Universal Gravitational Constant Via Rydberg Constant

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Abstract: Using the formula with the proton mass and the Rydberg constant, I obtained the value of the universal gravitational constant by three orders of magnitude more accurate than the recommended CODATA values [1].

Introduction

All the introductory considerations and formulas used in [2] apply to this article.

Formula for G

Let's define mathematical constants:

$t = \log(2\pi, 2) = 2.651496\ldots$, **Cycle - $cy = e^{2\pi} = 535.49165\ldots$, Half-cycle - $z = e^{2\pi}/2 = 267.74582776\ldots$**

And physical constants – inverse fine structure constant and proton-to-electron mass ratio:

ά $= 137.035999074$, μ $= 1836.15267245$ from [1]

From [2] we have the formula:

$$p = e^{2\pi} - 2 + \frac{1}{\mu/\alpha' + 2} = 265.8107668 \tag{1}$$

If m_p is proton mass and R_∞ is Rydberg constant, the approach identical to those used in my other articles published at [3] gives the formula:

$$G = c^2 * (2 * \mu * \alpha'^2 \, m_p R_\infty)^{-1} * 2^{(z - 3p/2 + t/2)} \tag{2}$$

All the physical quantities in (2) were determined experimentally with high precision.

Testing the formula for G

Here I will test formula (2), using the historical CODATA values. The CODATA values for **ά, μ, R_∞, m_p** are shown in columns 1, 2, 4 and 5 of **Table 1** and we can see that all the four physical constants in year 2010 [1] have at least two significant digits more than **G**, while the speed of light **c** in the third column is exact by definition.

The seventh column of Table 1 shows the value of G determined by the formula (2): the upper level **G'**, according to CODATA values of **ά, μ, R_∞, m_p** for the corresponding year, and the lower value **G.** The upper and lower values determine the uncertainty +/-1σ, shown in brackets. Value **(G'- G)/2** has been adopted to represent **1σ**.

Table 1 Determining universal gravitational constant G by the Rydberg constant

$p=cy/2-2+1/(μ'/ά+2)$ $p'=cy/2-2+1/(μ/a'+2)$	$G'=c^2*(2*μ*ά^2*m_p*R'_∞)^{-1} *2^{(cy/2-3p/2+t/2)}$ $G=c^2*(2*μ'*ά'^2*m'_p*R'_∞)^{-1}*2^{(cy/2-3p'/2+t/2)}$				$t=\log(2p,2)$	$=2.651496…$ formula
Year	CODATA Values [1]: $ά=1/alpha$	$μ=m_p/m_e$	c (m/sec)	Rydberg const $R_∞*10^7 m^{-1}$	m_p $*10^{-27}$ kg	G $*10^{-11}$	value G $kg^{-1}m^3s^{-2}$
1969	137.03602(21)	1836.1090(110)	299792500	1.09737312(11)	1.672614(11)	6.6732 (31)	6.67402(11)
1973	137.036040(110)	1836.15152(70)	299792458	1.097373177(83)	1.6726485(86)	6.6720(41)	6.673729(49)
1986	137.0359895(61)	1836.152701(37)	299792458	1.0973731534(13)	1.6726231(10)	6.67259(85)	6.6738316(48)
1998	137.03599976(50)	1836.1526675(39)	299792458	1.0973731568549(83)	1.67262158(13)	6.673(10)	6.67383674(59)
2002	137.03599911(46)	1836.15267261(85)	299792458	1.0973731568525(73)	1.67262171(29)	6.6742(10)	6.6738363(12)
2006	137.035999679(94)	1836.15267247(80)	299792458	1.0973731568527(73)	1.672621637(83)	6.67428(67)	6.67383653(35)
2010	137.035999074(45)	1836.15267245(75)	299792458	1.0973731568539(55)	1.672621777(74)	6.67384(80)	6.67383603(31)

Table 1 shows that the value of G determined by formula (2) already in the year 1969 achieved the accuracy from the year 2010 in [1]. The value of G determined by formula has as much as three significant digits more than the CODATA values and one significant digit more than in article [2]. The improvement originated in the fact that the value of the Rydberg constant is the known with two significant digits more than the Compton proton wavelength which was used in [2].

Conclusion

The article shows the predictive power of formula (2) for determining the value of the universal gravitational constant G by applying physical constants whose experimental determination gives the values m uch more accurate than the experimentally obtained G. The formula (2) testing results also confirm that the other results obtained by the same approach and published at [3] are not a coincidence and mere numerology.

I am aware of the fact that I have not shared the full theoretical explanation. For now I prefer to prove my concept by the quantity of its applications than to go through the toil of providing theoretical considerations, reviews, translations and peer reviews.

To put it in one sentence, the concept is: ***Parts are dependent on the whole (Universe) and are also an integral part of the whole, therefore, the whole is also dependent on the parts!*** This position implies that the concept is based on the fundamental importance of the relation between the parts and the whole, and if that position is wrong, then all the obtained results are a coincidence.

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References:

1. http://physics.nist.gov/cuu/Constants/
2. Branko Zivlak, Universal Gravitational Constant Via Proton, http://viXra.org/abs/1310.0018
3. viXra.org open e-Print archive