Calculating an accurate and precise value for the gravitational constant, *G*, independent of electromagnetic interaction.

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Abstract

The two most accurate measurements of Newton's gravitational constant contradict one another[1,2]. By using the universal system of units, the value of the gravitational constant (*G*), independent of electromagnetic interaction, can be determined with greater accuracy and precision than measured values. The calculated and measured values of the gravitational constant differ, suggesting a localised gravitational constant.

Introduction

Calculation of the Gravitational constant is dependant on two assumptions: our four-dimensional universe is symmetrical and; has it's own intrinsic set of units, which I refer to as *Universal units.*

The defining characteristic of Universal units is: all symmetrical universal constants equal one, when expressed in universal units. Universal constants are ratios, used to convert values between units when an alternative unit system is used, such as the International System of Units (S.I.). Symmetrical universal constants include: Planck constant (*h*) and; Speed of light in a vacuum (*c*). Asymmetrical universal constants are made symmetrical before use in any calculations, they include: Gas constant (*R*); Avogadro's constant (N_A); Boltzmann constant (*k*) and; Gravitational constant (*G*). I propose, the electron mass, m_e, as the universal unit for mass.

Formulas

$$E = hf = mc^2 = 3PV = 3nRT$$

where n is the number of moles

$$g = \frac{GM}{2R^2}$$

$$F = \frac{GMM}{R^2}$$

Calculations

Applying symmetry to the Gas constant (*R*), Avogadro's constant (N_A) and Boltzmann constant (*k*)

Let $N_R = N_A / 3R$ & $k_R = 3k$ such that $N_R k_R = 1$, derived from $N_A k = R$

$N_R = 2.414\ 321\ 274\ (4544) \times 10^{22}$ molecules = 1 Shrew (shr)

$k_R = 4.141\ 950\ 9\ (72) \times 10^{-23}\ \mathrm{J.K^{-1}}$

Applying symmetry to the Law of Gravitation

The strength of gravity (*g*) is inversely proportional to the surface area of a sphere, with radius (*r*) equal to the distance from the centre of the mass.

$$g_1 = k_m m_1 / 4\pi r^2$$

The attractive force between two masses is the sum of, the cross-product of each mass and the opposing gravitational field.

$$F = m_1 g_2 + m_2 g_1$$

$$= 2k_m m_1 m_2 / 4\pi r^2$$

$$k_m = 2\pi G$$

Calculating the Gravitational constant

The universal unit for Mass (M) is given by: $M^2 = ch / k_m N_R^2$

$k_m = ch / M^2 N_R^2$

substitute $M = m_e$ $k_m = ch / (m_e N_R)^2$

where $k_m = 2\pi G$ $G = ch / 2\pi (m_e N_R)^2$

$G = 6.536\ 252\ 677\ (26145) \times 10^{-11}\ m^3 kg^{-1} s^{-2}$

The two most accurate measurements of Newton's gravitational constant, from Sevres[1] and Wuhan[1] are:
$6.675\ 59\ (27) \times 10^{-11}\ m^3 kg^{-1} s^{-2}$ and, $6.669\ 9\ (7) \times 10^{-11}\ m^3 kg^{-1} s^{-2}$, respectively.
The calculated value is, 2.08% and 2.00% lower than these values, respectively.

By definition of the universal units, all measured values should match the calculated value exactly or be within the error range. As neither of the two, above mentioned, measured values are within this range it is acceptable to state: additional influence(s) are affecting the measurements of the gravitational constant and; these influence(s) are producing a localised gravitational constant different from the universal standard. Four possible explanations for this difference are as follows:

1• The experimental methods used to measure Newton's gravitational constant are susceptible to electromagnetic interaction, including diamagnetic levitation. If significant, variations in: latitude; planetary mass; planetary radius; height above the planetary radius; the strength of the Earth's magnetic field; the density, type and magnetic susceptibility of the material used in the experiment; would all effect the measured values. The difference of 2.00-2.08% is consistent with the Podkletnov effect[3], which notes a maximum 1.9-2.1% change in mass when a rotating superconductor excludes the Earth's magnetic field. As such, electromagnetic interaction is the most likely explanation.

2• An error in the electron mass (m_e) of only 1.06% would account for the 2.08% error in the gravitational constant. A possible source of the error would be the relativistic effects on a fast moving electron.

3• The electron is not a discreet particle, and is instead an aggregate of smaller particles. Although possible, this explanation is unlikely as the smaller particles would be at least ninety-fold smaller than the electron to account for the 1.06% difference.

4• Theory of gravitational dilation which will be discussed in another paper.

Calculating universal units

N_R, k_R, k_m are symmetrical universal constants.

The universal units for Mass (M), Length (L), Time (T), Temperature (K) and, Quantity (N) are given by:

$$M^2 = ch / k_m N_R^2$$

$$L^2 = k_m h / c^3$$

$$T^2 = k_m h / c^5$$

$$K^2 = hc^5 / k_m N_R^2 k_R^2$$

$$N = N_R$$

substitute $k_m = ch / (m_e N_R)^2$

Base Universal units and S.I. values

$M = m_e$ $= 9.109\ 381\ 88\ (72) \times 10^{-31}$ kg

$L = h / m_e N_R c$ $= 1.004\ 965\ 760\ 5\ (20495) \times 10^{-34}$ m

$T = h / m_e N_R c^2$ $= 3.352\ 204\ 946\ (6837) \times 10^{-43}$ s

$K = m_e c^2 / N_R k_R$ $= 8.187\ 104\ 140\ (647) \times 10^{-14}$ K

N_R $= 2.414\ 321\ 274\ (4544) \times 10^{22}$ molecules = 1 Shrew (shr)

Derived Universal units and S.I. values

$V = c$ $= 2.997\ 924\ 58 \times 10^{8}$ $m.s^{-1}$

$E = m_e c^2$ $= 8.187\ 104\ 140\ (647) \times 10^{-14}$ J

Universal Formulas

$$E = f = m = 3PV = nT$$

where n is the number of shrews

$$g = \frac{M}{2R^2}$$

$$F = \frac{MM}{R^2}$$

Summary

The Gravitational constant can be calculated from symmetrical universal units. The value of the Gravitational constant, *G*, independent of electromagnetic interaction, is given by:

$$G = ch / 2\pi(m_e N_R)^2$$

and has an approximate value of:

$$6.536\ 252\ 677\ (26145) \times 10^{-11}\ m^3 kg^{-1} s^{-2}$$

Universal constants[4]

N_A	= 6.022 141 99 (47) x 10^{23}	mol^{-1}
R	= 8.314 472 (15)	$J.K^{-1}.mol^{-1}$
k	= 1.380 650 3 (24) x 10^{-23}	$J.K^{-1}$
h	= 6.626 068 76 (52) x 10^{-34}	J.s
m_e	= 9.109 381 88 (72) x 10^{-31}	kg
c	= 2.997 924 58 x 10^{8}	$m.s^{-1}$
π	= 3.141 592 653 589 793 238 ...	

References

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