**Perfect Universe Theory with Infinite Layers of Nesting and Differentiability**

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# **Abstracts**

Momentum conservation and energy conservation are the basic laws of motion in physics. Nevertheless, for centuries new discoveries for fundamental laws have been scarce, there is also no unified mathematical expression between the macrosystem and the microsystem. Here I provides a universe model with a four-leaf catenoid upward rotationally layer-by-layer, in which the Milky Way is in five dimensions of space-time. I present the equations of complete momentum, complete energy, complete Lorentz factor ,new universal gravitation, and present the law of conservation of velocity. I also present new concept of kinetic flux, photon mass and Planck's coefficient, derive the simplified equation of universal gravitation and the planetary precession equation, prove the equivalence of two-dimensional Schrodinger equation and universal gravitation equation. I also improved the first and second equations of Maxwell’s equations. When applying the philosophy of opposites attract, the essence of gravity is derived from the mutual attraction between matter and antimatter. When I further philosophically consider the hyperbolic cosine function form of complete energy, I find that it can explain the yin-yang and five-element frameworks of the Chinese Taoist school. From the view of catenary aesthetics, the philosophical implications can be extended to the human instincts of pursuing the truth (natural balance), the good (balance between humans) and the beautiful (being in harmony with nature). It is believed that these discoveries are not only scientific, but also will have an important enlightening effect on the sustainable development of mankind.

# **Introduction**

The Special Theory of Relativity deduces the mass–energy equation E = mc² [1], I have discussed the philosophical implications of the equation several years ago. Physically, kinetic energy is generally expressed with Ek = 1/2 mv², which is inconsistent with the mass–energy equation because the universe is perfect. On the basis of my study on philosophy of life, I have made a induction on three principles that govern everything in the universe:

**Law 1: Need for self-** **perfection (circular movement is an outward manifestation);**

**Law 2: Requirement of maximum space-time effect (minimum disturbance to space-time);**

**Law 3: Requirement for symmetry and balance (symmetry for form, balance for state).**

Not long after that , by accident, I found that the first one and first two terms of the expanded hyperbolic sine and hyperbolic cosine functions under the Maclaurin series can express the momentum and the energy defined in the Special Theory of Relativity , and from this point on, the corresponding model of the universe is supposed. It is possible to find from the domain of the mathematical function definition that the kinematic velocity can surpass the velocity of light. I also discovers that the mathematical expression between the macrosystem and the microsystem can be unified, and that the conservation of the momentum of classical mechanics is absolute in the range of the universe. From the complete energy formula, it is easy to find that the photon is inferred to have a rest mass which keeps an inversely proportional relationship with the light-wave length. I also present that matter is essentially a light energy package. Many philosophies can be derived from the form of the hyperbolic cosine function.

# **Results**

Universe model with four-leaf catenoid

Figure 1 shows the universe model with a four-leaf catenoid upward rotationally layer-by-layer based on the hyperbolic functions.

The left leaf is symmetrical to the right leaf as to the original Point O, whilst the top leaf is symmetrical to the bottom leaf as to the original Point O. If the galaxy is located at the top leaf, looking down from the Pole S, the self-rotational direction is anti-clockwise, and the mirror galaxy is located at the bottom leaf, the self-rotational direction is clockwise. If the left leaf opens toward Pole E, then the right leaf will open toward Pole W. Each celestial body is located on the circular plane at a different level. The secondary celestial bodies at the same level form into a concentric circle by the orbit, and each celestial body in the galaxy is going up spirally. However, humans cannot perceive it because the velocity along the S-axis is the same. It is supposed that the above universe is making an anti-clockwise self-rotational motion along Point O and an anti-clockwise revolution along the centre of a larger and deeper universe as a small universe. For humans, the face at Pole N is shady all the time, like the moon. It is supposed that it deeply influences human destiny. Imaginarily, the universe is a structure with infinite nesting, which may be either a celestial body or a fundamental particle.



Figure 1 Multilayer galactic universe model with four-leaf catenoid

Complete momentum

(1)

where, is the momentum of motion of matter, kg.m/s; is the mass of motion of matter, kg; is the limiting propagation velocity of light in vacuum, m/s; and is the proportionality coefficient between motion velocity and velocity of light (i.e. hyperbolic sine ;).

According to Equation 1, if and take the first term of the expansion equation, then, which expresses the defined momentum in classical mechanics.

Complete energy

= (2)

where, is the energy of motion of matter, J; is the mass of matter, which is either inertial mass ( is not related to v and used to substitute the rest mass here) or mass of motion ( is related to v), kg; and is the hyperbolic cosine function.

According to Equation 2, if and take the first term of the expansion equation, then is the mass–energy equation derived from the Special Theory of Relativity. If the two front terms are taken, then, which expresses the defined energy in the Special Theory of Relativity.

The new Lorentz factor

(3)

where, is the proposed new Lorentz factor, and is the hyperbolic tangent function.

The specific derivation process is presented in the Supplementary Methods.

According to the expansion of series , if the first term is taken and put into Equation 3, equation can be obtained, which is the Lorentz factor of the Special Theory of Relativity.

Momentum also cause energy

(4)

where, a new momentum–mass function is defined, which is also cased as the resistance function of motion.

Catenary coefficient on momentum

= (5)

where, is the catenary coefficient of momentum in classical mechanics .

Law of velocity conservation

(6)

The new universal gravitation

(7)

where *r* is the orbital radius; is difined as the complete kinetic energy.

Considering the introduction of electron spin angular momentum, the above equation can be extended to

（8）

while， is revolution angular momentum；and is spin angular momentum.

The specific derivation process of the new universal gravitation and the equivalence of the two dimensional Schrödinger equation are presented in the Supplementary Methods.

The simplified equation of gravity

If (s is the irradiated area) is defined as flux of kinetic energy field, the total kinetic energy field flux is obtained through fitting ,it shows that is numerically equal to the term ‘GM’ in Newton's equation of gravity. Then, we can get,

(9)

A polar form is introduced, i.e. the rotation angle θ and the elliptic eccentricity ,we can get the precession of elliptical motion by Equation 10.

(10)

The specific derivation process of the simplified universal gravitation and the derivation of precession are presented in the Supplementary Methods.

Equation 7 is further expanded , and the derivative of F to r is solved to obtain,

(11)

where is the mass density,which is considered as a function of r.

A 5-dimesional space-time universe

Considering Ψ's dimension in the International System of Units is , from figure 1, we can know that Ψ is actually the shear rate of three-dimensional space to two-dimensional time,so we can define Ψ as the real velocity in a 5-dimesional space-time universe.

Planck constant expressed by photon mass

(12)

where, is the frequency of light and is the wavelength of light; and is definite; is the momentum of photon.

Improved Maxwell's equations

(13)

Where, Q is the quantity of source charge, m, and e are electron mass, average orbital radius and electron charge, r is the average radius of path integral, is the intensity of electric field, others are the same as general formula.

# **Disscussion**

The Special Theory of Relativity (STR) requires , but in Equation 3 can be defined within the whole field of real numbers, This is especially helpful in explaining the speed at which galaxies are moving away from each other.

The change ratio of energy to velocity is defined as momentum in classical mechanics. According to Equations 4, the change ratio of energy to velocity can be expressed with a moving mass function, whilst the product between and the change ratio of momentum to velocity is energy . Therefore, a casual relationship between momentum and energy exists.

According to Equation 5, we can demonstrate when . The equation of momentum in classical mechanics is universal because of the velocity conservation.The velocity of the macro-motion of matter can be calculated with the momentum equation in classical mechanics due to a small error. The catenary coefficient is necessary for the micro-particle.

According to Equation 6, the sum of the velocity vector of the same matters in the universe. Conservation of velocity should be considered from a universal viewpoint as it is based on thetime dimension. In addition, velocity has a normal distribution, while the square of velocity has a gamma distribution. In this study, energy is a special case of the Gamma distributionan as a generalized exponential distribution which domain is in (－∞,＋∞). If the motion is in a local system, then the velocity is not necessarily equal to 0. However, according to Equation 6 and , is true. This is Einstein’s hypothesis in STR, except the translational velocity of the galaxy.

According to Equations 7, 8 , the essence of universal gravitation is the density of the radial lines of the gravitational potential energy at the origin of the coordinates, defined in the galaxy center; the gravitational potential energy is twice the total kinetic energy of the current moving matter. If we take the derivative of Equation 7, it shows that the derivative of the sum of the higher order terms of the complete momentum with respect to the velocity produces the universal gravitation.

Because the velocity *v* of the internal motion of a micro-particle is comparable to the velocity of light, according to Equation 7, *F* is far larger than the macro universal gravitation defined by Newton. Consequently, the mathematical expressions of universal gravitation and electromagnetic force are identical. Equation 8 applies when spin motion is considered.

According to Equation 9, we can see that the first term on the right of the equation is Newton's universal gravitation value, and the equation has one extra cubic term of ‘1/r’ compared to Newton's equation of gravity.

According to calculation using Equation 10 , Mercury's centennial precession is 38.93 seconds of arc ("), considering the observation error, this result is consistent with the observation of the perihelion precession of Mercury by U. Le Verrier in 1859[2], which is 38 " per century faster than Newtonian theory.

According to the 5-dimensional space-time assumption, from the centre of the universe to the centre of the Galaxy (Axis OG) is the first-dimension time axis; from the centre of the Galaxy to the centre of the solar system (Axis GA) is the second-dimension time axis. The three-dimensional space is exactly what we see, while the two-dimensional time can only be imagined. Meanwhile, given the addition of an upper pole and a lower pole to the four-leaf catenary in Fig.1, the universe shown in Fig.1 is actually a 30-dimensional space-time. This leads to an awkward fact that the Earth is nothing more than a tiny dust suspended in the solar “atmosphere” and that the mass of the sun is far beyond human estimates. The harmonic energy of the sun determines all motions in the solar system; the harmonic energy of the unknown celestial bodies at the centre of the Galaxy determines all motions in the Galaxy; the harmonic energy at the centre of the universe determines the motions of all matters in the current universe.

Equation 11 leads to an amazing conclusion: the integral of the mass density function of antimatter along the radius of the sphere is gravity. It can be further deduced that antimatter density exists inside matter. The reasonable explanation is that antimatter means the space squeeze energy, and greater mass density corresponds to greater space squeeze energy;It’s a little bit like the buoyancy of water, which is the space squeeze. Among the eight planets, Earth has the largest average density. It is speculated that only when the space squeeze energy reaches a certain value can the instinctive desire necessary for life is formed. This may be the fundamental reason why Earth is home to life.

According to Equation 12, if is small enough, the micro-particle can have a jumping change and sublimates into a photon. The longer the wavelength of light, the smaller the mass, momentum and energy of the photon. In contrast, the shorter the wavelength of light, the larger the mass and the momentum of the photon. Moreover, the photon is easily affected by gravitation. That is, no absolute boundary exists between light and matter or the light itself is a special matter because it appears to be a “superconduction phenomenon” and runs with the limited velocity of matter. However, the common matter is considered as a “condensed state” of photon, whilst the matter is essentially a “package” of the light energy. Therefore, the Maxwell’s equations can be extended to Equations 13 as Improved Maxwell’s equations.

The complete energy equation consists of the hyperbolic cosine , where the former part in the bracket represents that everything is growing, and the latter part represents that everything is fading. The energy of the universe is formed under such a growing and fading effect (average), and the balance can be achieved. As the poet Tao Yuan-ming said, “Learning is like a tiny sprout, it's growing inconspicuously; Laziness is like a grindstone, it's depleting unwittingly.” The map of Yin and Yang and the Five Elements in 5-dimesional space-time is given in the Supplementary Methods.

The catenary appears aesthetic because of its minimum gravitational potential energy, which indicates consistency with nature.

The essence of energy conservation is the yin–yang balance, whilst that of momentum conservation is the velocity conservation that determines the circular motion of matter. Undoubtedly, humans have the instinct of pursuing the truth (natural balance), the good (balance between humans) and the beautiful (being in harmony with nature) because the natural demands shall be accommodated for humans as the product of nature.

As the Chinese old saying goes, “God tends to create all things rather than destroy them.” Care must be taken for humans because nature will be damaged during development. Nuclear energy will intentionally destroy matters, and transgenesis will intentionally change the nature of matter.

# **Methods**

The energy equation

As shown in Figure 1, Point G is located in the centre of the galaxy; the Sun is the centre of the solar system; Rs is the distance between the solar system and the centre of the galaxy; and is the radius of the galaxy.

is a Hubble constant. It is assumed that all units here are converted into international unit 1/s. The time evolution acceleration of the galaxy is defined as (Unit: ). If is the velocity of plane in the galaxy away from the centre of the universe, according to Hubble’s law, the height of the galaxy relative to the original Point O is . According to the four-pole symmetry of the model, the velocity of the relative far-away celestial body in the plane of the galaxy shall also be consistent with Hubble’s law. If the velocity at Point A is , then . Let the catenary coefficient be , then .Accordingly, can be obtained based on the catenary equation. According to the above definition of dimension, the gravitational potential energy at the lowest point relative to the catenoid in the plane of the galaxy can be calculated as .

Derivation of the new Lorentz factor

The energy conservation is still true here, from which the total energy relative to the mass of motion, product between momentum and velocity of light and inertial energy form a right triangle (with hypotenuse ) expressed in Equation 14:

(14)

where, and .

Equation 1 shows the expression of, where is the mass of motion, and is the rest mass.

If each equation is put into Equation 14, then,

(15)

According to Equation 15, we can get Equation 3.

The energy conservation is still applicable because the hyperbolic functions (Equation 1 and 2) can accommodate Equation 3 under the new Lorentz factor. Figure 2 shows the triangular relationship among the momentum and velocity of light, inertial energy and total energy in the Special Theory of Relativity and “the Perfect Universe Theory with Infinite Layers of Nesting and Differentiability” here.



Fig. 2 Triangular relationship between the Special Theory of Relativity and the momentum of the velocity of light (right-angle side), inertial energy (horizontal side) and total energy (hypotenuse) in “the Perfect Universe Theory with Infinite Layers of Nesting and Differentiability”

The Law of velocity conservation

The expression of force can be derived with any of the two equations in following formula:

(16)

where, is the differential of time, and is the differential of space, .

If the values of the two expressions in Equation 15 are equivalent, then can get Equation 6.

The simplified equation of gravity

Planetary motion is mostly elliptical motion. The precession of elliptical motion with large eccentricity cannot be reasonably explained by Newton's law of gravitation. According to Equations 2,7, only the kinetic energy part of the total energy corresponds to universal gravitation; thus, it can be speculated that gravitation applied to a planet may be determined only by the high-order component of the total solar energy.

If (s is the irradiated area) is defined as the flux of kinetic energy field, the total kinetic energy field flux at a point with a distance ‘r’ from the solar centre is = . A curve is drawn to demonstrate the relationship between and r. Then, the equation is obtained through fitting. Specifically, there is a linear relationship between the solar kinetic energy field flux and r, and the kinetic energy field flux increases with an increase in distance instead of declining. The results of fitting solar planetary data (‘v’ is the average planetary speed; radius ‘r’ is the semi-major axis A of elliptical motion) show that is numerically equal to the term ‘GM’ in Newton's equation of gravity. When the elliptical motion of a planet is regarded as the vibration caused by solar radiation, the amplitude is the elliptical semi-major axis A, and Amplitude A determines the total mechanical energy of the elliptical motion, which generates the total mechanical energy lock-in effect. At this time, the kinetic energy field flux remains constant, and the product of velocity and radius of motion remains constant during planetary motion. The high-order term energy generated after Equation 7 receives series expansion and will produce revolution precession.

In Equation 7, is supposed, then, Equation 7 can be developed into Equation 17,

(17)

By conducting Maclaurin series expansion of Equation 17 and taking the first two terms, and then substituting into it, Equation 9 is obtained.

Planck constant expressed by photon mass

A certain micro-matter can be assumed to reach the velocity of light and is defined as the photon. When is put into Equation 2,

(18)

The equation of photon energy in the quantum mechanics is given as

(19)

where, is Planck constant, and is the frequency of light.

Based on the two equations above, Equation 12 is obtained.

Another equation of universal gravitation

Equation 7 can be rewritten as Equation 20,

（20）

Where, is the complete momentum defined by Equation 1, and is the momentum defined by classical mechanics.

Precession of elliptical motion

Planetary motion is mostly elliptical motion. The precession of elliptical motion with large eccentricity cannot be reasonably explained by Newton's law of gravitation.

A polar form is introduced, i.e. the rotation angle θ and the elliptic eccentricity . It is easy to obtain the precession of elliptical motion by (Equation 21).

(21)

But according to calculations, Mercury's centennial precession is 93.04 seconds of arc (")，which is not consistent with the observation.

Considering that the gravitational potential energy is equal to 2 times the negative number of the kinetic energy, Equation 7 can be divided by 2 and then expanded into the Laurent series[3], eliminating the term m, and substituting v=sqrt(Ψ/r) into it, Equation 22 is obtained.

(22)

According to the definition of the residue[3]，the residue B at *=0* is obtained, which value is Ψ/ 2.And know *B=*[3]*，*thus, the ratio of the total remaining energy to the mass for one cycle along curve C can be obtained as the following formula*，*According to the above equation is equivalent to the ratio of the angular kinetic energy corresponding to the precession of planetary revolution to the mass, the following equation can be obtained，*，*then*，.*

According to calculations, Mercury's centennial precession is 38.93 seconds of arc ("), considering the observation error,this value is consistent with the observation of the centennial precession of Mercury by U.J. Le Verrier in 1859[2], which is 38 " per century than Newtonian theory. The calculation results of Venus , Earth , and Mars are all less than 0.28", which does not agree with the actual observed values. I suspected that too big observation errors are the cause.

Antimatter causes gravity

Assuming that the masses of Earth and a satellite are M and m, respectively, and that the antimatter exists in the interior of the matter, then the masses of the interiors of Earth and the satellite are −M and −m, respectively.Philosophically, the antimatter has a certain attraction to the matter. Thus, the attraction of Earth to the satellite and vice versa can be given as and , respectively.

where are the velocities of Earth and the satellite, respectively, and is the coefficient of universal gravitation.

If Earth were connected to the satellite with a rope, the tension applied to the rope can be estimated as . Based on the principle of mechanical-energy conservation, because & . Thus, the tension applied to the rope equals the negative value of the universal gravitation constant, and the point of zero potential energy is at the centre of the matter instead of being at an infinite location. Therefore, the origin of the universal gravitation is the inter-attraction between matter and antimatter, which is consistent with the principle of attraction of opposite poles. Similarly, considering the principle of repulsion of similar poles, an equal repulsive force develops, resulting in a centrifugal motion. In addition, the attraction and repulsive forces interact with each other, resulting in a periodical increase or decrease in the energy of the elliptical motion.

The 2D time-free Schrödinger equation

Let ，The general two-dimensional time-free Schrödinger equation can be rewritten in Equation 22.

(23)

Given that (T is period of motion), the total energy , the gravitational potential energy and the amplitude ; thus,

(24)

where *F* is the universal gravitation. This indicates that macro- and micro-motions can be expressed using the same mathematical equation if Planck’s coefficient is defined as the product of twice the kinetic energy and period of motion. In addition, Equation 23 indicates that the work efficiency using a natural force is twice that using manpower.

Calculations of catenary coefficient

When the matter moves in the local system (typically, if , then1.0+ 1.666675E−5; if , then 1.0+ 1.666675E−9), the velocity of motion declines by 1%, and a fractional part of the catenary coefficient declines by 0.01%. Therefore, the velocity of the macro-motion of matter can be calculated with the momentum equation in classical mechanics due to a small error.

Earth satellites and hydrogen atom

Let be the spatial acceleration in the Earth–Moon system. Given the lunar average velocity *v* = 1023 m/s, the average orbital radius 384400 km, and velocity of light *c* = 299792458 m/s, we obtain, from which . The acceleration of the lunar circular motion is then calculated as . The mass of Earth is kg and the equivalent gravitational constant is *G* ≈, hence /kg.

Table 1 shows the valuesof *GM* for nine satellites relative to the earth, based on the parameters from the SATVIEW website [4].

Table 1. Acceleration and valuesof *GM* for nine satellites on the SATVIEW website

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Satellite | Period(min) | Altitude(km) | v(Km/h) | a=F/m(m/s2) | GM(N.m2/kg) |
| STARLINK-1045 | 89.7 | 260.560 | 27894.730 | 9.05365E+00 | 3.98158E+14 |
| STARLINK-1522 | 95.6 | 547.730 | 27310.330 | 8.318070034 | 3.98176E+14 |
| STARLINK-1408 | 95.6 | 550.190 | 27305.480 | 8.3121552 | 3.98176E+14 |
| STARLINK-1284 | 95.6 | 547.690 | 27310.410 | 8.318170044 | 3.98176E+14 |
| STARLINK-1172 | 95.6 | 547.710 | 27310.370 | 8.318117155 | 3.98176E+14 |
| STARLINK-1709 | 95.6 | 547.750 | 27310.300 | 8.318028683 | 3.98177E+14 |
| STARLINK-1037 | 95.5 | 545.630 | 27314.470 | 8.32312E+00 | 3.98176E+14 |
| Hubble Telescope | 95.4 | 538.090 | 27329.360 | 8.34129E+00 | 3.98176E+14 |
| Int. Space Station | 93.0 | 420.410 | 27564.860 | 8.63270E+00 | 3.98168E+14 |

Note: In the above table, the radius of Earth is *R* = 6371 km.

As indicated in Table 1, the valueof *GM* depends on the velocity and orbital height of the satellite. Note that Equation 7 negligibly depends on the running velocity of the satellite because *v*/*c* is small and largely depends on the orbital height. More specifically, GM is an increasing function of orbital height. Moreover, the error is small when the orbital height of the satellite is not widely changing. When calculated for natural satellites such as the Moon, *GM* is maximized. Therefore, the gravitational constant is not a true constant, but is approximately constant within a certain range, and cannot be accurately measured.

When a hydrogen atom is in the ground state, its electronic orbit radius[5] is *r* =. Given the mass of an electron 3, the dielectric constant in vacuum[5] , and the electric charge of an electron [5] ), the Coulomb force is calculated as . As the Coulomb and centrifugal forces must balance each other, the kinematic velocity of an electron is calculated as . Using this velocity in Equation 7, the gravitational force is obtained as . The relative error from the above Coulomb force is 4.49, which is negligible. The above calculation ignores the effect of electron moving mass.

Yin-yang and five-element frameworks

Figure 3 shows a complete explanation of the energy types based on the yin-yang and five-element framework through further extension and thinking based on the traditional culture of the Chinese Taoist school.

Improved Maxwell's equations

By comparing Coulomb's law with Equation 9, we can get

(25)

(26)

According to Equation 26 we can get first equation of Equations 13, which adds a higher order term, the second equation add the electrostatic potential term which can be solved by the residue theorem. The third and the fourth expression are essentially unchanged.

Tai Chi

1D time

(yang)

1D space

(yin)

2D time

3D space

2D velocity

5D velocity

**v**

**Ψ**

Define order of the universe

Define position of the universe

Mass-energy relationship

**E**

Water

Fire

Earth

Wood

Metal

Determine reproduction

Determine energy transformation

Determine balance

Determine growth of all matters

Determine fading of all matters

Figure 3 Spatial relationship described by the energy equation and mapped using the yin-yang and five-element frameworks of the Chinese Taoist school

# **References**

[1] https://en.wikipedia.beta.wmflabs.org/wiki/Mass%E2%80%93energy\_equivalence

[2] U. Le Verrier(1859), "Letter from Monsieur Le Verrier to Monsieur Faye on the Theory of Mercury and the Perichelian Movement of the Planet", Proceedings of the Weekly Conference of the Academy of Sciences (Paris), vol. 49 (1859), pp. 380-382.

[3] Brown, J. W., Churchill, R. V. (Interpreted by Zhang Jianlong et al). Complex Variables and Applications. Beijing: China Machine Press, 2019.

[4] <https://www.satview.org/>

[5] <https://physics.nist.gov/cgi-bin/cuu>

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# **Ethics declarations**

Competing inerests

The author declare that there is no conflict of interests regarding the publication of this article.