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Gravitational Constant, Gravity Dependent Physical Constants, Wu Constant, Wu's Spacetime Constant And Absolute Light Speed

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Abstract
There are three types of physical constants: (1) Universal Physical Constant such as Gravitational Constant G which, subject to the reference point of measurement, contains a variable real number and a group of variable unit quantities that are both dependent on the local gravitational field and aging of the universe, (2) Gravity Dependent Physical Constant such as Planck Constant h, Coulomb Constant k_e, Permittivity ε_0, Permeability μ_0, Absolute Light Speed C and Wu Constant K which, subject to the location of the object, contains a fixed real number and a group of variable unit quantities that are dependent on the local gravitational field and aging of the universe, and (3) Absolute Physical Constant such as Wu's Spacetime Constant γ which, no matter of location and reference point, contains a fixed real number and a group of fixed mass and charge unit quantities (Absolute Physical Quantities) that are by nature independent of gravitational field and aging of the universe. In this paper, the differences between these three physical constants are studied and explained.

Keywords: *Physical Constant, Gravitational Constant, Coulomb Constant, Planck Constant, Wu Constant, Wu's Spacetime Constant, Permittivity, Permeability, Yangton and Yington, Wu's Pair, Subatomic Equilibrium, Wu's Spacetime Equation, Wu's Spacetime Transformation, Principle of Parallelism, Wu's Spacetime Shrinkage Theory, Photon Inertia Transformation, Absolute Light Speed, Inertia Light Speed, Equation of Relative Velocity, Equation of Light Speed.*

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I. Physical Constants

Physical constant contains two components: a real number and a group of unit quantities which are combined together by arithmetic operations [1]. There are three types of physical constants: (1) Universal Physical Constant such as Gravitational Constant G which, subject to the reference point of measurement, contains a variable real number and a group of variable unit quantities that are both dependent on the local gravitational field and aging of the universe, (2) Gravity Dependent Physical Constant such as Planck Constant h, Coulomb Constant k_e, Permittivity ε_0, Permeability μ_0, Absolute Light Speed C [2] and Wu Constant K [3], which, subject to the location of the object, contains a fixed real number and a group of variable unit quantities that are dependent on the local gravitational field and aging of the universe, and (3) Absolute Physical Constant such as Wu's Spacetime Constant γ [3] which, no matter of location and reference point, contains a fixed real number with a group of fixed mass and charge unit quantities (Absolute Physical Quantities) that are by nature independent of gravitational field and aging of the universe.

Gravitational Constant G is a Universal Physical Constant which is always a constant quantity, however subject to the measurement at different reference points, both the real number and the unit quantities of the Gravitational Constants, except mass (kg and m_{yy}) and charge (C and q_{yy}), can be different dependent on the local gravitational field and aging of the universe [4]. (This is revised from my previous publication [5], in which I have mistakenly proposed that all physical constants including Gravitational Constant are variables dependent on the local gravitational field and aging of the universe).

Planck Constant h, Permittivity ε_0, Permeability μ_0, Coulomb Constant k_e and Wu Constant K are all Gravity Dependent Physical Constants (revised from [4]). According to Principle of Parallelism [6], like the quantities of the properties of a corresponding identical object or event [6], the real number component of the Gravity Dependent Physical Constant remains unchanged by a fixed constant number, but their unit quantity component can be different dependent on the gravitational field and aging of the universe of the location of the object.

Wu's Spacetime Constant γ is an Absolute Physical Constant which contains a fixed real number and a group of fixed mass and charge units. Because both mass and charge units are absolute units, by nature they are fixed quantities and cannot be changed, therefore Wu's Spacetime Constant always remains the same, no matter local gravitational field and aging of the universe.

The differences between Gravitational Constant, Gravity Dependent Physical Constants and Wu's Spacetime Constant are discussed and explained in details as follows:

II. Gravitational Constant

Assuming a target object m at a distance R from a star M, because of Newton's Law of Universal Gravitation and Newton's second Law of Motion,

$F = GMm/R^2$

$F = mA$

Therefore,

$A = GM/R^2$

And

$G = AR^2/M$

Acceleration is defined by the infinitesimal velocity divided by infinitesimal traveling time.

$A = \Delta V/\Delta T$

Where A is acceleration, $\Delta V = (V' - V)$ is infinitesimal velocity and $\Delta T = (T' - T)$ is infinitesimal traveling time.

At a reference point with fixed local gravitational field and aging of the universe, acceleration A can be measured by the local MKS units as follows:

$L = ym$ and $L' = y'm$ and $L'' = y''m$

$T = xs$ and $T' = x's$ and $T'' = x''s$

$V = (L'-L)/(T'-T) = ((y'-y)/(x'-x))m/s$

$V' = (L''-L')/(T''-T') = ((y''-y')/(x''-x'))m/s$

$A = (V' - V)/(T''- T')$

$= [(y''-y')/(x''-x') - (y'-y)/(x'-x)](m/s)/(x''- x')s$

$= \{[(y''-y')/(x''-x') - (y'-y)/(x'-x)]/(x''- x')\}\ (m/s^2)$

Given

$a = [(y''-y')/(x''-x') - (y'-y)/(x'-x)]/(x''- x')$

Therefore,

$A = a\ (m/s^2)$

Where A is acceleration, "a" is amount of Normal unit Acceleration and m/s^2 (meter/second^2) is Normal Unit Acceleration measured at the reference point with fixed local gravitational field and aging of the universe.

According to Wu's Spacetime Shrinkage Theory [3], Wu Unit Length and Wu Unit Time are bigger at massive gravitational field and early aging of the universe, as is the Normal Unit Length (meter) and Normal Unit Time (second). As a consequence, because earth mass is bigger than moon, therefore Wu Unit Length and Wu Unit Time on Earth are also bigger than moon. Because the acceleration of the target object has a fixed quantity no matter the measurements at different reference points, therefore, the amount of acceleration of the same target object in the same system measured on earth is smaller than that measured on moon. Also, for the same reason, the amount of the distance of the same target object in the same system measured on earth is smaller than that measured on earth. Furthermore, the mass of the object is an absolute quantity which always remains unchanged no matter of the location and measurements. Therefore, the number and unit components of the Gravitational Constant measured on moon are also different from that measured on earth. A detailed analysis is discussed as follows:

III. Gravitational Constant Measured On Moon

$G_m = A\ R^2/M = a_m\ (m_m/s_m^2)\ r_m^2\ (m_m^2)/w\ (kg)$

$G_m = (a_m r_m^2/w)(\ m_m^3/s_m^2\ kg)$

Where A is acceleration, R is distance, M is the mass of parent object (they don't change with the gravitational field and aging of the universe at reference point), a_m is the amount of acceleration, r_m is the amount of distance, and w is the amount of mass of parent object, measured by MKS system on moon based on m_m (the meter on moon), s_m (the second on moon) and kg (Absolute Unit Quantity).

IV. Gravitational Constant Measured On Earth

$G_e = AR^2/M = a_e\ (m_e/s_e^2)\ r_e^2\ (m_e^2)/w\ (kg)$

$Ge = (a_e r_e^2/w)(\ m_e^3/s_e^2\ kg)$

Where A is acceleration, R is distance, M is the mass of parent object (they don't change with the gravitational field and aging of the universe at reference point), a_e is the amount of acceleration, r_e is the amount of distance, and w is the amount of mass of parent object, measured by MKS system on earth based on m_e (the meter on earth), s_e (the second on earth) and kg (Absolute Unit Quantity).

Because
$G = Gm = G_e$
Therefore,
$G = a_m r_m^2/w\ (m_m^3/s_m^2\ kg) = 6.674 \times 10^{-11}\ (m_e^3/s_e^2\ kg)$

As a result, even though $a_m r_m^2/w$ the number component of gravitational constant measured on moon is different from $a_e r_e^2/w = 6.674 \times 10^{-11}$ the number component of gravitational constant measured on earth, the Gravitational Constant should be the same no matter measured on moon or earth [4].

V. Gravity Dependent Physical Constants

According to Yangton and Yington Theory [7], under thermal and subatomic equilibriums [8], all objects maintain intrinsic atomic and subatomic structures (Correponding Identical Object or Event) and obey Principle of Parallelism and Principle of Correspondence, such that the real number component of the quantity (amount of the unit quantity) of the property of the corresponding identical object or event always remains unchanged, even though the unit quantity component is different subject to the local gravitational field and aging of the universe. Furthermore, in physical laws and equations, physical constants are the constant physical quantities correlated between different quantities of the properties of the corresponding identical objects or events at the same gravitational field and aging of the universe under thermal and subatomic equilibriums, therefore, like any other physical quantity, Physical Constants also contain a fixed real number and a group of variable unit quantities dependent on the local gravitational field and aging of the universe.

However, in case of Newton's Law of Universal Gravitation, because parent object is far away from target object, in other words, they are not in an equilibrium system, the remote gravitational force generated between the graviton flux from parent object and the gravitons on target object is not dependent on the gravitational field and aging of the universe at target object, therefore, the gravitational constant is an independent physical constant which remains unchanged no matter gravitational field and aging of universe at target object.

But, in case of Coulomb's Law, although the remote electrical force is generated by electron flux, both parent object and target object are in short distance and thus like any other gravity dependent physical constant, while under atomic and subatomic equilibriums, the real number component of the quantity (the amount of unit quantity (Coulomb)) of the property (electrical property) of a corresponding identical object or event (charged particle) remains unchanged no matter the gravitational field and aging of the universe. As is the Coulomb Constant, therefore,
$k_e = 8.99 \times 10^9\ kgm_e^3 s_e^{-2} C_e^{-2}$
$k_m = 8.99 \times 10^9\ kgm_m^3 s_m^{-2} C_m^{-2}$
Where k_e is Coulomb Constant on earth and k_m is Coulomb Constant on moon.
For the same reason, as is the Planck Constant, therefore,
$h_e = 6.626 \times 10^{-14}\ (m_e^2 s_e^{-1} kg)$
$h_m = 6.626 \times 10^{-14}\ (m_m^2 s_m^{-1} kg)$
Where h_e is Planck Constant on earth and h_m is Planck Constant on moon (revised from [4]).

VI. Photon And Light Speed

Based on Yangton and Yington Theory, photon is a free Wu's Pair (a pair of superfine circulating Yangton and Yington Antimatter particles with inter-attractive Force of Creation as the building block of the universe), traveling in the normal direction of the Yangton and Yington circulation orbit in space at light speed. Therefore the mass of a photon is the same as that of a Wu's Pair (m_{yy}).

Photon just like electron or any other particle, while emitted from the parent object (source), it travels at two speeds: (1) Ejection Speed which is subject to the ejection force and direction, and (2) Inertia Speed which is subject to the speed and direction of parent object. This is called "Inertia Transformation"[2]. In contrast, Phonon is not a particle emitted from the vibrator (sound source). Instead, it is a wave that is generated in the medium through the vibration process (energy transformation process) by the vibrator, transmitting radically in the medium at a nature speed of the medium no matter of the source. This is called "Non-inertia Transformation"[2].

At photon Ejection Stage, because of the corresponding constant repulsive string forces [2] generated between photon and the adjacent Wu's Pairs on the surface of the light source, regardless of the frequency, a photon emitted from light source under both thermal and subatomic equilibriums is a corresponding identical object or event and should always have a corresponding constant light speed in vacuum 3×10^8 m/s dependent on the local gravitational field and aging of the universe observed at the light source. This is called "Absolute Light Speed" [2].

Under both thermal and subatomic equilibriums [8], Absolute Light Speed is dependent on Wu Unit Length which is a function of gravitational field and aging of the universe. According to Wu's Spacetime

Shrinkage Theory, at massive gravitational field and early aging of the universe, Absolute Light Speed is slower while Wu Unit Length is bigger.

Absolute Light Speed doesn't change with temperature. When temperature increases, more electrons move to the higher quantum energy states, also the microstructure and macrostructure are expanded (thermal expansion), but Wu Unit Length and Wu Unit Time of the same quantum energy states remain unchanged. In contrast, Wu Unit Length can be influenced by particle bombardments such as static graviton flux, dynamic graviton flux and plasma bombardment, as is the Absolute Light Speed. Furthermore, photons with different angular momentum may also cause different Absolute Light Speeds.

At the Separation Stage of photon emission process, according to classical Newtonian physics, photon also carries the inertia of the parent object (light source). Therefore, at the instance of light emission, photon travels not only at the "Absolute Light Speed" (3×10^8 m/s dependent on the gravitational field and aging of the universe at the light source) in the trajectory direction observed at the light source, but also with a speed and direction as that of the light source observed at light origin (or at the reference point). This is called "Inertia Light Speed" [2].

In addition, the light speed observed at light origin is always a constant as the vector summation of the initial speed of light observed at light source (Absolute Light Speed) and the initial speed of the light source observed at light origin (Inertia Light Speed).

Furthermore, in case the speed of light source observed at light origin (Inertia Light Speed) is constant, because the light speed observed at light origin is always constant, then the light speed observed at light source (Absolute Light Speed) is also constant.

VII. Equation Of Light Speed

According to Equation of Relative Velocity [9], light speed observed at a reference point $_{p}\mathbf{C}_{h}$ is the vector summation of the speed of light source observed at the reference point $_{p}\mathbf{V}_{s}$ and Light Speed observed at light source $_{s}\mathbf{C}_{h}$.

$$_{p}\mathbf{C}_{h} = {}_{p}\mathbf{V}_{s} + {}_{s}\mathbf{C}_{h}$$

This equation holds at any instant time. In case $_{p}\mathbf{V}_{s}$ and $_{p}\mathbf{C}_{h}$ (or $_{s}\mathbf{C}_{h}$) are constant velocities, then $_{s}\mathbf{C}_{h}$ (or $_{p}\mathbf{C}_{h}$) is also a constant velocity and the above equation is true at all times.

As a consequence, in the system that contains a light origin with a light source and a photon, as the photon emitted from the light source at the instance of photon emission, due to the Vision of Light and Photon Inertia Transformation [2], it undergoes a two stage separation process: separation stage which gives Inertia Light Speed $\mathbf{V_o}$ (speed of light source observed at light origin at the instance of light emission), and ejection stage which provides Absolute Light Speed **C** (light speed observed at light source at the instance of light emission, $C = 3 \times 10^8$ m/s dependent on the local gravitational field and aging of the universe). Therefore, the light speed observed at light origin at the instance of light emission $\mathbf{C_o'}$ can be represented as follows:

$$\mathbf{C_o' = C + V_o}$$

Since light speed observed at the light origin $\mathbf{C_o'}$ is always constant, if speed of the light source observed at light origin $\mathbf{V_o}$ is constant then the light speed observed at light source **C** is also constant, and thus the above equation is true at all times.

Furthermore, for the same light source and photon observed at a reference point, then at any instance of time,

$$\mathbf{C' = C_1 + V}$$

Where **V** is the speed of light source observed at the reference point, $\mathbf{C_1}$ is the light speed observed at the light source and **C'** is the light speed observed at the reference point.

Assuming the speed of light source observed at light origin is constant, and then the light speed observed at light source is constant and equal to Absolute Light Speed **C**. Thus $\mathbf{C_1}$ is constant and also equal to Absolute Light Speed **C**.

Furthermore, assuming the speed of light source observed at the reference point **V** is constant, because light speed observed at light source **C** is constant, then **C'** is also constant and the following equation is always true at all times.

$$\mathbf{C' = C + V}$$

In other words, light speed **C'** (Normal Light Speed) observed at a reference point is the vector summation of Absolute Light Speed **C** observed at light source (3×10^8 m/s dependent on the local gravitational field and aging of the universe) and the speed of light source **V** observed at the reference point (Inertia Light Speed)**.** This is known as **"**Equation of Light Speed" [2][10].

$$\mathbf{C' = C + V}$$

Equation of Light Speed is always true if the light source travels at constant speeds observed at both light origin or any stationary point in the inertia system (which ensures $\mathbf{C} = 3 \times 10^8$ m/s dependent on the local gravitational field and aging of the universe), and also that at the reference point (which ensures both **V** and **C'** are constants).

Equation of Light Speed is the "Law of Light" which shows directly "Light Speed Is Not Constant". In addition, it can be used to explain many physical phenomena such as Cosmological Redshift [3], Hubble's Law [11], Spacetime Reverse Expansion (Universe Expansion) [12], Gravitational Redshift [13], Deflection of Light [14], Perihelion Precession of Mercury [14] and Gravitational Lensing [15] which are caused by the variations of Absolute Light Speed and Wavelength, also Axial Redshift [16], Transverse Redshift [16], Acceleration Redshift [16] and Event Horizon [17], which are due to the changes of Inertia Light Speed and direction. In fact those phenomena can also be considered as the nature proofs of Equation of Light Speed and that light speed is not constant [18].

VIII. Absolute Light Speed – A Gravity Dependent Physical Constant

Under both thermal and subatomic equilibriums, Absolute Light Speed (the light speed observed at light source at the instance of light emission) is a property of corresponding identical photon dependent on Wu Unit Length as a function of gravitational field and aging of the universe. In addition, according to Wu's Spacetime Shrinkage Theory, at massive gravitational field, Absolute Light Speed is slower while Wu Unit Length is bigger, resulting from the particle bombardments caused by static graviton flux, dynamic graviton flux and plasma bombardment.

On the other hand, Absolute Light Speed is independent of temperature. When temperature increases, more electrons move to the higher quantum energy states, also the microstructure and macrostructure are expanded (thermal expansion), but Wu Unit Length and Wu Unit Time of the same quantum energy states remain unchanged, as is the Absolute Light Speed.

Furthermore, according to Principle of Parallelism, Absolute Light Speed ($C = 3x10^8$ m/s) as the property of a corresponding identical photon has a fixed number ($3x10^8$) and a group of variable unit quantities (m/s) dependent on the local gravitational field and aging of the universe. On the other hand, ε_0 and μ_0 are gravity dependent physical constants, which also have a fixed number and a group of variable unit quantities dependent on the local gravitational field and aging of the universe. This conforms to $C = 1/(\varepsilon_0\mu_0)^{1/2}$ that is derived from Maxwell Equations, in which C, ε_0 and μ_0 all have a fixed number and a group of variable unit quantities dependent on the local gravitational field and aging of the universe. Because of this reason, some physicists believe that light speed is an absolute physical constant which doesn't change with anything at all. It is misleading, because even if C (Absolute Light Speed $3x10^8$ m/s) is a physical constant in compliance with ε_0 and μ_0, it can't be used to prove that either Absolute Light Speed C or Normal Light Speed C' (where C' = C + V) is an absolute physical constant.

As a result, because that Absolute Light Speed C is the quantity of the property (speed) of a corresponding identical object (photon), containing a constant number ($3x10^8$) and a group of variable unit quantities (m/s) dependent on the local gravitational field and aging of the universe, as is that the gravity dependent physical constants k_e, ε_0 and μ_0, and that $C = 1/(\varepsilon_0\mu_0)^{1/2}$, therefore Absolute Light Speed may also be considered as a gravity dependent physical constant.

IX. Wu's Spacetime Constant

Like most physical constants, Wu Constant K is a gravity dependent physical constant with a fixed number and a group of variable unit quantities dependent on the local gravitational field and aging of the universe.

$K = V^2r = ½\ k_e\ q_{yy}^2/m_{yy}$

Where K is Wu Constant, V is Wu's Pair circulation speed, r is the radius of Wu's Pair ($r = ½\ l_{yy}$), k_e is Coulomb's Constant $8.99 \times 10^9\ kgm^3s^{-2}C^{-2}$, kg is Normal Unit Mass and C is Normal Unit Charge, q_{yy} is Wu Unit Charge of a single Yangton or Yington, and m_{yy} is Wu Unit Mass of a single Wu's Pair (m_{yy} and q_{yy} are Wu Unit Mass and Wu Unit Charge which are Absolute Physical Quantities independent of gravitational field and aging of the universe).

Furthermore, the correlation between Wu Unit Time t_{yy} and Wu Unit Length l_{yy} can be derived as follows:

$T = 2\pi r/V$

$T^2 = 4\pi^2r^2/V^2 = 4\pi^2r^3/V^2r = 4\pi^2r^3/K$

$T = 2\pi\ K^{-1/2}\ r^{3/2} = \pi\ (2K)^{-1/2}\ d^{3/2}$

Given

$\gamma = \pi\ (2K)^{-1/2}$

Because

$T = t_{yy}$

$d = l_{yy}$

Therefore,

$t_{yy} = \gamma l_{yy}^{3/2}$

Where t_{yy} is Wu Unit Time, l_{yy} is Wu Unit Length and γ is Wu's Spacetime Constant. This equation is named Wu's Spacetime Equation [3].

Furthermore, Wu's Spacetime Constant γ can be derived as follows:

$\gamma = \pi\,(2K)^{-1/2} = \pi k_e^{-1/2}(q_{yy}^2/m_{yy})^{-1/2}$

$k_e = 8.99 \times 10^9\ kgm^3s^{-2}C^{-2}$

Therefore,

$\gamma = \pi\,(8.99 \times 10^9)^{-1/2}\,(kgm^3s^{-2}C^{-2})^{-1/2}\,q_{yy}^{-1}m_{yy}^{1/2}$

$\gamma = \pi\,(8.99 \times 10^9)^{-1/2}\,(q_{yy}^{-1}m_{yy}^{1/2}\,Ckg^{-1/2})\,(m/s)^{-1}m^{-1/2}$

$\omega = q_{yy}^{-1}m_{yy}^{1/2}\,Ckg^{-1/2}$

$\gamma = 3.313 \times 10^{-5}\,\omega\,(m/s)^{-1}m^{-1/2}$

According to Principle of Parallelism,

$m = k_1 l_{yy}$

$s = k_2\,t_{yy} = k_2\,\gamma\,l_{yy}^{3/2}$

Therefore,

$(m/s)^{-1}m^{-1/2} = (k_1/\gamma\,k_2)\,l_{yy}^{1/2}\,(k_1^{-1/2}l_{yy}^{-1/2}) = k_1^{1/2}/\gamma\,k_2$

$\gamma = 3.313 \times 10^{-5}\,\omega\,(m/s)^{-1}m^{-1/2} = 3.313 \times 10^{-5}\,\omega\,k_1^{1/2}/\gamma\,k_2$

$\gamma = (3.313 \times 10^{-5}\,\omega\,k_1^{1/2}/\,k_2)^{1/2}$

$\gamma = 5.756 \times 10^{-3}\,\omega^{1/2}\,k_1^{1/4}\,k_2^{-1/2}$

Because mass (m_{yy} and kg) and charge (q_{yy} and C) are Absolute Physical Quantities, they are independent of gravitational field and aging of the universe, therefore $\omega^{1/2} = (q_{yy}^{-1}m_{yy}^{1/2}\,Ckg^{-1/2})^{1/2}$ is also an Absolute Physical Quantity independent of gravitational field and aging of the universe. In addition, according to Principle of Parallelism, both k_1 and k_2 are reference dependent real number constants, therefore Wu's Spacetime Constant γ is also an Absolute Physical Constant composed of a real number and a group of mass and charge unit quantities (Absolute Physical Quantities) which is independent of gravitational field and aging of the universe (revised from [19][20][4]).

X. Conclusion

There are three types of physical constants: (1) Universal Physical Constant such as Gravitational Constant G which, subject to the reference point of measurement, contains a variable real number and a group of variable unit quantities that are both dependent on the local gravitational field and aging of the universe, (2) Gravity Dependent Physical Constant such as Planck Constant h, Coulomb Constant k_e, Permittivity ε_0, Permeability μ_0, Absolute Light Speed C and Wu Constant K which, subject to the location of the object, contains a fixed real number and a group of variable unit quantities that are dependent on the local gravitational field and aging of the universe, and (3) Absolute Physical Constant such as Wu's Spacetime Constant γ which, no matter of location and reference point, contains a fixed real number and a group of fixed mass and charge unit quantities (Absolute Physical Quantities) that are by nature independent of gravitational field and aging of the universe.

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