Unification of Electromagnetic Force and Gravitation

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First Portion: the essence of gravitational mass and electric charge

Abstract: Since the discovery of an electron, people have thought that it possesses one electric charge and that the nucleus possesses a contrary charge. Based on the new discovery that moving photons do create force, I have calculated the number Z of elements and discovered that the number Z of elements can be calculated by the frequency of X-rays, and the atomic weight can also be calculated by the frequency of X-rays. This method of calculation shows the essence of the electric charge and the essence of the gravitational mass; here, for the first time, this study provides the unification of gravitation and electromagnetic force. Further based on the new discovery that moving photons create force and a formula for describing this new discovery, applying this discovery from the micro world to the macro world shows that from the atomic world to the galaxy world, nature has been working to obey this law, and its actions can all be described by this formula. Coulomb's law and the Newtonian University's law of gravitation are only approximate calculation formulas for specific conditions.

***Keywords*: frequency of X-ray, force, gravitation**

Electromagnetic force Unification.

INTRODUCTION

Since Newton discovered universal gravitation [1], people have thought that the origin of gravitation only relates to the gravitational mass and have defined gravitational mass in the expression of gravitation without investigating other origin theories. During the process of investigating the origin of gravitation, my experiments showed that moving photons produce gravitation. This discovery reveals the origin of gravitation. Moreover, I found that the atomic weight can be calculated by the frequency of the X-ray [2]. On the other hand, I have also found that the number Z of elements can also be calculated by the frequency of the X-ray. These experiments and calculations show that the electromagnetic force and gravitation are generated from the same origin. Their essence is the same. Therefore, we can comprehend the meaning of the gravitational mass, which was defined by Newton and Einstein, and the meaning of charge, which was defined by Coulomb and Franklin. This shows the unification of gravitation and electromagnetic force.

Chapter.1. Force generated by moving photons

The experimental devices are indicated in pictures **a, b, and c** of Figure 1. The process of the experiment is as follows: first, the light beam **L** is separated into 2 parts by a ring, as shown in pictures c and d of Figure 1. Light beam **L** then becomes two new light beams **P** and **O**, as shown in picture **d** of Figure 1. Along with light moving forward, the five light beams possessing the highest intensity in light beam **P** with the greatest attractive force obviously attracted light beam **O** to become a pentagon (see pictures 1-12 of Figure 1). Only the five points of light beam **O**, which correspond to the five points of light beams that possess the highest intensity in light beam **P**, are in contact with each other and gradually link to each other. Note: at first, light beam **P** and light beam **O** do not contact at all. It is impossible for this contact to occur in the light wave theory. This action is not an effect of wave interaction. In contrast, this indicates that moving photons create gravitation. (See pictures 1-12 of Figure 1.)

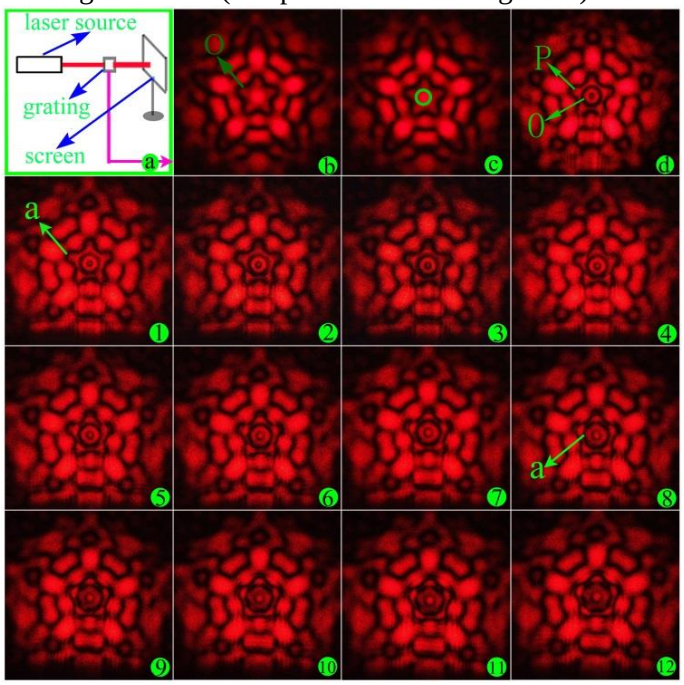

Figure 1. Picture **b** shows the device used in the experiment. Images **c and d** show the site of the ring in light beam O, and images 1-12 show that the form of light beam O changes from a circular shape to a pentagon because moving photons cause gravitation.

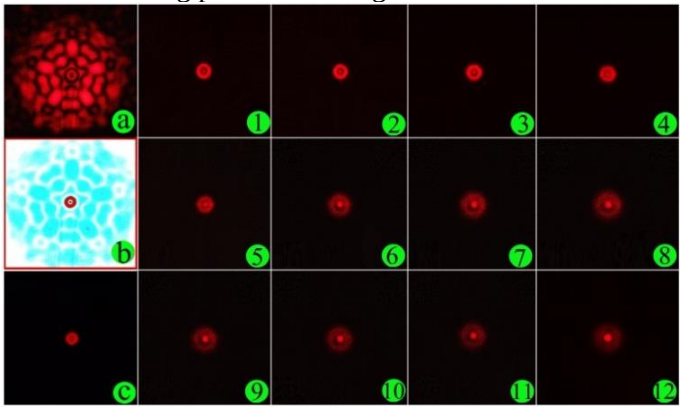

Figure2. This experiment shows that light beam O does not change its circular shape when there are no other light beams moving forward.

To verify that this phenomenon is caused by gravitation, a

second experiment was performed. The experimental device is shown in picture **a** of Figure2. Images b and c in Figure 2 show that the other light beams do not move forward and that only light beam O is allowed to move forward; under these conditions, light beam O maintains its circular shape. This phenomenon is shown in Figures 1-12 of Figure 2. This result demonstrated that if there was no other light beam, the light beam O would not accept the foregone gravitation.

In comparison with experiment 1, it appears that light beam O maintains its circular shape in unchanged form when there are no other light beams moving forward. According to the results of this experiment, light beam O does not appear before the phenomenon of gravitation. This phenomenon is confirmed only by the interaction force, indicating that gravitation occurs; thus, we find that moving photons cause gravitation.

Chapter.2. Validation of the force generated by moving photons

According to previous studies Gravitation origin , and above two experiments show moving photons generate force. Along this validated discovery, there is an interaction force between two light beams. Specifically, the distribution of light beams in space gives rise to a force field; thus, a change in the force field will change the distribution of light beams in space; on the other hand, a change in the distribution of light beams will change the force field in space. This inference can be further tested to validate the new discovery; for this purpose, I perform the following experiment. Figure3 shows a light source. When all the light beams move forward, the form of the central light beam changes with the difference form when only the central light beam moves forward. When only the center light beam moves forward, the intensity of the center light beam increases more than that when it moves with the other light beams, which occurs when the other light beams do not move forward; thus, more light beams are attracted to the center. See pictures **a, b, c, d, e, 1, 2, 3, 4, and 5**. This experiment validated the above findings.

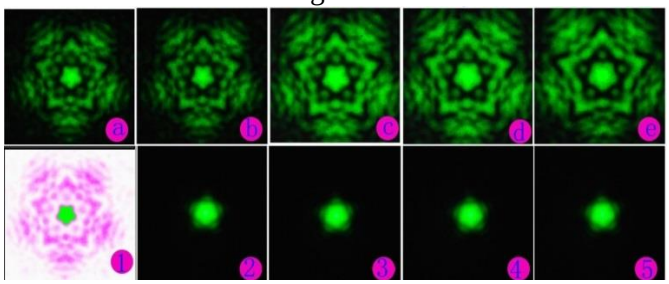

Figure 3. Image **a** is a light source. The form of the central light beam changes with the form. When only the central light beam moves forward, If so, the center light beam increases intensely, which indicates that when other light beams do not move forward, more light rays are attracted to the center. The form of center light beam will be difference, when all light beams move forward. **See pictures a, b, c, d, e, 1, 2, 3, 4, and 5 of figure 3.** This experiment tests the validity of the above discovery that moving photons generate force. From the above experiments, we can obtain a law of nature in which a moving photon creates force.

Chapter.3.The quantitative experiment

3.1. The interaction between photons.

One famous phenomenon in which the diffractive center changes from dark to bright has always been used to verify the wave theory of light. This seems to prove the existence of light waves. The following experiment shows that the change in the center of the light beam from dark to bright is not an effect of periodic waves but is the result of gravitational interactions. As shown in Figure4, when a light source is created, it emits two light beams, as shown in Figure4a. They do not contact each other in their movement process, while there is a 1.5 mm distance between them. Their tracks of movement are shown in picture **b** of Figure4. This experiment indicates that when both light beams O and P move forward, the center of light beam O is a dark project on the screen, as shown in picture **c** of Figure4; when only light beam O moves forward, the center of light beam O is a bright project on the screen. In this changing process, the radius of light beam O is 3.5 mm, and there is a 1.5 mm distance between light beam O and light beam P. This shows that the change in light beam O has nothing to do with the interaction of the contact force because, regardless of whether light beam P exists, the center of light beam O is far from the edge of light beam P and is not in contact; when light beam P is removed, this action does not act on light beam O. If the change in the center of the light beam from dark to bright is the result of periodicity of the wave, the change in the center of light beam O would be the same as the light beam traveling at an equal distance in these two states. However, in this experiment, the center of light beam O is bright when light beam P does not exist, and the center of light beam O is dark when light beam P exists. The light passed an equal distance in these two states. This finding unequivocally indicates that the change in the center of light beam O from dark to bright is not due to the periodicity of the wave but rather to gravitation, which the photons of movement created.

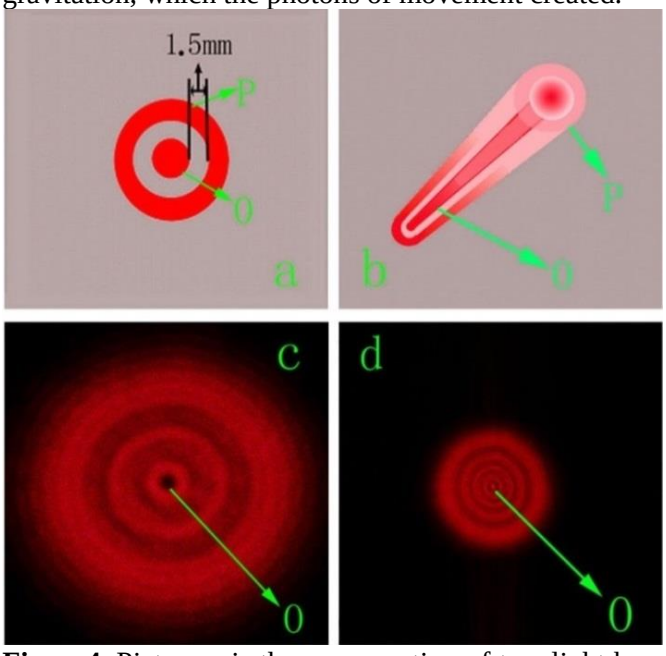

Figure4. Picture **a** is the cross-section of two light beams O and P. Picture **b** is the status of the movement track of

light beams O and P. Picture **c** is the photograph of the screen when light beams O and P are all moving forward, and picture **d** is the photograph of the screen when only light beam O moves forward.

This experiment indicates that the change in the center of light beam O diffraction from dark to bright is not a periodic wave change but rather the effect of the interaction of gravitation and the resulting movement photons.

To confirm that the interference fringe of light is a result of the interaction of gravitation and the resulting movement photons, experiment 5 was designed. Three light beams, A, O, and C, are created. Their interaction also indicates that the wave phenomenon in light is produced by force. The details are described below in experiment 5.

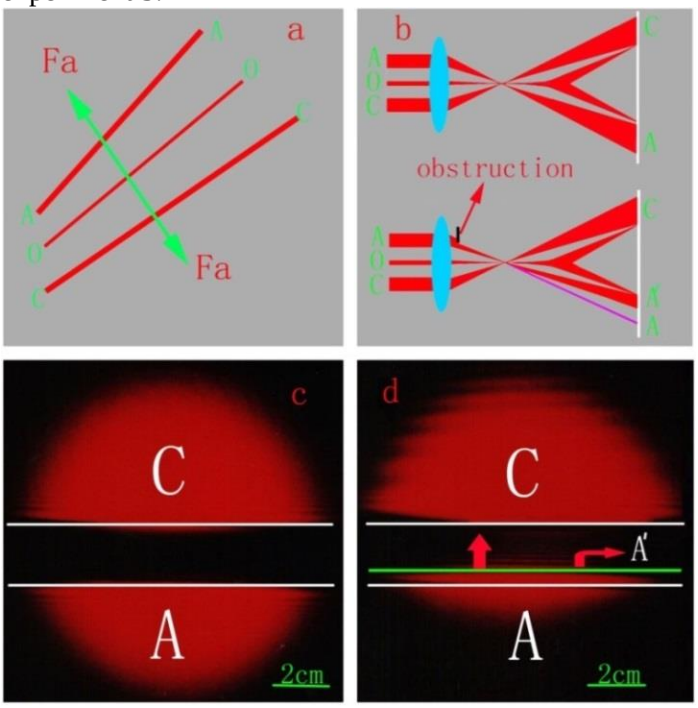

Figure5. Picture **a** is the status of force in the three light beams A, O, and C; Picture **b** shows the motion state of light beams A, O, and C; Picture **c** is the photograph of light beams A and C when they are first projected on the screen; Picture **d** is the motion state when the outer part of light beam A has been removed. In picture **d,** the white line is the original site of light beam A when the outside light beam has not been removed. The green line is the site of light beam A when its outside part of the light beam has been removed, and the red arrow is the direction of the light beam A accepting force. The purple line in picture **b** is the movement track of light beam A when its outer light beam has not been removed.

The interaction results are shown in Figure6. When the outer part of light beam A is removed, interference fringes appear in light beam C, and the remaining light beam A moves to light beam C. This also indicates that the interference fringes of light, which exhibit wave characteristics, are produced by the movement photons.

3.2. A method of describing interference and diffraction

We now know that the light wave phenomenon is produced by force, which photons of movement create. Based on this discovery, I developed a new method for obtaining images of multipinhole diffraction patterns and their interference fringes. According to the above conclusion, **the photons of movement create force**. Below, I do experiment 6 to apply this discovery.

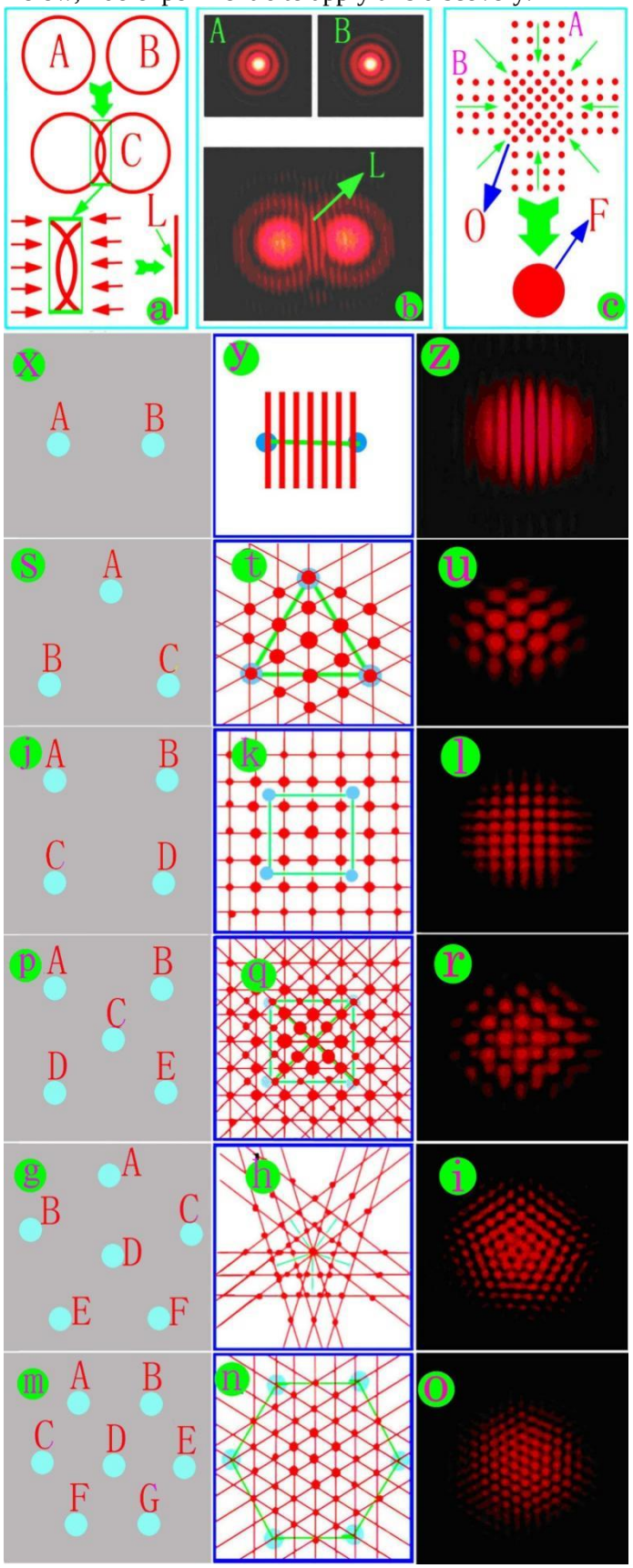

Figure6. a, b, and c are the pictures that indicate the method; **x, s, g, m, j, and p** are pinhole lattices; **y, t, k, q, h, and n** are drawn pictures according to the conclusions of discovery; and **z, u, l, r, i, and o** are photographs in which the light beam passes through the pinhole lattice projected on the screen.

Figure6a shows that when the light beam passes through

pinholes A and B, the beams close as they disperse while moving forward. At their coinciding region C, part of light beam A and part of light beam B can become a streak line such as **L**, which is confirmed by the experiments in picture **b** of Figure6. This becomes interference fringes between two pinholes; the image **z** in Figure6 confirms this conclusion. When two streaks intersect, the intensity of their intersected spot is greater than that of its surrounding region; hence, the force at the spot of intersection is greater than that at its outer region. This attracts the surrounding light rays to the center and becomes a circular dot at the intersection point, as shown in picture **c** of Figure6.The above meaning can be simply described as follows: First, the interference fringe between two pinholes is perpendicular to the line that links two pinholes. Second, the intersection of two streaks becomes a dot. According to this, I infer that when the light beam passes through three, four, five, or six pinholes, the image on which light projects on the screen can be drawn below. Given the perpendicular line for the line that links the nearest two pinholes, the point of intersection of this vertical line on the right is the image on the screen. Two facts confirm this view. First, the intersected dot of the two streaks is in the original source of these two streaks. Second, the number of dots in the line is equal to the number of streaks between two pinholes. In Figure6, the pictures **x, s, g, m, j, and p** are the pictures of pinholes, and **z, u, l, r, i, and o** are photographs of light going through the pinholes projected on the screen. Pictures **y, t, k, q, h, and n** are drawn according to the above method. These pictures are in extremely good agreement with photographs **z, u, l, r, i, and o,** in which light passes through the pinholes on the screen in the experiment. This experiment indicates that diffraction patterns and interference fringes projected on the screen can be drawn according to the new discovery that the movement photon creates gravitation.

3.3. The meaning of wavelength in optics:

From the above experiments, we know that light waves do not actually exist. Now, we will discuss the meaning of the wavelength in the light wave theory. Figure8 shows that $\Delta x=d_1/(n-1)$ can be compared to $\Delta x = D\lambda/d_2$ to obtain $d_1 \times d_2 = D\lambda \times (n-1)$, where $D = v \times t$. In the end, we can obtain the following formula: $\lambda \times v = d_1 \times d_2/(n-1)t$. On the one hand, because $d = \frac{n-1}{2p}(\frac{n+1}{n+3} + \frac{n+3}{n+1})$, in the specific numerical value of d_1, n is specified. This means that these n, t, d_1, d_2 can all be controlled by man. Namely: $\lambda v = k_\lambda = \text{constant}$. Here, $k_\lambda = \lambda v = 139$.

3.4. The meaning of frequency in the optics

According to formula: $\upsilon = \frac{c}{\lambda}$ $\lambda v = k_\lambda$ can get $\upsilon = cvk_2$, in spectrum because the photon movement speed $v \approx c$ so $\upsilon = c^2k_2 = v^2k_2$. In 1896 W. Wien proposed that $\upsilon = v^2k_2$ and then got a formula: $u_T(\upsilon) = \frac{a\upsilon^3}{c^2} e^{-\beta\upsilon/T}$ that can describe the short wavelength region.Now we know why the W. Wien formula fits the short wavelength region, but does not fit long wavelength regions. Because in the short wavelength region, $v \approx c$ the formula $\upsilon = c^2k_2 = v^2k_2$ is right; so, the W. Wien formula is right, but in the long wavelength region, the formula $v \approx c$ is not right. Therefore, W. Wien formula does not fit the experiments.

3.5. Quantitative experiments.

Below, we present the results of a quantitative experiment: first, we think that photons possess mass. The above two experiments indicate that there is a force between the light beams. Therefore, it is true that light possesses mass.

The process of the quantitative experiment is described below. First, I think that motion photons produce this gravitation proportional to their mass, and their velocity of motion, which is denoted as M_a , can be calculated via the following formula:M_a=mvk_mThe change in the distributed intensity of this force field in a specific space in a unit area is its value divided by $4\pi r^2$, which indicates that the change in the intensity of the force field in space is inversely proportional to the square of the increase in distance. This distributed intensity results are shown below Figure7.

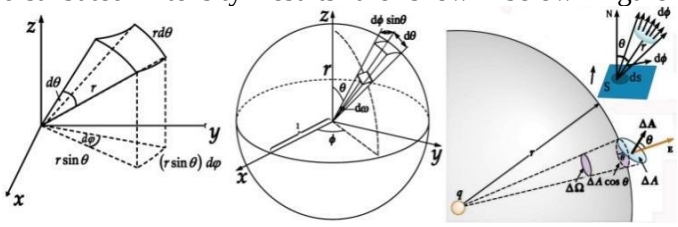

Figure7. The figure shows the change in the distributed intensity of the force field in space with increasing distance.

The intensity of this force field decreases with increasing distance r. Then, I write the following formula: $E_a = M_a/4\pi r^2$, namely, $E_a = mv\,k_m/4\pi r^2$. When the distance between two photons is r and m_1, m_2, v_1, v_2 are their mass and velocity, respectively, from the preceding analysis, at photon m_2, the intensity of the force field produced by m_1 is $E_a = m_1 v_1 k_m/4\pi r^2$. The greater the mass of photon m_2 is, the greater the amount of force received from photon m_1 in space; the faster the velocity of motion of photon m_2 is, the greater the amount of force received from photon m_1 in unit time. In other words, photon m_2 accepting force is proportional to the intensity of the force field in which photon m_1 is produced: E_a, and its mass is m_2, and its velocity is v_2 . Write a formula below: $F_a = \frac{m_1 m_2 v_1 v_2}{4\pi r^2} G_a$; this is a scalar form. On the other hand, from the abovementioned experiments, the two light beams are parallel, but the direction of the generated gravitation is perpendicular to the direction of the traveling path.

Considering the characteristics of the medium, $\boldsymbol{\Theta}$ is used to determine $\vec{F}_a = \frac{m_1 m_2 \times \vec{v}_1 \times (\vec{v}_2 \times \vec{r}_{12})}{4\pi\Theta \vec{r}_{12}^3} G_a$, which is a vector form. This formula implies that the two particles attracting or repelling only have to do with their motion direction.

Because there is an interaction force between two light beams, they can yield new light beams between them under special conditions. The changing distance between two light beams will change the number of light beams created between them. This phenomenon cannot be elucidated by wave theory but can be elucidated by the above discovery, as shown in Figure 5In light beam B of

picture **c**, the first light ray of the inside light beam accepts force from the outside light beam; on the other hand, the first light ray also accepts force from light beam A because the light disperses while moving forward. The distance between the first light ray and the outside light beam increases faster than that between the first light ray and light beam A; thus, the first light ray accepting force from light beam A will undergo a smaller change than that from its outside light beam. In other words, the first light ray, which accepts force from the outside light beam in light beam B, decreases as the light beam moves forward. Thus, part of the internal light beam B will move to light beam A. The motion status of light beam A is similar to that of light beam B; in the end, new light rays will appear between light beams A and B (see Figure 5).

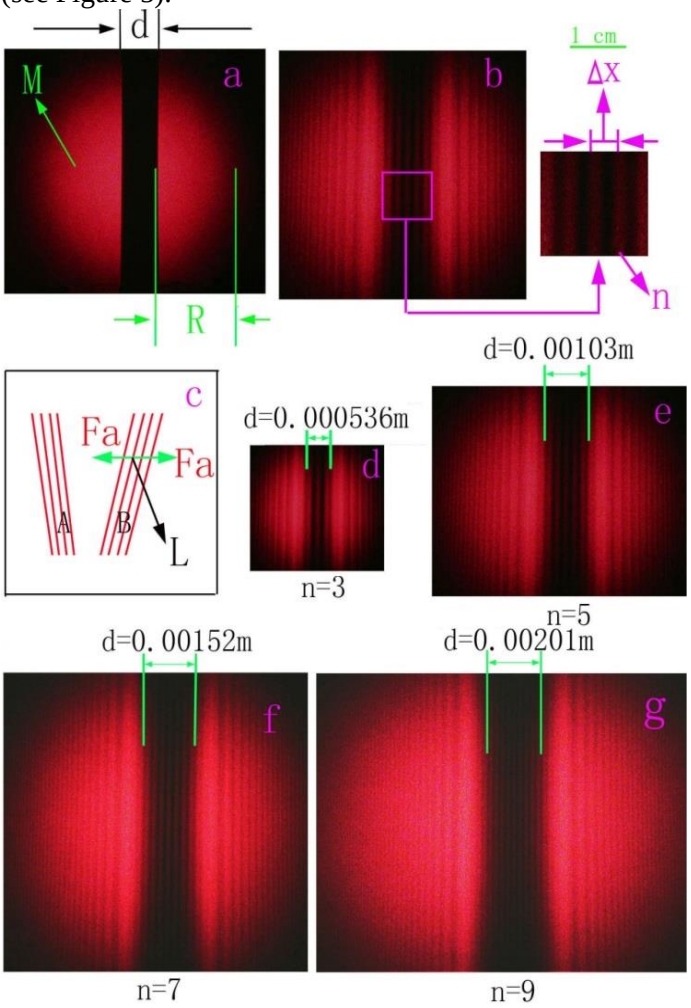

Figure8. Pictures **a, b, and c** show the status of the two dispersing light beams A and B. Pictures **d, e, f, and g** are photographs of the experimental results.

Because there is an interaction force between two light

When the status of the new light beam is balanced by the accepted force from its two sides, the magnitude of the force, which every new light beam receives from its two sides, is equal; the directions of the two forces received from the two sides are opposite. At the site of the light beam **n** in picture **b** of Figure8, according to the formula $F_a = \frac{m_1 m_2 v_1 v_2}{4\pi\Theta r^2} G_a$, we can obtain:

$$\frac{m^2v^2(n+1)^2}{4\pi d^2}G_a + \frac{m^2v^2(n+1)^2}{4\pi(2d)^2}G_a + \cdots + \frac{m^2v^2(n+1)^2}{(n+3)^2 4\pi d^2}G_a + \int_{\frac{n+3}{2(n+1)}d}^{\frac{n+3}{2(n+1)}d+R} \frac{mMv^2}{4\pi r^2}G_a dr$$

$$= \frac{m^2v^2(n+1)^2}{4\pi d^2}G_a + \frac{m^2v^2(n+1)^2}{4\pi(2d)^2}G_a + \cdots + \frac{m^2v^2(n+1)^2}{(n-1)^2 4\pi d^2}G_a + \int_{\frac{n-1}{2(n+1)}d}^{\frac{n-1}{2(n+1)}d+R} \frac{mMv^2}{4\pi r^2}G_a dr$$

$d = \frac{n-1}{2p}(\frac{n+1}{n+3} + \frac{n+3}{n+1})$where m is the mass of the new light beam created between two light beams and M is the mass in unit distance of two light beams A and B. The experiments3 and their results are shown in Figure 5and Table 1. Note that the calculation units are metric. Figure8and Table 1 show that **n** changes as **d** changes. The changes in their values in this experiment are in extremely good agreement with the calculated outcome according to $d = \frac{n-1}{2p}(\frac{n+1}{n+3} + \frac{n+3}{n+1})$, which is deduced from $\vec{F}_a = \frac{m_1 m_2 \times \vec{v}_1 \times (\vec{v}_2 \times \vec{r}_{12})}{4\pi\Theta \vec{r}_{12}^3} G_a$. If the photon possesses mass and the above analysis is correct, ***p*** will approach a constant value in the experiment. The third experiment confirms this prediction, as shown in Table 1. As a result of this experiment, the validity of the following formulas is confirmed:$\vec{F}_a = \frac{m_1 m_2 \times \vec{v}_1 \times (\vec{v}_2 \times \vec{r}_{12})}{4\pi\Theta \vec{r}_{12}^3} G_a$

Table 1: Results of experiment 3

Table the result of experiment				
the experimental d	d=0.00053mm	d=0.00103mm	d=0.00152mm	d=0.00201mm
the experimental n	n=3	n=5	n=7	n=9
the calculating p	p=4088.5	p=4045.307	p=4046.052	p=4046.434

From the above experiments, we discover the origin of gravitation: motion photons generate gravitation, and several formulas can be used to describe this phenomenon. See below:

$\vec{M}_a = \frac{m\vec{v}\times\vec{r}}{\vec{r}} k_m, \vec{E}_a = \frac{m_1 \times \vec{v}_1 \times \vec{r}_{12}}{4\pi\vec{r}_{12}^3}, \vec{F}_a = \frac{m_1 m_2 \times \vec{v}_1 \times (\vec{v}_2 \times \vec{r}_{12})}{4\pi\Theta\vec{r}_{12}^3} G_a$.

Chapter.4. The elementary particle

4.1. The constitute of electron

When positron and electron collide, it emits and produces photon:$e^- + e^+ \to \gamma$.

When cathode and anode are closing, between them appear spark and produce photons.

These two phenomena obviously show that the constitute of electron is photon, or other word below: the photon combine the electron. See below Figure9.

Figure9. This figure shows when cathode and anode are closing, between them appear spark and produce photons.

4.2. The elementary particle is photon

We know that if a photon is sufficiently energetic, it may produce an electromagnetic shower; this show photon can

turn into an electron–positron pair. According to above discovery that moving photon creates force, here clearly show the reason why photon becomes electron, because there is force between photons, thus the photon which possess sufficiently energy become electron, meanwhile we know that the electron and positron can become hadron see below: or see below Figure10.

$e^+ + e^- \rightarrow$Hadron

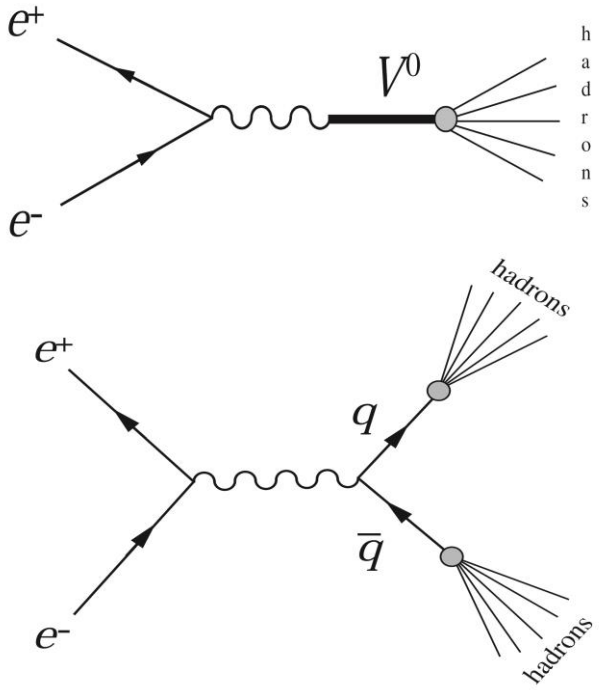

Figure10: the electron and positron become quark and so on hadron.

Here, we know that photon produce electron, electron produce quark, the quark is constituted of proton and neutron, and so the elementary particle in Nature is photon.

3. Rethink Millikan's elementary charge

In currently physical knowledge, we are told that the electric charge would be quantized, and the fundamental electric charge is constantly. Because we have used to define the attraction between electrons and nuclear in atom is an attraction of electric charge, the potential ionization is due to attraction of electric charge. According to above discovery and demonstrate: it show that electromagnetic force is as same as the gravitation in essence, this show that it maybe do not exist fundamental charge of electron! The electric charge is a continuous variable, so the charge is quantized is wrong that does not exist fundamental charge of electron? Which is right above discovery and fundamental charge of electron? This only can be tested by experiment and fact. In physical history: Millikan worked on an oil-drop experiment in which he measured the charge on a single electron. The elementary electric charge is one of the fundamental physical constants. His experiment measured the force on tiny charged droplets of oil suspended against gravity between two metal electrodes. Millikan selection the data of experiment showed that the results could be explained as integer multiples of a common value (1.592×10^{-19} coulomb), the charge on a single electron. Millikan's selection data also provided a demonstration that charge is actually quantized. Here I use below way to test above two thought: first I deduce a formula that can calculate the ionization potential when the element only has one electron in its out nuclear, the process of deduce is below:

$$f = \frac{Q_1 Q_2}{r^2} k = \frac{Ze^2}{r^2} K = m\frac{v^2}{r}\,; n\frac{h}{2\pi} = mvr$$

$$mv^2 = \frac{Q_1 Q_2}{r} k = \frac{Ze^2}{r} K\,; E_k = \frac{1}{2} mv^2 = \frac{Q_1 Q_2}{r} k = \frac{Ze^2}{r} K$$

$$E_k = \frac{2\pi mvZe^2 k}{nh}\,; v = \frac{2\pi Ze^2 k}{nh}$$

$$E_k = \frac{4\pi^2 mZ^2 e^4 k^2}{n^2 h^2} = z^2 k = 13.6Z^2$$

In the end we can get a formula that calculate ionization potential when only one electron in out of nuclear. See below: $E_k = 13.6Z^2$ Where Z is the charge number of element. If the elementary electric charge is one of the fundamental physical constants and the electric charge is actually quantized and Millikan oil-drop experiment is right, the value of according to this formula calculate would compatible with the experimental value! See below Table2.

Table2:

Z	element	value of theory	experimental value
1	H	13.6	13.598
2	He	54.4	54.417
3	Li	122.4	122.454
4	Be	217.6	217.718
5	Be	340.1	340.225
6	C	489.6	489.993
7	N	666.4	667.046
8	O	870.4	871.411
9	F	1101.6	1103.117
10	Ne	1360	1362.199
11	Na	1645.6	1648.702
12	Mg	1958.4	1962.665
13	Al	2298.4	2304.141
14	Si	2665.6	2673.182
15	P	3060	3069.842
16	S	3481.6	3494.189
17	Cl	3930.4	3946.296
18	Ar	4406.4	4426.229
19	K	4909.6	4934.046
20	Ca	5440	5469.864
21	Sc	5997.6	6033.712
22	Ti	6582.4	6625.82
23	V	7194.4	7246.12
24	Cr	7833.6	7894.81
25	Mn	8500	8571.94
26	Fe	9193.6	9277.69
27	Co	9914.4	10012.12
28	Ni	10662.4	10775.41
29	Cu	11437.6	11567.617

From above calculate and test, we can see that the value of according to this formula incompatible with the experimental value! So the quantized electric charge and Millikan oil-drop experiment are wrong hypothesis, it cannot describe the potential ionization, electromagnetic force is as same as the gravitation in essence.

Chapter.5. The essence of electric charge

According to the above discoveries and formula: $\vec{F}_a = \frac{m_1 m_2 \times \vec{v}_1 \times (\vec{v}_2 \times \vec{r}_{12})}{4\pi\sigma r_{12}^3} G_a$ We can obtain a formula that can calculate the nuclear charge of an element; see the following formula: $Q_Z = \sqrt{\frac{c}{\lambda} + Zb} \times (1 - (A_m - Z)k_1)k_2$ where Q_Z is the

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nuclear charge of the element, A_m is the atomic weight of the element, Z is the atomic number, and $\lambda_{k1}, \lambda_{k2}$ are the first and second wavelengths of X-ray emission, respectively, in $k, \bar{\lambda}$ is the mean wavelength of these two wavelengths of X-ray emission. b, k_1, k_2 are all constant. The test results for this formula are shown in Table3 and Table4 [3,4]

Z	symbol	atomic weight(A_m)	A_m-Z	$\lambda_{k1}\times10^{-10}$	$\lambda_{k2}\times10^{-10}$	δ	$\bar{\lambda}=\frac{\lambda_{k1}+\lambda_{k2}}{2}\times10^{-10}$	b	k_1	k_2	$Q_Z=\sqrt{\frac{c}{\bar{\lambda}}+Zb}\times(1+(A_m-Z)k_1)k_2$
3	Li	6.941	3.9410	241.686	226.456	1.001	234.192	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	3.000
4	Be	9.012	5.0120	114.272	111.698	1.007	113.379	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	4.000
5	B	10.811	5.8810	67.6400	65.9495	1.005	66.9638	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	5.000
6	C	12.011	6.0110	44.7600	43.6813	1.002	44.2654	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	6.000
7	N	14.006	7.0060	31.5966	31.5966	1.006	31.3880	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	7.000
8	O	15.999	7.9990	23.6207	23.3186	0.996	23.4224	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	8.000
9	F	18.998	9.9980	18.2000	18.0499	1.000	18.1250	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	9.000
10	Ne	20.179	10.179	14.6105	14.3023	1.001	14.4637	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	10.00
11	Na	22.989	11.989	11.9102	11.6174	1.004	11.7876	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	11.00
12	Mg	24.305	12.305	9.80700	9.80700	1.000	9.80700	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	12.00
13	Al	26.981	13.981	8.27067	8.27067	1.000	8.27067	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	13.00
14	Si	28.085	14.085	7.07677	7.07677	1.001	7.08030	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	14.00
15	P	30.973	15.973	6.11663	6.11663	1.001	6.11968	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	15.00
16	S	32.065	16.065	5.35329	5.34077	1.002	5.35038	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	16.00
17	Cl	35.453	18.453	4.71100	4.69567	1.001	4.70569	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	17.00
18	Ar	39.948	21.948	4.19180	4.19180	0.993	4.16245	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	18.00
19	K	39.098	20.098	3.74140	3.72060	1.000	3.73100	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	19.00
20	Ca	40.078	20.078	3.36166	3.34013	1.003	3.35593	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	20.00
21	Sc	44.956	23.955	3.03090	3.03090	0.997	3.02181	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	21.00
22	Ti	47.867	25.876	2.74851	2.74851	0.997	2.74026	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	22.00
23	V	50.941	27.941	2.50356	2.50356	0.997	2.49605	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	23.00
24	Cr	51.996	27.996	2.28970	2.28970	0.999	2.28741	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	24.00
25	Mn	54.938	29.938	2.10180	2.10180	0.999	2.09969	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	25.00
26	Fe	55.845	29.845	1.93998	1.93735	1.000	1.93866	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	26.00
27	Co	58.933	31.933	1.79285	1.78896	1.000	1.79091	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	27.00
28	Ni	58.693	30.693	1.66179	1.66179	1.001	1.66345	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	28.00
29	Cu	63.546	34.546	1.54440	1.54056	1.001	1.54325	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	29.00
30	Zn	65.409	35.409	1.43900	1.43515	1.002	1.43851	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	30.00
31	Ga	69.723	38.723	1.34138	1.34138	1.000	1.34138	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	31.00
32	Ge	72.641	40.640	1.25405	1.25405	1.000	1.25405	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	32.00
33	As	74.921	41.921	1.17588	1.17588	1.001	1.17705	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	33.00
34	Se	78.963	44.960	1.10477	1.10477	0.999	1.10366	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	34.00
35	Br	79.904	44.904	1.03974	1.03974	1.001	1.04077	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	35.00
36	Kr	83.798	47.798	0.98010	0.98010	0.999	0.98000	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	36.00
37	Rb	85.467	48.467	0.92550	0.92550	1.000	0.92550	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	37.00
38	Sr	87.621	49.620	0.87529	0.87529	1.001	0.87616	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	38.00
39	Y	88.905	49.905	0.83071	0.83071	1.000	0.83070	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	39.00
40	Zr	91.224	51.224	0.79012	0.78595	1.000	0.78803	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	40.00
41	Nb	92.906	51.906	0.75040	0.74622	1.001	0.74868	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	41.00
42	Mo	95.942	53.940	0.71360	0.70932	1.001	0.71181	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	42.00
43	Tc	97.907	54.907	0.67934	0.67509	1.003	0.67823	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	43.00
44	Ru	101.07	57.070	0.64743	0.64310	1.002	0.64591	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	44.00
45	Rh	102.905	57.905	0.61765	0.61329	1.003	0.61639	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	45.00
46	Pd	106.421	60.420	0.58984	0.58547	1.002	0.58810	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	46.00
47	Ag	107.868	60.868	0.56382	0.55943	1.004	0.56277	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	47.00
48	Cd	112.441	64.411	0.53944	0.53503	1.000	0.53723	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	48.00
49	In	114.818	65.818	0.51656	0.51213	1.001	0.51460	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	49.00
50	Sn	118.711	68.711	0.49062	0.49062	1.003	0.49209	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	50.00
51	Sb	121.761	70.761	0.47037	0.47037	1.004	0.47210	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	51.0
52	Te	127.603	75.603	0.45129	0.45129	1.001	0.45170	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	52.0
53	I	126.904	73.904	0.43784	0.43333	0.999	0.43536	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	53.0
54	Xe	131.293	77.293	0.41635	0.41635	1.003	0.41759	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	54.0
55	Cs	132.905	77.905	0.40180	0.40180	1.001	0.40220	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	55.0
56	Ba	137.327	81.327	0.38512	0.38512	1.005	0.38666	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	56.0
57	La	138.905	81.905	0.37532	0.37075	0.998	0.37266	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	57.0
58	Ce	140.116	82.116	0.36169	0.35710	1.001	0.35958	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	58.0
59	Pr	140.907	81.907	0.34876	0.34415	1.006	0.34750	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	59.0
60	Nd	144.243	84.240	0.33185	0.33185	1.010	0.33517	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	60.0
61	Pm	144.910	83.910	0.32481	0.31481	0.998	0.32416	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	61.0
62	Sm	150.363	88.363	0.31371	0.30905	1.006	0.31232	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	62.0
63	Eu	151.964	88.964	0.30313	0.30313	0.997	0.30222	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	63.0
64	Gd	157.253	93.253	0.29305	0.28836	1.005	0.29143	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	64.0
65	Tb	158.925	93.925	0.28343	0.27873	1.008	0.28221	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	65.0
66	Dy	162.500	96.500	0.27427	0.26954	1.007	0.27186	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	66.0
67	Ho	164.930	97.930	0.26549	0.26077	1.009	0.26432	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	67.0
68	Er	167.259	99.259	0.25712	0.25237	1.011	0.25616	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	68.0
69	Tm	168.934	99.934	0.25163	0.24435	1.005	0.24862	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	69.0
70	Yb	173.043	103.04	0.24150	0.23666	1.013	0.24065	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	70.0
71	Lu	174.967	103.97	0.23409	0.23409	0.998	0.23362	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	71.0
72	Hf	178.490	106.49	0.22926	0.22223	1.007	0.22655	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	72.0
73	Ta	180.948	107.95	0.22030	0.22030	0.999	0.22007	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	73.0
74	W	183.840	109.84	0.21383	0.21383	0.999	0.21362	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	74.0
75	Re	186.205	111.21	0.26762	0.26762	1.000	0.20762	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	75.0
76	Os	190.230	114.23	0.20165	0.20165	0.999	0.20145	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	76.0
77	Ir	192.217	115.22	0.19591	0.19591	1.001	0.19611	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	77.0
78	Pt	195.078	117.08	0.19038	0.19038	1.001	0.19057	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	78.0
79	Au	196.967	117.97	0.18508	0.18508	1.002	0.18545	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	79.0
80	Hg	200.590	120.59	0.17996	0.17996	1.002	0.18032	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	80.0

Table4 is following: [3,4]

Table4:

Z	symbol	atomic weight(A_m)	A_m-Z	$\lambda_{k1}\times10^{-10}$	$\lambda_{k2}\times10^{-10}$	δ	$\bar{\lambda}=\frac{\lambda_{k1}+\lambda_{k2}}{2}\times10^{-10}$	b	k_1	k_2	$Q_Z=\sqrt{\frac{c}{\bar{\lambda}}+Zb}\times(1+(A_m-Z)k_1)k_2$
81	Tl	204.383	123.38	0.17504	0.17504	1.003	0.17556	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	81.0
82	Pb	207.200	125.20	0.17030	0.17030	1.003	0.17081	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	82.0
83	Bi	208.980	125.98	0.16572	0.16572	1.005	0.16655	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	83.0
84	Po	208.980	124.98	0.16248	0.16248	1.002	0.16280	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	84.0
85	At	209.990	124.99	0.15846	0.15846	1.003	0.15893	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	85.0
86	Rn	222.020	136.02	0.15293	0.15293	1.003	0.15338	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	86.0
87	Fr	223.020	136.02	0.15028	0.15028	0.998	0.14998	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	87.0
88	Ra	226.030	138.03	0.14640	0.14640	0.998	0.14611	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	88.0
89	Ac	227.030	138.03	0.14265	0.14265	1.001	0.14279	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	89.0
90	Th	232.038	142.04	0.13903	0.13903	1.000	0.13903	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	90.0
91	Pa	231.035	140.04	0.13552	0.13552	1.005	0.13620	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	91.0
92	U	238.028	146.03	0.13212	0.13212	1.002	0.13238	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	92.0
93	Np	237.050	144.05	0.12883	0.12883	1.008	0.12986	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	93.0
94	Pu	244.060	150.06	0.12564	0.12564	1.005	0.12626	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	94.0
95	Am	243.060	148.05	0.12255	0.12255	1.008	0.12365	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	95.0
96	Cm	247.070	151.07	0.11955	0.11955	1.010	0.12075	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	96.0
97	Bk	247.070	150.07	0.11662	0.11662	1.015	0.11887	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	97.0
98	Cf	251.080	153.08	0.11383	0.11383	1.017	0.11577	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	98.0
99	Es	252.080	153.08	0.11109	0.11109	1.020	0.11331	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	99.0
100	Fm	257.010	157.01	0.10838	0.10838	1.021	0.11066	2.72641×10^{15}	5×10^{-4}	2.075×10^{-8}	100.0

K1 = KL3 = 1 s1/2 − 2p3/2,

K2 = KL2 = 1 s1/2 − 2p1/2[3,4] $\bar{\lambda} = \frac{\lambda_1+\lambda_2}{2}\times10^{-10}$

For example, for Li: $Q_Z=\sqrt{\frac{c}{\bar{\lambda}}+Zb}\times(1-(A_m-Z)k_1)k_2$

$=\sqrt{\frac{3\times10^8}{234.192^{-10}}+3\times2.72461\times10^{25}}\times(6.941-3)\times5\times10^{-4})\times2.075\times10^{-8}=3.$

The number or nuclear charge of other elements can also be calculated by this formula. This formula indicates that the nuclear charge of an element can be calculated by the wavelength of the X-ray of the element; thus, this formula indicates the essence of the nuclear charge of the element, namely, it reveals the essence of the electric charge.Table3:

Chapter.6. The essence of gravitational mass

According to the above findings, the following formula can be used to calculate the atomic mass of an element by moving photons: $m_a=\sqrt{\frac{c}{\bar{\lambda}}+Zb}\times(1+(k_1\times\frac{A_m}{Z})k_2$ where m_a is the atomic mass of the element, A_m is the atomic weight of the element, Z is the atomic number or element number, $\lambda_{k1}$is the wavelength of X-ray emission at a lower energy level, λ_{k2} is the wavelength of X-ray emission at a higher energy level, and $\bar{\lambda}$ is the mean wavelength of these two wavelengths of X-ray emission. b, k_1, k_2 are all constant. For example, Li: $m_a=\sqrt{\frac{c}{\bar{\lambda}}+Zb}\times(1+(k_1\times\frac{A_m}{Z})k_2$

$=\sqrt{\frac{3\times10^8}{226.456\times10^{-10}}+3\times2.72641\times10^{15}}\times\left(1+1.314\times\frac{6.941}{3}\right)\times1.115\times10^{-8}=6.5941$

Other atomic masses can also be calculated by this formula. The test results for this formula are shown in Table5, Table 6 [3, 4, 5, 6, 7].

Table5:

Z	symbol	atomic weight(A_m)	A_m-Z	$\lambda_{k1}\times10^{-10}$	$\lambda_{k2}\times10^{-10}$	$\bar{\lambda}=\frac{\lambda_{k1}+\lambda_{k2}}{2}\times10^{-10}$	b	k_1	k_2	$m_a=\sqrt{\frac{c}{\bar{\lambda}}+Zb}\times(1+(\frac{A_m}{Z}-1)k_1)k_2$
3	Li	6.9410	3.941		226.456	226.456	2.72641×10^{15}	1.314	1.115×10^{-8}	6.5941
4	Be	9.0120	5.012		111.698	111.698	2.72641×10^{15}	1.314	1.115×10^{-8}	8.5812
5	B	10.811	5.881		65.9495	65.9495	2.72641×10^{15}	1.314	1.115×10^{-8}	10.413
6	C	12.011	6.011		43.6813	43.6813	2.72641×10^{15}	1.314	1.135×10^{-8}	12.015
7	N	14.006	7.006		30.9899	30.9899	2.72641×10^{15}	1.314	1.135×10^{-8}	14.018
8	O	15.999	7.999		23.3186	23.3186	2.72641×10^{15}	1.314	1.115×10^{-8}	15.691
9	F	18.998	9.998		18.0894	18.0894	2.72641×10^{15}	1.314	1.115×10^{-8}	18.359
10	Ne	20.179	10.179		14.3023	14.3023	2.72641×10^{15}	1.314	1.135×10^{-8}	20.177
11	Na	22.989	11.989		11.5693	11.5693	2.72641×10^{15}	1.314	1.135×10^{-8}	22.917
12	Mg	24.305	12.305	9.51257		9.51257	2.72641×10^{15}	1.314	1.115×10^{-8}	24.086
13	Al	26.981	13.981	7.9484		7.94838	2.72641×10^{15}	1.314	1.115×10^{-8}	26.703
14	Si	28.085	14.085		6.73833	6.73833	2.72641×10^{15}	1.314	1.115×10^{-8}	28.186
15	P	30.973	15.973	5.78424	5.78424	5.78424	2.72641×10^{15}	1.314	1.115×10^{-8}	30.970
16	S	32.065	16.065		5.03166	5.03166	2.72641×10^{15}	1.314	1.115×10^{-8}	32.405
17	Cl	35.453	18.453			4.403905	2.72641×10^{15}	1.314	1.115×10^{-8}	35.572
18	Ar	39.948	21.948		3.8861	3.8861	2.72641×10^{15}	1.314	1.115×10^{-8}	39.567
19	K	39.098	20.098	3.7445	3.4365	3.5905	2.72641×10^{15}	1.314	1.118×10^{-8}	39.078
20	Ca	40.078	20.078	3.3617	3.0704	3.2161	2.72641×10^{15}	1.314	1.115×10^{-8}	40.252
21	Sc	44.955	23.955	3.0343	2.7620	2.8982	2.72641×10^{15}	1.314	1.115×10^{-8}	44.434
22	Ti	47.876	25.876	2.7486	2.4974	2.6230	2.72641×10^{15}	1.314	1.115×10^{-8}	47.216
23	V	50.941	27.941	2.5074	2.2692	2.3883	2.72641×10^{15}	1.314	1.115×10^{-8}	50.069

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Table6:

Z	symbol	atomic weight(A_m)	A_m-Z	$\lambda_{k1}\times10^{-10}$	$\lambda_{k2}\times10^{-10}$	$\bar{\lambda}=\frac{\lambda_1+\lambda_2}{2}\times10^{-10}$	b	k_1	k_2	$m_a=\sqrt{\frac{c}{\bar{\lambda}}+Zb}\times(1+(\frac{A_m}{Z})k_1)k_2$
24	Cr	51.996	27.996	2.2897	2.0703	2.1800	2.72641×10^{15}	1.314	1.115×10^{-8}	51.498
25	Mn	54.938	29.938	2.1018	1.8965	1.99915	2.72641×10^{15}	1.314	1.115×10^{-8}	54.291
26	Fe	55.845	29.845	1.9361	1.7435	1.83980	2.72641×10^{15}	1.314	1.115×10^{-8}	55.593
27	Co	58.933	31.933	1.78903	1.6082	1.69862	2.72641×10^{15}	1.314	1.115×10^{-8}	58.499
28	Ni	58.693	30.693	1.6618	1.4881	1.57495	2.72641×10^{15}	1.314	1.115×10^{-8}	58.921
29	Cu	63.546	34.546	1.5444	1.3806	1.46256	2.72641×10^{15}	1.314	1.115×10^{-8}	63.131
30	Zn	65.409	35.409	1.4390	1.28339	1.36120	2.72641×10^{15}	1.314	1.115×10^{-8}	65.152
31	Ga	69.723	38.723	1.3401	1.19582	1.26796	2.72641×10^{15}	1.314	1.115×10^{-8}	69.038
32	Ge	72.641	40.640	1.2541	1.11662	1.18536	2.72641×10^{15}	1.314	1.118×10^{-8}	72.048
33	As	74.921	41.921	1.1799	1.04496	1.11243	2.72641×10^{15}	1.314	1.115×10^{-8}	74.141
34	Se	78.963	44.960	1.1048	0.97977	1.04229	2.72641×10^{15}	1.314	1.118×10^{-8}	78.078
35	Br	79.904	44.904	1.0438	0.92045	0.98213	2.72641×10^{15}	1.314	1.118×10^{-8}	79.366
36	Kr	83.798	47.798	0.9801	0.86555	0.92283	2.72641×10^{15}	1.314	1.118×10^{-8}	83.038
37	Rb	85.467	48.467	0.92558	0.81556	0.87057	2.72641×10^{15}	1.314	1.120×10^{-8}	85.115
38	Sr	87.621	49.620	0.8795	0.76976	0.82463	2.72641×10^{15}	1.314	1.118×10^{-8}	87.148
39	Y	88.905	49.905	0.8330	0.72769	0.78035	2.72641×10^{15}	1.314	1.118×10^{-8}	88.786
40	Zr	91.224	51.224	0.7901	0.68885	0.73948	2.72641×10^{15}	1.314	1.118×10^{-8}	91.201
41	Nb	92.906	51.906	0.7504	0.65300	0.70170	2.72641×10^{15}	1.314	1.115×10^{-8}	92.891
42	Mo	95.942	53.940	0.7136	0.61994	0.66677	2.72641×10^{15}	1.314	1.115×10^{-8}	95.838
43	Tc	97.907	54.907	0.6793	0.58908	0.63419	2.72641×10^{15}	1.314	1.115×10^{-8}	97.997
44	Ru	101.07	57.070	0.6474	0.56053	0.60397	2.72641×10^{15}	1.314	1.115×10^{-8}	101.027
45	Rh	102.905	57.905	0.6176	0.54121	0.57941	2.72641×10^{15}	1.314	1.115×10^{-8}	102.804
46	Pd	106.421	60.421	0.5898	0.50922	0.54951	2.72641×10^{15}	1.314	1.115×10^{-8}	106.452
47	Ag	107.868	60.868	0.5638	0.49771	0.53076	2.72641×10^{15}	1.314	1.115×10^{-8}	107.650
48	Cd	112.441	64.411	0.5394	0.46409	0.50175	2.72641×10^{15}	1.314	1.115×10^{-8}	112.372
49	In	114.818	65.818	0.5165	0.44372	0.48011	2.72641×10^{15}	1.314	1.115×10^{-8}	114.897
50	Sn	118.711	68.711	0.4950	0.42468	0.45984	2.72641×10^{15}	1.314	1.115×10^{-8}	118.547
51	Sb	121.761	70.761	0.4748	0.40669	0.44075	2.72641×10^{15}	1.314	1.115×10^{-8}	121.572
52	Te	127.603	75.603	0.4513	0.38975	0.42053	2.72641×10^{15}	1.314	1.115×10^{-8}	127.051
53	I	126.904	73.904	0.4378	0.37383	0.40582	2.72641×10^{15}	1.314	1.115×10^{-8}	126.919
54	Xe	131.293	77.293	0.4208	0.35844	0.38962	2.72641×10^{15}	1.314	1.115×10^{-8}	131.020
55	Cs	132.905	77.905	0.4048	0.34453	0.37467	2.72641×10^{15}	1.314	1.115×10^{-8}	132.959
56	Ba	137.327	81.327	0.3896	0.33105	0.36033	2.72641×10^{15}	1.314	1.115×10^{-8}	137.082
57	La	138.905	81.905	0.3753	0.31937	0.34734	2.72641×10^{15}	1.314	1.115×10^{-8}	138.931
58	Ce	140.116	82.116	0.3617	0.30649	0.33410	2.72641×10^{15}	1.314	1.115×10^{-8}	140.695
59	Pr	140.907	81.907	0.3487	0.30498	0.32684	2.72641×10^{15}	1.314	1.114×10^{-8}	140.890
60	Nd	144.243	84.240	0.3365	0.29404	0.31527	2.72641×10^{15}	1.314	1.115×10^{-8}	144.270
61	Pm	144.910	83.910	0.3248	0.28361	0.30421	2.72641×10^{15}	1.314	1.115×10^{-8}	145.524
62	Sm	150.363	88.363	0.3137	0.27376	0.29373	2.72641×10^{15}	1.314	1.115×10^{-8}	150.418
63	Eu	151.964	88.964	0.3031	0.26434	0.28372	2.72641×10^{15}	1.314	1.112×10^{-8}	151.987
64	Gd	157.253	93.253	0.2930	0.25535	0.27418	2.72641×10^{15}	1.314	1.115×10^{-8}	157.200
65	Tb	158.925	93.925	0.2834	0.24684	0.26512	2.72641×10^{15}	1.314	1.113×10^{-8}	158.954
66	Dy	162.500	96.500	0.2743	0.23863	0.25647	2.72641×10^{15}	1.314	1.115×10^{-8}	162.745
67	Ho	164.930	97.930	0.2655	0.23084	0.24817	2.72641×10^{15}	1.314	1.112×10^{-8}	164.952
68	Er	167.259	99.259	0.2572	0.22342	0.24031	2.72641×10^{15}	1.314	1.115×10^{-8}	167.957
69	Tm	168.934	99.934	0.2491	0.21636	0.23273	2.72641×10^{15}	1.314	1.112×10^{-8}	169.589
70	Yb	173.043	103.04	0.2438	0.21037	0.22708	2.72641×10^{15}	1.314	1.115×10^{-8}	173.409
71	Lu	174.967	103.97	0.2364	0.20384	0.22012	2.72641×10^{15}	1.314	1.115×10^{-8}	175.689
72	Hf	178.490	106.49	0.2293	0.19759	0.21345	2.72641×10^{15}	1.314	1.115×10^{-8}	179.204
73	Ta	180.948	107.95	0.2225	0.19161	0.20705	2.72641×10^{15}	1.314	1.115×10^{-8}	181.916
74	W	183.850	109.85	0.2159	0.18586	0.20088	2.72641×10^{15}	1.314	1.115×10^{-8}	184.993
75	Re	186.207	111.21	0.2096	0.18035	0.19498	2.72641×10^{15}	1.314	1.115×10^{-8}	187.653
76	Os	190.200	114.20	0.2036	0.17506	0.18933	2.72641×10^{15}	1.314	1.115×10^{-8}	191.579
77	Ir	192.220	115.22	0.1978	0.16998	0.18388	2.72641×10^{15}	1.314	1.112×10^{-8}	193.482
78	Pt	195.080	117.08	0.1921	0.16509	0.17865	2.72641×10^{15}	1.314	1.112×10^{-8}	196.555
79	Au	196.967	117.97		0.18020	0.18020	2.72641×10^{15}	1.314	1.115×10^{-8}	195.795
80	Hg	200.590	120.59		0.17507	0.17507	2.72641×10^{15}	1.314	1.118×10^{-8}	200.020
80	Hg	200.590	120.59		0.17507	0.17507	2.72641×10^{15}	1.314	1.118×10^{-8}	200.020
81	Tl	204.383	121.38		0.17013	0.17013	2.72641×10^{15}	1.314	1.115×10^{-8}	203.322
82	Pb	207.200	125.20		0.16538	0.16538	2.72641×10^{15}	1.314	1.115×10^{-8}	206.425
83	Bi	208.980	`125.98		0.16079	0.16079	2.72641×10^{15}	1.314	1.115×10^{-8}	208.757
84	Po	208.982	124.98		0.15633	0.15633	2.72641×10^{15}	1.314	1.115×10^{-8}	209.760
85	At	209.987	124.99		0.15209	0.15209	2.72641×10^{15}	1.314	1.115×10^{-8}	211.503
86	Rn	222.017	136.02		0.14797	0.14797	2.72641×10^{15}	1.314	1.115×10^{-8}	221.783
87	Fr	223.019	136.02		0.14399	0.14399	2.72641×10^{15}	1.314	1.115×10^{-8}	223.586
88	Ra	226.025	138.03		0.14014	0.14014	2.72641×10^{15}	1.314	1.115×10^{-8}	226.959
89	Ac	227.028	138.03	0.1414	0.13640	0.13890	2.72641×10^{15}	1.314	1.118×10^{-8}	227.379
90	Th	232.038	142.04	0.1378	0.13282	0.13532	2.72641×10^{15}	1.314	1.115×10^{-8}	231.625
91	Pa	232.038	141.04	0.1344	0.12933	0.13184	2.72641×10^{15}	1.314	1.115×10^{-8}	232.652
92	U	238.028	146.03	0.1310	0.12595	0.12848	2.72641×10^{15}	1.314	1.115×10^{-8}	238.318
93	Np	237.048	144.05	0.1288	0.12268	0.12575	2.72641×10^{15}	1.314	1.112×10^{-8}	237.447
94	Pu	244.064	150.06	0.1246	0.11951	0.12204	2.72641×10^{15}	1.314	1.115×10^{-8}	245.156
95	Am	243.061	149.06	0.1215		0.12150	2.72641×10^{15}	1.314	1.115×10^{-8}	242.935
96	Cm	247.071	151.07	0.1185		0.11854	2.72641×10^{15}	1.314	1.115×10^{-8}	247.051
97	Bk	247.071	150.07		0.11566	0.11566	2.72641×10^{15}	1.314	1.115×10^{-8}	248.101
98	Cf	251.079	153.08		0.11288	0.11288	2.72641×10^{15}	1.314	1.112×10^{-8}	251.572
99	Es	252.083	153.08	0.1111		0.11107	2.72641×10^{15}	1.314	1.112×10^{-8}	252.387
100	Fm	257.095	157.09	0.1084		0.10838	2.72641×10^{15}	1.314	1.112×10^{-8}	257.331

In these tables, from Cl to La, the X-ray wavelengths include the Kl2 and K_{abs} edges at the K level. Some data were obtained via the following formula: $\lambda=\frac{12398.418}{E[eV]}$. From Li to S, the constant k_3 is $1.135e^{-8}$, which is more accurate than the value of $1.115e^{-8}$. From Cl to Fm, the constant K_3 is $1.115e^{-8}$. This calculation shows that the essence of gravitational mass is due to the movement of photons.

Table7:

Z	symbol	atomic weight(A_m)	natural abundance	$\lambda_{k1}\times10^{-10}$	$\lambda_{k2}\times10^{-10}$	$\bar{\lambda}=\frac{\lambda_1+\lambda_2}{2}\times10^{-10}$	b	k_1	$k=M_a/(\sqrt{\frac{c}{\bar{\lambda}}+Zb}\times(1+(\frac{A_m}{Z})k_1))$
3	Li	7.0120	92.414		226.456	226.456	2.72641×10^{15}	1.31	1.17661×10^{-8}
4	Be	9.0120	100		111.698	111.698	2.72641×10^{15}	1.31	1.17095×10^{-8}
5	B	11.0093	80.17	65.9496		65.9496	2.72641×10^{15}	1.31	1.16525×10^{-8}
6	C	12.0000	98.93		43.6813	43.6813	2.72641×10^{15}	1.31	1.13425×10^{-8}
7	N	14.0031	99.636		30.9899	30.9899	2.72641×10^{15}	1.31	1.13353×10^{-8}
8	O	15.9990	99.757		23.3186	23.3186	2.72641×10^{15}	1.31	1.13686×10^{-8}
9	F	18.9980	100		18.0894	18.0894	2.72641×10^{15}	1.31	1.15379×10^{-8}
10	Ne	19.9924	90.48		14.3023	14.3023	2.72641×10^{15}	1.31	1.13220×10^{-8}
11	Na	22.9890	100		11.5755	11.5755	2.72641×10^{15}	1.31	1.14121×10^{-8}
12	Mg	25.9850	10.029	9.8903		9.89030	2.72641×10^{15}	1.31	1.16570×10^{-8}
13	Al	26.9810	100	8.3420		8.34200	2.72641×10^{15}	1.31	1.15171×10^{-8}
14	Si	27.9769	92.223		7.0665	7.06650	2.72641×10^{15}	1.31	1.13433×10^{-8}
15	P	30.9737	100	6.1661	6.1088	6.13345	2.72641×10^{15}	1.31	1.14575×10^{-8}
16	S	31.9720	94.99	5.3719	5.0187	5.19530	2.72641×10^{15}	1.31	1.11894×10^{-8}
17	Cl	34.9688	75.76	4.8889	4.3982	4.64350	2.72641×10^{15}	1.31	1.13490×10^{-8}
18	Ar	39.9622	99.603	4.1948	3.8710	4.03290	2.72641×10^{15}	1.31	1.14563×10^{-8}
19	K	38.9637	93.258	3.7445	3.4365	3.59050	2.72641×10^{15}	1.31	1.11955×10^{-8}
20	Ca	39.9625	96.941	3.3617		3.36170	2.72641×10^{15}	1.31	1.13272×10^{-8}
21	Sc	44.9559	100	3.0343	2.7620	2.8982	2.72641×10^{15}	1.31	1.12808×10^{-8}
22	Ti	47.9479	73.72	2.7523	2.4974	2.6249	2.72641×10^{15}	1.31	1.13147×10^{-8}
23	V	50.9439	99.75	2.5074	2.2692	2.3883	2.72641×10^{15}	1.31	1.13441×10^{-8}
24	Cr	51.9406	83.789	2.2936	2.0703	2.1820	2.72641×10^{15}	1.31	1.12596×10^{-8}
25	Mn	54.9380	100	2.1058	1.8965	2.0012	2.72641×10^{15}	1.31	1.12883×10^{-8}
26	Fe	55.9349	91.754	1.9401	1.7435	1.8418	2.72641×10^{15}	1.31	1.12098×10^{-8}
27	Co	58.9330	100	1.7929	1.6082	1.70055	2.72641×10^{15}	1.31	1.12388×10^{-8}
28	Ni	57.9353	68.077	1.6618		1.66180	2.72641×10^{15}	1.31	1.13572×10^{-8}
29	Cu	62.9295	69.15	1.5444	1.3806	1.46256	2.72641×10^{15}	1.31	1.11949×10^{-8}
30	Zn	65.9260	27.73	1.4390	1.28339	1.36120	2.72641×10^{15}	1.31	1.12167×10^{-8}
31	Ga	68.9255	60.108	1.3440	1.19582	1.26991	2.72641×10^{15}	1.31	1.12360×10^{-8}
32	Ge	73.9211	36.521	1.2580	1.11662	1.18731	2.72641×10^{15}	1.31	1.13301×10^{-8}
33	As	74.9215	100	1.1799	1.04496	1.11243	2.72641×10^{15}	1.31	1.12673×10^{-8}
34	Se	79.9165	49.803	1.1088	0.97977	1.04430	2.72641×10^{15}	1.31	1.13722×10^{-8}
35	Br	80.9162	49.31	1.0438	0.92045	0.98213	2.72641×10^{15}	1.31	1.12909×10^{-8}
36	Kr	83.9114	56.987	0.9841	0.86555	0.92483	2.72641×10^{15}	1.31	1.12978×10^{-8}
37	Rb	84.9117	72.172	0.9297	0.81556	0.87263	2.72641×10^{15}	1.31	1.12408×10^{-8}
38	Sr	87.9056	82.581	0.8795	0.76976	0.82463	2.72641×10^{15}	1.31	1.12497×10^{-8}
39	Y	88.9058	100	0.8330	0.72769	0.78035	2.72641×10^{15}	1.31	1.11950×10^{-8}
40	Zr	89.9045	51.45	0.7901	0.68885	0.73948	2.72641×10^{15}	1.31	1.11418×10^{-8}
41	Nb	92.9063	100	0.7504	0.65300	0.70170	2.72641×10^{15}	1.31	1.11517×10^{-8}
42	Mo	97.9054	24.292	0.7136	0.61994	0.66677	2.72641×10^{15}	1.31	1.12182×10^{-8}
43	Tc	99.9076	15.8s	0.6793	0.58908	0.63419	2.72641×10^{15}	1.31	1.11958×10^{-8}
44	Ru	101.904	31.550	0.6474	0.56053	0.60397	2.72641×10^{15}	1.31	1.11745×10^{-8}
45	Rh	102.905	100	0.6176	0.53396	0.57578	2.72641×10^{15}	1.31	1.11267×10^{-8}
46	Pd	107.903	26.46	0.5898	0.50922	0.54951	2.72641×10^{15}	1.31	1.11848×10^{-8}
47	Ag	108.905	48.162	0.5638	0.48590	0.52485	2.72641×10^{15}	1.31	1.11405×10^{-8}
48	Cd	113.903	28.754	0.5394	0.46409	0.50175	2.72641×10^{15}	1.31	1.11897×10^{-8}
49	In	114.904	95.715	0.5165	0.44372	0.48011	2.72641×10^{15}	1.31	1.11443×10^{-8}
50	Sn	119.902	32.589	0.4950	0.42468	0.45984	2.72641×10^{15}	1.31	1.11924×10^{-8}
51	Sb	122.904	42.79	0.4748	0.40669	0.44075	2.72641×10^{15}	1.31	1.11925×10^{-8}
52	Te	125.903	18.84	0.4558	0.38975	0.42278	2.72641×10^{15}	1.31	1.11920×10^{-8}
53	I	126.904	100	0.4378	0.37383	0.40582	2.72641×10^{15}	1.31	1.11486×10^{-8}
54	Xe	128.904	26.908	0.4208	0.35844	0.38962	2.72641×10^{15}	1.31	1.11239×10^{-8}
55	Cs	132.905	100	0.4048	0.34453	0.37467	2.72641×10^{15}	1.31	1.11454×10^{-8}
56	Ba	137.905	71.698	0.3896	0.33105	0.36033	2.72641×10^{15}	1.31	1.11811×10^{-8}
57	La	138.905	99.911	0.3753	0.31845	0.34688	2.72641×10^{15}	1.31	1.11406×10^{-8}
58	Ce	141.909	11.114	0.3617	0.30649	0.33410	2.72641×10^{15}	1.31	1.11378×10^{-8}
59	Pr	140.907	100	0.3487	0.30498	0.32684	2.72641×10^{15}	1.31	1.11419×10^{-8}
60	Nd	145.913	17.189	0.3365	0.29404	0.31527	2.72641×10^{15}	1.31	1.11786×10^{-8}
61	Pm	147.917	5.37d	0.3248	0.28361	0.30421	2.72641×10^{15}	1.31	1.11579×10^{-8}
62	Sm	151.919	26.75	0.3137	0.27376	0.29373	2.72641×10^{15}	1.31	1.11732×10^{-8}
63	Eu	152.921	55.196	0.3031	0.26434	0.28372	2.72641×10^{15}	1.31	1.11350×10^{-8}
64	Gd	157.924	24.84	0.2930	0.25535	0.27418	2.72641×10^{15}	1.31	1.11650×10^{-8}
65	Tb	158.925	100	0.2834	0.24684	0.26512	2.72641×10^{15}	1.31	1.11279×10^{-8}
66	Dy	163.929	28.260	0.2743	0.23863	0.25647	2.72641×10^{15}	1.31	1.11561×10^{-8}
67	Ho	164.930	100.000	0.2655	0.23084	0.24817	2.72641×10^{15}	1.31	1.11185×10^{-8}
68	Er	167.932	2.978	0.2572	0.22342	0.24031	2.72641×10^{15}	1.31	1.11141×10^{-8}
69	Tm	168.934	100	0.2491		0.24910	2.72641×10^{15}	1.31	1.14542×10^{-8}
70	Yb	173.938	32.026	0.2438	0.21037	0.22708	2.72641×10^{15}	1.31	1.11399×10^{-8}
71	Lu	174.967	97.40	0.2364	0.20384	0.22012	2.72641×10^{15}	1.31	1.11038×10^{-8}
72	Hf	179.946	35.08	0.2293	0.19759	0.21345	2.72641×10^{15}	1.31	1.11267×10^{-8}
73	Ta	180.948	99.99	0.2225		0.22245	2.72641×10^{15}	1.31	1.14899×10^{-8}
74	W	183.950	30.64	0.2159		0.21592	2.72641×10^{15}	1.31	1.14836×10^{-8}
75	Re	186.955	62.60	0.2096		0.20960	2.72641×10^{15}	1.31	1.14765×10^{-8}
76	Os	191.961	40.78	0.2036		0.20360	2.72641×10^{15}	1.31	1.14983×10^{-8}
77	Ir	192.962	62.71	0.1978		0.19780	2.72641×10^{15}	1.31	1.14628×10^{-8}
78	Pt	195.964	25.21	0.1921		0.19214	2.72641×10^{15}	1.31	1.14511×10^{-8}
79	Au	196.967	100.00		0.18020	0.18020	2.72641×10^{15}	1.31	1.12167×10^{-8}
80	Hg	201.971	29.74		0.17507	0.17507	2.72641×10^{15}	1.31	1.12298×10^{-8}
81	Tl	204.974	70.48		0.17013	0.17013	2.72641×10^{15}	1.31	1.12157×10^{-8}
82	Pb	207.976	52.41		0.16538	0.16538	2.72641×10^{15}	1.31	1.12015×10^{-8}
83	Bi	208.980	100.00		0.16079	0.16079	2.72641×10^{15}	1.31	1.11412×10^{-8}
84	Po	209.982	138.4d		0.15633	0.15633	2.72641×10^{15}	1.31	1.11210×10^{-8}
85	At	216.002	0.3ms		0.15209	0.15209	2.72641×10^{15}	1.31	1.11431×10^{-8}
86	Rn	222.017	3.823d		0.14797	0.14797	2.72641×10^{15}	1.31	1.11615×10^{-8}
87	Fr	225.025	3.9m		0.14399	0.14399	2.72641×10^{15}	1.31	1.11442×10^{-8}
88	Ra	228.031	5.76a		0.14014	0.14014	2.72641×10^{15}	1.31	1.11264×10^{-8}
89	Ac	229.033	1.04h	0.1414	0.13640	0.13890	2.72641×10^{15}	1.31	1.11852×10^{-8}
90	Th	232.038	99.98	0.1378	0.13282	0.13532	2.72641×10^{15}	1.31	1.11698×10^{-8}

Table8:

Z	symbol	atomic weight(A_m)	natural abundance	$\lambda_{k1}\times10^{-10}$	$\lambda_{k2}\times10^{-10}$	$\bar{\lambda}=\frac{\lambda_{k1}+\lambda_{k2}}{2}\times10^{-10}$	b	k_1	$\bar{k}=M_0/\left(\left(\sqrt{\frac{c}{\bar{\lambda}}+Zb}\times(1+(\frac{A_m}{Z})k_1)\right.\right.$
90	Th	232.038	99.98	0.1378	0.13282	0.13532	2.72641×10^{15}	1.314	1.11698×10^{-8}
91	Pa	231.035	100	0.1344		0.13435	2.72641×10^{15}	1.314	1.12156×10^{-8}
92	U	238.028	99.274	0.1310		0.13097	2.72641×10^{15}	1.314	1.12439×10^{-8}
93	Np	239.052	2.355d	0.1288		0.12880	2.72641×10^{15}	1.314	1.12539×10^{-8}
94	Pu	246.070	10.85d	0.1246		0.12457	2.72641×10^{15}	1.314	1.12343×10^{-8}
95	Am	247.071	22.m	0.1215		0.12150	2.72641×10^{15}	1.314	1.11974×10^{-8}
96	Cm	247.071		0.1185		0.11854	2.72641×10^{15}	1.314	1.11508×10^{-8}
97	Bk	249.074	320d		0.11566	0.11566	2.72641×10^{15}	1.314	1.11243×10^{-8}
98	Cf	254.087	60.5d		0.11288	0.11288	2.72641×10^{15}	1.314	1.11283×10^{-8}
99	Es	255.090	40.d	0.1111		0.11107	2.72641×10^{15}	1.314	1.11359×10^{-8}
100	Fm	259.101	1.5s	0.1084		0.10838	2.72641×10^{15}	1.314	1.11263×10^{-8}

Because the atomic mass in the periodic table of elements is a weighted aggregate, every atomic mass with its X-ray wavelength is used to accurately test the meaning of $M_a=\sqrt{\frac{c}{\bar{\lambda}}+nb}\left(1+1.314\times\frac{A_m}{Z}\right)k$; see the above test: Table7,8[3-7]

Chapter.7. Unification of gravitation and electromagnetic force

From the following two formulas and the above discoveries, $Q_Z=\sqrt{\frac{c}{\lambda}+Zb}\times(1-(A_m-Z)k_1)\times k_2$;

$m_a=\sqrt{\frac{c}{\lambda}+Zb}\times(1+k_1\times\frac{A_m}{Z})\times k_2$ the interactions between two units of lithium are shown below; between them, the value of their Coulomb force is

$$F_c=\frac{Q_1\times Q_2}{r^2}k=\frac{[\sqrt{\frac{c}{\lambda}+Zb}\times(1-(A_m-Z)k_1)\times k_2]^2}{r^2}k=\frac{(\frac{c}{\lambda}+Zb)}{r^2}k\times[(1-(A_m-Z)k_1)\times k_2]^2$$

Among them, the value of their gravitational force is

$$F_g=\frac{m_1\times m_2}{r^2}G=\frac{[\sqrt{\frac{c}{\lambda}+Zb}\times(1+k_1\times\frac{A_m}{Z})\times k_2]^2}{r^2}G=\frac{(\frac{c}{\lambda}+Zb)}{r^2}G\times[(1+k_1\times\frac{A_m}{Z})\times k_2]^2$$

From the preceding validation, we can determine that the electromagnetic force and gravitational force are generated by the moving photons in the atom, and their origins are the same: $\frac{(\frac{c}{\lambda}+Zb)}{r^2}$. The difference in the values between them is only because the Coulomb force is the first interaction force generated by this force; it does not include the gravitational force, and the gravitational force includes the effect of the Coulomb force interaction: $(1-(A_m-Z)k_1)\times k_2$, $(1+k_1\times\frac{A_m}{Z})\times k_2$.

Now, we have known the unification of the electromagnetic force and gravitational force. There are only two different effects of one force.

Second portion: The Universal formula in the nature

Chapter.8. Applied in the micro world

8.1. The electric charge of the particle

We now know that moving photons do generate force, and knowledge of the unification of electromagnetic force and gravitation suggests that if a particle holds photons that are more or less than the threshold of its internal balance of force, it will attract or repel other particles; hence, the phenomenon of attracting or repelling other particles appears, showing electric characteristics, which is the essence of the electric charge of a particle. From this, we can determine the origin of the electrical charge of the particle.

8.2. Revealing the Bohr hydrogen spectrum formula

In the hydrogen atom, one electron revolves around the nucleus, between them, when the electron moves from velocity v_1 to v_2, and the distance between them changes from r_1 to r_2. In this changing process, the change in the energy of the electron is as follows:

$\Delta E=\int_{r_1}^{r_2}dr\int_{v_1}^{v_2}\frac{MVmv}{4\pi\Theta r^2}G_a dv=\int_{r_1}^{r_2}\frac{Qe}{r^2}kdr$

$\frac{MVmG_a}{4\pi\Theta}\times\frac{r_1-r_2}{r_1r_2}\times(v_2^2-v_1^2)=\frac{Qek}{r_1r_2}(r_1-r_2)$

$v_2^2-v_1^2=\frac{4\pi\Theta Qek}{MVmG_a}$ can be obtained via the following formula:$m\times(v_2^2-v_1^2)=m\times\frac{4\pi\Theta Qek}{MVmG_a}$;

$E_2-E_1=m\times\frac{4\pi\Theta Qek}{MVmG_a}$ (1)

Moreover, according to $\frac{MVmv}{4\pi\Theta r^2}G_a=\frac{Qe}{r^2}k$, $v=\frac{k_\lambda}{\lambda}$ can be calculated via the following formula: $v=\frac{4\pi\Theta Qek}{MVmG_a}=\frac{k_\lambda}{\lambda}$

Compare (1) yields the following formula:

$\frac{k_\lambda}{\lambda}=\frac{1}{m}\times(E_2-E_1)$, namely, $\frac{1}{\lambda}=\frac{1}{mk_\lambda}\times(E_2-E_1)$ and $m\ and\ k_\lambda$ are all constants, and $\frac{1}{\lambda}=k\times(E_2-E_1)$ is obtained. This formula explains why the Bohr formula can describe the hydrogen spectrum. From this, in generalization, the two-body system can be described by this formula. The spectrum of hydrogen and the spectrum of hydrogen-like systems include the ions He^+, Li^{2+}, Be^{3+}, and $U91^+$ and the spectrum of alkali metal can all be described by this formula. The hydrogen is only a specific case.

8.3. The decay of the particle

According to the above discovery that moving photons generate force, there is a force between photons and other particles. Namely, photons can interact with any other particles. One photon can be attracted or repelled by other photons or other particles. On the other hand, the magnitude of the force that moving photons create is specific. The two photons that produce the electron position pair need sufficient energy, and the appearance of the particle is determined by its moving state. If one particle absorbs one photon, its internal original balance of force will change, which will lead to fusion or fission for a new balance of force. In this process, the parent particle displays a decay process. For example, neutron decay, meson decay, nuclear decay, etc… involve many photons in space, and any particle can absorb photons at any time; thus, almost all the particles exhibit decay characteristics. The reason why the particles decay is the force between the photons and the particles.

8.4. Applied in the interaction between atoms and molecules

We now know that motion particles produce attraction or repulsion forces; from this, two motion atoms also produce attraction or repulsion forces between them; thus, the force of attraction or repulsion between two atoms or molecules will lead to chemical reactions, namely, the mechanism of chemical reactions is the mechanism of their attraction and repulsion forces, which are created by their motion. Below is a result of this interaction to prove the Maxwell distribution formula.

In particular, for a gas, is set up such that an atom moves from v_0 to v_t by attraction or repulsion, and the displacement is $r-r_0$ in this process; therefore, $fs=\frac{1}{2}mv_t^2-\frac{1}{2}mv_0^2$ according to the following formula:

$f_a=\frac{m_1m_2v_1v_2}{r^2}G_a$ Thus, $\int_r^\infty\frac{m_1m_2v_1v_2}{r^2}G_a dr\cdot s=\int_{r_0}^r dr\int_r^\infty\frac{m_1m_2v_1v_2}{r^2}G_a dr$

$\int_r^{\infty}\frac{m_1m_2v_1v_2}{r^2}G_a dr\cdot s=\int_{r_0}^{r}dr\int_r^{\infty}\frac{m_1m_2v_1v_2}{r^2}G_a dr=\frac{1}{2}mv_t^2-\frac{1}{2}mv_0^2$;

because $k_s=\frac{2k_BG_a}{k_\lambda^2}; k_B=\frac{R}{N_A}$, $G_a=\frac{k_\lambda^2K_s}{2R}\cdot N_A$ can be obtained.

Considering $v_1=v_2=v$ under specific conditions, the following equations can be obtained:

$\int_{r_0}^{r}dr\int_r^{\infty}\frac{m_2\sqrt{m_1v^2}\cdot\sqrt{m_1v^2}}{r^2}G_a dr=\int_{r_0}^{r}dr\int_r^{\infty}\frac{m_2\sqrt{m_1v^2}\cdot\sqrt{m_1v^2}}{r^2}\frac{K_\lambda^2k_s}{2R}N_A dr;$

$\int_{r_0}^{r}dr\int_r^{\infty}\frac{m_2\sqrt{N_Am_1v^2}\cdot\sqrt{N_Am_1v^2}}{r^2}\frac{K_\lambda^2k_s}{2R}dr=\int_{r_0}^{r}dr\int_r^{\infty}\frac{\sqrt{3K_BT}\cdot\sqrt{3K_BT}}{r^2}\frac{K_\lambda^2k_sm_2}{2R}dr;$

$\int_{r_0}^{r}dr\int_r^{\infty}\frac{\sqrt{3k_BT}\cdot\sqrt{3K_BT}m_2k_\lambda^2k_s}{r^2 2R}dr=\frac{1}{2}mv_t^2-\frac{1}{2}mv_0^2;$

$3K_BTln\left(\frac{r}{r_0}\right)\cdot\frac{m_2k_sk_\lambda^2}{2R}=\frac{1}{2}mv_t^2-\frac{1}{2}mv_0^2;$

$\frac{r}{r_0}=e^{\frac{\frac{1}{2}mv_t^2-\frac{1}{2}mv_0^2}{3K_BT}\frac{2R}{K_\lambda^2k_sm_2}}=(e^{\frac{\frac{1}{2}mv_t^2-\frac{1}{2}mv_0^2}{3K_BT}})^{\frac{2R}{K_\lambda^2k_sm_2}};$

Because $m_2;\ K_S;\ R;\ K_\lambda$ are all constant values,

$\sqrt[\frac{2R}{K_\lambda^2k_sm_2}]{\frac{r}{r_0}}=e^{\frac{\frac{1}{2}mv_t^2-\frac{1}{2}mv_0^2}{3K_BT}}$ can obtain $\frac{r'}{r_0'}=e^{\frac{\frac{1}{2}mv_t^2-\frac{1}{2}mv_0^2}{3K_BT}};$

Namely: $r=r_0e^{\frac{\frac{1}{2}mv_t^2-\frac{1}{2}mv_0^2}{3K_BT}}; r^3=r_0^3e^{\frac{\frac{1}{2}mv_t^2-\frac{1}{2}mv_0^2}{3K_BT}}; \frac{4}{3}\pi r^3=\frac{4}{3}\pi r_0^3e^{\frac{\frac{1}{2}mv_t^2-\frac{1}{2}mv_0^2}{3K_BT}}$.

This formula can be written as follows:

$(\frac{2n}{3})^{\frac{3}{2}}\pi^{\frac{3}{2}}r^3=(\frac{2n}{3})^{\frac{3}{2}}\pi^{\frac{3}{2}}r_0^3e^{\frac{mv_t^2-mv_0^2}{2K_BT}};$

$r=v_0t=v_0$(in unit time:$t=1$) is defined as follows:

$m_d=\frac{m}{(\frac{2n}{3})^{\frac{3}{2}}\pi^{\frac{3}{2}}r^3}=\frac{m}{(\frac{2n}{3})^{\frac{3}{2}}\pi^{\frac{3}{2}}r_0^3}e^{-\frac{mv_t^2-mv_0^2}{2K_BT}}=m\left(\frac{1}{(\frac{2n}{3})^{\frac{3}{2}}\pi^{\frac{3}{2}}r_0^3}\right)e^{-\frac{mv_t^2-mv_0^2}{2K_BT}}=m(\frac{3n}{2n\pi mv^2})^{\frac{3}{2}}e^{-\frac{mv_t^2-mv_0^2}{2K_BT}}=m(\frac{m}{2\pi K_BT})^{\frac{3}{2}}e^{-\frac{mv_t^2-mv_0^2}{2K_BT}};$

Namely $m_d=m\left(\frac{m}{2\pi K_BT}\right)^{\frac{3}{2}}e^{-\frac{mv_t^2-mv_0^2}{2K_BT}}$ Since $m_d=m\cdot p$ eventually: $p=f(v)=\left(\frac{m}{2\pi K_BT}\right)^{\frac{3}{2}}e^{-\frac{mv_t^2-mv_0^2}{2K_BT}}$ Namely, $f(v)=\left(\frac{m}{2\pi K_BT}\right)^{\frac{3}{2}}e^{-\frac{mv_t^2-mv_0^2}{2K_BT}}$. This is the probability of one atom in one direction with velocity v. Therefore, in the whole space, the probability with velocity v is $f(v)=4\pi v^2\left(\frac{m}{2\pi K_BT}\right)^{\frac{3}{2}}e^{-\frac{mv_t^2-mv_0^2}{2K_BT}}$, which is the **Maxwell distribution law of velocity** .

When$v_0=0$, $f(v)=4\pi v^2(\frac{m}{2\pi K_BT})^{\frac{3}{2}}e^{-\frac{mv^2}{2K_BT}}$.

8.5. Applied in the interaction between electrons

A formula describing the thermoelectric phenomenon, in the thermoelectric phenomenon, the temperature at one of the two joint points is variable, and the other is invariable. This produces thermoelectricity. In this process, all factors are invariable except temperature. According to the above, I define the mass of an electron as m, and the velocity of the electron on the side of varying temperature is v_1. Among the two metals in the A metal, the electron velocity is v_2. In the other metals of B, the electron velocity is v_3. r_0 is the nearest distance between two electrons, and its value is equal to the diameter of the atom. r is the length of the metal conductor. In the two joints of different metals:

$\sum F_a=\int_{r_0}^{r}\frac{mv_1mv_2}{r^2}G_a dr-\int_{r_0}^{r}\frac{mv_1mv_3}{r^2}G_a dr$

Considering that $\frac{1}{r_0}\gg\frac{1}{r}$ can obtain $\sum F_a=mv_1\left(\frac{mv_2-mv_3}{r_0}\right)G_a$, we define$\sum F_a=V$ can be $mv_1\left(\frac{mv_2-mv_3}{r_0}\right)G_a=V$, which shows that one electron on the variable temperature side produces a voltage. Therefore, all free-moving electrons on the varying temperature side produce a voltage below $nmv_1\left(\frac{mv_2-mv_3}{r_0}\right)G_a=nV=U$. The formula for the produced thermoelectric voltage can be deduced as follows:

$(nmv_1^2)^{\frac{1}{2}}(nm)^{\frac{1}{2}}\left(\frac{mv_2-mv_3}{r_0}\right)G_a=nV=U$

$(nmv_1^2)(nm)\left(\frac{mv_2-mv_3}{r_0}\right)^2{G_a}^2=U\times U$

$(nmv_1^2)(nm\frac{q}{q})\left(\frac{mv_2-mv_3}{r_0}\right)^2{G_a}^2=U\times U$

$(nmv_1^2)\left(\frac{m}{q}\right)\left(\frac{mv_2-mv_3}{r_0}\right)^2{G_a}^2=\frac{U}{nq}\times U,$ Consider

$Q=W=\frac{1}{2}mv^2=mc_{el}\Delta℃=m\gamma T℃$

$(nm\gamma T℃)\left(\frac{m}{q}\right)\left(\frac{mv_2-mv_3}{r_0}\right)^2{G_a}^2=\frac{U}{nq}\times U=UR=\frac{l}{s}\rho_0U(1+a℃)$

$T℃\left[\frac{nm^4\gamma(v_2-v_3)^2s}{q\rho_0r_0^2l}G_a^2\right]=U(1+a℃)$

Where $n,m,\gamma,q,\rho_0,G_a,r_0,s,l$ are the number of free-moving electrons on the variable temperature side, the mass of the electron, the heat capacity of the electron, the electron charge, the rate of the specific resistance, the constant of gravitation, the diameter of the atom, the area of the cross section of the conductor, and the length of the conductor, respectively.v_2,v_3 are the two velocities of free movement electrons in the two metals, respectively, and their values can be calculated by the following formula: $Q=W=\frac{1}{2}mv^2=mc_{el}\Delta℃=m\gamma T℃$. Because the temperature of one contact point varies, another is invariable. Therefore, only m and v_1 vary. For two metals, m and v_2,v_3 are invariable; thus, $n,m,\gamma,q,\rho_0,G_a,r_0,s,l,m,v_2,v_3,$ are all constant, and $k=\frac{nm^4\gamma(v_2-v_3)^2s}{q\rho_0r_0^2l}G_a^2$ is defined as follows:$T℃k=(1+a℃)U$.

Here, we can verify the right of $\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\Theta\vec{r}_{12}^3}G_a$ and $T℃k=(1+a℃)U$. For verification of the above formula, see the verification of Type S Thermocouples (Pt + 10% Rh) vs Pt [8] in Table9. In verification, we obtain the constant $k=2.026\times10^{-5}$and $\alpha=1.7\times10^{-3}$. The temperature coefficient of the Type S thermocouple is $\alpha=1.7\times10^{-3}$. Here, the formulas $\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\Theta\vec{r}_{12}^3}G_a$ and $T℃k=(1+a℃)U$ are in agreement with the experimental results and clearly verify the validity of the formulas: $\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\Theta\vec{r}_{12}^3}G_a$.Table9 is following:

Table9[7]:

$T℃k=(1+a℃)U$			unit:emf in Millivolts		
T	$℃$	T $℃$	U	a	k
373	100	37300	0.646	1.703×10^{-3}	2.02695×10^{-5}
473	200	94600	1.441	1.653×10^{-3}	2.02695×10^{-5}
573	300	171900	2.323	1.665×10^{-3}	2.02655×10^{-5}
673	400	269200	3.259	1.685×10^{-3}	2.02655×10^{-5}
773	500	386500	4.233	1.701×10^{-3}	2.02655×10^{-5}
873	600	523800	5.239	1.710×10^{-3}	2.02655×10^{-5}
973	700	681100	6.275	1.714×10^{-3}	2.02695×10^{-5}
1073	800	858400	7.345	1.711×10^{-3}	2.02695×10^{-5}
1173	900	1055700	8.449	1.703×10^{-3}	2.02695×10^{-5}
1273	1000	1273000	9.587	1.691×10^{-3}	2.02655×10^{-5}
1373	1100	1510300	10.757	1.678×10^{-3}	2.02655×10^{-5}
1473	1200	1767600	11.951	1.664×10^{-3}	2.02655×10^{-5}
1573	1300	2044900	13.159	1.653×10^{-3}	2.02655×10^{-5}
1673	1400	2342200	14.373	1.645×10^{-3}	2.02655×10^{-5}
1773	1500	2659500	15.582	1.639×10^{-3}	2.02615×10^{-5}
1873	1600	2996800	16.777	1.637×10^{-3}	2.02615×10^{-5}
1973	1700	3354100	17.947	1.639×10^{-3}	2.02615×10^{-5}

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8.6. The origin of chemical reaction

We now know that the electric charge do not exist at all, the electric charge is only the effect of moving particle producing attractive force, so the two particle attract or repulse will lead to generate the chemical reaction, namely the mechanism of chemical reaction is the mechanism of interaction of moving matter by their attraction and repulse which generated by their motion. Below are some results of this effect.

8.7. Demonstrate the chemical reaction rate

According to formula $f_a=\frac{m_1m_2v_1v_2}{r^2}G_a$ $f(v)=4\pi v^2(\frac{m}{2\pi k_BT})^{\frac{3}{2}}e^{-\frac{mv^2}{2K_BT}}$ in the special equilibrium state, the probability of two atom combine force is below: $f_a=\frac{m_1m_2v_1v_2}{r^2}G_a$

$f(v)=[4\pi v^2(\frac{m}{2\pi k_BT})^{\frac{3}{2}}e^{-\frac{mv^2}{2k_BT}}\cdot 4\pi v^2(\frac{m}{2\pi k_BT})^{\frac{3}{2}}e^{-\frac{mv^2}{2k_BT}}v\cdot vG_a^2]\div r^2$ $f=16\pi^2v^6(\frac{m}{2\pi K_BT})^3e^{-\frac{mv^2}{K_BT}}\frac{G_a^2}{r^2}$

$f=16\pi^2v^6(\frac{m}{2\pi K_BT})^3e^{-\frac{mv^2}{K_BT}}\frac{G_a^2}{r^2}=16\pi^2\frac{G_a^2}{r^2}(\frac{nmv^2}{2\pi nK_BT})^3e^{-\frac{mv^2}{K_BT}}$ $f=16\pi^2\frac{G_a^2}{r^2}\frac{n^3m^3v^6}{(n2\pi)^3(K_BT)^3}e^{-\frac{mv^2}{K_BT}}$ Consider $\frac{1}{2}nmv^2=\frac{3}{2}k_BT$, $G_a=\frac{K_\lambda^2k}{2R}\cdot N_A$ $f=16\pi^2\frac{K_\lambda^4K_s^2N_A^2}{4R^2r^2}\frac{27(nmv^2)^3}{(n2\pi)^3(3K_BT)^3}e^{-\frac{mv^2}{K_BT}}=\frac{27K_\lambda^4K_s^2}{2\pi R^2r^2N_A}e^{-\frac{mv^2}{K_BT}}$

$f=\frac{27K_\lambda^4K_s^2}{2\pi R^2r^2N_A}e^{-\frac{mv^2}{K_BT}}$ This is chemical reaction rate. In formula: $f=\frac{27K_\lambda^4K_s^2}{2\pi R^2r^2N_A}e^{-\frac{mv^2}{K_BT}}$ Because in specific equilibrium state, the $N_A;r;R;K_s;K_\lambda;\pi$ are all constant value, thus in the end we can get a below formula: $f=Ae^{-\frac{mv^2}{K_BT}}$ $A=\frac{27K_\lambda^4K_s^2}{2\pi R^2r^2N_A}$ This is **S.A.Arrhenius** chemical reaction rate of equilibrium state. From this we can know the reason why that when temperature is changing the electric charge does not change, but the chemical reaction rate will change!

8.8. Demonstrate Chemical equilibrium constant

In below chemical reaction $A+B=C+D$ according to follow formula:

$f_a=\frac{m_1m_2v_1v_2}{r^2}G_a$ in the equilibrium status

$f_a=\frac{m_am_bv_av_b}{r^2}G_a=\frac{m_cm_dv_cv_d}{r^2}G_a;\frac{m_a^2m_b^2v_a^2v_b^2}{r^4}G_a{}^2=\frac{m_c^2m_d^2v_c^2v_d^2}{r^4}G_a^2.$

$\frac{m_am_bT_aT_b}{Vr}G_a^2=\frac{m_cm_dT_cT_d}{Vr}G_a^2;\frac{m_am_b}{m_cm_d}=\frac{T_cT_d}{T_aT_b}..$

If the T keeping unchanged, then $\frac{m_am_b}{m_cm_d}=k$ this is the equilibrium constant of Chemical reaction equilibrium equation.

Chapter 9. Applied in the macro world

9.1. Demonstrate Kepler third laws

When the Sun and Planet are all moving forward, they are all revolving around the center of mass movement. In this condition, the Sun and all Planets are all around their center of mass moving forward in the infinity universe, which is the same as when they are all moving in one space, so here, the characteristics of the medium $\boldsymbol{\Theta}$ are not considered; thus:$F_a=\frac{MV^2m_pv_p}{4\pi r_c^2}G_a=M_p\frac{v^2}{r_c}$,Consider: $M_p=m_pv_pk$ $v^2r_c=\frac{MV^2G_ak}{4\pi}$ in the Sun system can be obtained because the $M\ V\ k\ G_a$ are all constant, so $v^2a=constant$, this is the Kepler third law. Here, the value of M is not equal to the known mass of the Sun.

9.2. Demonstrate Newtonian law of universal gravitation

Here we can deduce the Law of Universal gravitation by above discovery. In the earth: between two matters: their attractive force is : $\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\Theta\vec{r}_{12}^3}G_a$. We know that the gravitational mass in the law of Universal gravitation is the capacity of one matter to attract earth, which can be shown by its weight on earth, so the attractive force between two matter can be deduced by its weight on earth, as shown below: Because the weight of first matter on earth is $M_1=F_1=\frac{m_1v_1m_ev_e}{4\pi\Theta r_e^2}G_a=m_1v_1k$, the weight of second matter on earth is $M_2=F_2=\frac{m_2v_2m_ev_e}{4\pi\Theta r_e^2}G_a=m_2v_2k.$ Thus, the attractive force between two matter is as follows: $F_{12}=\frac{m_1v_1m_2v_2}{4\pi\Theta r^2}G_a=\frac{M_1M_2}{4\pi r^2k^2}G_a$ and M_1,M_2 are the weights of two matter, and k,G_a are two constants. In the end, we can obtain follow $F_{12}=\frac{M_1M_2}{r^2}G$, which is the law of Universal gravitation. ***The gravitational constant:*** *how* causes the existence of the Newtonian gravitation constant, according to:$F_{ab}=\frac{m_av_am_bv_b}{4\pi\Theta r^2}G_a$

$F_a=M_a=\frac{m_av_am_ev_e}{4\pi\Theta r_e^2}G_a,F_b=M_b=\frac{m_bv_bm_ev_e}{4\pi\Theta r_e^2}G_a;$

$F_{ab}=\frac{M_aM_b}{r^2}G$; So: $G=\frac{F_{ab}r^2}{M_aM_b}=\frac{16\pi^2\Theta^2m_av_am_bv_br_e^4G_ar^2}{4\pi\Theta m_av_am_bv_bm_e^2v_e^2G_a^2r^2}=\frac{4\pi\Theta r_e^4}{m_e^2v_e^2G_a}$.

Namely, $G=\frac{4\pi\Theta r_e^4}{m_e^2v_e^2G_a},m_e,v_e,r_e$ are the mass of all the particles in the earth, the velocity of the moving particles in the earth, and the distance between the measurement spot and the center of the earth, respectively. They are all specific values under specific conditions, namely, they are all constant. Thus, $G=\frac{4\pi\Theta r_e^4}{m_e^2v_e^2G_a}=$ constant.

9.2.1. The gravitation of the spiral galaxy rotation

The spiral galaxy is similar to the rotation of the disk. It includes two features: one is the spiral arm. The second center spherical component includes a large halo and a nuclear bulge, where the main mass of the galaxy is concentrated.

According to the formula, $\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\Theta r_{12}^3}G_a$. For a spiral galaxy, there is a central bulge where most of the mass is concentrated and the spiral arms are spread over a disk. For a star in such a galaxy at a distance r from the galactic center moving with a circular velocity:v. When $M_{body<r}$:where $M_{<r}$ is the mass enclosed within radius r. If the star is within the dense central region (or central hub) of the galaxy, then $M_{<r}=\frac{4}{3}\pi r^3\rho$, where ρ is the average density of the central hub. Therefore, within the central hub, one expects from

$\frac{mMvV}{4\pi r^2}G_a=\frac{m\frac{4}{3}\pi r^3\rho\cdot 2\pi rV}{4\pi r^2T}G_a=\frac{mv^2}{r}$. (consider: $v=\frac{2\pi r}{T}$)

Can obtain: $v=\sqrt{\frac{2\rho\pi G_aV}{3T}r^3}=\sqrt{r^3}\sqrt{\frac{2\rho\pi G_aV}{3T}}$

When $M_{body>r}, M>r$: $\frac{mMvV}{4\pi r^2}G_a=\frac{mv^2}{r}$

consider: $v=\frac{2\pi r}{T}$ The following conclusions can be drawn:$\frac{mMV2\pi r}{4\pi r^2T}G_a=\frac{mv^2}{r}$ $v=\sqrt{\frac{MVG_a}{2T}}$. In this result, the rotation velocity of the spiral galaxy is constant when $\sqrt{\frac{MVG_a}{2T}}$ is constant, which is in extremely good agreement with the fact that the observational measurements of rotation curves for several spiral galaxies show v to be equally constant for large r. These results indicate that Newton's

law of universal gravitation is not a natural law and that dark matter does not exist in nature. According to the following formula, $\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\Theta r_{12}^3}G_a$ yields two results: When $M_{<r}$: $v=\sqrt{r^3}\sqrt{\frac{2\rho\pi G_a V}{3T}}$; when $M_{>r}$: $v=\sqrt{\frac{MVG_a}{2T}}$. According to formula $F=\frac{m_1m_2}{r^2}G$, the following two results can be obtained: when $M_{<r}$: $v=\sqrt{\frac{4\pi\rho G}{3}}r$; when $M_{>r}$: $v=\frac{\sqrt{MG}}{\sqrt{r}}$. It is unequivocal that the two results from formula $\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\Theta r_{12}^3}G_a$ are in extremely good agreement with the observational facts, but the two results from $F=\frac{m_1m_2}{r^2}G$ are not in agreement with the observational facts.

9.2.2. The observations confirmed the discoveries

According to $v=\sqrt{\frac{MVG_a}{2T}}$. in one galaxy, if $\frac{MVG_a}{2T}$ is constant and the main mass of the galaxy is concentrated in the center of the galaxy, the rotation curve of the spiral galaxy will be flat; if the period changes more greatly than the mass changes, the rotation curve of the spiral galaxy will also change. Therefore, because N4565, N4594, M31, and N891 are around the center of the galaxy rotation, similar to the standard of disk rotation, from their center to large r, $\frac{MVG_a}{2T}$ is nearly constant, and we can infer that the velocity of rotation will be constant with increasing radius. The curve rotation is flat. Among these spiral galaxies, N4565 is the most standard rotation disk; thus, its rotation curve appears to be a straight line. N5033 has a main mass in its center, begins with a standard rotation disk, and then changes this status, so its rotation curve is flat first and then decreases. The M83, N7217, M51, M81, and our galaxy are not standard rotation disks, and their rotation curves are not flat. These observations are in good agreement with these conclusions [9-16].

9.3. The essence of the bending of light

From the above, we know the origin of gravitation. Here, this finding is used to calculate the bending of light. Figure11 shows the state of the light of the star passing near the Sun, where r is the distance between the center of the Sun and the passing light. A is the actual site of the star, B is the site of the Earth, and R is the radius of the Sun. see Figure11: According to the formula $\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\Theta r_{12}^3}G_a$, $F_a=\frac{m_sm_pv_sc}{4\pi\theta r^2}G_a$, where m_s is the mass of the Sun, v_s is the average speed of the moving particle in the Sun, m_p is the mass of the photon, c is the speed of light, and r is the distance between the center of the Sun and the passing light. The gravitation of the star light accepted from the Sun changes with distance, and the accepted gravitation is greatest when the star light passes through the nearest sun. Therefore, in this special area nearest to the Sun, the distance at which light moves S plays a key role in the bending of light; at this distance, light acceptance of gravity may represent the gross gravitation that occurs along its whole travel path. Then, after light has passed through the Sun, the velocity can increase via this gravitation:

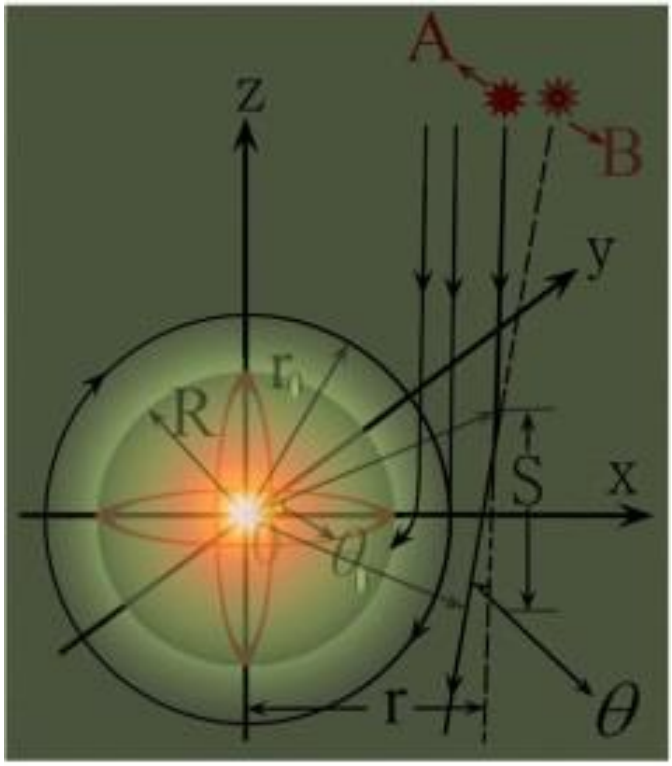

Figure11 This is the state of light from a star passing through the Sun, r which is the distance between the center of the Sun and the passing light. A is the actual site of the star, B is the site of the Earth, and R is the radius of the Sun. $v=at=\frac{m_sv_sm_pc}{r^2m_p}G\cdot\frac{s}{c}=\frac{m_sv_s}{r^2}G_aS=\frac{m_sv_s}{r^2}G_a2rtg\theta_0=\frac{m_sv_s}{r}G_a2tg\theta_0$

Namely, $v=\frac{m_sv_s}{r}G_a2tg\theta_0$. When light arrives at the Earth, it experiences a displacement: $h=vt=\frac{m_sv_s}{r}G_a2tg\theta_0\frac{L_1}{c}=\frac{m_sv\ 2tg\theta_0G_a}{rc}L_1$;

Namely, $h=\frac{2m_sv_sG_atg\theta_0}{rc}L_1$ thus: $tg\theta=\frac{h}{L_2}=\frac{2m_sv_sG_atg\theta_0}{rcL_2}L_1$ Namely, $tg\theta=\frac{2m_sv_sG_atg\theta_0}{rcL_2}L_1$. where L_1 is the distance between the Earth and the Sun and L_2 is the distance between the Earth and the star. Because m_s,v_s,G_a,c,L_1 are all constant, only L_2 and θ_0 undergo little change, so $tg\theta=\frac{h}{L_2}=\frac{2tg\theta_0}{rL_2}k$; here, if L_2 and θ_0 are all constant, then $tg\theta=\frac{2tg\theta_0}{rL_2}k=\frac{k_0}{r}$. Namely, $rtg\theta=k$ =constant. The test results are shown in Table10:.

Table10::

r	θ	$tg\theta$	$rtg\theta$
1.85	0.95″	4.61E-06	8.52E-06
4.82	0.37″	1.79E-06	8.65E-06
7.05	0.26″	1.26E-06	8.88E-06
8.35	0.21″	1.01E-06	8.50E-06
8.5	0.215″	1.04E-06	8.85E-06

Table10:. Show the results of the deduced conclusion. From this test, we can find that formula $tg\theta=\frac{2m_sv_sG_atg\theta_0}{rcL_2}L_1$ is compatible with the bending of light when it passes near the Sun.

According to the formula:$\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\Theta r_{12}^3}G_a=m_p\frac{c^2}{r}$, Three statuses of the bending of light when it passes through the Sun can be obtained. First, when $\frac{m_sv_s}{4\pi r}>c$, the light beam will be absorbed by the Sun. On Earth, the light beam

cannot be observed. In the second status: when $\frac{m_1 v_1}{4\pi r}=c$, the light beam will revolve around the Sun. On Earth, the light beam cannot be observed. The above two conditions indicate that in the special scope nearest to the Sun, we cannot see the star in the sky. Third, when $\frac{m_1 v_1}{4\pi r}<c$, the light beam will move forward, and the earth can see this bending of light. These three statuses are in good agreement with the phenomena that occur on Earth. Moreover, from these three statuses, we can clearly determine the extent to which the star light passes through the scope nearest to the Sun where the star light cannot reach the Earth, the reason why we cannot see a star when its light passes through the nearest Sun, and the orbit of light moving in space. With all this information, the term "general relativity" cannot be used.

9.4. The Universe does not inflation!

9.4.1. The Doppler Effect in light.

In light, according to the above discovery, we now know that light is not a wave–particle duality; rather, it is a particle. According to the following formula, $\lambda v = k_\lambda$ we can obtain the following formula: $\lambda = \frac{k_\lambda}{v}$, where the wavelength is the reciprocal of the speed. For an observer, some photons move toward left observer A, while some photons move toward right observer B; therefore, in observer A's eye, the wavelength of the photon is $\frac{k_\lambda}{v-v_0}$, where v is the speed of light and v_0 is the speed of the atom. In this case, the wavelength is increased, which is a redshift. The wavelength of the photon toward observer B is $\frac{k_\lambda}{v+v_0}$; in this case, the wavelength is decreased, and this is a blue shift. Namely, the frequency of photons decreases when moving toward left observer A, and the frequency of photons increases when moving toward observer B. This is the reason for the redshift and blue shift. However, the status of atomic movement, which emits light, did not change.

9.4.2. The Universe does not inflation

Doppler Effect in the Astronomy: See following Figure12.

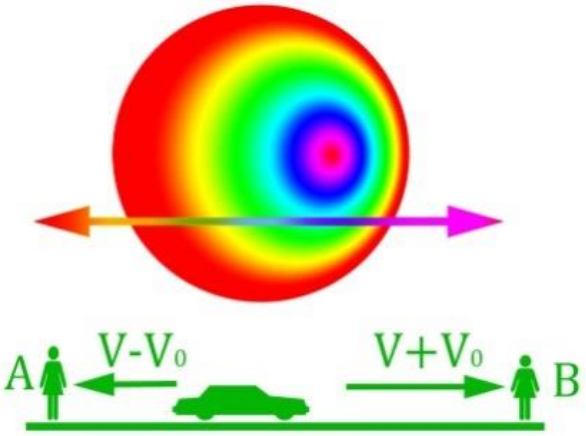

Figure12 This figure shows the essence of the Doppler Effect.

According to the above analysis, because some stars depart from the Earth, the wavelength that the Earth receives is $\frac{k_\lambda}{v-v_0}$, where v is the speed of light, v_0 is the speed of the star, and for some stars arriving at the Earth, the wavelength at which the Earth receives is $\frac{k_\lambda}{v+v_0}$; thus, we can observe the redshift of the light of some stars and the blue shift of some stars. Why we observe the light from a farther star, its more redshift than near a star sent, I think this is similar to the movement of a bullet, because in the moving process, the greater the distance moved is, the more energy is lost, so the lower the speed of the movement is. This is the reason why the greater the distance between the earth and the star is, the greater the redshift. The greater the distance between the earth and the star is the greater the distance needed to move for light, so the speed will decrease more than when the earth stars are nearer. In fact, in this state, only the wavelength of light will change as the distance between the earth and the star changes, but the state of the moving star does not change as it does for observers A and B (see the state of the moving car), and the space also does not change. Thus, the Universe is not inflation. In Figure14, if the speed of the car is v_0, the speed of sound of the car is v; when the car is moving toward right observer B, for observer A, the speed of the message is $v - v_0$, where v_0 is the speed of the car and v is the speed of sound. For observer B, the speed of the message is $v + v_0$, so observer A receives less sound than does the car. Observer B receives more sound than does the car. In fact, the frequency of sound sent by the car does not change, and only the frequency at which the observer receives sound changes. This is the essence of the Doppler Effect.

9.5. Newton's law of gravitation is not a natural law

9.5.1. The Newtonian law of gravitation does not agree with Natural working and cannot describing the gravity field of earth

Since Newton discovered the gravitation, the most direct and significant study of gravity is to measure the gravitational field of the earth, the gravitational field of the earth is indicated by the gravitational acceleration of the earth's surface, however, Newton's gravitational formula has not been able to describe accurately the gravitational acceleration of the earth's surface, and the gravitational acceleration calculated according to Newton's gravitational formula does not conform to the actual measured value of gravitational acceleration. In this paper using the new formula which describes the interaction between two matters to calculate the gravitational acceleration of the Earth, the calculated result is extremely agreement with the actual measured values.**To describe *the gravity field* of the Earth**, as shown in Figure13:

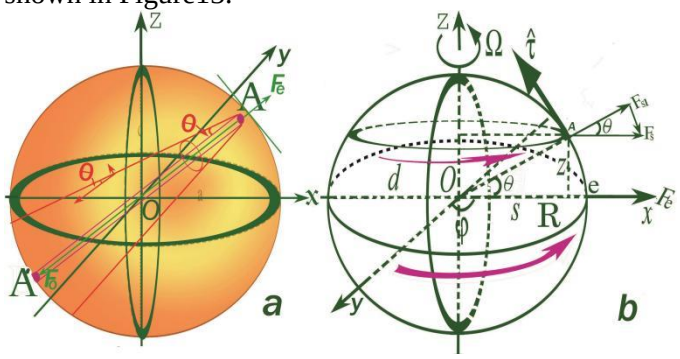

Figure13: A schematic diagram of the Earth's gravitational field acting on matter at point A: Panel **a** illustrates the component force at point A, an illustrates the status of all

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the particles in the Earth attracting matter A; Figure13(a) and (b) show that at site A on the surface of the earth, one matter **A, which is an** accepted attractive force of the earth, is attracted to all the particles of diameter AA' of the earth; additionally, the components parallel to the Earth's diameter AA', which is the attractive force of the particles elsewhere, etc. According to the new formula: $\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\theta\vec{r}_{12}^3}G_a$ the calculated value of this attractive force is as follows:

$$F_a=\int_0^{2\pi}d\varphi\int_0^{\frac{\pi}{2}}cos\theta d\theta\int_0^{m_e}dm\int_0^{v_e}dv\int_{r_0\to0}^{2R}\frac{m_sv_s}{4\pi\varepsilon r^2}G_a dr$$

where $m_e, v_e, R, r_0, m_s, v_s$ are the gross mass in diameter, the highest velocity of the particle in the earth, the radius of the earth, the distance between the nearest particle and matter **A,** the gross mass of all the particles in the matter, and the velocity of the particle in the matter, respectively; thus, the above calculated result is as follows:

$F_e=\frac{m_ev_em_sv_s}{8\pi\varepsilon R}2\pi G_a-\lim_{r_0\to0}\frac{m_ev_em_sv_s}{4\pi\varepsilon r_0}2\pi G_a=\frac{m_ev_em_sv_s}{8\pi\varepsilon}2\pi G_a(\frac{1}{R}-\lim_{r_0\to0}\frac{1}{r_0})$;

On the other hand, matter A is attracted by particles in the atmosphere and other celestial bodies, such as the moon. This size is as follows:

$F_o=\int_0^m dm\int_0^v dv\int_{r_0\to0}^{\infty}\frac{m_sv_s}{4\pi\varepsilon r^2}dr=0-\lim_{r_0\to0}\frac{m_ev_em_sv_s}{4\pi\varepsilon r_0}2\pi G_a$;

In the end, the accepted resultant force of matter A is as follows:$F_c=F_e-F_o=\frac{m_ev_em_sv_s}{8\pi\varepsilon R}2\pi G_a$

Namely,$F_c=\frac{m_ev_em_sv_s}{8\pi\varepsilon R}2\pi G_a$

Because of the Earth's rotation, the matter on the surface of the earth has a centrifugal force, and its centrifugal force is as follows:

$r_e=Rcos\theta,\ F_a=m\frac{v^2}{r_e}=m\frac{(2\pi Rcos\theta)^2}{T_e^2(Rcos\theta)}=\frac{4\pi^2Rmcos\theta}{T_e^2}$;$F_{ax}=F_acos\theta=\frac{4\pi^2Rmcos^2\theta}{T_e^2}$

Te is the rotation period of the earth. Thus, the resultant force is $F_r=F_c-F_{ax}=\frac{m_ev_em_sv_s}{8\pi\varepsilon R}2\pi G_a-\frac{4\pi^2Rmcos^2\theta}{T_e^2}$

$F_r=\frac{m_ev_em_sv_s}{8\pi\varepsilon R}2\pi G_a-\frac{4\pi^2Rmcos^2\theta}{T_e^2}$

In the end, we can obtain the following formula, which describes the acceleration of gravity:

$g=\frac{F_r}{m}=\frac{m_ev_e}{4\epsilon Rk_i}G_a-\frac{4\pi^2Rcos^2\theta}{T_e^2k_i}=\frac{\sqrt{m_e^2v_e^2}}{4\epsilon Rk_i}G_a-\frac{4\pi^2Rcos^2\theta}{T_e^2k_i}=\frac{\sqrt{m_e}\sqrt{kT}}{4\epsilon Rk_i}G_a-\frac{4\pi^2Rcos^2\theta}{T_e^2k_i}$

$g=\frac{\sqrt{m_e}\sqrt{kT}}{4\epsilon Rk_i}G_a-\frac{4\pi^2Rcos^2\theta}{T_e^2k_i}=\frac{\sqrt{2R\sigma}\sqrt{kT}}{4\epsilon Rk_i}-\frac{4\pi Rcos^2\theta}{T_e^2k_i}$

(Please note: $m_e=2R\sigma$, σ is the mass in unit length. On Earth, because the weight of first matter on earth is $M_1=F_1=\frac{m_1v_1m_ev_e}{4\pi\theta r_e^2}G_a=m_1v_1k$ namely, the weight of matter is proportional to the product of its internal mass and the velocity of the particles; on the other hand, the mass of matter is proportional to its weight too. Namely, $m=m_sv_sk_i$, the particles in the earth's core possess the highest velocity; thus, *T* is the temperature of the earth's core.). Considering that $\sigma, G_a, \epsilon, k, \pi, T_e, k_i, T$ are all constant, they are defined as $a=\frac{\sqrt{kT2\sigma}}{4\epsilon k_i}G_a$ $b=\frac{4\pi}{T_e^2k_i}$. The formula for the gravitational acceleration can be written as follows: $g=\frac{\sqrt{R}}{R}\frac{\sqrt{kT2\sigma}}{4\epsilon k_i}G_a-\frac{4\pi Rcos^2\theta}{T_e^2k_i}=\frac{a}{\sqrt{R}}-Rcos^2\theta b$

Namely: $g=\frac{a}{\sqrt{R}}-Rcos^2\theta b$

Where a =24789.4975, b=5.54433027× 10^{-9}. On the other hand, at present, we can obtain gravitational acceleration via geodesy. By comparing the gravitational acceleration determined by geodesy and the data calculated by the following formula, $g=\frac{a}{\sqrt{R}}-Rcos^2\theta b$, we can see that the formula strongly agrees with the results of geodesy. See Table11. According to the law of universal gravitation: $F=\frac{m_1m_2}{r^2}G$ and considering the centrifugal force of the earth, $g=\frac{MG}{r^2}-Rcos^2b_1=\frac{a_1}{R^2}-Rcos^2b_1$ can be obtained, namely, $g=\frac{a_1}{R^2}-Rcos^2b_1$, with the following formula:

$MG=a_1=3.9843912\times10^{14};\ b_1=\frac{4\pi^2}{(24\times3600)^2}=5.283136145^{-9}$,By applying the formula: $g=\frac{a_1}{R^2}-Rcos^2b_1$ to calculate the acceleration of gravity at any location on Earth, the calculated results show that Newton's law of Universal gravitation does not agree with the measured data see Table12 and Table14. We can also obtain precise gravitational acceleration data by measuring the actual gravitational acceleration. By further comparing the measured results on the earth and the calculated results of the new formulas, we also see that the calculated results are in extreme agreement with the measured results. See Table13. For more clarity, see Figure14.

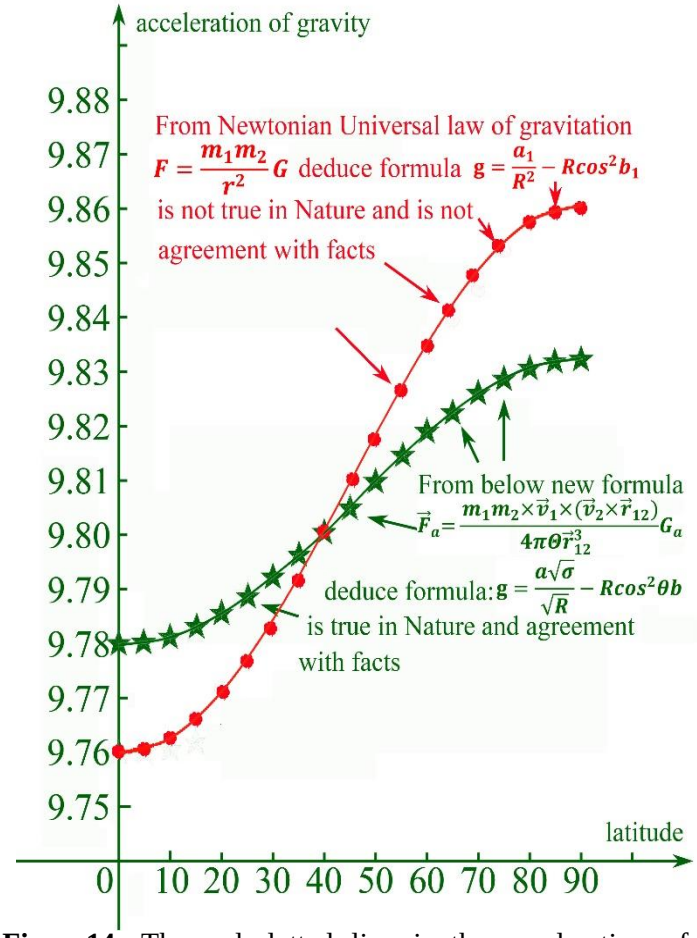

Figure14: The red dotted line is the acceleration of gravity obtained by the Newtonian law of Universal gravitation; the green lines are the measured actual values, and the green pentagon line is the calculated acceleration of gravity by the following new formula:$g=\frac{a\sqrt{\sigma}}{\sqrt{R}}-Rcos^2\theta b$. The right and validity of the new formula are clearly shown.

Table11, and Table13 shows new formula calculated results extremely agree with the actual measured data. a=24789.4975 and b=5.54433027×10^{-9} were obtained via geodesy. The $g=\frac{a\sqrt{\sigma}}{\sqrt{R}}-Rcos^2\theta b$ values used in Table11 were calculated via new formula:$\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\theta\vec{r}_{12}^3}G_a$.

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Table11 [17, 18]:

latitude	radius(m)	The Data of geodesy(m/s2)	$g=\frac{a}{\sqrt{R}}-Rcos^2\theta b$
0	6378137	9.7803189	9.78032677
1	6378131	9.7803346	9.78034219
2	6378111	9.7803817	9.78038999
3	6378079	9.7804626	9.78046858
4	6378034	9.7805700	9.78057867
5	6377976	9.7807110	9.78072016
6	6377905	9.7808830	9.78089295
7	6377822	9.7810857	9.78109610
8	6377726	9.7813189	8.78133022
9	6377618	9.7815824	9.78159434
10	6377497	9.7818759	9.78188903
11	6377365	9.7822198	9.78221247
12	6377220	9.7825511	9.78256595
13	6377063	9.7829320	9.78294840
14	6376895	9.7833413	9.78335872
15	6376716	9.7837784	9.78379657
16	6376525	9.7842428	9.78426237
17	6376323	9.7847339	9.78475493
18	6376110	9.7852511	9.78527386
19	6375887	9.7857939	9.78581795
20	6375654	9.7863615	9.78638673
21	6375411	9.7869533	9.78697974
22	6375158	9.7875685	9.78759648
23	6374895	9.7882065	9.78823643
24	6374624	9.7888665	9.78889751
25	6374344	9.7895475	9.78957994
26	6374055	9.7902490	9.79028845
27	6373759	9.7909698	9.79100503
28	6373455	9.7917093	9.79174572
29	6373143	9.7924665	9.79250460
30	6372824	9.7932405	9.79328029
31	6372499	9.7940305	9.79407135
32	6372168	9.7948352	9.79487712
33	6371831	9.7956540	9.79569694
34	6371489	9.7964856	9.79652934
35	6371141	9.7973293	9.79737441
36	6370789	9.7981838	9.79822990
37	6370433	9.7990482	9.79909510
38	6370074	9.7999214	9.79996850
39	6369711	9.8008023	9.80085016
40	6369345	9.8016900	9.80173857
41	6368977	9.8025833	9.80263223
42	6368607	9.8034812	9.80353037
43	6368235	9.8043824	9.80443227
44	6367863	9.8052861	9.80533562
45	6367490	9.8061909	9.80624945
46	6367116	9.8070959	9.80714601
47	6366743	9.8079999	9.80805000
48	6366371	9.8089919	9.80895166
49	6366001	9.8098903	9.80984948
50	6365632	9.8106952	9.81074349
51	6365265	9.8115843	9.81163225
52	6364900	9.8124671	9.81251480
53	6364539	9.8133423	9.81338908
54	6364181	9.8142089	9.81425507
55	6363827	9.8151511	9.81511128
56	6363478	9.8159122	9.81595623
57	6363133	9.8167468	9.81678999
58	6362794	9.8175686	9.81761032
59	6362460	9.8183766	9.81841733
60	6362132	9.8191699	9.81920957
61	6361811	9.8199475	9.81998562
62	6361496	9.8207083	9.82074560
63	6361189	9.8214516	9.82148735
64	6360890	9.8221763	9.82221025
65	6360598	9.8228816	9.82291447
66	6360315	9.8235667	9.82359790
67	6360040	9.8242306	9.82426074
68	6359755	9.8248726	9.82490089
69	6359519	9.8254918	9.82551861
70	6359272	9.8260876	9.82611339
71	6359036	9.8266591	9.82668318
72	6358810	9.8272058	9.82722829
73	6358594	9.8277268	9.82774828
74	6358390	9.8282215	9.82824117
75	6358196	9.8286894	9.82870810
76	6358014	9.8291299	9.82914714
77	6357843	9.8295424	9.82955869
78	6357684	9.8299265	9.82994166
79	6357537	9.8302816	9.83029572
80	6357402	9.8306070	9.83062059
81	6357280	9.8309031	9.83091522
82	6357170	9.8311688	9.83118014
83	6357073	9.8314041	9.83141437
84	6356988	9.8316086	9.83161847
85	6356916	9.8317820	9.83179153
86	6356857	9.8319242	9.83193338
87	6356811	9.8320350	9.83204392
88	6356790	9.8321143	9.83212227
89	6356759	9.8321618	9.83216993
89.1	6356755	9.8321624	9.83217000
90	6356752	9.8321777	9.83218608

Table12 [17, 18]:

latitude	radius(m)	The Data of geodesy(m/s2)	$g=\frac{a}{R^2}-Rcos^2\theta b_1$
0	6378137	9.7803189	9.76062330
1	6378131	9.7803346	9.76065206
2	6378111	9.7803817	9.76074437
3	6378079	9.7804626	9.76089407
4	6378034	9.7805700	9.76110419
5	6377976	9.7807110	9.76137460
6	6377905	9.7808830	9.76170529
7	6377822	9.7810857	9.76209295
8	6377726	9.7813189	8.76254050
9	6377618	9.7815824	9.76304470
10	6377497	9.7818759	9.76360800
11	6377365	9.7822198	9.76422550
12	6377220	9.7825511	9.76490150
13	6377063	9.7829320	9.76563300
14	6376895	9.7833413	9.76641720
15	6376716	9.7837784	9.76725300
16	6376525	9.7842428	9.76814402
17	6376323	9.7847339	9.76908600
18	6376110	9.7852511	9.77007909
19	6375887	9.7857939	9.77111950
20	6375654	9.7863615	9.77295500
21	6375411	9.7869533	9.77334090
22	6375158	9.7875685	9.77452108
23	6374895	9.7882065	9.77574680
24	6374624	9.7888665	9.77701150
25	6374344	9.7895475	9.77831770
26	6374055	9.7902490	9.77966496
27	6373759	9.7909698	9.78104646
28	6373455	9.7917093	9.78246470
29	6373143	9.7924665	9.78391927
30	6372824	9.7932405	9.78540630
31	6372499	9.7940305	9.78692170
32	6372168	9.7948352	9.78846630
33	6371831	9.7956540	9.79003810
34	6371489	9.7964856	9.79163370
35	6371141	9.7973293	9.79325560
36	6370789	9.7981838	9.79489690
37	6370433	9.7990482	9.79655710
38	6370074	9.7999214	9.79823237
39	6369711	9.8008023	9.79992500
40	6369345	9.8016900	9.80163128
41	6368977	9.8025833	9.80334740
42	6368607	9.8034812	9.80507270
43	6368235	9.8043824	9.80680648
44	6367863	9.8052861	9.80854180
45	6367490	9.8061909	9.81028105
46	6367116	9.8070959	9.81202350
47	6366743	9.8079999	9.81376230
48	6366371	9.8089919	9.81549676
49	6366001	9.8098903	9.81722299
50	6365632	9.8106952	9.81894340
51	6365265	9.8115843	9.82065420
52	6364900	9.8124671	9.82235470
53	6364539	9.8133423	9.82387099
54	6364181	9.8142089	9.82570649
55	6363827	9.8151511	9.82735641
56	6363478	9.8159122	9.82898397
57	6363133	9.8167468	9.83059160
58	6362794	9.8175686	9.83217245
59	6362460	9.8183766	9.83372895
60	6362132	9.8191699	9.83525737
61	6361811	9.8199475	9.83675399
62	6361496	9.8207083	9.83822128
63	6361189	9.8214516	9.83965244
64	6360890	9.8221763	9.84104688
65	6360598	9.8228816	9.84240712
66	6360315	9.8235667	9.84372640
67	6360040	9.8242306	9.84500728
68	6359755	9.8248726	9.84630500
69	6359519	9.8254918	9.84743623
70	6359272	9.8260876	9.84858639
71	6359036	9.8266591	9.84968684
72	6358810	9.8272058	9.85074022
73	6358594	9.8277268	9.85174609
74	6358390	9.8282215	9.85269784
75	6358196	9.8286894	9.85361057
76	6358014	9.8291299	9.85444981
77	6357843	9.8295424	9.85524620
78	6357684	9.8299265	9.85598701
79	6357537	9.8302816	9.85667194
80	6357402	9.8306070	9.85730070
81	6357280	9.8309031	9.85786994
82	6357170	9.8311688	9.85838251
83	6357073	9.8314041	9.85883509
84	6356988	9.8316086	9.85923061
85	6356916	9.8317820	9.85956580
86	6356857	9.8319242	9.85984052
87	6356811	9.8320350	9.86005465
88	6356790	9.8321143	9.86017088
89	6356759	9.8321618	9.86029773
89.1	6356755	9.8321624	9.86031208
90	6356752	9.8321777	9.86032967

Table13 [18]: Applying the formula $\mathbf{g = \frac{a\sqrt{\sigma}}{\sqrt{R}} - Rcos^2\theta b}$, **which is obtained by** $\vec{F}_a = \frac{m_1 m_2 \times \vec{v}_1 \times (\vec{v}_2 \times \vec{r}_{12})}{4\pi\theta \vec{r}_{12}^3} G_a$, and obtaining the constants via geodesy to calculate the gravitational acceleration at any location on the earth.

Location	latitude	radius(m)	measuement Data(m/s^2)	$g=\frac{a}{\sqrt{R}}-Rcos^2\theta b$
Amsterdam	52.37	6364766	9.8129	9.812839
Ankara	39.93	6369372	9.802	9.801672
Athens	37.98	6370081	9.800	9.799951
Auckland	36.84	6370491	9.799	9.798955
Bangkok	13.73	6376942	9.783	9.783245
Bucharest	44.44	6367699	9.8054	9.805732
Brussels	50.85	6365319	9.8114	9.811499
Buenos Aires	34.60	6371281	9.797	9.797035
Cape Town	33.91	6371520	9.796	9.796454
Chicago	41.88	6368651	9.803	9.803422
Copenhagen	55.67	6363593	9.8159	9.815678
Dusseldortf	51.23	6365179	9.812	9.811838
Frankfurt	50.11	6365591	9.810	9.810842
Havana	23.11	6374866	9.788	9.788307
Helsinki	60.16	6362080	9.819	9.819335
Hong Kong	22.39	6375056	9.785	9.787843
Vienna	48.21	6366293	9.809	9.809141
Jakarta	6.2000	6377890	9.781	9.780930
La Paz	16.5000	6376425	9.784	9.784050
Kolkata	22.572	6375009	9.785	9.787959
Nicosia	35.1850	6371076	9.797	9.797532
Kuwait City	29.378	6373023	9.792	9.792796
Lisbon	38.716	6369814	9.8009	9.800599
London	51.509	6365079	9.812	9.812082
Los Angeles	34.052	6371471	9.796	9.796573
Seoul	37.532	6370242	9.799	9.799559
Montreal	45.508	6367300	9.8069	9.806701
Manila	14.602	6376789	9.784	9.783618
Melbourne	37.840	6370131	9.800	9.799828
Montevideo	34.901	6371176	9.796	9.797289
Montréal	45.508	6367300	9.809	9.806701
New York City	40.711	6369083	9.802	9.802373
Prague	50.073	6365604	9.811	9.810809
Oslo	59.911	6362161	9.819	9.819139
Ottawa	45.424	6367331	9.806	9.806624
Paris	48.864	6366051	9.809	9.809727
Perth	31.952	6372184	9.794	9.794838
Rio de Janeiro	22.908	6374920	9.788	9.788176
Rome	41.902	6368643	9.803	9.803442
Rabat	34.013	6371484	9.796	9.796541
Singapore	1.2900	6378126	9.781	9.780352
Skopje	41.997	6368608	9.804	9.803515
Stockholm	59.334	6362350	9.818	9.818683
Sydney	33.867	6371534	9.797	9.796418
Guatemala	15.783	6376567	9.784	9.784158
Tokyo	35.652	6370912	9.798	9.797931
Toronto	43.653	6367992	9.805	9.805022
Vancouver	49.246	6365910	9.809	9.810069
Washington, D.C	38.907	6369745	9.801	9.800767
Wellington	41.286	6368871	9.803	9.802889
Zurich	47.366	6366607	9.807	9.808380

Table14 [18]: Applying the formula $g = \frac{a_1}{R^2} - Rcos^2 b_1$ obtained by the Newtonian law of Universal gravitation $F = \frac{m_1 m_2}{r^2} G$ to calculate the acceleration of gravity at any location on the earth.

Location	latitude	radius(m)	measuement Data(m/s^2)	$g=\frac{a_1}{R^2}-Rcos^2\theta b_1$
Amsterdam	52.37	6364766	9.8129	9.822979
Ankara	39.93	6369372	9.8024	9.801507
Athens	37.98	6370081	9.800	9.798199
Auckland	36.84	6370491	9.799	9.796287
Bangkok	13.73	6376942	9.783	9.766198
Bucharest	44.44	6367699	9.8057	9.809274
Brussels	50.85	6365319	9.8114	9.820401
Buenos Aires	34.60	6371281	9.797	9.792603
Cape Town	33.91	6371520	9.796	9.791489
Chicago	41.88	6368651	9.803	9.804866
Copenhagen	55.67	6363593	9.8159	9.828448
Dusseldortf	51.23	6365179	9.812	9.821052
Frankfurt	50.11	6365591	9.810	9.819133
Havana	23.11	6374866	9.788	9.775882
Helsinki	60.16	6362080	9.819	9.835499
Hong Kong	22.39	6375056	9.785	9.774995
Vienna	48.21	6366293	9.809	9.815860
Jakarta	6.2000	6377890	9.781	9.761776
La Paz	16.5000	6376425	9.784	9.768609
Kolkata	22.572	6375009	9.785	9.775216
Nicosia	35.1850	6371076	9.797	9.793558
Kuwait City	29.378	6373023	9.792	9.784478
Lisbon	38.716	6369814	9.8009	9.799444
London	51.509	6365079	9.812	9.821521
Los Angeles	34.052	6371471	9.796	9.791717
Seoul	37.532	6370242	9.799	9.797447
Montreal	45.508	6367300	9.8069	9.811166
Manila	14.602	6376789	9.784	9.766912
Melbourne	37.840	6370131	9.800	9.797965
Montevideo	34.901	6371176	9.796	9.793093
Montréal	45.508	6367300	9.809	9.811166
New York City	40.711	6369083	9.802	9.802852
Prague	50.073	6365604	9.811	9.819072
Oslo	59.911	6362161	9.819	9.835122
Ottawa	45.424	6367331	9.806	9.811021
Paris	48.864	6366051	9.809	9.816989
Perth	31.952	6372184	9.794	9.788391
Rio de Janeiro	22.908	6374920	9.788	9.775631
Rome	41.902	6368643	9.803	9.804904
Rabat	34.013	6371484	9.796	9.791656
Singapore	1.2900	6378126	9.781	9.760764
Skopje	41.997	6368608	9.804	9.805067
Stockholm	59.334	6362350	9.818	9.834242
Sydney	33.867	6371534	9.797	9.791422
Guatemala	15.783	6376567	9.784	9.767947
Tokyo	35.652	6370912	9.798	9.794323
Toronto	43.653	6367992	9.805	9.807939
Vancouver	49.246	6365910	9.809	9.817647
Washington, D.C	38.907	6369745	9.801	9.799766
Wellington	41.286	6368871	9.803	9.803841
Zurich	47.366	6366607	9.807	9.814396

9.5.2. The acceleration of gravity in different Elevation:

NOW, WE COMPARE THE CALCULATED RESULTS BY law of Universal gravitation $F=\frac{m_1m_2}{r^2}G$ and the calculated result by following new formula: $\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\Theta\vec{r}_{12}^3}G_a$.**The measured acceleration of gravity in the different elevation: see following Figure15:**

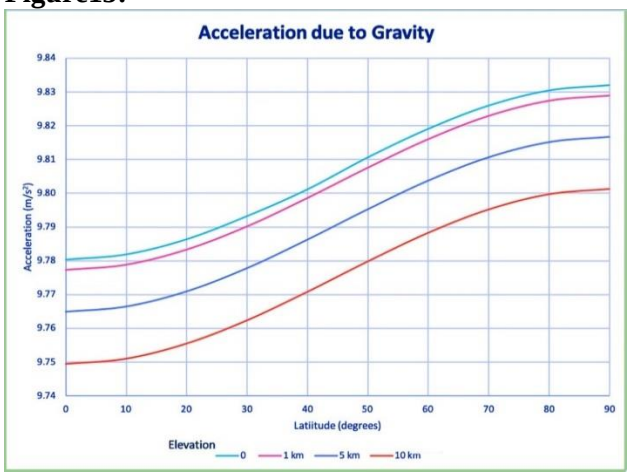

Figure15: here show the acceleration of gravity in the 1km, 5km, 10km.

The value of acceleration of gravity in different elevation are calculated by new formula: $\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\Theta\vec{r}_{12}^3}G_a$ the calculated results see following Figure16: we can see that the calculated results by the $\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\Theta\vec{r}_{12}^3}G_a$ consistent with measured acceleration gravity on earth. The gravitation relates to characteristics of medium. The characteristics of Medium is determined by the density of particle in space, the temperature of air, these conditions will be changed with the increasing of elevation, thus the characteristics of medium will be changed with increasing of elevation, in the end the field of gravitation of earth will changed with increasing of elevation.

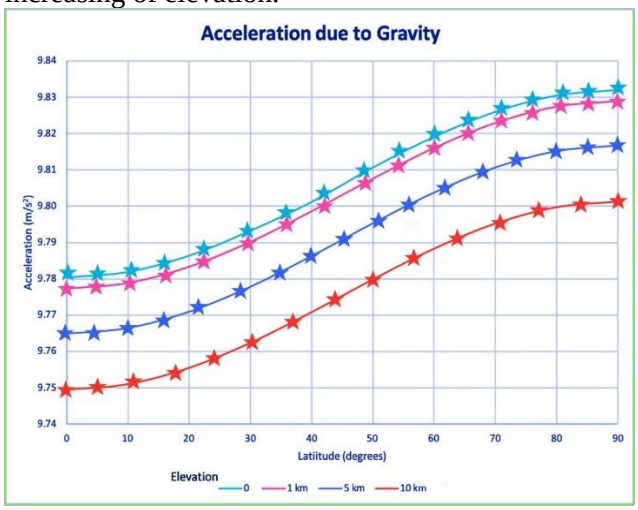

Figure16: the calculated acceleration of gravity by following new formula $\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\Theta\vec{r}_{12}^3}G_a$ consistent with measured acceleration of gravity on earth. In formula: $\boldsymbol{\Theta}$ is used to determine the field of gravitation of earth. Here $\boldsymbol{\Theta}=\frac{1}{\delta}=\frac{1}{1-h\epsilon}$, where h is elevation,$\varepsilon=2.42013\times10^{-7}$, namely new calculate gravitational acceleration of formula is following: $\mathbf{g}=\frac{a\sqrt{\sigma}}{\sqrt{R}}\delta-\boldsymbol{Rcos^2\theta b}$, **the calculated results see Table15 and Figure16.**

In this figure the pentagon line is the calculated acceleration of gravity by new formula, the line is the measured acceleration of gravitation on the earth. They are identical each other completely. Namely the results of new formula are identical with measured data.

The calculated results by Newtonian law of universal gravitation $F=\frac{m_1m_2}{r^2}G$ .See following Figure17:

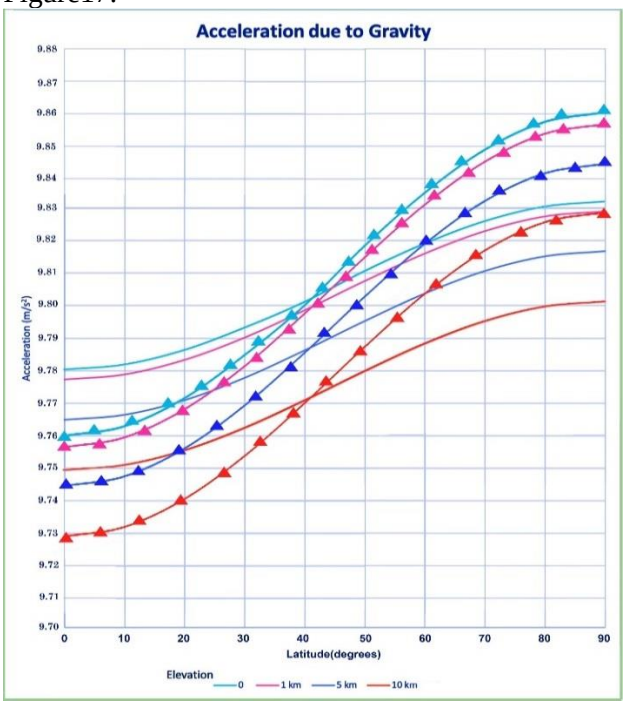

Figure17: in this figure show that the calculated acceleration of gravity by Newtonian law of universal gravitation is not agreement with measured acceleration of gravity on the earth. The triangle line is the calculated acceleration of gravity by Newtonian law of universal gravitation; the line is the measured acceleration of gravitation on the earth.

Figure16 and Table15 are results of calculated by new following formula $\vec{F}_a=\frac{m_1m_2\times\vec{v}_1\times(\vec{v}_2\times\vec{r}_{12})}{4\pi\Theta\vec{r}_{12}^3}G_a$.

Figure17 and Table16 are results of calculated by Newtonian law of universal gravitation: $F=\frac{m_1m_2}{r^2}G$ .Compared with the calculated result from Newton's law of universal gravitation, Newton's law is not in agreement with some observations, so the hypothesis of dark matter appears. We now know that there is no dark matter in nature; in fact, Newton's law of universal gravitation laws is based on the Kepler law. Namely, Newton's law of universal gravitation is not the law of nature; it is only an approximation formula that is deduced by Kepler's third law to calculate some mathematical problems.

Table15:

latitude	h0=radius(m)	h1=h0+1000	h2=h0+5000	h3=h0+10000	The Data of geodesy(m/s2)	$g=\frac{a}{\sqrt{R}}-R\cos^2\theta b$	$g=\frac{a\delta}{\sqrt{h1}}-h_1\cos^2\theta b$	$g=\frac{a\delta}{\sqrt{h2}}-h_2\cos^2\theta b$	$g=\frac{a\delta}{\sqrt{h3}}-h_3\cos^2\theta b$
0	6378137	6379137	6383137	6388137	9.7803189	9.78032677	9.777176	9.764581	9.748849
1	6378131	6379131	6383131	6388131	9.7803346	9.78034219	9.777192	9.764596	9.748864
2	6378111	6379111	6383111	6388111	9.7803817	9.78038999	9.777239	9.764644	9.748912
3	6378079	6379079	6383079	6388079	9.7804626	9.78046858	9.777318	9.764723	9.748991
4	6378034	6379034	6383034	6388034	9.7805700	9.78057867	9.777428	9.764832	9.749101
5	6377976	6378976	6382976	6387976	9.7807110	9.78072016	9.777569	9.764974	9.749242
6	6377905	6378905	6382905	6387905	9.7808830	9.78089295	9.777742	9.765147	9.749415
7	6377822	6378822	6382822	6387822	9.7810857	9.78109610	9.777945	9.765350	9.749618
8	6377726	6378726	6382726	6387726	9.7813189	8.78133022	9.778179	9.765584	9.749852
9	6377618	6378618	6382618	6387618	9.7815824	9.78159434	9.778444	9.765848	9.750115
10	6377497	6378497	6382497	6387497	9.7818759	9.78188903	9.778738	9.766143	9.750411
11	6377365	6378365	6382365	6387365	9.7822198	9.78221247	9.779062	9.766466	9.750733
12	6377220	6378220	6382220	6387220	9.7825511	9.78256595	9.779415	9.766819	9.751087
13	6377063	6378063	6382063	6387063	9.7829320	9.78294840	9.779798	9.767202	9.751469
14	6376895	6377895	6381895	6386895	9.7833413	9.78335872	9.780208	9.767612	9.751879
15	6376716	6377716	6381716	6386716	9.7837784	9.78379657	9.780646	9.768049	9.752317
16	6376525	6377525	6381525	6386525	9.7842428	9.78426237	9.781112	9.768515	9.752782
17	6376323	6377323	6381323	6386323	9.7847339	9.78475493	9.781604	9.769008	9.753275
18	6376110	6377110	6381110	6386110	9.7852511	9.78527386	9.782123	9.769526	9.753793
19	6375887	6376887	6380887	6385887	9.7857939	9.78581795	9.782667	9.770071	9.754338
20	6375654	6376654	6380654	6385654	9.7863615	9.78638673	9.783236	9.770639	9.754906
21	6375411	6376411	6380411	6385411	9.7869533	9.78697974	9.783829	9.771232	9.755499
22	6375158	6376158	6380158	6385158	9.7875685	9.78759648	9.784445	9.771849	9.756115
23	6374895	6375895	6379895	6384895	9.7882065	9.78823643	9.785085	9.772488	9.756755
24	6374624	6375624	6379624	6384624	9.7888665	9.78889751	9.785746	9.773149	9.757415
25	6374344	6375344	6379344	6384344	9.7895475	9.78957994	9.786429	9.773832	9.758098
26	6374055	6375055	6379055	6384055	9.7902490	9.79028845	9.787132	9.774535	9.758801
27	6373759	6374759	6378759	6383759	9.7909698	9.79100503	9.787854	9.775256	9.759522
28	6373455	6374455	6378455	6383455	9.7917093	9.79174572	9.788595	9.775997	9.760263
29	6373143	6374143	6378143	6383143	9.7924665	9.79250460	9.789353	9.776756	9.761021
30	6372824	6373824	6377824	6382824	9.7932405	9.79328029	9.790129	9.777531	9.761796
31	6372499	6373499	6377499	6382499	9.7940305	9.79407135	9.790920	9.778322	9.762588
32	6372168	6373168	6377168	6382168	9.7948352	9.79487712	9.791726	9.779128	9.763392
33	6371831	6372831	6376831	6381831	9.7956540	9.79569694	9.792545	9.779948	9.764212
34	6371489	6372489	6376489	6381489	9.7964856	9.79652934	9.793378	0.780779	9.765044
35	6371141	6372141	6376141	6381141	9.7973293	9.79737441	9.794223	9.781625	9.765889
36	6370789	6371789	6375789	6380789	9.7981838	9.79822990	9.795078	9.782480	9.766744
37	6370433	6371433	6375433	6380433	9.7990482	9.79909510	9.795944	9.783345	9.767609
38	6370074	6371074	6375074	6380074	9.7999214	9.79996850	9.796817	9.784218	9.768482
39	6369711	6370711	6374711	6379711	9.8008023	9.80085016	9.797698	9.785099	9.769363
40	6369345	6370345	6374345	6379345	9.8016900	9.80173857	9.798587	9.785988	9.770251
41	6368977	6369977	6373977	6378977	9.8025833	9.80263223	9.799481	9.786881	9.771145
42	6368607	6369607	6373607	6378607	9.8034812	9.80353037	9.800379	9.787779	9.772042
43	6368235	6369235	6373235	6378235	9.8043824	9.80443227	9.801281	9.788681	9.772943
44	6367863	6368863	6372863	6377863	9.8052861	9.80533562	9.802184	9.789584	9.773846
45	6367490	6368490	6372490	6377490	9.8061909	9.80624945	9.803089	9.790488	9.774751
46	6367116	6368116	6372116	6377116	9.8070959	9.80714601	9.803995	9.791355	9.775656
47	6366743	6367743	6371743	6376743	9.8079999	9.80805000	9.804898	9.792298	9.776559
48	6366371	6367371	6371371	6376371	9.8089919	9.80895166	9.805800	9.793199	9.777461
49	6366001	6367001	6371001	6376001	9.8098903	9.80984948	9.806698	9.794097	9.778358
50	6365632	6366632	6370632	6375632	9.8106952	9.81074349	9.807592	9.794991	9.779252
51	6365265	6366265	6370265	6375265	9.8115843	9.81163225	9.808763	9.795879	9.780141
52	6364900	6365900	6369900	6374900	9.8124671	9.81251480	9.809363	9.796761	9.781022
53	6364539	6365539	6369539	6374539	9.8133423	9.81338908	9.810237	9.797635	9.781896
54	6364181	6365181	6369181	6374181	9.8142089	9.81425507	9.811103	9.798501	9.782762
55	6363827	6364827	6368827	6373827	9.8151511	9.81511128	9.811959	9.799358	9.783618
56	6363478	6364478	6368478	6373478	9.8159122	9.81595623	9.812804	9.800202	9.784462
57	6363133	6364133	6368133	6373133	9.8167468	9.81678999	9.813653	9.801036	9.785296
58	6362794	6363794	6367794	6372794	9.8175686	9.81761032	9.814458	9.801856	9.786116
59	6362460	6363460	6367460	6372460	9.8183766	9.81841733	9.815265	9.802663	9.786922
60	6362132	6363132	6367132	6372132	9.8191699	9.81920957	9.816057	9.803455	9.787715
61	6361811	6362811	6366811	6371811	9.8199475	9.81998562	9.816833	9.804231	9.788490
62	6361496	6362496	6366496	6371496	9.8207083	9.82074560	9.817593	9.804991	9.789249
63	6361189	6362189	6366189	6371189	9.8214516	9.82148735	9.818335	9.805732	9.789991
64	6360890	6361890	6365890	6370890	9.8221763	9.82221025	9.819058	9.806455	9.790713
65	6360598	6361598	6365598	6370598	9.8228816	9.82291447	9.819762	9.807159	9.791418
66	6360315	6361315	6365315	6370315	9.8235667	9.82359790	9.820445	9.807842	9.792101
67	6360040	6361040	6365040	6370040	9.8242306	9.82426074	9.821108	9.808505	9.792763
68	6359755	6360755	6364755	6369755	9.8248726	9.82490089	9.821764	9.809160	9.793418
69	6359519	6360519	6364519	6369519	9.8254918	9.82551861	9.822366	9.809762	9.794021
70	6359272	6360272	6364272	6369272	9.8260876	9.82611339	9.822961	9.810357	9.794615
71	6359036	6360036	6364036	6369036	9.8266591	9.82668318	9.823531	9.810927	9.795185
72	6358810	6359810	6363810	6368810	9.8272058	9.82722829	9.824075	9.811472	9.795729
73	6358594	6359594	6363594	6368594	9.8277268	9.82774828	9.824595	9.811991	9.796249
74	6358390	6359390	6363390	6368390	9.8282215	9.82824117	9.825088	9.812485	9.796742
75	6358196	6359196	6363196	6368196	9.8286894	9.82870810	9.825555	9.812951	9.797208
76	6358014	6359014	6363014	6368014	9.8291299	9.82914714	9.825995	9.813390	9.797647
77	6357843	6358843	6362843	6367843	9.8295424	9.82955869	9.826406	9.813801	9.798058
78	6357684	6358684	6362684	6367684	9.8299265	9.82994166	9.826789	9.814185	9.798442
79	6357537	6358537	6362537	6367537	9.8302816	9.83029572	9.827143	9.814538	9.820193
80	6357402	6358402	6362402	6367402	9.8306070	9.83062059	9.827468	9.814863	9.799120
81	6357280	6358280	6362280	6367280	9.8309031	9.83091522	9.827762	9.815158	9.799415
82	6357170	6358170	6362170	6367170	9.8311688	9.83118014	9.828027	9.815423	9.799679
83	6357073	6358073	6362073	6367073	9.8314041	9.83141437	9.828262	9.815657	9.799913
84	6356988	6357988	6361988	6366988	9.8316086	9.83161847	9.828465	9.815861	9.800118
85	6356916	6357916	6361916	6366916	9.8317820	9.83179153	9.828638	9.816034	9.800291
86	6356857	6357857	6361857	6366857	9.8319242	9.83193338	9.828780	9.816175	9.800432
87	6356811	6357811	6361811	6366811	9.8320350	9.83204392	9.828891	9.816286	9.800542
88	6356790	6357790	6361790	6366790	9.8321143	9.83212227	9.828961	9.816356	9.800612
89	6356759	6357759	6361759	6366759	9.8321618	9.83216993	9.829017	9.816412	9.800668
89.1	6356755	6357755	6361755	6366755	9.8321624	9.83217000	9.829022	9.816417	9.800674
90	6356752	6357752	6361752	6366752	9.8321777	9.83218608	9.829033	9.816428	9.800685

Table16:

latitude	h0=radius(m)	h1=h0+1000	h2=h0+5000	h3=h0+10000	The Data of geodesy (m/s2)	$g=\frac{a}{R^2}-R\cos^2\theta b_1$	$g=\frac{a}{h_1^2}-h_1\cos^2\theta b$	$g=\frac{a}{h_2^2}-h_2\cos^2\theta b$	$g=\frac{a}{h_3^2}-h_3\cos^2\theta b$
0	6378137	6379137	6383137	6388137	9.7803189	9.76062330	9.757548	9.745258	9.729930
1	6378131	6379131	6383131	6388131	9.7803346	9.76065206	9.757576	9.745288	9.729959
2	6378111	6379111	6383111	6388111	9.7803817	9.76074437	9.757668	9.745379	9.730051
3	6378079	6379079	6383079	6388079	9.7804626	9.76089407	9.757818	9.745529	9.730201
4	6378034	6379034	6383034	6388034	9.7805700	9.76110419	9.758028	9.745739	9.730410
5	6377976	6378976	6382976	6387976	9.7807110	9.76137460	9.758298	9.746009	9.730679
6	6377905	6378905	6382905	6387905	9.7808830	9.76170529	9.758629	9.746339	9.731009
7	6377822	6378822	6382822	6387822	9.7810857	9.76209295	9.759016	9.746726	9.731396
8	6377726	6378726	6382726	6387726	9.7813189	8.76254050	9.759464	9.747173	9.731842
9	6377618	6378618	6382618	6387618	9.7815824	9.76304470	9.759968	9.747677	9.732345
10	6377497	6378497	6382497	6387497	9.7818759	9.76360800	9.760532	9.748240	9.732908
11	6377365	6378365	6382365	6387365	9.7822198	9.76422550	9.761148	9.748856	9.733523
12	6377220	6378220	6382220	6387220	9.7825511	9.76490150	9.761825	9.749531	9.734198
13	6377063	6378063	6382063	6387063	9.7829320	9.76563300	9.762556	9.750262	9.734927
14	6376895	6377895	6381895	6386895	9.7833413	9.76641720	9.763339	9.751045	9.735709
15	6376716	6377716	6381716	6386716	9.7837784	9.76725300	9.764175	9.751880	9.736543
16	6376525	6377525	6381525	6386525	9.7842428	9.76814402	9.765066	9.752769	9.737431
17	6376323	6377323	6381323	6386323	9.7847339	9.76908600	9.766008	9.753698	9.738371
18	6376110	6377110	6381110	6386110	9.7852511	9.77007909	9.767001	9.754702	9.739362
19	6375887	6376887	6380887	6385887	9.7857939	9.77111950	9.768041	9.755741	9.740399
20	6375654	6376654	6380654	6385654	9.7863615	9.77295500	9.769128	9.756828	9.741484
21	6375411	6376411	6380411	6385411	9.7869533	9.77334090	9.770262	9.757960	9.742615
22	6375158	6376158	6380158	6385158	9.7875685	9.77452108	9.771442	9.759138	9.743792
23	6374895	6375895	6379895	6384895	9.7882065	9.77574680	9.772667	9.760362	9.745015
24	6374624	6375624	6379624	6384624	9.7888665	9.77701150	9.773931	9.761626	9.746285
25	6374344	6375344	6379344	6384344	9.7895475	9.77831770	9.775237	9.762931	9.747579
26	6374055	6375055	6379055	6384055	9.7902490	9.77966496	9.776584	9.764276	9.748923
27	6373759	6374759	6378759	6383759	9.7909698	9.78104646	9.777965	9.765655	9.750301
28	6373455	6374455	6378455	6383455	9.7917093	9.78246470	9.779383	9.767072	9.751715
29	6373143	6374143	6378143	6383143	9.7924665	9.78391927	9.780838	9.768525	9.753166
30	6372824	6373824	6377824	6382824	9.7932405	9.78540630	9.782324	9.770010	9.754649
31	6372499	6373499	6377499	6382499	9.7940305	9.78692170	9.783839	9.771524	9.756161
32	6372168	6373168	6377168	6382168	9.7948352	9.78846630	9.785383	9.773066	9.757702
33	6371831	6372831	6376831	6381831	9.7956540	9.79003810	9.786955	9.774635	9.759269
34	6371489	6372489	6376489	6381489	9.7964856	9.79163370	9.788549	9.776229	9.760861
35	6371141	6372141	6376141	6381141	9.7973293	9.79325560	9.790171	9.777849	9.762479
36	6370789	6371789	6375789	6380789	9.7981838	9.79489690	9.791812	9.779488	9.764116
37	6370433	6371433	6375433	6380433	9.7990482	9.79655710	9.793472	9.781146	9.765772
38	6370074	6371074	6375074	6380074	9.7999214	9.79823237	9.795146	9.782819	9.767443
39	6369711	6370711	6374711	6379711	9.8008023	9.79992500	9.796839	9.784510	9.769131
40	6369345	6370345	6374345	6379345	9.8016900	9.80163128	9.798545	9.786214	9.770833
41	6368977	6369977	6373977	6378977	9.8025833	9.80334740	9.800260	9.787928	9.772545
42	6368607	6369607	6373607	6378607	9.8034812	9.80507270	9.801985	9.789651	9.774265
43	6368235	6369235	6373235	6378235	9.8043824	9.80680648	9.803718	9.791382	9.775995
44	6367863	6368863	6372863	6377863	9.8052861	9.80854180	9.805453	9.793115	9.777725
45	6367490	6368490	6372490	6377490	9.8061909	9.81028105	9.807192	9.794852	9.779461
46	6367116	6368116	6372116	6377116	9.8070959	9.81202350	9.808935	9.796592	9.781198
47	6366743	6367743	6371743	6376743	9.8079999	9.81376230	9.810672	9.798329	9.782933
48	6366371	6367371	6371371	6376371	9.8089919	9.81549676	9.812406	9.800061	9.784662
49	6366001	6367001	6371001	6376001	9.8098903	9.81722299	9.814132	9.801785	9.786385
50	6365632	6366632	6370632	6375632	9.8106952	9.81894340	9.815852	9.803503	9.788101
51	6365265	6366265	6370265	6375265	9.8115843	9.82065420	9.817562	9.805212	9.789807
52	6364900	6365900	6369900	6374900	9.8124671	9.82235470	9.819263	9.806911	9.791503
53	6364539	6365539	6369539	6374539	9.8133423	9.82387099	9.820945	9.808591	9.793182
54	6364181	6365181	6369181	6374181	9.8142089	9.82570649	9.822613	9.810258	9.794846
55	6363827	6364827	6368827	6373827	9.8151511	9.82735641	9.824263	9.811906	9.796491
56	6363478	6364478	6368478	6373478	9.8159122	9.82898397	9.825890	9.813531	9.798115
57	6363133	6364133	6368133	6373133	9.8167468	9.83059160	9.827498	9.815137	9.799718
58	6362794	6363794	6367794	6372794	9.8175686	9.83217245	9.829078	9.816715	9.801295
59	6362460	6363460	6367460	6372460	9.8183766	9.83372895	9.830634	9.818270	9.802848
60	6362132	6363132	6367132	6372132	9.8191699	9.83525737	9.832162	9.819796	9.804375
61	6361811	6362811	6366811	6371811	9.8199475	9.83675399	9.833658	9.821291	9.805865
62	6361496	6362496	6366496	6371496	9.8207083	9.83822128	9.835125	9.822756	9.807328
63	6361189	6362189	6366189	6371189	9.8214516	9.83965244	9.836556	9.824186	9.808756
64	6360890	6361890	6365890	6370890	9.8221763	9.84104688	9.837950	9.825578	9.810146
65	6360598	6361598	6365598	6370598	9.8228816	9.84240712	9.839310	9.826937	9.811503
66	6360315	6361315	6365315	6370315	9.8235667	9.84372640	9.840629	9.828255	9.812819
67	6360040	6361040	6365040	6370040	9.8242306	9.84500728	9.841909	9.829533	9.814097
68	6359755	6360755	6364755	6369755	9.8248726	9.84630500	9.843207	9.830829	9.815391
69	6359519	6360519	6364519	6369519	9.8254918	9.84743623	9.844338	9.831959	9.816519
70	6359272	6360272	6364272	6369272	9.8260876	9.84858639	9.845488	9.833108	9.817666
71	6359036	6360036	6364036	6369036	9.8266591	9.84968684	9.846588	9.834207	9.818764
72	6358810	6359810	6363810	6368810	9.8272058	9.85074022	9.847641	9.835259	9.819815
73	6358594	6359594	6363594	6368594	9.8277268	9.85174609	9.848646	9.836263	9.820818
74	6358390	6359390	6363390	6368390	9.8282215	9.85269784	9.849598	9.837214	9.821768
75	6358196	6359196	6363196	6368196	9.8286894	9.85361057	9.850501	9.838116	9.822668
76	6358014	6359014	6363014	6368014	9.8291299	9.85444981	9.851349	9.838964	9.823515
77	6357843	6358843	6362843	6367843	9.8295424	9.85524620	9.852145	9.839759	9.824309
78	6357684	6358684	6362684	6367684	9.8299265	9.85598701	9.852886	9.840499	9.825048
79	6357537	6358537	6362537	6367537	9.8302816	9.85667194	9.853571	9.841183	9.825731
80	6357402	6358402	6362402	6367402	9.8306070	9.85730070	9.854199	9.841811	9.826358
81	6357280	6358280	6362280	6367280	9.8309031	9.85786994	9.854768	9.842379	9.826926
82	6357170	6358170	6362170	6367170	9.8311688	9.85838251	9.855281	9.842891	9.827437
83	6357073	6358073	6362073	6367073	9.8314041	9.85883509	9.855733	9.843343	9.827888
84	6356988	6357988	6361988	6366988	9.8316086	9.85923061	9.856129	9.843738	9.828283
85	6356916	6357916	6361916	6366916	9.8317820	9.85956580	9.856464	9.844073	9.828617
86	6356857	6357857	6361857	6366857	9.8319242	9.85984052	9.856739	9.844348	9.828891
87	6356811	6357811	6361811	6366811	9.8320350	9.86005465	9.856953	9.844561	9.829105
88	6356790	6357790	6361790	6366790	9.8321143	9.86017088	0.857069	9.844678	9.829221
89	6356759	6357759	6361759	6366759	9.8321618	9.86029773	9.857196	9.844804	9.829348
89.1	6356755	6357755	6361755	6366755	9.8321624	9.86031208	9.857210	9.844818	9.829361
90	6356752	6357752	6361752	6366752	9.8321777	9.86032967	9.857228	9.844836	9.829379

Third portion: Applying in varying between micro world and macro world

Chapter.10. Applying in varying between micro world and macro world

The matter always varies between micro world and macro world; for example, vary between gas, liquid and solid. In this process of changing, the force between atoms play key role in their varying. Until today, the Newtonian universal law of gravitation, Columbia law of electric charge, Van der Waals force etc.…, they are all unable to describe this phenomenon. Now we apply above new discovery to describe this phenomenon. See Figure18.

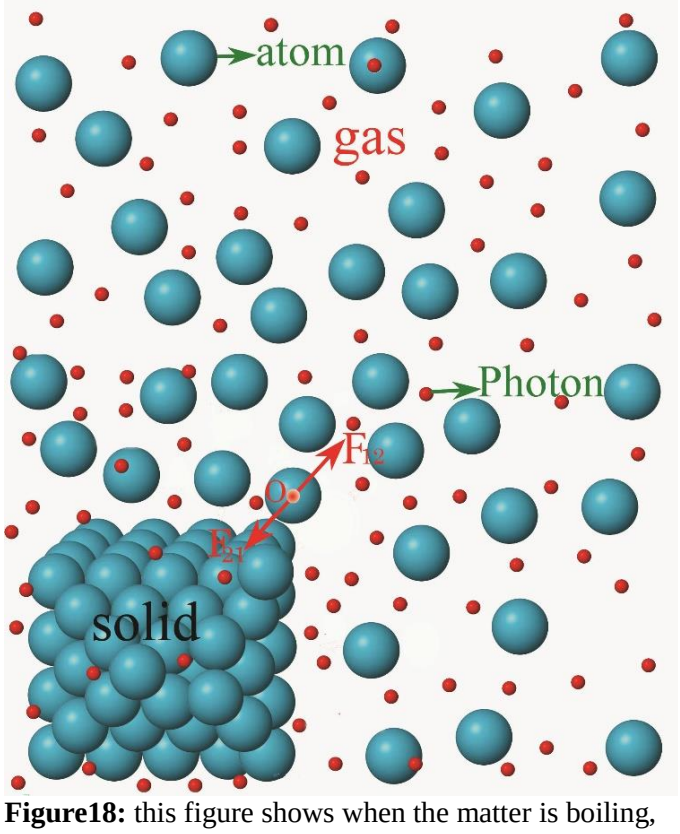

Figure18: this figure shows when the matter is boiling, its atom free moving into space overcome the attractive force of its internal atom's act on it.

When a matter is in normal boiling point, the atoms at interface overcome its internal attractive force which from others atoms, and can free moving into the space. See above Figure18. In Figure18, when the matter is boiling, at the atom *O* which site interface between solid and gas, it accepted forces which from atoms of solid equal it accepted the force from the atom of space. Its mass is m_a, its velocity is v_a .The accepted force from space includes two parts: one part is the attractive force which from the vaporization atom; another is the attractive force of photon. Set up the mass of one atom in the solid is m_{as}, its movement velocity is v_{as}, the mass of one atom in the vaporization is m_{ag}, its movement velocity is v_{ag}; the mass of photon is m_p, its movement velocity is v_p . According to formula: $\vec{F}_a = \frac{m_1 m_2 \times \vec{v}_1 \times (\vec{v}_2 \times \vec{r}_{12})}{4\pi\theta r_{12}^3} G_a$ **Can get below equation:**

$$\int_r^\infty \frac{dr}{r^2} \frac{m_{as} v_{as} m_a v_a}{4\pi\theta} G_a = \int_r^\infty \frac{dr}{r^2} \frac{m_a v_a m_p v_p}{4\pi\theta} G_a + \int_r^\infty \frac{dr}{r^2} \frac{m_{ag} v_{ag} m_a v_a}{4\pi\theta} G_a$$

$$m_{as} v_{as} = m_p v_p + m_{ag} v_{ag},$$

$$n m_{as} v_{as} = n m_p v_p + n m_{ag} v_{ag}$$

(Please note: here *n* is Avogadro constant)

$$\sqrt{n}\sqrt{m_{as}}\sqrt{E_{ka}} = \sqrt{n}\sqrt{m_p}\sqrt{kT} + \sqrt{n}\sqrt{m_{ag}}\sqrt{kT}$$

$$\sqrt{n}\sqrt{m_{as}}\sqrt{E_{ka}} = \sqrt{kn}(\sqrt{m_p}\sqrt{T} + \sqrt{m_{ag}}\sqrt{T})$$

$$\sqrt{\mu}\sqrt{E_{ka}} = \sqrt{knm_p}\sqrt{T} + \sqrt{k\mu}\sqrt{T}$$

$$\sqrt{E_{ka}} = \sqrt{\frac{nkm_p}{\mu}}\sqrt{T} + \sqrt{kT};\ PV = \mu T \qquad \mu = \frac{PV}{T}$$

$$\sqrt{E_{ka}} = \sqrt{kT} + T\sqrt{\frac{knm_p}{PV}};$$

$$\sqrt{E_{ka}} = \sqrt{T}(1 + \sqrt{T}\sqrt{\frac{nm_p}{PV}})\sqrt{k};$$

$$\sqrt{E_{ka}} = \sqrt{T}(1 + a\sqrt{T})k \quad (1)$$

In this equation: where $E_{ka}$is the cohesive energy; T is the temperature of the boiling point. Table17 [19] is the results of verification of this equation (1). We can see that the verified results in all metal element are all striking agreement with the experimental value except the nonmetal elements. In the verification of metal: the constant *k* is all equal. This result shows that the interaction between micro particles can be described by the formula: $\vec{F}_a = \frac{m_1 m_2 \times \vec{v}_1 \times (\vec{v}_2 \times \vec{r}_{12})}{4\pi\theta r_{12}^3} G_a$

In the calculated process, we did not consider the interaction between outermost layers electrons, for clear show this, we see Figure19 [19] below. In Table18[19], if the outermost layers' electron configuration is same, the calculated value of constants *k* is equal. See Figure19[9,10]. Table18 is the clearer result of verification between atoms. For clearer show the validity of the formula in describe this phenomenon, we see Figure19: in Figure19, we can see the constants *k* in the verification of Li, Na, K, Rb, Cs, is equal; as same as alkali metals. The constant *k* in the verification of inert gas: Ne, Ar, Kr, Xe, Rn is equal too. The constant *k* in the verification of the elements: Zn, Cd, Hg is also equal. In generally, if the outermost layers' electron configuration is same, the value of constant *K* is equal, this show the electron's attractive force is same, so the constant *K* is equal. This conclusion clear shows the validity of the formula $\vec{F}_a = \frac{m_1 m_2 \times \vec{v}_1 \times (\vec{v}_2 \times \vec{r}_{12})}{4\pi\theta r_{12}^3} G_a$ in describe the interaction between atoms and varying between micro world and macro world. Here: Newtonian universal law of gravitation is unable to describe this phenomenon, Columba law of electric charge is unable to describe this phenomenon, and the Van der vaals force is unable to describe this phenomenon. Only new discovery can describe this phenomenon, these clearly show the interaction between atoms can be described by following formula: $\vec{F}_a = \frac{m_1 m_2 \times \vec{v}_1 \times (\vec{v}_2 \times \vec{r}_{12})}{4\pi\theta r_{12}^3} G_a$

Table17 [19] is following:

Table17[19]:

z	symbol	atomic weight(A_m)	Cohesiveenergy(kcal/mol)	boiling	k	a
3	Li	6.9410	37.70	1615.15	0.0990430	0.0135
4	Be	9.0120	76.50	2741.15	0.0978700	0.0135
5	B	10.811	134.00	4273.15	0.0940700	0.0135
6	C	12.011	170.00	4098.15	0.1092500	0.0135
7	N	14.006	113.40	77.385	1.0822300	0.0135
8	O	15.999	60.03	90.188	0.7231300	0.0135
9	F	18.998	19.37	85.04	0.4244200	0.0135
10	Ne	20.179	0.46	27.104	0.1217200	0.0135
11	Na	22.989	25.67	1156.09	0.1016070	0.0135
12	Mg	24.305	34.70	1364.15	0.1064700	0.0135
13	Al	26.981	78.10	2792.15	0.0976130	0.0135
14	Si	28.085	106.70	3539.15	0.0963150	0.0135
15	P	30.973	79.16	704.15	0.2468500	0.0135
16	S	32.065	65.75	717.76	0.2222700	0.0135
17	Cl	35.453	32.20	239.11	0.3035900	0.0135
18	Ar	39.948	1.85	87.302	0.1292600	0.0135
19	K	39.098	21.54	1032.15	0.1007600	0.0135
20	Ca	40.078	42.50	1757.15	0.0993170	0.0135
21	Sc	44.955	89.90	3109.15	0.0970150	0.0135
22	Ti	47.876	111.80	3560.15	0.0981500	0.0135
23	V	50.941	122.40	3680.15	0.1002600	0.0135
24	Cr	51.996	94.50	2945.15	0.1034000	0.0135
25	Mn	54.938	67.40	2334.15	0.1028500	0.0135
26	Fe	55.845	98.70	3134.15	0.1010700	0.0135
27	Co	58.933	101.30	3200.15	0.1008700	0.0135
28	Ni	58.693	102.40	3186.15	0.1017400	0.0135
29	Cu	63.546	80.40	2833.15	0.0980220	0.0135
30	Zn	65.409	31.03	1180.15	0.1109750	0.0135
31	Ga	69.723	64.80	2502.15	0.0960600	0.0135
32	Ge	72.641	88.80	3106.15	0.0964800	0.0135
33	As	74.921	68.00	889.15	0.1300690	0.0135
34	Se	78.963	56.70	958.15	0.1715600	0.0135
35	Br	79.904	28.18	331.95	0.2338400	0.0135
36	Kr	83.798	2.68	119.735	0.1303500	0.0135
37	Rb	85.467	19.64	961.15	0.1007700	0.0135
38	Sr	87.621	39.70	1650.15	0.1001700	0.0135
39	Y	88.905	100.80	3618.15	0.0921100	0.0135
40	Zr	91.224	144.20	4679.15	0.0912700	0.0135
41	Nb	92.906	174.50	5014.15	0.0953370	0.0135
42	Mo	95.942	157.20	4912.15	0.0919500	0.0135
43	Tc	97.907	158.00	4535.15	0.0977700	0.0135
44	Ru	101.07	155.40	4420.15	0.0988100	0.0135
45	Rh	102.905	132.50	3968.15	0.0987500	0.0135
46	Pd	106.421	89.80	3236.15	0.0942200	0.0135
47	Ag	107.868	68.00	2435.15	0.1003100	0.0135
48	Cd	112.441	26.73	1040.15	0.1116800	0.0135
49	In	114.818	58.10	2300.15	0.0964700	0.0135
50	Sn	118.711	72.40	2859.15	0.0924200	0.0135
51	Sb	121.761	63.40	1860.15	0.1168000	0.0135
52	Te	127.603	50.34	1261.15	0.1350500	0.0135
53	I	126.904	25.62	457.55	0.1836000	0.0135
54	Xe	131.293	3.80	165.051	0.1253000	0.0135
55	Cs	132.905	18.54	944.15	0.0990450	0.0135
56	Ba	137.327	43.70	2118.15	0.0950240	0.0135
57	La	138.905	103.10	3737.15	0.0910000	0.0135
58	Ce	140.116	99.70	3716.15	0.0901530	0.0135
59	Pr	140.907	85.30	3793.15	0.0886240	0.0135
60	Nd	144.243	78.50	3347.15	0.0868630	0.0135
61	Pm	144.910		3273.15		0.0135
62	Sm	150.363	49.30	2067.15	0.0957000	0.0135
63	Eu	151.964	42.80	1802.15	0.0979600	0.0135
64	Gd	157.253	95.50	3546.15	0.0909700	0.0135
65	Tb	158.925	93.40	3503.15	0.0907600	0.0135
66	Dy	162.500	70.20	2840.15	0.0914300	0.0135
67	Ho	164.930	72.30	2973.15	0.0907530	0.0135
68	Er	167.259	75.80	3141.15	0.0884300	0.0135
69	Tm	168.934	55.80	2223.15	0.0968000	0.0135
70	Yb	173.043	37.10	1469.15	0.1016390	0.0135
71	Lu	174.967	102.20	3675.15	0.0917000	0.0135
72	Hf	178.490	148.40	4873.15	0.0897200	0.0135
73	Ta	180.948	186.90	5728.15	0.0896990	0.0135
74	W	183.850	205.20	5828.15	0.0924000	0.0135
75	Re	186.207	185.20	5863.15	0.0873900	0.0135
76	Os	190.200	188.40	5281.15	0.0953400	0.0135
77	Ir	192.220	160.10	4701.15	0.0958300	0.0135
78	Pt	195.080	134.70	4098.15	0.0972500	0.0135
79	Au	196.967	87.96	3109.15	0.0959600	0.0135
80	Hg	200.590	15.50	629.769	0.1171800	0.0135
81	Tl	204.383	43.40	1746.15	0.1007900	0.0135
82	Pb	207.200	46.78	961.15	0.0946400	0.0135
83	Bi	208.980	50.20	1837.15	0.1047100	0.0135
84	Po	208.982	34.50	1235.15	0.1133500	0.0135
85	At	209.987				0.0135
86	Rn	222.017	4.68	211.45	0.1240900	0.0135
87	Fr	223.019				0.0135
88	Ra	226.025	38.20		0.0923110	0.0135
89	Ac	227.028	98.00	3473.15	0.0935900	0.0135
90	Th	232.038	142.90	5058.15	0.0997210	0.0135
91	Pa	232.038				0.0135
92	U	238.028	128.00	4404.15	0.0949190	0.0135
93	Np	237.048	109.00	4175.15	0.0862900	0.0135
94	Pu	244.064	83.00	3501.15	0.0855900	0.0135
95	Am	243.061	63.00	2284.15	0.1009450	0.0135
96	Cm	247.071	92.10			0.0135
97	Bk	247.071				0.0135
98	Cf	251.079				0.0135
99	Es	252.083				0.0135
100	Fm	257.095				0.0135

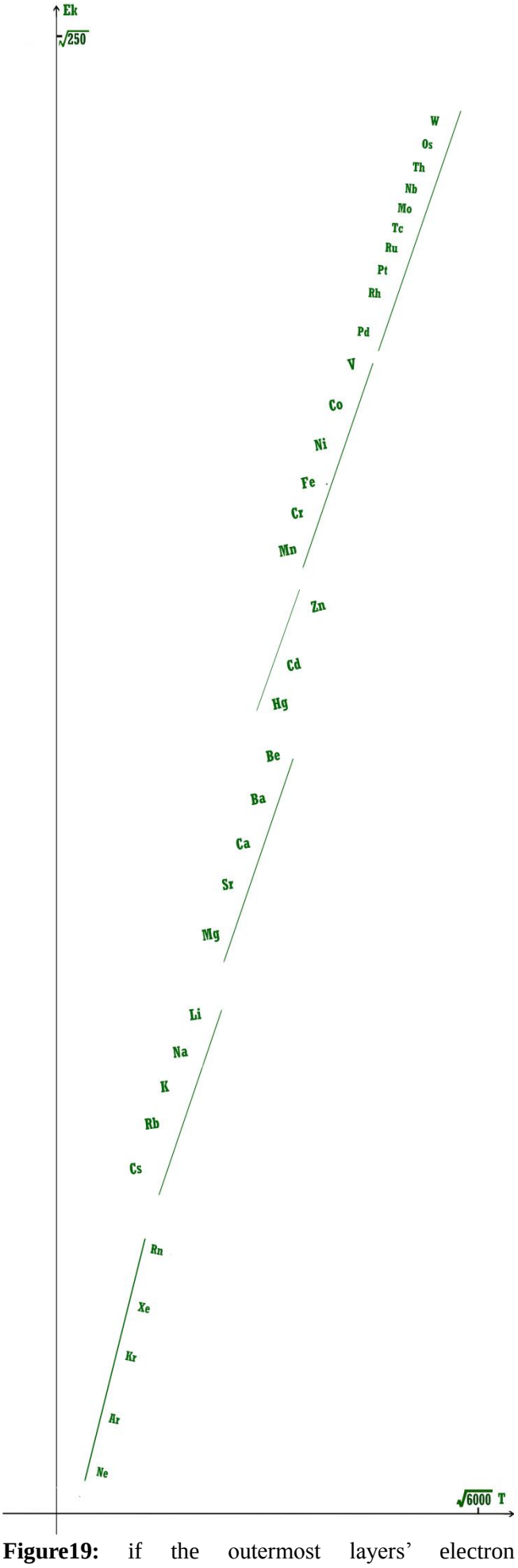

Figure19: if the outermost layers' electron configuration is same, the calculated value of constants *k* is equal.

Table18: further clear show the result of verification between atoms:

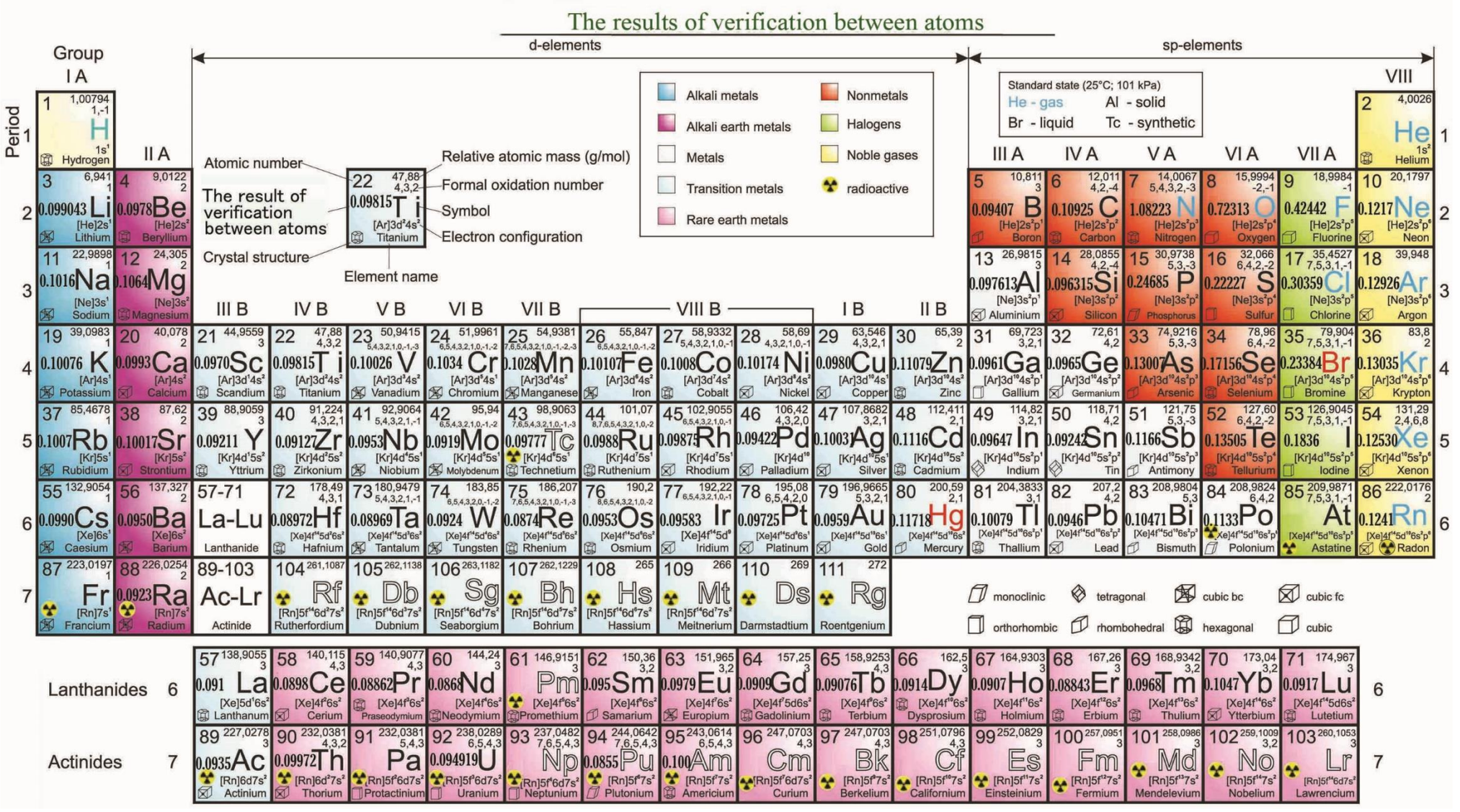

Table18 [19] is for clear show the validity of formula $\vec{F}_a = \frac{m_1 m_2 \times \vec{v}_1 \times (\vec{v}_2 \times \vec{r}_{12})}{4\pi\theta r_{12}^3} G_a$ in describing the interaction between varying micro world and macro world. Until today, we know Newtonian universal law of gravitation is unable to describe this phenomenon, Columba law of electric charge is unable to describe this phenomenon, and the Van der vaals force is unable to describe this phenomenon.

Conclusion

We know the essence of electric charge and the essence of gravitational mass in atoms; moreover, we have known the unification of gravitation and electromagnetic force by applying this new discovery from the micro world to the macro world and about the more contents and the more evidences of unification of the electromagnetic force and gravitational force; please see the next article [20].

Data availability

The authors confirm that the data supporting the findings of this study are available within the article.

Conflicts of interest

There are no conflicts to declare.

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