Section 8. Physics

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*Barykinsky Gennady Mikhailovich,
Moscow, Russia
E-mail: k@genn.ru*

THE UNIVERSAL LAW OF EVOLUTION OF MATTER AND CONSCIOUSNESS

Abstract. Based on deductive logic, analysis of mathematical expressions and the most important concepts that define various physical parameters and fundamental properties of existing physical and humanitarian things in Nature, conclusions are obtained, logical and functional generalization of which corresponds to the status of the universal Law of Evolution of Matter and Consciousness, which includes the General Darwin's law of evolution as a special case. Numerous spheres that make up a wide variety of phenomena that determine the existence of Nature have been studied for compliance with the Law.

Keywords: elementary particles, universe, physical and humanitarian parameters, evolution.

The vector that defines the direction of exploration and development of ideas related to the solution of unusual and complex issues is set by the outstanding physicist and philosopher **Niels Bohr**, who has repeatedly stressed the importance of creating as crazy theories as possible ..., [1].

The question has long been asked: Is there any functional pattern according to which there is an evolution and corresponding destruction of symmetries determining the world of fundamental properties of elementary particles, matter and consciousness in general?

Logic and analysis suggest that the creation of objects of increasing complexity occurs at discrete points of the evolutionary (DPE) process (Figure 1, stars). The relationship between the DPEs is determined by the mean geometric ratio (MGR). The value of time interval between the DPE is determined by the exhaustion of the existing systems complexity resource.

The theory of origin of biological species, which was published by **Charles Robert Darwin** in 1859,

suggests that the process of creating more and more complex biological species also corresponds to the evolutionary process shown in (Figure 1).

The analysis also shows that many of the physical and humanitarian parameters describing the complexity of objects of single or compound matter in the universe are functionally related, with the classical geometrical progression being the basis of this relation:

$$a_n = a_1 g^{n-1}, \quad (1),$$

where: a_1 and a_n are the first and following elements of the sequence; g is the denominator of progression, and n is the quantum number of evolution.

However, it should be noted that the process of destruction of simple symmetries, due to which the process of creation of objects of matter of increased complexity takes place in the points defined by the MGR of any three consecutive values forming a geometric progression (1):

Figure 1. Model of evolutionary process of matter development

$$a_n^2 = a_{n-1} a_{n+1}, \quad (2)$$

Universal Law of Evolution (ULE) and elementary particles

At the present time, expressions for a number of spatial characteristics of elementary particles are well known, for example, for the electron: classical radius r_e , Compton wavelength λ_k , Bohr radius r_b , de Broglie wavelength λ_b , mean square displacement of electron r_v , determined by the impact of virtual vacuum particles on the electron, and some others. Existing mathematical expressions of the electron parameters shed light on the essence and meaning of the hierarchy of a stepwise, i.e. discrete complication of existing forms of elementary matter.

The analysis of mathematical expressions describing various spatial characteristics of r_n electron

leads to a generalization which, according to (1, 2), corresponds to the status of ULE:

$$r_n = r_k \beta^{2n}, \quad (3),$$

where: r_k and λ_k are Compton radius and wavelength: $\lambda_k = 2\pi r_k$, β is the denominator of geometrical progression determined by equations: $\beta^{2a} = 1$ or $e\beta = q$, a is the fine-structure constant, q is the full electron charge, e is the electric charge of the electron, n is the quantum evolution number.

Table 1, based on the law defined by formula (3), presents expressions and corresponding calculated values of spatial characteristics of the electron. Full compliance of some obtained data with the already known tabular confirms the validity of the proposed expression (3) for the description of the spatial evolution of the fundamental properties of complex structures.

Table 1.

n	Parameter	cm	Parameter name
-3	$r_m = r_k \beta^{-6} = e^6 / m_e c^4 \hbar^2 = e^2 / m_e c^2$	$1.5 \cdot 10^{-17}$	Classic monopole radius
-2	$r_\mu = r_k \beta^{-4} = e^4 / m_e c^3 \hbar = \hbar / m_e c$	$2.06 \cdot 10^{-15}$	Compton's monopole radius
-1	$r_e = r_k \beta^{-2} = e^2 / m_e c^2$	$2.82 \cdot 10^{-13}$	Classic electron radius
0	$r_k = r_k \beta^0 = \hbar / m_e c$	$3.86 \cdot 10^{-11}$	Compton electron radius
1	$r_b = r_k \beta^2 = \hbar^2 / m_e e^2$	$5.29 \cdot 10^{-9}$	Min atom size, Bohr radius
2	$r_a = r_k \beta^4 = \hbar^3 c / m_e e^4$	$7.25 \cdot 10^{-7}$	Max atom size
3	$r_m = r_k \beta^6 = \hbar^4 c^2 / m_e e^6$	$9.94 \cdot 10^{-5}$	Biomolecule size

Table 1 shows that each point corresponding to the current discrete spatial parameter of the electron is a MGR of two neighboring ones:

$$\begin{aligned} r_\mu^2 &= r_e r_m \\ r_e^2 &= r_\mu r_k = r_m r_b \\ r_k^2 &= r_e r_b = r_\mu r_a = r_m r_m \end{aligned}$$

$$r_b^2 = r_k r_a = r_m r_e$$

$$r_a^2 = r_b r_m$$

Moreover, it is in these DPEs that a certain part of previous symmetries is destroyed, and the level of complexity of systems increases in proportion to the spatial size:

$$r_\mu < r_m < r_e < r_k < r_b < r_a < r_m$$

Spatial evolution of electromagnetic forces, based on the Coulomb's law: $F_{coul} \sim 1/r^2$, is responsible for the disintegration of the seemingly simple Coulomb force into the residual, but more complex forces, determining the interatomic and intermolecular interaction. For example, such residual forces as: dipole, quadrupole, ion, metal, hydrogen, valence, covalent, Van der Waals, polarization, induction, dispersion, orientation and some others.

It should be noted that the electric force itself, defined by the law Coulomb, is also residual, because the electric charge of the electron e is β times less than the full q , which means $q = e\beta$. For this reason, it is the full charge, which is the primary source of all types of interaction of elementary particles, that determines all types of interaction of the electron with the external environment.

As a result of the process of evolution of the fundamental properties of the electron specific spatial ranges arise, when moving between which starting from the center there is a gradual complication of created objects of matter, i.e. the formation of forms from simple to more complex, which is shown in Table 2 and Fig.1.

Table 2.

Discrete range	Specific examples
$r_{-1} - r_{-2} = 2.82 \cdot 10^{-13} - 2.06 \cdot 10^{-15}$	Monopole action. K-capture. Muon.
$r_0 - r_{-1} = 3.86 \cdot 10^{-11} - 2.82 \cdot 10^{-13}$	Internal energy action – $m_e c^2$.
$r_1 - r_0 = 5.29 \cdot 10^{-9} - 3.86 \cdot 10^{-11}$	q charge action, generation of force fields.
$r_2 - r_1 = 7.25 \cdot 10^{-7} - 5.29 \cdot 10^{-9}$	Range of electron shells of atoms.
$r_3 - r_2 = 9.94 \cdot 10^{-5} - 7.25 \cdot 10^{-7}$	Water molecule, DNA, virus.
$r_4 - r_3 = 1.36 \cdot 10^{-2} - 9.94 \cdot 10^{-5}$	Bacteria, erythrocyte, cell nucleus.
$r_5 - r_4 = 1.86 \cdot 10^{-1} - 1.36 \cdot 10^{-2}$	Skin cell, large bacteria, amoeba.
$r_6 - r_5 = 2.55 \cdot 10^1 - 1.86 \cdot 10^{-1}$	Ant, chicken egg.
$r_7 - r_6 = 3.49 \cdot 10^3 - 2.55 \cdot 10^1$	Human

Electron and virtual vacuum particles.

Let us record (3) for $n = -1/2$: $r_{-1/2} = r_v = r_k/\beta$, (4). Expression (4) shows that with the accuracy to a slightly changing logarithm it coincides with the known expression for the standard square shift of r_v electron r_v at its interaction with the field of virtual vacuum photons (Lambovisky shift) [2]. Let us add that r_v is related to other major spatial characteristics of the electron by the following MGR:

$$r_v^2 = r_k \cdot r_e$$

ULE and types of matter in the Universe.

Modern information about the distribution of matter in the Universe, which has already become stan-

dard, shows that the main global types of matter are in approximately the following percentage ranges: real matter $M_o = 4 \div 6$, dark matter $M_{dm} = 18 \div 24$, dark energy $M_{de} = 68 \div 75$, but ongoing expert assessments and scientific calculations of these values in recent years show that their results are increasingly seeking their MGR:

$$M_{dm}^2 = M_o \cdot M_{de}$$

ULE – Universe and Human.

It is known that the **min** mass of an object in the Universe is $m_{mu} \sim 10^{-48}$ g, and the mass of the whole Universe is $m_u \sim 10^{56}$ g, while the mass of living matter in the Universe-Human is $m_p \sim 7 \cdot 10^4$ g. The values of the above masses correspond to MGR:

$$m_p^2 = m_{mu} \cdot m_u.$$

Since the mass of a human exactly occupies its MGR relative to the limit parameters of the Universe, it is fair to conclude that the evaluation of the mass of the Universe as a whole as $m_u = 10^{56}g$, is quite realistic. If it is so, it is reasonable and logical to suppose that the size of a human being should correspond to their MGR as well.

It is common knowledge that **min** size of an object in the Universe is $r_{mo} = 10^{-33}$ cm, size of the Universe is $r_u = 10^{37}$ cm, medium size of a Human is $r_p = 1,6 \cdot 10^2$ cm. The values of the above sizes correspond to MGR:

$$r_p^2 = r_{mo} \cdot r_u, \quad (5)$$

However, modern astrophysics recognize the size of the Universe equal to $r_u = 10^{27}$ cm, which is 10^{10} раз меньше указанного в (5). times less than indicated in (5). This contradiction does not correspond to the ULE, which requires that the size of the universe corresponds to the value specified in (5), so the realistic size of the universe is $r_u = 10^{37}$, cm [3; 4].

ULE and some biochemical parameters of humans.

DNA, blood and exhaled air (excluding trace amounts of other gases) are the most important components of living matter in the Universe [5].

Genes in DNA, in (%): genes encoding proteins $G_{cp} = 2 \div 5$, repeating genes $G_{rs} = 20 \div 30$, genes not encoding proteins $G_{ep} = 70 \div 80$, their values meet MGR:

$$G_{rs}^2 = G_{cp} \cdot G_{ep}.$$

Forminal elements of blood, (unit/mm³): leukocytes $k_l = 8 \cdot 10^3$, platelets $k_p = 3 \cdot 10^5$, erythrocytes $k_e = 5 \cdot 10^6$, their values meet MGR:

$$k_p^2 = k_l \cdot k_e.$$

Exhaled air composition, without impurities, in (%): CO₂ – carbon dioxide $g_c = 2 \div 4$, O₂ – oxygen $g_o = 16 \div 17$, N₂ – nitrogen $g_{ng} = 74 \div 75$, their values meet MGR:

$$g_o^2 = g_c \cdot g_{ng}.$$

Figure 2. Graphic representation of the MGR

ULE and fundamental forces.

Assuming that strong and weak interactions of elementary particles are types of electromagnetic interactions, it turns out that Planck point is characterized by such forces as: gravitationa $F_g = \gamma m^2/r^2$, electromagnetic $F_e = q^2/r^2$ and elastic $F_u = kr$, where:

$k = m\omega^2$. The elastic force is related to the fluctuation of internal energy of the particle. It was found that the most important fundamental forces characterizing the elementary particle activity at the Planck point are related to the MGR:

$$F_e^2 = F_u \cdot F_g.$$

ULE and humanities.

Taking into account the difficulties with the units of measurement of humanities we will use relative conventional units (c.u.).

The geometric mean of two a_n **ДВУХ ВЕЛИЧИН** a_{n-1} and a_{n+1} is clearly shown in (Fig. 2). Two terminal cases can be seen from this drawing: 1) if a_{n-1} and a_{n+1} are equal to zero, then a_n will always be equal to zero, 2) if $a_{n-1} = a_{n+1}$, then $a_n = \mathbf{max}$.

Moving on to the problems of humanities, it is impossible to pass by the fundamental problem of philosophy, in which the main question of philosophy has always been: "What is primary: matter or consciousness?" The basic question of philosophy has found its principal solution within ULE, according to which it should be recognized that in reality the basic question of philosophy is devoid of any sense, and therefore it is farfetched, because there are no contradictions between these fundamental concepts, therefore [6]:

There is a great harmony between matter and consciousness in that one exists for the sake of the existence of the other.

The very fact of existence of the concept of "matter-consciousness" is related, first of all, to the main function of its development: it is a discrete creation of objects of increasing complexity, i.e. if, looking at (Fig. 2), one connects matter to the vector a_{n-1} and consciousness to the vector a_{n+1} then a_n will be MGR, **при** when moving around the circle from the point x to the point y the complexity of created objects will only increase, and this reflects the process of evolution corresponding to the graph presented in (Fig. 1):

Evolution = sqrt (matter $\times$ consciousness).

This formula shows that the limit of the increasing complexity of the created objects is at the point y which means that at this point there is an object of **max** complexity, the role of which can play only – the Creator, which means that consciousness is not the source, the existence of everything, but it in its **max** is a powerful source of influence on this very thing. That is why the Creator knows perfectly well

not only his past, not to mention his present, but his entire future.

The three of these notions also have their justification within ULE, since the present is formed from the vast experience of the past (i.e., cognition) and the conscious notions of the future on its basis. Therefore:

Present = sqrt (past $\times$ future),

which means that if notions of the future are wrong or insignificant, if experience of the past teaches nothing, the present will be primitive.

In November 2019, **Jan Todd** N Secretary General's Special Envoy for Road Safety, in his report, put the lack of sufficient training among the main causes of high mortality on the Russian roads. A broad study of the reasons for the decline in the quality of education allowed the author to draw the main conclusion that the legal culture (LC) of a person has shifted towards dogmatism [6].

It is obvious that human behavior is, among other things, regulated by legal and regulatory prescriptions (LRP) of the state and natural laws (NL).

In order to clarify the problem points, the author has been conducting an experiment-screening over the past 30 years, which was intended to get accurate answers to many questions, two of which are directly related to ULE:

1. How to drive correctly at an intersection controlled by traffic lights?
2. What is democracy?

Despite the fact that the participants were from all social strata of the country, it was not possible to get an exact answer to these questions. This is explained by the fact that all participants in formulating their answers were guided mainly by the existing LRPs, while ignoring NL, which indicates the existence of legal dogmatism.

In order to determine the necessary and sufficient basic level determining the ratio between NL and LRP, on which the Human LC should be based, and thus the corresponding training of a person, the extrapolation of the discussed problem within ULE, according to which:

$$LC = \sqrt{NL \times LRP}.$$

This formula shows that LC inevitably implies that a person should know not only LRP, but also NL, and LC corresponds to a high level if the volume of human knowledge of NL and LRP is balanced and as much as possible. Figure 1 shows that if a smaller vector a_{n+1} , is connected to NL, LC is not high and has a dogmatic shift to the right.

Regarding the second question, we can see a situation where there is a collision of Personal Rights (PR) and State Rights (SR). In this case, the level of democracy (D) also finds its description within the ULE:

$$D = \sqrt{SR \times PR}.$$

It is clear from this formula that any destruction of the balance between state and personal rights always leads to a decline in the level of democracy.

Taking into account the significant list of the above mentioned examples of ULE effect in absolutely different spheres of existence of matter and consciousness, the fundamental fact that this Law exists and is quite universal can be considered proved. The basis of this universality is provided by the principle of goal setting, without which neither the Universe nor the Consciousness can exist.

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