World asymmetry and consciousness

Sergey Ya. Kotkovsky

Abstract

The studies of weak interactions in physics have revealed a prominent, so-called chiral, asymmetry of our world. More widely known is the asymmetry of particles and antiparticles, which is also connected to chiral asymmetry: we know that all neutrinos are left-chiral. The attempts made by many physicists to restore the symmetry between right and left, i.e. to discover "mirror matter", have not been successful. In live beings the asymmetry manifests itself in male and female, the functioning of the right and left hemispheres of the brain, in phyllotaxis, in algebras of genetic alphabets, and other key phenomena. Our world is fundamentally asymmetric, both in physical and biological sectors. To deal with world asymmetry we have developed chiral algebra that describes skew-symmetric relations. This algebra is proven to successfully work in physical theory of spin. Particularly it allows to formulate in a new way the famous Dirac equation. Within this new representation we can better understand this equation and also discover the noise immunity mechanisms built in it. Chiral algebra uses the apparatus of biquaternions in light-like basis with new types of multiplication and conjugation. Another application of chiral algebra is a model of the genetic code built by the author. This model reflects the genetic code internal symmetries, previously studied in other works. As a result, we put forward the following hypothesis: DNA has a quantum-like biological nature, which is based on an analogue of physical spin, which we call "biospin". The concept of biospin also supports the theory of biological field. We assume that both "inanimate" matter and living beings have field nature. We assume that biological field is a nonlinear extension of electromagnetic field. Within field approach a singularity of the field, having operational and projection nature, becomes the most suitable candidate on the carrier of consciousness. As is known, singularities of electromagnetic field are represented by point-like charge particles such as electron. Paradoxically, these point particles have an internal structure described by spin. Having a structure We find that dimensionless objects have an internal structure and that indicates an "exit" to another space. We claim that living beings are represented by field singularities. They exist simultaneously in two spaces, or worlds – inner and outer. Our consciousness, being a field singularity, carries out the connection between these worlds. Inner world is the space of virtual paths, wave functions and potentialities, while outer world is actual physical world operated by fields.

Keywords: consciousness, singularity, asymmetry, inner and outer spaces, chiral algebra, Dirac equation, DNA algebra, quantum informatics.

Contents:

Introduction.

Widely known are such manifestations of biological asymmetry as the difference between male and female, between the functioning of the right and left hemispheres of human brain, asymmetry in the location of the heart and other organs, the common appearance of biospirals in the body, and the distinguished chirality of biomolecules (i.e. all amino acids are left-twisted and all sugars are right-twisted). The famous French naturalist Louis Pasteur, who discovered the phenomenon of chirality of biological structures, asserted that “the life revealed to us is a product of the asymmetry of the world.”

On the other side R. Sheldrake tells us about ubiquitous consciousness in the Universe and the inner world shared for all beings: "There is a certain field of images which common to all people. The images of such a field could be information, feelings or behavior pattern. Such fields exist not only in people, but also in animals, birds, insects, plants and even crystals. That is why this or that crystal takes a strictly defined, not arbitrary form." [10]

A similar idea was brought by J. Krishnamurti who asserted that the observer and the observable, so common objects for the modern science and mindset, in reality belong to the same whole: "The thinker, the observer, by it's very nature, introduces an artificial division in consciousness, when in fact he or she is inseparable from the events under observation." [12]

We look up into the roots of consciousness in the asymmetrical design of our world which is divided into two distinguished parts: inner and outer. We all know that each of us has its own internal world. However the central idea of our study is that, we are not only having our own internal spaces, but we live in the same universal inner world – same way as we live in the physical world shared by all of us.

Below we present our vision of the phenomenon of consciousness, based on the field theory and chiral mathematics. First, we will talk about the asymmetry of our world - biological and physical. Then we discuss a division of our world into inner and outer spaces, find proper mathematics, and finally bind consciousness to a singularity that connects the two spaces with each other.

The preamble: Lost realms of physics.

Antiparticle world.

In the scope of physics, well-known is the so-called baryon asymmetry. It is expressed in the fact that our world is inhabited by particles, while there are almost no antiparticles. Antiparticles appear only in exceptional cases and for a short period of time before they annihilate with particles.

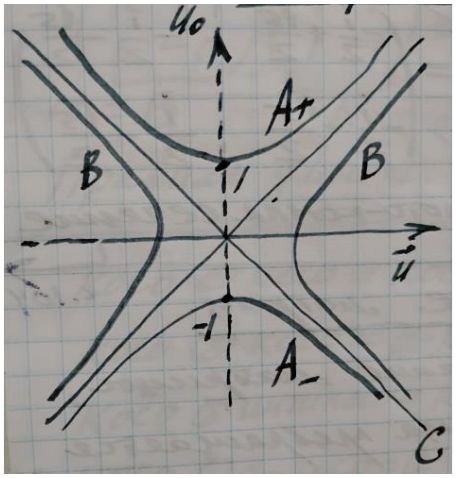
The "Wonderland" of weak interactions.

There is also a violation of physical chirality, the symmetry of right and left, observed in weak interactions. Chiral symmetry can be properly understood in the Dirac equation theory. We briefly investigate this equation below. The physicists have been trying for a long time to "restore" the broken symmetry of weak interactions, but all these attempts didn't succeed [1]. Our world is asymmetric by its nature.

Superluminal region.

The third "lost realm" of physics is the superluminal sector, i.e. the region of speeds above the speed of light. This sector arises in the theory, particularly, in the special relativity and the Dirac equation. The existence of superluminal region is explicitly seen in the hyperboloids on the velocity graph of a

particle. The upper and lower separated hyperboloids are subluminal, while the lateral connected hyperboloid is superluminal.



In order to solve the outlined problems of physics, we need to introduce another space. However, as it turns out, that this space goes far beyond physics – into the realm of consciousness.

Inner and outer spaces.

Inner and outer spaces.

We live simultaneously in two worlds or spaces - inner and outer. Inner world is "world behind the mirror" that physicists have been looking for so hard. Inner world reflects outer world perceptional "prisms" of consciousness. Backward, the virtual paths and patterns of inner world are projected into outer world by the consciousness acts. When we move from outer physical space to inner virtual space, subluminal speeds become superluminal, the right changes to the left, and time flows in the opposite direction - from the future to the past. The two worlds are separated from each other by a Membrane and connected by singularities. While you may have an intuitive idea about singularity, below we will give more accurate definition for it. The transitions between inner and outer worlds are carried out via fundamental transformations described by a special chiral algebra. We will briefly address this algebra further down.

Virtuality and Actuality.

Inner and outer spaces are fundamentally different from each other. Inner space has virtual character as it holds possibilities and potencies for outer space. Different kinds of events occur both in outer and inner spaces. Virtual events happen in inner space. Actual physical events take place in outer space, but these events are developed from possible scenarios and paths in inner world. Quantum mechanical wave function belongs to inner world, physical fields - to outer world. Thus wave function is immaterial in the usual physical sense. Resuming said above, inner space can be determined as Virtuality and outer space as Actuality.

Inner and outer spaces are perpetually exchanging energy. By its nature, kinematic energy belongs to outer space; potential energy belongs to inner space. Central for whole physics variational principle of Lagrange deals with this exchange - as we remember, for a basic mechanical system setup, the Lagrangian is defined as the difference between kinematic and potential energies of the system.

Negentropic flow.

Since outer space is the area of actual physical events and operations, any movements or signals in this area are subluminal. Also this area is characterized by the thermodynamic arrow of time: entropy is growing here, structures collapse if left alone and everything is cooling down. But the Universe keeps being alive! And this happens precisely due to the existence of inner space that is intrinsically negentropic or structure-organizing. Therefore, in living Nature, which is directly connected to inner world, we have processes that are opposite by its character to those occurring in inanimate nature. Live Nature does not obey entropy growth "dictate", but instead it gives birth of beautiful well-structured living beings. The reason behind these phenomena is negentropic flow streaming from inner space to outer space .

Wave-particle dualism.

As we noted above, the wave function belongs to inner space, while physical field belongs to outer space. This separation reflects quantum mechanical wave-particle dualism. This principle turns out to be based on a dichotomy between the field (in Maxwellian sense) and wave function, and thereafter it reflects the dualism between inner and outer spaces.

The Membrane.

The two worlds, inner and outer, are separated from each other by a kind of Membrane. From the division of kinematic space into subluminal and superluminal regions, we conclude that the Membrane is massless. This means that it is formed by waves of light and massless neutrinos. Viewed at different scales, the Membrane has fractal structure.

Universal Now.

The present moment is undefined in physics, all moments of time are equally valuable for it. Any point in time can be selected as the current moment. With the introduction of the Membrane separating two spaces, we can determine Now – the current moment of time for each of us. In our vision, the present moment is where the Membrane is and the moment has different lengths at each scale of reality. As was shown by Einstein, time flows differently in different areas of space. However, there is always a present moment for each consciousness, and all these moments unite together into one Universal Now for all living beings. One should avoid a confusion with Newton's absolute time flowing uniformly for the whole Universe. Universal Now is the current moment in whole time flow, which is un-uniform itself. In Aristotle's vision, time is a characteristic of the flow of events defined by a consciousness. With the concept of Universal Now we connect time flow with all live beings minds presence.

Consciousness as singularity.

Field singularity.

Field singularity is a region of a physical field in which the field value turns into infinity. Examples of physical singularities are electric Coulomb potential and the gravitational singularity. In synergetics, singularity is an attractor of phase space trajectories and the source of “self-organization” of the surrounding world. In the language of mathematics, singularity is an actual infinity, but not in the sense of classical set theory, but in the sense of generalized or singular functions. Being an infinite object each singularity is unique.

Electromagnetic singularity.

We know the Coulomb potential from school: it is a field produced by an ordinary point-like electric charge. This field tends to infinity at its center, represented by a particle. Paradoxically, such a point-like particle as an electron has an internal structure that finds expression in its spin wave function.

This fact indicates that the electron singularity carries inside an "exit" into a space different from the usual physical space-time.

Gravitational singularity.

Gravitational singularities are represented by white and black holes. The existence of black holes has been confirmed based on numerous astronomical observations and celestial mechanics. A white hole is a black hole reversed in time. It is believed that there are no white holes in the universe, because if there were, then the processes around them would go in the opposite direction compared to black holes and the entropy would spontaneously decrease forming certain structures of matter around. The latter process is impossible for inanimate matter by virtue of the second law of thermodynamics. But if we assume that a white hole has some kind of consciousness, then it could well exist without contradicting the known laws of nature. Within such a consideration, the stars may turn out to be white holes!

Biological field.

The foundations of the theory of biological (morphogenetic) field were laid out by A.G. Gurvich [9]. This theory received great conceptual development in the books of R. Sheldrake [11]. This researcher connects the past of a given individual with its present. This connection is carried out through morphic resonance. Thus, a living organism acts as an integral spatiotemporal formation. Sheldrake's concept also explains at some point the phenomenon of differentiation of the same DNA in the cells of various types.

Organic singularity.

Following Einstein's concept of unified field we consider biological field to be a manifestation of the same field which electromagnetic and gravitational fields contribute to on different scales. Within this approach we conclude that there exist biological singularities, and the consciousnesses of organic beings is attributed to it. Our primary conjecture is that each singularity represents an individual consciousness. Each individual has its own inner world which is a subspace of the universal inner world. In this way inner and outer worlds are connected to each other by singularities of different scales. The main way of interaction between singularities-consciousnesses is via light. Therefor the interaction between singularities mainly takes place at the Membrane.

Chiral algebra - the mathematics of inner space.

Biquaternions of outer space.

Biquaternions represent the native algebraic language of the relativistic theory of space-time [2]. The examples of biquaternions are such basic physics quantities as energy-momentum and space-time 4-coordinate. Biquaternions are algebraic objects of "3+1" metric type. Each biquaternion is a bundle of a complex number and a complex vector.

$$\mathcal{B} = (s, \mathbf{u}), \qquad s \in \mathbb{C},\ \mathbf{u} \in \mathbb{C}^{\mathbf{3}} \tag{1}$$

Algebra of biquaternions is noncommutative. The ordinary or outer product of two biquaternions $\mathcal{B}_1 = (s_1, \mathbf{u}_1)$ and $\mathcal{B}_2 = (s_2, \mathbf{u}_2)$ has the form:

$$\mathcal{B}_1\mathcal{B}_2 = \mathcal{B}_1 \odot \mathcal{B}_2 = (s_1 s_2 + \mathbf{u}_1 \cdot \mathbf{u_2},\ s_1\mathbf{u}_2 + s_2\mathbf{u}_1 + i\,\mathbf{u}_1 \times \mathbf{u}_2), \tag{2}$$

where $\mathbf{u}_1 \cdot \mathbf{u}_2$, $\mathbf{u}_1 \times \mathbf{u}_2$ are scalar and vector products of $\mathbf{u}_1$ and $\mathbf{u}_2$ accordingly, i is the imaginary unit. Special theory of relativity, including classical electrodynamics, is naturally described by biquaternionic algebra with multiplication (2).

Light-like basis.

Light-like, or Isotropic, basis of biquaternionic space consists of four elements: two null-vectors $\mathbf{q}$ and $\mathbf{q}^*$, which are complex vectors with square root equal to zero; and two null-quaternions $N = \frac{1}{2}(1, \mathrm{n})$ and $\overline{N} = \frac{1}{2}(1, -\mathrm{n})$ – biquaternions of zero magnitude. $\mathbf{q}^*$ is complex conjugation of $\mathbf{q}$. All four elements of the light basis are zero divisors. Isotropic basis is required to formulate chiral algebra [7][8] – mathematics native for the description of chiral spin wave functions. As we conjecture, biquaternions also constitute native algebra of genetic code [7].

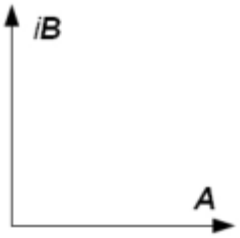


Fig 1. Nullvector $\mathbf{q}$ (plane Π).

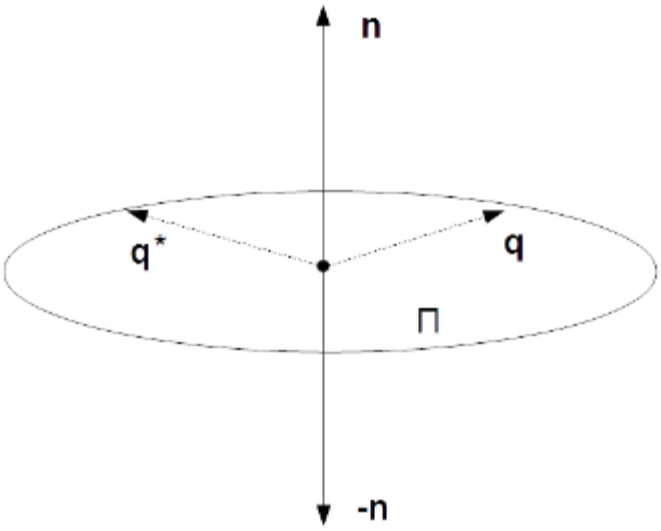


Fig. 2. Isotropic basis.

Biquaternions of inner space.

Usual algebra of biquaternions does a great job in field theory, or outer space. But how, from the mathematics of outer space, we can obtain the mathematics of inner space? To do this, we need a product of biquaternions different from (2). To get such a product, we have to turn the product (2) "inside out". For the sake of it we will use an isomorphism between biquaternions and matrices. Then, remember that usual matrix multiplication has a form:

$$M_1 \odot M_2 = \begin{pmatrix} a_{11} & a_{21} \\ a_{12} & a_{22} \end{pmatrix} \odot \begin{pmatrix} b_{11} & b_{21} \\ b_{12} & b_{22} \end{pmatrix} = \begin{pmatrix} a_{11}b_{11} + a_{21}b_{12} & a_{11}b_{21} + a_{21}b_{22} \\ a_{12}b_{11} + a_{22}b_{12} & a_{12}b_{12} + a_{22}b_{22} \end{pmatrix} \qquad (3)$$

Let's now, in addition to usual multiplication of matrices (3), introduce their anti-multiplication:

$$M_1 \otimes M_2 = \begin{pmatrix} a_{11} & a_{21} \\ a_{12} & a_{22} \end{pmatrix} \otimes \begin{pmatrix} b_{11} & b_{21} \\ b_{12} & b_{22} \end{pmatrix} = \begin{pmatrix} a_{11}b_{11} - a_{21}b_{12} & a_{11}b_{21} - a_{21}b_{22} \\ a_{12}b_{11} - a_{22}b_{12} & a_{12}b_{12} - a_{22}b_{22} \end{pmatrix} \quad (4)$$

As we see, contrary to usual matrix product, in anti-multiplication the products of row elements of the first matrix by column elements of the second matrix are not added, but subtracted from each other. Outer type of multiplication of biquaternions $\odot$ corresponds to regular multiplication of matrices (3); inner biquaternionic multiplication $\otimes$ corresponds to anti-multiplication of matrices (4).

Chiral algebra. Chiral algebra is a biquaternionic algebra in light-like basis with the use of inner and outer multiplication. A remarkable property of chiral algebra is two-sided operators: these operators act on quantities, such as the wave function, from both sides - right and left, and each side is using its own type of multiplication, inner or outer. We will see such operators further down in our formulation of the Dirac equation (5). Chiral algebra uses biquaternions as usual relativistic algebra does, but also represents them as "2+2" metric type. Hence we figure out specifics of the two spaces: outer space has metrics "3+1" while inner space has metrics "2+2".

Cyclic singularity.

Electron as singularity.

As we pointed above electron is a singularity of electromagnetic field. In the world of elementary particles the presence of mass signs for singularity. In case of electron the singularity is presented by point-like electric charge and magnetic dipole. Thus the Dirac equation describes a singularity in time. As a singularity electron projects inner and outer spaces to each other, and, as we assume, possesses some kind of consciousness. As we see below, the evolution of the wave function of an electron (or more generally a Dirac particle) is governed by the operators of chiral algebra.

Cyclic representation of the Dirac equation.

The Dirac equation describing the relativistic wave function, place a central role in quantum field theory. We obtained the cyclic representation of this equation that is based on chiral algebra [8]:

$$P^{-}\odot\overline{D} + D\otimes P^{+} = im\overset{\curvearrowleft}{F}, \tag{5}$$

where F is the particle biquaternionic wave function, $D = (\partial_t, \boldsymbol{\nabla})$ is 4-gradient biquaternion operator, and $\overline{D}$ is its vector conjugation. In isotropic basis 4-gradient looks like: $D = 2(\mathbf{q}\partial_\beta + \mathbf{q}^*\partial_\alpha + N\partial_\xi + \overline{N}\partial_\eta)$. $\overset{\curvearrowleft}{F}$ denotes a cyclic permutation of the components of the electron's wave function in isotropic basis $F = \mathbf{q}f_\alpha + \mathbf{q}^* f_\beta + Nf_\xi + \overline{N}f_\eta$:

$$\overset{\curvearrowleft}{F}: \quad f_\alpha \to f_\beta \to f_\xi \to f_\eta \to f_\alpha \tag{6}$$

The transformation $\overset{\curvearrowleft}{F}$ is called cyclic conjugation. $\odot$ is outer product, $\otimes$ is inner product of biquaternions. P^- and P^+ are left-chiral and right-chiral components of the wave function F correspondingly, $F = P^- + P^+$. In isotropic basis left and right chiral states get distinct expression: $P^- = \mathbf{q}f_\alpha + Nf_\xi$, $P^+ = \mathbf{q}^* f_\beta + \overline{N}f_\eta$.

Noise-immunity.

In Cartesian coordinates, cyclic conjugation is expressed in terms of a complex Hadamard matrix H_4. As is well known, Hadamard matrices work in noise-suppressing algorithms of discrete information transmission. Specifically Walsh functions used for signal encoding are constructed on their basis. The presence of Hadamard matrices in the Dirac equation indicates an informational aspect of this equation and also sets a bridge between this equation and the genetic code.

Linear and cyclic times.

Gradient D is associated with change of the wave function forward in time, while the reverse gradient $-\overline{D}$ is associated with change of the wave function backward in time. Therefore the Dirac equation describes the relationship between linear and cyclic times that govern the development of the wave function of a Dirac particle. In the new representation, the Dirac equation manifests cyclic nature of singularity which is intrinsic for consciousness.

DNA and consciousness.

Genetic code.

DNA code of all organic beings is universal, it is built upon the basis of four nucleotides A,T,C,G and their chains - duplets, triplets, and so forth. Each amino acid is encoded by one or more triplets-codons. In the case when the same amino acid is encoded by different codons, we are talking about the redundancy of the genetic code. DNA nucleotides are split into complementary pairs in such a way that in the DNA double helix, each nucleotide on one branch corresponds to a complementary nucleotide on the other branch. Universality, redundancy and complementarity are the major properties of the genetic code of living beings.

Matrix genetics.

Yu.B. Rumer was the author of the first work that revealed symmetries existing in the gene code, significantly based on so-called strong and weak duplets-roots [3]. The Rumer's division was independently discovered by S.V. Petoukhov and became one of the bases of his theory of the matrices of genetic inheritance, ore genetic matrices [4][5]. Petoukhov genetic matrices clearly showed a hierarchical fractal-like system of genetic code built on interconnected symmetric ensembles of nucleotide multiplets.

Algebraic model of DNA.

Based on chiral algebra, we have constructed an algebraic model of gene nucleotide structures [7]. After that we got confirmed that chiral algebra provides the opportunities for adequate description of the basic amino acid coding scheme. Our algebraic model gave a complete or partial algebraic representation of various symmetries, underlying the genetic code, such as complementarity, redundancy, strong and weak roots-duplets, and so forth. In this way we were able to see the genetic code being a native application of chiral algebra in biology. In our model four nucleotides become a basis of biquaternionic space of genetic structures.

Biospin.

In our model of the genetic code, the biquaternions of nucleotides are left and right chiral states – we already saw them in the Dirac equation. According to spin logic each nucleotide may have a certain "spin" projection in the direction of one of three space axes. Figure below shows one of the possible scenarios arising in our model of the genetic code:

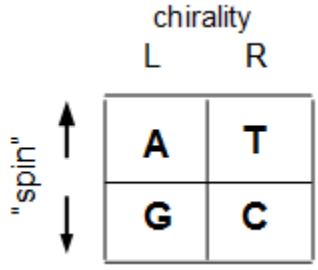


Fig. 3. Possible chirality-spin configuration
of nucleotide biquaternions.

Quantum informatics.

A quantum information approach, founded on the application of wave functions, was already applied to the study of the genetic code [6]. Introduced there analogous of wave functions determine the probability of certain nucleotide sequences to occur in a given DNA chain. It is noteworthy that 2-qubit nucleotide systems serve as the computational basis of this model, that indicates a certain spin-like nature of nitrogenous bases and their multiplets. The concept of biospin supports this idea, whilst chiral algebra provides a new language for quantum informatics in general.

DNA and consciousness.

Chiral spin-like and informational character of DNA genetic structures manifests its relation to the individual's consciousness. Out approach supports the ideas represented in [13], that DNA is the source of biological field, also serving a "gate" of our consciousness.

Conclusions.

Let us outline the key features of our concept of consciousness:

- We all live in the same universal inner virtual world – same way as we live in the same outer physical world. Both spaces are shared by all of us.
- Every living being has its own subspace in the outer world – their organism, and its own subspace in the inner world.
- The inner and the outer subspaces of an individual are connected together by a field singularity which represents their consciousness.
- By virtue of consciousnesses of living beings, inner and outer worlds are united into one whole world.
- Consciousness can not exist by itself - it is the core property of every living being.
- Inner world is described by special mathematics – chiral algebra. The relation between inner and outer worlds has skew-symmetrical character.
- Virtual or potential events of inner space are projected into real events of outer physical space by the actions of living beings, and are reflected back into the images of inner world.
- When the direction of our attention is dominantly outward (directed to outer space), we are awake; when it is inward (directed to inner space), we are asleep.
- The nature of consciousness is quantum: inner world operates wave functions. Be sure it is not reduced to quantum phenomena of micro world, instead it is quantum on macro level.
- A singularity has a cyclic character.
- Consciousness is a system-forming factor of an organism

References

1. L.B. Okun "Mirror particles and mirror matter: 50 years of hypotheses and searches". Uspekhi Fizicheskikh Nauk 1 77 397-406 (2007).

2. L. Silberstein. "Quaternionic Form of Relativity", Philos. Mag. S., 6, Vol. 23, [1]137, pp. 790-809, 1912.

3. Yu. B. Rumer. "Systematization of codons in the genetic code." Report of the USSR Academy of Sciences. April 21, 1966; 167(6):1393-4.

4. S.V. Petoukhov "Matrix genetics, algebras of the genetic code, noise immunity". Moscow, Regular and Chaotic Dynamics Publishing House, 2008.

5. S.V. Petoukhov. "Hypercomplex numbers and the algebraic system of genetic alphabets. Elements of algebraic biology". Hypercomplex numbers in geometry and physics, volume 8, no. 2(16), p. 122, 2011.

6. Sergey Petoukhov. "The rules of long DNA-sequences and tetra-groups of oligonucleotides". arXiv :1709.04943[q - bio . OT]. 2017.

7. S.Ya. Kotkovsky "Algebraic model of the genetic code and biospin ". viXra:2406.0163 . Accepted for publication in the journal "Biomashsystems", issue 4, 2024.

8. S.Ya. Kotkovskiy. "Cyclic representation of the Dirac equation". viXra:2502.0126. 2025.

9. A.G. Gurvich, "The Theory of the Biological Field." Moscow: Soviet Science. 1944.

10. R. Sheldrake. "A Conscious Universe?". A lecture. youtube.com/watch?v=XqWbIVlnmNM

11. R. Sheldrake. "A New Science of Life: The Hypothesis of Morphic Resonance." Park Street Press. 1995.

12. O. Freire Jr. "David Bohm. A life dedicated to understanding the quantum world". Springer. 2019. p.130.

13. M. Myakishev-Rempel. (2025). Imperfection as the foundation of life: the role of DNA in reality rendering. 10.13140/RG.2.2.36112.11524.

April 24, 2025

e-mail: s_kotkovsky@mail.ru