

Adjustments and Readjustments

Marc Pérez Mateos 

Instituto Anna Murià, Terrassa, Spain

Email: neomarc1978@gmail.com

How to cite this paper: Mateos, M.P.
(2026) Adjustments and Readjustments.
Journal of High Energy Physics, Gravitation and Cosmology, 12, 2304-2308.
<https://doi.org/10.4236/jhepgc.2026.124116>

Received: July 16, 2026

Accepted: October 17, 2026

Published: October 20, 2026

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Abstract

In this manuscript, I aim to determine and refine Newton's universal gravitational constant, G , achieving the highest possible precision. Once determined, I intend to apply this value to several areas of interest—specifically, three distinct topics. Determining a more precise value for Newton's constant is not overly complex; it simply requires using accurate data and organizing it mathematically. The three specific areas I address here—where improvements can be made—concern quantum mechanics, the mass of the Sun, and escape velocity. I have formulated the value of Newton's constant (G) presented in this manuscript so that it may be used and applied across all areas of physics where G appears.

Keywords

Newton's Gravitational Constant, Universal Gravitational Constant, Gravitational Physics, Precision Measurement, Escape Velocity

1. Introduction

This manuscript focuses on Newton's universal gravitational constant (G).

Newton's constant G is one of the universal constants with the greatest uncertainty we currently encounter, and finding it accurately remains an experimental challenge. In recent years, attempts to find G have been unsuccessful; all experiments and data differ from one another, but surely some of the experimental data or measurements of G are correct. The margin of error in experiments can be as low as 0.01 (1%) or even 0.02 (2%).

In my opinion, we can calculate the constant G with high accuracy or precision through theoretical reasoning. My task in this manuscript is to find G with high precision and apply it to several equations; for this, I will use a small and simple Newtonian equation. Determining the value of G theoretically is not complicated, since simplicity often leads to the correct answer.

And after this brief introduction, I will try to shed some light on the great unknown and mysterious value of Newton's constant G .

2. Theoretical Development

Thanks to NASA scientists, we know the Earth's mass with considerable accuracy. They calculated this using the Moon's movement, specifically its orbital period around the Earth. This data, the Earth's mass, is crucial for accurately determining the value of the gravitational constant G .

According to NASA, the Earth has a mass equal to $M_{\oplus} = 5.9722 \times 10^{24} \text{ kg}$.

Using the Earth's mass and two other pieces of information, we can find the value of G with great precision.

These pieces of information are:

The gravitational intensity at the Earth's surface, measured in a laboratory:

$$g = 9.80665 \text{ m/s}^2$$

The Earth's mean radius, whose exact value is:

$$R_T = 6371000 \text{ meters}$$

With these three highly precise data points, we can calculate G with maximum accuracy, and we will call this new value " G_c " (correct G). The Newtonian equation is exactly:

$$G_c = gR_T^2 / M_{\oplus}$$

$$G_c = 6.665021314 \times 10^{-11} \text{ N} \cdot \text{m}^2 / \text{kg}^2$$

And this data is the most precise value for Newton's constant that logic can offer.

It is a mathematical certainty.

The currently used value of G is $G = 6.67430 \times 10^{-11} \text{ N} \cdot \text{m}^2 / \text{kg}^2$.

What happens if we try to find the mass of the Earth using the current value of G ? The following occurs:

$$M_{\oplus} = gR_T^2 / G$$

$$M_{\oplus} = 5.963897381 \times 10^{24} \text{ kg}$$

It's clear that this data is incorrect; therefore, the current value of G is obsolete and useless.

The relative margin of error E_r between G and G_c is equal to:

$$E_r = (G - G_c) / G_c, \quad E_r = 0.001392146486 (0.139\%)$$

It is fortunate that Earth's gravitational intensity can be accurately measured in the laboratory.

And once we have found the new and correct Newton's universal gravitational constant, we will proceed to make several adjustments to some data considered correct [1].

Quantum Mechanics

According to the following equation, we can find a value for G .

The formula is

$$G = \ell_p^2 c^3 / \hbar$$

$$G = 6.674299 \times 10^{-11} \text{ N} \cdot \text{m}^2 / \text{kg}^2$$

where ℓ_p is the Planck length $\ell_p = 1.616255 \times 10^{-35}$ meters, c is the speed of light $c = 299792458 \text{ m/s}$, and $\hbar$ is the reduced Planck constant $\hbar = 1.054571817 \times 10^{-34} \text{ J} \cdot \text{s}$.

The equation results in the currently accepted constant G , but we've already seen what happened with this value of G when calculating the Earth's mass; G is incorrect. What we've done is adapt Planck's constants to Newton's constant, not the other way around. The incorrect value, by elimination, is the Planck length ℓ_p . We'll quantify it by including G_c , and we'll call it ℓ_{px} .

The equation is as follows

$$\ell_{px}^2 = \hbar G_c / c^3$$

$$\ell_{px} = 1.615131165 \times 10^{-35} \text{ meters}$$

Between ℓ_p and ℓ_{px} , there is a relative difference $E_r = (\ell_p - \ell_{px}) / \ell_{px}$.

$$E_r = 0.0006958165531, 6.95816 \times 10^{-4}, (0.0695\%)$$

And of course, the Planck time t_p is also affected, since $t_p = \ell_p / c$.

Therefore, the new value of t_p is equal to:

$$t_p = \ell_{px} / c, \quad t_p = 5.387437452 \times 10^{-44} \text{ seconds} \quad [2]$$

The mass of the Sun.

Another example I want to give is the mass of the Sun using the correct equation, G_c .

The famous equation that solves it would be the following:

$$(M_\odot + M_\oplus) = 4\pi^2 a^3 / G_c T^2 \text{ kg}$$

$M_\odot$ is the mass of the Sun, to be deduced.

$M_\oplus$ is the mass of the Earth, $5.9722 \times 10^{24} \text{ kg}$.

π is the number pi.

a is the semi-major axis of the Earth-Sun ellipse, 149,597,870,700 meters.

G_c is Newton's constant, correct, $6.665021314 \times 10^{-11} \text{ N} \cdot \text{m}^2 / \text{kg}^2$.

T is the period of revolution of the Earth around the Sun, 31,558,146 seconds.

The mass of the Sun has a value of $M_\odot = 1.991178368 \times 10^{30} \text{ kg}$.

This data has a relative difference of 0.001043787 (1 thousandth).

Calculated with G gives a mass equal to $M_\odot = 1.988410202 \times 10^{30} \text{ kg}$, this data is short, in my opinion [1] [3].

Escape Velocity (v_e)

The famous escape velocity is the speed an object must reach to escape the gravitational pull of a sphere forever.

The escape velocity of Earth, using the current gravitational constant G , is equal to:

$$v_e = 11186.1652 \text{ m/s}$$

Using the new, correct Newton's constant G_c , the equation for Earth's escape velocity is:

$$v_e'^2 = 2G_c M_\oplus / R_T$$

$$v_e' = 11178.38693 \text{ m/s}$$

Between the two results, we find an absolute margin of error $E_a = v_e - v_e'$
 $E_a = 7.77827 \text{ m/s}$.

And a relative margin of error $E_r = 0.000695831165(6.9583 \times 10^{-4})$.

This demonstrates that G_c is more accurate [1].

3. Discussion

I am referring to the Earth's radius, $R_T = 6,371,000$ meters; although this value may appear to be rounded—either up or down—it is not; this figure represents the radius the Earth would have if it were a perfect sphere, and it is well measured and exact.

Out of curiosity, I'd like to know what the Earth's radius would be if calculated using the current value of the gravitational constant G ,

$$R_T^2 = GM_\oplus / g$$

$$R_T = 6375433.14 \text{ meters}$$

We found an absolute margin of error of $E_a = 4433.14029$ meters, that is, a significant discrepancy. This result suggests that the current value of G is incorrect. The three data points presented at the beginning of the theoretical discussion are exact, or at the very least highly precise. This demonstrates that Newton's constant G_c is highly precise.

There is no more accurate method than the one presented here for calculating the value of G_c in a purely theoretical manner.

And now we must continue to wait for the experimental results, and everything seems to indicate that we will need a great deal of patience.

4. Conclusions

Sometimes, as physicists, we complicate our lives so much that we forget the fundamentals, the basics, simplicity, and coherence. In this short paper, I have attempted to shed light on the subject by identifying the "correct G constant"— G_c —and treating it as the most accurate possible value for Newton's constant based on theory; I hope I have succeeded.

To this end, I have presented three clear examples—and no more, since the idea has already been made clear. I have provided the exact data, without rounding, and included the decimal places I deemed appropriate.

Personally, I consider G_c to be correct, exact, or nearly exact, and I believe I have demonstrated this; the equation to deduce it has always been right there, right under our noses—the three exact data points: the Earth's mass, the Earth's

mean radius, and the exact gravitational intensity at the Earth's surface as measured in the laboratory.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

- [1] Newton, I. (1687) *Philosophiae Naturalis Principia Mathematica*.
<https://doi.org/10.5479/sil.52126.39088015628399>
- [2] Planck, M. (1900) On the Law of Distribution of Energy in the Normal Spectrum [Zur Theorie des Gesetzes der Energieverteilung im Normalspektrum]. *Annalen der Physik*, **4**, 553. <https://strangepaths.com/files/planck1901.pdf>
- [3] Lea, R. (2021) Kepler's Third Law: The Movement of Solar System Planets.
<https://www.space.com/keplers-third-law>