A new look on the structure of the nucleus and the atom

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Abstract

The discreteness and dualism of the electromagnetic wave packet and energy are revealed, i.e. an electron and other waves can be an electromagnetic wave packet or energy depending on the state. Mass, neutron, as well as positive, negative charge and proton, a transformation of proton orbitals and proton bond in the nucleus, are determined.

Keywords: discreteness; dualism; electromagnetic wave packet; mass; atomic unit mass; neutron; proton; proton bond; positive charge; proton spin; neutron spin.

In nuclear physics, phenomena that occur at short distances with very high energies per particle are studied.

The size of an atom is 10^{-10} m, and therefore nuclear physics is a physics that studies atomic phenomena, the shape of atomic nuclei, and the shape of electromagnetic phenomena; the main properties of the quantum world is the connection between nucleons and electromagnetic waves. The main quantities characterizing the wave are the frequencies nu (γ), the wavelength λ, and the direction of its propagation - the wave vector.

As is known from the course of physics, oscillations of the atomic nucleus have a size of the order of 10^{-12} m; this is the value of a wave with spiral radiation (Figure. 1) [1].

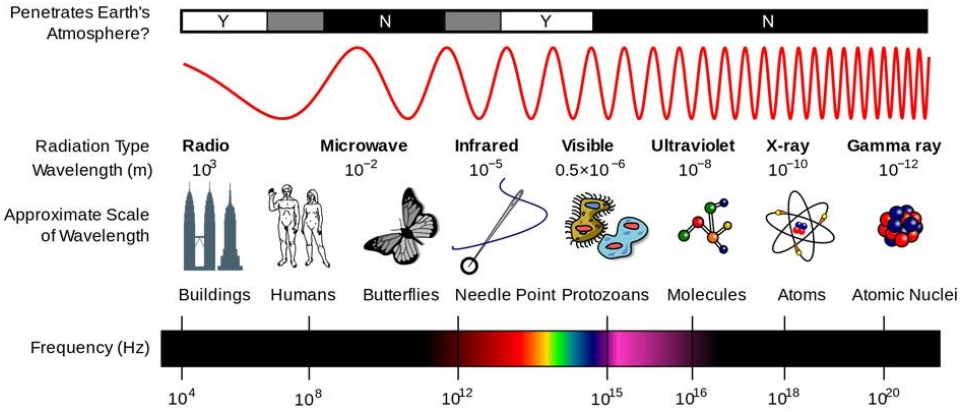


Figure. 1. The form of radiation of waves of different frequencies

In Figure 1. At 10^{-7} - 10^{-12} m, an electromagnetic wave (EMW) is shown in an open, continuously threaded form, that is, an open wave, which has attenuation properties and does not meet the requirements of EMW discreteness and dualism, as well as time stability. Uncertain ideas about EMW ah enable researchers to imagine them as clouds, particles, EMW and quarks in various forms (spherical, dumbbell-shaped, interacting 1/3 quarks). Furthermore, this leads to researchers proposing their interactions as an intersection, overlapping of the EMW, and in some cases, even as the interaction of parts of the EMW. These manipulations lead to the fact that the nature of EMW becomes no longer clear, and one cannot even talk about the unit of measurement of EMW. In addition, in an open wave, it is impossible to determine the unit of measurement of electromagnetic waves, which makes them indefinite, like photon, electron, positron and gamma waves. Using the properties of these waves, we will construct an

electromagnetic wave packet (EMWP): closed, continuous, uniform, stable, stable, and the existence of energy in a free state.

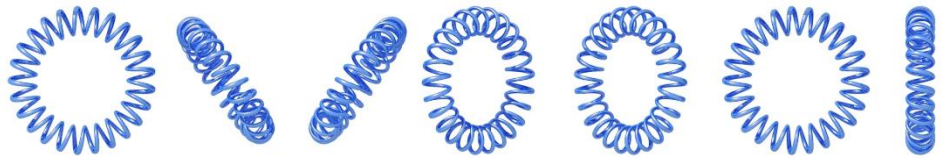


Figure. 2. Propagation of a light beam-photon, as an EMWP

As can be seen from the above images, according to our theory, the electron and other electromagnetic waves are discretely closed, continuous, uniform and with a stable shape with different frequencies, which determines the nature of a long wave, for example, a light wave (Figure 2).

Thus, discrete waves of a light beam have one direction, but each wave can independently change direction. When it encounters an obstacle, the closed wave is reflected or destroyed, which leads to the absorption of the wave by this object. The absorption of the wave leads to a change in the energy of the object since the wave emits its energy upon the destruction of the closed EMWP [2].

Moreover, on this basis, we can conclude that the EMWP has not the corpuscular-wave dualism but the dualism of the electromagnetic wave and energy, i.e. EMWP can be energy or an electromagnetic wave, depending on its state. As indicated in the article, all EMWPs are discretely closed, continuous, uniform and stably stable states of energy. Chemists divide an electron into various pieces during hybridization, and physicists divide positive and negative charges into pieces (quarks), which does not correspond to simple laws of physics. According to our theory, the division of EMWP is impossible since they are closed, continuous, uniform, stable and stationary in the local orbit; if not influenced from outside the EMWP, they can stably overcome light years. With an external impact, the EMWP emits waves or is destroyed, thereby being absorbed by the object in the form of energy.

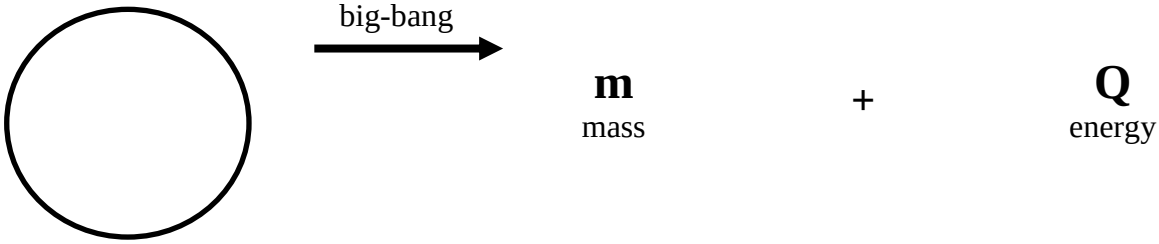
There is a neutron in the nucleus, but how is the neutron arranged, and what is its nature? The neutron has a spin and a neutron lifetime in a free state.

Many natures of the neutron are determined - the Compton wavelength is $1.32 \cdot 10^{-15}$ meters, and the electric radius is 0.1149 f.m (negative). The neutron consists of a heavy center with a radius of $r=0.25 \cdot 10^{-15}$ m. The mass of the neutron is $1.67492749804 \cdot 10^{-17}$ kg 1.00866491595 a.m.u. (atomic mass unit), approximately 0.1378% more than the mass of the proton. In the free state, the lifetime of the neutron is $\overline{\tau}=880 \pm 0.9$ sec, and gravitational radius is $2.48 \cdot 10^{-54}$ m. Therefore, the neutron is heavier than the proton. In nuclear experiments, the neutron lives for about 8`80 seconds. This phenomenon reduces everything to uncertainty; the neutron is destroyed in a free state. If the neutron is destroyed, then there is still something indestructible; otherwise, there is no constant - the constant basis of the world, then the basis of the world is the mass constant; constant - 1 atomic mass unit. The *m - mass*[1] is an elementary physical quantity, which is equal to the mass of the standard atomic mass unit (a.m.u).

The atomic nucleus is made up of neutrons and protons. To understand these particles, one must consider the mechanism of the big bang.

With a big explosion, a mass and an energy medium are formed, with an extremely low density with a high temperature - energy Q (Figure. 3).

[1] *Mass* - from Latin - lump, lump, piece, the fundamental value of the measurement of an elementary particle.



m - mass
E - highly compressed energy

Figure. 3. Big bang scheme

With a decrease in temperature in the medium, the formation of EMWP from energy begins, and it interacts with mass and forms a neutron and a proton.

The material world consists of two components; the primary basis is the mass-neutral, indivisible, with high density, small volume and very stable particle at high 0C temperatures.
Mass (neutral) is an indivisible matter of high density with the smallest particle size.

Figure. 4. Mass

Mass in the core is an indivisible part of matter, which is the primary basis of all particles (Figure. 4.), The secondary basis is energy with different characteristics. Mass is a homogeneous particle and does not consist of quarks; its derivatives are neutrons and protons.
The quark structure of the neutron is determined by the bound state of three quarks, that is, one "up" (**u**) and two "down" (**d**), and therefore write the **udd**-quark structure.
The quark structure of the neutron decays in the free state; how to understand this destruction? How the energy basis - the neutron can collapse remains a mystery. If the neutron is destroyed, then there is no constant in the world.
Let us try to answer these riddles logically and with the concepts of physics.

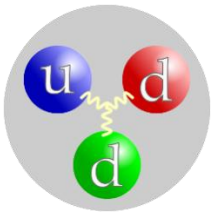


Figure 5. Quark structure of the neutron

As can be seen from the figure, the quark structure of the neutron is one u-quark and two d-quarks, and it is stipulated that the u-quark consists of two 1/3 positive charges, and each d-quark has one 1/3 negative charge, which does not correspond to physical laws (Figure 5) [3].
As three quarks are placed in a critically small volume of a neutron, then one u - quark has two 1/3 positive charges; if, as during β-decay, one whole e- is split off from a neutron, where does this electron come from, when in two d - quarks have 1/3 of the negative charge, and in total it is 2/3 of the negative charge, the question arises where does 1/3 of the negative charge inside the neutron come from? Let us try the process explain this phenomenon without using quarks.

After the big bang, the temperature begins to drop, leading to the formation of EMWP in an endothermic process—primarily formed with a very high energy gamma EMWP (Figure 6).

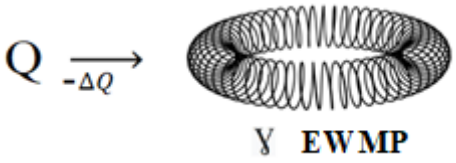


Figure 6. Formation of a ɣ - EWMP

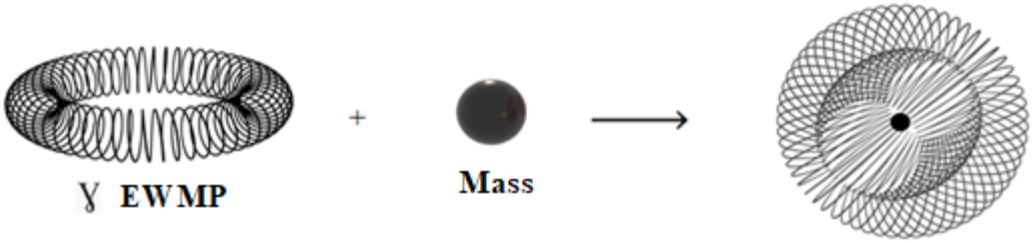


Figure 7. Formation of a neutron

As can be seen from the above diagram, the neutron is also a derivative of the mass and the ɣ-EMWP wave, a uniform, continuous, stable, stable distribution of this wave packet with a transformation around the mass in a stationary orbital, is called a neutron. So now one can understand that the destruction of the neutron really occurs; the lifetime of the neutron is 880 seconds - this is the release time of the gamma-EMWP wave in the free state (Figure 8).

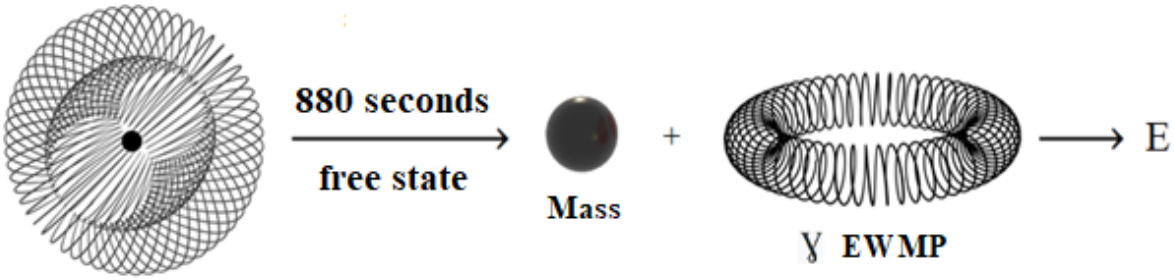


Figure 8. Destruction of the neutron

This means that the neutron is destroyed into mass and energy. The resulting mass in the experiment cannot be registered because the gravitational size of the mass is very small and neutral. This once again confirms that the neutron is a derivative of mass and energy. According to the literature, the neutron has a spin since the spin is a way of binding the EMW in atomic orbitals, chemical bonds, and also in the nucleons of the nucleus. Since the neutron also has a spin, it is possible to form a bond between two neutrons with opposite spins, so there is no need for a gluon during the formation of the nucleus of atoms. Thus, using EMW, one can easily explain the formation of a bond between identical particles (electrons, protons, neutrons, etc.). Furthermore, the difference between the mass of a neutron and a proton can be explained by the fact that the mass of a neutron is approximately 0.1378% more than that of a proton, which means that the gamma EMWP of a neutron is greater in mass than the EMWP of a proton when recalculating energy to mass.

Let us describe the positive charge of the EMWP. A positive charge - spiral, closed, continuous, uniform and stable EMWP in a free state (Figure 9).

Figure 9. Formation of a positive charge EMWP

This means that the positive charge of the electromagnetic wave packet is formed from the energy. A wave with a right-handed threaded movement along the spiral axis determines the charge in the electromagnetic wave packet (EMWP), a spiral, closed, continuous, uniform and stable state called a positive charge.

A closed helical EMWP in a proton is transformed, highly compressed, stable, uninterrupted, and uniform in a stationary state.

This EMWP is a method of energy conservation in a spherical, hemispherical and sectoral spherical form in the nucleus and atom.

The EMWP has charge and spin. Above, the charge was defined; spin is the vector direction of movement in the helix of the electromagnetic wave packet; if the vector direction of movement is counterclockwise, it has the right spin (Figure 10), and in the case of a vector, the direction of movement is clockwise - the left spin of the positive charge (Figure 11).

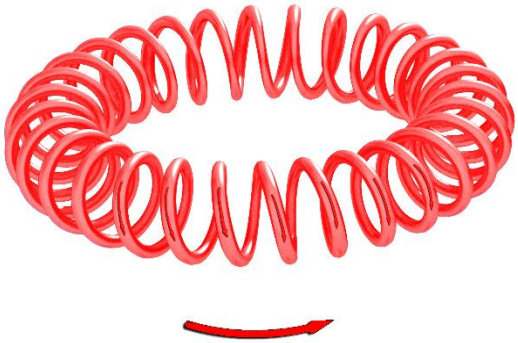


Figure 10. Right-hand thread EMWP of a positive charge with a right-hand spin

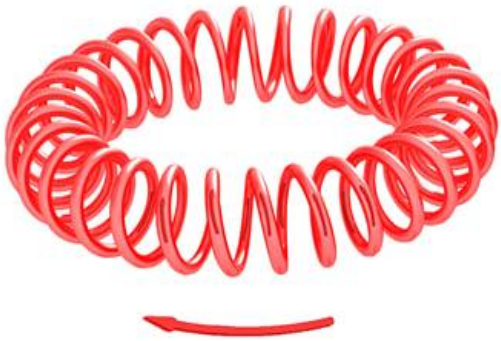
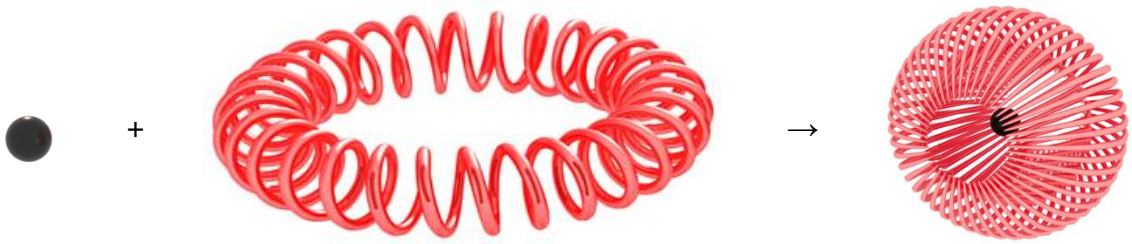


Figure. 11. Right-hand thread EMWP of a positive charge with left-hand spin

Consider the formation of a hydrogen nucleus: the nucleus is one mass around which there is an EMWP of a positive charge, the size of which is ten times larger than the size of the mass in a highly compressed state.

The primary nucleus of the hydrogen atom is formed from a particle of the mass of a positive charge surrounded by EMWP with transformation - let us call it a proton.

This wave packet is distributed with transformation around the mass evenly, continuously, steadily, and stably in a stationary orbital, and a hydrogen proton is formed (Figure 12).



mass EMWP positive charge hydrogen proton

Figure 12. Formation of a hydrogen proton

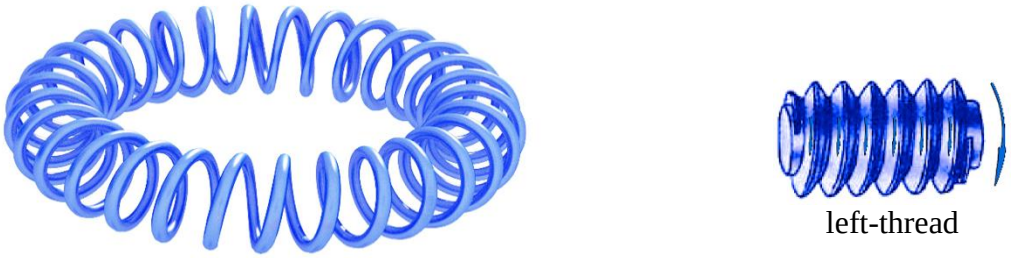
The positive charge of the proton is a transformed EMWP with a right-hand threaded movement with a closed helix, with a continuous and uniform, stable and stationary orbital above the mass. Proton-forming is also a derivative of mass and energy.

An atom has an outer orbital with a negatively charged EMWP of an electron.

Consider the external wave packet of an electron with a negative charge of the atomic orbital.

The negative charge will be denoted by the left-threaded, helical EMW, which differs in size by 10^3 times larger than the positive EMWP of the proton.

EMWP of a negative charge in a free form can be represented as a closed, continuous and uniform free wave (Figure 13).

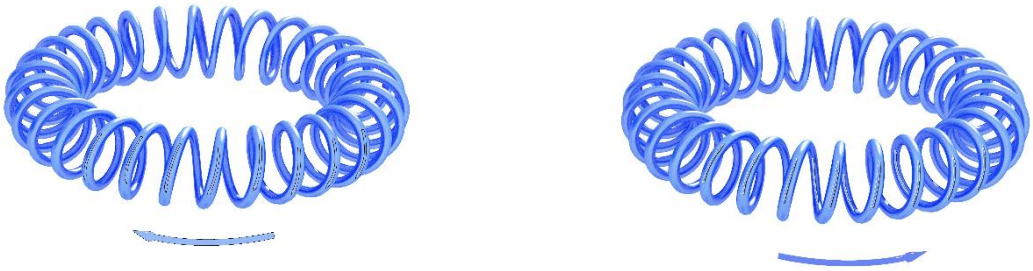


left-thread

Figure 13. Left-thread free EMWP electron

In turn, an EMWP with a left-handed helix thread can have a vector directed clockwise or counterclockwise, which is the electron spin.

In turn, the EMWP of a negative charge with the left screw of the spiral can have a vector, directed clockwise or counterclockwise, which is the spin of the electron (Figure 14).

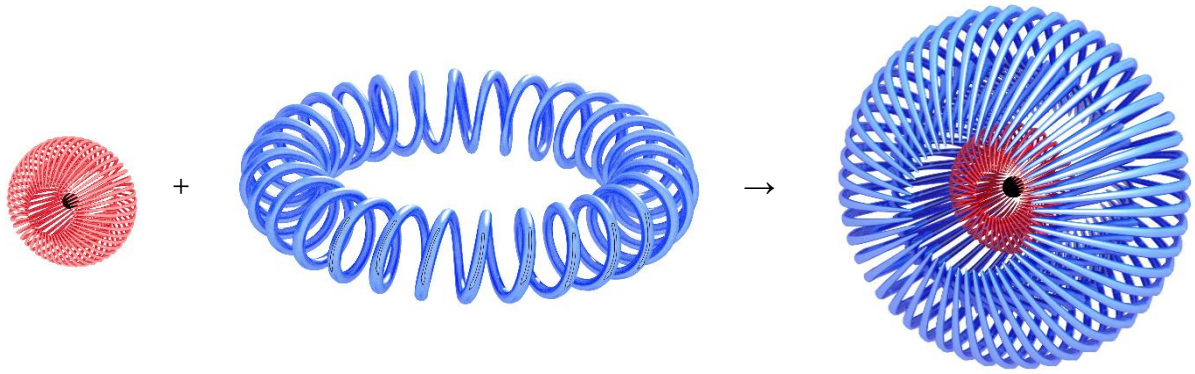


vector of an EMWP with a clockwise - left spin vector of an EMWP with a clockwise - right spin

Figure 14. Spins of a negative charge EMWP

Therefore, the electron must be considered not as a material point or an electron cloud in space but as an EMWP with a spiral, closed, continuous, uniform, stable waveform.

Further, the resulting proton interacts with the negative charge of the EMWP and forms an atomic orbital of hydrogen (Figure 15).



proton EMWP of a free electron hydrogen atom

Figure 15. Formation of a hydrogen atom

The hydrogen nucleus consists of a neutral center of mass and a very high energy EMW-positive charge around it in a right-spin compression state.

We have discussed the wave packet with right-hand spirals and called them positive charges around the mass, where if the vector is counterclockwise, it is right, and clockwise it is left spin.

This EMWP electron with transformation is distributed around the proton evenly, continuously, steadily, stably, and stationary; this is the atomic orbital of hydrogen (Figure 15).

In the nucleus, interactions arise between nucleons with positively charged protons, holding each other with opposite spins, and over time, the formation of the elements D, T, and He begins.

$$n_1^0 + EMWP^+ \rightarrow p_1^+;\ p_1^+ + EMWP^- \rightarrow (p_1^+\ e^-)\ \textbf{H - hydrogen}$$

$$p_1^+ + n_1^0 \rightarrow p_1^+ n_1^0;\ p_1^+ n_1^0 + EMWP^- \rightarrow (p_1^+ n_1^0\ e^-)\ \textbf{D - deuterium}$$

$$p_1^+ n_1^0 + n_1^0 \rightarrow p_1^+ n_2^0;\ p_1^+ n_2^0 + EMWP^- \rightarrow (p_1^+ n_2^0\ e^-)\ \textbf{T - tritium}$$

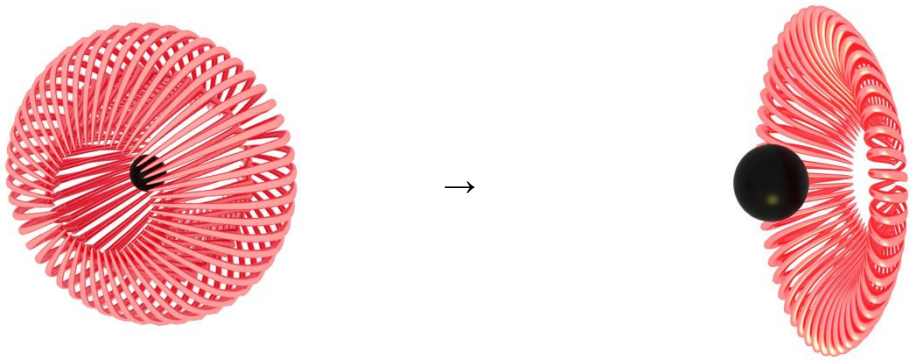
$$p_1^+ n_2^0 + p_1^+ \rightarrow p_2^+ n_2^0;\ p_2^+ n_2^0 + 2EMWP^- \rightarrow (p_2^+ n_2^0\ 2e^-)\ \textbf{He - helium}$$

Thus, the formation of the elements that we know continues. Now, there is a misunderstanding of how two identical charges are kept in an extremely small volume, like a helium atom.

In the nucleus, interactions occur between nucleons with the formation of a proton bond between positively charged protons with opposite spins, and they hold each other.

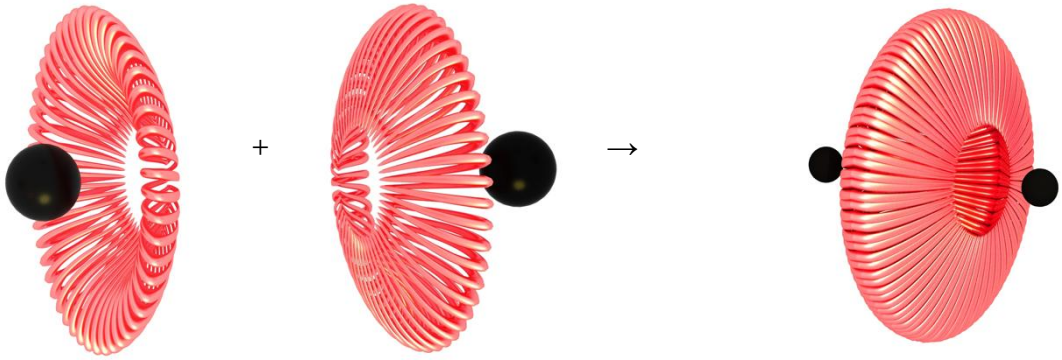
A helium nucleus contains four particles, two of which are positive and two are neutral. The two positive charges must repel each other in the nucleus, but they are held stably, but how can one understand this?

Here the theory of transformation of the EMWP of proton orbitals will help us; that is, two proton orbitals are separately transformed into a hemispherical orbital from a spherical one with the right spin (Figure 16.)



a proton with a spherical orbital → hemispherical orbital proton

Figure 16. Transformation of EMWP proton orbitals with the right spin

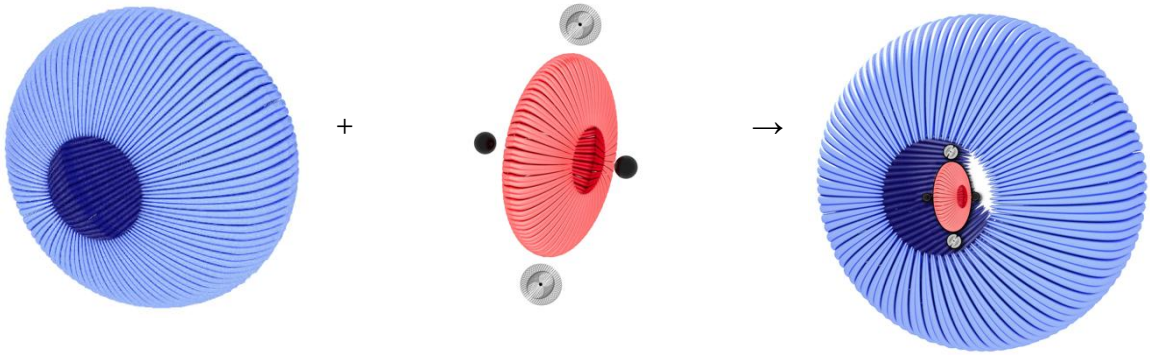


right spin + right spin → the pairing of two proton orbitals with opposite spins - forming a proton bond

Figure 17. Formation of a proton bond

Formation of hemispherical, transformed proton orbitals of the EMWP of a proton with the opposite spin, which binds in a nuclear cell to form a proton bond (Figure 17) [4].

As a result, they stably stay in a small volume of the nucleus; there is one problem: both protons had the right spin, but when two particles are mirrored to each other, the spins become opposite. Thus, the transformed proton orbital of a positive charge forms paired proton bonds with the opposite spin, now they do not repel each other but are stably held in the nucleus with a small volume, and the neutron is placed in the nucleus without obstacles (Figure 18).



$1S^2$ 2p+2n helium nucleus helium atom

Figure 18. Formation of a helium atom

The transformation of the EMWP of nuclear proton orbitals occurs in all elements with the formation of pair-proton bonds; if the serial number is even, all protons are paired; if odd, then one unpaired spherical proton orbital and the rest of the paired protons, and they do not repel each other, thereby ensuring stability in the core.

Based on the above information, the following postulates can be asserted:

1. The form of discreteness and electromagnetic waves is revealed, which was previously unclear. In this case, the positive charge (proton), negative charge (electron) and light waves (photon) should be considered not from the point of view of wave-particle duality but as a dualism of an electromagnetic wave and energy, i.e. waves can be an electromagnetic wave or energy depending on the state.
2. There is a constant basis mass in the world—one atomic mass unit (1 a.m.u).
3. EMWP - electromagnetic waves are the way of existence, transmission and transformation of energy.
4. The mass has an EMWP orbital, and depending on the EMWP, it can be either a neutron or a proton, which has a closed, continuous wave function in a uniform, stable form and is a highly ordered electromagnetic wave packet and it is not divided into quarks with different charges, as well as does not hybridize with different pieces of electromagnetic waves of the electron.
5. The proton EMWP of a spherical orbital is transformed, if necessary, into hemispherical orbitals with the formation of positive spins of proton orbitals, followed by the formation of a proton bond.

Based on the above data, the following conclusions can be drawn:

1. The currently existing theories about the structure of the nucleus and the nature of bond formation do not fully describe all cases. Furthermore, with the development of physics and chemistry, more and more special cases and exceptions to existing theories appear.
2. The application of the theory of transformation of electromagnetic wave packets leads to a more accurate interpretation of the results of quantum-chemical calculations and also makes it possible to calculate the volume of electromagnetic waves in an atom and chemical bonds.

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