

MODEL STRUCTURE OF THE ELECTRON, MASS, CHARGE AND SPIN*.

D.b.s. S. Kurotchenko

Ingate Development. Tula City, Russia

10091982@RAMBLER.RU

Abstract

In this article, the author proposes the mathematical model of electrons, as volume waves of a comprehensive environment circulating in a certain volume of space defined shape in the form of s-, p-and d-orbitals. It is shown, that the process of hybridization of electron orbitals is due to interference (summation) of volume waves-electrons, as organized structures of a comprehensive environment. Also it is shown, that the cause of the charge and spin of electron are appropriate high frequency whirlwinds with different depth of polarization of the comprehensive environment, different volumes of polarization and different frequency of circulation these whirlwinds as a rotor, which corresponds to a variety of mutually nested (fractal) levels of organization of matter.

1. Introduction

According to modern scientific ideas the world around us, or, in other words, a comprehensive environment (CE), which is immersed in our world, is asymmetric and anisotropic. It is heterogeneous, both at macro-levels (molecules, different types of substances), the mega-and gigo-levels (stellar and galactic systems), and at substrukturnyh (atomic, subatomic, up quarks, and deeper) levels. Opening of "asymptotic freedom", CMB anisotropy, and asymmetry at the level of quarks and the corresponding Nobel Prize in Physics for 2004, 2006 and 2008 seemed to put an end to the methodology of private, closed systems and ideas about the limitations of the universe [8,15].

But the modern mathematical models of various structures, including, among other things, the model of elementary particles, do not explain the cause of phenomena such as charge, spin, electric field, magnetic field, as well as the bizarre shape of electron orbitals. For the theoretical basis of established models taken the position OV Martynov on the mechanism of formation of structures of matter from a comprehensive environment [2,10,11]. Processes that are implemented in the structures of different levels of organization of matter described by the general formula:

$$\operatorname{div}U_0 \geq \hbar^n \left| \sum_n \operatorname{rot}U_n \right| \quad (1)$$

* scientific adviser O.V. Martynov. Also, the basic provisions that he created the theory presented in detail in the article, O.V. Martynov, published in this collection.

where $divU_0$ - the divergence of the field U_0 , arising in response to the initial pulse, caused by the potential of a comprehensive environment; $\sum_n rotU_n$ - the sum of the rotors, as a reaction to a comprehensive environment for the emergence of the primary pulse \hbar - constant interaction in this area of the universe n - the level of nesting space.

2. What is an electron?

Based on the developed theory proposed a model of an electron, which explains the form of s-, p- and d-orbitals of electron, as well as the mechanism of sp-hybridization and the form of sp-hybrid orbitals.

Consider the simplest example - the hydrogen atom. But the electron, we will not be seen as a particle which moves in its orbit around the proton. In proposed model the electron - is a volume wave in comprehensive environment, concentrated in a spherical volume (or more complex form) around the nucleus. How is this possible?

Based on the above theory is not difficult to understand what is the electron and how it is organized. Let comprehensive environment circulates as a whirlwind in a plane S, and the plane S itself rotates as another whirlwind around a certain axis, which lies on this plane S. Then create the volume wave in the form of a ball. Such a spherical continuously circulating clot of comprehensive environment is an electron. The electron is a volume wave of comprehensive environment. A comprehensive environment circulates in the electron simultaneously in several planes of rotation.

If written in parametric form the equation of the desired curve graphically showing the movement of the wave-electron, then it will look like this:

$$F(R, t) = \begin{cases} X(t) = R \cdot \cos(2 \cdot \pi \cdot f_2 \cdot t) \\ Y(t) = -R \cdot \cos(2 \cdot \pi \cdot f_1 \cdot t) \cdot \sin(2 \cdot \pi \cdot k \cdot f_2 \cdot t) \\ Z(t) = R \cdot \sin(2 \cdot \pi \cdot f_1 \cdot t) \cdot \sin(2 \cdot \pi \cdot k \cdot f_2 \cdot t) \end{cases} \quad (2)$$

Here

R - radius of electron orbit;

f_2 - frequency of rotation of the vortex, which creates the electron charge;

f_1 - frequency of rotation of the vortex, which creates the electron spin;

k - coefficient. For the S-electron $k = 1$;

t - time parameter.

Projections of the spatial trajectory of the axis X, Y, Z will be as follows (Figure 1):

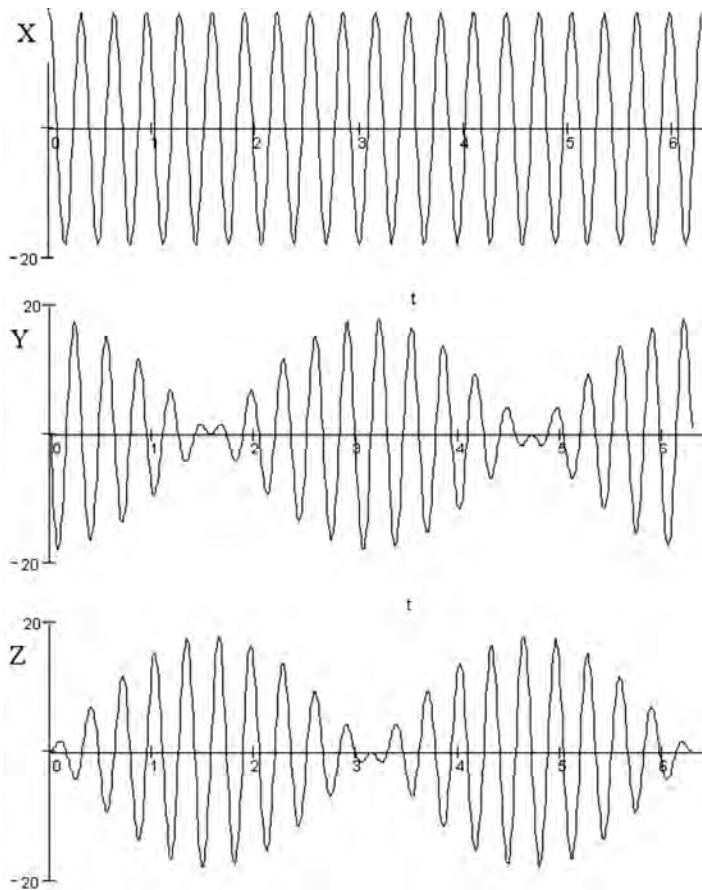


Figure 1. The projections of the function $F(R, t)$ on the axis X, Y, Z

In a three-dimensional space this trajectory will look like this (Figure 2):

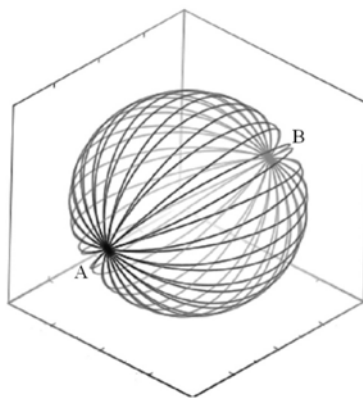


Figure 2. Graph of the function $F(R, t)$ for $k = 1$ (model of S-electron)

The result is a spherical S-orbital of electron. Really, an electron – is a wave in comprehensive environment. In other words, an electron – a whirlwind compacted comprehensive environment. This whirlwind rotates around the nucleus at a frequency f_1 , and the plane of rotation of this whirlwind itself rotates with frequency f_2 around a certain axis AB,

which lies in this plane. The points A and B are called the poles of the electron. It is obvious that the frequencies f_1 and f_2 some way connected with the charge and spin of the electron.

The reason for the charge – in the rotation whirlwind of compacted comprehensive environment with frequency f_2 , which forms the electron. Sign of the charge depends on the direction of rotation of this whirlwind in the plane S. This whirlwind have the opposite direction of rotation in the positron. But the spin of an electron in an atom is dependent on the direction of rotation of the itself plane S. Recall, when we describe element in electronic form, the electron spins are compensated on each orbit. For example, for sodium

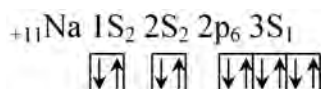


Figure 3. Description of sodium atom in electronic form

Arrow – a symbol of the electron. Direction of arrows indicates the direction of electron spin. The reason valence of sodium, which is equal to 1 because there is 1 not compensated spin of electron. Number not compensated, the spins of electrons – this is the valence of the element

In other words, the element with the highest valence – is an element that has a large number of electron-vortex (volume waves comprehensive protection) the last orbitals have the same direction of rotation of the plane S as the volume of the vortex. Unity and struggle of opposites. Opposites in the atom – is paired electrons with opposite spins. This is a pair of electron-waves, in which the plane of rotation of the vortex rotating in opposite directions. Also the atom – is the N of electron-waves with charge e, existing in various orbitals around a nucleus with charge $Z = n \cdot e$. The nucleus of an atom is the center of the polarization, if operate with concepts of Lobachevsky geometry [1]. It is the emergence of the center of the polarization in the form of an atomic nucleus is a compensatory process by a comprehensive environment – the emergence of vortices around the nucleus in the form of electrons in full accordance with experimental validation of theoretical propositions, created at different times in the works of Newton, Lobachevsky, Vlasov, Markov, Martynov [1, 4-7, 8,12].

From the chemistry is well known that p-orbital electron in an atom is like an hourglass (or dumbbell), in contrast to the S-orbitals, which has the shape of a ball, and was considered above. But what seems to be the equation of the electron wave which is on the p-orbitals? It turns out that the form of equations for the p-orbitals of exactly the same as that for the S-orbital (ie the equation 2), here only for the p-orbitals coefficient $k = 2$, and the sight of such orbitals, on which moves the wave-electron constructed according to the equation 5 with $k = 2$, exactly the same as and should be, ie in the form of an hourglass or dumbbell (see Figure 4).

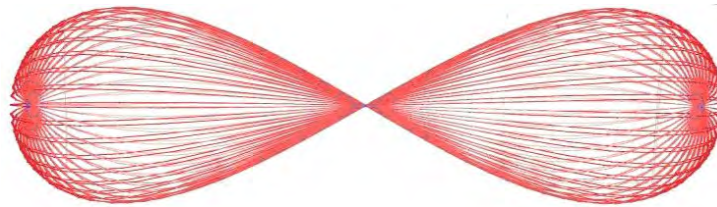


Figure 4. Volume wave-electron, constructed according to equation 5 with $k = 2$ (electron, located on the p-orbital)

Whirlwind in the plane of such orbital is not already moving in a circle, as in the S-orbital, and on a trajectory reminiscent of an infinity sign. However, just as in the S-electron, this plane of whirlwind is also rotates, that creates second whirlwind of comprehensive environment as a more organized structure. Note that the direction of rotation of the whirlwind, which is responsible for what we are dealing precisely with the electron but do not positron, is the opposite direction of rotation, that is, it is responsible for the sign of the charge remained unchanged. Unchanged and remains the direction of rotation of the plane vortex (this is the direction of rotation is responsible for the spin) in the equation 2 as when $k = 1$ (S-orbital), and $k = 2$ (p-orbital).

Applying the same principles in the proposed model of electron at the d-orbitals:

$$\begin{aligned}
 X(t) &= R \cdot \sin(2 \cdot \pi \cdot f_2 \cdot t / N) \cdot \sin(\pi \cdot f_2 \cdot t / N) \cdot \cos(\pi \cdot f_1 \cdot t / N) \\
 Y(t) &= R \cdot \sin(2 \cdot \pi \cdot f_2 \cdot t / n) \cdot \sin(2 \cdot \pi \cdot f_1 \cdot t / N) \\
 Z(t) &= R \cdot \sin(2 \cdot \pi \cdot f_2 \cdot t / N) \cdot \cos(\pi \cdot f_2 \cdot t / N) \cdot \cos(\pi \cdot f_1 \cdot t / N)
 \end{aligned}
 \tag{3}$$

where N – a constant. In three-dimensional space such a wave is as follows:

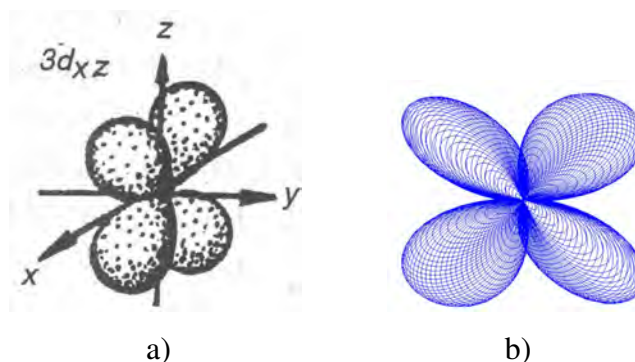


Figure 5. The shape of the d-orbital electron (a) and its wave analogue (b)

It turns out that the electron and the orbital in which it is located with a probability close to 1 – this is one indivisible phenomenon. Described here is the principle of structural

organization of the electron is fully consistent with the work of Vlasov, the center of the polarization, point nonlocality in the physical space and the macroscopic electrodynamics [4-7].

Electron – a volume wave of comprehensive environment, circulating in a certain volume of space around the nucleus. In other words, the electron – that volume whirlwind polarized comprehensive environment. Hence the main conclusion. All the other elementary particles – is also a volume three-dimensional wave of *comprehensive environment*, inter-spatial variations which occur in a certain volume with a certain set of related frequencies. Such volume fluctuations limited to a certain volume of space, with this amount of space in which there is a volume wave, always has a definite and often very intricate form. For the electron at the s-orbitals, or in our terminology – for the s-electron – this form is spherical. For the p-electron – in the form of dumbbells, for d- and f-electrons – this form is even more difficult.

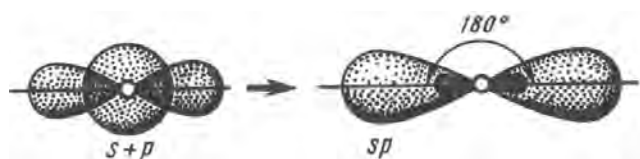
This is a very important point. Three interrelated parameters – the amplitude of the oscillation, the oscillation frequency and nature of the oscillation in comprehensive environment set parameters of three-dimensional waves – form and volume of space in which these fluctuations in comprehensive environment implemented. In other words, the wave – is a comprehensive environment in some way organized complex vibrations which are carried out with a certain set of frequencies, with a certain amplitude in a certain volume of space, in certain a geometric shape.

By the nature of the oscillations is meant here is the interconnection of several types of fluctuations in comprehensive environment with various frequencies and with different amplitude in several orthogonal planes.

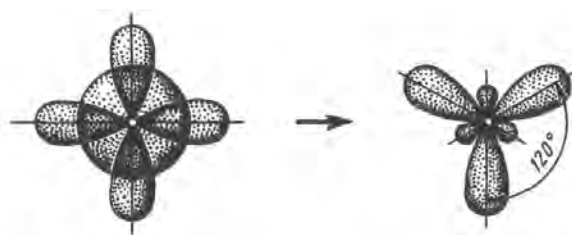
3. Hybridization of the electron orbitals – is the interference of waves of a comprehensive environment

Any chemist knows that during the formation of atoms of complex substances often are the phenomenon of hybridization of orbitals of the electrons, while the chemical bond, which arose as a result of hybridization, is very strong. What is the cause of hybridization with the terms of the new methodology of physics? Below is a very simple scheme of the formation of hybrid orbitals (and possibly more complex forms of hybridization with the d- and f-orbitals). Picture taken from the book [14]. What is the hybrid orbital? Given the fact that the electron – is a wave, concentrated in a small volume of space, then, like any wave, the electron can interfere. That is 2 or more unpaired (valence) electron-waves may emerge and to create a more complex wave – hybrid orbital (electrons). Why the initial wave-electrons can emerge? Because in our world, any system tends to minimize energy, so when adding two waves of electrons the total energy received by the two hybrid electrons should be less than the energy of initial electrons.

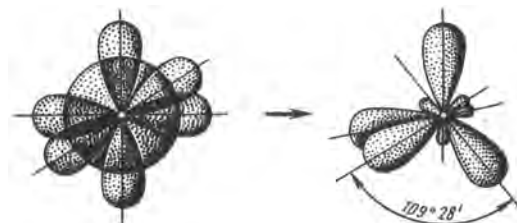
The excess energy leaves the system with photons, some of which is scattered by the molecules of the reactants (reaction is exothermic). At the same time to maintain the charge (ie, full compensation for the nuclear charge) the number of hybrid wave-electron remains the same, and that was in the beginning before hybridization. So let's show how to get a hybrid wave-electrons.



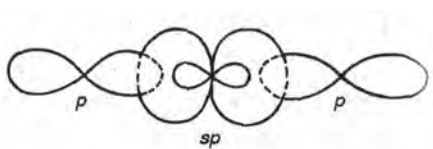
a) Scheme of Sp-hybridization



b) Scheme Sp 2 hybridization



c) Scheme Sp 3 hybridization



d) formation of the molecule CaCl₂ with Sp-hybridization

Figure 6. Different types of hybridization and the scheme of formation of the molecule CaCl₂.

Consider the formation of Sp-hybridization (Figure 6, a).

In the process of Sp-hybridization involving one S-electron (the concept of orbital, electrons and the wave is now synonymous) and one p-electron. For example, the reaction of one atom of calcium with a diatomic molecule of chlorine, the calcium atoms in the process of hybridization involves two of its valence electron (S-and p-electron) with the same spin. After their hybridization produced two Sp-hybrid electrons with different spin. Chemical bonding, forming diatomic molecules of chlorine, formed by two electrons with different spins. In the course of the reaction with calcium, this relationship is destroyed, and the valence electrons of

the two chlorine atoms combine with each of the two Sp-electrons, also have a different spin (Figure 6, d). The reaction forms a very stable compound CaCl₂.

We write the equations of the models S-and p-electrons in the atom of calcium. As is the addition of electrons, the trigonometric functions sin and cos in the argument of f_2 , which are responsible for the formation of a negative vortex-charge, the S-and p-electrons are the same. The trigonometric functions sin and cos in the argument of f_1 (these functions are responsible for the spin) on the coordinate axes Y and Z in S-and p-electrons of the atom source of calcium is also the same:

$$\begin{aligned} X_1(t) &= R \cdot \cos(2 \cdot \pi \cdot f_2 \cdot t) \\ Y_1(t) &= R \cdot \cos(2 \cdot \pi \cdot f_1 \cdot t) \cdot \sin(2 \cdot \pi \cdot 2 \cdot f_2 \cdot t) - \text{for p-electron} \\ Z_1(t) &= R \cdot \sin(2 \cdot \pi \cdot f_1 \cdot t) \cdot \sin(2 \cdot \pi \cdot 2 \cdot f_2 \cdot t) \end{aligned} \quad (4)$$

$$\begin{aligned} X_1(t) &= R \cdot \cos(2 \cdot \pi \cdot f_2 \cdot t) \\ Y_1(t) &= R \cdot \cos(2 \cdot \pi \cdot f_1 \cdot t) \cdot \sin(2 \cdot \pi \cdot f_2 \cdot t) - \text{for the S-electron} \\ Z_1(t) &= R \cdot \sin(2 \cdot \pi \cdot f_1 \cdot t) \cdot \sin(2 \cdot \pi \cdot f_2 \cdot t) \end{aligned} \quad (5)$$

Functions of the original wave-electron

$$p(t) = \begin{pmatrix} X_1(t) \\ Y_1(t) \\ Z_1(t) \end{pmatrix} - \text{for p-electron;} \quad (6)$$

$$S(t) = \begin{pmatrix} X_2(t) \\ Y_2(t) \\ Z_2(t) \end{pmatrix} - \text{for S-electron} \quad (7)$$

$$p(t) + S(t) = \begin{pmatrix} X_1(t) + X_2(t) \\ Y_1(t) + Y_2(t) \\ Z_1(t) + Z_2(t) \end{pmatrix} \quad (8)$$

The equation of the electron-wave interference can be written in the following form:

$$p(t) + S(t) = Sp_{\uparrow}(t) + Sp_{\downarrow}(t) + \gamma(t) \quad (9)$$

Addition of waves and wave sums received by the construction was carried out in Mathcad

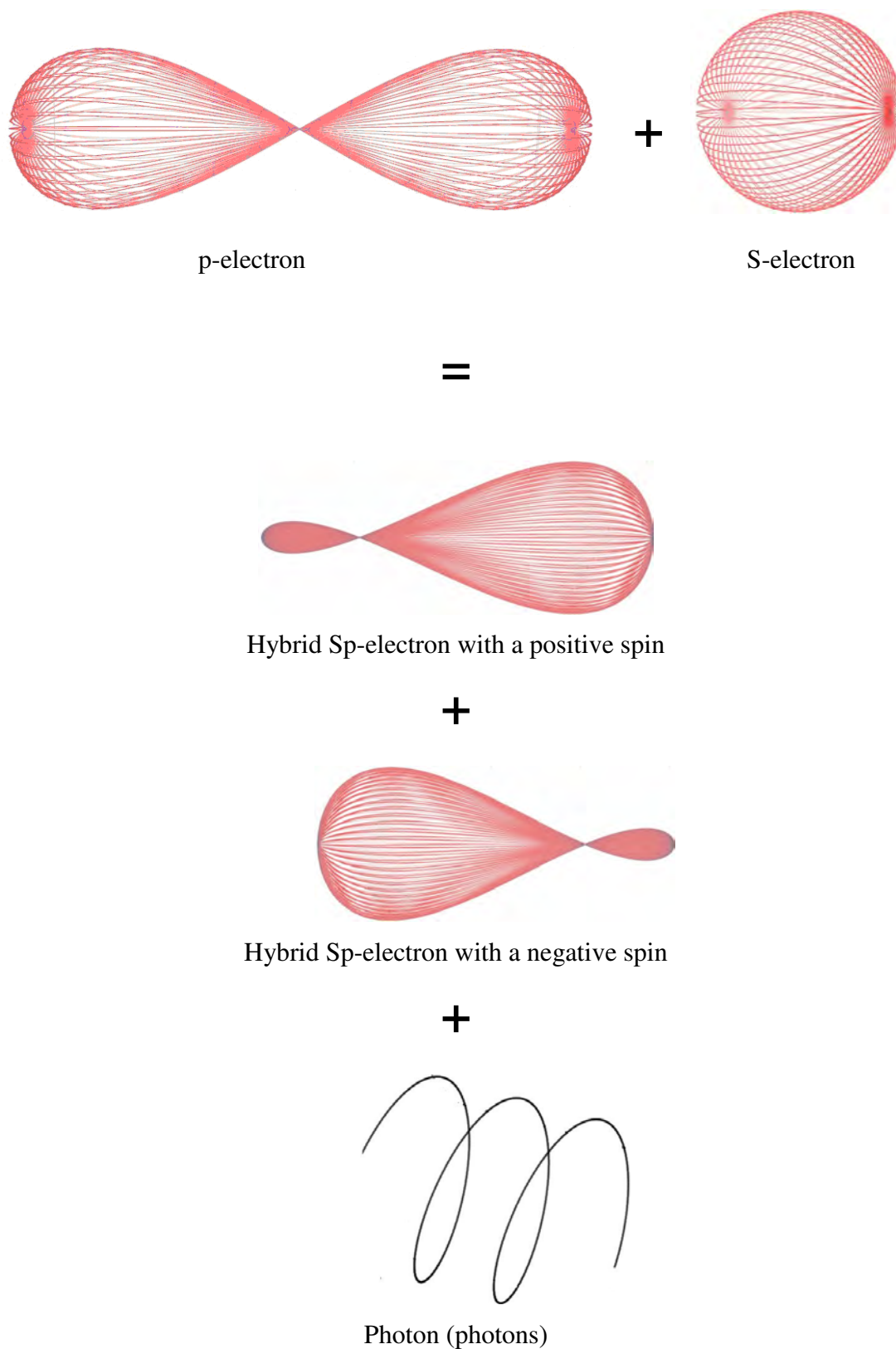


Figure 7. Sp -hybridization as amount of volume wave-electron

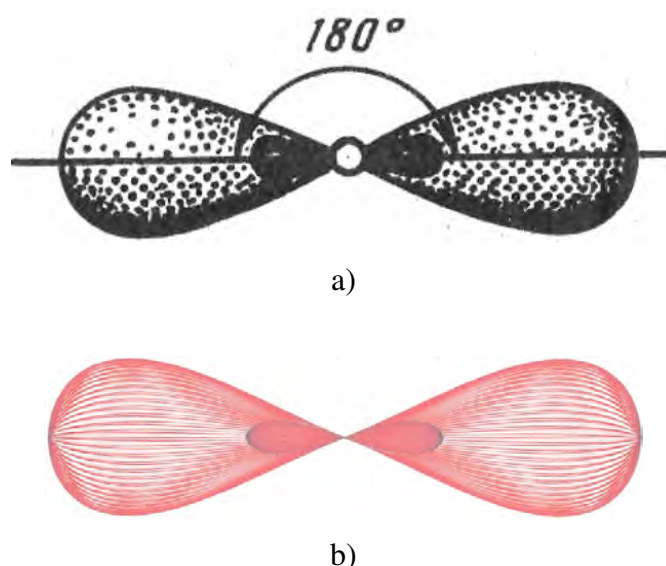


Figure 8. Two sp-hybrid electron, creating a strong chemical bond:

- a) the classical representation of electrons as particles that are within their lived with probability close to unity;
- b) two hybrid sp-electrons with opposite spins as a result of interference between s- and p-electrons – volume waves.

Conclusion

The whole world around us – is a collection of infinite number of different volume waves comprehensive protection. These three-dimensional wave-structure at each level of organization of matter formed by the appearance of anisotropy of the core polarization continuously interfere (interact) with each other. These waves can propagate in straight lines (light), can be spherical wave (the electric and gravitational field), and finally, the waves can be concentrated in a very small volume of three-dimensional space, and have a few to an infinite number of frequency coordinates (the electron and all the other "elementary particles "with" rest mass "). The form of bulk waves determines the character of vibrations of a comprehensive environment. On the other hand, the nature of oscillations of a comprehensive environment determines the shape of a material object (wave) in the three-dimensional space because the shape and nature of the oscillation volume wave – in essence, a single phenomenon

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