Determinative atom model

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Abstract

The most accepted atom model currently was proposed by Dr. Bohr and by Dr. Schrodinger and Dr. Dirac subsequently[12]. However, many phenomenon cannot be explained by Bohr's atom model. He used Coulomb electric force as the centripetal force to explain the rotation of electrons around nucleus. Another very important basic forces, magnetic force and frame-dragging force (spinity), were neglected and not included in his atom model. In Schrodinger's atom model, there are problems limiting the formation of correct atom model such as principle of uncertainty, Schrodinger's cat, and EPR paradox[345]. In this study, a new determinative atom model is proposed to explain atomic phenomenon and to solve above puzzles.

Main text

According to a previous important research by Professors Ostuka T and Tajima N, proton group and neutron group are packed separately and rotating collectively in the nucleus status [6]. This phenomenon can also be confirmed by the semi-empirical mass formula from liquid-drop nuclear model:

$$\mathrm{Eb} = \alpha(\mathrm{v})\mathrm{A} - \alpha(\mathrm{s})\frac{\mathrm{A}^2}{3} - \alpha(\mathrm{c})\frac{\mathrm{Z}^2}{\mathrm{A}^{1/3}} - \alpha(\mathrm{a})\frac{\mathrm{T}^2}{\mathrm{A}} + \delta(\mathrm{A},\mathrm{Z})$$

In the asymmetric term T(which is neutron-proton isospin difference N-Z, the difference of neutron numbers and proton numbers will decrease the nuclear binding energy. This can be explained only when protons and neutrons are packed separately. If they are packed together, there will be no difference in the binding energy. Thus, there are proton subplace and neutron subplace in the nucleus. It is worth noting that magnetic moment of proton is +14*10^-27 J/T and the magnetic moment of neutron is -9.7*10^-27 J/T. Electron also has a negative magnetic moment, so neutron is like electron in the aspect of magnetic moment. Positive sign means any proton's magnetic moment is parallel to its spin, and negative sign means any neutron's magnetic moment is antiparellel to its spin. Thus, when protons (proton line) and neutrons (neutron line)rotate in the same direction, there will be an repulsive magnetic force between them. However, there is an attractive nuclear force

mediated by pion between neutron and proton. In addition, we know the strong force is represented by Yukawa potential which is related to charge. The formula is:

$$V(r) = \frac{-g^2}{r} e^{\frac{-r}{d}}$$

(d: mediator particle diameter=h'/mc, g:coupling constant)
The pion particle mediates the nuclear force between neutrons and protons. This is the reason why proton group and neutron group attract each other in atomic nucleus. In addition, pion interaction also happens between proton and proton or between neutron and neutron. It explains why neutrons in nucleus won't decay into protons. There is a spin dependent (tensor component) and charge independent in this nuclear force. If the two nucleons stand up-and-down with same spin, there is an attractive nuclear force between. That is the reason why neutron group and proton group can rotate collectively in the same direction.

I propose that the arrangement of protons and neutrons in atomic nucleus should be in two lines like:

+-+-+-+-+-+- Protons
+-+-+-+-+-+- Neutrons

Proton and neutron are located side-by-side with opposite magnetic field like:
N--S
S—N

+ means clockwise spin and – means counterclockwise spin. Because there are Coulomb repulsive electrostatic forces between protons, only protons with opposite spin can stand in a line. Thus, there is no net force(Coulomb electrostatic force balances spin magnetic forces). It is also true for neutrons. Because neutron has magnetic moment, only neutrons with opposite spin can attract each other to stand in a line. In addition, because of the Coulomb repulsive forces between protons, protons won't be form a sphere-like structure and they can only make a line. And, neutron's magnetic forces between each other also prevent neutron sphere formation. However, if there are too many neutrons, the gravity between neutrons still will let neutrons to tend to form a sphere-like structure. Besides, in a heavy nucleus, there are more neutrons needed to have enough magnetic moment compared to proton groups. This is especially important in an atom with an even-odd nucleus. Neutron excess is important to maintain the stability of atom. Nuclear magnetic moment is also important in electron orbiting. Between proton and

neutron, there is nuclear force mediated by pion. Besides, if there is a proton-sphere with some protons hidden in sphere center, the net charges of protons will be canceled out due to screen Coulomb effect. Thus, the two line arrangement is the most reasonable arrangement. If the nucleus is static such as in an even-even nucleus, it is like a prolate rugby shape. If the proton line and neutron line is rotating in an even-odd, odd-odd, or odd-even nuclei, the nucleus will be like an oblate moon-cake shape. This new nuclear model solves the mystery of atomic nuclear shape. Because there is an unequal magnetic moment between neutron and proton, there will be a net nuclear magnetic moment. In order to combat this intrinsic magnetic moment, the nucleus will start to rotate with the short axis as the rotational axis due to the conservation of angular momentum. The nucleus won't rotate along its long axis because of the characteristics of meson mediated nuclear force and the direction of nuclear magnetic moment. Nuclear rotation must generate two opposite directions with opposite magnetic moments for the outer electrons. If there is even-even nucleus, we can see the balanced spin-antispin of protons and neutrons will generate no net magnetic moment and no nuclear spin(angular momentum). If there is an unequal magnetic moment between neutron and proton in even-odd, odd-odd, or odd-even nucleus, there will be a net nuclear magnetic moment corresponding to the extra neutron or proton or unbalanced proton-neutron pair. In order to combat this intrinsic magnetic moment, the nucleus will start to rotate with the short axis as the rotational axis due to the conservation of angular momentum (Barnett/Einstein-deHaas effect). The generated rotating magnetic moment is opposite to the intrinsic nuclear magnetic moment.(u=qJ/m). In even-odd, odd-odd, odd-even nucleus, the net angular momentum or net nuclear spin is not zero since the nucleus is rotating.

The nuclear shell model is the current popular nucleus model. However, I think it is not correct. If nucleons are forming a circle, then the centrifugal force generated by these protons or neutrons will let them to accelerate to move out the nucleus. Besides, the nuclear shell model cannot include odd protons/neutrons in a circle because of Coulomb repulsion between nucleons with same spin. The shell model also precludes the newly added nucleons due to its close circle characteristics. And, opposite protons in the shell model will not both attract outer electrons due to electric shield effect. The opposite protons in a circular shell can also repel each other to make the shell model unstable. In addition, the atomic nucleus is compact due to Rutherford's experiment. Thus, nuclear shell model is wrong.

The mass of neuron and proton is almost equal. In light atom, proton mass numbers

are equal to neutron mass numbers. Thus, proton group angular momentum should be equal to neutron group angular momentum when they have same numbers.

Frame dragging force (spinity) is a newly identified force. I propose here that “rest mass produces gravity, spinning mass produces spinity; rest change produces Coulomb electric force, spinning and moving charge produces magnetism”. Frame dragging effect was derived by Dr. Lense and Thirring to describe the procession of an orbiting object using general relativity [7]. Nobel prize winner Dr. LD Landau also derived orbiting object’s lagrangian around central spinning mass using general relativity[8]. I propose to call this new force “spinity” because it is a combination of “spin” meaning origin of this force and “ity” meaning basic force. Frame dragging means a spinning mass can drag nearby space-time to rotate around the mass, so it is actually a force which can cause peripheral smaller object to orbit around the central mass according to the basic concept of general relativity Below is the summary of Professor Landau’s derivation from general relativity[78]:

$$\text{Spinnity F} = \frac{\text{SJj}}{\text{r}^4}$$

(S=2G/c^2,J=central mass spin angular momentum,j=peripheral mass orbiting angular momentum)
Considering the angle θ between orbiting object and the equator plane of central spinning mass, the formula can be adjusted into:

$$\text{F} = \frac{\text{SmJ}\omega\cos\theta}{\text{r}^2} = \text{ma}$$

However, because neutron or proton has very tiny mass (~10^-27kg), the spinity produced by neutrons or protons is very tiny compared to electromagnetism. However, the frame dragging force produced by nucleus can help the electrons to orbit around the nucleus in the middle plane of proton group rotation and neutron group rotation. In addition, gravity produced by nucleus will let light electrons to orbit around the nucleus.

Bohr’s atom model only considered about Coulomb electrostatic force. However, since both proton and neutron have magnetic moment, the magnetic forces generated by proton or neutron cannot be neglected. Since proton and neutron are rotating in the same direction but they have opposite sign of magnetic moment. Thus,

they can generate opposite magnetic field for electrons in the orbit. Because the opposite magnetic fields from proton and neutron, the only possibility that electrons won't be affected by external magnetic force to cause acceleration is that electrons are in the middle plane of protons and neutrons rotating plane. Only when electrons rotate in the middle plane, the atom can maintain stable. The magnetic moments generated by neutrons or protons rotation can also help the electrons to rotate around the nucleus in the middle plane of protons and neutrons rotation. Thus, we know that all electrons are rotating in the middle plane of protons and neutrons rotation. This is due to the following formula:

$$\tau = \mathrm{mXB}$$

$$\mathrm{F} = \nabla(\mathrm{m}.\mathrm{B})$$

When nucleus spin, the spinity of the nucleus(minor component) and the magnetic moment of neutrons will let the electrons to rotate around the nucleus with proton group's rotation direction. Besides, the magnetic moment of protons can let the electrons to rotate around the nucleus with opposite direction as protons' rotation direction. Thus, it can explain the two direction of electron standing waves explained later. The torque induced by protons or neutrons can let the electron's orbit to align with protons or neutrons magnetic field. The force induced by protons or neutrons can accelerate the electrons to let them have enough orbiting velocity to have enough centrifugal force to compete with protons' Coulomb electrostatic force. Finally, the Coulomb electrostatic force, magnetic force, and centrifugal force will reach a balance. There is a standing wave in electron's movement. Besides, the magnetic force from protons will balance the magnetic force from neutrons and the nucleus spinity. And, there is no net acceleration for the electron. The electron can maintain in a homogenous position.

According to Bohr's deduction, electrons are rotating around protons because protons provide electric force as centripetal force. And the centripetal Coulomb force is equal to centrifugal force produced by electron's orbital rotation movement. Viewing from an inertial reference frame, we find that there is a centripetal force during electron's orbital rotation. However, we know the example of general relativity's equivalence principle. Thus, the centripetal force observed from inertial reference frame is actually a centrifugal force acted on the electron itself (acceleration reference frame). In order to maintain the electron's orbit, the centripetal Coulomb force must be equal to the centrifugal force due to electron's orbit movement. There is a misleading that centrifugal force is fictious force. The acceleration of orbiting or spinning is a=dV/dt. And, dV=Vdθ, so a=V*dθ/dt=V*w. Angular velocity w is not a vector, so the acceleration direction is the same as V.

When the orbiting or spinning acceleration continues, the orbit tends to be enlarged. Thus, there seems to be an outward force which is so-called centrifugal force. The balance of centrifugal force and Coulomb's force is very important because the electron's net acceleration then is zero. Thus, the electron won't radiate energy and fall into nucleus. We can deduct net inward/outward force: Net Fio.

$$\mathrm{Fc} = \frac{\mathrm{KQq}}{\mathrm{r}^2}$$

(K=Coulomb constant=9*10^9, Q=proton charges, q=electron charges, r=distance between electrons and protons)

$$\text{Net Fio} = \frac{\mathrm{KQq}}{\mathrm{r}^2} - \mathrm{mr}\omega^2 = \frac{\mathrm{KQq}}{\mathrm{r}^2} - \mathrm{m}\frac{\mathrm{V}^2}{\mathrm{r}} = 0$$

(W=electron's orbital angular velocity)(7)

When angular momentum is quantized, then the formula is given following:

$$\mathrm{r} = \frac{\mathrm{nh}'}{\mathrm{mV}}$$

(n=major quantum number, h'=reduced planck constant=1*10^-34, m=electron mass, V=electron orbital linear velocity)
Thus, we can get:

$$\frac{\mathrm{KQq}}{\mathrm{r}} = \mathrm{mV}^2$$

$$\frac{\mathrm{KQq}}{\mathrm{nh}'} = \mathrm{V} = \mathrm{Ve}$$

For example: In hydrogen atom with n=1(innermost orbit) and
Q=q=1.6*10^-19coulomb, the value Ve becomes:
Ve=2.3*10^6m/sec
Thus, electron orbital linear velocity is less and close to light speed (3*10^8m/sec).

Even the largest atom's electron linear velocity is smaller than lightspeed. For the atom118, the Ve becomes (Q=118q and n=1):
Ve=118*2.3*10^6=2.7*10^8m/sec
It is worth noting that the largest atom be possibly formed is Feynanium (Z=137). Due to my modified Bohr atom model, the electron velocity will exceed light speed if atomic number is greater than 137. Based on Dirac equation, the largest atom should have Unseptinum z=173. It is wrong because Dirac equation is wrong.

Total energy emitted from orbiting electron is:

$$\text{Total E} = (\frac{-KQq}{r^2} + m\frac{V^2}{r})r + \frac{1}{2}mV^2 = \frac{1}{2}mV^2 = \frac{13.6ev}{n^2}$$

This is seen in a simple Hydrogen Bohr atom. In a more complicated atom, the following formula must be obeyed:(Coulomb electrostatic force, magnetic force, and centrifugal force are in a balance). But, in a static nucleus, there is no magnetic term. Thus, the above equation is correct in all even-even nucleus atomes without nuclear rotation because magnetic force is the relativity movement effect of electricity. If there is nucleus rotation, we will need to adjust the formula by relativity. The formula should be:

$$\frac{KQq}{r^2} \pm \frac{\mu Q_{m1} q_{m2}}{4\pi r^2} = mr\omega^2$$

Based on Dr. French AP's derivation, we can get force transformation between reference S (x,y,z) and reference S' (x',y',z'). Reference S includes relative moving charges and reference S' includes relative static charges.

$$x = \gamma(x' + vt')$$
$$y = y'$$
$$z = z'$$
$$t = \gamma\left(t' + \frac{vx'}{c^2}\right)$$

When charge q1 is moving at V velocity (along x axis) and charge q2 is moving at W velocity and same direction (along x axis), then:

$$W' = \frac{W - V}{1 - \frac{VxW}{c^2}} = \frac{dx'}{dt'}$$

And momentum Py'=Py, then the force between q1 and q2 is Fy. The two charges have the same charge q:

$$Fy = \frac{dPy}{dt} = \frac{\frac{dPy}{dt'}}{\frac{dt}{dt'}} = \frac{\frac{dPy'}{dt'}}{\gamma\left(1 + \frac{Vdx'}{c^2 dt'}\right)} = \frac{\frac{Fy'}{\gamma}}{1 + \frac{v}{c^2}\left(\frac{w - v}{1 - \frac{vxw}{c^2}}\right)} = \gamma Fy'\left(1 - \frac{VxW}{c^2}\right)$$

Since $Fy'=Kq^2/r^2$, we can compare this result to previous Lorenz equation. We can see the term $V*W/c^2$ arises during the relative movement between the two charges. This is the magnetic force. Thus, we can see magnetic force is merely the special relativity moving effect of charges.

It is important to compare my atom model to Bohr model. When the electron absorbs photon energy, it can increase its kinetic energy. Then, the linear velocity of the electron will enhance, and then the centrifugal force mV^2/R will increase to let the electron to jump to the outer orbit. The energy gap is $\triangle E=Ef-Ei=hf=1/2mVk^2$. The orbiting frequency of the electron in the outer orbit is equal to absorbed photon frequency: f=1/T. However, when the eelctron is in the outer orbit, there is force imbalance that centrifugal force is not equal to Coulomb electrostatic force. So, the electron will start to radiate with frequency f due to acceleration. Later, the electron will fall back to the original inner orbit due to reduced centrigual force. It is like $mgh=KQg/r_1-KQq/r_2=1/2mVk^2=hf$. The potential energy can be exchanged to kinetic energy or photon energy. The new atom model can also explain the Rydberg formula.

Magnetic force plays an important role in the new atom model. In this new atom model, electric force and magnetic force are serving as two balanced force to control electron movement.

According to Coulomb's magnetic law, the magnetic force induced by two spinning charges is:

$$\mathrm{Fm} = \left(\frac{\mu}{4\pi}\right) * \mathrm{qVs} * \frac{\mathrm{qVs}}{\mathrm{r}^2} = \left(\frac{\mathrm{K}}{\mathrm{c}^2}\right)\frac{\mathrm{q}^2}{\mathrm{r}^2}\mathrm{Vs}^2$$

If the paired electrons are spinning in the opposite direction, the magnetic force between them is attractive.
We can deduct net in-between force Fib:

$$\text{Net Fib} = \mathrm{Fc} - \mathrm{Fm} = \gamma\left(1 - \frac{\mathrm{Vs}^2}{\mathrm{c}^2}\right)\frac{\mathrm{Kq}^2}{\mathrm{r}^2} = 0$$

(Vs=electron spin linear velocity)

Electron spin velocity (Vs) is light speed to overcome the repulsive electric force. Thus, the net force between the two electrons is close to zero. Because the two paired electrons spin in the different direction, they can be coupled together like two small magnets. However, the tiny balanced spinity and gravity between the two paired electrons will keep the two paired electrons to keep in the same orbit position. The same orbit position is also kept from the electro-repulsive force from other electrons in the orbit. Because the paired electrons need specialized spin direction, it is more difficult to pack them compared to unpaired electrons. In addition, nucleus' small spinity will let electron to tend to rotate around nucleus spin first. Thus, it can

explain Hund's law why unpaired electrons are arranged in an atom first.

It is also worth noting that a paired electrons(size 10^{-13}m) with opposite direction in the orbit are in the same position compared to the long distance of atomic nucleus(>10^{-11}m). Even the two electrons have opposite spin, this paired electron unit has no net magnetic moment output for the nucleus. Thus, there is no magnetic force between paired electron and the nucleus due to the electron spin. Especially in the even-even nucleus, there are even numbers of protons and even numbers of neutrons. Thus, the paired nucleon arrangement will let no spin induced nuclear magnetic moment to generate. Then, the even numbered paired electrons in the orbit are in a balance position. In the atom with even-even no net spin nuncleus, electrons are still in the middle plan of neutron or proton groups' rotating plane. It is because the plane is the rotating plane for neutrons' or protons' magnetic moment. Thus, atoms with even-even nucleus are more stable. And, there is no net acceleration for the electron.

Pauli's exclusion principle is saying that no two electrons have the exactly the same quantum number. If two electrons are in the same position, their spinning direction must be different. However, Pauli's exclusion principle suffers from EPR paradox even the principle is effective. The EPR paradox is saying that: If we move away one of two paired electron to a far away distance. If we check one electron's spinning direction, the other electron's spinning direction can be decided at once. Thus, it disobeys the principle of locality of physics. In this new atom model, we infer that two electrons are in the same orbital position rotating around the nucleus. In addition, one electron is a little bit left of the electron orbital rotational plane and the other one is a little bit right of the electron orbital rotational plane.

Electron spin will let them become a small magnet. The spinning direction can decide the direction of magnetism. Thus, the two electrons have different spinning direction, so they can couple together as two small magnets. Thus, EPR paradox is solved. The different spinning direction of two electrons is because they use it to couple each other in the same orbital position. If the two electrons are separated, the spinning direction of the two electrons will be changed. It can explain why Pauli's exclusion principle is effective.

From Bohr's deduction:

$$\mathrm{E\ total} = \frac{\mathrm{Re}}{\mathrm{n}^2} = \frac{-13.6\mathrm{eV}}{\mathrm{n}^2}$$

From the Etotal equation, we can infer that the relationship between radius and major quantum number (n). When n=1, r is called Bohr radius(r=1^2). When n=2, r=2^2=4 Bohr radius. When n=3, r=3^2=9 Bohr radius. When n=4, r=4^2=16 Bohr radius. We can also infer the radius of electron rotation. Form inner to outer orbit, the radius should be like 1, 4, 9, 16, 25, 36. Two electrons can be in the same orbital position. The circumference is 2πr, so the magic numbers can be predicted: 2, 8, 8, 18, 18, 32, 32. It is because that one paired electrons are arranged in a 2π distance, and then another paired electrons are arranged in resulting π distance. It is worth noting that electron can propagate in standing wave. The formation of standing wave is due to opposite propagating wave with same frequency and amplitude. For examples: In 2π distance, electrons are rotating in clockwise direction (n=2 orbit, totally 8 electrons). In subsequent final π distance, electrons are rotating in counterclockwise direction and in the same plane (n=2 orbit, another 8 electrons). It is because only this can let formation of standing wave. Thus, there is no energy loss and atom can be extremely stable. Current quantum mechanics model assume standing wave formation, but it didn't have two equal waves propagating in opposite direction. Thus, current quantum mechanics theory cannot generate standing wave actually. Thus, we can explain the origin of diamagnetisim. For example, Ar with its electron configuration: 2,8,8. In n=2 orbit with two nodes, Argon's electrons are both rotating in clockwise direction and counterclockwise direction. Thus, there is no net magnetic moment generated by these orbiting electrons. So, Argon is generally diamagnetic. It can also explain why there is only 2 electrons in n=1 orbit. In the n=1 orbit, only a round circle wave can be formed. Thus, if there are two waves propagating in opposite direction. These two waves will collide each other to prevent to form a standing wave. Thus, in n=1 orbit, electron wave can only propagate in single direction. Because electron movement is like transverse wave, there is a node in pi distance of electron wave. Thus, electrons can be located in pi or 2pi distance. However, packing in pi distance may not be used in an atom. For example, Gold atom (Au) 's electron configuration is 2,8,18,18,32,1. In the n=2 orbit, only 8 electrons are packed once. Electron's movement wavelength should match orbital length. It should be noted in n=1 orbit, the minimal length of n=1 orbit is just 2π. Thus, only one paired electrons can be packed in n=1 orbit. The standing wave produced by paired electrons in n=1 orbit is just a full circle. In n=1 orbit, packing electrons in pi distance is not allowed. It is worth noting that one paired electrons are located in the node of the standing wave. The paired electrons are receiving opposite and equal force from other electrons located in the right side and left side of the paired electrons. Thus, no net force and no net acceleration are generated. My atom model can also explain

why Al (2,8,3) atom radius is less than Li(2,1) atom radius. Although Li atom has less orbiting electrons, both Li atom and Al atom's outer orbit electrons are in the n=2 orbit which can maximally include 8+8 electrons. Thus, it is not surprising that Li atom radius is slightly larger than Al atom radius since the outer unpaired electron of Li receives less Coulomb attractive force from the Li nucleus. This phenomenon cannot be explained by quantum mechanics.

It is worth noting that the status of multiple electrons in the same orbit. Because of the Coulomb repulsive force, all electrons in the same orbit will repulse each other to maintain equal mutual distances in the same orbit. There is no net Coulomb repulsive force and acceleration. It is because each electron or one paired electrons can have equal and opposite Coulomb force from its two sides. Thus, electrons in atomic orbits are stable.
For many-electron atoms:

$$\text{Total E} = \frac{(\text{Z} - \text{j})^2 \text{Re}}{\text{n}^2}$$

The number Z is the total proton numbers in any given many-electron atom. The number j is the total electron numbers of any given many-electron atom without the valence electrons. Because the inner shell electrons provide an obstacle for valence electrons to obtain protons' electrostatic force, the inner shell electrons should be subtracted during total energy calculation. After doing this, the centrifugal force from valence electrons' orbital movement is still balanced with the centripetal force from the net proton charges. The estimated total energy for many-electron atoms is quite accurate. It is worth noting that electrons will expel each other in the valence orbit. Thus, the valence electrons in the outer orbit remain in the electric balance situation. We can use this formula to calculate individual electron in different orbit position. It means that this new atom model is also suitable for many-electron atoms.

According to the previous researches, four "quantum numbers" have been identified in atom model. Our new model is also consistent with the four quantum numbers. The first major quantum number is used above to describe the electron radium. The second angular momentum quantum number could be explained by the degree of ellipse orbits of our new atom model. The magnetic quantum number m should be replaced because electrons are rotating in the same plane. Thus, it is not necessary to quantize space of electron orbiting. The four spin quantum number s is because electron is spinning in lightspeed c and the radius of electron is h'/2mc. Our new model has the advantage without the disadvantage of quantum mechanics.

Because electron's linear velocity is near lightspeed, we should use relativity to adjust the energy formula. Thus,

$$\mathrm{E} = \mathrm{mc}^2 * \left[\frac{1}{\left(1 - \frac{\mathrm{V}^2}{\mathrm{c}^2}\right)^{1/2}} - 1 \right]$$

$$\frac{\mathrm{v}}{\mathrm{c}} = \frac{\mathrm{alpha} * \mathrm{Z}}{\mathrm{n}}$$

This formula is very similar to Dirac's formula. I think Dirac's formula is only an approximation. Actually, electron spin won't affect the radiation spectrum. My energy formula is the correct exact answer. Because we need to adjust electron orbit velocity, we will need to use Taylor series to solve the gamma factor:

$$\mathrm{E} = \mathrm{mc}^2 * \left[\frac{1}{\left(1 - \frac{\mathrm{V}^2}{\mathrm{c}^2}\right)^{1/2}} - 1 \right] = mc^2 \left(\frac{1}{2}\frac{v^2}{c^2} + \frac{3}{8}\frac{v^4}{c^4} + \right)$$

The second term is the relativity adjust term for Bohr atom model.

Besides, we need to consider another adjust term. That is spin-orbit coupling term. Because electron has spin and orbiting rotation, it will have a combined magnetic potential in the same energy level as relativity adjustment term.

$$\mathrm{E} = \mu_s B_L = \frac{\mu_0 Z e^2}{8\pi m^2 r^3} (S \cdot L)$$

We know here electron spin angular momentum S is 1/2h' and electron orbit angular momentum L is nh'. Thus, we can solve the equation. Finally, we can get a final adjusted energy level:

$$\mathrm{E} = -\frac{m e^4 Z^2}{2n^2 h'^2 (4\pi\epsilon)^2} \left[1 + \frac{\alpha^2 Z^2}{4n} \right]$$

This is compatible with Sommerfeld equation as well as Dirac equation. Thus, I don't need to use Dirac's quantum number l and m to derive the final energy level formula.

Here, I would also like to explain why Klein-Gordon equation derived by Schrodinger equation is correct in many atomic experiments. It is not because Schrodinger

equation is correct but because there is screened Coulomb potential. In many electron atoms, we need to consider screen effect of non-adjacent electrons at same orbit. The Klein-Gordon equation is:

$$\left[\nabla^2 - \frac{m^2c^2}{h'^2}\right]\varphi(r) = 0$$

, which can be derived from relativistic version of Schrodinger equation:

Here, I don't want to derive it again. If we consider the concept of screened Coulomb potential, we can still get the Klein-Gordon equation.
The screened Coulomb equation function is:

$$[\nabla^2 - k^2]\varphi(r) = \frac{-Q}{\epsilon}\delta(r)$$

$$\varphi(r) = \frac{Q}{4\pi\epsilon r}e^{-kr}$$

$\delta(r)$=infinite if r=0 or $\delta(r)$=0 if r><0
Since the distance between non-adjacent electrons are not zero
Thus,

$$[\nabla^2 - k^2]\varphi(r) = 0$$

$kr=r/r_0$
Since electron diameter=h'/mc=r_0
kr=r/(h'/mc)=(mc/h')*r
Thus, k=mc/h'
Thus,

$$\left[\nabla^2 - \frac{m^2c^2}{h'^2}\right]\frac{Q}{4\pi\epsilon r}e^{-mc/rh'} = 0$$

Using my atom model, I can still derive Klein-Gordon equation. The solution of Klein-Gordon equation is very similar to Dirac equation. Because Klein-Gordon equation is very successful in many atomic experiments, it is assumed that Dirac equation and Schrodinger equation are correct. However, it is not so. The satisfactory experimental results can be merely due to the screened Coulomb potential of non-adjacent electrons.
($r=10^{-11}$meter, $r_0=10^{-13}$ meter)
$e^{r/r0}=10^{-44}$ which is really small compared to usual Coulomb potential.
Thus, the force between two non-adjacent electrons in the same orbit can be neglected.

Electron radius:
r=h'/2mc

Electron diameter:
D=h'/mc

We can also use the concept of Compton scattering to obtain particle radius. The Compton scattering equation is:

$$\lambda' - \lambda = \frac{h}{mc}(1 - \cos\theta)$$

During scattering, there is a phase delay which is the difference between input wave and output wave. It means the delay that photon is passing through a particle sphere. The phase delay is:

$$\frac{2r(n-1)2\pi}{\lambda}$$

r is particle radius, n is refraction index. When photon is going straight through the particle, the input angle θi=0

$$n = \frac{\sin\theta i}{\sin\theta r} = 0$$

It means that there is no refraction. Thus, the phase delay during Compton scattering is:

$$\frac{4\pi r}{\lambda} = \frac{\Delta\lambda}{\lambda} = \frac{\lambda' - \lambda}{\lambda}$$

Comparing the Compton scattering equation, we let:

$$4\pi r = \frac{h}{mc}$$

Thus,

$$r = \frac{h'}{2mc}$$

So, there is relation between Compton wavelength (h'/mc) and particle size. My deduction is well correlated with experimental observation.

Thus,

$$r * mc = \frac{1}{2}h'$$

Comparing to Heisenberg's position-momentum uncertainty principle, we can view

mc as the invariance of momentum:

$$\Delta X * \Delta P \geq \frac{1}{2}h'$$

We can find out the great similarity! We can see a natural limitation for particle size based on the principle of uncertainty. When the $\triangle P$ exceeds mc, then the uncertainty of energy exceeds mc^2. Then, this is enough energy to create another particle of the same type. Thus, the particle size(radius) must have a limitation:

$$\Delta X \geq \frac{h'}{2mc}$$

Thus, the size of particle must exceed h'/2mc, the reduced Compton length. Thus, a basic particle's size(diameter) must be greater than h'/2mc. Thus, a old theory saying electron's classical radius is:

$$r = \frac{e^2}{Kmc^2} = 2.8 * 10^{-15}\text{meter}$$

This is much less that the reduced Compton length of electron. This means the classical electron radius is wrong. The classical electron radius is based on the assumption that the size of electron must has its mass completely due to electrostastic potential energy. This is a wrong assumption. Mass and charge are two different entities. Thus, reduced Compton wavelength is actually the diameter of electron. It is also true for proton and neutron. Both proton and neutron's diameter is their reduced Compton wavelength. Their diameter is equal to and should not be less than their reduced Compton wavelength.

My atom model can also successfully explain Zeeman effect. There is no need of electron spin quantization. Following is my deduction:
W=U*B=(Ua+Ub)*B
For orbital magnetic moment:
Ua=Uo*J (Uo=q/2m, J=nh') (h' is plank constant)
For spin magnetic moment:
Ub=Us*S(Us=q/m, S=Iw) (r=electron radius, m=electron mass, v=electron spin speed)
J is proximally 10^-34
m=10^-31kg, v=lightspeed=10^8m/s
If r=around 10^-13meter, there will be spin-orbit coupling. (electron spin angular momentum S=Iw=1/2h'(r=h'/2mc,v=c); this explain why electron spin is quantized)
Thus, Zeeman effect is observed. It is worth noting that classical electron radius (10^-15meter) is underestimated. Thus, my deduction should be correct.

Quantum mechanics hypothesizes that electron's phase velocity is not equal to group velocity. However, there is no dispersion phenomenon in atom. Thus, how can we say electron wave's phase velocity is different from electron wave's group velocity. Actually, I think electron's group velocity is exactly the same as electron's phase velocity. If we accept the fact that electron group velocity is phase velocity, then Schrodinger and Dirac equation has severe defects. The principle assumption of Schrodinger and Dirac equation is that electron wave energy can be described by Plank law:

E=hf (f=electron wave frequency)

According to DeBroglie's hypothesis, the matter wave wavelength is:

λ=h/p, p=γmv

Thus, $E=hf=hv/\lambda=\gamma mv^2$

According to Einstein's special relativity, the total energy of a moving mass is:

$E=\gamma mc^2$

We can see the discrepancy of these two equations. Electron moving speed is not equal to lightspeed c. Electron wave energy cannot be described by E=hf.

How about the situation of rest electron? Then,

E=hf=h*0=0

That is totally disobeying special relativity's result for rest particle $E=mc^2$. Even we use the Dirac equation, we still get wrong result $E=\pm mc^2$. The negative energy is totally wrong.

Thus, Schrodinger and Dirac equations underestimate electron's total energy. The ihdΨ/dt of Schrodinger and Dirac equation is from the assumption E=hf=h'w. The basic assumption of Schrodinger and Dirac equation is totally wrong. Thus, quantum mechanics is totally wrong! Different situations use different equations.

Based on the Lorenz invariance of four momentum:

$$E = \sqrt{(mc^2)^2 + (pc)^2}$$

When rest mass m=0 such as in photon:

E=pc=hc/λ=hf=h'w

When rest mass m is not zero such as electron:

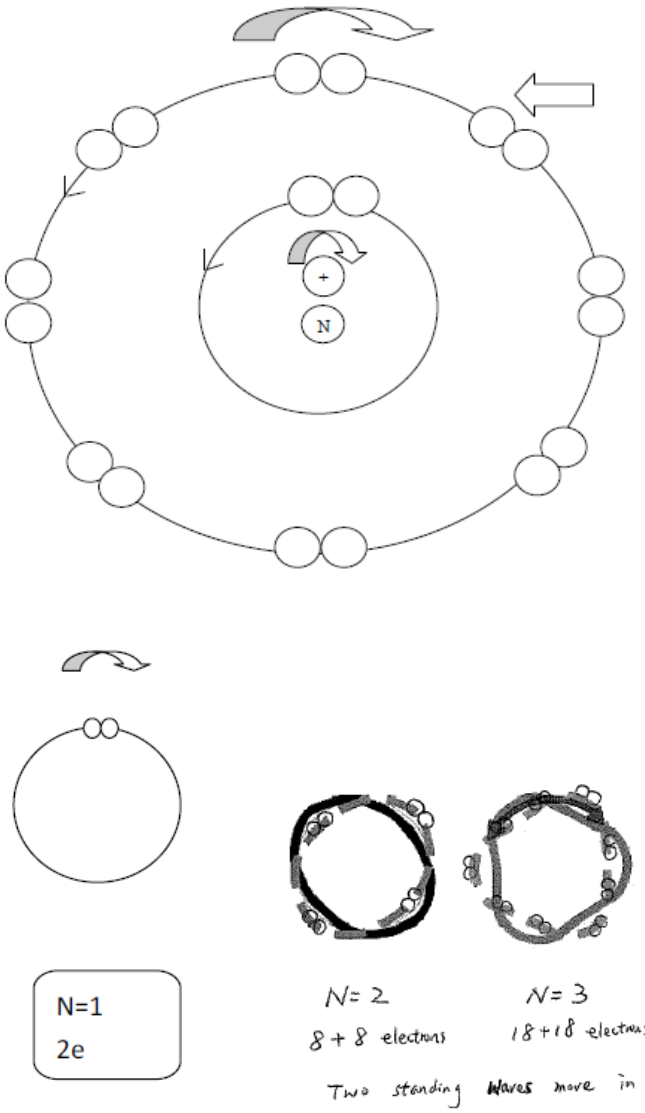
$m=E/c^2=p/v$ Then pc=Ev/c,

$E=\gamma mc^2$

In addition, it is proved recently that Heisenberg's matrix mechanics is not equal to Schrodinger's wave equation. Thus, there is inconsistency between Heisenberg's formula and Schrodinger's formula. This is a major defect in quantum mechanics. And, an important phenomenon called Bremssttrahlung suggested that electron can

emit continuous electromagnetic radiation with continuous emission spectrum. It is directly against Schrodinger's and Dirac's equation saying that electron only has discrete energy. In Schrodinger's equation, the symbol Ψ2 is defined as probability or wave amplitude. However, Ψ is actually used in Schrodinger's equation and it is a complex number. Ψ is not Ψ2. How can a complex number describe probability wave amplitude in Schrodinger's equation? Quantum mechanics is wrong!

Heisenberg's principle of uncertainty said that we cannot predict the exact electron position in the atom because photo will interfere with electron's orbit. Then, Dr. Schrodinger proposed his atom model by using wave probability function. However, the probability has severe limitation. It causes a paradox like Schrodinger's cat that saying the strangeness and logical problems of the quantum mechanics. And, it is very difficult to imagine electrons can really rotate in strange orbital shapes such as dumbbell or double donut from Schrodinger's atom model. It is more reasonable that electrons are rotating in a circular or ellipse shape. Quantum mechanics needs Copenhagen interpretation saying that wave function collapse during observation. It says that subject's measurement affects object's physical law and fact (positivism). It is not realism and is not truth. Because the wave function collapse Copenhagen interpretation cannot be accepted by most scientists, there are other quantum mechanics interpretations such as Consistent histories, Many worlds, Ensemble interpretation, Decoherence, Conciousness causes collapse, Objective collapse theory, Many minds, Quantum logic, Bohm interpretation, Incomplete measurement, and Relational quantum mechanics. These theories attack each other and none of them is generally accepted in scientific world. I think none of them including Copenhagen interpretation is correct. In addition, quantum mechanics is required to assume absolute and discontinuous time which should be discarded according to special relativity. Quantum mechanics treats space and time separately and differently (differentiate once or twice), not treating space-time as a four dimension structure. Quantum mechanics is also allowed to disobey conservation of energy which is the most fundamental law of physic. Besides, Dirac spinor has no geometry meaning. This new atom model proposed here let the atom go back to the classical physics. Principle of uncertainty is a limitation of observational physics, but it cannot be viewed as a law to governing real atom orbit. I believe this new atom model will provide an important insight into the current physics.



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