that gravity is a geometric property of space and time as suggested by Einstein [17], although light can be displaced by strong magnet [23], which existed in the sun [24], or the claim light has been photograph as both particle and wave [25], regardless of the strong argument that Radiation Magnetic Force (F_{mR}) embedded electromagnetic radiation as given by Eq. (24) [20], thus many issues need revision.

IV. Conclusion

We analyzed the relation between gravity and the Centripetal Force (F_C), supposing both forces are equal, the result gave the true coefficients of the gravitational constant G, consisting of the multiplication of the *radial distance of a planet by the square of its orbital velocity, divided by the mass of the sun*; when the gravitational constant G in the formula of gravitational force is replaced by this component, this resulted in the Centripetal Force (F_C); the complex relation of the constant G formula, as deciphered, showed in slight variation for each of the nine planets, which can increase for far away stars and galaxies, these findings as they showed Newton's Law of Gravitation is wrong, it also showed the need for an alternative theory that can explained the force responsible about the stability of planets around the stars, which is suggested in form of electromagnetic force [12].

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