# The Relativistic Newton's Law Of Universal Gravitation (F°) And The Value Of The Modified Universal Gravitational Constant (G°):

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ABSTRACT:

This article is about the equation, that is resulted in my search for understanding the Gravity fundamentally & the equation can be well understood with few basic Sir Newton's & Laureate Einstein's equations, along with basic mathematics. The concept of the equation is primarily based on the paradoxical view of our current understanding of relativistic mass equation.

DISCUSSION:

Relativistic Newton's Law Of Universal Gravitation (F°);

$$F° = m\,g° = m\,(G°\,E/R^2)$$

$$i.e.,\ (m\,G°\,E)/R^2$$

Where,

G° - Modified Universal Gravitational Constant

$$(G° = 1.83662×10^{-22}\ m/kg),$$

E - Energy Lost By The Primary Mass In Attaining Its Current Position In The Universe

R - Distance Between The Masses &

m - Relative Value Of The Secondary Mass.

The relativistic equation for mass is differed from the equations for length & time by the way of adding the Lorentz Factor (LF) in their equations, defined the length & time will be reduced in a Frame of Reference (FoR) with respect to their relatively slower FoRs but the mass will be increased, as stated by our current understanding of equations of special relativity.

There is also a fundamental statement about accelerating charges, that they emit photons - thus, this process of emission of photons make them stable in their FoR and unstable in ours, as explained by Heisenberg's Uncertainty Principle & matter is made of atoms, atom is made of charged particles, thus combination of them leads to the statement that moving matter i.e., mass emits photons & loss their energy, which is obvious.

From the forementioned view, we can restate the relativistic mass equation in the same way as that of the equations for length & time, and redefine as, if a mass approaches the velocity of light (c), its mass will reduce due to the emission of its energy in the form of photons, as due to the acceleration of their charged constituents like electrons & quarks as a whole & on attaining the c, mass will become zero, as everything will be converted to photons.

Thus, the reframed relativistic mass equation is,

$$\text{Relative Mass} = \text{Rest Mass}/\text{LF}.$$

The total energy of the system will be given by,

$$\text{Total Energy (Rest Mass} \times c^2) = \text{Energy Lost ((Rest Mass - Relative Mass)} c^2) + \text{Remaining Energy (Relative Mass} \times c^2).$$

The relation between momentum and energy will be rewritten as,

$$(\text{Rest Mass} \times c^2)^2 = p^2 c^2 + (\text{Relative Mass} \times c^2)^2.$$

Now the beginning equation, where the gravity is given by, $g° = G° E/R^2$ (° - used to differentiate the similar terms from the Newton's Law Of Universal Gravitation, F), this equation defines gravity as the potential or tendency of a mass to regain its lost energy in attaining its current position in the universe.

That is, for example to determine the g° (gravity) on the surface of the Earth, we need to calculate the Energy Lost By The Earth In Attaining Its Current Position In The Universe, since moving object losses energy as explained before, the velocity of the Earth with respect to the Universe's FoR has to be calculated first, the velocity of the Milky Way Galaxy with respect to the Universe's FoR is said to be 6×10^5 m/s [1], velocity of the Sun with respect to Milky Way's Galactic Centre is said to be 2.3×10^5 m/s [2], & lastly the velocity of the Earth with respect to the Sun's FoR is 2.98×10^4 m/s, on adding these three we will get the effective velocity of the

Earth with respect to the Universe's FoR, which is 8.598×10^5 m/s, & the known mass of the Earth (5.97×10^24 Kg) is actually the Relative Mass with respect to the Universe's FoR & not the Rest Mass, thus by substituting the both values in the reframed relativistic mass equation, we will get the Rest Mass of the Earth as 5.97002451880×10^24 Kg & the difference with its rest mass is 2.45188×10^19 Kg, its product with $c^2$ gives the Energy as 2.20669×10^36 J & this energy has to be added with the rotational kinetic energy of the Earth, which is 2.59019×10^29 J. Thus, the net total loss in energy of the Earth in attaining its current position in the universe is, 2.206692259019×10^36 J.

Thus, the energy lost has been calculated, the R refers to the Radius of the Earth (6.378×10^6 m), then the constant G° (1.83662×10^-22 m/kg), whose value is calculated by taking average for the calculated G° values by substituting the values for remaining terms in the equation for every other planets [3]. The values of G° resulted are for,

Sun = 1.93615129×10^-22 m/kg

Mercury = 1.733490151×10^-22 m/kg

Venus = 1.789179679×10^-22 m/kg

Earth = 1.806563211×10^-22 m/kg

Moon = 1.785859743×10^-22 m/kg

Mars = 1.822266776×10^-22 m/kg

Jupiter = 1.750092844×10^-22 m/kg

Saturn = 1.632386751×10^-22 m/kg

Uranus = 1.87012094×10^-22 m/kg

Neptune = 1.895268909×10^-22 m/kg &

Pluto = 2.181494971×10^-22 m/kg.

And the Gravity (g°), resulted is 9.96304 m/s².

Thus, for a two body system, namely A & B, the value of F° on A due to B and on B due to A are equal, which also equal to the value calculated by Newton's Law Of Universal Gravitation (NLOUG), if the system is within our FoR. The explanation of F° is, that the force is due to the potential or tendency of a mass to attract the other mass inorder to regain its energy lost in attaining its current position in the universe (since, mass is composed of energy, which is according to Einstein's E = m c² equation, and is interconvertable - as in the case of Cosmic Ray Showers, where pair production & annihilation are seen), unlike NLOUG, where the only common statement is, that the force is due to a mass attracting the other mass.

There is a very high possibility that the value of G in the NLOUG only applicable for our FoR or similar FoR but not for all. Currently, as it may be valid due to the coincidental proportionality i.e., the quantity of a mass in a FoR is directly proportional to the Energy Lost by the mass in the same FoR, thus the G value changes with change in FoR. The forementioned g° equation has high significance as it defines gravity of an object from Universe's FoR & so can be universally applicable. The equation itself also conversely proves that the Universe's FoR is at rest & will greatly assist in the development of the Theory of Everything, moving forward.

## REFERENCES:

1. https://en.m.wikipedia.org/wiki/Milky_Way

2. https://en.m.wikipedia.org/wiki/Galactic_year

3. https://nssdc.gsfc.nasa.gov/planetary/factsheet/