Modified Equations of Newtonian Dynamics (MEND) vs Modified Newtonian Dynamics (MoND)

Vito R. D'Angelo (vrd156@aol.com) (646-369-2506) August 8, 2016

Abstract

Asking the question: What if the Newtonian gravitational constant G, is inherently comprised of segmented values?

Modified Equations of Newtonian Dynamics **(MEND)** as an alternative to Modified Newtonian Dynamics **(MoND**), by postulating the Newtonian constant of gravitation G, as an *aggregate of constants*. A mechanism by which the galactic rotation curves could be explained by utilizing the segmented values of G. The sacrosanct doctrine of non-variability of G is preserved. The view is taken that the author of MoND, Dr.Milgrom unwittingly stumbled upon the segmented values of the Newtonian constant of gravitation, [1]

Introduction

A constant is a constant, is a constant, period. The universe is bound by physical laws. Constants are fundamental percepts of the laws of physics. If constants weren't constant there would be no laws of physics. This has been the greatest obstacle in accepting the varying constant concept of the Modified Newtonian Dynamics (MoND), and rightfully so. But, what if the Newtonian constant of gravitation is an aggregate of other constants? The next undiscovered onion layer, so to speak. We already have such constants that are aggregates of other constants in the Standard Model. Examples: [2]

Fine structure constant, $\alpha = e^2/4\pi\epsilon_0\hbar c$

Rydberg constant, $R_\infty = \alpha^2 m_e c/2h$

Reduced Planck constant, $\hbar = h/2\pi$

Planck time, $tp = lp/c$

Einstein's energy equation, $E = mc^2$

So why can't the Newtonian constant of gravitation G, be an aggregate of other constants? Let's not forget that it is one of the least known of the constants. Gravity, the greatest force in the universe is not included in the standard model.

Modified Equation of Newtonian Dynamics (MEND) (7 segments)

(Equations in brackets as constants in their own right)

$G = [Y'*c^5] = 1.969943969 \times 10^{-11}\ m\ s^{-2}$
(1 segment)

$G = [Y'*c^5]\ [e/(c*Ⓟ*10^7)] = 2.073497578 \times 10^{-10}\ m\ s^{-2}$
(2 segments)

$G = [Y'*c^5]\ [e/(c*Ⓟ*10^7)]\ [\alpha^{-1}/(h/Ⓟ)] = 2.177319966 \times 10^{-10}\ m\ s^{-2}$
(3 segments)

$G = [Y'*c^5]\ [e/(c*Ⓟ*10^7)]\ [\alpha^{-1}/(h/Ⓟ)] / [\pi] = 6.930624704 \times 10^{-11}\ m^3\ kg^{-1}\ s^{-2}$
(4 segments)

$G = [Y'*c^5]\ [e/(c*Ⓟ*10^7)]\ [\alpha^{-1}/(h/Ⓟ)] / [\pi] / [½ħ/Ⓟ] = 6.673694115 \times 10^{-11}\ m^3\ kg^{-1}\ s^{-2}$
(5 segments)

$G = [Y'*c^5]\ [e/(c*Ⓟ*10^7)]\ [\alpha^{-1}/(h/Ⓟ)] / [\pi] / [½ħ/Ⓟ] / [c/(c-(\alpha^{-1}/(h/Ⓟ)))] = 6.673693882 \times 10^{-11}\ m^3\ kg^{-1}\ s^{-2}$
(6 segments)

$G = [Y'*c^5]\ [e/(c*Ⓟ*10^7)]\ [\alpha^{-1}/(h/Ⓟ)] / [\pi] / [½ħ/Ⓟ] / [c/(c-(\alpha^{-1}/(h/Ⓟ)))] / [c/(c-\alpha)] = 6.673693866 \times 10^{-11}\ m^3\ kg^{-1}\ s^{-2}$
(7 segments)

(within CODATA value: $G = 6.67384\ (80) \times 10^{-11}$) $m^3\ kg^{-1}\ s^{-2}$

Where: $Y' = 8.134865168 \times 10^{-54}$ (fundamental unit)
$c = 299792458$ (speed of light)
$e = 1.602176511 \times 10^{-19}$ C (elementary charge)
$Ⓟ = lp * \pi = 5.077383865 \times 10^{-35}$ m (Planck circumference)
$\alpha^{-1} = 137.0359996$ (inverse fine structure constant)
$h = 6.626068909 \times 10^{-34}$ J s (Planck's constant)
$\pi = 3.141592654$ (pi)
$\alpha = 0.007297353$ (fine structure constant)
$½ħ = 5.27285810 \times 10^{-35}$ m (half of the reduced Planck constant)

$[Y'*c^5] = 1.969943069 \times 10^{-11}\ m\ s^{-2}$
$[e/(c*Ⓟ*10^7)] = 1.052566779$
$[\alpha^{-1}/(h/Ⓟ)] = 10.5007114$
$[½ħ/Ⓟ] = 1.038499006$
$[c/(c-(\alpha^{-1}/(h/Ⓟ)))] = 1.000000035$
$[c/(c-\alpha)] = 1.000000002$

Alternate format:

$$G = \left[\frac{\left[\frac{\left[Y' * c^5 \right] \left[\frac{e}{c * Ⓟ * 10^7} \right] \left[\frac{\alpha^{-1}}{\frac{h}{Ⓟ}} \right]}{[\pi]} }{\left[\frac{½\hbar}{Ⓟ} \right]} }{\left[\frac{\frac{c}{c - \left(\frac{\alpha^{-1}}{\frac{h}{Ⓟ}} \right)}}{\left[\frac{c}{c - \alpha} \right]} \right]} \right]$$

Alternate expression:

$$G = \frac{lp * c^3}{2\pi \left[\frac{(½)\hbar}{Ⓟ} \right]}$$

Where: lp = 1.61611480 x10^{-35} m (Planck length)

c = 299792458 (speed of light)

½ħ = ħ/2 = 5.272656101 x 10^{-35} J s (half of the reduced Planck constant)

Ⓟ = lp*π = 5.077383865 x10^{-35} m (Planck circumference)

Discussion

The position is taken that contemporary estimates of dark energy / matter are correct. And, that Milgrom's calculations reflect a segmented value of G; not a varying value of G. [4]

The segmented values of the Newtonian constant of gravitation G, as an outcome of an investigation in the theoretical calculation of the fundamental constants. Something that has never been done before. The values of all constants (standard model) have been derived solely by measurement. Utrixical theory attempts to address the conundrum of the missing mass via the segmented values of G, without invoking a varying G.[5]

It is postulated that all of creation, from galaxies to particles can be extrapolated to the fundamental unit Y'. Where aggregates of the fundamental unit Y', form the foundation of the constants. A generalized overview of Utrixical theory is shown below.

Postulates of Utrixical theory

1) The existence of a fundamental unit / building block, denoted Y', which is more than 35 orders of magnitude smaller than the elementary charge. (The only hypothetical in Utrixical theory)

a) the attributes of the fundamental unit, Y': charge, energy, mass, length, speed, magnetism, temperature, etc., as the binding adhesives of creation.

b) The charge attribute as the *one* force. Defining the four forces: gravity, the electro-magnetic, weak and the strong forces as manifestations of the *one* charge force, within a classical framework.

c) The double function of (gravity) the charge force: 1) the binding force in atomic structure (matter). 2) The collective charge pressure of Y' units in between subatomic particles, planets, stars, galaxies, etc. The voids with the greatest concentration of Y' units pressure (dark matter / energy) as the mechanism of galactic stability. The double function of gravity (attractive force of matter to matter and the repulsive force of the collective indivisible Y' units, as a pressure) the self-similarity (fractal) nature of nature, .e.g., north and south poles of magnetism; positive and negative of electricity, matter / anti-matter creation, (Yin and Yang, so to speak) etc.

2) The equivalency principle of the fundamental unit, Y'- at the fundamental level, the attributes of matter, (i.e., charge, energy, mass, length, speed, magnetism, temperature and by extension all units) are equivalent. All units equate to the same value: 8.134865168^{-54}.

3) Groupings of fundamental units Y', give rise to the fundamental constants. i.e., all fundamental constants can be derived purely from specific groupings of fundamental units, Y'.

4) The value of the inverse of the elementary charge as the number of fundamental Y' units, gives rise to the Planck length.

5) The dual role of π as the catalyst of structure and beginning of time.

6) The theoretically enumerated Planck length to manifest its value as a terminating decimal. (the inverse of the elementary charge, e; multiplied by the fundamental unit, Y' ; then divided by π, i.e., $lp = (\frac{1}{e} * Y')/\pi$

7) The simplification / reduction of the four dimensions to three. Elucidating time, not as a dimension, but as a process of decay. Time defined as structure dependent.

8) Postulating a ground state universe of absolute 0, prior to time and after time. In its short period of existence since its birth, (13.7 billion years) the universe has managed to reverse its temperature from the Planck temperature of $1.416785(71) \times 10^{32}$ K to 2.7 K above absolute zero!

9) Introducing a new constant, the Planck circumference, Ⓟ = $(\frac{1}{e} * Y')$, the inverse of the elementary charge multiplied by the fundamental unit Y'. The first π, first structure, first time.

10) Re-introducing, half of the reduced Planck constant, ½ħ. "The Forgotten constant".

11) Subset of new constants (ratios), that provide the connectedness to the relationships of fundamental constants. Also as components of the known constants. [3] [4]

Conclusion

Utrixical theory defines gravity as having a dual role: 1) as the attractive force between two particles / two masses and 2) As a cosmic pressure of fundamental units Y' on matter. Analogous to fruit in a jello-bowl, where the fruit is the mass, and the jello is the pressure that keeps it in place.

Milgrom's **MoND** value of: **1.2×10^{-10} ms^{-2}** is close to the second segmented value (**2.07×10^{-10} ms^{-2}**) of the Modified Equation of Newtonian Dynamics **(MEND)** to warrant an investigation.

Acknowledgement

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References

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[4] Bekenstein, Magueijo , arXiv:astro-ph/0602266vl 12 Feb 2006

[5] Blanchet, Luc. arXiv:1105.5815vl [astro-ph.CO] 29 May 2011