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Anti γ - Negation of Newton's constant γ.

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Abstract

Even under the most optimistic conditions, it is very difficult to measure Newton's gravitational constant γ with an extremely great accuracy, a great uncertainty in the measurement of this constant remains. The current uncertainty in Newton's constant γ is of the order of 0.15 %. Is there something like a cause for this uncertainty? Is Newton's constant γ really a constant? This publication will proof, that Newton's constant γ is not a constant, Newton's constant γ is changing all the time and is determined by the relationship

$$\gamma * (\text{Anti}\,\gamma) \leq (c^2) / 4 .$$

Key words: Anti γ, Newton's constant γ, General relativity, General Contradiction Law.

1. Background

According to the well known Newton's law of universal gravitation $F = \gamma * (m_1 * m_2) / r^2$, γ is the value of Newton's constant, a physical constant which appears in Einstein's theory of general relativity too. The recommended value of Newton's gravitational constant today is about $\gamma = 6.6742 \pm 0.001*10^{-11}$ [(m*m*m)/(s*s*kg)]. The first experiment (originally proposed by John Michell) to accurately measure Newton's gravitational constant γ was done by Henry Cavendish (Cavendish 1798). However, it is worth mentioning that it is difficult to measure Newton's gravitational constant γ with an extremely great accuracy. Even under the most optimistic conditions, there is still a great uncertainty in the measurement of this constant. The current uncertainty in Newton's constant γ is of the order of 0.15 %. What is the cause of this uncertainty, why is Newton's constant γ like it is, because of its own properties or because of a third?

2. Material and Methods

Newton's gravitational constant γ appears in Einstein's investigation of the relationship between energy, time and space too. In so far, Einstein's field equations of general relativity, which relate the presence of

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the curvature of space-time and matter, can be used to define Newton's gravitational constant γ. Thus, our starting point to proof whether Newton's gravitational constant γ is constant or not is Einstein's field equation.

2.1. Einstein's field equation.

Einstein's theory of general relativity, especially **Einstein's field equation** describes how energy, time and space are interrelated, how the one changes into its own other and vice versa. It needs Newton's gravitational constant γ for the description of space-time and vice versa. Newton's gravitational constant γ can be described by **Einstein's field equation**.

Einstein's basic field equation (EFE).

Let

R_{ab} denote the Ricci tensor,

R denote the Ricci scalar,

g_{ab} denote the metric tensor,

T_{ab} denote the stress-energy tensor,

h denote Planck's constant, h ≈ **(6.626 0693 (11)) * 10 $^{-34}$ [J * s],**

π denote the mathematical constant π, also known as **Archimedes' constant.** The numerical value of π truncated to 50 decimal places is known to be about

π ≈ 3.14159 26535 89793 23846 26433 83279 50288 41971 69399 37510,

c denote the speed of all electromagnetic radiation in a vacuum, the speed of light, where

***c* = 299 792 458 [m / s],**

γ denote Newton's gravitational 'constant', where

γ ≈ (6.6742 ± 0.0010) * 10 $^{-11}$ [m^3 / (s² * kg)],

Einstein's field equation describes how a field or energy (or matter) and time changes space and vice versa. Einstein's basic field equation (EFE) is usually written in the form

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / (c^4)) + ((R * g_{ab}) / 2)) = (R_{ab}). \quad (1)$$

The stress-energy-momentum tensor is known to be the source of space-time curvature and describes more or less the density and flux of **energy** and momentum in space-time in Einstein's theory of gravitation.

The metric of space-time is determined by the matter and energy content of space-time. The Ricci scalar/metric tensor completely determines the curvature of space-time and defines such notions as **future, past**, distance, volume, angle and ...

The Ricci tensor, named after Gregorio Ricci-Curbastro, is a key term in the Einstein field equations and more or less a measure of **volume distortion**.

3. Results

3.1. Newton's gravitational constant γ is not constant

Let us assume that Newton's gravitational constant γ is a constant. In so far the same can not change as such under any circumstances otherwise it would not be a constant. If this is correct, then the stress-energy-momentum tensor T_{ab} or the Ricci scalar/metric tensor ((R*g_{ab}) /2)) should not have any influence at all on the uncertainty in the measurement of Newton's gravitational constant γ. But it is equally true that especially **Einstein's field equation** doesn't work without Newton's gravitational constant γ .

Theorem 1. Newton's gravitational constant γ is not a constant**.**

Let

R_{ab} denote the Ricci tensor,

R denote the Ricci scalar,

g_{ab} denote the metric tensor,

T_{ab} denote the stress-energy tensor,

h denote Planck's constant, h **≈ (6.626 0693 (11)) * 10 $^{-34}$ [J * s],**

π denote the mathematical constant π, also known as **Archimedes' constant.** The numerical value of π truncated to 50 decimal places is known to be about

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γ ≈ (6.6742 ± 0.0010) * 10 $^{-11}$ [m^3 / (s² * kg)],

Einstein's field equation describes how a field or energy (or matter) and time changes space and vice versa. Einstein's basic field equation (EFE) is usually written in the form

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / (c^4)) + ((R* g_{ab}) / 2)) = (R_{ab}).$$

then

$$\gamma = (c^4)*((R_{ab}) - ((R* g_{ab}) / 2)) / (4 * 2 * \pi * T_{ab}).$$

Proof. Eq.

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / (c^4)) + ((R* g_{ab}) / 2)) = (R_{ab}) \quad (2)$$

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / (c^4)) = ((R_{ab}) - ((R* g_{ab}) / 2))) \quad (3)$$

$$(4 * 2 * \pi * \gamma * T_{ab}) = (c^4)*((R_{ab}) - ((R* g_{ab}) / 2)) \quad (4)$$

Let us assume, that the division by $(4 * 2 * \pi * T_{ab})$ is allowed.

$$\gamma = (c^4)*((R_{ab}) - ((R* g_{ab}) / 2)) / (4 * 2 * \pi * T_{ab}) \quad (5)$$

If the division by (T_{ab}) is not allowed, let us set $(T_{ab}) = 1$.

$$\gamma = ((c^4) / (4 * 2 * \pi))*((R_{ab}) - ((R* g_{ab}) / 2)) \quad (5a)$$

Q. e. d.

This solution of Einstein's field equation has consequences. First of all, Eq. (5) states more or less that

$$\text{constant1} = \text{constant2} *((R_{ab}) - ((R* g_{ab}) / 2)) / (4 * 2 * \pi * T_{ab}).$$

The consequence of this equation is, that if Newton's gravitational constant γ is a constant, then

$$\mathbf{((R_{ab}) - ((R* g_{ab}) / 2)) / (4 * 2 * \pi * T_{ab}) = constant3}$$

too. Only, this does not sound very well. Further, if the Ricci tensor $R_{ab} = 0$ or vanish, theoretically Newton's gravitational constant γ according to Eq. (5) can survive. Let us assume that the Ricci scalar / metric tensor $((R* g_{ab}) / 2) = 0$ or vanishes, theoretically Newton's gravitational constant γ can survive in this case according to Eq. (5) too. Contrary to this, Newton's gravitational constant γ is not able to survive if $T_{ab} = 0$. We are not allowed to divide by 0. Is Newton's gravitational constant γ at the end dependent or determined more or less by the stress-energy tensor T_{ab}? Is it allowed to state that without the stress-energy tensor T_{ab} no Newton's gravitational constant γ. On the other hand, theoretically it is not forbidden that $((R_{ab}) - ((R* g_{ab}) / 2)) = 1$. The world under this circumstances has its special face. In this very important case where $((R_{ab}) - ((R* g_{ab}) / 2)) = 1$ we obtain $\gamma = (c^4)*(1) / (4*2*\pi* T_{ab})$. In so far, if Newton's gravitational constant γ is a constant, then $\pi * T_{ab}$ must be a constant too. We know that π is not a constant, a stable and precisely value of π is not known. Thus $\pi * T_{ab}$ as a whole must be a constant, if Newton's gravitational constant γ is a constant. Only, this does not appear to be compatible with the known development of our world of today. At the end, based on this solution of Einstein's field equation, Newton's gravitational constant γ seems to depend more or less on the stress-energy tensor T_{ab}. This solution of Einstein's field equation raises serious doubts on the constancy of Newton's gravitational constant γ.

3.2. Anti γ - the otherness of Newton's constant γ

Is Newton's gravitational constant γ something able to change and something that is changed too?

Theorem 2. **Anti γ - the otherness of Newton's constant γ**.

Let

R_{ab} denote the Ricci tensor,

R denote the Ricci scalar,

g_{ab} denote the metric tensor,

T_{ab} denote the stress-energy tensor,

h denote Planck's constant, h ≈ **(6.626 0693 (11)) * 10^{-34} [J * s],**

π denote the mathematical constant π, also known as **Archimedes' constant.** The numerical value of π truncated to 50 decimal places is known to be about

$$\pi \approx \mathbf{3.14159\ 26535\ 89793\ 23846\ 26433\ 83279\ 50288\ 41971\ 69399\ 37510},$$

c denote the speed of all electromagnetic radiation in a vacuum, the speed of light, where

$$c = \mathbf{299\ 792\ 458\ [m / s]},$$

γ denote Newton's gravitational 'constant', where

$$\gamma \approx \mathbf{(6.6742 \pm 0.0010) * 10^{-11} [m^3 / (s^2 * kg)]},$$

Einstein's field equation describes how a field or energy (or matter) and time changes space and vice versa. Einstein's basic field equation (EFE) is usually written in the form

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / (c^4)) + ((R * g_{ab}) / 2)) = (R_{ab}).$$

The unified field equation (Barukčić 2006e) is known to be

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / (c^4)) * ((R * g_{ab}) / 2)) \le ((R_{ab})*(R_{ab})) / 4,$$

thus

$$\gamma * (\text{Anti}\ \gamma) \le (c^2) / 4$$

or

$$\text{Anti}\ \gamma = ((4 * \pi * T_{ab})*(R * g_{ab})) / ((c^2)* ((R_{ab})*(R_{ab}))).$$

Proof. Eq.

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / (c^4)) * ((R * g_{ab}) / 2)) \le (R_{ab})^2 / 4 \quad (6)$$

Let us assume, that the division by $((R_{ab})*(R_{ab}))$ is allowed.

If the division by $((R_{ab})*(R_{ab}))$ is not allowed, let us set $((R_{ab})*(R_{ab})) = 1$.

$$((4 * 2 * \pi * \gamma * T_{ab})*(R * g_{ab})) / (2*(c^4)* ((R_{ab})*(R_{ab}))) \le 1 / 4 \quad (7)$$

$$((4 * \pi * \gamma * T_{ab})*(R * g_{ab})) / ((c^2) * ((R_{ab})*(R_{ab}))) \le (c^2) / 4 \quad (8)$$

$$\gamma * ((4 * \pi * T_{ab})*(R * g_{ab})) / ((c^2) * ((R_{ab})*(R_{ab}))) \le (c^2) / 4 \quad (9)$$

According to the general contradiction law (Barukčić 2006d) $((c^2) / 4)$ is the unity and the struggle of X and Anti X. Set $\gamma = X$. Thus we obtain Anti X as

$$\text{Anti}\ \gamma = ((4 * \pi * T_{ab})*(R * g_{ab})) / ((c^2) * ((R_{ab})*(R_{ab}))) \quad (10)$$

$$\gamma * (\text{Anti}\ \gamma) \le (c^2) / 4 \quad (11)$$

Q. e. d.

Anti γ, the strong force, can be defined as **Anti $\gamma \le (c^2 / (4 * \gamma))$.**

3.3. The constant (1 / 4)

Theorem 3. The constant (1/4) is defined by Einstein's field equation.

Let

R_{ab} denote the Ricci tensor,
R denote the Ricci scalar,
g_{ab} denote the metric tensor,
T_{ab} denote the stress-energy tensor,
t denote the (space) time,
h denote Planck's constant, h ≈ **(6.626 0693 (11)) * 10 $^{-34}$ [J * s].**
π denote the mathematical constant π, also known as **Archimedes' constant.** The numerical value of π truncated to 50 decimal places is known to be:

$\pi \approx$ 3.14159 26535 89793 23846 26433 83279 50288 41971 69399 37510.

c denote the speed of all electromagnetic radiation in a vacuum, the speed of light, where

c **= 299 792 458 [m / s].**

γ denote Newton's gravitational 'constant', where

$$\gamma \approx (6.6742 \pm 0.0010) * 10^{-11} [m^3 / (s^2 * kg)].$$

Set $((R_{ab}) - ((R * g_{ab}) / 2)) \neq 0$.
Recall, it is known that Einstein's field equation describes how a field or energy (or matter) and time changes space and vice versa. Einstein's basic field equation (EFE) is usually written in the form

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / (c^4)) + ((R * g_{ab}) / 2)) = (R_{ab}).$$

then

$$(((2 * \pi * \gamma) * T_{ab}) / ((c^4) * ((R_{ab}) - ((R * g_{ab}) / 2)))) = (1 / 4).$$

Proof.

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / (c^4)) + ((R * g_{ab}) / 2)) = (R_{ab}) \quad (12)$$

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / (c^4)) = ((R_{ab}) - ((R * g_{ab}) / 2))) \quad (13)$$

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / (c^4)) = ((R_{ab}) - ((R * g_{ab}) / 2))) \quad (14)$$

Let us assume, that the division by $((R_{ab}) - ((R * g_{ab}) / 2)))$ is allowed.
If the division by $((R_{ab}) - ((R * g_{ab}) / 2)))$ is not allowed,
we set $((R_{ab}) - ((R * g_{ab}) / 2))) = 1$.

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / ((c^4) * ((R_{ab}) - ((R * g_{ab}) / 2)))) = 1 \quad (15)$$

$$(((2 * \pi * \gamma) * T_{ab}) / ((c^4) * ((R_{ab}) - ((R * g_{ab}) / 2)))) = (1 / 4) \quad (16)$$

Q. e. d.

The constant (1 / 4) is very important and needed everywhere in physics and probability theory too.

3.4. The unity of gravitation and electromagnetism

Gravitation and electromagnetism determine each other, the one cannot without its other.

Theorem 4. The unity of gravitation and electromagnetism.

Let

R_{ab}	denote the Ricci tensor,
R	denote the Ricci scalar,
g_{ab}	denote the metric tensor,
T_{ab}	denote the stress-energy tensor,
h	denote Planck's constant, h ≈ **(6.626 0693 (11)) * 10 $^{-34}$ [J * s],**
π	denote the mathematical constant π, also known as **Archimedes' constant.** The numerical value of π truncated to 50 decimal places is known to be about **π ≈ 3.14159 26535 89793 23846 26433 83279 50288 41971 69399 37510,**
c	denote the speed of all electromagnetic radiation in a vacuum, the speed of light, where ***c*** **= 299 792 458 [m / s],**
γ	denote Newton's gravitational 'constant', where **γ ≈ (6.6742 ± 0.0010) * 10 $^{-11}$ [m^3 / (s² * kg)],**
μ_0	denote the permeability constant, the magnetic constant, the permeability of free space or of vacuum,
ε_0	denote the permittivity of vacuum, the electric constant.

Recall, (μ_0* ε_0 * (c²)) = 1.

Einstein's field equation describes how a field or energy (or matter) and time changes space and vice versa. Einstein's basic field equation (EFE) is usually written in the form

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / (c^4)) + ((R * g_{ab}) / 2)) = (R_{ab}).$$

The unified field equation (Barukčić 2006e) is known to be

$$(((4 * 2 * \pi * \gamma) * T_{ab}) / (c^4)) * ((R * g_{ab}) / 2)) \leq ((R_{ab}) * (R_{ab}))/ 4,$$

thus

$$\boldsymbol{\gamma * (\text{Anti}\,\gamma) *(\mu_0 * \varepsilon_0) \leq (1 / 4)}$$

Proof. Eq.

$$\boldsymbol{\gamma * (\text{Anti}\,\gamma) \leq (c^2) / 4} \qquad (17)$$

$$\gamma * (\text{Anti}\,\gamma) \leq 1 / (\mu_0 * \varepsilon_0 * 4) \qquad (18)$$

$$\boldsymbol{\gamma * (\text{Anti}\,\gamma) * (\mu_0 * \varepsilon_0) \leq (1 / 4)} \qquad (19)$$

Q. e. d.

The identity and the difference between gravitation and electromagnetism, between the week and the strong force finds its completion in (1/4).

3.5. Black Hole and Anti γ of our Galaxy

Expectation

The (Anti γ) of our Galaxy based on the unity of gravitation and electromagnetism can be calculated as

Anti γ ≤ (c^2) / (4 * γ) .
Anti γ ≤ (8.98755178736818 * 10^{+16}) / (2.69036 * 10^{-10})
Anti γ ≤ 3.36734003863874 * 10^{+26} [kg/m].

Experimental confirmation of Anti γ

An international team of astronomers (Schödel et al. 2002) has directly observed a star orbiting the supermassive black hole at the centre of our Milky Way Galaxy. The centre of our Milky Way galaxy is known to be about 26,000 light-years away from us and is located in the southern constellation Sagittarius (The Archer). The mass of the Supermassive Black Hole at the centre of our Milky Way is calculated about **2.6 ± 0.2 million solar masses**. The Schwarzschild radius of the Supermassive black hole at the centre of our Milky Way Galaxy is approximately **7.7 million km** (26 light-seconds). Recall, the radius of our sun is known to be about 696 000 000 [m] that is about 696000 [km]. Further, the mass of our sun is about 1.99 * 10^{+30} [kg]. According to Barukčić (Barukčić 2006a, p. 67) there is a relationship between Anti γ and the radius of a Black Hole that way that **Anti γ = Mass $_{\text{Black Hole}}$ /(2 * r $_{BH}$).** Based on this equation, we can calculate the radius of the supermassive black hole at the centre of our Milky Way Galaxy denoted by r_{BH} as

r_{BH} ≤ Mass $_{\text{Black Hole}}$ /(2 * Anti γ)
r_{BH} ≤ Mass of Black Hole / (2*Anti γ)
r_{BH} ≤ 2.6 ± 0.2 [million solar masses] * 1.99 * 10^{+30} [kg] / (2* 3.36734003863874 * 10^{+26} [kg/m])
r_{BH} ≤ 15.365.243,6066172 [km]/2.

r_{BH} ≤ 7.682.621,8033086 [km].

The calculated Schwarzschild radius of the Supermassive black hole at the centre of our Milky Way Galaxy is approximately **7.700.000,00 km** (ESO 2002) which supports extremely our hypothesis of the unity of gravitation and electromagnetism, the value of Anti γ and the fact, that Newton's constant γ is not a constant. The value of Anti γ is experimentally confirmed.

4. Discussion

This publication has proofed that Newton's gravitational constant γ is not a constant. This constant is dependent on energy, time and space and is determined by its own counterpart Anti γ. The relationship between Newton's gravitational constant γ and Anti γ is based on the general contradiction law. According to the unified field equation and based on the general contradiction law, we were able to derive the relationship between γ and Anti γ as

γ * (Anti γ) ≤ (c^2) / 4.

Observations support our basic equation above. The strong force **Anti γ**, the weak force γ and electromagnetism finds their unity in (1 / 4) . Is Newton's gravitational constant γ different from Galaxy to Galaxy and even everywhere inside our Galaxy? Does γ depend on the distance to the black hole of a Galaxy?

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