We need to return to Bohr's orbit to study atomic physics

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Abstract

Physicist Niels Bohr in 1913, according to Rutherford atomic model and a hydrogen atom spectrum, proposed a hydrogen atom theory, initially laid the foundation of atomic physics. Bohr's theory can be a good answer Rutherford atomic model can not explain – the stability of atoms, identity, regeneration and discrete line spectrum – question. Bohr theory consistent with experimental data very well. However, mainly due to the physics of long-term mistakenly believe that "uniform circular motion of electrons, but also electromagnetic radiation", the theory is abandoned by the physics community (including Bohr himself).

The author, using mathematical methods can prove:1. uniform circular motion of the electron, does not radiate electromagnetic waves; 2. the basic assumptions of Bohr theory, its equivalent is "Phase harmony principle";3. The fine structure constant physical meaning is – in the atomic environment, electrons are accelerated speed limit is the speed of light 1/137; 4.n and m, are hydrogen atomic energy-level changes, two different step.

Keywords:Bohr, hydrogen atom theory, electromagnetic radiation, phase harmony principle, the fine structure constant, energy levels

PACS: 31.90 + s, 32.10.Fn, 32.90 + a, 34.10 + x

1 Introduction

To explain the hydrogen atom spectrum of experimental facts, Niels Bohr proposed his theory of the hydrogen atom in 1913, the basic assumption are: 1. a hydrogen atom electron motion in the Coulomb field of the proton, the main force is the subject of Coulomb force; 2. the electron in a hydrogen atom , on the relatively stable (stationary state) circular orbital motion; movement in the stationary state track, does not produce electromagnetic radiation; 3. hydrogen atom electron orbital angular momentum is quantized ; 4 hydrogen atoms electrons produce electromagnetic radiation, only in transition between steady states orbit ; radiant energy equal to the difference between electronic mechanical energy both of steady state orbits . According to the basic assumption, the Bohr's atomic model established and successfully explain the experimental fact that the hydrogen spectrum.

However, since (1) in accordance with the traditional understanding of the necessary and sufficient conditions for the electromagnetic radiation, do uniform circular motion of the charge is bound to radiate electromagnetic waves, Bohr's hydrogen atom is still unstable; (2) According to Bohr's theory, it can not explain the fine structure of the hydrogen atom spectrum. Finally, the theory was abandoned by Bohr himself and other physics.

Bohr theory matches with a series of experimental facts perfectly, Is it really a coincidence?

Our studies have shown that the Bohr theory perfect fit of the experimental facts, is not a coincidence; but inevitable phenomenon, based on the energy conservation principle, the principle of phase harmony, and the basic laws of electrodynamics. Negative the Bohr hydrogen atom theory, it means to deny some of-

the principle of conservation of energy, phase harmony principle, and the basic laws of electrodynamics – the most basic laws in nature.

In the following text, we will use mathematical reasoning to prove:

1. The electron which do uniform circular motion will not radiate electromagnetic wave;

2. For the basic assumption of Bohr theory, its equivalent is "the principle of phase harmony";

3. The physical meaning of the fine structure constant is that electrons are accelerated at the limit value: 1/137 speed of light, in atomic environment;

4. n and m are two different steps in the process of the hydrogen atom energy level change (Meeting the requirements of the principle of the phase of the "harmony"); The change of m, which corresponds to the fine structure of the hydrogen atom spectrum; The change of n, which corresponds to the advanced structure of the hydrogen atom spectrum.

2. Text

Theorem 1. The electron that makes a uniform circular motion, will not radiate electromagnetic wave.

The proof of Theorem 1 is as follows:

1 According to the basic equations of the electromagnetic wave (1).

$$\nabla^2 B - \frac{1}{C^2}\frac{\partial^2 B}{\partial t^2} = 0 \qquad\text{———}(1)式$$

The necessary condition for generating electromagnetic wave radiation is that the B of the magnetic field is not zero for the

two order of time t.

2 According to the Lorentz transformation, with the formula (2).

$$B = \frac{1}{C^2} V \times E = \frac{1}{C^2} |V||E| e_V \times e_E \quad ——(2)式$$

3 According to the vector differential rule, it can be exported (3).

$$\frac{dB}{dt} = \frac{1}{C^2} \left[\left(\frac{\partial |V|}{\partial t} \right) |E| e_V \times e_E \quad ——①项 \right.$$
$$+ |V| \left(\frac{\partial |E|}{\partial t} \right) e_V \times e_E \quad ——②项$$
$$+ |V||E| \left(\frac{\partial e_V}{\partial t} \right) \times e_E \quad ——③项$$
$$\left. + |V||E| e_V \left(\frac{\partial e_E}{\partial t} \right) \right] \quad ——④项$$

$$\left. \right\} (3)式$$

4 (theorem 1-1) as shown in Figure 1, in the X-Y plane, B (direction of negative Z axis) along the counter clockwise direction, charge +q to do uniform circular motion; Can prove dB/dt=0. (Therefore, no electromagnetic wave radiation)
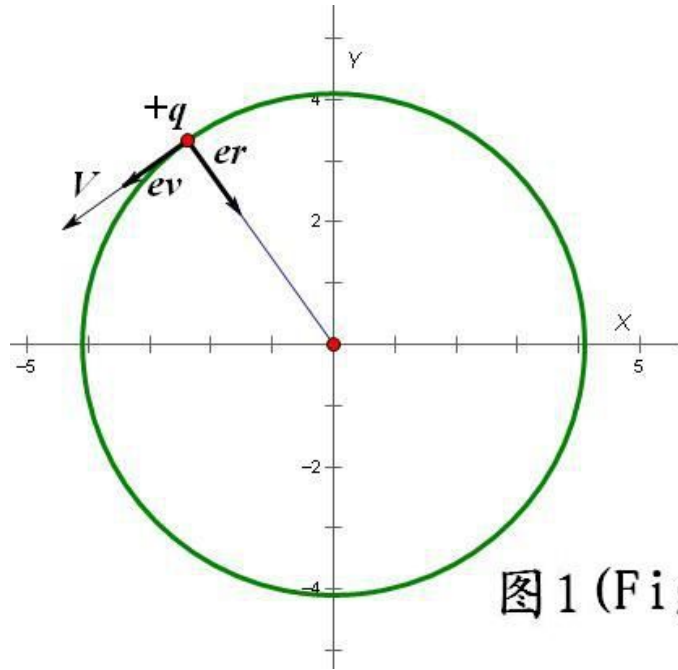
图1 (Fig. 1)

Theorem 1-1, prove as follows:

For the **(3)**. The first item is zero; (according to the uniform circular motion is V rate constant, dV/dt=0)

For the **(3)**. The second item is zero; (according to the E initial setting value is zero).

For the **(3)**. The third item is zero; (according to the E initial setting value is zero).

For the **(3)**. The fourth item is zero; (according to the E initial setting value is zero).

At this point, the theorem 1-1 is proved.

5 (theorem 1-2) as shown in Figure 2, in the X-Y plane, along the counter clockwise direction, the electronic -q, it moves around the common center of mass (coordinate origin) which belong to the both of the electronic -q and the proton +q, to do uniform circular motion; It can be proved: dB/dt=0. (Therefore, no electromagnetic wave radiation)
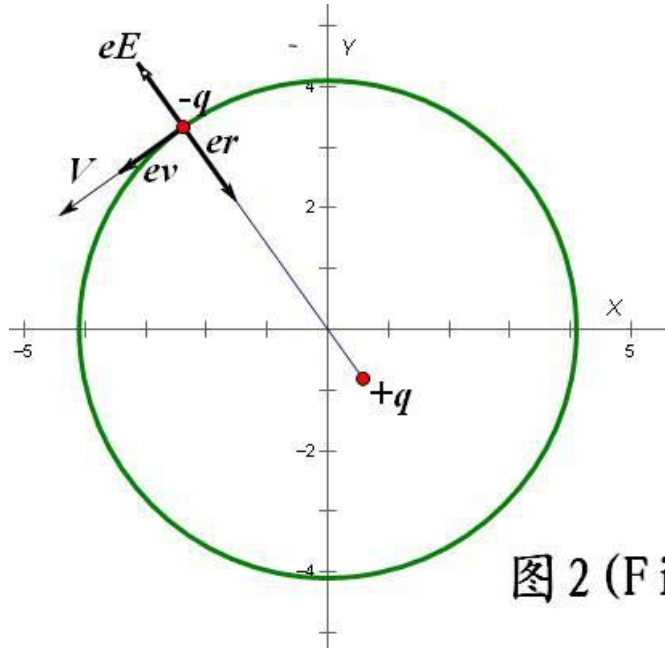
图2（Fig.2）

Theorem 1-2, prove as follows:

For the (3). The first item is zero; (according to the uniform circular motion is V rate constant, dV/dt=0)

For the (3). The second item is zero; (according to: the value of E is constant, dE/dt=0)

For the (3). The third item is zero; (according to: d$\mathbf{e}$v/dt parallel to $\mathbf{e}_E$)

For the (3). The fourth item is zero;(according to: d$\mathbf{e}_E$/dt parallel to $\mathbf{e}_V$)

At this point, the theorem 1-2 is proved.

Now, theorem 1 proof is completed through the both proof of theorem 1-1 and theorem 1-2.

Theorem 2. Bohr theory's basic assumption, its equivalent is "the principle of phase harmony".

The premise of Bohr theory's basic assumption is:

1. in the Coulomb field of a proton, electrons in a hydrogen atom making a uniform circular motion;

That is:

$$F = m\frac{V^2}{r} \qquad\qquad ——① 式$$

$$\frac{q^2 e_r}{4\pi\varepsilon_0 r^2} = m\frac{|V|^2}{r}e_r \qquad ——② 式$$

2 the angular momentum L of the electronic motion track can only take a series of discrete values;

That is:

$$L = n\frac{h}{2\pi}e_L \qquad\qquad ——③ 式$$

$$m|V||r|e_L = n\frac{h}{2\pi}e_L \qquad ——④ 式$$

Its equivalent is "the principle of phase harmony";

That is:

$$n = \frac{c}{|V|} \qquad\qquad ——⑤ 式$$

And,

$$h = \frac{1}{2}\frac{q^2}{\varepsilon_0 c} \qquad\qquad ——⑥ 式$$

The proof of theorem 2 is as follows:

Simultaneous ②④⑤⑥ four types in any three, can solve the other one.

So, the original hypothesis of Bohr, the two type ②④; its

equivalent is the two type ⑤⑥.

Theorem 2 proof is completed.

Theorem 3. The physical meaning of the fine structure constant is that electrons are accelerated at the limit value: 1/137 speed of light, in atomic environment.

The proof of Theorem 3 is as follows:

Comparison the theoretical and practical values of the Planck constant which proved by theorem 2, it can be found that: the difference between the two is a "fine structure constant α" value, that is: The difference is 137 times!

Why there is such a coincidence?

Consider the whole thing, just as $C/V \neq n$; Only $C/137V = n$; The physical meaning of the fine structure constant is exposed. That is:

In the atomic environment, the speed of the electron by acceleration motion, not only can not reach the level of C of the speed of light; even the level of 1/10 C, the level of one percent C can not reach; Only the 1/137 speed of light can be reached.

Therefore, in the proof of theorem 2, which is $C/137V = n$; replace the ⑤ Formula, then you can get $h = (1/2)q^2/\varepsilon_0 C$ (the revised formula ⑥); Theoretical and experimental results are in agreement.

At this point, theorem 3 proof is completed.

Theorem 4. n and m are two different steps in the process of the hydrogen atom energy level change (Meeting the requirements of the principle of the phase of the "harmony"); The change of m, which corresponds to the fine structure of the hydrogen atom spectrum; The change of n, which corresponds to the advanced structure of the hydrogen atom spectrum.

The proof of theorem 4 is as follows:

In nature, according to the principle of phase harmony, requires the electronic movement speed V, satisfies C/V=m, to be the natural number.

However, due to the electronic environment in which the electrons are accelerated to reach the limit speed is V_{Max}, leading us to accept (C/137V=n) this theory. According to the relationship of n, (n takes 1, 2, 3, …) with the change of n, there will be many gap; Produce huge waste of resources!

Is nature going to be such a waste of resources?

Should not.

Therefore, Simultaneous the above (C/V=m, C/137V=n) two, can be obtained:

$$m=137n$$

Such a relationship. Represents the change in each step of the N, allowing the m to have a 137 steps change. Each step of the n and m changes to meet the requirements of the principle of phase harmony.

So, the fine structure of the hydrogen atom spectrum is related to the change of m, and the change of the advanced structure is related to the change of n.

At this point, theorem 4 proof is completed.

3. Conclusion

1 The electron which do uniform circular motion will not radiate electromagnetic wave;

2 For the basic assumption of Bohr theory, its equivalent is "the principle of phase harmony";

3 The physical meaning of the fine structure constant is that electrons are accelerated at the limit value: 1/137 speed

of light, in atomic environment;

4 n and m are two different steps in the process of the hydrogen atom energy level change (Meeting the requirements of the principle of the phase of the "harmony"); The change of m, which corresponds to the fine structure of the hydrogen atom spectrum; The change of n, which corresponds to the advanced structure of the hydrogen atom spectrum.

4.Corollary

We need to return to Bohr's orbit to study atomic physics.

Reference

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A Member of the Perseus Books Group, New York, E-book ISBN: 978-0-465-07998-8

Attachment:

An ideal experiment -

Consider a frictionless rotation possible (electrically neutral material) discs, vertical disk, there is a uniform magnetic field passing through; the edge of the disc, very close to each other there is an electric dipole paste (one end with a positive charge at one end negatively charged ends equal power, equal to the orbiting radius).

Let the disc-turn up, according to the principle of conservation of angular momentum, the disc continues to rotate at a constant angular velocity. Right?

Now analyze the force (acting on the electric dipole), at both ends of the charge to be subjected to the Lorentz force from the static magnetic field, since the charge polarity different ends,

these two forces are in the radial direction, in the limiting case, equal in magnitude and opposite in direction. Right?

Do not forget, on both ends of the dipole charge, there is also a force Fe (from their self-inductance electromagnetic field (B, E)); assume, Fe component in the tangential direction is not zero; so, will the two Fe on charges tangential component, in the limit case, equal in magnitude and opposite in direction. That is, a Fe component in the tangential direction same instantaneous movement, a Fe in the tangential component of the instantaneous movement in the opposite direction. Right?

If we cut that end (on which Fe component in the tangential direction opposite to the instantaneous movement), we can obtain a perpetual motion machine yet? Of course, This is impossible!

Therefore, the above assumption is not valid. Thus proving that: Fe in the tangential component is zero.

Now that we have demonstrated, Fe in the tangential component is zero; then, in the minimalist, with only a uniform magnetic field, and a single charge of uniform circular motion (perpendicular magnetic field direction), the default scenario, there is no any force F, and the charge of instantaneous velocity V, to meet: $F \cdot V \neq 0$ this relation, thus, can not make the rate of movement of the moving charge is reduced, reducing the kinetic energy to provide the necessary energy to radiate electromagnetic waves.

(The ideal) Experimental results show: charge uniform circular motion in the process, although there is the centripetal acceleration; however, the charge is impossible to radiate electromagnetic energy. Otherwise, it must go against the

principle of conservation of energy.

Conclusion: Charge accelerated motion is necessary but not sufficient to produce electromagnetic radiation conditions; Charge system forms a force doing work on the electromagnetic field, is sufficient and necessary conditions to produce electromagnetic radiation.