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About a dualism of corpuscular and of wave properties of elementary particles.

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Abstract

In modern physics, it is believed that every a moving elementary particle of matter is associated with a certain oscillation, that is, with the wave process. According to this concept feature of the microcosm is a kind of duality, dualism corpuscular and wave properties. According to de Broglie (1923), the corpuscular characteristics - an energy and a momentum, and the wave characteristics - a frequency and a wavelength are associated with an each micro-object. De Broglie's hypothesis was put forward based on the analysis of experimental data. In 1927, by the physicists K.Davisson and Germer L. experimentally was confirmed the hypothesis of de Broglie. They got the electron diffraction pattern

In this paper, we present a theoretical conclusion of the de Broglie formula for determining the wave length of the moving electron which we obtained. In the output was used the atomic model of Rutherford and the Bohr's postulates. It is shown that the problem of the dualism corpuscular and wave properties of elementary particles, atoms and molecules is probably was far-fetched problem that arose due to incorrect interpretation by de Broglie of experience Devissona and Germer.

In modern physics, it is believed that every a moving elementary particle of matter is associated with a certain oscillation, that is, with the wave process. This assertion is based on the results of experiments Devissona, Germer and a number of other researchers to study the scattering of electrons by a single crystal of nickel and by the de Broglie's hypothesis about the wave properties of particles of matter [1].

The reason is that the reflection of the electrons from the surface of the crystal was detected the violation of laws of geometrical optics. The experience scheme can be found in [1]. For a given angle of incidence of the electrons the angles of a reflection from the surface of the crystal was received different. If you build a diagram distribution of the number of an electrons in the directions scattered by reflection from the crystal target, then it will resemble the picture of X-ray diffraction. In the diagram, the length of the radius drawn from the center of the target is taken proportional to the number of electrons reflected at a given angle.

Surprising in this diagram is that in some areas there are peaks of a reflected electrons, and in other areas there are a minima. And this despite the fact that the distribution of an electrons in the beam was initially uniform. This phenomenon is named by analogy with the diffraction of light

and diffraction of X-rays. It later is emerged that other the elementary particles, such as the protons, the atoms and the individual molecules are also subject to diffraction.

Even more surprisingly, the diffraction patterns are observed not only for a beams simultaneously moving particles, but also for single particles, that alternately is flying on the crystal screen. After the multiple " bombing" the single electrons a metal film by a single crystal the diffraction pattern is observed the same as when the beam of electrons are passes. How one electron is impacting to another, and even after the lapse of the time interval when it is already in another place, is unknown.

The french scholar de Broglie trying to reconcile the quantum theory and the wave theory, put forward the hypothesis that the wave-particle duality which is characteristic for the light and of the electromagnetic field, has a universal character. According to this hypothesis with the any particle, having the mass m ,which is moving with velocity V, is associated the wave propagation. A length of wave is determined by the well-known formula of de Broglie

$$\lambda = \frac{h}{mV} . \qquad (1)$$

where $h=6{,}626\cdot10^{-34}$ $J\cdot s$ $=6{,}54\cdot10^{-27}$ $erg\cdot s$ - Planck's constant. It is included in the second postulate of Bohr, stating that the electron can rotate around the nucleus of an atom only in circular orbits, for which is performed the equality

$$2\pi r_{opb} U_{opb} m_{el} = nh, \qquad (2)$$

where m_{el} - mass of the electron; r_{opb} - radius of the orbit of the electron rotating around the atomic nucleus; U_{orb} is a peripheral speed of the electron in orbit; n - integer called the quantum number. Every motion of a particle is inextricably linked with the wave motion. However physics does not know that it varies how and where the oscillations is occur, what is the relationship between a wave and a particle, and how is their an interaction. The problem of wave mechanics of de Broglie is that the true nature of the two components of dualism, as well as their a mutual relationship, remains is a complete mystery.

Have done a lot of attempts to answer on these the questions. So Schrodinger assumed that the particle itself is nothing other than the place of the condensation waves (wave packet), but later gave it up. De Broglie believed that the wave motion is the real phenomena, occurring in space, inside which there is a material particle. The intensity of the wave motion at each point of this space, he connected with the degree of probability of finding the particle at this point. It followed that the particle is directed by the wave. Heisenberg and Bohr believed that the wave accompanying the particle, not a physical event, but only is symbolizes the duality of the properties of the particles. All this is quite vague.

Before making any own assumptions about their the physical nature waves of de Broglie recall some the well-known concept about the atom and the electron. The planetary model of the atom of Rutherford suggests that in the center is a heavy nucleus around which an electrons. revolve in their orbits. The electrostatic forces hold them near. Under the influence of external factors (heat, strong collision and so on) the atom is in an excited state, and from it can to fly out one or more an electrons. Circumferential speed of rotation of the electron around the nucleus

$U_{opb}=\omega_a \cdot r_{opb}$, (3)

where ω_a-angular speed of rotation of the electron around the nucleus. r_{orb}-radius of the electron orbit. It is also known that electron rotates around its own axis with an angular velocity ω_{el}.

Next, we shall be selecting a point B on the surface of the electron, as shown in Figure1 (can to take any point on the surface of the electron is outside the axis). As a result of addition of velocities of translational and rotational motions the point B will describe a curve close to a sine wave. In its motion appears cyclicality, which is a prerequisite for the formation and the functioning of any wave. The oscillation period will be equal of time of the total turnover of the electron around its axis

$$T=\frac{2\pi \cdot \mathbf{r_{o-el}}}{\omega_{el}\mathbf{r_{o-el}}}=\frac{2\pi}{\omega_{el}}. \quad (4)$$

Wavelength is

$$\lambda = \mathbf{VT} = \frac{2\pi \mathbf{V}}{\omega_{el}}, \quad (5)$$

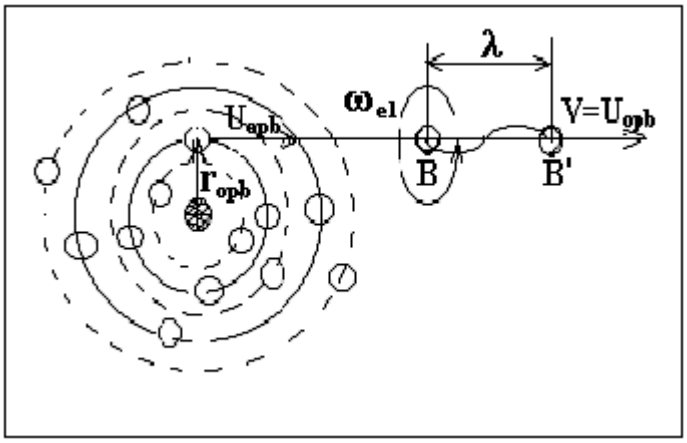

Fig.1

where V-speed flight, $r_{o\text{-}el}$ -electron radius. At first glance, the formula of de Broglie (1) and the formula (5) do not have anything in common?

We test the hypothesis that these formulas under certain the assumptions will be moved the one into the another. To do this, right-hand side of formula (5), we shall multiply and divide by the same magnitude $V \cdot r_{orb} \cdot U_{opb} \cdot m_{el}$

$$\lambda = \frac{2\pi \mathbf{V}}{\omega_{el}} \cdot \frac{\mathbf{V} \cdot \mathbf{r_{opb}} \mathbf{U_{opb}} \mathbf{m_{el}}}{\mathbf{V} \cdot \mathbf{r_{opb}} \mathbf{U_{opb}} \mathbf{m_{el}}} = \frac{\mathbf{nh}}{\mathbf{m_{el}} \mathbf{V}} \cdot \frac{\mathbf{V}^2}{\omega_{el} \mathbf{r_{opb}} \mathbf{U_{opb}}}. \quad (6)$$

Obviously, the electron leaves the excited atom with the speed with which he moved in a circular orbit within the atom

$$V=U_{opb}=\omega_a \cdot r_{opb}. \quad (7)$$

With this in mind the formula (6) can be rewritten to the form

$$\lambda = \frac{\mathbf{nh}}{\mathbf{m_{el}V}} \cdot \frac{\mathbf{U_{opb}^2}}{\omega_{el}\mathbf{r_{opb}U_{opb}}} = \frac{\omega_a}{\omega_{el}} \cdot \frac{\mathbf{nh}}{\mathbf{m_{el}V}}. \quad (8)$$

If we assume that the angular velocities ω_a and ω_{el} is linked interconnected through the quantum number

$$\omega_{el}=n\omega_a, \quad (9)$$

the formula (7) takes the form

$$\lambda = \frac{\mathbf{h}}{\mathbf{m_{el}V}}. \quad (10)$$

The resulting formula is identical to the formula of de Broglie for wavelength by an flying electron. If you omit the indices "el", then we obtain a recognized form of formula of de Broglie which used to determine the wavelength accompanying any flying an elementary particle with mass m and velocity V

$$\lambda = \frac{h}{mV}. \quad (11)$$

The formula of De Broglie and the first postulate of Bohr was tested repeatedly experimentally and recognized by the scientific world. This frees us from having to verify the accuracy of the resulting formula. Coincidence of the formulas (1) and (11), one of which (11) is obtained theoretically, and the other (1) is obtained of the experimental data processing is not accidental. The study suggests that the duality properties of the elementary particles is due to two the components of their movements, namely forward with a velocity V and the rotation around its axis with the angular velocity ω.

The answer to the question how the rotational motion of the electron distributes the reflected electrons in the group with the highest and with lowest values of their concentration on the reflection angles can be obtained by analogy with the twisted and untwisted rebound the ball in tennis or ping pong. For untwisted the ball and therefore for the reflected electron the flight speed V does not play a big role. Regardless of this velocity the angle of incidence equal to the angle of reflection. Here is useless to seek a mechanism of distribution of a particles. The situation is different with the rotational movement. The rotational angular velocity of the electrons in their seemingly uniform the beam, however, are not identical. They depend on the quantum number "n", that is, from the orbit on which they fly within the atom. To see this we equate the right side of formulas (1) and (5)

$$\lambda = \frac{\mathbf{h}}{\mathbf{m_{el}} \cdot \mathbf{V}} = \frac{2\pi \cdot \mathbf{V}}{\omega_{\mathbf{el}}}. \qquad (12)$$

Replace the velocity V using (7) and ω_a on ω_{el} using (9), we obtain

$$\omega_{el} = \frac{n^2 \cdot h}{2\pi \cdot m_{el} \cdot r_{opb}^2} = \frac{\pi \cdot e^4 \cdot m_{el}}{2n^2 h^3 \varepsilon_o^2}. \qquad (13)$$

Here, e-electron charge, ε_o-electric constant. As the value r_{opb} substituted by the value of radius of the permitted stationary orbits of the electrons inside the atom [1]. The formula shows that the greater the quantum number, the smaller the angular velocity of a rotation of the electron. Consequently, the reflection of electrons from the crystalline screen also will be different.

Therefore, despite the apparent homogeneity of the electron beam directed on the screen in the experiment, this the electron beam is not uniform by number of electrons with the same angular velocity and the number of electrons with the same quantum numbers. Moreover, the process of reflection of electrons from the screen is not related to the fact are flying whether the electrons of beam simultaneously or one after the other with a time interval. Importantly, many of them had been emitted from the same orbit, and consequently, many of them have the identical values of quantum numbers and angular speeds.

Not surprising that in this formulation of the problem the fact that the other elementary particles and even the some atoms also violate the laws of the geometrical optics in a reflection from the crystal screen. This does not mean that they have the wave properties, as was assumed by de Broglie and followed by other well-known physics. The reason is the presence of a rotation of the particles around their axes of a rotation.

Apparently, all of the elementary particles rapidly rotate. The reason for this rotation is the interaction of the particles with the surrounding gaseous dark matter. This interaction is that the all baryonic particles continuously absorb dark matter [4,5]. This produces the radial flow to the center of the particle. These flows are unstable. So they quickly fold into the vortex. A similar picture is observed the each time, then we release the water from the tank through the drain hole. The particle cores of a baryonic matter (atoms, electrons, photons) quickly rotate due to the fact, that the gaseous dark matter is flowing into them with a high peripheral speed, and transmits them his movement.

From what we can to conclude that the problem of the dualism of the corpuscular and wave a properties of elementary particles and atoms maybe is the some far-fetched problem that has arisen due to the improper interpretation of de Broglie of experience Devissona and Germer.

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