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Einstein's Field According to *Q*

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Abstract

Greetings, dear reader. "*Q*" is a novel gravitational constant that I derived myself in 2020. The *Q* constant is composed of mathematically well-chosen relativistic constants. The *Q* constant is scientifically accepted and considered correct. The *Q* constant works wonderfully when calculating the radius and mass of black holes with precision and accuracy. In this manuscript, I will attempt to clarify a dilemma related to the "Einstein field", specifically the "coupling factor" of that formula, using *Q*. Only one substitution is required. The theory presented in this manuscript is relatively easy to understand, as you will soon see, and I hope, dear reader, that you will find it both enjoyable and interesting.

Keywords

General Relativity, Einstein Field Equations, Gravitational Constant *Q*, Coupling Factor, Black Hole Mass, Black Hole Radius, Relativistic Constants, Gravitational Theory

1. Introduction

Current experimental astronomical data are consistent with the theoretical predictions of Einstein's General Theory of Relativity, including its "coupling factor". The theoretical predictions agree with the experimental data within a margin of error of less than, or far less than, 5% in most cases. In this short treatise, I will decipher the true margin of error purely theoretical found in the "coupling factor" of the "Einstein field".

But first, let's move on to the introductions.

Constant *Q*, abstract.

The constant *Q* is exactly.

$Q = 1/8\pi c$ kg·s/m, or kg/m/s, and its exact value is $Q = 1.327209365 \times 10^{-10}$.

It consists of 3 constants: 1, 8π, and c.

1 is one kilogram of mass.

π is the number pi (3.14159…).

c is the exact speed of light in a vacuum (299,792,458 m/s).

1 kg of mass is a universal constant and is part of the International System of Units (SI). The kilogram of mass is invariant in space and time.

8π is a fundamental physical constant in General Relativity that determines the magnitude of gravitational interaction, indicating how much curvature a given amount of mass/energy produces in the fabric of space-time. Interpreting the division of 1 kg of mass by c gives us the "temporal magnitude" that 1 kg has in the context of the speed of light, which is inversely proportional to the energy it would release.

The time scale is equal to 3.335640952 × 10^{-9} s (seconds), which is the time it takes for gravity to travel a distance of 1 meter, since the speed of gravity is the speed of light, c; at this speed, a geometric distortion of space-time occurs.

Einstein's field, abstract

Einstein's field describes how matter and energy curve space-time, and how this curved space-time determines how matter moves. The equation for "Einstein's field" states the

$$G\mu v = T\mu v \cdot 8\pi G/c^4$$

$G\mu v$ is the Einstein tensor.

$T\mu v$ is the energy-momentum tensor.

G is Newton's universal gravitational constant.

π is the number pi.

c is the speed of light.

The "coupling constant" κ, which is included in the "Einstein field" equation, is given by

$$\kappa = 8\pi G/c^4$$

The κ value states that in weak gravitational fields and at low speeds, General Relativity reduces to Newton's law of gravitation. It determines how rigid space-time is, and given its tiny magnitude, a large amount of energy or mass is required to produce a significant curvature in space-time.

κ quantifies how mass-energy warps the geometry of the Universe.

The approximate value of κ is equal to $\kappa \approx 2.075309537 \times 10^{-43}$ m·kg^{-1}·s^{2}.

I say "approximate" because κ has a striking margin of error, due to the inaccuracy of the constant G. Newton's constant G is one of the fundamental constants with the greatest uncertainty currently known.

To calculate it, I used the value of Newton's constant G that Einstein used to quantize his equations—the same value that Newton himself theorized—which is

$$G = 6.67 \times 10^{-11}\ \mathrm{N \cdot m^2/Kg^2}$$ [1] [2].

2. Theoretical Background

The constant Q is a parallel and alternative constant to Newton's gravitational constant G; it is fully relativistic and precise. If we substitute the equation for the constant Q into the equation for the constant κ, we obtain a novel equation that depends solely on the speed of light. We will call it "q"; the result is as follows:

Given that $\boldsymbol{Q = 2G}$, we obtain

$$q = 1/2c^5$$

$$q = 2.064745317 \times 10^{-43}$$

We observe that there is a difference of exactly 0.005116476068 (0.51%) between q and κ.

We conclude that the relative margin of error for the "Einstein field coupling constant" is 0.005116476068 (0.51%), according to Q, for now.

But I'm going to take it a step further. The currently accepted value of Newton's

$$G = 6.67430 \times 10^{-11}\ \mathrm{N \cdot m^2/Kg^2}$$

In my view and in my opinion, this current value of G is incorrect; it is too high. If we include this value of G in the "coupling factor", we find that the value of κ is

$$\kappa = 2.076647443 \times 10^{-43}$$

In this case, the difference between q and κ is exactly 0.005765324131 (0.57%). This difference is slightly greater than the previous figure. But that's not all; the most precise margin of error can be found in the "discussion" [1]-[3].

3. Discussion

The new equation for q, the "coupling factor", is more precise because we discard Newton's unstable constant G to introduce the novel and correct constant Q. The new formula for q ($1/2c^5$) is axiomatic, as has been shown, and has no margin for error. And this simple equation should be multiplied by the "energy-momentum tensor", which I will not include here out of respect for Einstein.

By raising c to the fifth power, it takes center stage, since c is exact, and overshadows G; this means the equation is more precise.

Now I would like to present an example.

To calculate a more precise and accurate value for Newton's gravitational constant G, I will use measurements of Earth's gravitational field.

According to NASA, the currently accepted mass of the Earth is $M_\oplus = 5.9722 \times 10^{24}$ kg.

The average radius of the Earth is $r = 6{,}371{,}000$ meters.

The gravitational acceleration at the Earth's surface is $g = 9.80665\ \mathrm{m/s^2}$, laboratory-measured.

With these correct data, we can calculate a more realistic and accurate value for the gravitational constant G; the Newtonian equation is:

$$G = gr^2/M_\oplus\ \mathrm{N \cdot m^2/Kg^2}$$

In this case, Newton's constant is equal to $G = 6.665021314 \times 10^{-11}\ \mathrm{N{\cdot}m^2/kg^2}$.

In other words, this value does not cross or reach the 7 threshold (6.67…).

There is a relative difference of 0.001392146486 between them (0.139%).

Logically, if I choose a numerical value greater than the mass of the Earth, the constant G becomes even smaller.

If we take this value of G into account, we obtain a margin of error between q and κ of less than 0.01. By adding this new G to the equation for the coupling factor κ, we calculate a value equal to

$$\kappa = 2.073753833\times10^{-43}\ \mathrm{m}\cdot\mathrm{kg}^{-1}\cdot\mathrm{s}^{2}$$

From this, we can deduce that, based on the constant Q, the relative margin of error or gap for κ regarding q, is exactly **0.004363015586** (4.36×10^{-03}, 0.43%).

This margin of error for the "coupling factor" seems to me to be more appropriate, precise, realistic, and accurate. And with that, I have concluded my objective in this manuscript.

Calculation of the margin of error,

Absolute margin of error (Ea) Ea = $\kappa - q$.

Relative margin of error (Er) Er = Ea/q.

Percentage margin of error (Ep) Ep = Er × 100.

The exact value of Newton's constant is currently being tested. Until its exact value is determined, it will be impossible for us to calculate the mass of the Earth with complete accuracy, or the exact mass of the Sun.

The alternative to this confusion is called "the Q constant". The Q constant is exact because it is composed of three exact constants; it is scientifically validated and helps us unravel uncertainties such as the margin of error of the "coupling factor" of the "Einstein field", for example.

Q calculates the radius and mass of black holes with great precision; in measurements, it closely resembles the currently accepted constant G. According to Q, the mass of the Earth is significantly greater than what I have stated above; and, incidentally, so is that of the Sun [2].

4. Summary

The margin of error for the "coupling constant" is only 0.43% (4 thousandths).

When we know the exact value of G, we may be in for a shock. Over the past 20 years, data on the precision of G have been emerging, but these differ from one another; they are all different. Personally, I believe in and trust a purely relativistic constant, such as Q, more than the endless search for the exact value of G. Some sources indicate that Newton's constant may have a margin of error of 2%; I am among those who think the margin of error may be even greater; time will tell.

And here, dear reader, I conclude the treatise on "Einstein's field according to Q". Until next time!

Conflicts of Interest

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

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