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Grand Unified Physics

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Abstract：It is Newton who first fond the half rule of the universe – universal gravitation and the law; It is the Advanced Physics which fond the other half rule of the universe – universal repulsion and the law. The whole universe shall be constructed by the combination of these two rules, this combination is just the "universal equation". In this paper the universal equation not only gives the sole stable state, real-time and accurate solution of the universe structure (including micro universe) ,but also gives the dynamic solution of the generation and development of the universe. This theory is so called as "Grand Unified Physics", *i.e.* The Advanced Physics.

Key Words：Universal Equation; Universal Repulsion; Full Kinetic Energy; Advanced Physical; Physical Reaction; Synchrotron Radiation; Radiation Repulsion Energy

1. Introduction

According to Newton's laws, the universe will have infinitely many solutions. But there is no denying that fact is that, the universe, for example solar system, there will always be the sole steady condition. This paper first to create the "universal equation",which not only gives the accurate solution of the sole stable state universe, including micro universe, but also gives the dynamic solution of the generation and development of the universe.

2. The Universal Equation

2.1 Universal equation expression formular

$$T_1 = U / 2 \qquad (1)$$

$$T_1 = E_1 \qquad (2)$$

$$E_1 = n^2 \hbar^2 / (2m r^2) \qquad (3)$$

The three formulas (1), (2) and (3) to be set simultaneously is called the "universal equation".

2.2 Theoretical significance of the universal equation

The universal equation not only can give accurate solution of macrocosmos structure, but also can give accurate solution of the microcosms structure.

The universal equation can not only given the sole stable-state, real-time, accurate solution of the universe structure but also can given a dynamic solution of the generation and development and death of the universe.

It is important to note that the structures of the earth - moon are also accurately comply with the universal equation.

This equation not only can show the singularity point of the universe, but also show us that the universe how to play before and after this singularity point….

It is a millennium dream of human bings to solve the whole universe, merely by using one grand unified equation which can not be done by other theories.

3. The composition of the universal equation

3.1 It is Newton who first fond the half rule of the universe – universal gravitation and the law of

In the universal equation, formular (1) represents the law of universal gravitation (details will be discussed as belows).

But there will be infinite numbers of solutions of the universe when law of universal gravitation are solely used. Therefore, the theory that "God push it at one time" was in default by all scholars.

3.2 It is the Advanced Physics first fond the other half rule of the universe – the universal repulsion and law of

Universal equation formula (3) represents the law of universal repulsion (details are as belows).

3.3 The two laws combined together to compose the whole universe

The marriage of the law of universal gravitation and the law of universal repulsion can solve all questions in the universe (including microcosmos). Please see belows.

4. Physical meaning of the universal equation in diagram

See Figure 1:

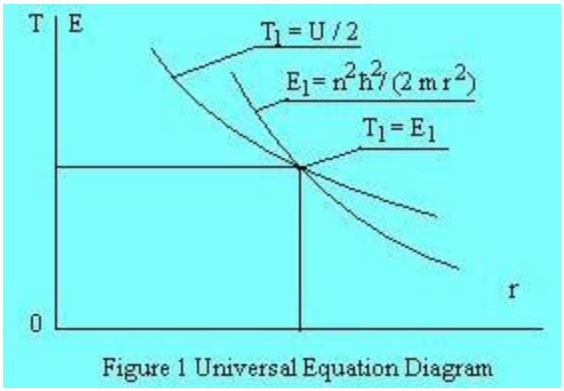

Figure 1 Universal Equation Diagram

In Figure 1, the two curves represents formula (1) and formula(3) of the

universal equation, the intersection point of them $T_1 = E_1$, represents formula (2) of the universal equation.

In Figure 1, one curve:

$$T_1 = U / 2$$

In this formula, U represents gravitational potential energy, T_1 represents orbital kinetic energy. The viewpoint that T_1 equals to the half of the gravitational potential energy U is the classical mechanics issue of Newton.

The other curve:

$$E_1 = n^2 \hbar^2 / (2m r^2)$$

E_1 represents radiation repulsion energy (this represents the universal repulsion. please see belows) :

In Figure 1:

$$T_1 = E_1$$

$T_1 = E_1$, which shows intersection point of the two curves, this is the steady-state solution of the celestial structure around the center, including atomic structure. X-axis is orbit radius r, ordinate is orbital kinetic energy T_1, or radiation repulsion energy E_1 . This calculation shows that the results are pretty accurate upon whichever the celestial object or atomic structure.

5. New basic principle and laws of physics

5.1 Universal gravitation and the law

Newton discovered the universal gravitation and the law. But Newton's law need to be re-expressed scientifically and strictly, therefore, the re-expressed law shall be regarded as a new law.

5.2 The universal repulsion and the law

The universal repulsion does exist accurately in the universe and can be expressed by laws as belows:

5.2.1 The law of universal repulsion

In the universe, when mass (m) with temperature T (K) got velocity V, there will be the universal repulsion F:

$$F = F_T + F_V \quad (4)$$

$$F_T = f(T) \quad (5)$$

F_T represents the universal hot repulsion, see the item of the law of universal hot repulsion as below.

$$F_V = f(V) \quad (6)$$

F_V represents the universal dynamic repulsion, see the item of the law of universal dynamic repulsion as belows.

5.2.2 The universal hot repulsion law

There is always hot universal repulsion F_T between the two parallel plates with same area S and same temperature T(K) and a distance of R. F_T is in positive proportion with the biquadrate of temperature T (K), and in positive proportion with the area S, and also in negative proportion with the cube of distance R, and the ratio is constant Ψ(kg/cm degree^4):

$$F_T = \Psi T^4 S / R^3 \quad (7)$$

Ψ shall be merely determined by experiment.

5.2.3 The nature of the universal hot repulsion

(i) The universal hot repulsion is in negative proportion with the cube of distance R, it shows that the repulsion is reducing very fast as the shift of distance and it will make the universal repulsion be difficult to be sensed by human beings in the macro world.

(ii) Within the size scope of atom and molecule, the universal repulsion is very huge and can not be neglected. The expansion caused by heat and contraction by cold of any macro body is just the result of the action of the universal hot repulsion.

(iii) The macro pressure of gas is just the result of action of the universal hot repulsion between molecules of gas.

(iv) In 20th century, physicists considered that the gas pressure is the result of the hot collision of molecules. This kind of statement is specious (be omitted).

5.2.4 The universal dynamic repulsion law

Any moving mass (m) with velocity V in the universe always has universal dynamic repulsion F_V. Usually the "repulsive force" effect of F_V is very small and may be ignored, but the energy effectiveness of the universal dynamic repulsion can not be ignored.

The repelling effectiveness (*i.e.* the exclusiveness) of radiation energy creates this universal dynamic repulsion, see the principle of synchrotron radiation below.

5.3 Synchrotron radiation principle

Any mass m, whenever it has velocity V, there will be synchronous radiant energy E_2.

E_2 is equal to macro mechanical kinetic energy of mass m accurately:

$$E_2 = 0.5 m V^2 \qquad (8)$$

5.3.1 Nature of synchrotron radiation

(i) The exclusiveness of synchrotron radiation energy E_2 constructed the important content of the universal repulsion.

(ii) When V is pretty smaller than the speed of light c, the radiation energy E_2 will radiate isotropic around the center m, when V is almost equal to the speed of light c, E_2 will radiate concentratedly along the tangent direction of V forward.

(iii) In fact, the synchrotron radiation energy E_2 will, take m as the center, emit neutrino particle flow to all around at the speed of light c. This kind of particle flow has the exclusiveness and this exclusiveness formed universal dynamic repulsion, and its energy can be absorbed by outside objects. But regarding that the mass of this kind of neutrino particle is very small, its repulsion force effect are small enough to be omitted. But its energy effect did exist and can not be omitted because it can bring the energy of repulsion, please see below. Therefore, when this universal equation are used for physical calculation, only the radiation repulsion energy will be taken in use and not use repulsion force, please see the universal equation formula (1), (2) and (3).

5.3.2 Proof of synchrotron radiation principle

(i) Synchrotron radiation experiments conducted by many countries have proved that this synchrotron radiation principle is correct when $0 < V < c$.

(ii) The following calculation about the astronomical structure of the solar system and the earth - moon, have once again proved that this synchrotron radiation

principle is correct. The sun and the earth all have this kind of synchrotron radiation energy E_2.

(iii) The astronomical structure calculation about the solar system and the earth – moon also accurately proved the theorem of universal dynamic repulsion.

(iv) The following calculation about the structure of atoms not only accurate verified this synchrotron radiation principle but also accurate prove the theorem of universal dynamic repulsion.

5.4 Full kinetic energy principle

whenever there is a mass m with velocity V, there must be full kinetic energy T:

$$T = T_1 + T_2 \tag{9}$$

$$T_1 = T_2 = 0.5mV^2 \tag{10}$$

T_1 represents the macro mechanical kinetic energy of mass m while T_2 represents the kinetic synchrotron radiation energy of it.

6. The celestial structure of the cored universe

The definition of the cored universe: in the center of the universe, there is a celestial physical mass M which possessed a dominance position.

6.1 Theorem Ⅰ of cored universe celestial structure

There is no exceptions in any cored universe that all celestial bodies around the same center of the universe moving in a closed orbit have the same first astronomic structural constant K_1:

$$K_1 = V^2 R \equiv \text{constant} \tag{11}$$

In this formula, V represents the velocity of orbital theoretical line velocity (approximately equal to the average orbit velocity), R represents the theoretical orbit radius of each celestial body (approximately equal to the average orbit radius).

6.1.1 The celestial structure of the solar system

The celestial structure of the solar systems complied accurately with theorem Ⅰ of cored universe celestial structure.

6.1.2 First astronomic structural constant K_1 of the solar system

Constant K_1 of the all celestial bodies (including the nine planets, crowds of small planets and comets) are equal to each other in the solar system:

$$K_1 = V^2 R = \text{constant} = 1.3274387 \times 10^{26} \ (cm^3 / s^2) \qquad (12)$$

K_1 was deduced by the law of universal gravitation (following specific derivation).

In this formula, R represents the theoretical orbital radius of celestial bodies and V represents its theoretical velocity, see the following table II.

6.1.3 The significance of K_1 to astronomical observation

K_1 can guide our astronomical observation and can correct astronomical observation, because:

In the solar system, if a celestial body was observed to be there from a point at a distance of R to the Sun, no matter whatsoever its mass and size and its orbital shape (circle, ellipse or parabola), its velocity V immediate can be fixed by only K_1.

$$V = (K_1 / R)^{1/2} \qquad (13)$$

Velocity V see Figure 2, celestial structure theorem 1 in the solar system:

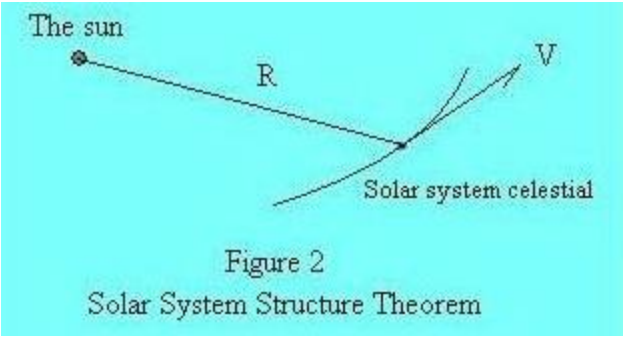

Figure 2
Solar System Structure Theorem

Similarly, in the solar system, if there is celestial object with velocity V, no matter whatsoever its mass and size and its orbital shape, its distant R to the sun can be fixed immediately by K_1:

$$R = K_1 / V^2$$

See Figure 2, these facts have not been acknowledged by the former physicists, so this theory can instruct astronomical observation.

6.1.4 Theoretical significance of K_1

Theory about K_1,(please see Figure 2) should completely cover and substitute the theory of Kepler. This theory will make Kepler's theory only own the meaning of museum. In addition, we have to point out that the Kepler's elliptical orbit theory is a big mistake! See figure 3 belows.

6.2 Theorem Ⅱ of the cored universe celestial structure

6.2.1 Theorem Ⅱ

In the cored universe, all celestial bodies in the closed orbit have the same second constant of the astronomical structure K_2:

$$K_2 = m^2 V^2 R^2 / r^5 \equiv \text{constant} \qquad (14)$$

Specific deduction as belows.

6.2.2 Astronomical structure constant K_2 in the solar system

In the solar system, all celestial bodies in the closed orbit including the nine planets, crowds of small planets and comets own the same constant of the astronomical structure K_2:

$$K_2 = m^2 V^2 R^2 / r^5 \equiv \text{constant} = 9.549815421 \text{ X } 10^{49} \ (g^2 / s^2 \text{ cm}) \qquad (15)$$

In this formula, m is the mass of a celestial body around center (including satellites), V represents theoretical orbital velocity, R represents theoretical orbital radius, r represents the "carrying radius".

The definition of the "carrying radius": the radius of any celestial body including the size of atmosphere is called as "carrying radius".

Why should we introduce the "carrying radius" here?

It is because all calculation, research and astronomical observation showed that the radiation repulsion energy of the sun is very sensitive to the density of mass of celestial around center. Therefore, the radiation repulsion energy of the sun caught by planets' atmosphere is much larger than that caught by the solid part of the planets. Therefore, we must introduce the "carrying radius" here.

So, the density of the mass of the nine planets will decrease as their distances increasing from the sun. Mercury is the nearest planet to the sun, it owns max. mass density. The celestial bodies in outer space own min. mass density.

It is to say that the radiation repulsion energy of the sun just resembles to wind, it can blow far away the celestial bodies with small mass density while the celestial

with big mass density shall be pulled closer to the sun.

The derivation of K_2 is as belows.

6.3 Theorem IIIof the cored universe celestial structure

6.3.1 Theorem III

In the cored universe, radiation repulsion energy E_1 gained by celestial around the center is in positive proportion with the radiation repulsion energy sum discharged by the center celestial body E, and is also in positive proportion with the projection area πr^2 of the celestial body around center on the center celestial body and is in negative proportion with the square of the distance R to the center celestial body,and is in negative proportion with the celestial body around center mass density ρ, the proportion is constant k:

$$k = 1 (g / cm^3)$$

6.3.2 Theory expression formula of the Theorem III

$$E_1 = k E \pi r^2 / (R^2 \rho) = k E (4/3) \pi^2 r^5 / (m R^2) \quad (16)$$

In this formula, E represents the total radiation repulsion energy of the center celestial body, this kind of radiation repulsion energy is tremendously larger than that on the earth through testing. Because the sun to emit a large amounts of neutrino and the smaller particle of the energy flow can not be tested by the human beings.

6.4 Theorem IVof the cored universe celestial structure

6.4.1 Theorem IV

As for the radiation repulsion energy E_1 caught by all the celestial bodies around center from the center and their orbital kinetic energy T_1:

$$T_1 = 0.5 m V^2 \quad (17)$$

There are 3 logical relationships as below:

The first logical relationship is: $E_1 > T_1$

The second logical relationship is: $E_1 = T_1$

The third logical relationship is: $E_1 < T_1$

6.4.2 The dynamic solution of the life of the cored universe

If $E_1 > T_1$, the universe is belongs to youth outbreak period, such as the Milky

Way, being in its acceleratory expansion due to effect of the universal repulsion of the universe center.

If $E_1 = T_1$, the universe shall be in middle-aged stable period, for e.g. the solar system, all celestial bodies only have one steady-state solution.

If $E_1 < T_1$, the universe will shrink gradually.

This is the dynamic solution of the life of the universe.

7. The sole stable-state solution of the universe

When the universe comes into its middle ages period, the merely stable state solution can be concluded by applying the said above theorem and the universal equation. The solar system will be taken as the example to conduct its solution as below.

7.1 The astronomical structure of the solar system

7.1.1 The constant K_2 of the astronomical structures in the solar system

Let formulas (16) and (17) to be equal, according to theorem Ⅲ and theorem Ⅳ of the celestial structure. *i.e.* $E_1 = T_1$, and then:

$$k E (4/3) \pi^2 r^5 / (m R^2) = 0.5 m V^2$$

To be:

$$k E（8/3）\pi^2 = m^2 V^2 R^2 / r^5 \qquad (18)$$

In this formula, k,E,π are all constant, the left side of this formula is constant, and this constant can be marked as K_2:

$$K_2 = m^2 V^2 R^2 / r^5 \quad = m^2 K_1 R / r^5 \equiv \text{constant} \qquad (19)$$

In this formula, value of V,R,m are all very accurate, only the carrying radius have not been fixed. But it is not difficult to find that there is no atmosphere on the Mercury and the its carrying radius is just the radius of the solid body by observing. So, following data of the Mercury will be substitute into formula (19) and resulted that:

$$m = 3.310704 \times 10^{26} \text{ (g)}$$

$$R = 7 \times 10^{12} \text{ (cm) (orbit long radius)}$$

$$V = 3.961816 \times 10^6 \text{ (cm / s) (long radius linear velocity)}$$

$$r = 2.45 \times 10^{10} \text{ (cm) (Mercury own maximum radius)}$$

The substitution of the data of the Mercury into formula (19) and resulted that:

$$K_2 = m^2 V^2 R^2 / r^5 \equiv \text{constant} = 9.54981542 \times 10^{49} (g^2/s^2 cm) \qquad (20)$$

Similarly, since all celestial bodies in the solar system have the same constant k_2, so the solution for celestial bodies in the solar system can be given as below accurately:

7.1.2 The physical meaning of K_2

Physical meaning of K_2 is more important than K_1, for example, in the solar system, if a celestial body which can be observed has a velocity V, its other data can be calculated by using K_2, its distance R to the sun, its mass m, and its own carrying radius r, and these achievements will be beyond general physics.

7.1.3 Note of Mercury

Calculations show that the reason the elliptical orbit of the Mercury is due to the change of its own carrying radius (change of mass density).

The radius change of the Mercury is the result of the temperature change caused by its distance change to the sun.

Some long uplift shape and the gill shape on the surface of the Mercury by observing is just the reflection of the shift of the radius of the Mercury.

7.2 The carrying radius of nine planets r

The carrying radius of the nine planets can be computed by using K_2 as below:

Table I The list of the nine planets' carrying radius

	Carrying radius (cm)	Atmosphere thickness (cm)	Atmospheric observations Molecular number ($10^n/cm^2$) [1]	Average mass density (g / cm^3)
Mercury	2.450×10^8	0	n=0	5.3744
Venus	8.13784848×10^8	2.06784848×10^8	n=24.6	2.1575
Earth	9.46850254×10^8	3.09050240×10^8	n=25.3	1.7013
Mars	4.20030188×10^8	8.05301882×10^7	n=23.6	2.0696

Jupiter	1.31307334×10^{10}	6.00073344×10^{9}	n=26.4	0.2003
Saturn	9.14883924×10^{9}	3.13883924×10^{9}	n=27	0.1773
Uranus	5.00654582×10^{9}	2.46634582×10^{9}	n=27.6	0.1687
Neptune	5.81149236×10^{9}	3.28899236×10^{9}	n=27	0.1253
Pluto	9.66943498×10^{8}	6.46943498×10^{8}	-	0.2682

Table Ⅰshows that the atmosphere thickness of the nine planets by calculation is almost the same as the observation results.

All data in this paper comes from reference [1].

7.3 *Significance of constants K_1, K_2 of the astronomical structures in the solar system*

The two constants K_1,K_2 work together to strictly limit the position of all celestial bodies in the solar system. A clear corollary is : if people factitiously disturb the order of nine planets (just like God throw the dice again), they can still slowly automatic go back to the original set positions by the force complex of the gravitation and repulsion of the sun under the control of constant K_1 and K_2, as light as feather planets by the sun still "blown" (pushed) far away, as a result of the bigger mass density, the Mercury will still return to the sun nearest side.

And the structure calculation about the earth - moon proved further that the law of the universal repulsion as well as the theorem of the celestial structure all are correct.

Whenever K_1 appears in this paper, it represents formula (1) of the universal equation, *i.e.* the law of the universal gravitation. Whenever K_2 appears, it represents formula (3) *i.e.* the law of the universal repulsion. Whenever $T_1 = E_1$ appears, it represents formula (2), therefore, the simultaneous of K_1 andK_2 , expresses the universal equation.

7.4 The earth-moon celestial structure

All theorems of the cored universe celestial structures are concluded on the basis of the solar system data, but they are accurately appropriate for the earth-moon celestial structure.

7.4.1 Calculation of the astronomical structure of the earth-moon

The application of Theorem Ⅲof the cored universe celestial structure upon the structure of the earth-moon:

The radiation repulsion energy E_1 gained by the moon when it is moving in its

orbit around the earth is in positive proportion with the total radiation energy E_e of the earth, and is in positive proportion with the projection area πr^2 of the moon on the earth, is in negative proportion with the average mass density of the moon ρ, the proportion is constant k:

$$k = 1 \ (g / cm^3)$$

So:

$$E_1 = k E_e \pi r^2 / (R^2 \rho) = k E_e (4/3) \pi^2 r^5 / (m R^2) \qquad (21)$$

Since the total radiation repulsion energy E_e of the earth equals to its orbital kinetic energy, let's set the aphelion orbital kinetic energy of the earth $T_e = 0.5 \ m V_e^2$, so:

$$E_e = T_e = 0.5 \ m V_e^2 = 2.5635924 \times 10^{40} \ (erg)$$

Since the structure of the earth-moon is stable, using the second kind of celestial logical relationship of the above as belows:

$$E_1 = T_1 = (1/2) \ m V^2 \qquad (22)$$

Data of the earth-moon:

The Ee

The moon itself radius $r = 1.7382 \times 10^8$ (cm)

The moon's mass $m = 7.35 \times 10^{25}$ (g)

The moon's orbit long radius $R = 4.067 \times 10^{10}$(cm)

The velocity V of the orbital long radius of moon can be resulted from the substitution of the said above data into formula (21) and (22):

$$V = 1.09458 \times 10^5 \ (cm / s) \qquad (23)$$

The obital apogee velocity of the moon by observation is:

$$V = 1.08251 \times 10^5 \ (cm/s)$$

Visibly, the deviation between this paper and the observation value is merely 1%.

7.4.2 *Conclusion*

This amazing deviation of merely 1% proved that the theory in this paper is correct and it also shows that the carrying radius of the moon equals to the value of the observation, and this means there is no atmosphere on the surface of the moon.

It shows that in calculation method for the first time human get a naked star.

7.4.3 Important conclusions of the stable structure of the cored universe

In the cored universe, including micro universe, all celestial bodies around the center, e.g. the earth, its orbital kinetic energy equals to the radiation repulsion energy from the center celestial accurately, the earth also discharges the equal amount of radiation energy simultaneously. Earth's orbit energy is in a dynamic equilibrium. The earth radiant energy strict dominate the moon's orbit as above. And all celestial bodies structure are like this.

7.5 The theoretical data of the nine planets

7.5.1 The significance of the theoretical data

Celestial orbit theoretical data have significant instruction meanings to astronomical theory and observation. But the existing theory can not do that.

7.5.2 Significance of the theoretical value of celestial orbits

(i) Celestial orbit theoretical value has very import physical meanings e.g. in the solar system, any celestial body around center, if its carrying radius and mass-density will not shift against the temperature and position, the orbit of this celestial body will be a perfect circle and the radius of this circle is just the theory orbit radius of this celestial body and in this circumstance, its uniform orbit velocity shall be its theoretical orbital velocity.

(ii) But, in fact that, the size and mass-density of all celestial bodies will change against the shift of temperature and position, therefore, all celestial bodies have similar ellipse orbit just because the radiation repulsion energy gained by all celestial body around center are in negative proportion with its mass density.

(iii) If a certain celestial body’s mass density changes slightly, its orbit will be nearly a circle, on the contrary, the celestial body’s mass density changes very sharp, its obital radius will change a lot. If the change of the celestial body’s mass density is gigantic, it is comet, for e.g. the Halley’s comet, its mass density changes hundreds of millions times, and its obit radius also changes at that degree. And the some comets with much bigger change of the mass density than the Halley’s comet are called as

hyperbolic orbits comets.

(iv) Among the terrestrial planets, the mass density of the Mercury changed in a comparatively large scope, so its self radius changed pretty much also. The calculation shows that the ratio between max and min radius of the mercury should be a 1.087 change in value.

(v) There are perihelion and aphelion in the orbit of the earth moving around the sun obviously, this is because that the temperature of the earth to escalate after the midwinter, its mass density is becoming smaller gradually, and the radiation repulsion energy gained from the sun will increase gradually, so the earth go away gradually from the sun. But the temperature reached its max. value and its density reaches min. aphelion value when the midsummer comes. After the midsummer, the things will go in the contrary direction till the midwinter and the earth back to its perihelion. All these theories is beyond the general physics.

(vi) It is easy to conclude that the ellipse orbits in the celestial structure are the result of the change of average mass density of the celestial bodies. If there is no this kind of change, orbits of all celestial bodies shall be circle.

(vii) This study also shows that all celestial bodies have similar elliptic orbits but not genuine elliptic. Just because they are not conform to the "elliptic equation" but their orbits all conform to the "parabolic equation" accurately.

The parabolic equation is as follow:

$$\rho = (1/R) = (1/K_1)\, V^2$$

In this formula, R is the instant orbit radius, V represents the instant velocity, K_1 is astronomical structure constant, ρ is defined as the curvature of the parabola (the curvature is different from math). The orbits of all celestial bodies are formed with 4 (or 2) parabolas, the sun is just on one focus of the parabola, see Figure 3:

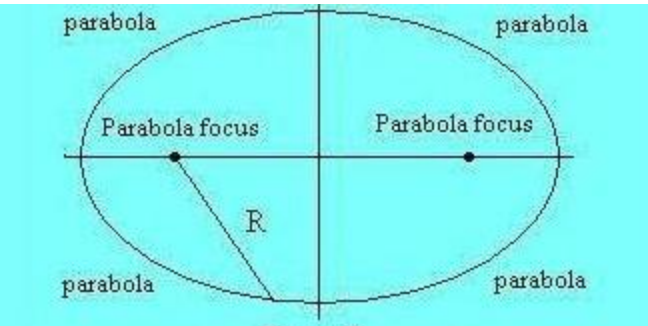

Figure 3
Celestial Object Orbit Theory Curve

Figure 3 shows that celestial orbit curve is composed with 4 (or 2) parabolas.

7.5.3 Theoretical orbit value of the Mercury

(i) Theoretical orbit radius of the Mercury

K_1 shall be substituted into formula(19) and then:

$$K_2 = m^2 K_1 R / r^5$$

Therefore:

$$R = (K_2 / K_1) (r^5 / m^2) \qquad (24)$$

Data of the Mercury:

$$K_2 = 9.54981542 \times 10^{49} (g^2 / cm\, s^2)$$

$$K_1 = 1.3274387 \times 10^{26} (cm^3 / s^2)$$

$$r = 2.45 \times 10^8 (cm)$$

$$m = 3.310704 \times 10^{26} (g)$$

To submit the said above data into formula (24), the theoretical orbit radius of the Mercury around the sun is as below:

$$R = 5.7938896 \times 10^{12} (cm) \qquad (25)$$

This value is very close to the average orbital radius of the Mercury, see Table II.

(ii) Theoretical orbit velocity V of the Mercury

The substitution of formula (25) into formula (13) will reach the theoretical orbital velocity V of the Mercury as below:

$$V = 4.786544807 \times 10^{16} (cm / s) \qquad (26)$$

It obviously that the theoretical orbital velocity of the Mercury is very close to its average orbital velocity. See Table II.

(iii) Now let's check the carrying radius of the Mercury:

The substitution of the theoretical orbital radius and the theoretical velocity of

the Mercury into formula (20) will reach the own radius of the Mercury r as below:

$$r = 2.45 \times 10^{8} \text{ (cm)}$$

The conclusion is correct and this calculation shows that all the said above calculations are valid.

7.5.4 Theoretical orbital value of the earth

(i) Theoretical orbital radius R of the earth

Data of the earth:

$$m = 6.0495 \times 10^{27} \text{ (g) (including the moon)}$$
$$r = 9.4685024 \times 10^{8} \text{ (cm) (carry radius)}$$

The substitution of the data of the earth into formula (24) will reach the theoretical orbital radius R of the earth as below:

$$R = 1.49605666 \times 10^{13} \text{ (cm)}$$

This theoretical value in 9 digits are effective accurate precision.

Apparently, the theoretical orbital radius proximate equals to the average radius, please see Table II. The average radius has no physical meanings but the theoretical radius has the important meaningful in physics, as above.

(ii) Theoretical orbital velocity V of the earth

The substitution of the theoretical orbital radius of the earth into formula (13) will reach the theoretical velocity V of the earth orbit:

$$V = 2.97874425 \times 10^{6} \text{ (cm / s)} \qquad (27)$$

As the same, this theoretical value in 9 digital expression is effective accurate precision.

7.5.5 Table for the theoretical orbital values of the nine planets

Table II for the theoretical orbital values of the nine planets

	Orbital theory radius R (cm)	Orbital average radius R (cm)[1]	Orbital theory speed V(cm/s)	Orbital average speed V(cm/s) [1]
Mercury	5.7938896×10^{12}	$5.79091944 \times 10^{12}$	4.78654481×10^{6}	4.789×10^{6}

Venus	1.08241077×10^{13}	1.08208942×10^{13}	3.50196003×10^{6}	3.503×10^{6}
Earth	1.49605666×10^{13}	1.49597892×10^{13}	2.97874425×10^{6}	2.979×10^{6}
Mars	2.27900313×10^{13}	2.27940962×10^{13}	2.41343039×10^{6}	2.413×10^{6}
Jupiter	7.78390615×10^{13}	7.78328361×10^{13}	1.30589555×10^{6}	1.306×10^{6}
Saturn	1.42554742×10^{14}	1.42699036×10^{14}	9.64975757×10^{5}	9.64×10^{5}
Uranus	2.87682830×10^{14}	2.86957181×10^{14}	6.79282251×10^{5}	6.81×10^{5}
Neptune	4.49107712×10^{14}	4.49658352×10^{14}	5.43665759×10^{5}	5.43×10^{5}
Pluto	5.89205740×10^{14}	5.90014086×10^{14}	4.74650293×10^{5}	4.74×10^{5}

Note for Table II:

In this table, all theoretical values are expressed in 9 digits, and the expression are valid and accurate. Data in this table are closely related to each other, no changing is allowed on single data because all data will change due to a change merely on a individual data.

8. To solve the astronomic structure of the solar system with the universal equation

8.1 Relationship between formular (1) of the universal equation and K_1

K_1 is equivalent to formular (1) of the universal equation because K_1 is derived from universal gravitation formula.

The universal gravitation of the sun F:

$$F = G M m / R^2 \qquad (28)$$

In this formula, G is the gravitational constant, M = 1.989 X 10^{33}g, it is the mass of the sun. The centrifugal force of celestial bodies around the sun is F:

$$F = mV^2 / R \qquad (29)$$

Let formula (28) equals to formula(29), and then:

$$V^2 R = G M \equiv \text{constant}$$

This constant is named as K_1, and then

$$K_1 = V^2 R = \text{constant} = 1.3274387\times10^{26}\ (cm^3 / s^2)$$

This is formula (12) or (13). K_1 represents formula (1) of the universal equation. it is easy for the solution of celestial structures with K_1.

8.2 Relationship between formular (3) of the universal equation and K_2

K_2 is equivalent to formula (3). The physical meaning of the formular (3) of the universal equation is that E_1 represents the radiation repulsion energy caught by the celestial body around the center (including electrons) from the center (celestial).

It is easy to find that formular (3) itself is Bohr's "quantum condition" and it is also easy to understand that the universal equation is applicable for the calculation of the atom structure of all element.

As for the atom structure, in formular (3), ħ is the orbit angular momentum of the electrons, its value is identically equal to Planck's constant.

In celestial structure, ħ in formula (3) represents the orbit angular momentum of the celestial body around the center.

$$\hbar = m R V \qquad (30)$$

In this formula, m represents the mass of the celestial object, R represents the orbital radius and V represents the orbit velocity.

For the celestial structure, the value of ħ is as below:

$$\hbar = (K_2 r^5)^{1/2} \qquad (31)$$

In this formula, r represents the celestial carrying radius.

So, it is K_2 which make the solution of the cored universe much easier.

8.3 Seeking solution of the earth with Formular (31)

Both research and calculation show that the "principal of full kinetic energy" and the"principle of synchrotron radiation" are all suitable for the solution of the earth, electrons around the center and synchrotron radiation particles etc accurately.

Now let take the solution of the earth as an example:

All mass m moving around the center have synchrotron radiation phenomenon, and their orbital energy sum E can be represented using full kinetic energy T:

$$E \equiv T = T_1 + T_2 = h \nu \qquad (32)$$

In this formular, T_1 represents the mechanical kinetic energy, T_2 represents its potential kinetic (*i.e.* the synchrotron radiation energy), ν represents the moving

frequency around the center. It is clear that the full kinetic energy E of moving mass

m around the center is similarly to the energy of photons, photon is matter particles of combination of T_1 and T_2. h is Planck constant.

$$h = 2 \pi \hbar \tag{33}$$

$$\hbar = m R V \tag{34}$$

$\hbar$ represents the orbit angular momentum of the celestial.

As for the earth:

$$h = 2 \pi \hbar = 2 \pi m R V \tag{35}$$

So, the total orbital energy E of the earth is:

$$E = T = T_1 + T_2 = h \nu = 2 \pi \hbar \nu = 2 \pi m R V \nu \tag{36}$$

Data of the earth:

$$m = 6.0495 \times 10^{27} \text{ (g) (contains the moon)}$$

$$R = 1.49605666 \times 10^{13} \text{ (cm) (theory orbit radius)}$$

$$V = 2.97874425 \times 10^{6} \text{ (cm / s) (theory orbital velocity)}$$

$$\nu = 1 / [3.15569259747 \times 10^{7} \text{ (s)}] \text{ (the earth's orbital frequency)}$$

The substitution of said above data of the earth into formula (36) results as below:

$$E = 5.36767133 \times 10^{40} \text{ (erg)} \tag{37}$$

The orbital full kinetic energy of the earth (including the moon) T is as below:

$$T = m V^2 = 5.36767133 \times 10^{40} \text{ (erg)} \tag{38}$$

Formula (31) was substituted into formula (36) and resulted that:

$$E = h \nu = 2 \pi \hbar \nu = 2\pi (K_2 r^5)^{1/2} \nu \tag{39}$$

In this formula:

$$K_2 = 9.54981542 \times 10^{49} \text{ (} g^2 / cm\ s^2 \text{)}$$

$$r = 9.46850254 \times 10^8 \text{ (cm) (The earth carry radius)}$$

$$\nu = 1 / [3.15569259747 \times 10^7 \text{ (s)}] \text{ (The earth's orbital frequency)}$$

The said above data were substituted into formula (39) and results as below:

$$E = 5.36767133 \times 10^{40} \text{ (erg)} \qquad (40)$$

By comparing formulas (37), (38), (39)and (40), we can see that they are congruent in nine effective digits and this shows that the said above calculations are complete valid. (2005.10.22 t i e ling 10 n-14)

9. To solve the microcosm with the universal equation

9.1 Atom structure of hydrogen

9.1.1 Formula of the orbital kinetic T_1 of extranuclear electrons of hydrogen atom

$$T_1 = 0.5\ U = 0.5\ e^2 / r \qquad (41)$$

In this formula, U represents the electrostatic gravitational potential energy, r represents orbital radius of electrons. The view that the obital kinetic T_1 equals to half of U is the classical mechanics issue of Newton, and that is also the content of formula (1) of the universal equation.

Again observe formula (3) of the universal equation:

$$E_1 = n^2\ \hbar^2 / (\ 2\ m\ r^2\ ) \qquad (42)$$

In general physics, formula (42) is the Bohr' quantization condition. But advanced physics gives formula (42) a completely new significant physical meanings - the universal repulsion law (see the said above item of the "universal dynamic repulsion law") .

Formulas (41) and (42) work simultaneously:

$$T_1 = E_1$$

It shows that T_1 as a half of the electrostatic gravitational potential energy U, it equals to the radiation repulsion energy E_1 gained from the micro-universal center by electrons.

9.1.2 General formula of all orbital radius r of hydrogen atom

$$r = n^2 \hbar^2 / (me^2) \qquad (43)$$

Set n=1, the ground state orbit radius of hydrogen atom r_1 is resulted as belows:

$$r_1 = 0.52917721 \times 10^{-8} \text{ (cm)}$$

Apparently:

$$r_1 = a_。 = \text{Bohr radius} \qquad (44)$$

So, the respective substitution of n= 0，1，2，3…into formula (43) will get all orbit radius of the hydrogen atom as belows:

$r_0 = 0$

$r_1 = a_。$

$r_2 = 4a_。$

$r_3 = 9a_。$

……

The universal equation can also be applicable for solutions of all atom structure of other elements. (Detail omitted)

9.2 Conclusion of atom structure

9.2.1 Universal application of the universal equation

The said above shows that atom structure is conformed with the universal equation as the same as celestial structure accurately. Therefore, the universal equation is universally applicable.

9.2.2 Atomic energy level

At any time, only one electronic orbit can be owned by one hydrogen atom, so it can have only one atomic energy level but not multiple level simultaneously. This acknowledgment is very important when to discuss and know the atomic structure of all elements.

9.2.3 Quantum number and the universal equation

As the increasing of the quantum number n, orbital radius of electrons r is in positive proportion with n^2. This shows that the electrons will gain more radiation repulsion energy E_1 due to the increasing of the quantum number, and the electrons will be repulsed further far. The nine planets in the solar system are repulsed in this way: under the repulsion and those celestial with very light mass (Uranus, Neptune, Pluto), will be “blowed” (pushed) far away from the sun. But for the celestial of larger mass density such as the Mercury, will be pulled closer to the sun. As for the structure of atoms, the mass density of electrons are very huge and stable, when the quantum number increases, *i.e.* the radiation repulsion energy increases, the electrons outside the nucleus will be “blowed”(repulsed) far away.

9.2.4 The source for the quantization of atom structure

It is easy to see that nucleus is the source of energy quantization in atom structure. In an other words, the self energy of nucleus are quantized, so, its radiation energy is also quantized. This quantization will make the energy of all electrons outside the

nucleus be quantized. All electrons outside the nucleus have the same quantum number and equals to quantum number of the nucleus. Calculation and study showed that the atomic structure of all element is like this.

It is lamentable that quantum mechanics regarded that , in the structure of atom, in the different electron shell K, L, M, N…, the electron quantum number respectively is: n=1, 2, 3, 4…. This is completely wrong!

9.2.5 The essence of sun radiation energy

The nuclear energy is quantized. Radiation energy of the sun is also send out by the nucleus in principle. But the energy of the sun is a kind of degeneration and statistical result of a large number of nuclear energy and not appears in quantization.

9.2.6 The abnormal state of atom structure

It is necessary to point out that when quantum number n is zero, then the radiation repulsion energy of the nucleus is also zero, and the radiation repulsion energy E_1 gained by electrons is also zero. At this time, nucleus has no radiation repulsion energy and the orbital radius of electrons is also zero:

$$r = 0 \qquad (45)$$

This conclusion shows that all orbit electrons outside of the nucleus will fall on to the nucleus and this is a abnormal state, a peculiar phenomenon must appear and it has been defined by Advanced Physics as “physical reaction”. Please see belows:

It is also lamentable that the quantum mechanics regarded that the atomic structure also is in a kind of stable state when the quantum number n is zero. It is a serious mistakes!

9.3 Physical reaction

When the quantum number n is zero, the nucleus has no radiation repulsion energy as well as universal repulsion and all electron outside the nucleus will fall on to the nucleus. At this time, not only positive and negative electronic annihilate, release electron pair energy and the nucleus will crack and give out mass energy E:

$$E = mc^2 \qquad (46)$$

This process is called as “physical reaction”.

The result will be atoms explosion - matter explosion - the universe explosion. The universe explosion, so that's it.

9.4 The singularity and the explosion of the universe

The nucleus quantum number is zero, it represents the lowest temperature in the universe *i.e.* the absolute zero and this is the singularity of the universe.

According to the singularity can be concluded that: the universe mill explode inevitably on the singularity! The "nova explosion" and the "supernova explosion" by observing is just the result of physical reaction in the isolated universe. This is to show that the explosion only can happen in the isolated universe, but not in the whole universe. Therefor, the "Big Bang" theory of Einstein is completely wrong!

9.5 The fourth law of thermodynamics

9.5.1 The fourth law

Heat is created from universe singularity.

9.5.2 The deduction of The fourth law

If there is no creations of heat quantity, the universe will be heat death.

9.6 Self radius r_e of electron

Calculations resembled to the solar system by using the theorem of the cored universe celestial structures upon atom structures can achieve the self radius r_e of electron accurately.

$$r_e = 5.08428680 \times 10^n \text{ (cm)} \qquad (47)$$

This result in nine effective figures are accurate. But the order of magnitude 10^n is not as small as our imagination (be omitted) and is still waiting to be filled by physicists.

9.7 Physics of nucleus

9.7.1 Spin angular momentum of the nucleus (proton)

Large amount of studies showed that the spin angular momentum of the nucleus (proton) is h (Planck's constant).

$$h = m_p r_p c = 6.6260693 \times 10^{-27} \text{ (erg s)}$$

In this formula, m_p represents the mass of proton, r_p is the spin radius of proton, c is the velocity of light, therefore, the spin radius of proton r_p is as below:

$$r_p = 1.3213886 \times 10^{-13} \text{ (cm)} \qquad (48)$$

Visibly, the spin radius r_p of proton is in consistent with the value by experiments.

This conclusion shows that the nucleus (proton) is just the particle which rotating in the velocity of light. So, the spin mechanical kinetic energy T_1 is as below:

9.7.2 Spin mechanical kinetic energy T_1 of proton

According to the universal equations, the formula is as below:

$$T_1 = E_1 = h^2 / (2 m_p r_p^2) = (m_p r_p c)^2 / (2 m_p r_p^2) = 0.5 m_p c^2 \qquad (49)$$

9.7.3 Spin latent energy T_2 of proton

$$T_2 = T_1 = 0.5 m_p c^2 \qquad (50)$$

9.7.4 Full kinetic energy T of the nucleus (proton)

The full kinetic energy T of the proton is as below as per the theorem of full kinetic energy:

$$T = T_1 + T_2 = m_p c^2 \qquad (51)$$

Note: this is the internal energy of any mass m which have been exist inside the mass m in the universe, so, it is easy to see:

$$T = E = m c^2$$

This is the so called Einstein's "mass-energy equation". But, Einstein does not understand the physical meaning of "mass-energy equation" .

Therefore, when the fission and fusion of the nucleus happens, the loss of mass of atoms will discharge gigantic amount of nuclear energy $E = m c^2$.

9.7.5 The up-dated experimental verification for the mass - energy of the nucleus (protons)

The European hadron experiment is saying that two protons collide. This experiments have been confirmed that the nucleus has mass - energy:

$$E = mc^2$$

When this external added energy is 114-160 GeV, two protons collide and two gamma rays will be radiated, please see Fig 4:

Fig 4 Two protons collide to produce two gamma rays

The λ of the gamma ray is very short, and shall be as below:

$$\lambda = 1.3 \times 10^{-6} \text{ (n m)}$$

This is the wave length of the full kinetic energy of the protons spin at the speed of light.

It is also lamentable that scholars who do not grasp the truth of physics, they regarded this kind of external-added energy 114-160 GeV as “God Particle” .

9.7.6 Energy and mass of photon

It is easy to understand that any photon is a concentration of mechanical kinetic energy and latent kinetic energy, so the energy of any photon is E:

$$E = m c^2 \qquad (52)$$

It is easy to see that any photon has its precise mass m:

$$m = E / c^2 \qquad (53)$$

So, Einstein's theory of relativity that considered the rest mass of the photon is zero is completely wrong.

9.7.7 Radiation repulsion energy of the nucleus(proton) E_2

Radiation repulsion energy of the nucleus is latent kinetic energy, see formula (50).

$$E_2 = T_2 = h^2 / (2 m_p r_p^2) = 0.5 m_p c^2$$

Since the radiation repulsion energy of the nucleus is quantized (The energy quantization of the nucleus has been proved by experiment), quantum number n shall be introduced here, and the radiation repulsion energy E_2 of the nucleus (proton) can be expressed as below:

$$E_2 = n^2 h^2 / (2 m_p r_p^2) \quad (54)$$

9.7.8 Radiation repulsion energy E_1 gained by extranuclear electrons

$$E_1 = n^2 \hbar^2 / (2 m r^2) \quad (55)$$

9.8 The energy units of quantization series

Physics in 20th centaury considered that the Planck's constant h is the minimum unit of energy exchanging but the research in this paper shows that this is a mistake due to the congenital defect of quantum mechanics.

Study and calculation shows that, Planck's constant is not the minimum unit but the maximum unit of energy exchanging. There are smaller units for energy exchanging, they constitute a geometric series, this is the energy exchange units of quantization series, the geometric series of general term h' can be expressed as below:

$$h' = h / \Phi^n \quad (56)$$

In this formula, h represents Planck's constant, n = 0, 1, 2, 3…are nature numbers. The derivation process is omitted here.

$$\Phi = 4\pi / \alpha = 4\pi \times 137.03604 = 1722.0456 \quad (57)$$

Φ is defined as the universal constant, it is a new and non-dimensional universal constant. This universal constant owns significant physical meanings for example, the each h' equal to a neutrino, this suggests that neutrino is infinitely divisible downwards and so on.

10. Conclusion

All the said above views showed that physics has step on a new stage, *i.e.* the stage of the Grand Unified Physics, that is the Advanced Physics.

End

reference

[1] (English) C.W.Allen Astrophysical Quantities, (China)Yangjian translation Shanghai People's Publishing House，1976 (179-192)