

# NATURE OF ELECTROMAGNETIC INTERACTIONS: THEORETICAL CONCEPTS AND PRACTICAL SOLUTIONS\*

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## Abstract

*In this article, the authors present the results of research on the nature of the electromagnetic interaction, causes the electric and magnetic fields and electromagnetic induction. The authors considered the phenomenon of the photoelectric effect from the position of the wave nature of matter. A model of the structure of atomic orbitals proposed. Submitted the theory, which explains the emergence of a strong magnetic field coupling  $\text{SmCo}_5$  and the permanent magnets on the basis of this compound. It is shown that with the help of structures with variable size and sign of the curvature of space may receive energy from a more global level of organization of matter. Submitted created on the basis of this theoretical concept of a functioning system monitoring of natural disasters. Proposed the design of portable monitoring seismic activity of the planet, as well as the system is environmentally clean electricity without the cost of non-renewable resources.*

## 1. Introduction

The basis of our practical decisions we have laid the theory of the interconnectivity of processes in the world around us and the unity of the basic laws on which they are implemented [1,2]. It was shown that matter - it is difficult to do, one-dimensional sub-wave Vortices comprehensive environment (CE), in which this environment varies with the strictly defined set of frequencies [3]. In this paper, explains the nature of electromagnetism as a compensatory process by the overall environment for the emergence of three-dimensional structures in the form of wave-attractor as a set of polarizing this environment are mutually embedded vortices in the form of the charge and spin. Demonstrate the link motion of charged particles with magnetic field and defined the nature of the magnetic field.

## 2. Physics of the basic concepts

Any structure of quarks to the galactic space can be represented as a ratio of potentials:

$$|\Psi_1\rangle = |\text{div}\bar{U}_1\rangle \otimes \hbar \left\langle \sum_n |\text{rot}\bar{U}_n| \right\rangle = \text{grad}U = \mathbf{m}_1 + \emptyset = \mathbf{V}_1 \quad (1)$$

The structure of any size a comprehensive environment consists of a primary pulse  $|\text{div}\bar{U}_1\rangle$  and secondary compensatory process  $\hbar \left\langle \sum_n |\text{rot}\bar{U}_n| \right\rangle$  that determines the amount of weight and the amount of matter in a state of stable bundles of spaces, interacting with internal and external environments in different time periods of its evolution through the polarization processes in the so-called empty sets  $\emptyset$ .

Introduce the concept of function space and the angle of the Lobachevsky  $\alpha \equiv \Pi(l)$  potential gradient according to the formula 1 and putting a topological physical-mathematical meaning of the coefficients of the curvature  $k$  and the value of  $l$ , after rearranging and taking the logarithm, please contact:

$$\alpha \in l = -k \cdot \ln \left( \text{tg} \left( \frac{\Pi(l)}{2} \right) \right) \quad (2)$$

Introducing the corresponding dynamics in the concept of space:  $W = \frac{N!}{n!n!} = \text{tg} \left( \frac{\Pi(l)}{2} \right)$ ,

you can get a formula for the Boltzmann-Kolmogorov entropy [2]:

$$S = -k \cdot \ln W \leq \sum_{\lambda_i < 0} \lambda_i \quad (3)$$

As we know,  $\lim_{\ell \rightarrow \infty} F(\ell) = 0$  but then  $\text{grad}U \rightarrow \infty$ . Therefore, each value  $\alpha$  corresponds to the subspace of a comprehensive medium with a certain volume  $\mathbf{V}_{n+1}$ , the geometry is determined by the coefficient  $k$  and the segment  $l$ , as well as the sum of the Lyapunov characteristic exponents  $\xi_n$ . In this case  $\alpha_n \in l_n = \hbar_i = \nabla \sum_n \int f(\mathbf{o}_n) \partial \xi_n$  [2].

Tangential function of a single space, formed by relations of potentials by the formula (1), incorporating relevant as macro and micro-space. These spaces, in accordance with the laws of conservation, through the processes of screening and anti-screening (flop-adjustment) implemented at each step (angle) in the form of different directions of rotating the sub-micro mass – the volume of particles of a comprehensive medium (empty set  $\emptyset$ ) on the boundaries of

these spaces . That is, in a sense different directions of the charges, which leads to the emergence of multi-choice of polarization processes in the form of Kollabi-Yau spaces. Therefore, we have introduced into their calculations the concept of Lobachevsky's operator:

$$\mathcal{I}_{on.} = \frac{\left| rot^{+e} \mathbf{q}_{k_j} \right\rangle \otimes \left\langle rot^{-e} \mathbf{q}_j \right|}{\mathbf{r}_k \cap \mathbf{r}_j} \in \emptyset = \mathbf{V}_0 \quad (4)$$

Where,  $\mathbf{r}_j$  - frequency relationship-building – the space of the matrix phase of the wave of CE;  $\mathbf{r}_k \cap \mathbf{r}_j$  - topological intersection of elements of spaces – the matrices of quarks  $\mathbf{r}_k$  with a set of elements belonging to the set of spaces of the structure of a comprehensive environment -  $\mathbf{r}_j$ . where  $rot\mathbf{q}_k$  - an elementary vortex matrix quark;  $rot\mathbf{q}_j$  - an elementary vortex matrix-phase of the wave CE. The primary impetus  $\left| \Psi_j \right\rangle$  in the form  $\mathcal{I}_{on.} \vec{div} \vec{U}_1$  polarizes and creates a certain amount – quadric. In total, this leads to a system:

$$\left| \mathcal{I}_{on.} \vec{div} \vec{U}_1 \right\rangle \otimes \left\langle \sum_n \mathcal{I}_{on.} \left| rot^{\mp} \vec{U}_n \right| \right\rangle = grad U_x^1 = \mathbf{V}_1 + \iiint_{m-n+1} (\sum_{n+1}^{r+y} \mathcal{I}_{on.}) \partial \partial \partial \mathcal{I}_{on.}^{\mp} + \emptyset \quad (5)$$

where the index of the degree of "r+y" as the rank refers to the process of forming a new structure through the processes of polarization of a more global level substructural matter with subsequent processes of interaction. In the ratio:  $\iiint_{m-n+1} (\sum_{n+1}^{r+y} \mathcal{I}_{on.}) \partial \partial \partial \mathcal{I}_{on.}^{\mp} = \emptyset$  contains the whole essence of the polarization. The index  $\sum_{n-1}$ , like,  $\iiint_{m-n+1}$  means the process of impact on the analyzed system polarization, as more global substructural level with relevant information about the processes of interaction potentials of this level, and one structural level of matter with all of the analyzed system. The process of cooperation  $\bar{\nabla}_n \mathcal{I}_{on.} \sum \mathbf{rot}^{\mp e} \vec{U}_n$  with the process  $\bar{\nabla}_1 \mathcal{I}_{on.} \vec{div} \vec{U}_1$  creating the volume, with specific content and density of matter, which determines its mass and energy, in full accordance with the definition of Isaac Newton. Primary momentum corresponding to the field curvature of space  ${}^2 k_n$ , is realized in the analyzed our space and by virtue of the potentials of these spaces creates an orthogonal field. Along the boundaries of this new space there are micro-subspace, the so-called electric charges, as the centers of the magnetic fields of matrices that carry information from a more global spaces. Interaction between nested spaces sold on the basis of the Lobachevskiy's space. This impulse-volume  $\left| \mathcal{I}_{on.} \vec{div} \vec{U}_1 \right\rangle = \mathbf{V}_1$

carries a specific potential difference  $gradU_x^1$ , as the space from which he appeared in a test of our system and the new (x), the space in its evolutionary development, which is the physical basis of evolution, the nature of gravity, magnetism, electricity, kinetic energy, etc.

### **3. The nature of the magnetic field**

The magnetic field arises when there is a gradient of potentials. The induced magnetic field arises around ferromagnets under the influence of external magnetic fields. To explain the presence of a magnetic field of the permanent magnets in physics introduced the notion of "domains". Domains – are the microscopic regions of a substance, which circulates around the circular currents. This means that the domain – this is a superconducting system in which the hypothetical circular currents circulate indefinitely. That is, the postulation of the existence of domains in permanent magnets – a postulation of perpetual motion, whose existence is based on modern knowledge of physics, is impossible.

The movement of charges occurs when there is a potential difference of the electric field, since the electric field – a whirlwind of compensation (wave) from another space of CE, arise from the charge is not compensated charge of opposite sign. In response to the appearance of the charge of one sign (the polarizing vortex-wave), the system seeks to replace the compensation incurred in the polar vortex-forming vortex (charge) of the opposite sign, including the space of another relationship-building. The result is a process of equalization of the volume concentration of charges of opposite signs and their mutual compensation. This alignment is carried out by the motion of charges, ie the emergence of a particular field of electric charges.

The real reason for the presence of a magnetic field from permanent magnets and a residual magnetic field during magnetization in ferromagnetic materials under the influence of an external magnetic field in the other. The reason for this is well known – it is the presence in the elements Fe, Co, Ni, lived on the second, electron spins are not compensated. The structure of the atoms of these elements is such that the mutual compensation of the spins of electrons occurs only at the last inhabited, which "shields" the penultimate orbital. On the penultimate orbitals of these elements contains either 6 (for iron) or 4 (with cobalt) or 2 (a nickel) of an electron with non-compensated spins. That is, the electron pair orbitals of the outer shields penultimate orbital electron spins are not compensated, therefore, the elements Fe, Co, Ni formed by the total spin is not compensated. In the event of an external magnetic field, these electrons are not compensated spins uniformly oriented in space in such a way as to maximize compensate the external magnetic field and stabilize the energy system. Uniform orientation of the spins of these electrons, in turn, causes the compensation process on the part of a

comprehensive environment - the appearance of induced magnetic field around the ferromagnetic material.

As was shown in [3], the electron is characterized by the presence of two closely related with each other levels of organization of matter – the charge and spin. That is why it is so closely linked electric and magnetic field. They can give rise to each other in their dynamic change. To describe the interaction of electric and magnetic components in physics coined the term: the electromagnetic interaction, which again was not true.

Electronics always exists in the form of unity of volume of vortices comprehensive protection of various topological scale – in the form of spin and charge as the reasons for the magnetic and electric fields, respectively. Therefore, the alternating magnetic field there is always next to an alternating electric field.

However, no movement of charges – the cause of the magnetic field. The reason for the magnetic field – is not compensated back. We show how to be focused when driving in the space carriers. As shown in Figure 1, the motion of free electrons of the axis of rotation AB plane S must coincide with the velocity vector  $v$  of the electron. When a potential difference across the ends of the metal conductor, all the free electrons acquire a velocity  $v$ , with velocity vectors are oriented in the direction of electric field  $E$ . The direction of rotation of the plane S of all the electrons in this case is the same, and, consequently, the spins of all electrons are uniform in sign, and therefore the total spin of the moving electrons is not compensated. Investigation complete neskompensirovannosti spin move freely-ing of electrons (and other carriers) - is the emergence of compensatory vortex comprehensive protection in the form of a magnetic field around these moving charges (currents around). Fig. 1 shows that the direction of rotation of the plane S, ie the direction of rotation of the vortex, creating a spin (pink arrows) opposite to the direction of the magnetic induction  $B$  (blue arrows) of the magnetic field, which tries to compensate for this spin.

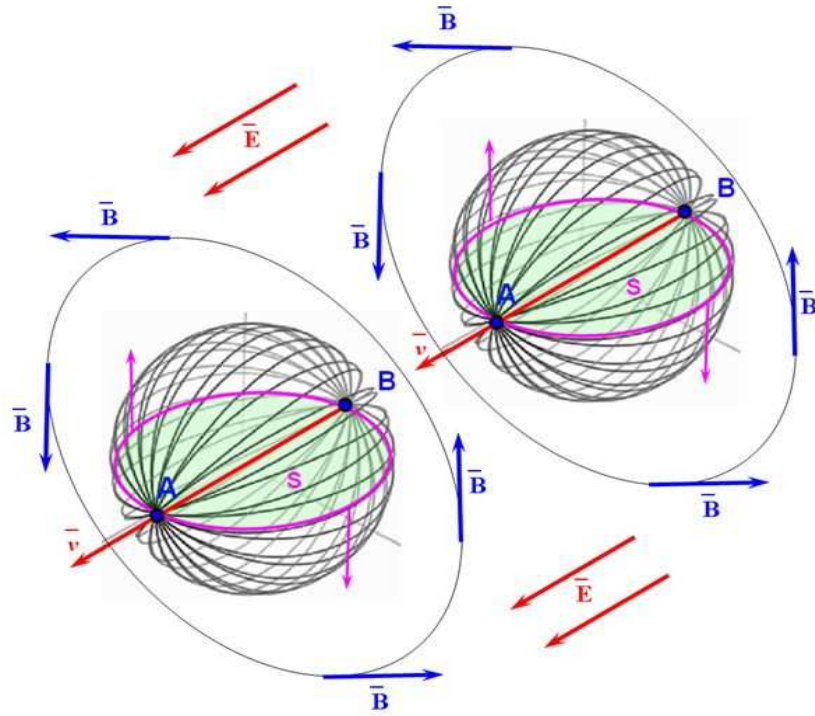


Figure 1 - Uniformity of the mark and not skompensirovannost spins of free electrons in their movement which arose with the advent of the electric field. The compensation of the spins of the overall environment in the form of a magnetic field.

The magnitude of the magnetic field induction  $B$  quantifies the compensatory whirlwind, CE emerged in response to not compensate spins of electrons in their motion.

Known equation that determines a given point in space the magnitude and direction of the magnetic induction of the magnetic field caused by the moving charge carriers.

$$\vec{B} = \frac{\mu_0}{4\pi} \cdot \int_{\gamma} \frac{\vec{I} \left[ d\vec{I}; \vec{r} - \vec{r}_0 \right]}{\left| \vec{r} - \vec{r}_0 \right|^3} \quad (6)$$

Module vector  $dB$  is defined by expression:

$$dB = \frac{\mu_0}{4\pi} \cdot \int_{\gamma} \frac{I \cdot dl \cdot \sin \alpha}{r^2} \quad (7)$$

Electric current – is the amount of charge flowing per unit time, ie

$$I = \frac{q}{t} \quad (8)$$

The charge – is the quantization value. Quantum of charge – is the charge of electron, ie:

$$q = n \cdot e \quad (9)$$

where  $e$  – electron charge,

$n$  – the number of carriers of charge and spin/

Then equation 7 with equations 8 and 9 can be represented as:

$$dB = \frac{\mu_0}{4\pi} \cdot \int_{\gamma} \frac{n \cdot e \cdot dl \cdot \sin \alpha}{r^2 \cdot t} \quad (10)$$

It is obvious that no current value  $I$  and not the amount of charge  $q$  determines the induction  $B$  of the magnetic field. It determines the number  $n$  of free moving electrons with non-compensated spins. This fact is a confirmation that the motion of free electrons are strictly defined and unified way oriented in space, and therefore are not compensated spins of opposite sign back.

That is why the magnetic induction a magnetic field is directly proportional to the current in a conductor. Electric current – is the number of moving charge in a time period. But the reason for the magnetic field is not in a moving charge, and the number of carriers of charge, and at the same time, carriers are not compensated spin. It polarizing volumetric vortex in the form of the total spin is not compensated is the cause of the magnetic field as a compensatory response by a comprehensive environment that questioned the closure of the Maxwell equations.

#### **4. The motion of an electron. Photoelectric effect with the position of the volume-wave of matter.**

We have shown that electrons can move in space with only one way – so that the velocity vector of electrons coincides with the axis of rotation of the plane  $AB$  at  $S$  in a single-direction of all the electrons (fig. 1). Whirlwind of a comprehensive environment in the form of rotating the plane of  $S$  at each electron creates a spin. Since the electron motion direction of rotation of the plane  $S$  the same in all the electrons, the spins of moving electrons is absolutely not compensated. Compensation whirlwind of comprehensive environment, which rotates in the opposite direction with respect to the spin of electrons – is the magnetic field arising around each

moving electron. Local magnetic field of each electron (vortices of comprehensive environment), which are also the volume waves are summed up and create a total magnetic field (volume vortex-wave of CE).

Known formula for the photoelectric effect:

$$E_K = h \cdot \nu - A \quad (11)$$

Where  $E_K$  – kinetic energy of electrons knocked out of the metal by a photon

$A$  – work of release

$h \cdot \nu$  – photon energy

Consider formula (11) as:

$$h \cdot \nu = A + E_K \quad (12)$$

All the photon energy absorbed by an electron substance is spent on:

1. to free electron from the substance of what is spent work  $A$ . For each substance, calculated photoelectric threshold.

$$\nu_{\min} = \frac{A}{h} \quad (13)$$

2. Acquisition of an electron, the so-called kinetic energy of the CE

Let the electron is in a steady state in which he no longer belongs to the atom, but not yet moving, while it is strictly defined form, parameters:  $\nu_2$  (frequency of rotation of the vortex, creating a charge), the frequency  $\nu_1$  (frequency of rotation of the vortex, creating a spin ) and the volume of the polarized medium (the volume of the medium involved in the process of wave formation). We call such electrons are stationary. Obviously, the electrons are close to stationary will occur if the substance is to begin irradiating photons with a frequency photoelectric threshold for the substance. For each substance, this frequency is strictly defined, because the atoms of different substances have different structures and the free electrons for various elements (metals) have different values of energy. This energy is greater than the electrons of the elements whose atoms have a complex structure and have a large number of atomic levels. Free electrons is much easier to leave the atoms of such substances, and therefore the work function of  $A$ , and



accordingly such substances below. If the electrons are close to stationary, can really exist, then we can write this equation:

$$E_{\text{STATIONARY}} = E_{\text{FREE}} + A \quad (14)$$

Where  $E_{\text{STATIONARY}}$  – energy of a stationary electron (a constant for any stationary electron, since all the electrons are stationary uniform).

$E_{\text{FREE}}$  - total energy of free electrons in the metal

A - electron work function for this metal.

In order to extract an electron from the atom, but not to give it no kinetic energy must be added to the energy of the electron in an atom energy equal to the work function for a given substance. Stationary electron – this is an idealization. To achieve zero linear velocity (kinetic energy) of an electron in reality impossible. However, using the model of a stationary electron is very easy to explain the photoelectric effect.

Photoelectric effect always goes in two stages, which merge seamlessly into one another:

1. Isolation of a free electron from the material, converting it into a stationary electron, what is part of the photon energy in the amount equal to the work function.
2. The remaining photon energy is spent on communication stationary electron kinetic energy, while the photon is completely absorbed by either electrons or Compton scattering occurs, resulting in significantly reduced photon energy and therefore, its frequency.

As noted earlier, for every electron that is close to steady-state must be strictly defined and constant parameters: shape, energy,  $E_{\text{STATIONARY}}$ , and the frequency  $\nu_{1\text{ST}} \nu_{2\text{ST}}$ , the amount of polarized environment  $V_{\text{ST}}$ , mass  $m_{\text{ST}}$ , radius  $R_{\text{ST}}$ , etc., as all fixed electrons in a uniform not depending on what material they were obtain. The charge of the electron is no longer compensates for the core, and the electric field as a compensatory whirlwind CE. The form of a stationary electron (electron cloud – the amount of space in which there is a wave-electron) must be spherical (like S-electron), as spherical electron has an energy minimum, and there is no reason for the emergence of more complex forms out of the atom.

Then the equation of photoelectric effect for a stationary electron can be represented as:

$$h \cdot \nu = E_K \quad (15)$$

That is the photon energy, completely scattered on a stationary electron, is spent on stationary electronic message only kinetic energy. We show how the scattering of a photon by an

electron from the standpoint of the wave theory of matter. Electron, like a photon – is a wave that can interfere (summate).

Simulate the result of interference of a stationary electron and photon.

There is a stationary electron, the axis AB which is located along the axis X. In steady-state electron falls photon, which moves well along the axis AB. There is an interference of matter waves and the electron is fully absorbed photon, starts to move along the axis X. The fact that the motion of an electron with its axis AB always coincide with the direction of the velocity vector, we found above.

For a stationary electron, which, according to our ideas is similar to S-electron [3]:

$$\begin{cases} X(t) = R_{ST} \cdot \cos(2 \cdot \pi \cdot \nu_{2ST} \cdot t) \\ Y(t) = R_{ST} \cdot \cos(2 \cdot \pi \cdot \nu_{1ST} \cdot t) \cdot \sin(2 \cdot \pi \cdot \nu_{2ST} \cdot t) \\ Z(t) = R_{ST} \cdot \sin(2 \cdot \pi \cdot \nu_{1ST} \cdot t) \cdot \sin(2 \cdot \pi \cdot \nu_{2ST} \cdot t) \end{cases} \quad (16)$$

For a photon:

$$\begin{cases} X(t) = \lambda \cdot \nu \cdot t \\ Y(t) = R_0 \cdot \cos(2 \cdot \pi \cdot \nu \cdot t) \\ Z(t) = R_0 \cdot \sin(2 \cdot \pi \cdot \nu \cdot t) \end{cases} \quad (17)$$

Where  $R_0$  - radius of the photon,  $\lambda$  – the wavelength of the photon,  $\nu$  - frequency of the photon.

When the interference of the electron need to do something "to get a legacy" of the photon. The fact that the motion of a photon at light speed - a product of the existence of  $\lambda \cdot \nu \cdot t$  (where  $\lambda \cdot \nu$  – is the speed of light) along the coordinate axis along which the photon is moving, in this case, the axis X. It is obvious that in the equation of the moving electron expression similar to  $\lambda \cdot \nu \cdot t$  must also appear in the projection on the X axis in the form of the term, as there is an interference of matter waves (addition of vibration). Due to the fact that the photon energy goes entirely to an electron kinetic energy, ie energy of motion, change the settings of the electron will occur only in the term of the X, responsible for the fact of movement. Therefore, an electron moving with any speed, as well as in the stationary electron, the values of  $R_{ST}$ , and  $\nu_{1ST}$   $\nu_{2ST}$  remain the same. Below is a mathematical model of the moving electron:

$$\begin{cases} X(t) = R_{ST} \cdot \cos(2 \cdot \pi \cdot \nu_{2ST} \cdot t) + \lambda \cdot \nu_{1ST} \cdot t \\ Y(t) = R_{ST} \cdot \cos(2 \cdot \pi \cdot \nu_{1ST} \cdot t) \cdot \sin(2 \cdot \pi \cdot \nu_{2ST} \cdot t) \\ Z(t) = R_{ST} \cdot \sin(2 \cdot \pi \cdot \nu_{1ST} \cdot t) \cdot \sin(2 \cdot \pi \cdot \nu_{2ST} \cdot t) \end{cases} \quad (18)$$

$\lambda$  – wavelength.

$\lambda \cdot \nu_{1ST} \cdot t$  – The "legacy of the photon" – the term responsible for the fact that the electron motion

From this equation should be a number of interesting facts:

1. The product  $\lambda \cdot \nu_{1ST}$  - is nothing more than the electron velocity  $v$ ;
2. Unlike the photon, whose speed  $c = \lambda \cdot f$ , the electron velocity  $v$  can be changed from  $v=0$  and  $v \rightarrow c$ . This is due to the fact that the value  $\nu_{1ST}$  - is constant and fixed, and  $\lambda$  can be changed.

Increasing the value of  $\lambda$  and the system according to the equation 18 three-dimensional graphs, we obtain the appearance of electrons moving with high velocities ( $v \rightarrow c$ ). These graphs are shown in fig. 2 and fig. 3.

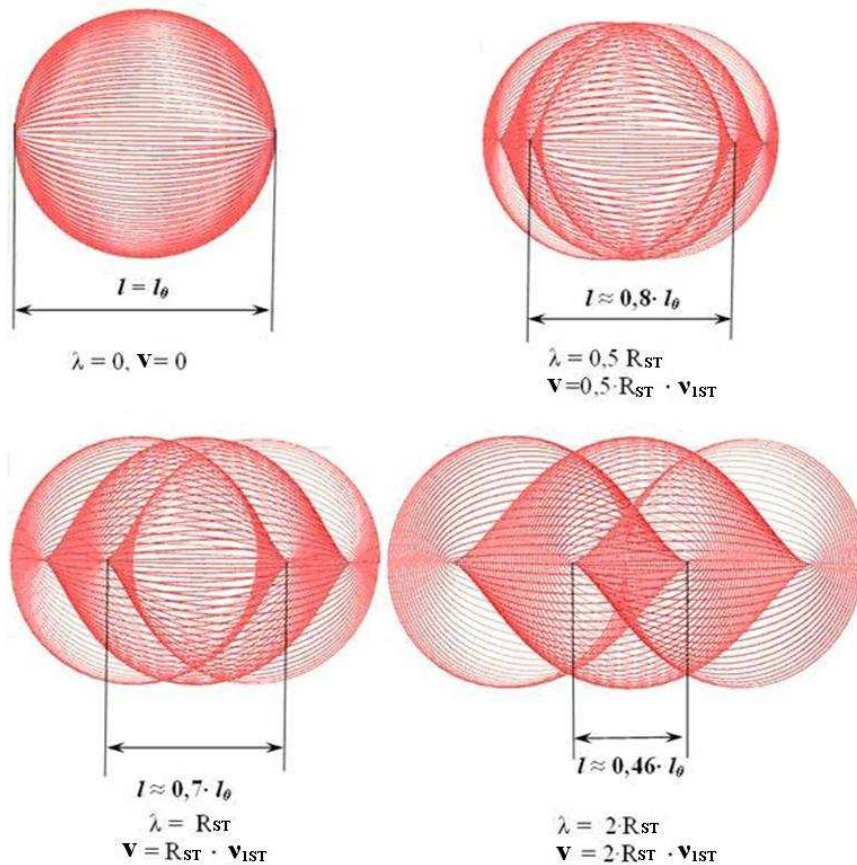


Figure 2. Method of stationary and moving with high velocity electrons.

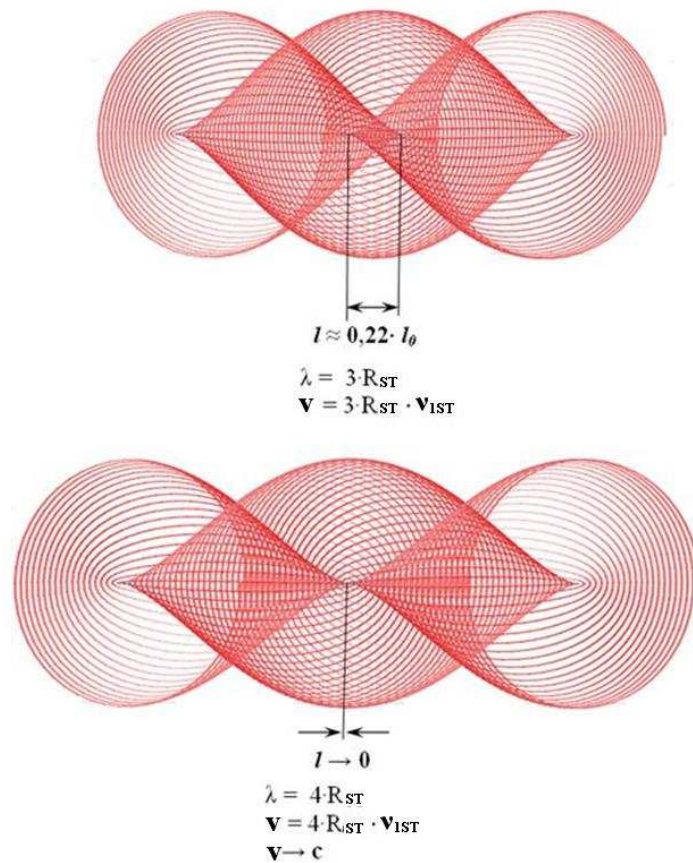


Figure 3. Forms of electrons moving at velocities close to the speed of light.

$R_{ST}$  - is the radius of a stationary electron (orbital radius)

$v_{1ST}$  - is the frequency of rotation of the plane S in a stationary electron.

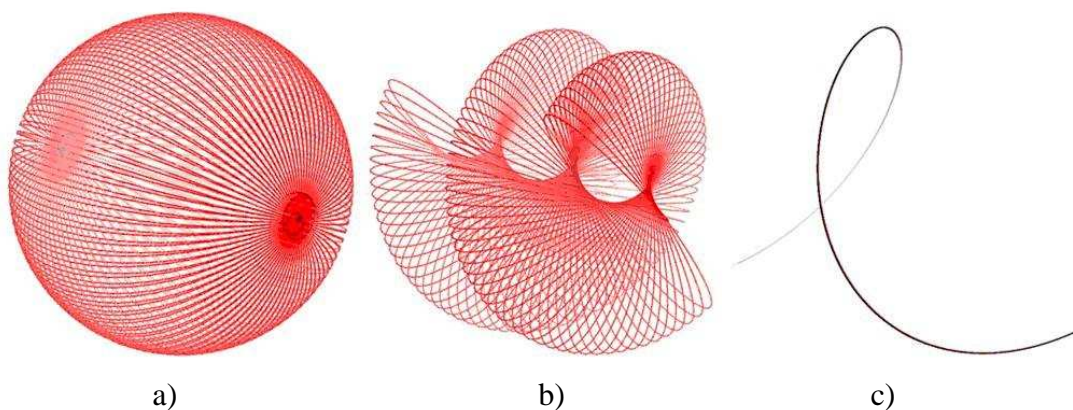
In the figure the distance  $l$  – a linear size of the electron as a particle, which is perceived as a corpuscle. That is the area between the vertical lines completely "covered" the plane S with its  $360^\circ$  for the period  $T_1 = 1/v_1$ .

When the electron velocity  $v \approx 0,1 \cdot R_{ST} \cdot v_{1ST}$  and further increase speed, begin to markedly decrease the linear dimensions of the electron. When the electron velocity  $v \approx 4 \cdot R_{ST} \cdot v_{1ST}$  its linear size  $l$  shrinks to a point.

FA Wilczek, the Nobel Prize in Physics in his Nobel lecture delivered on Dec. 8, 2004, says: "So we have come to a paradox consisting in the fact that the unification of quantum mechanics and special relativity theory leads inevitably to quantum field theory ..." [ 9]. In fact, some topological field quanta of scale – is any wave structure-attractors, each of which is open, is connected with the rest of the world and the wave interacts with it through the interference.

The significant increase in mass and energy of the electron during its acceleration to close to the speed of light is due to increase in a polarized environment (environment, involved in the existence of the wave), and the shape of an electron with a velocity shifts from spherical to elongated spiral, and begins to resemble a form of photon (Fig. 4). The frequency  $v_{1ST}$  and  $v_{2ST}$

when an electron moves remain constant. The value of magnetic induction around a moving electron with an increase in their rate increases because the increased volume of polarized electron-wave of a comprehensive environment, which in turn leads to an increase in volume of the medium involved in the compensatory rotation – the environment, which creates a magnetic field. That is why in modern cyclotrons magnetic field, confining ultrafast electrons can reach 10T and more. Thus, the movement – a wave process.



*Figure 4. Forms of matter waves: a) a stationary electron; b) electron, which moves at a speed close to the speed of light; c) photon.*

Equable motion of any structure – it is an equilibrium process of capture and release of the wave structure of equal volumes of comprehensive environment, and the volume of the polarized system environment (CE involved in the existence of the wave) remains constant. The movement of any structure with acceleration – is a wave process in which the amount of grip (polarized) of the medium exceeded the amounts released this comprehensive environment. The movement of any structure to the inhibition of – the wave process in which there is a decrease of the polarized structured environment.

Our world – is a system of structured volumetric vortices-waves of comprehensive environment, each of which creates a mass. This gigantic system structured compensate by the gravitational field of the universe. These are two worlds of volumetric waves of comprehensive environment evolve together and throughout the evolution of continuously interact with each other.

## **5. The cause of the strong magnetic field coupling $\text{SmCo}_5$ and the permanent magnets on the basis of this compound**

Strong permanent magnets based on the compound  $\text{SmCo}_5$  appeared relatively recently and have been widely used in electronics and household appliances. In this section we touch on

the causes of the strong magnetic field from permanent magnets on the basis of connections  $\text{SmCo}_5$ .

It is known that permanent samarium-cobalt magnets create a very strong magnetic field, which is near the poles of a magnet can have a magnetic induction of up to 0.1 T and more. This section explains the reason for the strong magnetic field coupling  $\text{SmCo}_5$ .

Fig. 5 shows the latest electronic shells of elements Co and Sm:

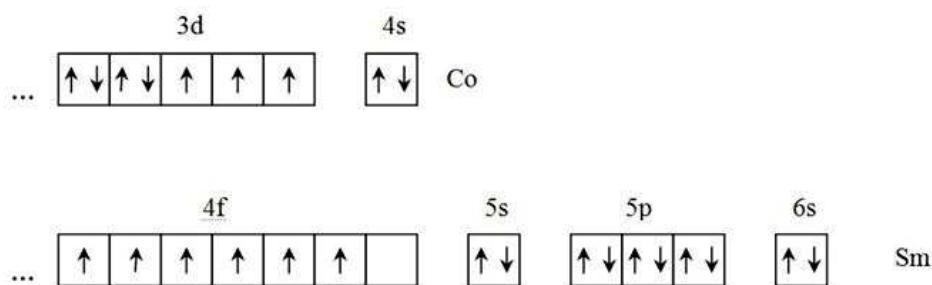


Figure 5. The valence electron shells of atoms of cobalt (Co) and samarium (Sm)

Us represent the mechanism of formation of the compound  $\text{SmCo}_5$

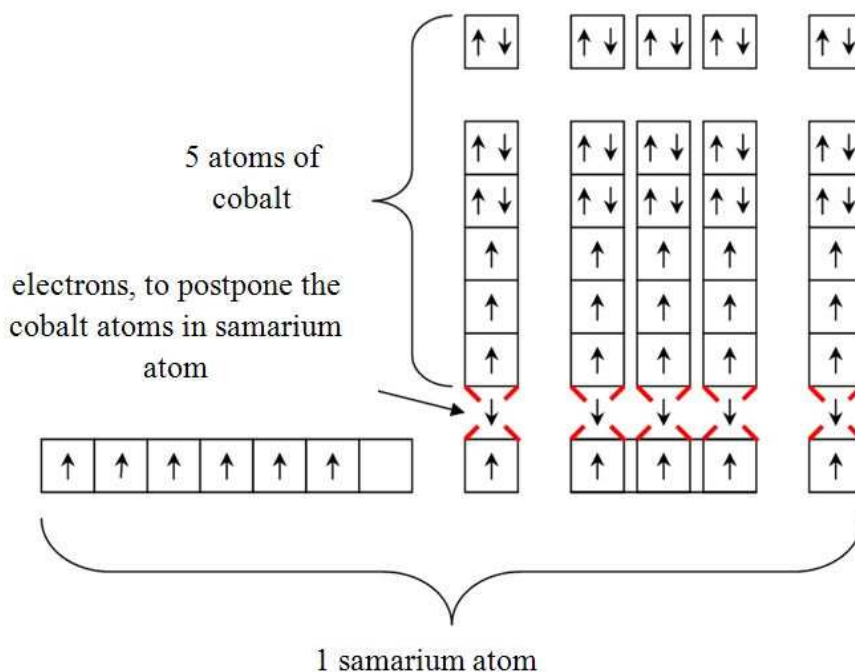


Figure 6. The structure of the molecule  $\text{SmCo}_5$ .

In cobalt atoms on the 3d-orbitals are 3 unpaired electrons. They cause the ferromagnetic cobalt, since 3 of the unpaired electron – a 3 electron with uncompensated spins. At the same time on 4s-orbital filled paired electrons. 4s-shell is a kind of "shield." This shell prevents the filling of 3d-shell electrons, which in the case of an open 3d-shell could get on this orbital as a

result of chemical reactions. We also have a samarium atom 4f-orbital with six unpaired electrons. 5s, 5p and 6s electrons are filled completely. The energy of these shells is very high. The energy of 3d-orbitals of cobalt is much lower than energy of 5s, 5p and 6s samarium shells, so the electrons of samarium with these electron shells are energetically more advantageous to be close to the unpaired electrons of cobalt (the system tends to minimize the energy). Such disclosure samarium nucleus gives rise to a very large total uncompensated spin. As a result, we have a connection with the five cobalt atoms with uncompensated spins of electrons and one atom of samarium as the uncompensated spins of electrons.

When the magnet is magnetized by the connection  $\text{SmCo}_5$  served very strong magnetic field and all the electron spins are not compensated equally oriented in such a way as to compensate for this external magnetic field. After magnetizing the magnetic field is switched off, and the electron spin has nothing to compensate. Total no compensated electron spins in the compound  $\text{SmCo}_5$  becomes so great that it is near the samarium-cobalt magnet is very strong vortex of CE in the form of its own magnetic field.

## 6. Electromagnetic induction

Most of the metals on the outer electron shell has significant number of vacant orbitals and the small number of electrons. Therefore, energetically more favorable that the electrons were not localized, but belonged to all the metals. According to the theory of free electrons in the metal lattice sites are positively charged ions, which are immersed in an electronic "gas", distributed throughout the metal. Thus, the valence electrons in metals are not localized. Between the positively charged metal ions and non-localized electrons exist electrostatic interactions, providing the stability of the substance. The energy of this interaction is intermediate between the energies of covalent and molecular crystals. The presence of electrons which can move freely over the crystal volume, provides high electrical and thermal conductivity, ductility and plasticity of metals. Metallic luster is due to reflection of light rays from the electron gas, which is a bit beyond the boundary lay negatively charged ions.

Consider non-ferromagnetic metals. The charge of free electrons in the metal charge is compensated by ions in the crystal lattice. In any element of a fully completed (no bond) electronic levels are always an even number of electrons, and always, at any energy sublevels of the completely filled orbitals is always a pair of electrons, in which: the same principal quantum number  $n$ , orbital quantum number  $l$ , magnetic quantum number  $m_l$  but different spin quantum numbers, which for this pair of electrons have values  $+1/2$  and  $-1/2$ . In other words, the non-valent orbitals of the electrons are always arranged in pairs, with their spins are opposite. Hence



it becomes obvious that the compensation of the spins of free electrons in the metal also occurs by twinning of free electrons with opposite spins. It is obvious that the lowest energy will have no single free electrons electron "gas" as described in the classical theory of metals, and free electrons are combined in pairs so as to mutually compensate for their own backs. Such a pair of electrons is relatively equilibrium state, at which the minimum energy. There are two main forces: the force of mutual electrical repulsion caused by the negative charges of electrons and the force of mutual magnetic attraction, caused by mutual compensation of the spins of electrons. Between the centers of electrons in the electron pair set distance  $r_I$ . The pairs of electrons are located randomly on the other pairs (Fig. 7). Let us show what happens when the metal (not ferromagnetic) will affect the external magnetic field.

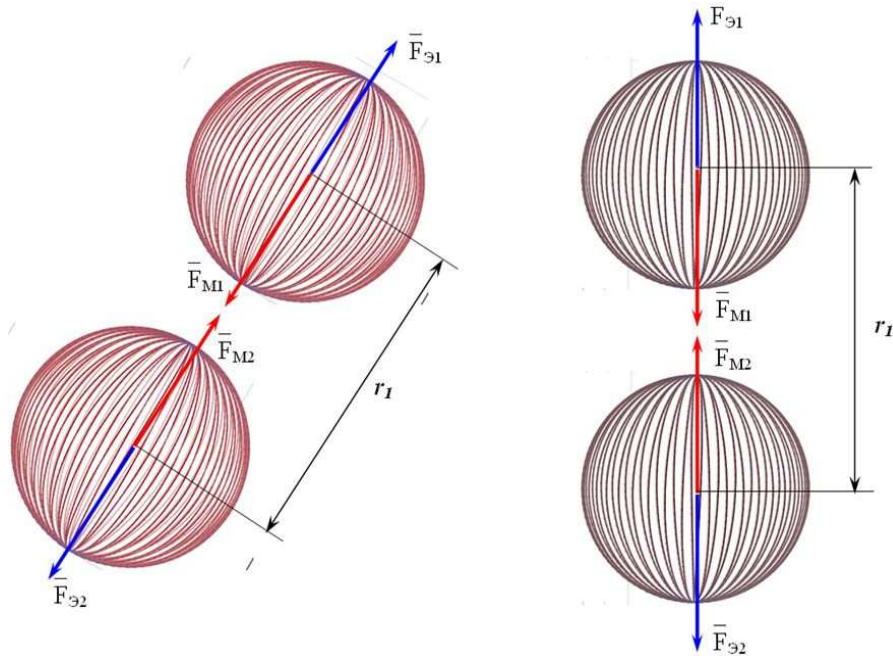


Figure 7. A pair of free electrons in the metal without an external magnetic field.



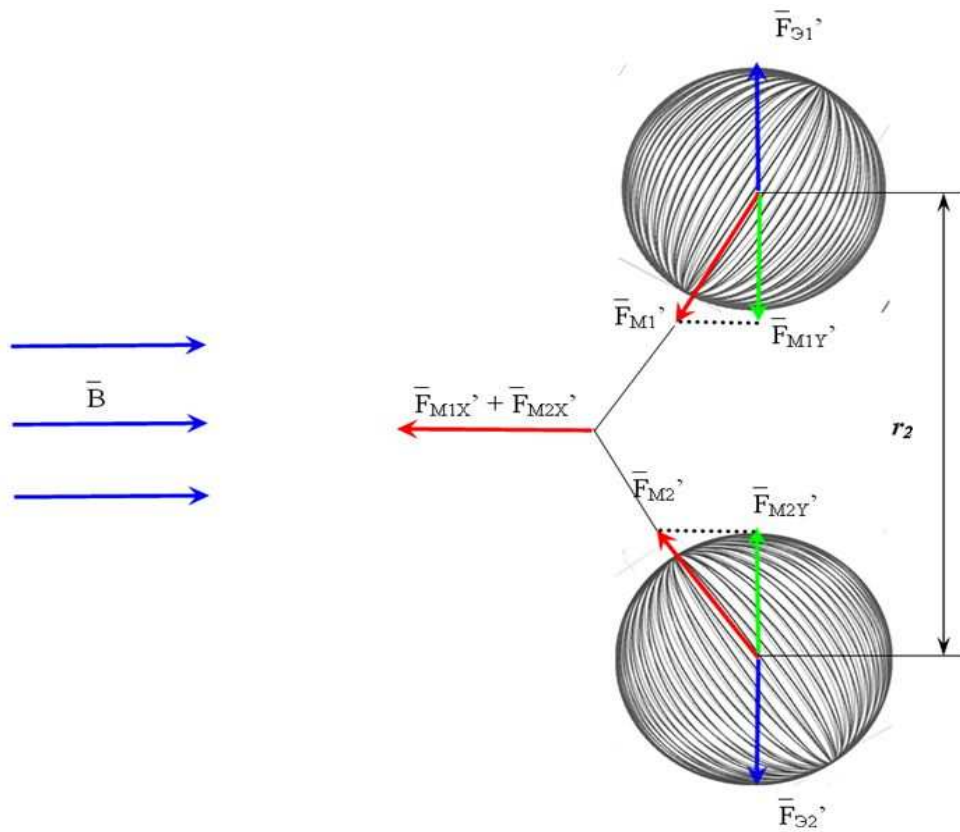


Figure 8. A pair of free electrons in the metal when an external magnetic field.

When applying an external magnetic field on the metal, each of the electrons constituting the electron pair, in addition to compensation of the spin of electron-partner, will seek to compensate for its spin more and the external magnetic field. Inside the electron pair, electrons turn around their axes of rotation of the plane of the vortex in the direction of the external magnetic field at a small angle (Fig. 8). This turn will decrease the magnetic force of attraction (force of mutual compensation of the spins) on the vertical axis in a pair of electrons. Reducing the magnetic force of attraction between the electrons cause the electrons relative to each other, caused by the electric repulsion. When the motion of electrons, inversely proportional to the square of the distance will decrease the forces of electrical repulsion. Reaching distances  $r_2$ , the system pairs of electrons and external magnetic field comes into a new conditional equilibrium. The distance between the centers of electrons in the electron pair will be equal to  $r_2$ . The energy of the system increases. Turning off the external magnetic field will return the system to its original state with the release of energy in the form of photons, ie electromagnetic radio waves with large wavelength. The presence of electron motion in a mass of metal will cause the unevenness of their distribution, and therefore - a short-term potential difference. This potential difference – are the EMF magnetic induction.

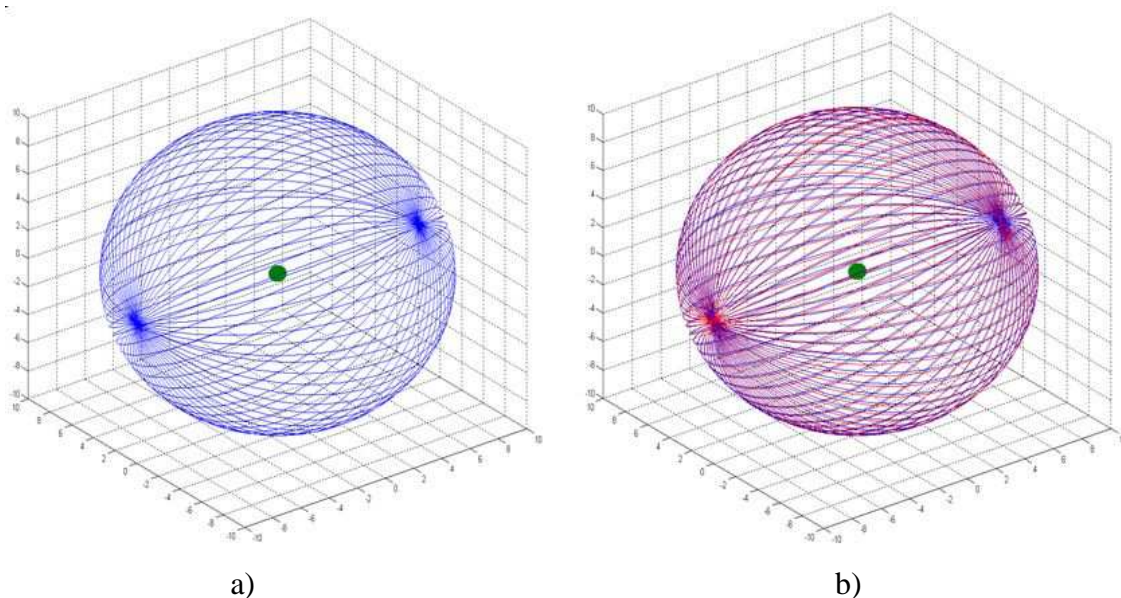
Maxwell's equations express the relationship between electric and magnetic quantities. However, the magnetic and electric field can generate each other without an intermediary – an

electron or other charged particles. All radio-wave measuring devices use the principle of converting photon energy into the energy of the moving electron, ie, using the phenomenon of interference of the photon and electron. Even seemingly purely optical devices using the phenomenon of diffraction by a narrow slit, also uses the interference of the incident photons and the “electron gas”, which stands for the boundary cracks. Diffraction, ie, "bending" the light of the obstacles associated with the interference of photons with the electron gas at the border of the substance.

## 7. The structure of electronic shells of atoms

Based on the above it becomes possible to depict the structure of atoms of light elements.

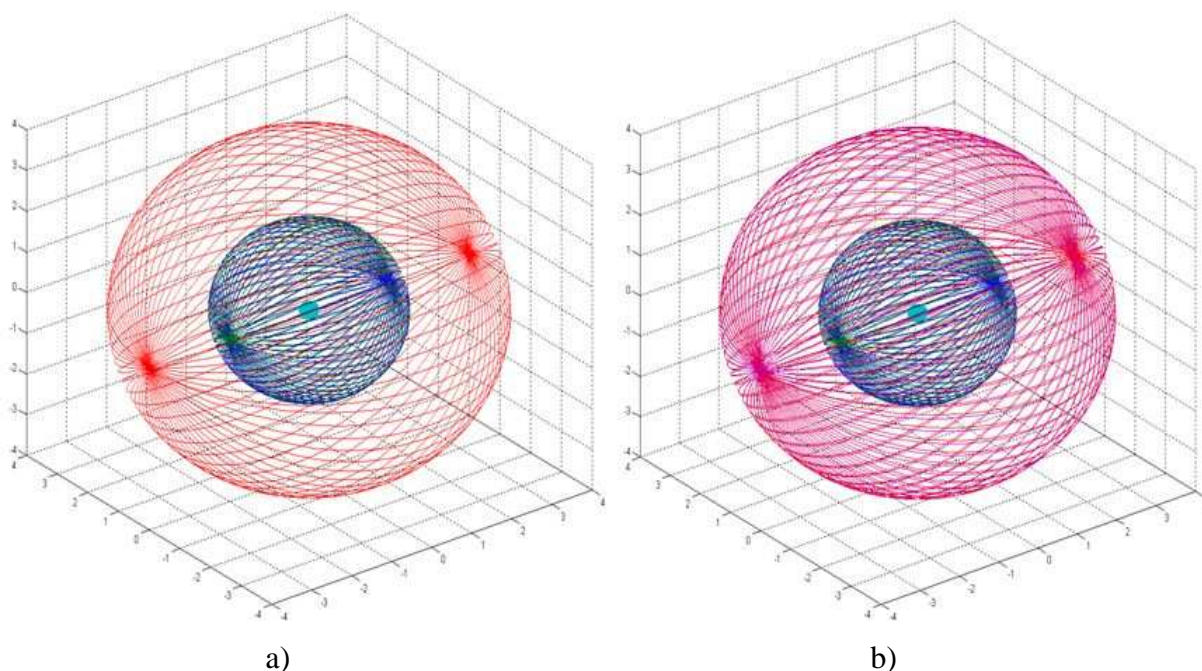
Fig. 9 shows the hydrogen (a) and helium (b) atoms.



*Figure 9. The appearance of atoms: a) hydrogen b) helium*

In the hydrogen and helium, there is only one s-orbital. At the same time that hydrogen at this orbital only 1 electron with spin is not compensated – this explains the rapid twinning of hydrogen atoms into diatomic molecules in which the uncompensated electron spin of the first atom cancel out the electron spin-mate of the second atom. Do the same for helium 1s-orbital has 2 electrons with mutually compensated spins. These 2 electrons almost completely shield all the wave perturbations of a comprehensive environment caused by the nucleus of helium (ie compensate for the charge), and moreover, mutually compensate for their own comprehensive environmental disturbances – own spins. Due to this almost complete compensated wave disturbances of a comprehensive environment, helium is always monatomic molecule, the most inert to chemical reactions, has the lowest melting and boiling points of all elements, and

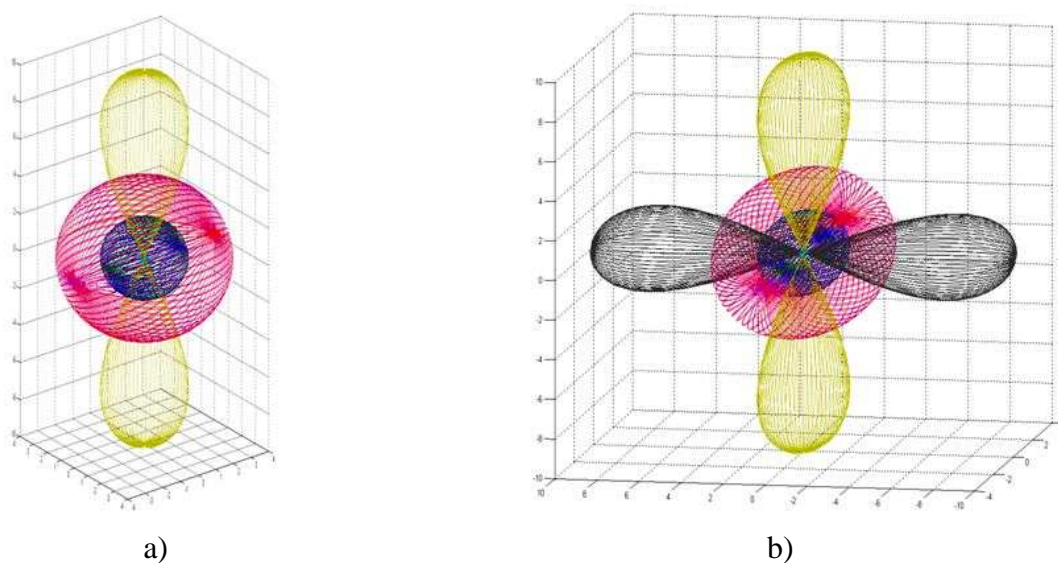
superfluidity, becomes solid only under high pressure and temperature are very close to absolute zero, is other unique physical and chemical properties.



*Figure 10. Appearance of atoms: a) lithium, b) beryllium*

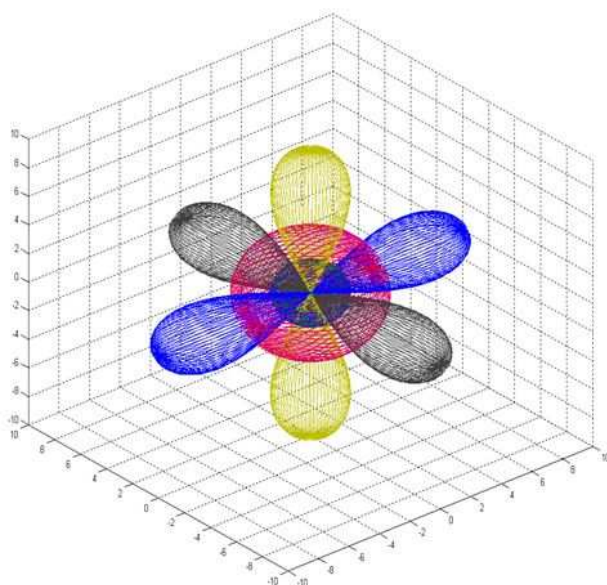
Next come the elements with filled 2s-orbitals. This lithium and beryllium (Fig. 10). Lithium – the lightest metal. Its properties are explained by the fact that only one electron on the second electronic level is very easy to interfere with the electrons of other atoms, while Li has always played the role of a reducing agent (this gives an electron). Beryllium is a much more inert than lithium, since the 2s-orbital is already 2 electrons with mutually compensated spins.

With increasing nuclear charge electron shells become more complex, there are p-electrons in the form of dumbbells, etc. (Fig. 11 - 15).

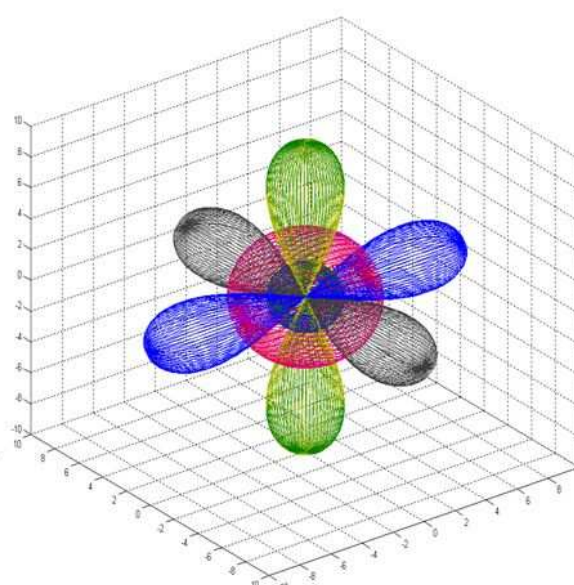


*Figure 11. Appearance of atoms: a) boron, and b) carbon*



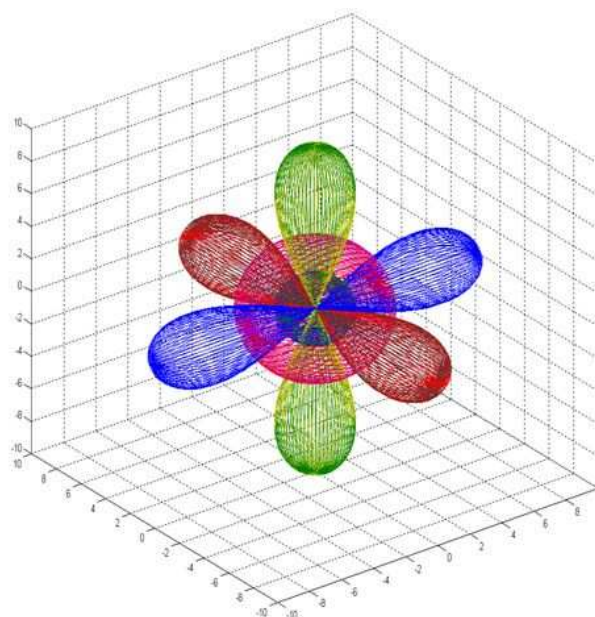


a)

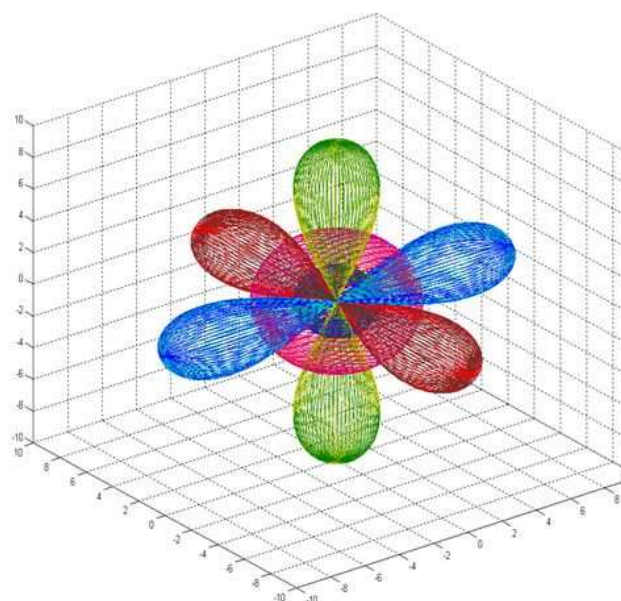


b)

*Figure 12. Appearance of atoms: a) nitrogen b) oxygen*

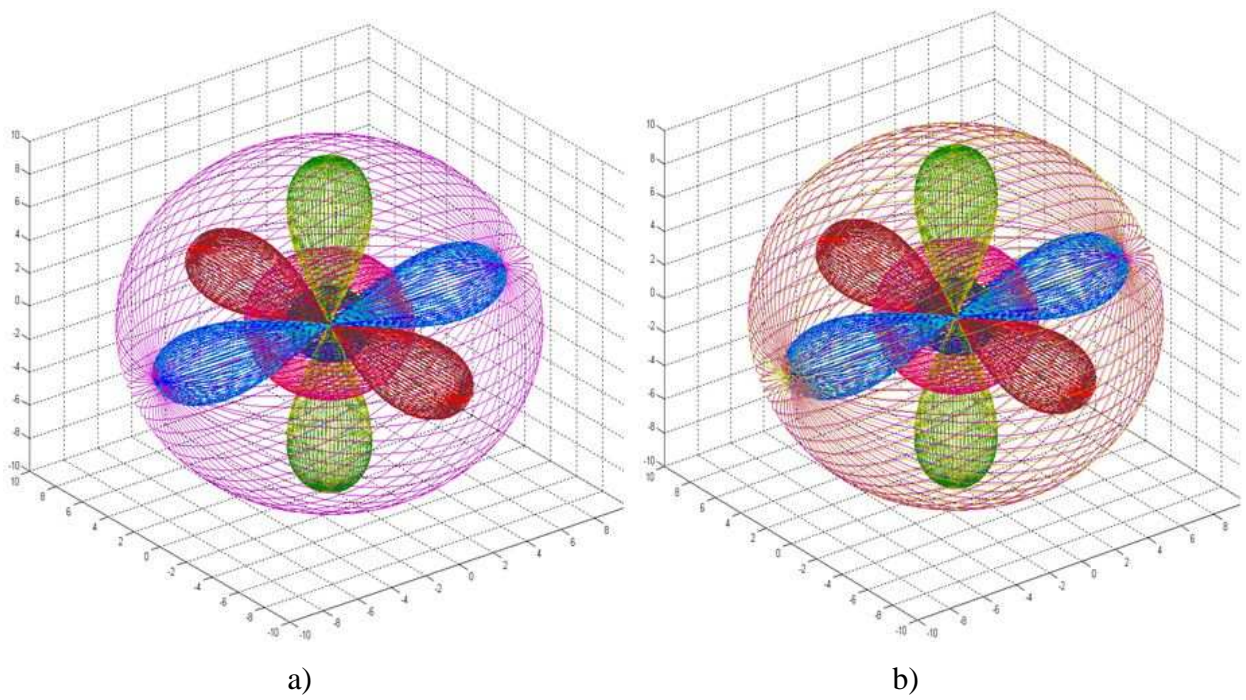


a)

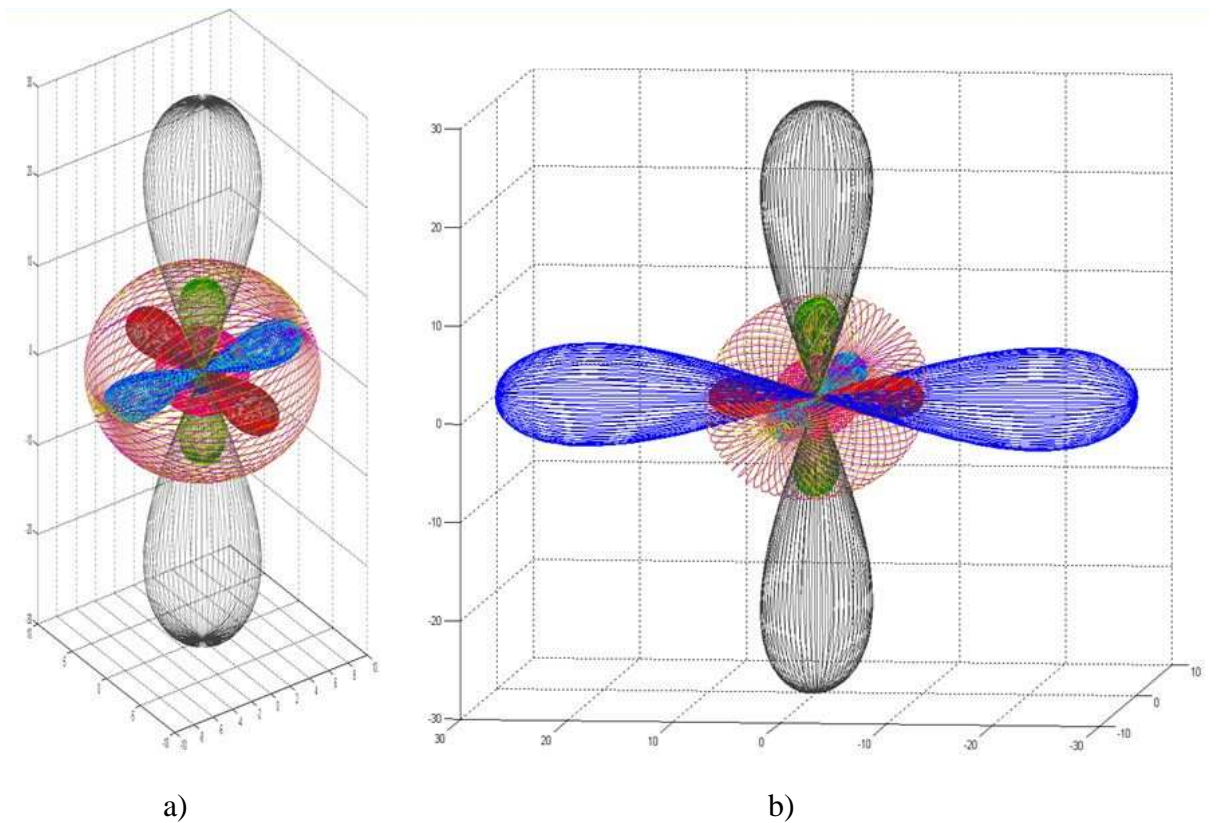


b)

*Figure 13. Appearance of atoms: a) fluorine, b) neon*



*Figure 14. Appearance of atoms: a) sodium b) magnesium*



*Figure 15. Appearance of atoms: a) aluminum and b) silicon*

Thus, in every atom of the center of the primary polarization  $\text{div}U_1$  comprehensive environment is core, and compensatory vortices, the rotors are electrons arranged in such a way as to maximize the potential to compensate for the nuclear charge and, as well as the potentials

of their own spins on condition of minimum energy of the whole system of the atom. Such consideration of the atom, the complex system of potentials according to equation 2 and the above theoretical concept provides a complete and most correct vision and understanding of chemical processes, ie processes at the level of the electron shells, as well as the causes of certain chemical and physical properties of individual elements or complex chemical compounds.

## 8. The curvature of space structure as a channel of energy exchange with the external environment

In this section we consider the notion of the curvature of space and its relationship to the mechanism of energy exchange between the structure and environment. To analyze this equation 2, in accordance with which, each value  $\alpha$  corresponds to the subspace of a comprehensive environment whose geometry is determined by the coefficient  $k$  or  $\hbar$ , as the content of a certain volume  $V$  of a comprehensive protection.

Consider two types of spaces of different curvature:

1. Spaces of constant positive curvature;
2. The space of constant negative curvature.

As a space of constant positive curvature, we choose a spherical surface, as well as a space of constant negative curvature - a surface in the form of pseudosphere.

### 1. Spherical space - a space of constant positive curvature $1/R^2$ .

The equation of a spherical space in parametric form:

$$\begin{cases} x = R \cdot \sin a \cdot \cos b \\ y = R \cdot \sin a \cdot \sin b \\ z = R \cdot \cos a + 0 \end{cases} \quad (19)$$

Where  $a$  and  $b$  – have the physical meaning of subspaces of a spherical space. In particular, if

$$a = 2 \cdot \pi \cdot \nu_2 \cdot T \quad (20)$$

and

$$b = 2 \cdot \pi \cdot \nu_2 \cdot T \quad (21)$$

we obtain the equation s-electron [3]. The zero term in equation (19) - is an empty set, as the possibility of the free (kinetic) energy.



## 2. Pseudospherical space of constant negative curvature $-1/R^2$

The equation pseudospherical space:

$$\begin{cases} x = R \cdot \sin a \cdot \cos b \\ y = R \cdot \sin a \cdot \sin b \\ z = R \cdot \cos a + R \cdot \lg \left( \operatorname{tg} \frac{a}{2} \right) \end{cases} \quad (22)$$

Comparing equations 19 and 22, it is easy to see that pseudospherical space (the space of negative curvature) differs from the spherical space (the space of positive curvature) only nonzero terms  $R \cdot \lg \left( \operatorname{tg} \frac{a}{2} \right)$  in equation (22), comparing this term with equation (2)

$V = \ln \left( \operatorname{tg} \left( \frac{\Pi(l)}{2} \right) \right)$ , struck by their amazing similarity. In this case, if we consider that  $V$  - is the volume of CE, which determines the appropriate amount of this energy and mass, we obtain the main conclusion: *the physical effects of the emergence of an influx of energy into the system from the environment will occur during the transition polarized comprehensive environment (environment, organized in the structure) from the space of positive curvature to the space of negative curvature and vice versa.*

In any physical and chemical processes, we are constantly witnessing the transformation of some structures in the other, which always takes place with the release or absorption of energy. Transformation of structures – it is always a transition of a comprehensive environment of space with a single curvature in space with another curvature, as any structure (the attractor) always generates its space.

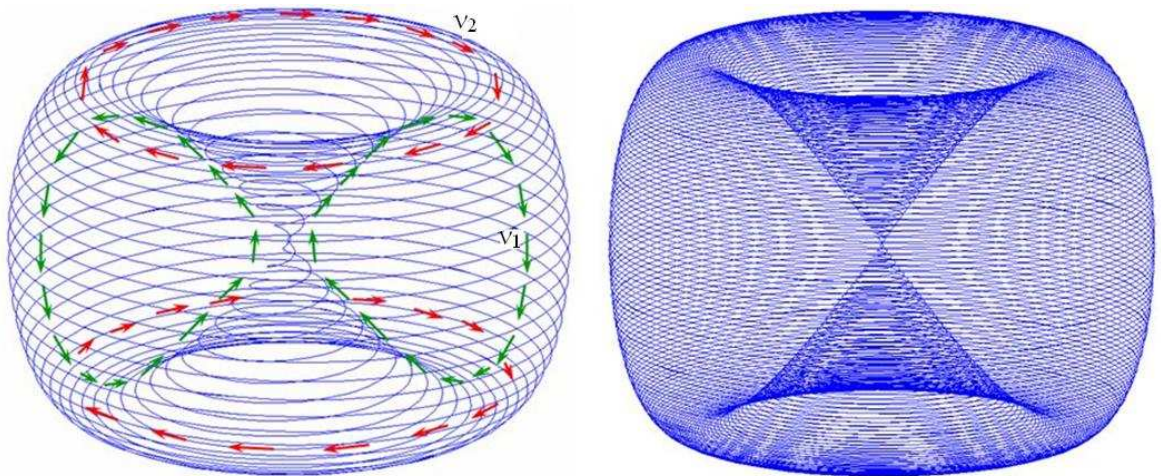


Figure 16. Vortex, as structure-attractor, whose outer surface has positive curvature, and the inner surface – the negative curvature.

Furthermore, in our real physical world, there are structures in which the curvature of space inside the structure changes not only in magnitude but also in sign. Such structures – a three-dimensional vortices. Fig. 17 shows a model of a volume wave-vortex of CE.

The outer surface of such a vortex has a positive curvature (similar to a spherical space), and internal – a negative curvature (similar to a pseudospherical space). Due to the presence inside the vortex of the two pseudospheres with a negative curvature, which are analogous to the Lobachevsky's space, in accordance with equations 19 and 22, this structure arises influx of a comprehensive environment that creates a new volume (according to equation 6), and therefore, new mass and energy. It is a fact of energy balance in a whirlwind from the outside (of a comprehensive environment) can be explained as a destructive force of hurricanes and tornadoes.

If we assume that the internal structure of the movement of liquid mass within the Earth like a flow, shown in Fig. 16, in view of the foregoing, it is easy to understand that in the evolution of the planet from the nucleus by the mechanism described above is a constant influx of energy from a comprehensive environment (CE) thanks parity effect of gravitational fields of the galaxy and the Sun. Consequently, in the bowels of the Earth, in accordance with equations 19 and 22 happened and is happening still grow volume and mass involved in the system layer of the planet, and therefore is very slow but steady increase in Earth's gravitational field and this is the basis for the evolution of life on the planet. The volume of the planet as a whole remains virtually unchanged, but increasing density of the planet, and with a total mass of the planet and its density – is growing and the gravitational "constant"  $g$ . Therefore, we can assume that the gravity on Earth several hundred million years ago was significantly lower than today. Confirmation of the hypothesis are the following facts: creatures, like dinosaurs in the present can not exist on the Earth is not so much because of the climate, but because of the high gravity. The largest modern animal on Earth - the blue whale being beached on shore very quickly dies from the strain of his internal organs by large gravity. The idea of connection, size of living creatures and the gravitational field of the planet we find in [10].

## **9. The system of producing energy from the environment.**

To obtain energy from the environment to create a system in line with the theoretical concept to create a process in accordance with equations 1 and 2.

The main element of the system – a generator of the primary pulse  $\text{div}U_0$ . As the momentum necessary to create a very powerful impetus to the magnetic field with steep fronts (like  $\delta$ -function). The peculiarity of the pulse edges are similar to  $\delta$ -functions is that the decomposition of such a signal in the harmonic Fourier series obtained by an infinite number of



harmonics. Each harmonic – is an integral part of the hologram structure and at the same time – one of the endless variations of the structure. The structure, which enters the magnetic pulse  $\text{div}U_1$ , will resonate at the natural frequency, and therefore such a resonance will create a harmonic signal, which will be part of the volume projection of the hologram structure. Structurally, as the generator of the primary impulse to use a coil of several turns of thick wire, and coil must be consistently included in the arrester – a nonlinear element, creating a powerful current pulse with very steep edges. Also parallel to the coil and the spark gap must be switched capacitor to store electric charge and the formation of a strong current pulse. The entire circuit of the generator should eat a constant voltage 10000 - 20000 volts.

Another integral part of the resonators – they must necessarily be few. Each resonator includes a coil having a greater number of turns than the coil of the generator-shaper of the primary pulse and with a thinner wire. One end of a coil is grounded, and the other - remains free. In general, each resonator – a system consisting of coils and the “parasitic” capacitance – the capacitance between the free end of the coil and the earth. Through this “parasitic” capacitance will occur so-called bias currents. Resonator – a system inductance-capacitance, it is an oscillating circuit, which will resonate at the frequency of natural oscillations and greatly enhance the vibrations of the primary pulse  $\text{div}U_1$ . Natural frequency of resonators must necessarily be multiples of each other in order to provide "nesting" of waves. Resonators must be placed in pairs in each of three mutually orthogonal planes. In each pair, with the first resonator natural frequency should be  $\nu_1$ , and a second resonator –  $\nu_2$ , the ratio of these frequencies should give an integer. Each pair of resonators will create modulated amplitude oscillations with a carrier frequency  $\nu_1$  and frequency modulation of  $\nu_2$  (see Fig. 17)

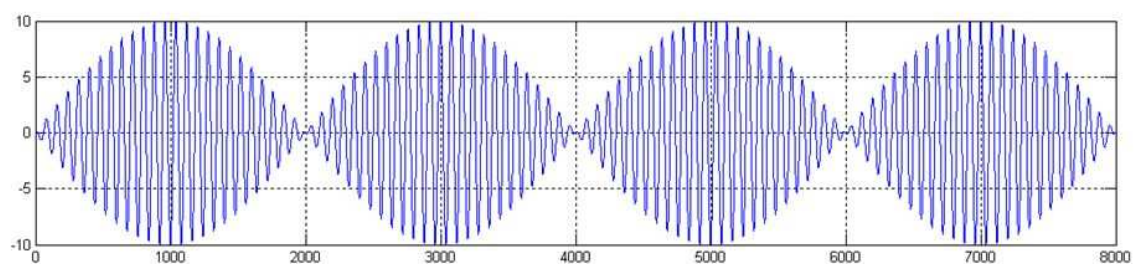


Figure 18 - The projection of the hologram, created by a pair of resonators

Resonators with the same natural frequency  $\nu_2$  or  $\nu_2$ , located in different orthogonal planes should have the phase shifts of  $90^\circ$ .

Due to the fact that the primary pulse generator is  $\text{div}U_1$  has a gap, which breaks the circuit after the passage of the pulse energy to the resonator will not go back to the coil of the pulse generator due to mutual induction coils.

Work in concert resonators, that is, when the waves of each cavity harmonically nested, and placed orthogonally to each other will form a hologram projection (Figure 18). Each projection will emerge with the other orthogonal projections and in general, formed by the volume hologram will eventually form a structure (Figure 17).

Thus, in the described device, the process is implemented in full accordance with equation 1, created a gradient of potentials  $\text{grad}U$  in the form of a powerful initial impulse  $|\text{div}\vec{U}_1\rangle$ , which comes from a more global space – an external oscillator circuit containing a coil of thick wire with a small number of turns. This impulse causes a complex compensatory processes  $\hbar\left\langle\sum_n|\text{rot}\vec{U}_n|\right\rangle$  in the resonators. A set of resonators forming complex of stable lamination spaces, which interact with the environment through comprehensive polarization processes in the empty set  $\emptyset$ , that is the reason for the formation of a new stable structure with a volume  $V_1$  and the mass  $m_1$ .

Structure to be established will be similar to ball lightning, or mega-electron. This structure will grow in volume, with each new impulse to involve (polarizing) and more new volumes of a comprehensive protection. The energy on the structure is taken from a comprehensive environment. To remove the energy need to be by its pumping from the formed structure.

## 10. Nonlinear holographic processes of evolution of the world.

Similarly, in according the mechanism described above are formed and other structures of our world, such as a planet. The role of the primary pulse  $\text{div}U_1$  here is the momentum of the galaxy. Resonators – the stars and star clusters are oriented relative to each other in some way, each star cluster, or resonates at a strictly defined set of frequencies, each structures-cavity contributes to the formation of the projection of the hologram of the planet. In a special place (in the point of crystallization) on the structural cavities (ie, stars and clusters), these projections are met and formed a hologram. At the point of crystallization by dynamically changing the hologram begins to act and organize CE, from the hologram, a new structure-planet. Node crystallization can still be called a point of parity of the fields. This point – where the projection of the hologram harmoniously fit into each other.

Similarly works DNA. DNA – is the set of gene-resonators. The primary impetus is the cosmic background radiation. Each structure of DNA resonates at a certain set of resonant frequencies. In addition, each structure of DNA spatially oriented relative to other structures of the cell in some way. The whole set of projections of the hologram is focused at a specific point, with the hologram begins to form the structure. Hologram - is essentially a 'frame' the future

structure, which begins to fill an oscillating, circulating, and so - organized by the CE, forming the mass of the structure. And so it evolves a living organism. It is proved that the germs of living organisms (eg, caviar) do not develop at screening the background radiation with the help of permalloy screen [11]. In other words, if there is no initial impulse, there is no resonance at well-defined frequencies, there is no projection of holograms, there is no hologram, so there is no structure-attractor.

The above studies and the general conditions for the realization of controlled processes have allowed to determine the sequence of solving this problem: first of all, we must create a sufficiently complex system, the stability of which can be affected so that it implemented the dissipative processes that lead the system to a given structural level in the state of the bifurcation transition to create a system of new structural units, characterized by increasing temperature.

### **Conclusion**

Thus, on the basis of theoretical research and understanding of the surrounding non-uniform, asymmetrical world, received a fundamentally new solutions to error-free long-term and short-term forecasting of natural disasters. Also based on the proposed concept are designed the systems for generation of clean energy, without using non-renewable energy sources that do not contradict modern theoretical advances in fundamental physics, allowing to solve the problem of efficient energy production on a fundamentally new basis.

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