Maximum and minimum values for natural quantities

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Abstract

In this paper will be presented the law of the gravitational fine-structure constant followed by ratios of maximum and minimum theoretical values for natural quantities. Also that the gravitational fine-structure constant is the coupling constant for the fifth force. This article will be followed by the energy wave theory and the fractal space-time theory.

Keywords

Fine-structure constant , Proton to electron mass ratio , Dimensionless physical constants , Coupling constant , Gravitational constant , Avogadro's number , Fundamental Interactions ,Gravitational fine-structure constant ,

1. Introduction

Since time philosophers,poets,and scientists have pondered the relationship between the microcosm and the macrocosm. This theory was started by Pythagoras who saw the universe and the body as a harmonious unity. The microcosm and the macrocosm. Since Newton,the scales of the largest and the smallest have extended by ten orders of magnitude in both directions. It was only in the late 1910s,however,that the first physical fact was discovered that could provide a quantitative clue to the interconnection between the micro-and mega-worlds. It was a mathematician, Hermann Weyl,who made this discovery. His discovery later gave rise to such different ideas as the hypothetical variation of the gravitational constant and the anthropic principle. Although this link between the micro-and mega-worlds is regarded as an empirical fact,its recognition was intertwined with developments in advanced theoretical physics. The laws of physics have a set of fundamental constants,and it is generally admitted that only dimensionless combinations of constants have physical significance. The most fully developed version of the idea in antiquity was made by Plato,but fragmentary evidence indicates that philosophers before him articulated some version of it. The idea may have begun as an archetypal theme of mythology that the pre-Socratic philosophers reworked into a more systematic form. Unfortunately,it is impossible to reconstruct their thinking in much detail,and clear references attributing the doctrine to Democritus and Pythagoras are quite late,dating to the fifth and ninth centuries C.E.,respectively. Among extant Greek texts,the term first appears in the Physics of Aristotle,where it occurs in an incidental remark. Plato did not use the terminology when he developed the idea.

In [10] we presented exact and approximate expressions between the Archimedes constant π,the golden ratio φ,the Euler's number e and the imaginary number i.

We propose in [11] and [20] the exact formula for the fine-structure constant α with the golden angle,the relativity factor and the fifth power of the golden mean:

$$\alpha^{-1}=360\cdot\varphi^{-2}-2\cdot\varphi^{-3}+(3\cdot\varphi)^{-5}=137,035999164\ldots$$

Also we propose in [14] , [15] and [25] a simple and accurate expression for the fine-structure constant α in terms of the Archimedes constant π:

$$\alpha^{-1}=2\cdot3\cdot11\cdot41\cdot43^{-1}\cdot\pi\cdot\ln2=137,035999078\ldots$$

We propose in [12] the exact mathematical expression for the proton to electron mass ratio using Fibonacci and Lucas numbers:

$$\mu^{32}=\varphi^{-42}\cdot F_5^{160}\cdot L_5^{47}\cdot L_{19}^{40/19}=1.836,15267343\ldots$$

Also we propose in [12] the exact mathematical expression for the proton to electron mass ratio:

$$\mu = 165\sqrt[3]{\frac{\ln^{11}10}{7}}$$

with numerical value:

$$\mu=1836,15267392...$$

Other exact mathematical expression in [12] for the proton to electron mass ratio is:

$$\mu=6\cdot\pi^{5}+\pi^{-3}+2\cdot\pi^{-6}+2\cdot\pi^{-8}+2\cdot\pi^{-10}+2\cdot\pi^{-13}+\pi^{-15}=1.836,15267343...$$

Also in [12] was presented the exact mathematical expressions that connects the proton to electron mass ratio μ and the fine-structure constant α:

$$9\cdot\mu-119\cdot\alpha^{-1}=5\cdot(\varphi+42)$$

$$\mu-6\cdot\alpha^{-1}=360\cdot\varphi-165\cdot\pi+345\cdot e+12$$

$$\mu-182\cdot\alpha=141\cdot\varphi+495\cdot\pi-66\cdot e+231$$

$$\mu-807\cdot\alpha=1.205\cdot\pi-518\cdot\varphi-411\cdot e$$

In [15] we reached the conclusion of the simple unification of the nuclear and the atomic physics:

$$10\cdot(e^{i\mu/\alpha}+e^{-i\mu/\alpha})^{1/2}=13\cdot i$$

In [13] , [16] , [17] , [19] **,** [21] and [22] it presented the dimensionless unification of the fundamental interactions. We calculated the unity formulas that connect the coupling constants of the fundamental forces. The dimensionless unification of the strong nuclear and the weak nuclear interactions:

$$e\cdot\alpha_s=10^{7}\cdot\alpha_w$$

$$\alpha_s^{2}=i^{2i}\cdot10^{7}\cdot\alpha_w$$

The dimensionless dimensionless unification of the strong nuclear and electromagnetic interactions:

$$\alpha_s\cdot(e^{i/\alpha}+e^{-i/\alpha})=2\cdot i^{2i}$$

The dimensionless dimensionless unification of the weak nuclear and electromagnetic interactions:

$$10^{7}\cdot\alpha_w\cdot(e^{i/\alpha}+e^{-i/\alpha})=2\cdot e\cdot i^{2i}$$

The dimensionless unification of the strong nuclear,the weak nuclear and electromagnetic interactions:

$$10^{7}\cdot\alpha_w\cdot(e^{i/\alpha}+e^{-i/\alpha})=2\cdot\alpha_s$$

The dimensionless unification of the gravitational and the electromagnetic interactions:

$$4\cdot e^{2}\cdot\alpha^{2}\cdot\alpha_G\cdot N_A^{2}=1$$

$$16\cdot\alpha^{2}\cdot\alpha_G\cdot N_A^{2}=(e^{i/\alpha}+e^{-i/\alpha})^{2}$$

The dimensionless unification of the strong nuclear,the gravitational and the electromagnetic interactions:

$$4\cdot\alpha_s^{2}\cdot\alpha^{2}\cdot\alpha_G\cdot N_A^{2}=i^{4i}$$

$$\alpha^{2}\cdot(e^{i/\alpha}+e^{-i/\alpha})\cdot\alpha_s^{4}\cdot\alpha_G\cdot N_A^{2}=i^{8i}$$

The dimensionless unification of of the weak nuclear,the gravitational and the electromagnetic interactions:

$$4 \cdot 10^{14} \cdot \alpha_w^2 \cdot \alpha^2 \cdot \alpha_G \cdot N_A^2 = i^{4i} \cdot e^2$$

$$10^{14} \cdot \alpha^2 \cdot (e^{i/\alpha} + e^{-i/\alpha})^2 \cdot \alpha_w^2 \cdot \alpha_G \cdot N_A^2 = i^{8i}$$

The dimensionless unification of the strong nuclear,the weak nuclear,the gravitational and the electromagnetic interactions:

$$\alpha_s^2 = 4 \cdot 10^{14} \cdot \alpha_w^2 \cdot \alpha^2 \cdot \alpha_G \cdot N_A^2$$

$$8 \cdot 10^7 \cdot N_A^2 \cdot \alpha_w \cdot \alpha^2 \cdot \alpha_G = \alpha_s \cdot (e^{i/\alpha} + e^{-i/\alpha})$$

We found the formula for the Gravitational constant:

$$G = \alpha_s^2 \left(2\,10^7 \alpha_w \alpha N_A\right)^{-2} \frac{\hbar c}{m_e^2}$$

In [23] and [24] we calculated the expression that connects the gravitational fine structure constant with the four coupling constants:

$$\alpha_g^2 = 10^{42} i^{2i} \left(\frac{\alpha_G \alpha_w^2}{\alpha^2 \alpha_s^4} \right)^3$$

Perhaps the gravitational fine structure constant is the coupling constant for the fifth force. It presented that the gravitational fine structure constant is a simple analogy between atomic physics and cosmology. The conclusion of the dimensionless unification of atomic physics and cosmology:

$$\alpha_s^{12} \cdot \alpha^6 \cdot l_{pl}^2 \cdot \Lambda = 10^{42} \cdot i^{12i} \cdot \alpha_G^3 \cdot \alpha_w^6$$

We found the formula for the cosmological constant:

$$\Lambda = 10^{42} i^{12i} \left(\frac{\alpha_G \alpha_w^2}{\alpha^2 \alpha_s^4} \right)^3 \frac{c^3}{G\hbar}$$

The Equation of the Universe is:

$$\frac{\Lambda G \hbar}{c^3} = 10^{42} i^{12i} \left(\frac{\alpha_G \alpha_w^2}{\alpha^2 \alpha_s^4} \right)^3$$

We proposed a possible solution for the cosmological parameters. From the dimensionless unification of the fundamental interactions the density parameter for normal baryonic matter is:

$$\Omega_B = e^{-\pi} = i^{2i} = 0{,}043214 = 4{,}32\%$$

The density parameter for dark matter is:

$$\Omega_D = 6 \cdot e^{-\pi} = 6 \cdot i^{2i} = 0{,}2592835 = 25{,}92\%$$

The density parameter for the dark energy is:

$$\Omega_\Lambda = 17 \cdot e^{-\pi} = 17 \cdot i^{2i} = 0{,}73463661 = 73{,}46\%$$

The sum of the density parameter for normal baryonic matter and the density parameter for the dark energy is:

$$\Omega_0 = 24 \cdot e^{-\pi} = 24 \cdot i^{2i} = 1{,}037134$$

A positively curved universe is described by elliptic geometry,and can be thought of as a three-dimensional hypersphere,or some other spherical 3-manifold,such as the Poincaré dodecahedral space,all of which are quotients of the 3-sphere. The state equation w has value:

$$w=-24\cdot e^{-\pi}=-24\cdot i^{2i}=-1,037134$$

For as much as $w<-1$,the density actually increases with time.

2. Gravitational fine-structure constant

The relevant constant in atomic physics is the fine-structure constant α,which plays a fundamental role in atomic physics and quantum electrodynamics. The analogous constant in cosmology is the gravitational fine-structure constant α_g. It plays a fundamental role in cosmology. The mysterious value of the gravitational fine-structure constant α_g is an equivalent way to express the biggest issue in theoretical physics. The new formula for the Planck length l_{pl} is:

$$l_{pl} = a\sqrt{a_G}\alpha_0$$

The fine-structure constant equals:

$$\alpha^2 = \frac{r_e}{a_0}$$

From these expressions we have:

$$l_{pl} = \frac{\alpha\sqrt{\alpha_G}r_e}{\alpha^2}$$

$$l_{pl} = \frac{\sqrt{\alpha_G}}{\alpha}r_e$$

$$\frac{l_{pl}^3}{r_e^3} = \frac{\sqrt{\alpha_G^3}}{\alpha^3}$$

The gravitational fine structure constant α_g is defined as:

$$\alpha_g = \frac{l_{pl}^3}{r_e^3}$$

$$\alpha_g = \frac{\sqrt{\alpha_G^3}}{\alpha^3}$$

$$\alpha_g = \sqrt{\frac{\alpha_G^3}{\alpha^6}} \qquad (1)$$

with numerical value:

$$\alpha_g=1,886837\times10^{-61}$$

Also equals:

$$\alpha_g^2\cdot\alpha^6=\alpha_G^3$$

$$\alpha_g^2=\alpha_G^3\cdot\alpha^{-6}$$

$$\alpha_g^2 = \left(\frac{\alpha_G}{\alpha^2}\right)^3$$

Now we will try to find the best mathematical expression of the gravitational fine structure constant α_g with the mathematical constants. In trying to do this we found surprising coincidences and various approaches for the math constants. A approach for Archimedes constant π is:

$$\pi^6 \simeq \frac{2^{300}}{6\,7^{103}} \tag{2}$$

A approach for the Gelfond's constant e^{π} is:

$$e^{\pi} \simeq \frac{55}{\pi}\sqrt{\frac{2}{\ln \pi}} \tag{3}$$

A approximation expression that connects the golden ratio φ,the Archimedes constant π and the Euler's number e is:

$$2^2 11^2 e \simeq 3^4 \varphi^5 \sqrt[3]{\pi} \tag{4}$$

Two approximations expressions that connects the golden ratio φ,the Archimedes constant π,the Euler's number e and the Euler's constant γ are:

$$4e^2 \gamma \ln^2(2\pi) \simeq \sqrt{3^3}\varphi^5 \tag{5}$$

$$\sqrt{3^5} e \gamma \ln(2\pi) \sqrt[3]{\pi} \simeq 11^2 \tag{6}$$

The expression that connects the gravitational fine-structure constant α_g with the Archimedes constant π,the Euler's number e and the Euler's constant γ is:

$$\alpha_g=[e\cdot\gamma\cdot\ln^2(2\cdot\pi)]^{-1}\times10^{-60}=1{,}886837\times10^{-61} \tag{7}$$

The expression that connects the gravitational fine-structure constant α_g with the golden ratio φ and the Euler's number e is:

$$\alpha_g = \frac{4e}{3\sqrt{3}\varphi^5} \times 10^{-60} = 1,886837 \times 10^{-61} \tag{8}$$

The expression that connects the gravitational fine-structure constant α_g with the Archimedes constant π is:

$$\alpha_g = \frac{\sqrt{3^5}\sqrt[3]{\pi}}{11^2} \times 10^{-60} = 1,886837 \times 10^{-61} \tag{9}$$

The expression that connects the gravitational fine-structure constant α_g with the golden ratio φ and the Euler's constant γ is:

$$\alpha_g = \frac{7\varphi\gamma^2}{2} \times 10^{-60} = 1,886826 \times 10^{-61} \tag{10}$$

The expression that connects the gravitational fine-structure constant α_g with the Archimedes constant and the golden ratio φ is:

$$\alpha_g = \frac{2\pi}{3\varphi^5} \times 10^{-60} = 1,888514 \times 10^{-61} \tag{11}$$

From the expressions resulting the unity formula for the gravitational fine-structure constant α_G:

$$\alpha_G=(2\cdot e\cdot \alpha^2\cdot N_A)^{-3} \tag{12}$$

Also apply the expressions:

$$(2\cdot e\cdot \alpha^2\cdot N_A)^3\cdot \alpha_G=1$$

$$8\cdot e^3\cdot \alpha^6\cdot \alpha_G\cdot N_A^3=1$$

From the expressions resulting the unity formula for the gravitational fine-structure constant α_G:

$$\alpha_G=i^{6i}\cdot (2\cdot \alpha_S\cdot \alpha^2\cdot N_A)^{-3} \tag{13}$$

Also apply the expression:

$$(2\cdot \alpha_S\cdot \alpha^2\cdot N_A)^3\cdot \alpha_G=i^{6i}$$

$$8\cdot \alpha_S^3\cdot \alpha^6\cdot \alpha_G\cdot N_A^3=i^{6i}$$

From the expressions resulting the unity formula for the gravitational fine-structure constant α_G:

$$\alpha_G=i^{6i}\cdot e^3\cdot (2\cdot 10^7\cdot \alpha_W\cdot \alpha^3\cdot N_A)^{-3} \tag{14}$$

Also apply the expression:

$$(2\cdot 10^7\cdot \alpha_W\cdot \alpha^3\cdot N_A)^3\cdot \alpha_G=i^{6i}\cdot e^3$$

$$8\cdot 10^{21}\cdot \alpha_W^3\cdot \alpha^9\cdot \alpha_G\cdot N_A^3=i^{6i}\cdot e^3$$

From the expressions resulting the unity formulas for the gravitational fine-structure constant α_G:

$$\alpha_G=(10^7\cdot \alpha_W\cdot \alpha_G^{1/2}\cdot e^{-1}\cdot \alpha_S^{-1}\cdot \alpha^{-1})^3 \tag{15}$$

Also apply the expressions:

$$\alpha_G=10^{21}\cdot \alpha_W^3\cdot \alpha_G^{3/2}\cdot \alpha_S^{-3}\cdot \alpha^{-3}\cdot e^{-3}$$

$$\alpha_G\cdot \alpha_S^3\cdot \alpha^3\cdot e^3=10^{21}\cdot \alpha_W^3\cdot \alpha_G^{3/2}$$

So the unity formula for the gravitational fine-structure constant α_G is:

$$\alpha_G^2=(10^{14}\cdot \alpha_W^2\cdot \alpha_G\cdot e^{-2}\cdot \alpha_S^{-2}\cdot \alpha^{-2})^3 \tag{16}$$

Also apply the expressions:

$$\alpha_G^2=10^{42}\cdot \alpha_W^6\cdot \alpha_G^3\cdot e^{-6}\cdot \alpha_S^{-6}\cdot \alpha^{-6}$$

$$e^6\cdot \alpha_S^6\cdot \alpha^6\cdot \alpha_G^2=10^{42}\cdot \alpha_W^6\cdot \alpha_G^3$$

$$\alpha_G^2\cdot (e\cdot \alpha_S\cdot \alpha)^6=(10^{14}\cdot \alpha_W^2\cdot \alpha_G)^3$$

From the expressions resulting the unity formula for the gravitational fine-structure constant α_G:

$$\alpha_G=i^{6i}\cdot(10^7\cdot\alpha_w\cdot\alpha_G^{1/2}\cdot\alpha_s^{-2}\cdot\alpha^{-1})^3$$

$$\alpha_G=10^{21}\cdot i^{6i}\cdot(\alpha_w\cdot\alpha_G^{1/2}\cdot\alpha_s^{-2}\cdot\alpha^{-1})^3$$

$$\alpha_G=10^{21}\cdot i^{6i}\cdot\alpha_w^3\cdot\alpha_G^{3/2}\cdot\alpha_s^{-6}\cdot\alpha^{-3} \tag{17}$$

Also apply the expressions:

$$\alpha_G^{1/3}\cdot\alpha_s^2\cdot\alpha\cdot\alpha_w^{-1}\cdot\alpha_G^{-1/2}=i^{2i}\cdot10^7$$

$$\alpha_G\cdot\alpha_s^6\cdot\alpha^3=10^{21}\cdot i^{6i}\cdot\alpha_w^3\cdot\alpha_G^{3/2}$$

So the unity formulas for the gravitational fine-structure constant α_G are:

$$\alpha_G^2=i^{6i}\cdot(10^{14}\cdot\alpha_w^2\cdot\alpha_G\cdot\alpha_s^{-4}\cdot\alpha^{-2})^3$$

$$\alpha_G^2=10^{42}\cdot i^{12i}\cdot(\alpha_w^2\cdot\alpha_G\cdot\alpha_s^{-4}\cdot\alpha^{-2})^3$$

$$\alpha_G^2=10^{42}\cdot i^{12i}\cdot\alpha_w^6\cdot\alpha_G^3\cdot\alpha_s^{-12}\cdot\alpha^{-6} \tag{18}$$

Also apply the expressions:

$$\alpha_G^2\cdot\alpha_s^{12}\cdot\alpha^6\cdot\alpha_w^{-6}\cdot\alpha_G^{-3}=i^{12i}\cdot10^{42}$$

$$(\alpha_s^6\cdot\alpha^3\cdot\alpha_G)^2=(10^{14}\cdot i^{4i}\cdot\alpha_w^2\cdot\alpha_G)^3$$

$$\alpha_s^{12}\cdot\alpha^6\cdot\alpha_G^2=10^{42}\cdot i^{12i}\cdot\alpha_w^6\cdot\alpha_G^3$$

So the unity formulas for the gravitational fine-structure constant α_G are:

$$\alpha_g=\left(\frac{10^7\alpha_w\sqrt{\alpha_G}}{e\alpha_s a}\right)^3 \tag{19}$$

$$\alpha_g^2=10^{42}\left(\frac{\alpha_G a_w^2}{e^2\alpha_s^2\alpha^2}\right)^3 \tag{20}$$

$$\alpha_g=10^{21}i^{6i}\left(\frac{\alpha_w\sqrt{\alpha_G}}{\alpha_s^2\alpha}\right)^3 \tag{21}$$

$$\alpha_g^2=10^{42}i^{2i}\left(\frac{\alpha_G a_w^2}{\alpha^2\alpha_s^4}\right)^3 \tag{22}$$

This expression connects the gravitational fine-structure constant α_G with the four coupling constants. Perhaps the gravitational fine structure constant α_G is the coupling constant for the fifth force. Some speculative theories have proposed a fifth force to explain various anomalous observations that do not fit existing theories. The characteristics of this fifth force depend on the hypothesis being advanced. Many postulate a force roughly the strength of gravity with a range of anywhere from less than a millimeter to cosmological scales. Another proposal is a new weak force mediated by W and Z bosons. The search for a fifth force has increased in recent decades due to two discoveries in cosmology which are not explained by current theories. It has been discovered that most of the mass of the universe is

accounted for by an unknown form of matter called dark matter. Most physicists believe that dark matter consists of new,undiscovered subatomic particles,but some believe that it could be related to an unknown fundamental force. Second,it has also recently been discovered that the expansion of the universe is accelerating,which has been attributed to a form of energy called dark energy. Some physicists speculate that a form of dark energy called quintessence could be a fifth force.

3. Maximum and minimum values for natural quantities

There have been theories of the shortest and largest natural quantities. F. Dieterlen in [8] presented a law. Physics can be summed up in a few limiting statements. They imply that in nature every physical observable is bounded by a value close to the Planck value. The speed limit is equivalent to special relativity,the force limit to general relativity,and the action limit to quantum theory. The newly discovered maximum force principle makes it possible to summarize special relativity, quantum theory and general relativity into a fundamental limiting principle each.

We present the law of the gravitational fine-structure constant α_g followed by ratios of maximum and minimum theoretical values for natural quantities. This theory uses quantum mechanics,cosmology,thermodynamics,and special and general relativity. Length l,time t,speed υ and temperature T have the same max/min ratio which is:

$$\alpha_g = \frac{l_{min}}{l_{\max}} = \frac{t_{min}}{t_{\max}} = \frac{\upsilon_{min}}{\upsilon_{\max}} = \frac{\mathrm{T}_{min}}{\mathrm{T}_{max}} \tag{23}$$

Energy E, mass M, action A,momentum P and entropy S have another max/min ratio,which is the square of α_g:

$$\alpha_g^2 = \frac{\mathrm{E}_{min}}{\mathrm{E}_{\max}} = \frac{\mathrm{M}_{min}}{\mathrm{M}_{\max}} = \frac{\mathrm{A}_{min}}{\mathrm{A}_{\max}} = \frac{\mathrm{P}_{min}}{\mathrm{P}_{\max}} = \frac{S_{min}}{S_{max}} \tag{24}$$

Force F has max/min ratio which is α_g^4:

$$\alpha_g^4 = \frac{F_{min}}{F_{max}} \tag{25}$$

Mass density has max/min ratio which is α_g^5:

$$\alpha_g^5 = \frac{\rho_{min}}{\rho_{max}} \tag{26}$$

A smallest length in nature thus implies that there is no way to define exact boundaries of objects or elementary particles. Length l has the max/min ratio which is:

$$\alpha_g = \frac{l_{min}}{l_{max}} \tag{27}$$

The maximum distance l_{max} corresponds to the distance of the universe:

$$l_{max} = L_H = c \cdot H_0^{-1} = \alpha_g \cdot l_{min}$$

Perhaps for the minimum distance l_{min} apply:

$$l_{min} = 2 \cdot e \cdot l_{pl} \tag{28}$$

So for the Bohr radius a_0 apply:

$$a_0 = 2 \cdot e \cdot N_A \cdot l_{pl}$$

$$a_0 = N_A \cdot l_{min}$$

From expressions apply:

$$\cos\alpha^{-1}=e^{-1}$$

$$\cos\alpha^{-1}\cdot l_{min}=2\cdot l_{pl}$$

$$\cos\alpha^{-1}=\frac{2l_{pl}}{l_{min}} \tag{29}$$

A precise discussion shows that measurement errors increase when the characteristic measurement energy approaches the Planck energy. In that domain, the measurement errors of any observable are comparable to the measurement values. Limited measurement precision implies that at Planck energy it is impossible to speak about points,instants,events or dimensionality. Limited precision implies that no observable can be described by real numbers. Limited measurement precision also implies that at Planck length it is impossible to distinguish positive and negative time values: particles and antiparticles are thus not clearly distinguished at Planck scales.The fundamental unit of length in this unit system is the Planck length l_{pl}. Spacetime is proposed to be a lattice structure,in which its unit cells have sides of length a,marked below in the next figure.

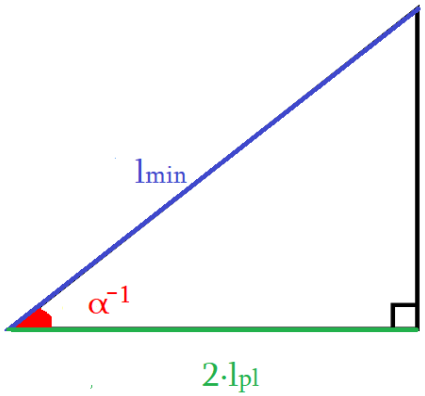

Figure 19. *Geometric representation of the fundamental unit of length.*

Gravitons do indeed have mass,and their motions generate kinetic energy. Thus,they have both energy and mass,and they obey the law of conservation of energy and matter. If gravitons did not have mass there would be no physics that we could understand. Other particles have mass,but they are much larger,much less numerous,and cannot substitute for the gravitational effects which generate space curvature. The great mystery of so-called force at a distance is explained by the mass of gravitons. Where things get really interesting is in the smallest dimensions. Even an incredibly small and nearly massless particle can have great adjacent gravitational powers,as long as the centers of two attracted particles are sufficiently close. Dark energy and dark matter are thus aspects of a phenomenon. That phenomenon is the flow of gravitons on a Planck scale,expressed as spacetime foam. Gravitons flow on a massive scale among universe bubbles and the matter between. Given enough flowing gravitons in the spacetime foam,on a scale the human mind can hardly comprehend,there is apparent force at a distance,expressed as the bending of space. Mass M have max/min ratio,which is the square of α_g:

$$\alpha_g^2=\frac{M_{min}}{M_{max}} \tag{30}$$

Also apply the expressions:

$$M_{max}=\alpha_g^2\cdot M_{min}$$

$$l^2_{max}\cdot M_{min}=l^2_{min}\cdot M_{max}$$

$$M_{min}\cdot M_{max}=m^2_{pl}$$

The following applies to the minimum mass M_{min}:

$$M_{min}c^2=\frac{\hbar}{t_{max}}$$

$$\mathrm{M}_{\min}c^2 = \hbar \mathrm{H}_0$$

$$\mathrm{M}_{\min} = \frac{\hbar \mathrm{H}_0}{c^2}$$

$$\mathrm{M}_{\min} = \frac{\hbar}{c l_{max}}$$

So apply the expressions:

$$\mathrm{M}_{\min} = \frac{\hbar}{c}\sqrt{\Lambda} \tag{31}$$

$$\mathrm{M}_{\min} = \frac{m_{pl}^2}{\mathrm{M}_{max}} \tag{32}$$

$$\mathrm{M}_{\min} = \frac{m_{pl}^2}{\mathrm{M}_{max}} \tag{33}$$

Therefore for the minimum mass Mmin apply:

$$\mathrm{M}_{\min} = \alpha_g m_{pl} \tag{34}$$

$$\mathrm{M}_{\min} = \frac{\alpha_G}{\alpha^3} m_e \tag{35}$$

$$\mathrm{M}_{\min} = \frac{\sqrt[3]{\alpha_g^2}}{\alpha} m_e \tag{36}$$

R. Adler in [7] calculated the energy ratio in cosmology,the ratio of the dark energy density to the Planck energy density. Atomic physics has two characteristic energies,the rest energy of the electron Ee,and the binding energy of the hydrogen atom EH. The rest energy of the electron Ee is defined as:

$$\mathrm{E}_e = m_e c^2$$

The binding energy of the hydrogen atom EH is defined as:

$$\mathrm{E}_{\mathrm{H}} = \frac{m_e e^4}{2\hbar^2}$$

Their ratio is equal to half the square of the fine-structure constant:

$$\frac{\mathrm{E}_{\mathrm{H}}}{\mathrm{E}_e} = \frac{\alpha^2}{2}$$

Cosmology also has two characteristic energy scales,the Planck energy density ρpl,and the density of the dark energy ρΛ. The Planck energy density is defined as:

$$\rho_{pl} = \frac{\mathrm{E}_{pl}}{l_{pl}} = \frac{c^7}{\hbar G^2}$$

To obtain an expression for the dark energy density in terms of the cosmological constant we recall that the cosmological term in the general relativity field equations may be interpreted as a fluid energy momentum tensor of the dark energy according to so the dark energy density ρΛ is given by:

$$\rho_{\Lambda} = \frac{\Lambda c^4}{8\pi G}$$

The ratio of the energy densities is thus the extremely small quantity:

$$\frac{\rho_{\Lambda}}{\rho_{pl}} = \frac{\alpha_g^2}{8\pi}$$

So with expression (8) for the ratio of the dark energy density to the Planck energy density apply:

$$\frac{\rho_{\Lambda}}{\rho_{pl}} = \frac{2e^2\varphi^{-5}}{3^3\pi\varphi^5} \times 10^{-120} \tag{37}$$

Some authors consider the small value of the ratio to be arguably one of the most mysterious problems in present day physics. The understanding of atomic structure required the discovery of the fundamental dynamical constant ħ. Viewed in this way the cosmological analog of ħ is Λ,but any dynamical role it may play is not yet apparent. It is amusing to note that in the presence of two length scales,and their dimensionless ratio,dimensional analysis becomes problematic,a dimensional estimate can contain an arbitrary function of the ratio,for example a power or a logarithm. In the case of cosmology it is clear that dimensional estimates,with two disparate length scales,may be much worse than useless.

In 1961,Dicke observed that a dimensionless number must necessarily be large to make the lifetime of stars long enough to produce heavy chemical elements such as carbon. Knowing that carbon is the most essential element for biological materials,this is the first claim called "Human Coincidence",which infers that the connection between physical constants is necessary for the existence of life in the universe. Thermonuclear combustion is necessary for the production of elements heavier than hydrogen. Again it takes several billion years for this to occur. type of conversion inside a star. According to the general theory of relativity no universe can provide several billion years of time unless it is several light-years in extent. Serious criticisms and interpretations have been made on the issue of the large number hypothesis and the existence of intelligent beings or life. One of the most difficult issues in understanding consciousness is understanding how information is synthesized to form our subjective experience. The widely accepted hypothesis is that gamma currents ranging from many places in the brain combine to create a unified subjective experience. In this way,neurons performing different tasks in separate areas of the brain are divided into a single instantaneous activity. From [9] the gamma rhythm is a pattern of neuronal oscillations whose frequency ranges from 25 Hz to 100 Hz although 40 Hz is typical. Gamma frequency oscillations are present during wakefulness and REM sleep. Changes in electrical membrane potential generate neuronal action potentials. Oscillatory activity of neurons is connected to these spikes. The oscillation of the single neuron can be observed in fluctuations at the threshold of the membrane potential. The time quantum in the brain tʙ,the smallest unit of time that related to the 40 Hz oscillation of the gamma rate:

$$\frac{t_B}{t_{pl}} = \sqrt[3]{\alpha_g^2} \tag{38}$$

The Planck time depends on the fundamental constants such as the Planck constant ħ,the gravitational constant G and the speed of light c,while it is not clear whether the shorter time scale in the brain also depends on these fundamental constants. Thus,the observer who can observe a universe tuned to the various fundamental constants must have synchronous activity of gamma oscillations of about 40 Hz in his nervous system. This is what we find from the experimental results in modern neuroscience.

4. Conclusions

We presented the law of the gravitational fine-structure constant αg followed by ratios of maximum and minimum theoretical values for natural quantities. Also that the gravitational fine-structure constant is the coupling constant for the fifth force. Perhaps for the minimum distance lmin apply:

$l_{min} = 2 \cdot e \cdot l_{pl}$

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