1. ROLE OF SUPERSTRONG INTERACTION IN SYNTHESIS OF ELEMENTARY PARTICLES

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It was an inherent carrier of electromagnetic field - the elementary quantum of space in the form of an electromagnetic quadrupole (quariton) that has been introduced in the field theory in 1996. The quanton integrates four elementary massless charges: two electric (-1e and +1e) and two magnetic (-1g and +1g) ones, related by the equation g= C₀e (C₀ ≈ 3·10⁸ m/s is a light speed for non-strained vacuum field) at the orthogonal projection of electric and magnetic spatial axes in the quanton.

Explaining the laws of electromagnetic induction and electromagnetic perturbation propagation in the vacuum field the quanton couples the electricity and magnetism together. The size of me quanton is of an order of 10^{-25} m, the concentration (quantum density) is ~ 10^{75} particle/m³. Interacting one with another, the quantons form an elastic quantized space (EQS), specifying the electromagnetic vacuum field statics and the fifth type of superstrong basic interaction, as well as giving the first explanation of the mass appearance for particles at their birth (fusion) in terms of a vacuum field strain (actual distortion of space).

1. **Introduction**. The fifth type of superstrong fundamental interactions, joining all known others, was declared in work [1] to be in Nature. Why the new type of fundamental interactions was introduced into theoretical physics if it would seem there are no objective reasons to do it? If there is the fifth force in nature, « physicists realize that they search for something extremely weak, hardly eluding from observation» [2,3] - is an academic science opinion accepted for a long time.

On the contrary I formulate the problem in an affirmative form. Really in Nature there is the fifth force determined by superstrong interactions. Ones ask: «How the realities of superstrong interactions are proved?» In order to answer this question, it was necessary to develop the essentially new physical philosophy concept, which was transformed in the theory of elastic quantized space (EQS) [4,5,6]. On the other hand, the statement, that the new idea is a well-forgotten old one is truly fair. Actually the EQS theory returns physicists to an initial point established by Lorentz's concept of electromagnetic motionless ether. ·

In his famous electron theory Lorentz wrote: « the ether, undoubtedly, differs essentially from any usual substance, we can make the assumption, that this medium, which is a carrier of electromagnetic energy and many - probably, of all - forces acting on a tangible matter » [7]. Thus, Lorentz has formulated an idea of joining for all interactions via the structure of electromagnetic ether.

Why the idea of Lorentz has not found the understanding of physicist in XX century, and was subjected even to severe criticism as antiscientific one? The situation subjectivity has been explained himself by Lorentz: «I did not manage to receive the equations referred to moving axes in the same form as for motionless system equations; Einstein has made it in terms of a new variable system, distinguished slightly from equations introduced by me » [8].

The tragedy of physics in XX centuries is that Lorentz could not receive the necessary equations for motionless ether, which would satisfy to conditions of motion in it. But we shall present a situation, when Lorentz receives the equations. Then there would be no Einstein's theory of relativity. The paradoxicality of the viewpoint to natural science in XX century is defined by a skill to find and to solve the mathematical equations. If nobody could build and solve equations for the electromagnetic and motionless ether of Lorentz, the ether is not ostensibly in Nature.

But Nature does not depend on our consciousness and human abilities to think mathematically. The substitution of real physical models and the leaving from the classicism in theoretical physics to the subjectivism of mathematical imaginations have resulted the physical science in deepest crisis. The general theory of relativity (GTR), initially conceived by Einstein as a theory joining gravitation with electromagnetism, was not held even as a gravitation theory, since it could not establish causes of gravitational interactions.

There is no sense to subject GTR to the further criticism, since everybody criticizes it (excepting orthodox scientist). Now it is important to determine those directions in science, which lead the physics from the critical

status. In my understanding these directions have been formulated by Lorentz in a concept of motionless electromagnetic ether, as a carrier of all interactions (forces).

The modern physics operates in terms of four types of fundamental interactions: strong (nuclear), electromagnetic, weak (neutrino) and gravitational. The theory of electroweak interaction has allowed to join electromagnetism and weak interaction. It is doubtless, in order to join a strong interactions with all others the stronger force is necessary. That is a so-called superforce, which has expressed in the discovery of superstrong unifying interactions. Only the force can overcome other force. They are the firm laws of physics.

This fifth superforce in the EQS theory is the motionless electromagnetic ether of Lorentz, which is considered as an elastic quantized space with the strictly specified structure, possesing enormous tension and forces. In the basis of these enormous forces and tension there are the laws of electromagnetism.

Accordingly to the existing classification of types for fundamental interactions the electromagnetic interactions concede to the strong interactions in strength, occupying the second place in the general sheet of force rank. It is necessary to note that the present classification of fundamental interactions is conditional and determined by the time of course for known interaction processes. So, for example, the speed of nuclear processes (the strong interactions) is characterized by time of their course about $\sim10^{-24}$ s. The electromagnetic processes occur during $\sim10^{-21}$ s, that is slower by one thousand times. Weak interaction is slowest ($\sim10^{-10}$ s). The time of gravitational interactions has not been found [9].

Such time approach to the classification of interactions does not promote the development of common understanding not only for the nature of elementary particles, but also the nature of things as a whole. Naturally, when one say about the joining of all interactions, the fifth type of superstrong interactions in the EQS theory is determined by an electromagnetic structure for Lorentz's motionless ether as an electromagnetic vacuum field, on which there are all other events including strong, electromagnetic, weak and gravitational ones.

The EQS theory considers all interactions only on a background of vacuum field and with interaction with it. For this purpose it was necessary to reconsider the viewpoint to electromagnetism, not as the second rank force conceding to intranuclear interactions, and as the most important force forming other interactions. It is not necessary to confuse the wave electromagnetic processes in vacuum to a static electrical and magnetic tension of vacuum field, which represents itself the superstrong interactions.

Running forward I note, that such approach has allowed to receive a physical model of static electromagnetic spatial vacuum field, on the basis of which one built and solved necessary spatial equations for movement in motionless static field, which Lorentz tried to receive [6].

The presence of a structure for static electromagnetic vacuum field allows to exclude the Lorentz transformations from the equations and to refuse completely the relativity principle as a paradoxical phenomenon, which is unacceptable in the creation of an absolute model of space. Only such approach to the problem enables for the first time to join strong, weak and gravitational interactions from unified positions of electromagnetism. We live in the electromagnetic Universe.

Main, the discovery of quantized structure of space gives a new impulse in development of the quantum theory of elementary particles by specifying models of their synthesis from vacuum field. Before to consider the models and the structure of elementary particles it is necessary in brief to familiarize with the basis of vacuum field quantization, the detailed statement of which is represented in work [6].

2. Basis of electromagnetic quantization of vacuum field. The elementary particles cannot be considered in the absence of vacuum field, which indivisible part they are, defining spherical deformation of the field. Einstein has changed the real deformation of vacuum by a geometrical curvature, which establishes ostensibly the gravitational interactions.

The Einstein approach to the gravitation problem looks as a bending of empty space by a body and no more. Hence as a gravitational charge the body mass represents something firm, initially created in the empty space.

In the EQS theory the approach to the

gravitation problem is completely opposite to the Einstein approach. Thus the particle mass is considered as a result of spherical deformation of the vacuum field. That is the vacuum field synthesizes elementary particles. And the vacuum deformation in particle synthesis for different elementary particles is realized in different ways.

The particle movement in the fixed vacuum field is considered as a transfer of field deformation by subordinating the properties of such particle to a principle of the wave corpuscular dualism. The consideration of mass motion in the vacuum as a transfer of the vacuum field deformation has allowed to build and to solve the motion equations for fixed ether. However, these motion equations do not differ essentially from ones, known in the classical and relativistic mechanics and establish the final magnitudes for energy and mass particles of in all range of speeds, including light one.

In order to describe the laws of the vacuum field deformation in synthesis of elementary particles, it is necessary to know the field structure. In this case one can only say about specific electromagnetic structure of a vacuum field penetrating our Universe. And naturally, such structure can be determined by the electromagnetic quantization of vacuum by representing the structure, woven from a manifold of electromagnetic static quantums of space (it should not confuse to a radiation quantum).

In order to form new initial universal bedrock of World, it was necessary to determine initial constants lying in the basis the EQS theory. So, in the special theory of relativity (STR) it was postulated the light speed constancy rejected later in GTR. At establishing the hadron structure in quantum chromodynamics (QCD), three fractional electrical charges (quarks) appeared initially: − (1/3) e, − (1/3) e, + (2/3) e, where e=1.6 10^{-19} C is the elementary electrical charge.

From the viewpoint of classical electromagnetism, the introduction of fractional electrical charges is nonsense. It has been to one of the reasons, explaining why the QCD models are not so universal and demand the introduction of more and more new parameters for description. The parameter number reaches up to 100, but all the same problems of the strong interactions do not solve. But main, QCD predicted obtaining a quark -gluon plasma in accelerator at achievement by proton the energy of 200GeV/nucleon , when the proton must "melt" to plasma. The higher energies are achieved but the quark-gluon plasma is not found experimentally. Even the experts in this area have enough of doubts in the basis of QCD [10].

Nevertheless, the QCD approach to matter structure at the cost of using the electrical charges is also applied in the EQS theory. Only the application vector and the amount for charges are changed. If in QCD the quarks are an initial building material only for one type of particles (hadrons), in the EQS theory the charges are a construction basis for the space structure and, accordingly, for the whole scale of elementary particles by forming a new universal particle - the space quantum called by **quanton**. Only four integer elementary massless charge are used instead of the fractional ones: two electrical (-1e and +1e) and two magnetic (-1g and +1g), joined in a unified design - the electromagnetic quadrupole .

In the EQS theory the electrical and magnetic charges as massless monopoles are separated from elementary particles, possessing the mass and being only carriers of free monopole charges. In space quantum (quanton) the joined monopole charges are considered only.

The choice of integer charges in the basis foundation of the EQS theory is explained by the most stable (external parameter independent) constant for the elementary charge from all known fundamental constants. Practically, all physical bodies are represented in general by electrically neutral material objects. It is explained by the electrical neutrality of atom in the non-excited state when the nuclear, proton charge is compensated by opposite charges of orbital electrons. The disbalance between the positive polarity charge of proton and the negative polarity charge of electron is inspected with the high accuracy level of 10^{-20} e.

As to a problem of magnetic charges, the ratio between the electrical and magnetic charges, received for Dirac's monopole, was revised, since the initial presumptions in the Dirac equations for a magnetic monopole had been chosen wrongly [6]. The most precise ratio between the elementary electrical and magnetic

charges is given by the symmetric Maxwell equations for vacuum, from which it follows

$$g = C_o e = 4.8 \cdot 10^{-11} Dc \qquad (1)$$

where $C_o \sim 3 \cdot 10^8$ m/s is the light speed in a non-deformed vacuum field.

The elementary magnetic charge in (1) is measured in the Dirac units (Dc). The magnetic charges are not found experimentally in a free state. It confirms that they are really coupled by the electromagnetic quadrupole inside hereafter the indivisible space quantum (quanton) and belong to the quantized space, i.e. the electromagnetic ether, alongside with the electrical elementary charges. Some excess in the free electrical charges is specified by an electrical asymmetry of Universe. But the excess, similarly to a continuous vacuum field, defines conditions and a mechanism of elementary particles synthesis in vacuum.

The procedure of the electromagnetic quantization of space by charges is stated specifically in work [6]. It is important to understand, in order to allocate an elementary volume in space the four marking-off points are necessary only. Actually if we take only one point, in fixed space this point is adhered to space. Two points can form already a line as a segment of space. Three points allow us to allocate a surface in space and four ones - a volume.

So, from the geometrical minimization viewpoint the quantization procedure of space requires only four marking-off points. The transition from the geometry to physics is associated with a replacement of the geometrical points by physical objects. These objects were stipulated by Nature in the form of the mentioned four massless charges: (-1e, +1e, -1g and +1g). The built construction in the form of an electromagnetic quadrupole represents also an elementary static electromagnetic massless quantum of space - the quanton.

Naturally, we can not approach to the quanton structure even with a measure of elementary particles. From classical viewpoints, under action of enormous tension forces the four unlike charges in the quanton have to collapse in a point. However, using known conditions of the collapse restriction, the quanton sizes should be equal to the Planck length about 10^{-35} m [5]. At such quanton sizes the elastic properties of vacuum are shown in

further investigations to be so great, that they exceed the light speed by tens orders.

It means the quanton sizes should be much higher than the Planck length and is shown in calculation to correspond to sizes about 10^{-25} m. For this purpose there should be objective reasons which would prevent the monopole charges to collapse. Only the structure of monopole possessing certain sizes can be such reason.

The most probable structure of the electrical and magnetic massless monopole is presented in Fig. 1. In order to satisfy the conditions of an elastic state for the vacuum field the monopole sees to be a two-phase particle consisting of a central nucleus 1 surrounded by an elastic atmosphere 2. It is the nucleus 1, which is a source of field (electrical or magnetic) in a charge form. It is possible to assume, the monopole nucleus is determined by the Planck length. The physical nature of the monopole charges and the structure of their elastic atmosphere are not clear yet. We are able only to guess that the elastic atmosphere of the monopole defines electrical and magnetic properties of vacuum side by side with the monopole.
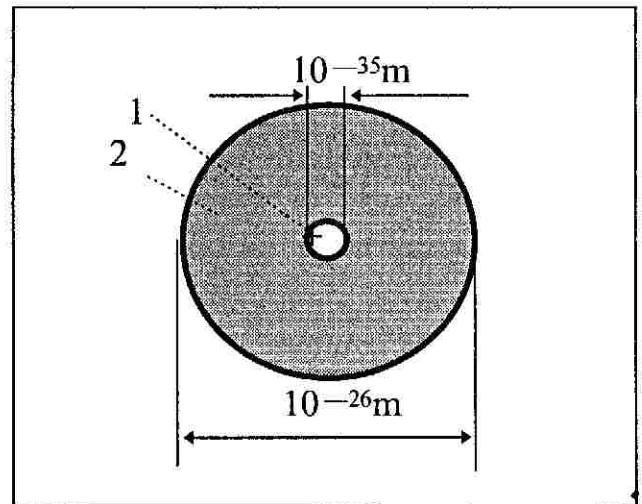

Fig. 1. Structure of electrical (magnetic) monopole:
1 - charge nucleus, 2- atmosphere

The monopole structure is shown by me to be described in the non-categorical form, since it is impossible to investigate directly its essence experimentally. Following from accumulated inferential results of investigations on the electromagnetic properties of vacuum, the monopole charges should satisfy certainly to the model shown in Fig. 1.
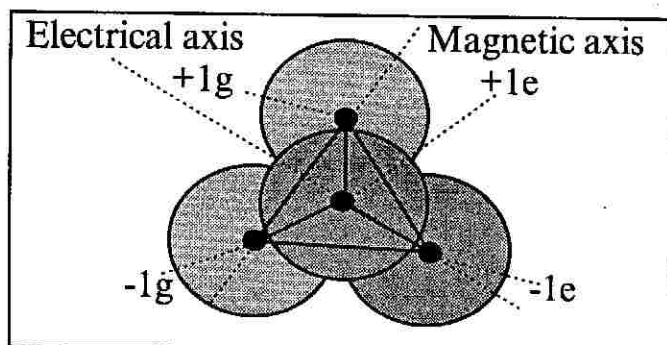
Fig. 2 Formation of space quantum (quanton) from four monopole charges in tetrahedron model for nucleus arrangement (top view).

On the basis of the physical model for monopole charges it is possible then to analyze a quanton formation process represented in Fig. 2. The four elastic balls - the monopoles - form a figure with the nucleus arrangement in the tetrahedron vertexes, providing the orthogonality of electrical and magnetic axes for the neutral quanton as a whole.

But the quanton can not remain in this state (Fig. 2). Naturally, the enormous forces of electromagnetic compression should deform the quadrupole from the monopoles to a spherical particle presented in Fig. 3, keeping the particle integrity and the orthogonality of the electrical and magnetic axes.
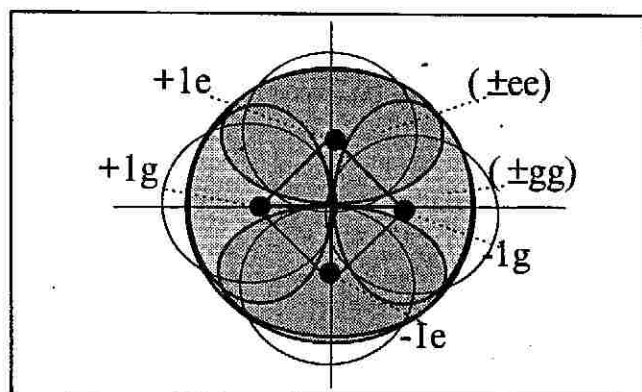

Fig. 3. Formation of spherical form for the quanton as a result of electromagnetic compression of the monopoles in quadrupole

In the EQS theory the quanton is represented in a ball form, with the mentioned four monopole charges (embedded inside the ball), which nucleuses are located in tetrahedron vertexes. Then it is very simple to imagine a process of large volume space quantization associated with its filling by quantons. Through the natural ability to couple opposite charges, the quantons link each with other and form a quantized elastic medium.

The tetrahedral form of monopole

nucleus arrangement in the quanton brings a chaotic element in the quanton coupling, orientates randomly their electrical and magnetic axes in space and excludes thus any priority direction in the orientation. The electrically and magnetically homogeneous isotropic medium, possessing electric and magnetic properties, is formed as a whole. The medium is called be the vacuum field.

Naturally, to present the structure of the discrete electrical and magnetic field of quantized space in a projection to plane is not possible. But the simplified model of a local segment in the vacuum field for the four quantons in a projection to plane is shown in Fig.4 in terms of force lines of the electrical and magnetic fields. Of course, the vacuum field can be considered as a discrete mesh of force lines for static electrical and magnetic fields. The mesh is thrown over Universe and connects together everything. The vacuum field represents a static discrete electromagnetic field.
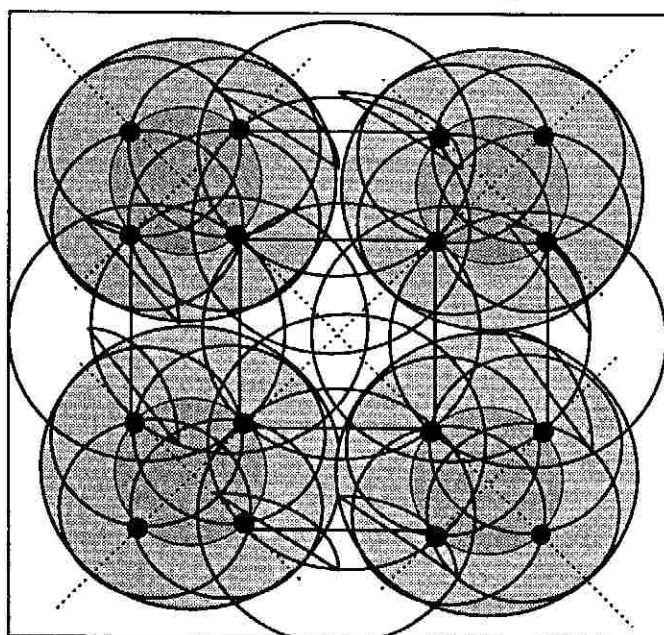

Fig. 4 Simplified diagram for the four-quanton interaction as force lines on local area of the vacuum field.

Due to the presence of a static electromagnetic field in vacuum the electromagnetic induction laws, associated with a violation of the electrical and magnetic balance of the vacuum field, work. The quanton ability to electromagnetic polarization has allowed for the first time to receive an informal conclusion for Maxwell equations. For vacuum the equations are represented in the symmetric form as the unified equation and specify the

equality between electrical (j_e) and magnetic (j_m) current displacement densities, provided that $j_e \perp j_m$

$$j_m = -C_o j_e \qquad (2)$$

After expression of (2) through a relevant modification of strength vectors for the electrical E and magnetic H vacuum fields, caused by an electromagnetic perturbation in time t, we receive the equations of electromagnetic induction for vacuum. According to the equations the change in the electrical field results in the electrical field induction. On the contrary, keeping the orthogonality of the vectors $E \perp H$

$$\frac{\partial H}{\partial t} = -C_o \varepsilon_o \frac{\partial E}{\partial t} \qquad (3)$$

Following from the conditions of electromagnetic tension for the vacuum field and tension perturbation by the spherical vacuum deformation at synthesis of elementary particles (proton and neutron), the sizes L_q for an electromagnetic static quantum of space (quanton) have been determined

$$L_q = \left(\frac{4}{3} k_3 \frac{G}{\varepsilon_o}\right)^{\frac{1}{4}} \frac{\sqrt{eR_s}}{C_o} = 0,74 \cdot 10^{-25} m \qquad (4)$$

Where
$k_3 = 1.44$ is a factor of vacuum filling by spherically shaped quantons ;
$G = 6.67 \cdot 10^{-11} Nm/kg^2$ is the gravitational constant;
$\varepsilon_o = 8,85 \cdot 10^{-12}$ F/m is the electrical constant;
$R_s = 0,81 \cdot 10^{-15}$ m is the proton radius.

For the first time the electromagnetic quantum of space was introduced into theoretical physics in January, 1996 [4]. Naturally there were doubts and mistakes, which were overcame later. The electromagnetic structure of space allowed to explain and to describe mathematically the most difficult and puzzling physical phenomena including the analytical informal conclusion for the Maxwell equations and the determination of energy limit for relativistic particles.

Knowing electromagnetic structure of space it is absolutely simple to specify the enormous tension and the boundless heat capacity for the vacuum field. For instance, at activation of 1 m³ vacuum the released energy is equivalent to birth another Universe. The EQS theory discoveries the fifth type of superstrong interactions between the quantons in the vacuum field and entrusts a new concept for Universe.

3. Formation of mass in the vacuum field.

Practically, it is impossible to explain a phenomenon of mass formation for elementary particles without invoking a conception of superstrong interactions.

Let's allocate a spherical impenetrable border inside the vacuum field and compress it uniformly. It is obvious, the internal volume region will be compressed, and the external one will be stretched. The stretching will weaken with the distance from border. How is it possible to describe mathematically the given process? Initially for this purpose it is necessary to introduce a conception of the quantum space density ρ_o for non-deformed vacuum field. The density is specified by the quanton amount in a volume unit

$$\rho_o = \frac{k_3}{L_q^3} = \frac{1,44}{(0,74 \cdot 10^{-25})^3} = 3,55 \cdot 10^{75} \frac{particle}{m^3} \qquad (5)$$

The quantum space density introduction allows us to make a transition from the discrete space structure to the continuum. In this case, the spherical deformation of the vacuum field results in a redistribution of the quantum density for elastic medium. The redistribution is described in terms of the well-known Poisson equation for elastic deformation. Thus the vacuum field deformation D_a will be observed from the external part of border. The vector magnitude for the deformation is determined by gradient for the quantum density ρ_a of the deformed space medium.

$$D_a = grad\rho_a \qquad (6)$$

The presence of the vacuum field deformation (6) shows that inside the local region in the field there is a deformation source in the form of a gravitational charge. The charge is specified by the density of usual substance ρ_m (kg/m³) and represented in terms of divergence for the quantum density ρ_a of medium

$$\rho_m = \frac{C_o^2}{\rho_o G} divgrad\rho_a = \frac{C_o^2}{\rho_o G} div D_a \qquad (7)$$

The equation (7) is Poisson's equation in a vector form for the deformed vacuum field. From the equation it follows, that the birth of substance is caused by a vacuum deformation.

The space curvature is a consequence of the substance birth.

It is obvious, that the equation (7) results in the Gauss theorem for the mass as a gravitational charge

$$m = \frac{C_o^2}{\rho_o G} \oint_S \mathbf{D}_a dS \qquad (8)$$

From equation (8) follows, that for the vacuum field the flow of the deformation vector $\mathbf{D}_a$, penetrating through a closed surface around of the deformation center, defines the magnitude of the mass formed in the vacuum field.

The Poisson equation (7) for a spherically and symmetrically deformed vacuum has the simple decision as a result of integration. The decision allows to find the quantum density distributions for medium in deformed space outward from the deformation source center with the distance r.

$$\rho_a = \rho_o \left(1 - \frac{R_g}{r} \right) \qquad (9)$$

R_g is a gravitational radius, m [6].

Naturally, it possible to make a transition from equation (9) to Newton's gravitational potential and the gravitational field strength. The latter is a derivative from equation (9) and decreases inversely proportional to the squared distance. As against an electromagnetic polarization of the vacuum field, the gravitational interactions are characterized by a spherical deformation. But nevertheless, the electromagnetic and gravitational interactions are of the uniform nature based on the electromagnetism laws.

4. Synthesis of electron from the vacuum field. Naturally to describe the theory of synthesis of electron and other elementary particles in detail is not possible in the single report. Therefore the basic statements approving new approaches to physics of elementary particles will be considered.

Still never the theoretical physics considered causes of mass formation for elementary particles. It became possible due to a discovery of the electromagnetic structure for vacuum and a description of the vacuum field deformation in terms of the Poisson equation, which determines a particle mass as a result of spherical deformation for vacuum.

The mechanism of a spherical deformation for vacuum field by a monopole charge is determined through the gradient forces arising as a result of vacuum field polarization by the central electrical charge. Actually, if one inserts a perturbing free massless electrical monopole charge of negative polarity in the vacuum field, in a local region surrounding the free charge the quantons will try to be oriented by the electrical axis in a direction of the radial electrical field of the monopole charge. Thus the quantons will try to be turned so that the positive polarity charge will be directed to the central monopole charge.

The diagram of the vacuum field polarization by the central monopole charge is shown in Fig. 5. For presentation the quanton projection in the plane is shown in a simplified kind, that the electrical and magnetic charges inside the quantons can be visible. As a result of the polarization orientation of the quanton the electrical gradient forces arise. The forces affect on every quanton in a direction to the central perturbing charge. Under action of this force the quantons are displaced to the central charge, deforming spherically the vacuum field.
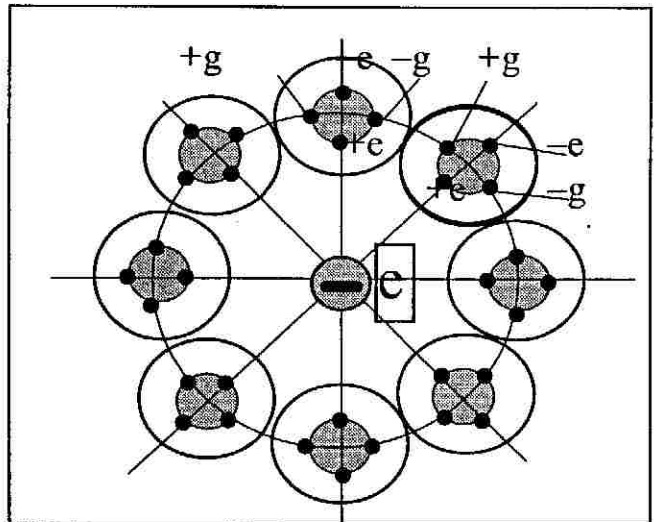

Fig. 5. To formation of electron mass as a result of vacuum field polarization by the central monopole charge of negative polarity.

Unfortunately, we are obliged to omit an intermediate calculation of the electrical force F_e, influencing on the quanton in a direction to the central charge, and to give immediately a final calculation result

$$\mathbf{F}_e = \frac{1}{6\pi\varepsilon_o} \frac{e^2}{r^2} \left(\frac{L_q}{r} \right)^3 \qquad (10)$$

where $r^2 = \mathbf{r}\,\mathbf{r}$ is a direction of the radius vector (for a simplification of equation records).

The electrical force F_e is seen from equation (10) to decreases very quickly with a distance from the central perturbing charge, and the force action extends in vicinity of the charge. It shows that the electrical force is not main one for the processes of vacuum field deformation.

The advantage of the physical model (Fig. 5) allows us to estimate evidently other possible forces acting on the quanton in a direction of the central charge. The attentive inspection of the model in Fig. 5 shows that the magnetic axes of the quantons is locked naturally over the sphere and provides an enormous spherical tension of the vacuum field by the magnetic field. In vacuum the magnetism is intimately linked to the electricity through the quanton. In a direction of the central charge the normal component of magnetic force N_m is determined also through the electrical parameters of system with the account of (1)

$$N_m = \frac{1}{8\varepsilon_o} \frac{e^2}{r^2} \frac{L_q}{r} \qquad (11)$$

The relation of forces (11) to (10), acting on the quanton at the distance of classical radius of electron $r=r_e=2{,}8 \cdot 10^{-15}$m shows, that the determining force in the spherical deformation of the vacuum field is a tension force for the magnetic spherical field of electron

$$\frac{N_m}{F_e} = \frac{3}{4}\pi\left(\frac{L_q}{r}\right)^2 = 3{,}6 \cdot 10^{20} \qquad (12)$$

Thus, inserting a monopole electrical charge into the vacuum field creates sufficient forces in order to deform spherically the vacuum field in a direction of the central perturbing charge. Hence the massless electrical charge gets a mass and regenerates into an elementary particle - electron.

The magnitude of the vacuum field deformation for the recreated electron can be estimated by expression (9) in terms of the quantum density change at a distance of electron classical radius

$$\rho_a = \rho_o\left(1 - \frac{R_g}{r_e}\right) = \rho_o(1 - 2{,}4 \cdot 10^{-41}) \qquad (13)$$

$$D_a = grad\rho_a = \rho_o\frac{R_g}{r_e^2} = 6{,}3 \cdot 10^{46}\frac{particle}{m^4} \qquad (14)$$

At electron birth the magnitude change in the quantum density of medium is seen from equation (13) to be negligible and differs slightly from ρ_o even at a distance of its classical radius in the range of enormous tension for the electrical and magnetic fields. It confirms that the vacuum field represents a superelastic medium. On the other hand, for electron the vacuum field deformation (14), specifying the variation in the quantum density of medium by gradient in space, is sufficiently appreciable.

For the first time, considering the electron structure the EQS theory has mentioned a problem of the spherical magnetic field for electron. The problem falls outside the frameworks of the given report and is considered intimately in work [6]. It is a physical analogue for electron spin, distinguished in essence from an anopole magnetic moment. The distinction between the spherical magnetic field and the electrical radial field of electron is that the spherical field is in equilibrium with the vacuum and is exhibited only in the local region of quanton interaction. The radial field of electron is determined by an infringement of the electrical balance for the vacuum.

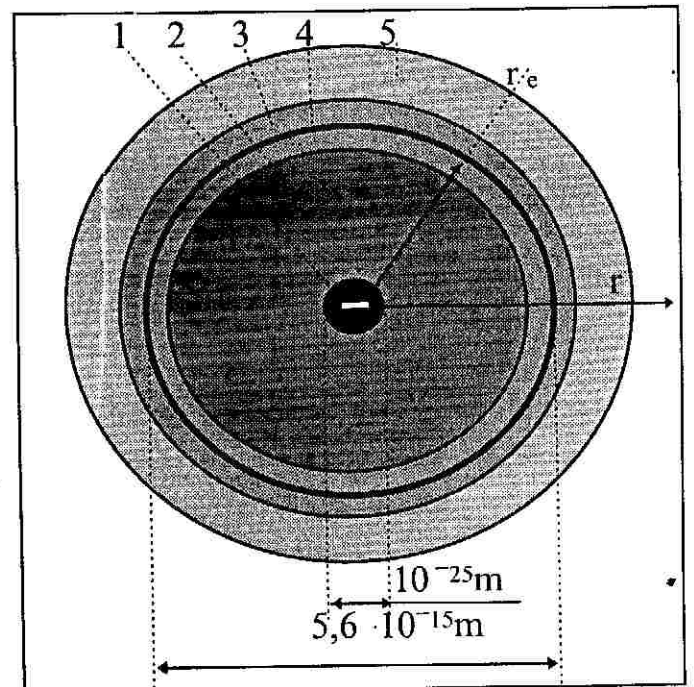By and large, in vacuum the electron has a certain structure, which is shown in Fig. 6.

Fig. 6. Electron structure in the vacuum field. 1- electron nucleus (electrical monopole of negative polarity), 2 - region of vacuum field compression by the spherical magnetic field, 3 - transient region, 4 - conditional border (classical radius electron), 5 - region of vacuum field rarefaction.

In the electron center the nucleus is a central monopole electrical charge of negative polarity. Around of the central charge the

region of a vacuum field deformation is created. Since, by virtue of specificity of formation by the central charge, the electron possesses no precisely expressed border between regions of compression and rarefying of the vacuum field, the electron structure is "smeared" over the vacuum in local region. The absence of exact superficial border for the electron is proved in experiment. By reason of the place deficiency it was not possible to result a diagram of the quantum density distribution of medium for electron, which shows, that the electron can be characterized only by conditional border described by the classical radius of electron at some assumptions.

By similar way the structure of positron can be represented where the place of electrical charge of negative polarity will be borrowed be a monopole of positive polarity.

5. Synthesis of proton and neutron in the vacuum field.
As against the electron, the nucleons (proton and neutron) are characterized by the large mass up to ~1840 times exceeding the electron mass. Furthermore the nucleon sizes ($R_s = 0.81 \cdot 10^{-15}$m) are commensurable with the conditional sizes of electron.

The nucleon properties indicate that the vacuum field deformation by a nucleon differs considerably from the vacuum deformation by electron. Work [4] gives a shell model of nucleons, the shell for which is composed from electrical monopoles of negative and positive polarity in such a manner that the nucleon surface is represented as a mesh shell with the sign-alternating arrangement of charges in nodes of the mesh.

The sign-alternating shell of nucleons is shown in calculation to possess a considerably strong tension of the vacuum field in comparison with the electron field and to provide the needed mass for nucleons.

The nucleon cross-section with the sign-alternating arrangement of charges in nodes of the mesh shell is depicted in Fig. 7.

In Nature the similar mechanism of rolling-up shell structures is known for example of fullerene clusters [11]. The part of a nucleon shell for fullerene C60 is presented in Fig. 8.

Knowing the probable nucleon structure with a charge arrangement in the shell, it is possible always to calculate the shell tension corresponding to the nucleon mass. The charge amount in the proton shell is found (while

tentatively) in calculation to equal 69 charges, and for the neutron -70 ones. In the shell the proton has the single excessive charge of positive polarity as a result of the presence of the mesh cell defect in the shell structure (in Fig. 8 the cell defect is not shown). It is possible, that the mesh cells for proton are generated in such a manner that the presence of an excessive positive charge creates a stable shell design, which defines the proton stability.
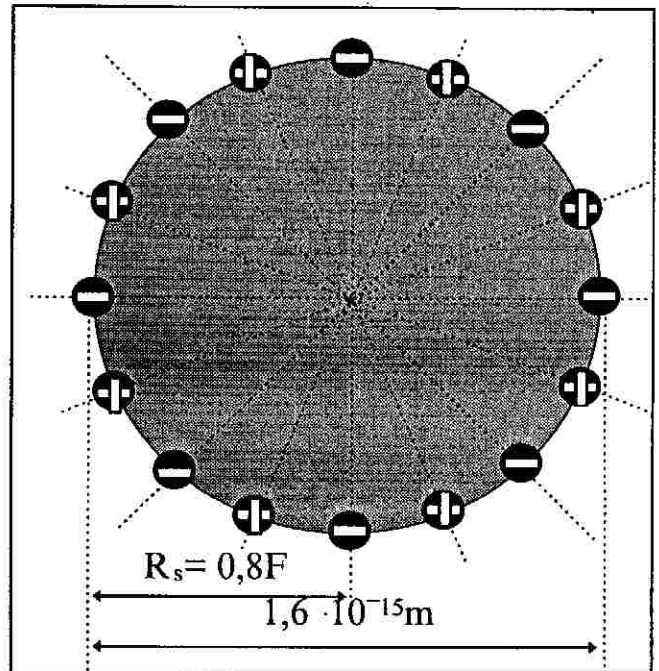
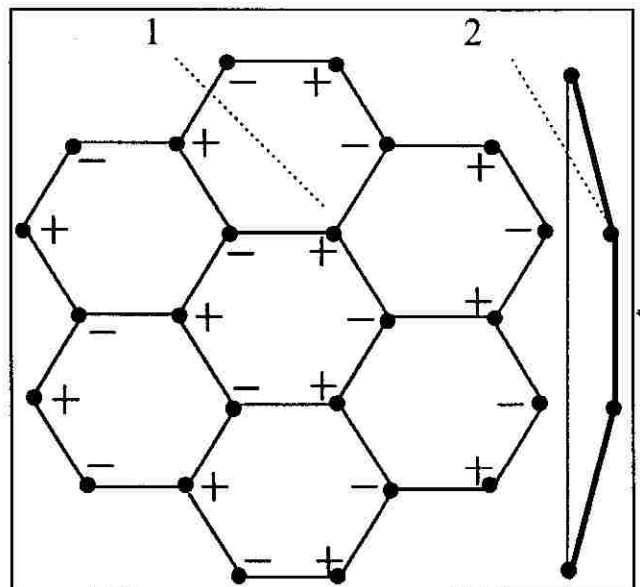**Fig. 7. Section of nucleon shell with a sign-alternating arrangement of electrical charges in mesh nodes·**

Fig. 8. Fragment of nucleon mesh shell by the pattern of fullerene C₆₀ cluster.

The neutron can be formed as a result of capture of an orbital electron by the proton shell, when the positive excessive charge of

proton is compensated by an electron charge of negative polarity. It defines the instability for the neutron, which breaks down to a proton and an electron with antineutrino generation.

The nucleons contain charges both positive and negative polarity. This fact is proved experimentally for electron scattering by nucleons. It explains a quark introduction. But the quark model has appeared to be an ineffective direction in comparison with applying the integer electrical charges in shell models for nucleons.

Generally the whole scale of elementary particles, possessing the mass, is formed in the result of the vacuum field deformation by the central charge or various shells, some of which are stable and steady (as proton) or unstable and spontaneously break down in others.

The shell model for nucleon explains completely the nuclear forces as forces of electrostatic attraction between the sign-alternating shells. The electrostatic repulsive forces are shown from the received functional dependencies to act at the great distance between two protons. With decreasing the distance up to $\sim 10^{-15}$m the forces of mutual attraction between the sign-alternating nucleon shells begin to affect. The forces are characterized by the properties of nuclear forces. It is contact short-range forces decreasing very quickly with a split of the shell from each other. If to bring the nucleons closer up to distances, which are shorter than those for the nuclear forces, the repulsion fork, caused by the presence of defects in the mesh cells of the particle shell, arises again.

Naturally, at calculating the shell model for nucleons there are many problems, which are overcome finally. It is described specifically in work [6]. For the first acquaintance to the new approaches to elementary particle structure it is important to understand, that the elementary particle mass can be formed only as a result of spherical deformation of the vacuum field, irrespective of there is an excessive electrical charge for given particle, or the particle is electrically neutral as neutron.

The particles such as neutrino are exception. The electronic neutrino ν_e is formed in the result of an annihilation of electron e^- and positron e^+ with emitting two gamma - quantums $2\gamma_q$

$$e^- + e^+ \rightarrow 2\gamma_q + \nu_e \qquad (15)$$
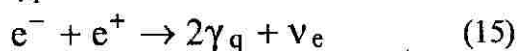
Only the particle mass is shown in the annihilation reaction (15) to transform in radiation energy, defining the mass equivalence as a property of electromagnetic energy for the vacuum field deformation. In the rapprochement of electron and positron up to the annihilation distance, equal apparently to the classical radius of electron, there is a destruction of the radial electrical field and consequently the spherical magnetic field, which is transformed in a two-charge dipole field unable to keep the enormous spherical tension of vacuum. Hence the spherical field crashes and the energy transforms into the radiation. Another two massless electrical monopoles form electronic neutrino, a certain information bit saying that there was previously a pair of particles: electron and positron.

And on the contrary, the birth of particle pair (electron and positron) is possible only as a result of electronic neutrino splitting into two free electrical monopoles, which deform spherically the vacuum field by transforming in electron and positron at once. It is possible only when the gamma quantum with sufficient energy affects on an electronic neutrino $\bar{\nu}_e$ excited previously in the presence of a strong electrical field of atomic nucleus, (the arrow above neutrino shows, that it is excited, i.e. it is stretched previously in strong electrical field as a dipole)

$$\vec{\nu}_e + \gamma_q \rightarrow e^- + e^+ \qquad (16)$$
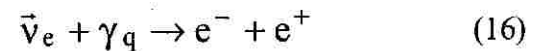
Conclusion. The discovery of superstrong interactions (SSI) has been a result of development of experimental physics of elementary particles and atom nucleus in XX century. Up to the EQS theory the physics was a phenomenological science. Naturally, in the century origin Lorentz had no sufficient knowledge on the elementary particles, the electrical and magnetic monopoles in order to offer a real physical model for electromagnetic motionless ether, in which he trusted due to the enormous intuition of scientist.

Without SSI it is impossible to explain the mechanisms of mass formation for elementary particles at their synthesis from the vacuum field. To generate any particle (excepting photon) the vacuum field and the integer electrical charges appears to be necessary. It allows us to create the broad scale of elementary particles, as both stable long-lived

and short-lived unstable ones.

Naturally, the static electromagnetic quantum of space (quanton) is a basis SSI. The quanton is a spherically shaped complex particle capable both to polarization deformation (compression and stretching in axes, rotation) and spherical deformation (uniform compression and stretching). In the first case the vacuum represents electromagnetic properties, in second - gravitational ones.

The EQS theory changes the approach to a problem of association of all interactions.

Instead of the uniform universal formula for Nature the particle (quanton) joining electricity and magnetism in electromagnetism, electromagnetism and gravitation, electromagnetism and strong interactions, electromagnetism and space-time is discovered.

Really, the quanton is not only a carrier of electromagnetic field joining all fundamental interactions, but also the elastic volume resonator, a certain electronic timer specifying a course of time in space and dynamics for all processes.

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FOUR REPORTS

ON THE THEORY OF ELASTIC QUANTIZED SPACE (EQS)

(Conference proceedings)

St.-Petersburg — 2000

Leonov ▦ V.S.

L 47   Four reports on the theory of elastic quantized space (EQS). (Proceedings of the Sixth
International Conference «Modern Problems of Natural Sciences »,
August 21-25, 2000, St.-Petersburg, Russia)

The theory of elastic quantizedой space (medium) (EQS) is the first informal theory
of electromagnetic structure of vacuum (to be exact, of vacuum field). In the basis of the
theory EQS there is an electromagnetic quantum of space (quanton) discovered on January
1996. In the same year the first part of the theory EQS has been published (in 1997 - the
second: «New Sources of Energy»).

Now the third part of the theory EQS «Synergetics of uniform vacuum field » is
prepared for publication, the part of materials from which has been stated in the «Four
reports»:

1. **Role of superstrong interactions at synthesis of elementary particles.**
2. **"Relativism" as a special case of Newton's classical mechanics.**
3. **Spherical invariance at the development of absolute cosmological model.**
4. **Benefit and harm of relativism for fundamental science.**

In essence the «Four reports» are an incomplete summary of the third part of the theory
EQS, which represents the informal uniform theory of field. The joining particle (quanton) in
structure of continuous elastic quantized medium (vacuum field) is an uniting criterion in the
uniform theory. Joining both electricity and magnetism into electromagnetism and gravitation,
the quanton is a realistic carrier of the electromagnetic field. Joining space and time the
quanton is a carrier of time. The vacuum fields is a medium from that the elementary particles
are synthesized and which joins the known fundamental interactions. The interaction of
quantons inside vacuum field is the fifth type of superstrong joining fundamental interactions.

The theory EQS discoveries the enormous prospects in development of new power
ecologically clean technologies based on production of excessive energy resulted from
synthesis of elementary particles from the vacuum field. It is confirmed experimentally.

The author of the theory of elastic quantized space (medium) (EQS), the winner of the
premium of Government of Russian Federation in the branch of science and engineering, the
valid member of International academy of ecology (IAE), the candidate of engineering science
Vladimir Leonov, who has discovered the elementary quantum of space - quanton in 1996,
works in the field of development of quantum theory and its practical application in the
newest power technologies, the opponent of construction NPS with reactors on uranium fuel
as ecologically and economically unpromising.

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