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Subatomic Equilibrium and Subatomic Properties as Foundations of Wu's Spacetime Theories and Wu's Spacetime Field Equations

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[Abstract]
Subatomic Equilibrium and Subatomic Properties are proposed as the foundations of Principle of Equilibrium, Principle of Correspondence and Principle Parallelism. With Wu's Spacetime Equation, a group of Wu's Spacetime Theories associated with length, time, velocity and acceleration of Corresponding Identical Objects or Events are derived. Physical phenomena such as Deflection of Light, Perihelion Precession of Mercury, General Relativity, Gravitational Time Dilation, Cosmological Redshift and Gravitational Redshift are explained. In addition, a system transformation diagram between subatomic equilibrium states and corresponding identical objects or events is used for the derivation and interpretation of Wu's Spacetime Field Equations. Furthermore, a comparison with Einstein Field Equations is discussed.

[Keywords]
Yangton & Yington, Wu's Pairs, Principle of Equilibrium, Principle of Correspondence, Principle of Parallelism, Wu's Spacetime Equation, Wu's Spacetime Shrinkage Theory, General Relativity, Gravitational Time Dilation, Cosmological Redshift, Gravitational Redshift, Deflection of Light, Mercury Perihelion Precession, Einstein's Field Equations, Wu's Spacetime Field Equations, Hubble's Law, Universe Expansion, Spacetime Reverse Expansion.

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I. Subatomic Properties

A subatomic particle can stay at different quantum energy states subject to the surrounding atomic structure that is dependent on temperature. All the properties of a subatomic particle at a quantum energy state are dependent on Wu's Unit Length (l_{yy}) and Wu's Unit Time t_{yy} ($t_{yy} = \gamma l_{yy}^{3/2}$) of the subatomic particle [1]. Also, Wu's Unit Length can increase with the gravitational field due to graviton radiation and contact interaction [2] (or increase with acceleration according to General Relativity [3]), and decrease with aging of the universe in compliance with CMB [4]. Therefore, all the properties of a subatomic particle at a quantum energy state are dependent on gravitational field and aging of the universe.

In addition, for the properties of an object or event such as length, time, velocity and acceleration; as well as those of a standard normal object or event such as the normal unit length and normal unit time, they are also exclusively dependent on Wu's Unit Length which again is the function of gravitational field and aging of the universe.

All of the above properties including Wu's Unit Length of any subatomic particle and Wu's Unit Length–dependent properties of any object or event are called "Subatomic Properties".

II. Subatomic Equilibrium

An object or event stays at a location and time with a fixed gravitational field and aging of the universe for sufficient period of time, and exposed to constant graviton radiation and contact interaction and undergoes consistent shrinkage caused by Yangton and Yington internal attraction, its subatomic structures and subatomic properties should eventually become stable with the environment. This phenomenon is named "Subatomic Equilibrium" and the gravitational field and aging of the universe is named "Subatomic Equilibrium State".

III. Principle of Equilibrium

As an object or event at a location and time in subatomic equilibrium with its environment, each of its subatomic particles should have a fixed Wu's Unit Length and each of its subatomic properties should have a fixed quantity. This phenomenon is named "Principle of Equilibrium" [5].

One exception is that when a photon (free Wu's Pairs) intruded into earth at an extremely high speed from a far distance star, it carries the Wu's Unit Length and Wu's Unit Time influenced by the gravitational field and aging of the universe of its original light source (for example H_α) in the star, which is different from that of the photon generated from the same light source (H_α) on the present earth. In other words, the intruded photon is not in subatomic equilibrium with the gravitational field and aging of the universe on the present earth. This is the reason that causes Cosmological Redshift and Gravitational Redshift.

IV. Corresponding Identical Object or Event

As an object or event moves slowly under subatomic equilibrium conditions from one location to the other location, or two identical objects or events take place at two different locations, these objects or events are called "Corresponding Identical Object or Event" [6].

V. Principle of Correspondence

The amount of unit quantity of the subatomic property of a corresponding identical object or event measured by the unit quantity of the same subatomic property of a corresponding identical reference subatomic object or event at the same location and time remains unchanged no matter the location and time. This is named "Principle of Correspondence" [6].

VI. Principle of Parallelism

The ratio between the quantities of the same subatomic property of two different corresponding identical objects or events at the same location and time remains unchanged no matter the location and time. This is named "Principle of Parallelism [7].

VII. Wu's Spacetime Equation

The circulation of Yangton and Yington Antimatter particles in Wu's Pair is named "Photon Spin" or "Wu's Pair Spin". It is a revolution of Yangton and Yington particles around the normal axis of the circulation orbit. Fig. 1 is a schematic diagram of the circulation.

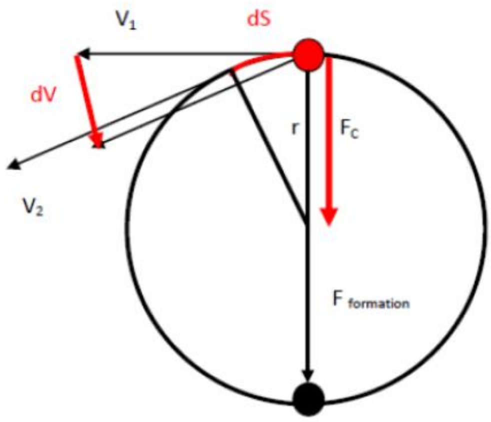

Fig. 1 Schematic diagram of a Wu's Pair.

Because of the circulation, the central acceleration (a_c) can be derived as follows:

$a_c = dV/dt = (VdS/r)/dt = V(dS/dt)/r = V^2/r$

And the center face can be represented as follows:

$F_c = ½\ m_{yy}\ a_c = ½\ m_{yy}\ V^2/r$

Where m_{yy} is the mass of a single Wu's Pair.

Also, because of Coulomb's Law of Electrical Force,

$F_{attraction} = k\ q_{yy}{}^2/(2r)^2$

Where k is Coulomb's Constant and q_{yy} is the charge of either a Yangton particle or a Yington particle (same charges).

And

$F_c = F_{attraction}$

Therefore,

$½\ m_{yy}\ V^2/r = k\ q_{yy}{}^2/(2r)^2$

$V^2r = ½\ k\ (q_{yy}{}^2/m_{yy})$

Given

$$K = ½\ k\ (q_{yy}{}^2/m_{yy})$$

Therefore,

$$V^2r = K$$

Where K is Wu Constant, V is the speed of circulation and r is the radius of the circulation orbit. This equation is named Photon Spin Equation or Wu's Pair Spin Equation.

Furthermore,

$T = 2\pi r/V$

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

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

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 the circulation period (T) of Wu's Pairs, named "Wu's Unit Time", l_{yy} is the size of the circulation orbit (2r = d) of Wu's Pairs, named "Wu's Unit Length", and γ is Wu's Spacetime constant. This equation is named "Wu's Spacetime Equation" [8]. It is true for all objects and events.

VIII.Velocity and Spacetime

The velocity of an object or event measured by normal unit length and normal unit time of a normal object or event can be represented as follows:

$$V = v\,(l_s/t_s)$$

Where V is the velocity, "v" is the amount of normal unit velocity, I_s is normal unit length and t_s is normal unit time.

Because

$l_s = m\, l_{yy}$

$t_s = n\, t_{yy}$

$V = v\,(m/n)(l_{yy}/t_{yy})$

Also, because of "Wu's Spacetime Equation",

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

$l_{yy}/t_{yy} = \gamma^{-1} l_{yy}^{-1/2}$

Therefore,

$$V = v\, m\, n^{-1} \gamma^{-1} l_{yy}^{-1/2}$$

Where V is the velocity, "v" is the amount of normal unit velocity, γ is the Wu's Spacetime constant, m is the ratio between the normal unit length of a normal object or event and Wu's Unit Length of a reference subatomic object or event, n is the ratio between the normal unit time of the normal object or event and Wu's Unit Time of the reference subatomic object or event. l_{yy} is Wu's Unit Length of the reference subatomic object or event.

According to Principle of Correspondence and Principle of Parallelism, for a corresponding identical object or event moving from one location to another location or taking place in two locations under subatomic equilibrium, v is a constant, m and n are reference-dependent constants no matter the location and time. Therefore,

$$V \propto l_{yy}^{-1/2}$$

For a corresponding identical object or event, the velocity V is proportional to $l_{yy}^{-1/2}$ of the reference subatomic object or event no matter the location and time. This correlation is used to interpret Perihelion Precession of Mercury [9]. The speed of Mercury is reduced because of the big Wu's Unit Length of the corresponding identical reference subatomic object or event due to the large gravitational field of the sun based on "Gravity Effect Wu's Spacetime Shrinkage Theory" [8] caused by graviton radiation and contact interaction.

IX. Photon and Spacetime

According to Principle of Correspondence, a photon emitted from a light source with a fixed frequency (such as H_α) at different locations should be considered as a corresponding identical object or event and have a constant amount of normal unit velocity. Also, based on Principle of Parallelism, the ratio between the unit quantities of the same subatomic property of two different objects or events at the same location and time should remain a constant no matter the location and time. Therefore,

$$C = c\, m\, n^{-1} \gamma^{-1} l_{yy}^{-1/2}$$

$$c = 3 \times 10^8$$

$$C \propto l_{yy}^{-1/2}$$

Where C is the Absolute Light Speed of a photon with a fixed frequency, "c" is the amount of normal unit velocity which is a constant 3 x 10^8, γ is the Wu's Spacetime constant, m is the reference-dependent constant of normal unit length and n is the reference-dependent constant of normal unit time, l_{yy} is Wu's Unit Length of a corresponding identical reference subatomic object or event.

Because of the constant ejection force in the photon emission process, regardless of the frequency, a photon escaped from the light source should always have a constant Absolute Light Speed 3 x 10^8 m/s on earth (Absolute Light Speed is a function of gravitational field and aging of the universe associated with location) while observed from the light source. Also, "c" is not a frequency-dependent constant, instead, it is an absolute constant (c = 3 x 10^8) for all photons no matter the frequency and location.

The above correlation can be used to explain "Deflection of Light" [9]. The light speed is reduced because of the big Wu's Unit Length of the corresponding identical reference subatomic object or event due to the large gravitational field of the star based on "Gravity Effect Wu's Spacetime Shrinkage Theory" [8] caused by graviton radiation and contact interaction.

Furthermore, according to Principle of Correspondence, a photon emitted from a light source with a fixed frequency at different locations should have a constant amount of normal unit length. Therefore,

$$\lambda = \lambda_a \, m \, l_{yy}$$

$$\lambda \propto l_{yy}$$

Where λ is the wavelength of a photon with a fixed frequency, λ_a is the constant amount of normal unit length, m is a reference-dependent constant of normal unit length and l_{yy} is Wu's Unit Length of a corresponding identical reference subatomic object or event.

The wavelength of the photon generated from a light source on the present earth is smaller than that from the same light source on an ancient star, because that the Wu's Unit Length of the reference subatomic object or event on the present earth is smaller than that on the ancient star based on "Aging Effect Wu's Spacetime Shrinkage Theory" [8] caused by aging of the universe. This correlation can be used to explain "Cosmological Redshift" [10].

Similarly, the wavelength of the photon generated from a light source on the present earth is smaller than that from the same light source on a massive star, because that the Wu's Unit Length of the reference subatomic object or event on the present earth is smaller than that on the massive star based on "Gravity Effect Wu's Spacetime Shrinkage Theory" [8] caused by graviton radiation and contact interaction. This correlation can be used to explain "Gravitational Redshift [11].

In addition, according to Principle of Correspondence, a photon emitted from a light source with a fixed frequency at different locations should have the same amount of normal unit frequency. Therefore,

$$\nu = \nu_a \, n^{-1} t_{yy}^{-1} = \nu_a \, n^{-1} \gamma^{-1} l_{yy}^{-3/2}$$

$$\nu \propto l_{yy}^{-3/2}$$

Where ν is the frequency of the photon, ν_a is the constant amount of normal unit frequency, n is the reference-dependent constant of normal unit time, γ is Wu's Spacetime constant and l_{yy} is Wu's Unit Length of a corresponding identical reference subatomic object or event.

When the universe grows older, the circulation orbit (2r) of the Wu's Pair of a corresponding identical reference subatomic object or event becomes smaller due to Aging Effect Wu's Spacetime Shrinkage Theory. Since V^2r is always a constant ($V^2r = K$) for an inter-attractive circulating pair such as a Wu's Pair (Fig. 21), the circulation speed (V) of Wu's Pair becomes faster. Also, the circulation period ($T = 2\pi r/V$) of the Wu's Pair gets shorter. In other words, Wu's Unit Time ($t_{yy} = T$, also $t_{yy} = \gamma \, l_{yy}^{3/2}$) and Wu's Unit Length ($l_{yy} = 2r$) of the corresponding identical reference subatomic object or event both become smaller.

As a result, when the universe grows older, for a photon (corresponding identical object or event) such as the one emitted from light source H_α, because Wu's Unit Length l_{yy} of the corresponding identical reference subatomic object or event (such as H_α) becomes smaller, the frequency ($\nu \propto l_{yy}^{-3/2}$) of the photon becomes bigger, the light speed ($C \propto l_{yy}^{-1/2}$) becomes faster, and the wavelength ($\lambda \propto l_{yy}$) becomes smaller.

On the other hand, in a massive star with high gravitational field, because the circulation speed (V) of Wu's Pair of the corresponding identical reference subatomic object or event becomes slower due to Gravity Effect Wu's Spacetime Shrinkage Theory . Since V^2r is always a constant ($V^2r = K$) for an inter-attractive circulating pair such as a Wu's Pair, the size of circulation orbit (2r) of Wu's Pair becomes larger. Also, the circulation period ($T = 2\pi r/V$) of Wu's Pair gets longer. In other words, Wu's Unit Time ($t_{yy} = T$, also $t_{yy} = \gamma \, l_{yy}^{3/2}$) and Wu's Unit Length ($l_{yy} = 2r$) of the corresponding identical reference subatomic object or event both become bigger.

As a result, at a high gravitational field, for a photon (corresponding identical object or event) such as the one emitted from light source H_α, because Wu's Unit Length l_{yy} of the corresponding identical reference subatomic object or event becomes bigger, the frequency ($\nu \propto l_{yy}^{-3/2}$) of the photon becomes smaller, the light speed ($C \propto l_{yy}^{-1/2}$) becomes slower, and the wavelength ($\lambda \propto l_{yy}$) becomes larger.

Photon is a free Wu's Particle traveling in space. Without collision with other particles in the traveling path, its original wavelength, momentum and energy generated from the light source could be completely preserved. In other words, doesn't like the photon generated on the present earth, a photon emitted from an ancient star is not in subatomic equilibrium with the objects and events (environment) on the present earth. Its original wavelength generated from the light source can be revealed in the H_2 absorption spectrum observed on earth. As a result, photon can be considered as a marker or DNA of its light source which can be used for the explanation of Cosmological Redshift also the derivation of Hubble's Law [12].

X. Acceleration and Spacetime

In the acceleration of an object or event is measured by Wu's Unit Length and Wu's Unit Time of a reference subatomic object or event,

$$A = a\,(l_s/t_s^2)$$

$l_s = ml_{yy}$

$t_s = nt_{yy}$

$A = a\,(m/n^2)(l_{yy}/t_{yy}^2)$

Because of Wu's Spacetime Equation,

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

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

Therefore,

$$A = a\,m\,n^{-2}\,\gamma^{-2}\,l_{yy}^{-2}$$

Where A is the acceleration, a is the amount of normal unit acceleration, γ is the Wu's Spacetime constant, m is the ratio between normal unit length and Wu's Unit Length of the reference subatomic object or event, n is the ratio between normal unit time and Wu's Unit Length of the reference subatomic object or event, l_{yy} is Wu's Unit Length of the reference subatomic object or event (can be the same object or event that is under measurement).

For a corresponding identical acceleration, the amount of normal unit acceleration "a" is a constant, both m and n are reference-dependent constants, therefore,

$$A \propto l_{yy}^{-2}$$

As a result, for a corresponding identical acceleration at high gravitational field or in ancient universe, because the size (l_{yy}) of Wu's Pair is bigger, therefore the acceleration is slower.

XI. Wu's Spacetime Field Equations

Because of Newton's Second Law of Motion and Newton's Law of Universal Gravitation, an object "m" at a distance "R" from a massive star "M" can have an acceleration "A" generated from the gravitational force "F" between the object and the star as follows:

$$F = m\,A$$

$$F = G\,m\,M/R^2$$

Therefore,

$$A = GM/R^2$$

Where GM/R^2 is the gravitational field surrounding the massive star M, this equation is called "Field Equation".

Furthermore, the acceleration of an object or event can be measured by Wu's Unit Length of a reference subatomic object or event at the same location and time as follows:

$$A = a\,m\,n^{-2}\,\gamma^{-2}\,l_{yy}^{-2}$$

Where A is the acceleration of a object or event, a is the amount of normal unit acceleration, γ is the Wu's Spacetime constant, m is the ratio of normal unit length, n is the ratio of normal unit time and l_{yy} is Wu's Unit Length of the reference subatomic object or event at the same location and time.

In addition, with the same reference subatomic object or event at the same location and time, the Absolute Light Speed of a photon emitted from an object or event (a light source) can be represented as follows:

$$C = c\ m\ n^{-1}\ \gamma^{-1}\ l_{yy}^{-1/2}$$

Where C is the Absolute Light Speed of a photon (an object), c is the amount of normal unit velocity (a constant 3 x 10^8), γ is the Wu's Spacetime constant, m is the ratio of normal unit length, n is the ratio of normal unit time and l_{yy} is Wu's Unit Length of the reference subatomic object or event at the same location and time.

For an object or event at a location and time (or a gravitational field and aging of the universe, or a subatomic equilibrium state),

$$A = GM/R^2$$

$$A = a\ m\ n^{-2}\ \gamma^{-2}\ l_{yy}^{-2}$$

$$C = c\ m\ n^{-1}\ \gamma^{-1}\ l_{yy}^{-1/2}$$

Also,

$C^{-4} = c^{-4}\ m^{-4}\ n^{4}\ \gamma^{4}\ l_{yy}^{2}$

Given

$\sigma = m^{-1}\ n^{2}$

$\delta = m^{3} n^{-2} c^{4}$

Therefore,

$$a = \sigma\ \gamma^{2}\ l_{yy}^{2}\ (GM/R^{2})$$

$$a = \delta\ \gamma^{-2}\ C^{-4}\ (GM/R^{2})$$

These are named "Wu's Spacetime Field Equations" [13]. Where A is the acceleration of an object or event, a is the amount of normal unit acceleration, σ and δ are ratio factors, γ is Wu's Spacetime constant, G is the gravitational constant, l_{yy} is Wu's Unit Length of a reference subatomic object or event at the same location and time and C is the Absolute Light Speed at the same location and time. (σ and δ are ratio factors of the reference subatomic object or event, C is a constant at the same location and time).

Wu's Spacetime Field Equation represents the amount of normal unit acceleration "a" based on Wu's Unit Length l_{yy} of a reference subatomic object or event at the same location and time, which reflects the distribution of energy and momentum of matter. Instead of Wu's Unit Length l_{yy} of the reference subatomic object or event, which is an unknown quantity, Absolute Light Speed is used, which is dependent on the location and time (or the gravitational field and aging of the universe at the location and time), no matter the reference subatomic object or event used in Wu's Spacetime Field Equation.

XII. Wu's Spacetime Field Equations versus Einstein's Field Equations

Acceleration and Wu's Spacetime Field Equation of an object or event can be formulated by the System Transformation Diagram (Fig. 2) and represented by Wu's Unit Length l_{yy} of the reference subatomic object or event and the Absolute Light Speed at a location and time (or a gravitational field and aging of the universe, or a subatomic equilibrium state) as follows:

$$A = a\ m\ n^{-2}\ \gamma^{-2}\ l_{yy}^{-2}$$

$$a = \delta\ \gamma^{-2}\ C^{-4}\ (GM/R^{2})$$

Where A is the acceleration of an object or event, a is the amount of normal unit acceleration, δ is a ratio factor, γ is Wu's Spacetime constant, l_{yy} is Wu's Unit Length of the reference subatomic object or event at a location and time and C is the Absolute Light Speed at the location and time.

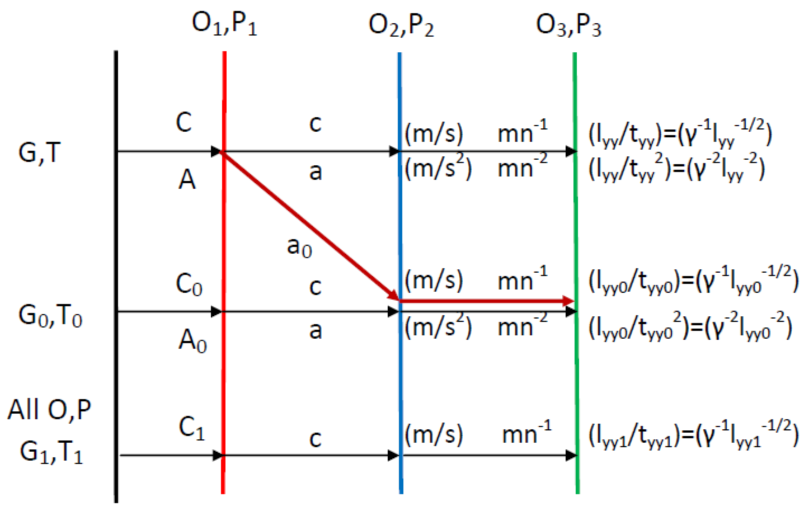

Fig. 2 System Transformation Diagram shows the correlations and transformations between equilibrium states and corresponding identical objects or events (G = gravitational field, T = aging of the universe, O = object or event, P = property, A = acceleration, C = Absolute Light Speed).

In addition, the same acceleration and Wu's Spacetime Field Equation of an object or event can also be formulated by the System Transformation Diagram (Fig. 2) and represented by Wu's Unit Length l_{yy0} of the reference subatomic object or event and the Absolute Light Speed C_0 at a location and time on earth as follows:

$$A = a_0\, m\, n^{-2}\, \gamma^{-2}\, l_{yy0}^{-2}$$

$$a_0 = \delta\, \gamma^{-2}\, C_0^{-4}\, (GM/R^2)$$

Where A is the acceleration, "a_0" is the amount of normal unit acceleration measured on earth, δ is a reference-dependent constant of the reference subatomic object or event, γ is Wu's Spacetime constant, C_0 is the Absolute Light Speed on earth ($3\text{x}10^8$ m/s) and l_{yy0} is Wu's Unit Length of the reference subatomic object or event on earth ($\delta = m^3 n^{-2} c^4$, it is a constant for the same reference subatomic object or event).

Einstein's Field Equations has a solution (Einstein's Spacetime) with a four dimensional space-time continuum (a function of space and time such as the potential energy) derived from a nonlinear geometry system (geodesics) transformed to a Normal Spacetime System on earth. Reflecting the distribution of matter and energy, the derivative of the curvature of the space-time continuum represents the amount of normal unit acceleration a_0 in a Normal Spacetime System on earth.

In contrast, Wu's Field Equation presents the amount of normal unit acceleration a_0 in Wu's Spacetime reflecting the gravitational field and the distribution of matter on earth where Wu's Unit Length l_{yy0} and Wu's Unit Time t_{yy0} on earth are correlated to each other by $t_{yy0} = \gamma l_{yy0}^{3/2}$.

$$a_0 = \delta\, \gamma^{-2}\, C_0^{-4}\, (GM/R^2)$$

$$R_{\mu\nu} - \frac{1}{2} R\, g_{\mu\nu} + \Lambda\, g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$$

Because the same terms GC_0^{-4} and G/C^4 ($C = C_0$, the Absolute Light Speed on earth) appears in both equations, Einstein's Field Equation and Wu's Spacetime Field Equation are equivalent. However, there is no gravitational force in Einstein's Spacetime Field Equation. Acceleration is derived from the curvature of space-time continuum, which reflects the virtual distribution of matter and energy in the universe. On the other hand, in Wu's Spacetime Field Equation, matter does exist, as is the gravitational field. The acceleration is indeed caused by the gravitational field.

XIII. Wu's Spacetime Theories and Corresponding Identical Objects or Events

As all corresponding identical objects or events measured by the corresponding identical normal unit length and normal unit time, because of Principle of Parallelism, their length L, time T, velocity V and acceleration A can be represented as follows:

$$L = l\, l_s$$
$$T = t\, t_s$$
$$V = v\, (l_s/t_s)$$
$$A = a\, (l_s/t_s^2)$$

Where l is the amount of normal unit length, l_s is normal unit length; t is the amount of normal unit time, t_s is normal unit time; v is the amount of normal unit velocity, l_s/t_s is normal unit velocity; a is the amount of normal unit acceleration, l_s/t_s^2 is normal unit acceleration; I, t, v and a are all constants.
Also, because of Wu's Spacetime Equation,

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

Therefore, for all corresponding identical objects or events measured by the corresponding identical Wu's Unit Length and Wu's Unit Time, because of Principle of Parallelism, their length L, time T, velocity V and acceleration A can be represented as follows:

$$L = l\, m\, l_{yy}$$
$$T = t\, n\, \gamma l_{yy}^{3/2}$$
$$V = v\, m\, n^{-1}\, \gamma^{-1}\, l_{yy}^{-1/2}$$
$$A = a\, m\, n^{-2}\, \gamma^{-2}\, l_{yy}^{-2}$$

Where m is the constant of normal unit length, n is the constant of normal unit time, γ is Wu's Spacetime constant and l_{yy} is Wu's Unit Length (diameter of Wu's Pair) of the reference object or event at the reference point. l, t, v and a are constants. These are called "Wu's Spacetime Formula".

Table 2 summarizes the properties including l_{yy}, t_{yy} and $V_{circulation}$ of Wu's Pairs; ν, C and λ of photons; and length, time, velocity and acceleration of corresponding identical objects and events with the influences of gravitational field and aging of the universe.

Wu's Spacetime Formula and Wu's Spacetime Shrinkage Theory can be used to interpret many phenomena such as Cosmological Redshift, Gravitational Redshift, General Relativity, Gravitational Time Dilation, Deflection of Light, Perihelion Precession of Mercury, Einstein's Field Equations and Wu's Spacetime Field Equations, as well as Hubble's Law and Wu's Spacetime Reverse Expansion Theory.

Table 1 summarizes the properties including l_{yy}, t_{yy} and $V_{circulation}$ of Wu's Pairs; ν, C and λ of photons; and length, time, velocity and acceleration of corresponding identical objects and events with the influences of gravitational field and aging of the universe based on Wu's Spacetime Shrinkage Theory.

As a result, on the present earth (old universe), because of the small Wu's Unit Length l_{yy} and Wu's Unit Time t_{yy} of the light source, photon has a smaller wavelength λ and period T (larger frequency ν) than that coming from a star at far distance (young universe) which can cause cosmological redshift and universe expansion (actually spacetime shrinkage). Also, for a massive star, because of the large Wu's Unit Length l_{yy} and Wu's Unit Time t_{yy}, a corresponding identical object or event has a larger wavelength and slower speed than that on earth. As a consequence, the photon emitted from a corresponding light source in the star has a larger wave length λ and period T (smaller frequency ν) than that on earth which can cause Gravitational Redshift.

Table 1 Properties of Wu's Pairs, Photons and Corresponding Identical Objects and Events

		Young Universe	Aged Universe	High Gravity	Low Gravity
Wu's Pairs					
l_{yy} (=2r)	l_{yy}	Large	Small	Large	Small
t_{yy} (=T)	$t_{yy} \propto l_{yy}^{3/2}$	Large	Small	Large	Small
V_{cir}(=2πr/T)	$V_{cir} \propto l_{yy}^{-1/2}$	Small	Large	Small	Large
Corresponding Identical Objects and Events					
L	$L \propto l_{yy}$	Large	Small	Large	Small
T	$T \propto l_{yy}^{3/2}$	Large	Small	Large	Small
V	$V \propto l_{yy}^{-1/2}$	Small	Large	Small	Large
A	$A \propto l_{yy}^{-2}$	Small	Large	Small	Large
Photons					
ν	$\nu = 1/t_{yy} \propto l_{yy}^{-3/2}$	Small	Large	Small	Large
C	$C \propto l_{yy}^{-1/2}$	Small	Large	Small	Large
λ	$\lambda = C/\nu \propto l_{yy}$	Large	Small	Large	Small

XIV. Conclusion

Subatomic Equilibrium and Subatomic Properties are proposed as the foundations of Principle of Equilibrium, Principle of Correspondence and Principle Parallelism. With Wu's Spacetime Equation, a group of Wu's Spacetime Theories associated with length, time, velocity and acceleration of Corresponding Identical Objects or Events are derived. Physical phenomena such as Deflection of Light, Perihelion Precession of Mercury, General Relativity, Gravitational Time Dilation, Cosmological Redshift and Gravitational Redshift are explained. In addition, a system transformation diagram between subatomic equilibrium states and corresponding identical objects or events is used for the derivation and interpretation of Wu's Spacetime Field Equation. Furthermore, a comparison with Einstein Field Equations is discussed.

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