

Concepts and definitions of the theory of gukuum.

Abstract. The beginning of a more rigorous exposition of the theory of the elastic universe.

There are no known sources that directly formulate the hypothesis of the Elastic Universe. The jelly-shaped vacuum mentioned by Einstein does not count, as there it was only a matter without matter, and it was incomprehensible how material objects would be "torn" in this jelly. The proposed hypothesis is radically different from all existing versions of the universe device.

All previous versions necessarily assumed the Empty Space, in which everything moves or is hidden: from "vortices of Ether" to "virtual electron-positron pairs." All previous models inevitably ended each time with a list of unsolvable questions and paradoxes, a reference to mathematical difficulties, a mystery. But the model of the Elastic Universe with "Loks = Wave Vortices" as elementary particles gives an absolutely finished result. After reading the proposed article, there is literally nothing to ask about, there is an answer to everything. The only question is: what is Gukuum can be equated with a philosophical search for a box that holds all the boxes in it. The universe turned out to be ridiculously simple. We just have to work on, detail, clarify. Hundreds of doctoral dissertations on this subject are waiting for their owners. To the development of this gold vein, the whole active genius of world and Russian physics and mathematics is invited. The way to the creation of Axiomatic Physics is open.

The goals are clear, the tasks are defined, for the work, comrades!

The last stage of the work and the specified results are proposed to the court of the official academic community.

It is possible that some formulas are inaccurate due to simplifications. There are assumptions that have not yet been substantiated. It is possible that not all factors are taken into account. Sometimes attempts at refinement lead to impassable philosophical jungle.

But on the other side of the scale there are huge pluses. Such pluses that there is confidence: it is not only a mathematical model, but a real device of the universe. The proposed theory of gukuum does not contradict any law of physics and does not create paradoxes. Explains the essence and the diversity of matter. Easily resolve all existing paradoxes. And with striking clarity, he models the internal arrangement of elementary particles, all their properties, and the nature of these properties. In this case, theoretically calculated such an absolutely mysterious property as the spin of elementary particles. A new relationship is established between world constants: the masses of elementary particles, the Planck constant and the parameters of the gukuum. And in the future, you can theoretically calculate any other parameters of particles and physical parameters. All this is at the level of precise mathematical formulas. On the properties of elementary particles in this article.

Concepts and definitions.

In previous chapters, the idea of an Elastic Universe is consistently developed. A transition is made from a bare idea to a mathematical and logical proof of the correctness of the idea with access to precise formulas. Over time, many new things are being revealed, the wording is being refined. Here is the latest, improved and revised version of the basic concepts and definitions.

- 1) **The universe** is an infinite homogeneous elastic medium. In this case, it exists not only in itself, but with all kinds of elastic waves allowed in it. More than anything in the universe does not exist. What? How? Why? - Has always been, is and will be, forever.
- 2) **Definition.** This elastic medium is named as a **gukuum**. It's like russian "Гулкий

(echoing) **vaKUUM** (vacuum)". And still related to the names of the famous researcher of the elasticity of **Hooke**. And it also echoes the continuum. Thus, the entire universe is the **Infinite Homogeneous Gukuum**. (When translating into English, it is advisable to pay attention to the abbreviation). Unlike a **vacuum**, which has always been considered only a void, the element of the **gukuum** can be strained and, possibly, even elastically deformed. Unlike the term "physical vacuum," **gukuum** most likely has a continuum or is close to that.

3) **The unified formula of the universe.** This is a well-known wave equation:

<p>The uniform formula of all Matter, of all Particles, of all Fields and all Quanta of our Universe:</p>
$\frac{\partial^2 \mathbf{W}}{\partial t^2} - c^2 \Delta \mathbf{W} = 0;$
<p>$\overline{\mathbf{W}}$ - displacement vector of elastic space</p>
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(1-1)

Here, **W** is the displacement vector of the elastic cosmic **gukuum** element. **c** - is the speed of light or the speed of transverse waves, determined by the mechanical parameters of the **gukuum**. Longitudinal waves are not considered.

4) Different types of solutions of equation (1-1) correspond to different types of oscillatory processes. In particular, a) waves propagating to infinity at the speed of light, b) waves localized, standing, vortex. And so on. And these two kinds are not all solutions. It is not ruled out that certain types of localized solutions can also propagate to infinity at the speed of light. And it is very likely that many waves propagating to infinity have a localized structure. All these kinds of oscillations really exist in the universe, creating a visible variety of material objects.

More later. There is an assumption that all material objects existing in our perception are localized. Including radio waves.

5) **Definition.** One of the solutions of equation (1-1) is a localized wave or **LOK**. This is a vortex-shaped wave object localized in space-the stress fields in **Gukuum**. The basic solution of the wave equation, which is used in the theory of **gukuum** to describe localized waves, is the sinusoidal spherical standing waves. In spherical coordinates:

$$x = r \cdot \sin \varphi \cdot \cos j, \quad y = r \cdot \sin \varphi \cdot \sin j, \quad z = r \cdot \cos \varphi;$$

A particular solution of the wave equation, spherical standing waves:

A particular solution of the wave equation: spherical standing waves.

$$W_i(r, \theta, \varphi, t) = \frac{C_{j,m}^i}{\sqrt{r}} \cdot J_{j+\frac{1}{2}}(kr) \cdot Y_{j,m}(\theta, \varphi) \cdot \cos(\omega t + \delta)$$

$i=1,2,3$ (cartesian); $j=0,1,2,\dots$; $m=0,1,\dots,j$; c - speed of light;

ω - frequency; λ - wavelength; $\lambda \cdot \omega = c$; $k = 1/\lambda$;

$C_{j,m}^i$ - constants; $J_{j+1/2}$ - Spherical Bessel function;

$Y_j(\theta, \varphi)$ - spherical surface harmonics;

$Y_j(\theta, \varphi) = \Phi_m(\varphi) P_j^m(\cos\theta)$;

$\Phi_m(\varphi) = (\text{const}_1 \cos(m\varphi) + \text{const}_2 \sin(m\varphi))$;

P_j^m - Adjoint order function m and rank j ;

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(1-2)

It is assumed that the velocity of motion of a perturbation in a localized wave is equal to the velocity of transverse waves or the speed of light.

The energy density corresponding to the solution (1-2) is determined in accordance with Hooke's law and can be estimated from the formula:

$$\rho^1_E \sim \Sigma W_i^2; \quad i=1,2,3 \text{ (Cartesian coordinates);} \quad (1-3)$$

The discrete spectrum of the solution (1-2) is determined by integers (j, m) and each pair of numbers (j, m) determines its **lok** in the gukuum. This discreteness gives rise to quantum physics.

6) **Analogues** of localized formations exist and are described in the physics of liquids and plasmas, for example, in [08] - [09]. So even more than a century ago on the water, J. Scott Russell observed "solitary waves" in the form of a **hill on the surface** of the water. The physical meaning of this hill is very interesting and consists in the fact that an analogy with the appearance of the gravitational field opens here! Under the external influence (such as explosion and subsequent reflection of the blast wave), a localized **transverse sound wave** appears on the water. It winds around the vertical axis and draws (!) into itself surrounding water. This forms a hill on the surface of the water.

It is not necessary to connect the formation of such a hill with the movement of the water proper. The movement of water does not participate in the formation of hills. Moreover, with the circular motion of the masses of water, not hills, but pits, funnels, and breakers are formed. But when the transverse sound wave of elasticity rotates around the axis, inside the water, the water contracts to the axis of rotation of the wave and forms a hillock.

It is also known that solitons in a collisionless plasma were studied by RZ Sagdeev in 1956, 1958.

In 1964 Kruskal and Zabuzhsky discovered by numerical modeling that the solution of the Korteweg-De Vries equation (KdV), which is a solitary wave (soliton), has a property that was not known before. Namely, such a solution "elastically" interacts with another similar solution.

In the same books it is reported that the interactions of solitons can be both elastic and forming bound states-quasibers. And these phenomena are confirmed by theoretical calculations and examples.

These two ancient results allow us to hope that our Loki will interact elastically with each other and even sometimes form compounds like hydrogen or helium nuclei or

complex molecules.

Later. The essence of **Loks** lies in the elastic stress wave in matter, while the substance itself is motionless. This Loks differs from solitons, in which the substance is mobile. Unlike solitons, Loks has the phenomenon of stratification, see the following.

Why do localized entities interact with each other? There is an interesting physical explanation. After all, there is something that turns the wave, according to a mathematical solution. In order for it to become localized, it spun around in a circle. So there is some component of the tensor that turns it ?! And if there is a component of the tensor that acts on the wave, then this component of the tensor can act on another wave! That is, localized entities can interact.

7) **The law of stratification.** Solution (1-2) does not directly describe elementary particles. The reason is that this solution with the formal approach (the energy is determined by the square of the displacement) does not give a convergent integral over the energy. The integral diverges at infinity. This fact is known to mathematicians and physicists in similar studies and related problems. Hence the conclusion is drawn: there is a new phenomenon, the effect of stratification or winding. The localized wave is representable as excitation elements running around a certain center, axis, or infinity. The wave elements moving along closed trajectories per unit time run through fixed points different times depending on the distance from the center of the localized wave. Consequently, the elements of the object under study formally identical in energy (by the solution (1-2)), located at different distances from the center of rotation of the wave, will have different real energies. Moreover: they will have generally different properties. So a new concept is born: **lok**.

A confirmation of the existence of the layering effect is the analogy from the mechanics of liquids, which has already been mentioned. Just as localized waves on the water surface have a convex upward shape, the loks have an increased concentration of energy in the center of the lok. In this case, the main solution (1-2), as the final result shows, most likely does not change.

8) **Lok** is in a sense a *virtual object*. It differs from a localized wave as a mathematical solution in the following way. Lok is a stable in form and energy, localized around a certain center or axis, an object that can *move* in space and *interact* with other loks and stress fields in the *gukuum*. And the effect of stratification greatly influences the properties of the lok when interacting with other loks. This is taken into account in the layering coefficient introduced below.

The **element of lok - is an element of the vibrational energy** at a given point in space, coinciding in coordinates with the element of oscillations of the *gukuum* at a given point in space. But it differs from the **wave element in the *gukuum*** by the fact that when the lok moves its elements move, while the elements of the wave in the *gukuum* have fixed coordinates in the *gukuum* and can only fade or grow. That is, the vibrational energy as it runs from one element of the *gukuum* to the other, which are motionless.

Dimensions loks as the size of elementary particles are tied to the elastic-density characteristics of *Gukuum*.

9) **The correcting functional factor** for the energy is equal to $(1/r)^2$. The most important, decisive argument in favor of such a multiplier is the consequences of such an assumption. This is a complete coincidence of the properties of all loks - theoretical candidates for a proton, a neutron and an electron with the properties of a real proton, a neutron and an electron. About this in the following articles. An attempt to delve into the strictly justified conclusion of this multiplier leads to a philosophical abyss and again to the search for a box containing all the boxes. But the simplest explanation is the phase addition of waves in the layering.

It is extremely important to distinguish the real picture of oscillations in *gukuum* from

the virtual picture of movement of the elements of the lok, the displacement of the loks entirely, the interaction of the loks.

The mathematical picture of oscillations in gukuum is described by the solution (1-2). This picture is absolute, there are no additional circumstances or clarifications, and nothing can shake this decision. The solution (1-2) has the property that it is "stitched" with itself over angular variables within the specified limits ($0 \leq \theta \leq \pi$) and ($0 \leq \varphi \leq 2\pi$) and does not require any "winding" on itself. All real distributions of stresses, deformations, energies, all tensors, gradients and rotors - all this should be determined from equation (1-2). At each point of space, according to the solution (1-2), the amplitude of the oscillations of the gukuum is constant, and the magnitude of the displacement is determined by the single time dependence $\cos(\omega t + \delta)$.

The energy of the solution, if treated formally according to formula (1-2), would be infinite, if not for the law of stratification. No point of the remote part of the solution (1-2) hinders the motion of the center of this solution. The center of the lok moves, interacting with other loks, and how they relax the "tails", this does not bother anyone. By and large, it is possible that the amplitude of the solutions (1-2) is infinitesimal, and the whole picture of the universe is the motion of infinitesimal quantities. But now it's not about that. Otherwise, you can drown in philosophy.

Moving decisions (1-2) formally do not interact with each other. And they could safely fly through one another as radio waves pass through each other. Although this also requires experimental verification. If there was no interaction between the elements of the corresponding loks. Some day theorists will prove that the determining factor in such an interaction is the phenomenon of stratification.

The real picture of the movement of loks and elements of loks is completely different. The physical and spatial properties of loks (implied: elementary particles), which are recorded in experiments and in the sense organs of a person, are determined by the effect of stratification within the lok itself. Elements of the lok move along closed trajectories, forming a vortex wave. And the smaller the radius of these trajectories, the more turns do the elements of the lok, and consequently the wave per unit of time. This radically affects the experimental results. Lok interactions occur differently than if they were just solutions (1-2). And the physical and spatial properties of loks are also different than they follow from equation (1-2).

How should we investigate the properties of loks and their interactions? It is impossible to invent anything new here, except to take into account the dependence of the number of turns of the lok elements on their distance from the center of the lok. How many times a wave passes through a given point - it does not matter. It is important to compare the number of passes at different points per unit time. The number of passes (at a constant speed of a wave equal to the speed of light) is inversely proportional to the radius of motion. A circling wave (of the elements of the lok) is coherent to itself and as a result only the displacements, the amplitudes of the waves, are summed. Summarizes everything that is linear with the solution (1-2), linearly with displacement. Of course, as long as the process remains within the framework of Hooke's law. That is, the correction factor for the amplitude of the voltage oscillations in the lok is $(1/r)$. That is, the phase addition of the amplitudes takes place because of the synchronism and coherence of the waves upon their layering. Energy in this virtual world is not the main, but the derivative value and is determined by the square of the amplitude. Consequently, the correction factor to the value of the energy density of the lok must be equal to $(1/r)^2$.

To this we can add the version that the phenomenon of contraction of the solution to the center is possible. It is difficult to recognize as convincing the assumption that the amplitude of waves is added in the phenomenon of winding. This contradicts our habits of preserving energy. Somehow, the addition of energies is more natural. But this would

give a multiplier of only $(1/r)$. But when contracting the solution it is entirely possible that the equilibrium point is reached on the factor $(1/r)^2$.

Let's try to simulate the solution (1-2). Let's say that we become small, make the palm of our hands a ladle, we put a lok on them and examine it from the moment of its formation (by a formal decision), and in a strong slowdown. What do we see?

And we see at the beginning that according to the legend of this solution the lok first rotates as a single whole, with the angular velocity ω . At the "equator" of the lok, any perturbation of Gukuum rotates with a linear velocity: $v = r \cdot \omega$. Consequently, as r increases, the linear velocity of the lok element increases more and more. And at certain distances from the center of the lok, the linear velocity of motion of its elements becomes many times higher than the speed of light. Physically, this is impossible.

What physical picture will we see real, holding the **lok** in the palms, in fact? Let's say that we created a lok by the solution (1-2) and gave it a primary impetus to the rotation. We will observe its evolution. We see that the **angular velocities of the rotation of the lok** elements are different at different distances from its center. That is, ω is variable and depends on r . And maybe not only from him. We see that as r increases, the angular velocity of rotation of the lok is slower, with decreasing r , the angular velocity is increasing. That is, the middle twists, and the edges lag behind. In this process, a certain stress gradient (toward the center or from the center) is created in **gukuum**, and consequently also some forces that force the loks to move not along circles, but along tightening spirals. Most likely for remote parts - approaching the center. An analogy with spaghetti wrapping on the plug for the outer parts.

In other words, there are internal mechanisms of interaction of these perturbations in the vortex of the Gukuum perturbations that form the lok, which give Lok some desire for greater compactness. Lok begins to pull together to the center. In this case, of course, the solution (1-2) in each of its **harmonics** does not cease to operate, but in the aggregate a certain functional series formed of these solutions begins to act. This series converges to a function that is as yet unknown, which by properties is very close to (1-2). It is close because in practice its action is confirmed. And it was the solution (1-2) that was implicitly used in quantum physics when Bohr calculated the energy levels of an electron in a hydrogen atom. And if we delve deeper into those calculations, then undoubtedly, we can draw out the divergence from the total energy, which we have just overcome with purely physical reasoning. And in part to deprive the meaning of all modern quantum physics. Let us recall publications on this topic, such as "electrodynamical divergence".

We return to today's reasoning.

As a result, instead of formula (1-2) for localized oscillations, formula

$$\rho_E \sim (1/r)^2 \cdot \sum W_i^2; \quad i=1,2,3; \quad (\text{Cartesian coordinates});$$

Once again, the main thing. In Gukuum, in cosmic reality, which is not available to a person in his sensations, there are only localized oscillations in the form of a solution (1-2). But loks (and this world feels a person) behave as if they are "wound up" on themselves and their energy is multiplied by $(1/r)^2$. Hence, the nonlinearity of our world, known to scientists, occurs. The whole observable world can be compared to a computer game. The player presses on the buttons, controls the running and shooting Quakers, watches the beautiful multi-colored graphics. But there is a real world: a colorless waving bundle of electrons inside a kinescope and multi-core current oscillations in the processor. Or from the life of knights: One knight defeats the other, celebrates success. But there is no one to notice the reason for the victory: his stronger and better trained horse.

10) All **physical phenomena**, as shown by the analysis ([22] - [25]), can be explained

from the standpoint of the gukuum theory.

All **physical equations** are a consequence of the wave equation (1-1), including the equations of mechanics, electromagnetism, quantum physics, and so on. The appearance of high-order interactions is explained by the action of stratification laws; possibly by engaging layers; as well as not yet described effects.

The **theory of relativity** is translated into the category of approximate theories, built on the assumption of the absence of a distinguished frame of reference. While a fixed and fixed frame still exists: it is a gukuum. If such a system has not yet been found, so because it is bad and not there looking for and not so searched. Perhaps it will not be easy to determine it because of the low density of the gukuum (see below) and the relatively slow velocities of the stars and planets. This is the business of the future. All previously published **theories of the ether** are canceled.

11) In order not to complicate the presentation of the theory of loks, one more term is used everywhere: lok. But it is necessary to distinguish by the context, we are talking about a localized wave or a virtual object, lok.

12) The photon, neutrino and some other particles have not yet been considered as representatives of loks. For them, classes of localized solutions of the wave equation are considered, which have not yet been investigated. Other (short-lived) particles appear to be no more than temporary eddies of stresses in the gukuum. They do not have number like the breakers around the ship.

Additionally:

13) If you think about it, you can, instead of (1-2), compose and solve **the equation for the angular rate of rotation of the excitation in the lok**. There will immediately appear discrete values of angular velocities, just as they appear for energy or displacement. This is a task for the future.

14) Regarding the objects of the universe, which are described by a cylindrical solution, no conclusions are being made, except for the assumption that these are even lightning. The assumption of the existence of "lenticular" objects has not yet been confirmed.

15) Since the possible choice of coordinates is not exhausted by cylindrical and spherical coordinates, in principle, the existence of other solutions and objects and other forms is not excluded.

16) When the current in the circuit breaks around the conductor, clusters of a "high-grade" field are generated by electrons leaving the chaos (sparks, lightning). And, in any experiment, with the weakest current, these electromagnetic clumps of 90% do not fly away anywhere after the current is cut off. These clots are ball lightning. After each click of the switch, in all likelihood, too, a small "ball lightning" is formed! Only its field is very small, weak and does not cause a visible glow in the air molecules passing through it. Therefore, it is not noticeable and not too dangerous. Of course, it still collapses due to interactions with air molecules or surrounding objects and wires. But its hidden influence on the organism is quite possible. In rooms where there are many switches, electrical appliances, wires and electric motors, some unpredictable and yet unexplained effects on the body, glitches and drums are quite possible. Full fantasy: some people can, in principle, accumulate these invisible fireballs. For example, in the place of work. They can wear this "spoilage" and with their help influence other people. At the same time knows what he thinks of himself. Also, cleaning procedures from them, "removal of spoilage" in principle, are possible.

17) **The process of electrifying bodies in friction** is also becoming clear. Unlike conductors in which electrons freely float, in dielectrics, the electrons are sufficiently rigidly fixed. It is difficult to understand the students of traditional physics. They consider the electron to be a point running along some trajectory. In fact, an electron is a real and very large cloud consisting of petals. And this electronic "flower" is, as it were,

cemented by some petals in the dielectric material. The peripheral parts of the electrons protrude far beyond the conductor, forming, as it were, the thorns of the cactus. As a result, when rubbing a piece of cloth "about the cactus," the electrons are "uprooted" from the cactus. This is electrification. But in the existing physics, there is no satisfactory explanation for the phenomenon of electrification. All these stories with a "surface" layer of electrons, according to the authors, are not serious.