Disputable issue of matter and antimatter symmetry –*English version*

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ABSTRACT

Analyzed the common views on the origin matter and antimatter. Proposed and rationalized the hypothesis, stating that the antimatter was not lost in The Big Bang as a result of annihilation but remained in the matter, i.e. matter itself (protons and neutrons) consists of particles and antiparticles.

Rationalized the possibility of electron placed inside a neutron and, as a conclusion, the possibility to influence the nuclear half-life.

Proposed the hypothesis regarding the origin and structure of electron, muon, proton, neutron and neutrino, regarding the nature of nuclear (strong) interaction and regarding the prevalence of stretching pressures in Physical Vacuum.

Proposed the mechanism of the expansion of the Universe by «swelling» of the Physical Vacuum energy structure itself and some conclusions of that model.

Analyzed the possible energy effects, resulting from the sharp change in the density of Physical Vacuum.

Proposed an alternative mechanism for the Relic radiation origin (microwave background radiation).

Introduction

One of the most important questions in physics is the structure and origin of matter. Theoretic physics have achieved some success in this are – for example in the usage of nuclear and, in part, thermonuclear energy. But, from the other side, many foundational questions are left unanswered, particularly, how did the matter form, symmetry of matter and antimatter, what is antimatter and where did it vanish.

Should the physical nature of phenomena be deeply understood? This is not just a philosophical question. We can mathematically describe most of phenomena, including gravitation, not understanding its mechanism. But as a result of that, we can't build flying machines using antigravitation.

Physics of nature and astrophysics study things formed in the Big Bang, i.e. relic Universe, in which we live in – in the matter, formed out of electrons, protons and neutrons. This is a world of consequences, we don't know about the world of causes and thus, it is difficult for us to understand the Nature.

Discovery of the novel and novel metastable elementary particles made their classification significantly difficult and poor fits into existing theories. But these discoveries that took a lot of money, instead of providing qualitative new knowledge, only have complicated the structure of the matter more. Therefore, naturally, articles appear in the area of the new alternative physics, that try to look at many physical phenomena in a different way. It is a normal scientific approach to the natural studies.

In this article I won't describe my vision of the Big Bang, structure of the Universe and Physical Vacuum (PV) in detail. Furthermore, at this point it is only a very distant view of reality, so I would stop on the question of matter and antimatter symmetry. It is a key question, because for some reason

physics theoretic have linked it to the experimentally discovered Relic radiation, and, therefore, the scenario, the energy and the age of the Big Bang.

This article does not have a goal of overturning the common views and definition, seem from its conclusions, but just rethink them in a new way, leaning on the known physical phenomena and experimental facts.

1. Common views on the origins of matter.

Universe was born as a result of an extremely powerful explosion (Big Bang), distinct for its precision. The smallest deviation of any parameter would lead to our world ceasing to exist (this is a key principle of anatropous philosophy).

Nowadays everyone accepts that our Galaxy consists only of matter. But is it common for Universe in general? Most likely - yes. If our Galaxy had antimatter in a substantial volume, then in numerous collisions between gases, stars, dust and other objects, matter, meeting with the antimatter, would be annihilated causing massive streams of gamma radiation. Such high level gamma radiation, without doubt, would be registered, what is not really observed now. Same goes for the other galaxies [1-4].

Furthermore, if we look at the Universe as a whole, it is difficult to understand, how did the original mix of matter and antimatter could divide and send them in the opposite areas of space. Basing on these observations, most cosmologists think that the Universe is mostly built out of the matter and its structure was defined in the earliest stage of Universe evolution [1-4].

It has been long known that matter is not eternal, it forms and disappears. The birth of new particles occurs with enough energy. But the birth of particles in laboratory (in the accelerators) is always accompanied by the formation of «antipodes» – antiparticles. For example, electron is always born in pair with positron (with a positive charge). Similarly, the birth of each proton is accompanied by the birth of antiproton etc [5].

The hypothesis of Universe creation as a result of the Big Bang is supported by the majority of scientists, due to sufficient scientific data proving this fact. At the time of the Big Bang there was no shortage of energy needed to form the matter comprising the observable part of the Universe. The question is: how could all that matter appear without an equal amount of antimatter, because the symmetry between them, as it appears, lies in the laws of physics. Inevitable question: where did all antimatter go?

To explain the absence of antimatter in the Universe a theory of Universe asymmetry was proposed, i.e. during Big Bang a disproportion between matter and antimatter was formed. But no direct proof was found, only tertiary experiments of W.L. Fitch and J.W. Cronin (Brookhaven National Laboratory, USA). They have discovered an insignificant disruption of mirror symmetry for neutral K-mesones. This little disbalance appearing on an unstable neutral particle, was considered as a scientifically proven fact proving the existence of asymmetry between matter and antimatter [1, 2, 6, 7].

But this experiment is unrelated to the forming of the particles themselves, only to the spin effects. Therefore, it is impossible to directly extrapolate it to the formation of stable particles (electron, positron, proton, neutron) from energy gamma quantum, as it happened at the birth of the Universe.

The next step for the Big Bang model would be an evaluation of a disproportion between matter and antimatter. It must be very small, because despite of all efforts, it has not been found experimentally. The asymmetry between matter and antimatter was evaluated in a comparison $(10^9 + 1)$ to 10^9. It means, that for a billion antiparticles a billion plus one particle is born (fig. 1.) [1-3]. Therefore, as the creators of the Big Bang model think [8], while the Universe cooled down, the matter annihilated with antimatter and almost all matter disappeared, excluding one billionth part which is our whole Universe. Where have 10^9 gamma quantum for every surviving electron or proton, gone away? It is thought, that they transformed into a background Relic radiation.

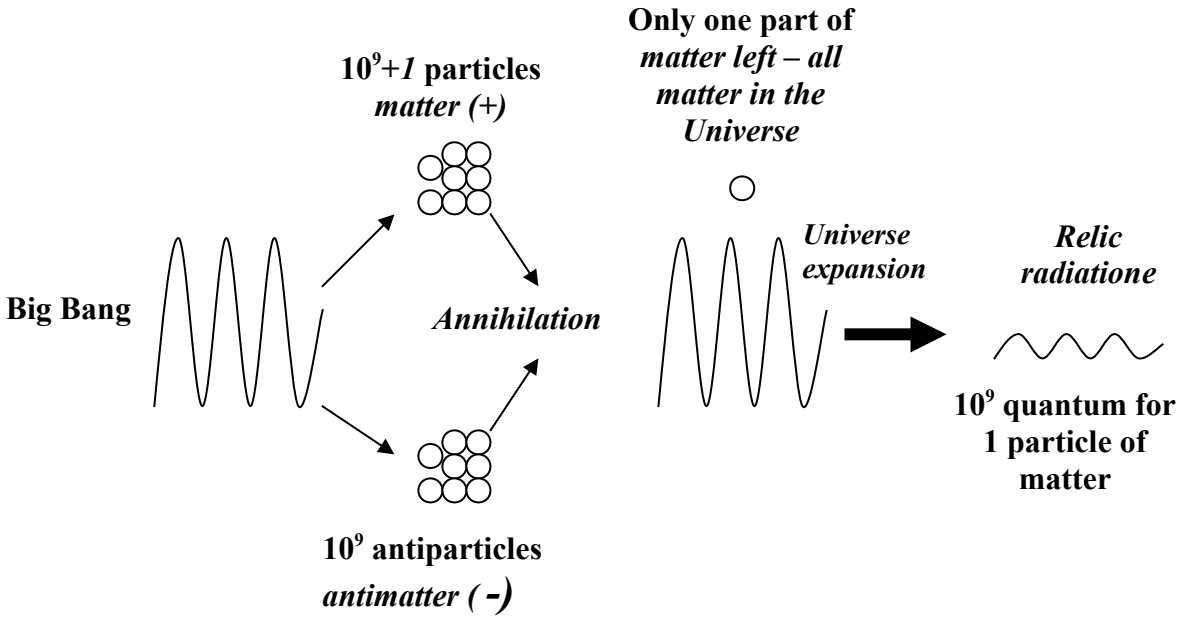


Fig. 1. Formation of the excess matter from gamma quantum by letting asymmetry between matter and antimatter in proportion *(10^9 + 1)* to *10^9. Standard model (schematic presentation)*

Therefore, the Universe Relic radiation, without even looking at the other scenarios of its origin, has been artificially tied to the process of annihilation of matter and antimatter. From it was born the mass of the original matter, and energy Universe. One wrong disposition created a chain of foundational principles defining the basic structure of the Universe.

It should be noted, that the proportion 10^9+1 to 10^9 was chosen wisely, because it is almost impossible to prove this asymmetry experimentally. For decades, the experiments to find the asymmetry of matter and antimatter have been conducted in Grenoble and other places. The absence of positive results does not worry everyone because achieving the true results requires thousands of years. Therefore, it is not a fault of experimentators or theorists.

There is also a doubt about this irrationality in the usage of energy in the creation of the Universe. All scientists agree that the Universe is rational and was created with extreme precision, the smallest deviation in parameters by10^{-43} would have resulted in a failure. And here is a mistake repeated billion times in a creation of a hydrogen atom. God has a way too huge rejection rate.

Then the measured temperature of background radiation is only 2.7 K, impossible to correlate with the great energy of gamma quantum, born in the annihilation of the main mass of matter and antimatter. Therefore, an assumption is made that the gamma radiation «cooled down» a billion times to the energy of photons, that cause the changed measured temperature [5, 8].

This does not explain how gamma quantum, could have «cooled down» and lose energy This does not explain how the gamma quantums could have «cooled down» so strongly and lost energy and where did that energy go. The value of energy in background radiation is about 10^{10} times less than the energy, released from the annihilation of matter and antimatter. The law of energy conservation should be respected. *If in the annihilation of electron and positron gamma quantum were born, then during the expansion of Universe the correlation between their energy and the energy of Physical Vacuum should not change due to the Law of energy conservation, therefore they can't transform into radio waves. Most likely, the gamma splashes are the echoes of annihilation of the small amount of the matter Most likely, the known gamma splashes are the echoes of annihilation of the small amounts of the remaining matter and antimatter, discovered evenly in the whole volume of the Universe. Their number, compared to the number of hydrogen atoms is minuscule. The origin of experimentally discovered Relic radiation, probably, has another foundation.*

Traditional calculation of the loss in Physical Vacuum energy during the expansion of the Universe relied on the gases formula PV=RT. But, firstly, the Universe is considered empty and it is unclear, how a gas formula could be applied to it. Secondly, if it is not empty, it should be filled with energy - Physical Vacuum or ether (one and the same), we don't know how this energy is structured in a Physical Vacuum node. In chapter 4, it will be shown that the energy loss at the expansion does not go proportionally to R^3, as for the volume, but linearly, i.e. proportionally to R^1 – the expansion radius of the Universe.

2. Matter and antimatter symmetry

An easier hypothesis is proposed regarding origin of the matter, in its basis lies the original symmetry of matter and antimatter and, therefore, the equality of matter and antimatter, formed as the result of the Big Bang (*brief description of this hypothesis and other ones is provided in the works [4, 10-12, 21]).* If there is any asymmetry present in some neutral unstable particles, as the experiments of W.L. Fitch and J.W. Cronin have shown, it is not related to the processes of matter formation и annihilation. This asymmetry appeared later and is a consequence of the change in the state of PV at the expansion of the Universe, as will be shown in ch. 4.

Therefore, matter and antimatter do not exist separately, but, as paradoxically as it sounds, exist in us. In other words, the matter itself consists of the elementary particles and antiparticles. Everything is clear with the truly elementary particle – electron. The prime elementary particle – electron is an elementary vortex of energy that had been a heavier particle with the same charge from its formation in denser PV and to the loss of energy due to the neutrino release, basically - pseudo muon. Its antiparticle - positron – is hidden in a pseudo antimuon state inside a proton. This is particularly confirmed by the proton decay, as explained later, causing the transformation of the proton and electron, into energy (hydrogen atom annihilation). The term pseudo is applied to the elementary vortices - muons, that had higher proton density at the proton creation while retaining the same charge.

Proton, unlike the electron, is a complex particle and, presumably, consists out of muons (negative muons) and antimuons (positive muons).

Naturally, a question arises - why doesn't the matter annihilate itself, as it happens in the experiments where particles meet antiparticles? Of course if, electron would meet positron or muon meet antimuon in the free state, an annihilation would happen. But it should be considered that the birth of matter happened in the first nanoseconds of the Big Bang, when the energy density of vacuum-ether was way higher, and the unstable structure of particles and antiparticles was fixed in the place by an explosive reduction in ether density and became more valuable energetically (for example, we evaluate the mass defect in the creation of a proton to be 32%). A detailed description will be provided further, now we are going to look, what are some known *experimental facts,* proving that the matter is build out of particles and antiparticles and the existence of symmetry between matter and antimatter. Here are some of them:

1. The transformation of an electromagnetic γ-quantum into the matter is always accompanied by the creation of particles and antiparticles (for example, electron and positron), which is proven by multiple experiments. By this particular way the matter was created as the result of the Big Bang, which is the most substantial argument for the equal volume of matter and antimatter.

2. The «penetration» of protons and neutrons by a beam of high energy electrons (20 GeV) has shown that the nucleons (not only proton, but electrically neutral neutron) have internal electromagnetic charges [13]. That is to say, nucleons include some points of formation, called patrons, that have positive and negative charges, pointing at the possible complex structure of a nucleon (proton and neutron) out of particles and antiparticles.

3. Magnetic moment value of a proton is almost three times higher than its mechanical (spin moment), which is contradictory to the theory and is not found in electrons [14], i.e. proton carries more than a single charge. This contradiction is explained by the fact that proton is surrounded by a pion cloud, some of which carry an electric charge. This does not take into account that virtual pions carry mass, weighting about 1/7 of the proton mass.

Even bigger contradiction is caused by the magnetic moment of an electrically uncharged neutron. Citing [14]: «it should be allowed, that a neutron can consist of a positively charged core, surrounded by a positive pion cloud. Such system of charges, even if it is electrically neutral, has a non-zero magnetic moment».

Therefore, the presence of positive and negative charges that is, in sum, more than one in the internal nucleon structure and that has no explanation in existing common theories, also leads to the possibility of nucleon composition of particles and antiparticles.

4. According to the modern theories [15], nucleons (proton and neutron) consist of quarks having a fractional electric charge. There are positively and negative charged quarks in a nucleon at the same time. Beyond that, some hadrons consist of a quark and antiquark. Why they don't annihilate? Turns out they are connected by a so called «gluon liquid», with the mass comparable to quarks. I won't stop on the other quark and antiquark properties – with their "scent, colour, charm and pleasantness", antiquark with their antiscent, etc. The main thing is that even the standard model relies on the assumption that there exist nucleons out of particles and antiparticles, even if they are connected by something – the «gluon liquid» can be replaced by a mass defect. It is strange that no one thought about that.

5. If we follow the present theory that all matter in the Universe is matter left after annihilation, it is not possible to turn it back into *energy,* i.e. into gamma quantum, without the same amount of antimatter, that does not exist in the Universe. For example, electron as the final elementary particle cannot be divided into gamma-quantum, it requires its antiparticle - positron, absent from the Universe (fig. 2) [1-3]. Therefore, the main final product of our Universe is the hydrogen consisting of a proton and electron, unable to be divided and annihilated, due to the absence of corresponding antiparticles (according to the theory, they were annihilated in the Big Bang). But this is not true. After being irradiated by high energy gamma quantum (electrically neutral) a proton decomposition occurs, forming the neutral pion and positron [1]. After 10^{-8} sec pion divides into two photons, positron annihilates with the electron of a hydrogen atom, creating two more photons. Therefore, there is an experimentally proven fact of an annihilation and full transformation of a hydrogen atom, which represents most of the mass in the Universe into energy, which is impossible without antiparticles. But everything is put into its place if we propose that the matter itself consists out of particles and antiparticles.

6. The only strong reason against the structure of particles and antiparticles lies in their almost instant annihilation, proven by many experimental facts. What do the particles and antiparticles look like? It is matter with the same mass, but opposite Charge (electron and positron, muon and antimuon etc.). Nevertheless, is an annihilation of different particles and antiparticles, varying only in mass, possible? It turns out to be true, but it won't be instant. Take for example a negative muon and a positive K-meson. At first, in 10^{-8} sec after formation, K-meson, releasing the neutrino, turns into a antimuon, then a common annihilation of muon and antimuon takes place. Same thing happens during the aforementioned proton decay and the hydrogen atom annihilation (i.e. in fact, proton-electron annihilation). Therefore, the main difference between particles and antiparticles is a charge difference. Mass plays a secondary role, because it can be changed. Therefore, proton is a some kind of an antiparticle to electron, i.e. it can be divided into γ-quantum energy, neutrino and positron, i.e. it is separated from the electron only by energy. This means that all particles formed simultaneously, not separately proton with electron, then electron with proton, then proton and antiproton, but as particles and antiparticles at once, that due to some conditions did not annihilate, but turned into a proton and electron. Therefore, it can be proposed, that the matter itself consists of particles and antiparticles.

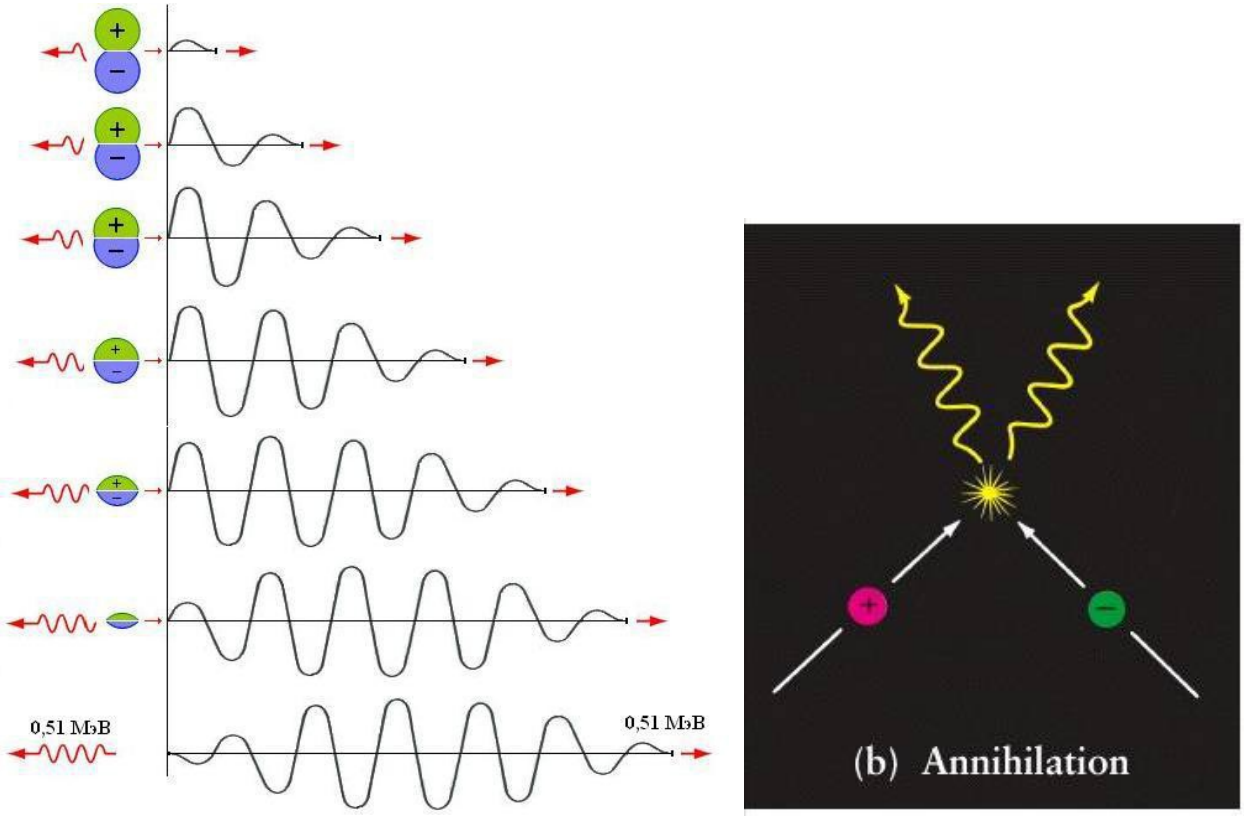


Fig. 2. Electron-positron annihilation scheme with the formation of gamma quantum. Electron cannot decay without antiparticles (turn into energy)

3. Structure of the matter (electron, proton, neutron and nucleon)

In order to explain the particle and antiparticle matter structure, we should look into a number of other foundational questions. Because they require an analysis of their own, here they will be represented only briefly as statements necessary to understand the core idea.

Firstly, let's look at the alma mater - the Physical Vacuum (PV) structure, which excessive energy formed the matter and the structure of the main particles - electron, proton and neutron. In the next chapters we will look at the stages of PV at the expansion of the Universe and how it has influenced the matter, energy of the Universe and the formation of Relic radiation, born out of multiple quantum leaps inside Physical Vacuum.

Modern physics refers to the space surrounding us in different ways [1, 5, 6, 8]. It is known that "the nature does not tolerate emptiness", but, nevertheless, the space of the Universe created in the Big Bang is considered empty by many physicists. With that, they refer to the special theory of relativity by Albert Einstein. But Einstein himself did not deny the existence of some energy environment in the space. He did not need the environment for mathematical explanation of his special theory of relativity. At the same time, his general theory of relativity needed some energy medium filling the space.

Modern physics has many theories treating Physical Vacuum or ether, as it was called before, not as an empty space, but as an energy medium, in which the matter exists and which is a medium for distribution and interaction of waves - gravitational, electromagnetic etc. Creating his famous electrodynamics equations, Maxwell oriented on the existence of PV. Paul Diraque treated PV as compensated state of electron-positron pairs, causing their spontaneous birth at energy fluctuations in Physical Vacuum.

In modern view, PV is also considered to have energy [16]. Even the **Higgs field**, introduced in place of ether, has the same **energy nature** and with every modification comes closer by its features to ether or PV.

Michelson recieved negative experiments to discover the “ethereal wind” and rational explanations about bodies moving through the dense material medium without interaction. But ether or PV can be an energy medium not isolated from matter. Because the matter formed out of PV, it is connected to it and in the movement leads the ether surrounding it after itself. This was proven in Michelson’s findings, where the “ethereal wind” was discovered, but it was many times smaller than expected – it did grow in strength at the higher altitude from Earth.

In our understanding, Physical Vacuum filling all space in the Universe formed from the ether in stages, by achieving the minimum energy state.At the energy loss during the expansion of the Universe, ether (energy clusters) gradually, with phase transitions, formed into PV, that forms an elastic space lattice with vortex energy clots bindings.

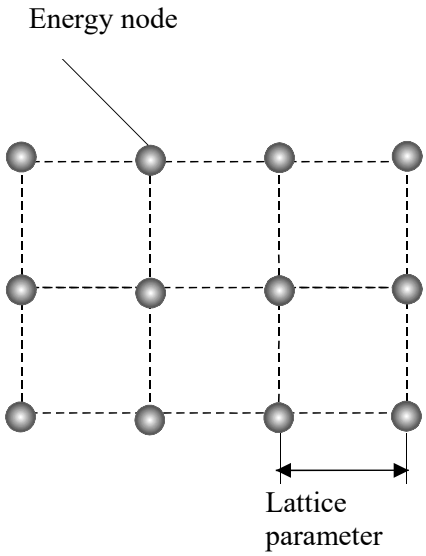


Fig. 3. Energy structure of the PV lattice) schematic presentation)

Therefore, the PV (ether) is of material nature only in the energy sense by having "pseudo mass". We consider the PV node structure to be a *double toroid*, with right-hand screw and left-hand screw, which causes the positive and negative polarity of PV (fig. 4) [18, 19, 21].

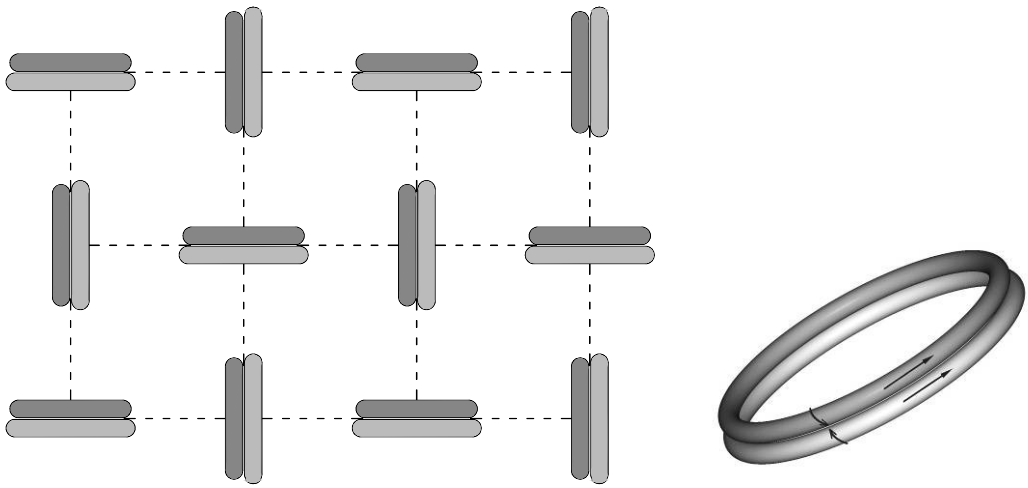


Fig. 4. Schematic image for node structure of the Physical Vacuum

Due to the pressurization of toroids, the PV polarity is almost ***compensated*** in the absence of the external impact, with a slight move into the negative space. *Toroid twisting of a PV node is responsible for electromagnetic integration, circled - for gravitational interaction. Therefore, it is*

logical, that with circled twisting of a PV node at a higher speed, its radius is lower and the PV density is higher (the space is compressed). With that, as known from the theory of whirlpool movement and geodynamics, the vortex energy is proportional to its speed squared (V^2) and inversely proportional to the vortex radius (R). Therefore, a compressed PV lattice has higher energy and correlates to the earlier stages of Universe fig. 5). Therefore, our understanding of PV is close to the structure proposed by Paul Diraque.

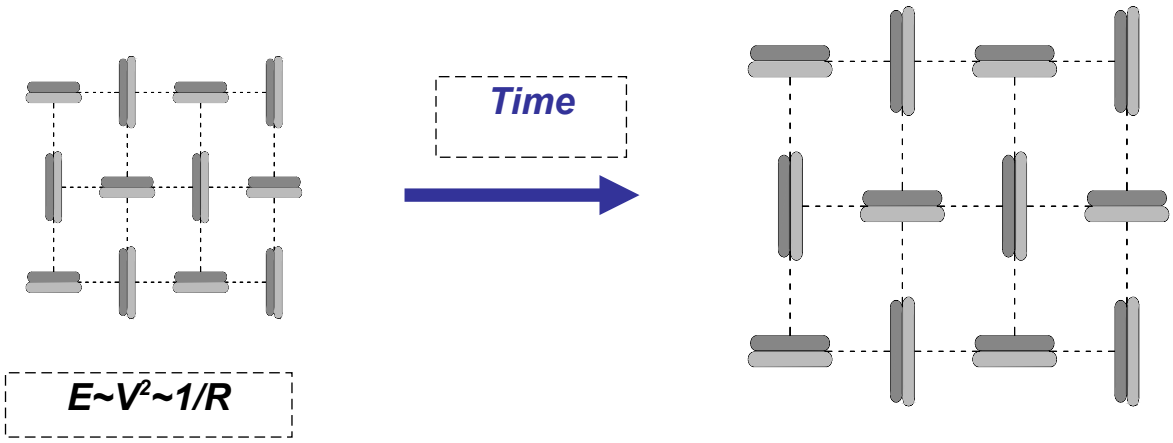


Fig. 5. Energy density decrease of the PV lattice during the expansions of the Universe (energy is inverse proportional to the ring twist of the PV node)

Left wise twist of a single toroid conditionally correlates to a positive charge, right wise – negative. Both toroids are pulled according to the Bernoulli effect do to the toroid and ring twisting, retaining a stable structure.

It should be noted, that thanks to the dipole structure, PV is electrically neutral. Bu if a material particle is small (less than 10^{-13} m), it remains inside the PV dipoles, where it is highly polarized. Maybe, as a consequence of that, such effects like mass defect, strong interaction and quantum effects are present at the short ranges.

PV shows its resilient lattice properties during the energy transfer in a moment of excitement – transition of the electromagnetic waves or compression of the waves into matter. With that, the node itself could be viewed as a simple oscillating circuit of defined properties (induction L and capacity C).

For the PV of another density, for example, higher at the earlier stage of formation of the Universe or in a strong gravitational field, its energy properties would be higher. According to the inverse dependence equation of oscillations to these parameters $\nu \sim 1/LC$, fluctuation frequency, correlating to the same energy, would be lower. This is proven by time slowing down near the massive stars (equal to the decrease of lightspeed), where the PV energy density is higher, similar to the state of young Universe. Therefore, the frequency resonance of the PV lattice would be lower in this case.

So, at the electro-magnetic oscillations both toroids get deformed, transferring fluctuations further down the PV lattice with a light speed (fig. 6). Due to PV having a vortex structure, its fluctuations, i.e. the photon itself, would have a similar structure with internal rotation freedom. Therefore, energy nodes of the ethereal lattice are only used in the moment when electromagnetic waves pass through. Therefore, ether is of material nature only in the energy sense, by having “pseudo mass”, because energy and matter are interrelated according to Einstein formula $E=mc^2$. Due to this fact we are able to move easily throughout the ether.

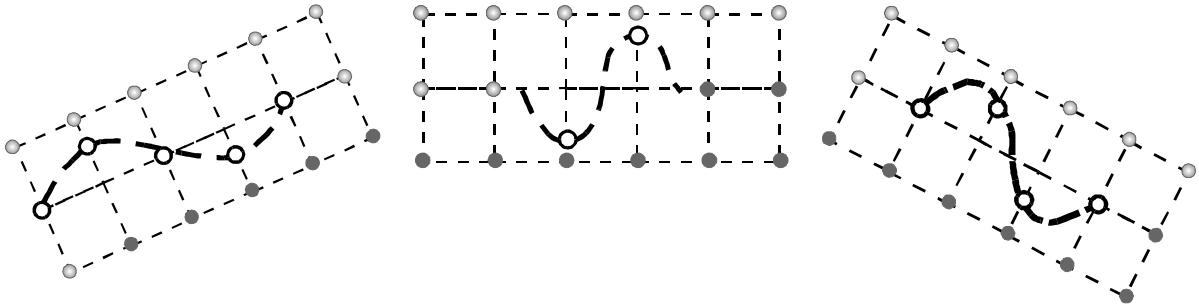


Fig. 6. Ether deformation in the moment of electromagnetic waves passing. Energy nodes of the ethereal lattice are only used in the moment when electromagnetic waves pass [4, 10]

Like any resilient medium that forms a lattice, ether is resilient (shift module G), has density ρ and wave distribution speed (in our case, electromagnetic light speed waves), and is also a conductor for electromagnetic excitements (waves) due to the ether deformation. When a gamma quantum (electromagnetic wave) is formed toroid and ring twists of the PV node are simultaneously compressed, i.e. gamma quantum carries compressed positive and negative charges at the same time.

It is known from the fluctuation theory, that any resilient medium has a resonance frequency, defined by a lattice period – minimally possible wavelength for a taken resilient medium (fig. 3). This wavelength correlates to maximum amount of energy that this resilient medium can safely transfer. For the PV (ether), this energy correlates to the formation of an electron-positron pair from one gamma quantum. From here we find the resonance value for an ethereal energy lattice wavelength, $\lambda=h/2mc=1.212\times10^{-12}$ m, where m –electron or positron mass, h – Planck constant, c – light speed in a vacuum. If ether fluctuations caused by electromagnetic waves would go with a shorter wavelength, they would be unstable, which would cause the twisting of an electromagnetic wave into a stable «vortex» - an elementary particle of matter (fig. 7). Therefore, the mass of a constant whirlpool allows to compensate the excessive ether energy from the electromagnetic oscillations inside it.

The ether lattice parameter should be defined as half of wavelength resonance, i.e. 6.06×10^{-13} m, as shown on fig.3.

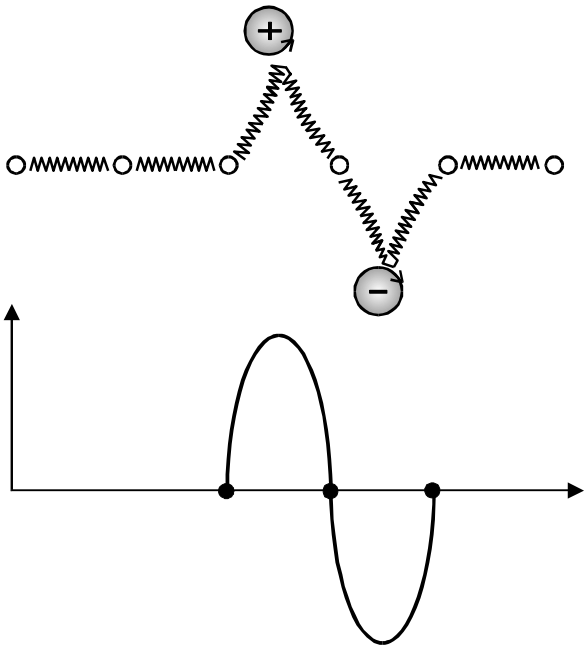


Fig. 7. Electron-positron pair formation from a γ-quantum at a critical ether deformation

Electron-positron pair is formed from a PV lattice node, when the excessive energy overcomes the nominal energy that it can reliable handle and retain its structure, i.e. ring and toroid twists respectably responsible for gravitation and charge. Together they form mass and charge-energy deformation of a PV node.

Released from a PV node and divided, a double toroid divides in two separate ones, with right wise and left wise twist, correlating to the positive and negative charges. Later, they get a circle, spherical twist, i.e. spin (fig. 8). Spin creates stability and magnetic moment of the particles and lowers their energy. As a result of spherical twist, we consider electron and positron to be points.

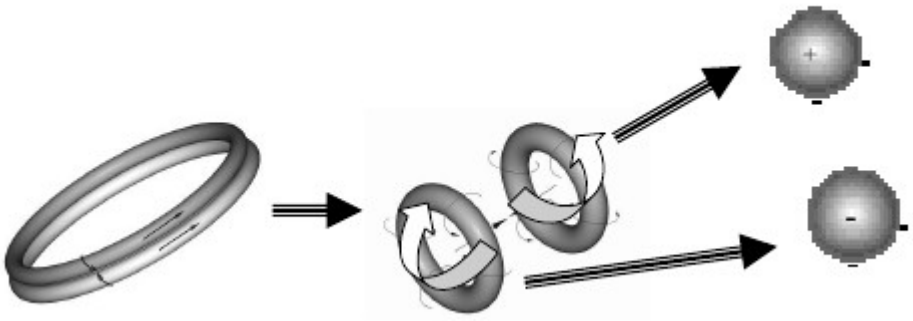


Fig. 8. Transformation of gamma quantum from a vortex structure of PV node into a particle

Formation of positive and negative charges in an electron-positron pair can be represented in another way.

As it is known, electromagnetic fluctuations are cross-section fluctuations. During these fluctuations, a shift of parallel planes occurs without changes in lattice parameters. But during that, compressive (by BD line) and stretching (by AC line) pressures (fig. 9) are created between the planes, rotating elementary whirlpools in the opposite directions, conditionally – positive in a compression, negative in stretching, defining the particle charge.

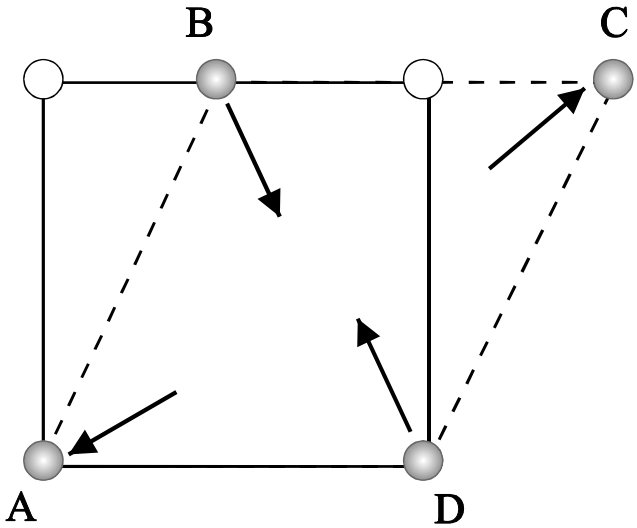


Fig. 9. Formation of stretching and compressive pressure in the PV (ether) during the transition of an electromagnetic wave quantum.

Therefore, we can draw the following curve directions of a whirlpool: inside, from a compressive pressure, and outside from a stretching (fig. 9, 10). Because it is impossible to do in a 3d space, we can only propose that the curve direction is set in a fourth dimension.

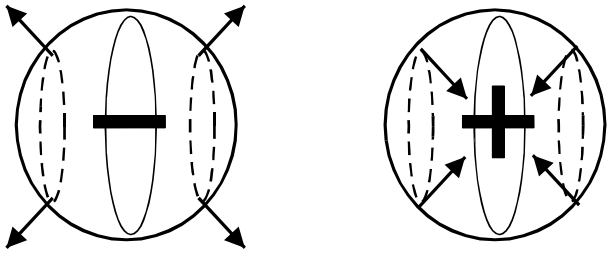


Fig. 10. Formation of the positive and negative elementary particle charges

Another particularity of a PV node structure change during the expansion of the Universe is pointed out by an experimentally proven presence of +1 or -1 charges in the non-neutral elementary particles regardless of their mass. *Therefore during the expansion of the Universe PV toroid curving energy stays the same, but the ring twist energy, responsible* for gravitation, decreases (alternative Universe expansion mechanism according to the PV structure expansion is provided in the articles [18, 19, 21] and on the website www.proatom.ru). Therefore, the more there is energy and speed in a ring twist, the less is radius and size of the particles, formed in a whirlpool.

Because of that, naturally forms a normal scientific approach to the very expansion of the Universe. It can be proposed, that the experimentally proven Universe expansion mechanism based on the «swelling» principle occurs not by the accepted Big Bang concept where every big material part of the Universe distances from another in the emptiness. Expansion of the *Universe goes by the swelling principle of the very PV structure,* containing the connected with him material bodies. With that, the gravitational forces due to their weakness compared to the PV energy, cannot oppose it. Therefore, the far galaxies don't move with a speed of light in a common sense, because they don't move with a speed of light relatively to the absolute PV.

Another consequence of a proposed swelling model is the possibility of faster than light speeds. If the Universe swells every moment through the synced increase of every energy node in the Physical Vacuum structure, we get a mechanism allowing not only to transfer information or signal (as Nicolay Kozyrev says), but instant transfer of energy to any point in the Universe.

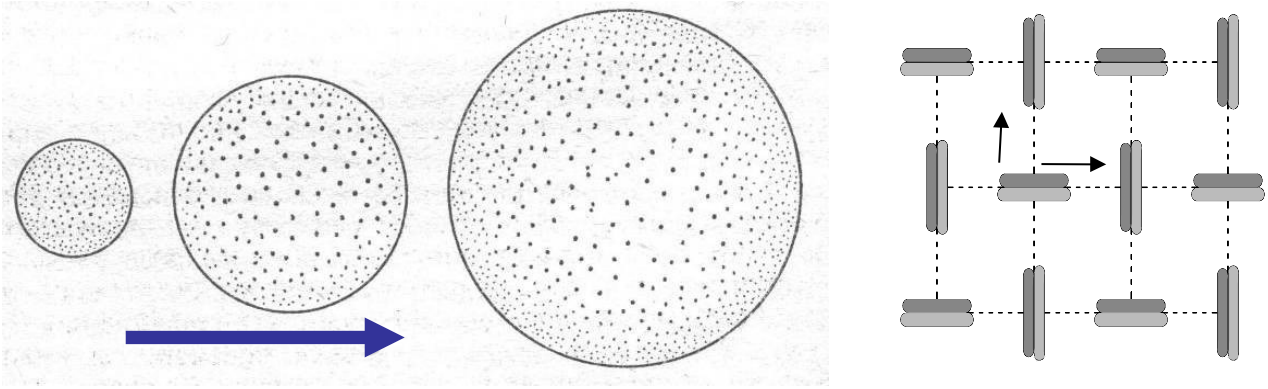


Fig. 11. Swelling model of the Universe expansion by the PV structure swelling (increase of a PV node and internode distance)

Let's get back to the structure of elementary particles, consisting of an elementary whirlpool (electron, muon). For example, a muon has the same type of structure, that electron has (fig. 12), because it turns into an electron while releasing energy as an antineutrino. But the curving energy of a whirlpool during muon formation is 207 times bigger, then the electron one, despite the same charge value.

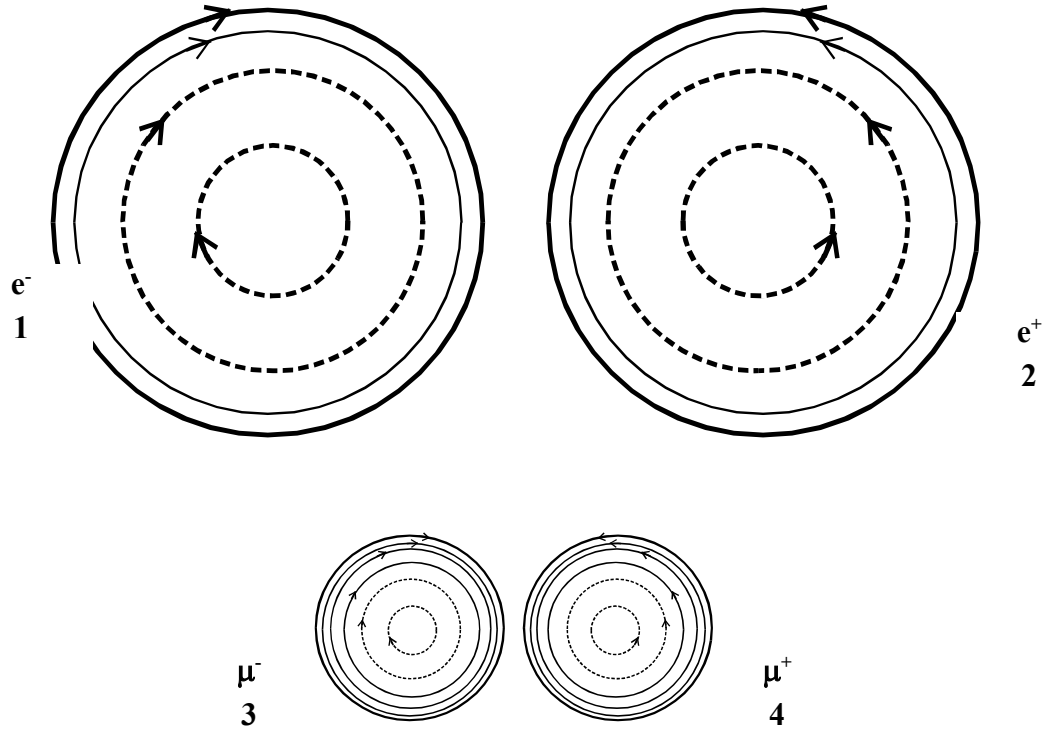


*Fig. 12. Structure of elementary vortices-particles: 1 – electron (**e**⁻), 2 –positron(**e**⁺), 3 – muon (**μ**⁻), 4 – antimuon (**μ**⁺)*

Therefore, naturally, its radius, according to vortex motion equation $V^2 \sim 1/R$ should be significantly less. But when taking the toroid twists into account, the dependency of elementary particle size from their formation energy becomes more complex.

In our ether, with existing energy density and lattice parameter, the only constant one is a vortex with energy equal to the energy of an electron formation. Therefore, the muon whirlpool gives the excess energy away as a muon neutrino, transforming into an electron. With that due to an impulse from neutrino, an electron receives kinetic energy that can be used [17, 20, 21]. Similar effect occurs in the well-known β-decay process, where electron, flying out of the nucleus, gives the excessive mass (energy) in the form of antineutrino and kinetic energy from the impulse – at average, about 30% of energy is spent on an impulse.

If the energy parameter of the lattice would have been 207 times less than the current one, energy density would have been higher and the muon whirlpool would've been stable.

But stability of the muons (or proto-muons, if they had been formed in a denser PV in the younger Universe) may be saved in the ether of our density, if their excess energy would be connected.

Particles – stable vortices – create a powerful ether deformation around themselves, causing the gravity to appear. Inside the vortex a rarefied ether is created, by its perimeter – condensation (fig. 12). Because of that, the vortices are pulled into a conglomerate, and the attraction forces created that may be consider to be nuclear ones. At the same time, the ether condensation by the vortex perimeters does not let them to annihilate even at the different rotation directions, i.e., when the conglomerate consists of the particles and anti-particles. The higher the energy (mass) of vortex-particle, the higher is the pressure inside ether and the attraction of the whirlpools. By coming closer and forming a conglomerate, they reduce the ether deformation and, therefore, mass (fig. 13). With that, the connection energy increases due to the creation of a mass defect. And while the concentration energy of electron and positron on the outer surface of a vortex does not exceed the electrostatic attraction energy of the vortices, causing their annihilation, then, for example, this energy for muons is proportional to the mass defect and higher in value. Therefore, by creating a close packing of, for example, 13 positive and negative muons with a single positive muon at the center, the energy gain

due to the mass defect can ensure the stability of such formation, despite the presence of differently charged particles.

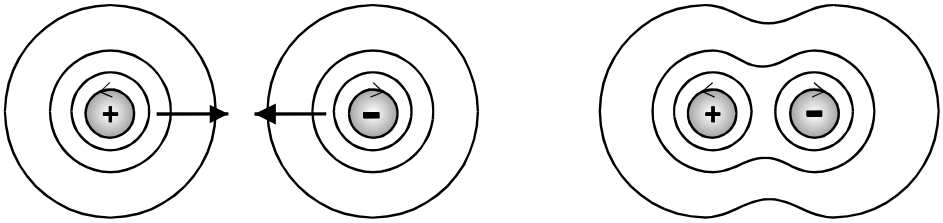


Fig. 13. The decrease of elastic deformation fields (mass) at the merger of two particles (formation of mass defect)

Muons in the nucleus stay in the plasma state, which is also preventing the annihilation.

The choice of muon (originally a proto-muon in a denser PV) as an elementary particle that protons and neutrons are based on, was not coincidental. In a long chain of discovered elementary particles there must have been a true «elementary» particle. From the most known elementary particles (excluding electron and positron, unable to form a stable conglomerate in ether of existing density), the muon is the most suitable candidate for a «brick» of all matter – the basis for proton and neutron (table 1) [22, 23]. It is the most elementary – by delay to electron it does not form transitional particles and 99% of its mass transforms into energy. It has a highest lifespan - 10^{-6} sec, while for the others it is 10^{-8} sec. Finally, it does not form neutral particles like pions and has a complete charge +1 or -1. Muon was the first of discovered metastable particles. It was discovered in the cosmic rays back in 1932. At first it was considered a «light» particle – lepton, which did not allow to view it as a basis for protons and neutrons.

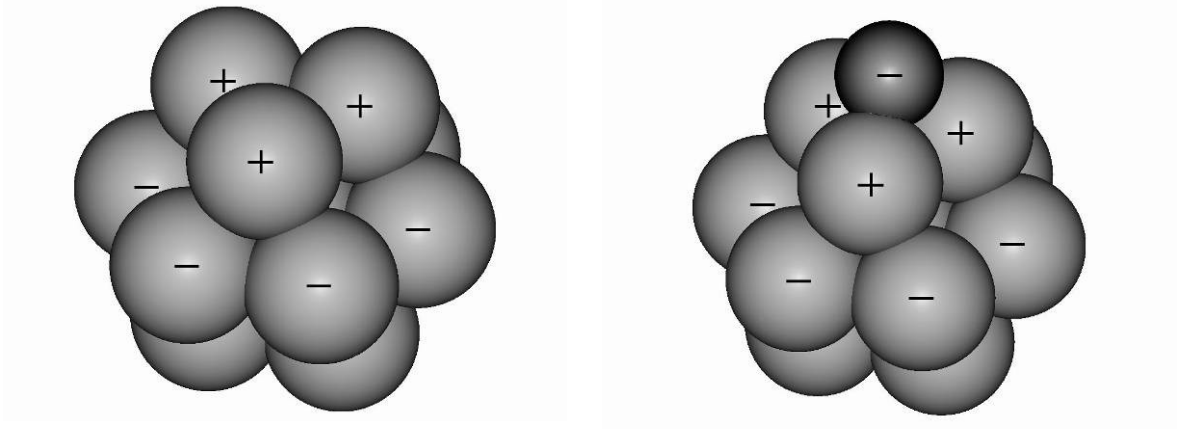
As we think, a proton consists of 7 antimuons and 6 muons (fig. 14) [4, 10]. The mass of a single muon or antimuon – 105,66 MeV, mass of 13 muons and antimuons – 1373,58 MeV, proton – 938,2 MeV. Therefore, the energy of a muon in a connected state is 72.169 MeV. The difference in the energy of a proton and muons and antimuons – 435,38 MeV. Therefore, the mass defect is equal ~32%, and the average connection energy for one muon is 33,49 MeV. For example, mass defect (or connection energy) in the nucleus between nucleons (proton and neutron) is about 0.8 %, correlating to the nucleon connection energy 8 MeV per one nucleon.

Table 1

Characteristics of some elementary particles

Title of a particle	Designation		Rest mass, MeV	Charge	Average lifespan, sec	Decay type	Energy emission, MeV
	Particles	Anti particles					
Electron neutrino	ν_e	$\bar{\nu}_e$	(<0.2 кэВ)	0	Стабилен	–	–
Muon neutrino	ν_μ	$\bar{\nu}_\mu$	(<4 МэВ)	0	Стабилен	–	–
Electron, positron	e^-	e^+	0.511	±1	Стабилен	–	–
Muon	μ^-	μ^+	105.66	±1	2.2×10^{-6}	$\mu^- \rightarrow e^- + \nu_\mu + \bar{\nu}_e$	105.1
Charged pion	π^+	π^-	139.60	±1	2.55×10^{-8}	$\pi^+ \rightarrow \mu^+ + \nu_\mu$	33.95
Neutral pion	π^0		135.01	0	1.8×10^{-16}	$\pi^0 \rightarrow \gamma + \gamma$	135.01
Charged caon	K^+	K^-	493.8	±1	1.2×10^{-8}	$K^+ \rightarrow \mu^+ + \nu_\mu$	388.1
Proton	p	$\bar{p}$	938.26	±1	Стабилен	–	–
Neutron	n	$\bar{n}$	939.55	0	1×10^{3}	$n \rightarrow p + e^- + \bar{\nu}_e$	–
Lambda-hyperion	Λ	$\bar{\Lambda}$	1115.4	0	2.62×10^{-10}	$\Lambda \rightarrow p + e^- + \nu_e$	37.5

The neutron structure correlates to the proton structure plus one nominal particle related to the electron. On the nucleon surface, where the ether energy density is higher, electron stays in a compressed state and a bit shifted to the muon side. Therefore it has a mass 2,5 times higher and, therefore, energy that it emits as an electron antineutrino at the β-decay; $n \rightarrow p + e^- + \bar{\nu}_e$.



a **b**

Fig. 14. Proton (a) and neutron (b) structure [4, 10]

Therefore, it is proposed to get back to the proton-electron nucleus structure from the common proton-neutron model.

According to a traditional proton-neutron model, electrons can't remain in the nucleus, despite the fact that they fly away from it and can be caught by it. At first, it looks simple – there is a direct experiment, the electron flies out of the neutron (and not from the nucleus) and neutron turns into a proton. But the traditional nuclear physics has vetoed this process. There are two main prohibitions of nuclear physics. Let's take a look at them.

1. There is no space for them. The nucleus radius for A=20 is around $3*10^{-15}$ m. In order to place it inside, the nucleus diameter must be equal to λ/2, where λ – the length of a De Broglie electron wave, i.e. $\lambda=1.2*10^{-14}$ m. That is to say, the kinetic energy of an electron is equal to 100 MeV, exceeding the nucleus connection energy (around 8 MeV). If the electron energy is significantly lower than its wave function should spread farther than the nucleus limits.

But we won't stay at the particularities of contemporary nuclear physics and physics of elementary particles – instead, we will try to provide an answer in the same language.

Firstly, the nucleus releases an electron 2,5 times higher in mass (proto-electron, a muon analogue), that is taken away by neutrino. That is to say, only 100:4=25 MW left.

Secondly, it would be a mistake to treat an electron as a part of a nucleus of average connection energy 8 MeV per nucleon. Electron never flies away from inside protons (from a hydrogen atom nucleus). At the same time, it is known that the free neutron divides into proton, electron and electron antineutrino after 15 minutes. Therefore, an electron flies out of a neutron, and, therefore, is a part of it. The better question would be: can electron be a part of a neutron? And as we have shown, in the proposed proton-electron nucleus structure the connection energy inside a nucleon is about 400 MeV, enough to anchor an electron.

2. The second thought is related to the nucleus spin. Electron spin, just as a proton spin, is equal to ½. If the deuterium atom consisted of two protons and one electron, then the resulting spin would be either ½ or 3/2.

But the deuterium atom consists of a proton and a neutron, and its total spin equals 1. We need to prove that the spin of a neutron, consisting of a proton and an electron (plus antineutrino, because the electron mass in the neutron is higher than in the free state), should be equal to ½. This has already been proven in a beta-decay, where the absent spin ½ was ascribed to the electron antineutrino. Therefore, aside from an electron an electron antineutrino is included in a neutron. Therefore, the prohibition of nuclear physics is easily avoided.

Let's get back to the proton and neutron structure.

The connection between muons inside proton and neutron can be nominally called intermuon or interparton, by the names of the nucleon-forming particles. By their type and properties, it is almost the same as nuclear, because it has the properties of the nuclear forces [23]:

а) charge independence: forces present in the different-charged muons are equal, because they depend on a vortex underpressure and peripheral compression, i.e. vortex energy. At the same time, they influence the nucleus properties, because there are no protons-only or neutrons-only nuclei.

б) fulfillment property – every muon (patron) interacts only with a limited number of neighbors.

в) nuclear and interparton forces are attraction forces.

г) nuclear and interparton forces are short-ranged. If the nuclear forces' radius is valued about $R \approx 1.5 \times 10^{-15}$ m, in the interparton it is about 3 times lower. When the distance closes, the attraction forces transform into pushing forces, because of the same charges. This property, just like a number of other occurrences, does not have a strict physical interpretation and it is explained by a pushing core in nuclear forces. According to the proposed model, it is explained by a mutual pushing of vortices at the short range due to the ether compression on the vortex edge, as it was explained earlier when describing the muon and proton structure.

Regarding the nuclear forces connecting protons and neutrons inside the nucleus, they represent an interaction of touching muons on the surface of every nucleon (fig. 15) [4, 10]. Because not all muons are used in that, the nuclear bonding energy is lower than interparton bond.

Let's try to evaluate the nuclear connection energy between nucleons and compare it to the intermuon connection inside the nucleon.

Intermuon connection inside the nucleon. Thirteen (13) muons, form a tight package inside the nucleon, have 36 touches or connections with each other. Therefore, the total connection energy in a nucleon is 435,38 MW, average energy ***of a single connection is 12,094 MeV.***

Should be considered that the muons inside nucleons and nucleons inside the nucleus act as a «Fermi gas», i.e. *constantly fluctuate and move in relation to the original place.* Therefore, such uptight package correlates to the well-known «drop» model of a nucleus.

It is more difficult to theoretically evaluate the ***nuclear connection, i.e. internucleon connection.*** It is naturally weaker and form at the place of interaction of peripheral muons in nearby nucleons (fig. 15). Due to the nucleon number inside the nucleus rising with the atomic number increase, and the nuclear connection value remains constant for stable nucleus, starting from A=12 (carbon), the nucleon package cannot be tight [22, 23]. Therefore, it is likely that nucleons form a package similar to the crystal lattice of a diamond with a coordination number around 4. Naturally, this number correlates to the number of nucleons inside the nucleus. Nucleons on the nucleus surface have uncompleted connections. And due to the fact that nucleons on the nucleus surface are more than a half of nucleons total, the average coordination number turns out to be smaller.

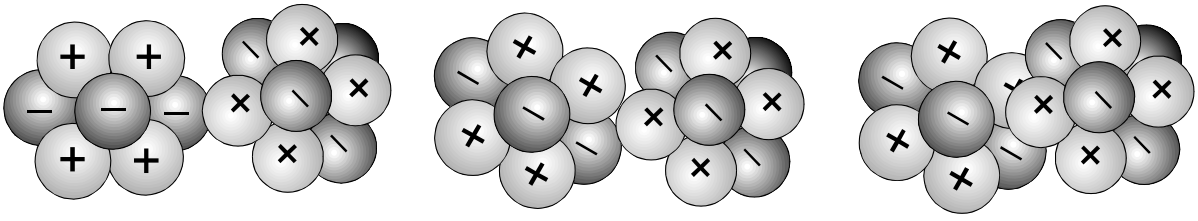


Fig. 15. Formation of the nuclear forces on the nucleons surface during the connection between surface muons, one bond- (a); two bonds - (b); four bonds- (c)

At average, judging by a binding energy in deuterium (H_1^2) equal to 2.2 MeV (table 2), the value of a binding between two muons belonging to different nucleons, can be about ~2 MeV.

Table 2

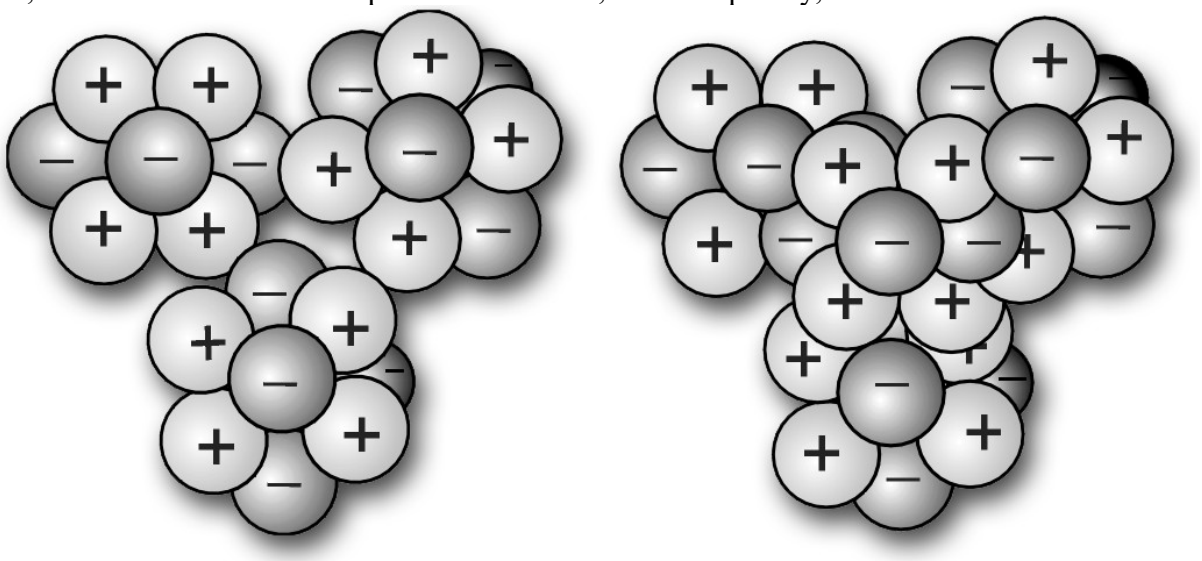
Binding properties for some nucleons

Element	Atom weigh t	Nucleus binding energy E_B, MeV	Binding energy per 1 nucleon E_B/A, MeV	Number of contacts between nucleons, N	Number of contacts per nucleon, N/A	Binding energy for a single contact, E_B/N, MeV
Hydrogen	1	–	–	–	–	–
Deuterium	2	2.2	1.1	1	0.5	2.2
Tritium	3	8.5	2.83	3	1.0	2.83
Helium	3	7.7	2.57	3	1.0	2.57
Helium	4	28.3	7.07	6	1.5	4.72
Helium	5	27.3	5.46	9	1.8	3.03
Helium	6	29.13	4.85	12	2.0	2.43
Aluminium	27	225.0	8.33	–	2-3	2.78-4.16
Zirconium	91	791.1	8.69	–	2-3	2.89-4.34
Uranium	235	1783.8	7.59	–	2-3	2.53-3.79

Another unclear question is the number of surface nucleons interacting at a point of contact, i.e. the number of bonds between two nearby nucleons at a point of contact. As seen on fig.15, they can be from one up to four and, theoretically, to six.

It can be proposed, that in one contact of two nearby nucleons one bond is established between muons (fig 15a), sometimes two (fig. 15b). This is related to the properties of a nucleus itself, where, aside from the internal movement of nucleons, collective movement of nucleus parts is possible. It allows for a relative freedom of movement for nucleons inside nucleus, causing a nucleus deformation, and moving nucleus to the «Fermi gas» state.

Depending of nucleons placement in relation to each other and the nucleus excitement energy, causing a quantum shift of nucleons to a higher energy level and, therefore, a reduction in the number of bonds, the number of bonds at a point of contact is, most frequently, from one to two.



a **b**

Fig. 16. Schematic presentation of nucleus structure: a – tritium; b – helium

In some stable nucleus (He_2^4) the number of bonds can also be higher.

Average binding energy for one contact is calculated in table 2. As seen from the table, it could shift 2 to 5 MeV, maximum value of some contacts could be even higher. But for the most nucleus this value lies in the 2-3 MeV range.

Therefore, the proposed nucleon (proton and neutron) and atomic nucleus structure formation from particles and antiparticles does not contradict experimental facts and known physical models.

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4. Some conclusions from the proposed nucleon structure model

The hypothesis about matter consisting of particles and antiparticles can explain effects of high-powered gravitational fields – in collapsing objects, like neutron stars or black holes. Gravitational field increase causes the penetration of a potential barrier that precluded convergence and annihilation of muons and antimuons in nucleons, resulting in an explosion – transformation of mass into energy. These flashes of «supernova» stars are registered in different parts of Galaxy from time to time.

Another proof of this model is multiple publications regarding the results of a cold core transmutation by various methods [24-33]. We can refer to the experiments of Rossi and his follower (collected and systematized by A.A. Prosvirnov on the website www.LENR.SEPLM.RU) [24, 28, 29]. The most verified are microbiological methods of chemical transmutation [30-33].

These methods have always been approached cautiously because of the following. Firstly, the bacteria are fickle, the processes are very slow. Secondly, and mostly, the layman explanation of these processes – bacteria "eat" or recycle isotopes – so common, that it pushed many scientists away. In reality, there is no miracle. Bacteria just speed up natural decay process for isotopes, acting as a catalyst. And because the half-life period is an average definition – some nucleus decay immediately, their neighbors for an unknown reason,– after millions of years – then, by building up some conditions it is possible to trigger the decay of all nucleuses of the element.

First one to describe the transmutation effects in biological systems was Louis Kervran in 1963 [30]. Later many researchers confirmed these effects.

One can believe or not believe that it is possible, but the experiments on bacteria, confirming this effect on the radioactive waste solutions, were conducted in our Institute (AO VNIINM), designed by the group of A.A. Kornilova in MSU [31], which also confirmed this effect already with radioactive waste solutions.

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Many research groups work in this area. Most renowned are the works of V. Kurashov and T. Sakhno [32, 33]. Bacteria contribute to the alpha and beta decay processes, transferring electrons to the elements of variable valence (Fe, Mn etc.), creating an oxidating-restoring potential in the solution to the radioactive isotopes and in reverse. *In fact, according to our model, interacting with heterogamous charges on the nuclear surface and electrons in the nucleus.*

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This process can be initiated even without bacteria. In order to speed the process up, the transition elements are needed (Fe etc.), their electron transfers are transformed by bacteria and affect the nucleus (most likely, it is a variety of synphase radiation).

Naturally, to explain this effect we need to move away from the common quark nucleus model, that does not allow the presence of electrons in the nucleus and neutrons.

The proposed structure of the main elementary particles and atomic nucleus allows to physically explain the transformation of mass into energy and back.

During the formation of a mass defect, when muons converge, their opposing ring twists converge due to the decreased pressure, according to geodynamics. They are slowed down, the energy of their twist decreases and, therefore, their mass. A mass defect occurs. Excessive deceleration energy transforms into a gamma quantum. But the total PV deformation from the mass and gamma quantum remains the same, the PV energy remains unchanged.

The nucleon volume increases during the twist deceleration (it is known, that the size of an electron is much higher than of muons and protons). This confirms, that energy whirlpools form the elementary particle structure, the whirlpool energy is inversely proportional to its radius and volume. This again confirms that energy vortices form the elementary particle structure, and that the vortex energy is inversely proportional to its radius and volume.

5. Particulates of the matter formation as a result of the Big Bang

The researchers have built a model of the Universe aged less than 1 second [3, 6-8]. The main point of that module is that all energy of the Universe was concentrated in micro volume and then suddenly expanded, its speed in proportion 1/t, where t – time from the moment of the Big Bang.

Therefore, the energy density of ether was huge, while the PV lattice parameter – minimal. Gamma quantum appeared in the Big Bang, elemental vortices – particles and antiparticles - immediately annihilated, the newly formed gamma quantum birthed new particles.

Therefore, following this model, we propose, that at such enormous density, the energy and gamma quantum were being born in serious (stages) (fig. 17). Later, when the ether density decreased to a particular value, about 207 times higher than now, the elemental vortices converged into 13 vortices with tight package, reducing the energy of the system [4, 10]. The paired 14^{the} whirlpool was not included in the packed proton structure (it would've violated the package and proton stability in a higher energy density environment), another destiny awaited it.

It is difficult to say while the convergence of vortices happened only in the given ether density and not earlier. It is likely, that there happened a PV phase transformation from a chaotic structure, to an ordered structure of an amorphous or pseudo solid state. Therefore, the light (electromagnetic waves) only has later fluctuations when transitioning through the PV structure.

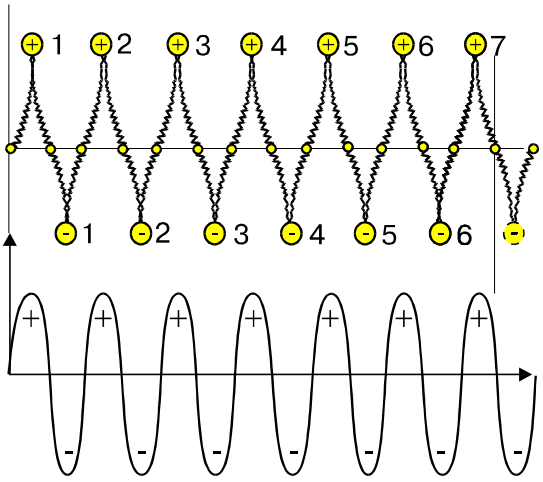


Fig. 17. Shematic description of protons formation from a series of γ-quanta at the early stage of the formation of the Universe evolution [4, 10]

Universe continued to expand and the ether density hastily decreased. The formed vortices conglomerate – proton was not losing its energy due to the binding energy of the muons and antimuons forming it, and was becoming more and more stable, while its intermuon bond power increased at the Universe expanding. The energy difference between a proton and PV surrounding it is also increased, and, therefore, the PV deformation and warping did too. According to Albert Einstein, even this space warping causes gravitation. Therefore, the mass increases in volume with the expansion of the Universe, but not numerically (the number of protons, neutrons и electrons does not change), the PV deformation around matter increases and so does the attraction force and gravitation.

Increase of an intermuon bond happened due to the increase of energy difference between vortices-muons and the energy of the PV surrounding at its expansion. That is to say the mass defect increased.

Let's get back to the 14th vortex-muon, not included in the proton and forming the 7th pair of the serious (fig. 17). While the ether density decreased, it gradually releases its energy as neutrino, until it became an electron in the PV of our contemporary energy density. Electron is a muon that has gradually lost its energy while the expansion of the Universe occurred. It has the same charge, but about 207 times less mass. Because muon and electron have the same charge, during the expansion of the Universe only the PV node ring twist (responsible for gravitation) decreases, while the toroid, responsible for the charge, remains unchanged.

A question arises – why muon remains as the 14^{th} whirlpool, and not the positive muon or antimuon, i.e. what came first, the pressure that formed the antimuon, or stretching that formed the muon. Because the expansion was explosive, the process of ether grid compression came first. Therefore, during the formation of gamma quantum, the first vortex-antimuon with a plus charge was born from a compressive pressure, defining the positive charge of a proton. 14^{th} whirlpool-muon, the last of the gamma quantum, by transforming into an electron, released its excessive energy to ether as negative neutrino, i.e. PV-ether carries in itself the little excess of stretching pressure.

«Stretched» energy structure of the ether is presented on fig. 18 b. Because this «stretch» is isotropic, it does not influence the most of physical laws. Nevertheless, it is responsible for the violation of mirror symmetry in nature.

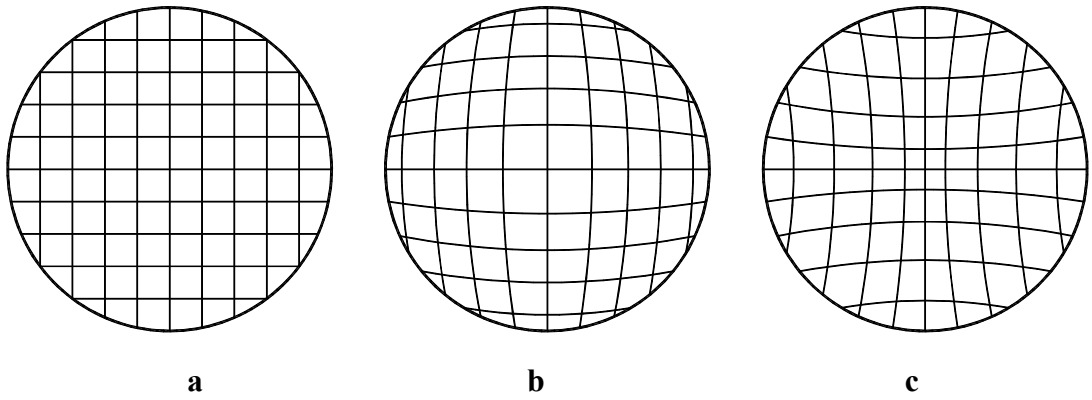


Fig. 18. Schematic presentation of ether (PV) state: a – balanced state (before the formation of protons and electrons); b – «stretched» state (after the formation of matter): c – «compressed» state

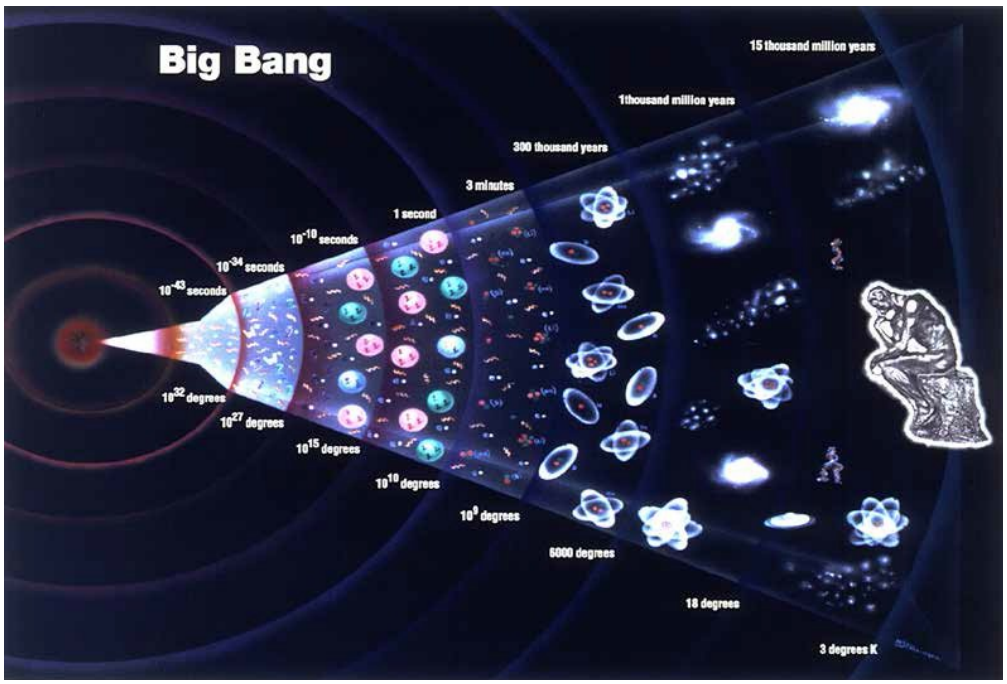
Energy value of the unbalanced PV state in the unit of volume, can be evaluated due to the fact that there is about 5×10^{8} hydrogen atoms per m^3 in the Universe, while the energy loss of one muon decaying to electron is about 105,1 MeV (ref. table 1) or $1.6816\text{x}10^{-11}$ joules That is to say, $8.408\text{x}10^{-3}$ joules per 1 m3 exist in an unbalanced state. By comparison to the energy of the PV, which density we value at $1.14\text{x}10^{36}$ MeV/m^3 [4, 10], this value is miniscule, almost 10^{40} times less. But it is enormous by earth standards. If we presume, that neutrino speed cannot be less than the speed of light and, therefore, energy taken from the PV would be compensated by the same speed from other points of Universe, then there is $9.5\text{x}10^{23}$ joules of energy in $3\text{x}10^{8}$ m (volume of the sphere that light penetrates in 1 sec), and the source power would be no less than $9.5\text{x}10^{17}$ MWtt, which is *9 orders of magnitude* bigger than all power plants in the world. There is about 10^{69} joules of energy in the whole Universe, which mass is value at about 10^{50} tons. There is about 10^{69} joules of energy in non-equilibrium state in the whole Universe, which mass is value at about 10^{50} tons [1].

But this is not our energy yet, but just remaining in an unbalanced state and is the most accessible.

There are many other unexplained occurrences regarding the mirror asymmetry, still unexplained in physics. For example, the spiral frequency of biological objects – that there is only right wise twist in the nucleic acid molecules, and only left wise in the protein ones. This property of living matter, discovered by L. Pastor, is one of the main traits of life

It is most likely, that the symmetry violation in K-mesones, discovered by L. Fitch and J. W. Cronin, can be explained by this “stretching” of ether. Same could be applied to a number of other studies. Among them the movement effect of a charged condensator in the direction of a positively charged cover, discovered by Townsend Brown.

Detailed description of the structure for neutrino responsible for these effects with the main reactions is provided in our work [4]. Now, let’s take a look at how the unbalanced state of ether can influence the biological beings [11]. Due to their creation in the «stretched» Universe, their state must be related to the state of Physical Vacuum.



Volatile or quantum nature of the neutrino release, i.e. in the batches with varying energy and, at the same time, the constant expansion process of the Universe and, therefore, the decrease of its density and PV density leads to the thought that in some time another release of the electron antineutrino would happen with free electrons losing mass to the balanced value in the ether of lower density. It won't likely affect the nature of physical processes in the Universe, but the same can't be said about the biological processes because this occurrence, aside from the neutrino release, is also likely to be accompanied by a photon release. It is likely that the dinosaurs died not due to some earthly cataclysm, but because of the previous universal outburst.

Therefore, due to the neutrino release by the negative muon with a constant transformation into an electron, occurs a little gravitational polarization of a *PV node* (on fig. 4 the left toroid is compressed more). The ring twist of right wise toroid becomes stronger and its diameter shortens. As a result, the new negative neutrinos have an important role, despite being incredibly small compared to the PV energy and distributed along the Universe.

This *neutrino loss mechanism by an electron during the decrease of PV density* can be used to generate energy, because an electron gets an impulse from a neutron, i.e. kinetic energy, like in a beta-decay process. It is further detailed in our works [17-19]. Most likely, such effects occur in the Sun and stars, creating additional energy aside from thermonuclear reactions. By registering solar neutrinos, it was determined, that the thermonuclear sources compose only one third of Sun radiation.

Electron remains in a balanced state in PV with existing energy density. Pressuring and densification of PV occurs in whirlpools (stars, the Sun, water whirlpools and whirlwinds), rotational movement with acceleration and in any energy effects related to sudden change in PV density. Electron, being an elementary particle, a probable elementary vortex, is stable only in the PV of energy density where it had been created (particle charge stability is always constant, even during the transfer from an electron to muon). According to the classical physics of elementary particles, electron **mass change** is possible only by absorption or return of the mass-carrying particle. In case of the electron, it is the electron antineutrino (fig. 19) [17, 19-21].

Fig. 19. Absorption and release of anti-neutrino by an electron during the change in PV energy density; a - at decrease; b - at increase [17-19]

Electrons, arriving into PV of lower density, transfer into unbalanced state (the degree of swirl of the electron vortex is too high for a lower density PV). Electron mass, i.e. the degree of swirl of the electron vortex in lower density PV should be lower, supporting the stability of electron as a true elementary particle. Therefore, it gives away the excessive mass to PV, releasing the electron anti-neutrino. With this, **electron receives an impulse from anti-neutrino**, i.e. kinetic energy, spent on heating up its environment - gas, plasma or water. Then, returning to a normal state - a PV of normal density, lower mass electron in some time absorbs additional mass of electron anti-neutrino. With that, by absorbing anti-neutrino, electron gets an impulse again i.e. kinetic energy, spent on heating up its environment

If we take as a basis the famous process of **β-decay**, where electron, flying out from the core, releases the **excess of energy (mass) as antineutrino and kinetic energy**, about 30% of that energy is spent on the impulse. Therefore, about 30% of energy is absorbed by the environment.

It is quite possible, that this process occurs in plasma charges in the water or in the other environment with excessive emission of heat, which, probably by mistake, is attributed to the thermonuclear synthesis effect.

Should be noted, that a similar energy process, but with an electromagnetic emission, can happen with the nucleus in the core, but it is way more complicated and is not investigated in this article.

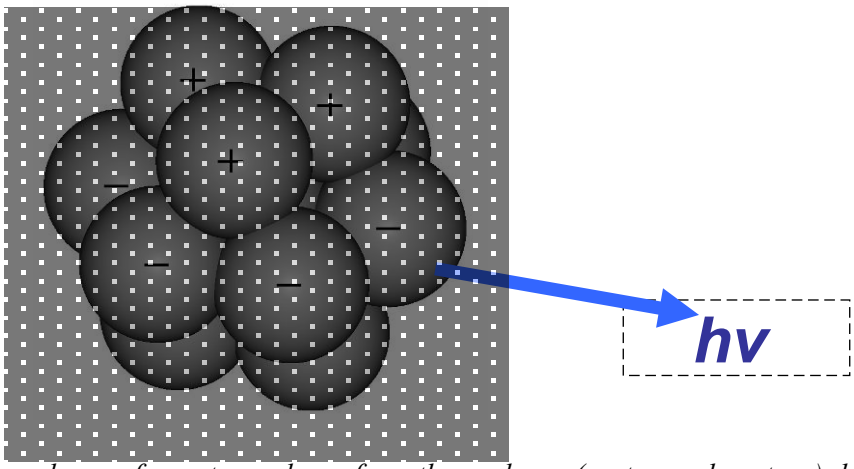


Fig. 20. Common scheme of quantum release from the nucleons (proton and neutron) during the change in PV density

Nevertheless, it is closely related to the star luminosity. In short, the hydrogen nucleons – protons, as a result of the change in PV density during the expansion of the Universe emit not neutrino, but electromagnetic quantum – thermal radiation. And the Relic radiation can also be a result of this process [21].

6. Universe expansion mechanism and the creation of Relic radiation

As we have noted in the beginning, the expansion of the Universe goes according to the «inflation» mechanism, as was confirmed by official science (fig. 21). The only difference is that according to the official canon, the expansion occurs as the scattering of material bodies and particles in empty Space, not filled even with energy, but according to our hypothesis, the Space itself expands (swells) – or rather, its energy medium - *Physical Vacuum, and, with it and inside it the material bodies distance themselves from each other*.

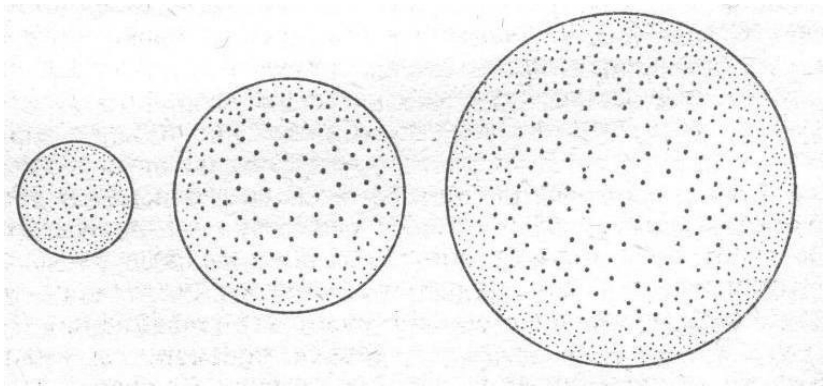


Fig. 21. Mechanism expansion of the Universe by expansion (swelling) mechanism [1-3]

Gravitational forces, due to their miniscule nature in comparison to the PV energy, cannot oppose it. Therefore, there are no Galaxies spreading out with the light speed, because they don't move at the light speed in comparison to the absolute PV.

One conclusion of the PV energy structure "swelling - inflation" model is the **possibility** of faster than light speeds. If the Universe inflates every moment through the synced increase of every energy node in the Physical Vacuum structure, we get a **mechanism** allowing not only to transfer information or signal (as Kozyrev says), but instant transfer of energy to any point in the Universe.

Another conclusion is an opportunity to differently explain processes occurring in the contemporary Universe, particularly - Relic radiation.

Relic (background) radiation of the Universe is an isotopic thermal radiation of a millimeter wavelength, keeping the temperature of the Universe on the 2.7K level. The density of radiation is about 5×10^8 photons per 1 m3, while average matter density in the Universe is valued at one proton per 1 m3. In other words, there are 5×10^8 Relic radiation photons for one hydrogen atom in the Universe.

A traditional and codified presumption is that the Relic radiation is the energy remains from the annihilation of matter and antimatter, shrinked about 10^{30} times due to the expansion of the Universe [1-3]. It is based on a presumption, that the miniscule asymmetry of matter and antimatter (one billionth part) from The Big Bang remained in our Universe, while everything else annihilated, turning into Relic radiation.

At our approach we connect the forming of Relic radiation *with the expansion process of the Universal energy structure and, therefore, the change in the energy state of primary material of the Universe – hydrogen atoms (protons and electrons).*

According to the proposed hypothesis, Relic radiation appeared because of the energy loss by the free negative muons that were left after the formation of protons. As a result, muons gradually transformed into electrons (see ch. 4).

The energy transformation mechanism (from energy to relic radiation quantum) is unclear. In usual conditions with the common ether density, the muon decay into electron is accompanied by an energy release as muon neutrino and electron antineutrino, and not as photons, light quantum or γ- quantum.

But from the other side, any emissions of neutrino by an electron cause its acceleration due to the kinetic energy from the recoil, like in a β-decay. During the accelerated movement of charged particles, the electromagnetic radiation is released into a proton field. Secondly, a change in electron mass during the release of antineutrino accompanied by an acceleration, cause the orbit shift in the rotation around a proton. These are purely quantum effects, accompanied by electromagnetic emission. It is because in the changing gravitational field the atom size (size of the electron cover) changes, as do

the transferring energy of electrons moving between levels, radiation frequencies and wavelengths of the spectral lines.

It could also be proposed that during the expansion of the Universe and the change of PV density there occurs a photon emission by the protons themselves, similar to the reactions occurring in the atomic nucleus, releasing the γ-quantum. Another possible process is the photon emission during the muon transfer between energy orbits (or quantum change of the energy state) due to the mass loss and, therefore, the increase in electrostatic interaction with the proton and a formation of a hydrogen atom from a mesoatom (metastable atom forming out of a proton and a muon rotating around it) known in the classical studies of elementary particles). In any case, the result of these processes could be the relic or background radiation of the Universe, characterized by its isotropic nature and uniformity in all directions.

7. Conclusion

Analyzed the common views on the origin matter and antimatter. Proposed and rationalized the hypothesis, stating that the antimatter was not lost in The Big Bang as a result of annihilation but remained in the matter, i.e. matter itself (protons and neutrons) consists of particles and antiparticles.
Rationalized the possibility of electron placed inside a neutron and, as a conclusion, the possibility to influence the nuclear half-life.
Proposed the hypothesis regarding the origin and structure of electron, muon, proton, neutron and neutrino, regarding the nature of nuclear (strong) interaction and regarding the prevalence of stretching pressures in Physical Vacuum.
Proposed the mechanism of the expansion of the Universe by «swelling» of the Physical Vacuum energy structure itself and some conclusions of that model.
Analyzed the possible energy effects, resulting from the sharp change in the density of Physical Vacuum.
Proposed an alternative mechanism for the Relic radiation origin (microwave background radiation).

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