Kulak L.A. (Antoniya Ilyinskaya)

QUANTIZATION OF CHARGES IN THE FORMAT OF MAGNETIC MONOPOLE BIFURCATION WITH DOUBLING OF ITS INFOGENOME.

Member of the International Public Organization PU IAIT, engineer, independent researcher in the field of Fractal Synthesis and Linguistic Physics of the corresponding sector of the International Institute of Humanitarian and Ecological Projects (IHEP) as part of the International Academy of Information Technologies (PU IAIT). Florida, USA. Toronto, Canada. Minsk, Belarus.
Email: antoniyau@yahoo.com

ABSTRACT.

As is known, electric charge occurs in nature only in the form of an integer number of elementary charges that cannot be divided further. And the electric charge of any microsystem and macroscopic bodies is always a number multiple of the minimum charge e (or zero).

The reason for such "quantization" of charge has not yet been established. One of the hypotheses, put forward by P. Dirac in 1931, is based on the existence of magnetic monopoles. This hypothesis went down in history under the name "***Dirac monopole***".

The presented work shows that the process of charge quantization occurs in the method of bipartition/fibration of a magnetic monopole and its geometric transformation into a magnetic dipole with the transfer of the original InfoGenome "charge" to each of the dipole arms. In the process of subsequent fibrations and obtaining a set of magnetic dipoles connected in a topological node, the minimum charge is transferred to each copy in the self-copying method, forming a total charge of the structure, a multiple of the minimum. With such a geometric transformation, the opposite charge and the physical value of the "charge" are actualized, which are related to the frame parameters of the magnetic monopole and are in it in a hidden and unmanifested form.

As a result, it is shown that the multiplicity of the minimum charge is due to the method of copying the InfoGenome of the magnetic monopole in the process of its bifurcation with doubling of its frame parameters and transfer of the original InfoGene of inversion to all subsequent generations in the phases of geometric transformations in the process of growth of the structure (matter) from within.

This article is an extract from the author's monograph and subsequent works based on it. [5] [6] [7] [8] [9] [10]

«I think the physical world itself is a very ordinary one that is completely classical. The trouble is, the world still appears complicated to us now, which is why we're in this situation». *Nobel laureate and Breakthrough Prize laureate in physics G. 't Hooft* [18]

More than a hundred years ago, Robert Andrews Millikan conducted his famous experiment, which made it possible to prove quite reliably that an electric charge is always a multiple of a certain small value, and even calculate it quite accurately.

R. A. Millikan's experiment and a number of other experiments showed that in nature, electric charges consist of discrete charges of constant magnitude.

In the latest experiment of 2021, published in ***SCIENTIFIC REPORTS*** "***Visualizing the electron's quantization with a ruler***" [11], physicists modified the famous experiment of R. A. Millikan, which made it possible to verify with the naked eye the discreteness of the elementary electric charge.

Nevertheless, the answer to the question of the cause of discreteness, quantization and multiplicity to the minimum has not yet been received.

"According to modern views, there is a maximum possible difference in magnitude between an electron and a proton for elementary particles. But no one understands why their charges are equal with such fantastic precision. It is obvious that charge quantization is a mysterious and universal law of nature. We can hope that in the future some new discovery or insight of theorists will explain it." [12]

Charge quantization in physics means that electric charge occurs in nature only as an integer number of elementary charges, which cannot be divided further.

As can be seen from the current state, the question of charge quantization requires the following answers:

- What is a reason for the discreteness of charges?
- What is a reason for quantization and the multiplicity of the minimum charge?
- What is a connection between quantization and the multiplicity of the minimum charge with a magnetic monopole?
- What is the form representation of the monopole and what are its main properties?

The existence of a magnetic monopole was predicted by P. Dirac in **1931**. [1] [2] The prediction does not contain any specific form representation or a sufficiently specific descriptive characteristic. Nevertheless, the intuitive insight into the existence of a monopole includes the thought that the idea of a magnetic monopole is too elegant not to be used by Nature itself.

"But it is precisely the multiplicity of all observed charges to the charge of an electron that is one of the fundamental laws of nature. If M. m. existed, this law would have a natural explanation. No other explanation of the quantization of electric charge is known." P.A.M. Dirac [2]

In 1974, Gerard 't Hooft and Alexander Polyakov independently discovered that the existence of a magnetic monopole is not only possible, as hypothetically predicted by P. Dirac, but also obligatory in a certain class of field theories.

In theoretical physics, the 't Hooft–Polyakov monopole is **a topological soliton** similar to the Dirac monopole but without the Dirac string. It arises in the case of Yang–Mills theory with a gauge group associated with the Higgs field, which spontaneously splits it into a smaller group via the Higgs mechanism. It was first found by Gerard 't Hooft and Alexander Polyakov independently. [3] [4] Unlike the Dirac monopole, the 't Hooft–Polyakov monopole is a smooth solution with finite total energy.

When describing a magnetic monopole, the general inclination of thought goes into defining that "magnetic monopoles are theoretical particles that have one isolated magnetic charge, unlike conventional magnets, which have both north and south poles." [Google]

"No matter how sophisticated you try, you will not get a unipolar magnet - a positive or negative magnetic charge, or a monopole. In other words, magnetic monopoles do not exist in nature." [Google]

It should be noted here that poles and charges are not the same thing. Yes, it is impossible to obtain a unipolar magnet, all baryonic matter is in a state of dipole. And no matter how much

you divide a magnet, each separated part will retain the properties of the whole. The same property is inherent in a hologram. Therefore, there is a universal structure inherent in magnetism, as well as in a hologram based on it, which is capable of retaining this property in the method of division. The fact that it is impossible to obtain a unipolar magnet – a positive or negative magnetic charge, does not mean at all that magnetic monopoles do not exist in Nature. Too elegant an idea, as it was designated by P. Dirac! Nature is optimal, creative and brilliant.

The whole question is how the scientific community at the current stage of development understands a concept of monopole and how close it has come to Nature in its understanding. Within the current particle-based paradigm, the understanding of a magnetic monopole is as follows.

«In particle physics, a magnetic monopole is a hypothetical particle that is an isolated magnet with only one magnetic pole (a north pole without a south pole or vice versa). [1][2] A magnetic monopole would have a net north or south "magnetic charge". Modern interest in the concept stems from particle theories, notably the grand unified and superstring theories, which predict their existence. [3][4] The known elementary particles that have electric charge are electric monopoles». [Wikipedia, magnetic monopole]

Next, we will also turn to the experiments conducted over the past decade and a half. Based on P. Dirac's hypothesis on the existence of a magnetic monopole, as well as on the fact of studying processes in condensed media, a number of experiments have been conducted over the past 10-15 years to detect magnetic monopoles or structures that behave like magnetic monopoles. [6, [94] – [116]]

The experiments focus on the fact that the monopole is explained and considered as a **uni-polar unit** (the scientific position of modern theories). Based on this, the interpretations of the experiments are given in the format of magnetic uni-polarity, even if what is observed in them could be interpreted differently.

The interpretation of the concept of a "***magnetic monopole***" as a uni-polar physical unit contradicts the concept of the essence of magnetism itself, which is characterized by natural **duality** – **two poles**. Therefore, the presentation of mono-polarity as uni-polarity does not correspond to the essence of **universal natural duality**, mediated by the original principle of complementarity, which implies the existence of its equivalent in everything without exception and the existing concept of complementarity is based on the comprehensiveness of the principle of complementarity.

Consideration of the essence of magnetism itself and the magnetic monopole in the format of the universalism of natural duality (complementarity) shows the following.

Universal complementary duality in the context of its physical implementation in magnetism and its polarities has two main phases: the phase of **mono-polarity** (monopole) and the phase of **bi-polarity** (dipole).

The **phase of mono-polarity** is characterized by internal hidden polarities and the absence of an external magnetic field, which is inherent in magnetic monopoles, while the **phase of bipolarity** is characterized by polarities and a magnetic field expressed outwardly, which is inherent in magnetic dipoles.

The **mono-polarity phase** as a phase of unmanifested matter is inherent in the etheric units (magnetic monopoles) of the matrix structure of the supporting Cosmic Medium. The **bi-polarity phase** is inherent in the manifested baryonic matter. All baryonic matter is magnetic dipoles.

The **mono-polarity phase** and the internal closure of polarities mediate the basic properties of quantum breathing as continuous and unceasing oscillations.

The **bi-polarity phase** inherits the basic properties of a monopole and at the same time determines gravity and mass, which are manifested during the transition of the etheric magnetic monopole from the mono-polarity phase to the bi-polarity phase, that is, during the geometric transformation of a magnetic monopole into a magnetic dipole and the actualization of the dipole properties of matter.

The **mono-polarity phase** corresponds to an etheric magnetic loop, topologically closed through an inverse turn, which can be geometrically displayed using a geometric analogue of the complementarity principle – a Mobius strip with one 180-degree turn. It should be noted that to this day, no known theoretical physicist has proposed considering a magnetic loop as closed through inversion.

The bipolarity phase corresponds to the basic element of nature – a magnetic loop with two inversions (two 180-degree turns), obtained in the first phase of the geometric transformation of a magnetic monopole into a magnetic dipole.

In the state of mono-polarity or monopole, magnetism (magnetic field) does not have its external manifestation like a bar magnet. Such a state can be called an unmanifest or hidden state of magnetism. And the entire so-called hidden mass of matter, which in the current scientific view has received the names "***dark matter***" and "***dark energy***", which, according to scientific data, accounts for 25% and 95% of matter, respectively, is in a state of monopole (mono-polarity) and is not recorded by equipment.

Based on the logic described above, the concept of "mono-polarity" does not mean uni-polarity. **Mono-polarity is a phase state of duality of magnetism**, when its polarities represent an internal character of closure without the manifestation of an external magnetic field for interactions. That is, a **monopole** is not a uni-polar unit, but a complementary duality "two in one", which is in the phase of polarities that are not manifested externally in dipole state.

As a result of such anti-phase closure, Nature organizes the process of continuous and non-stop oscillations with emission-absorption of discrete portions of etheric magneto-plasma (quanta). That is, a monopole is not a unipolar unit, but a complementary duality “two in one”, which is in the phase of polarities that are not manifested externally.

It should be noted that to this day in the science of physics the cause of continuous and non-stop oscillations **has no explanation**. As shown above, considering the original magnetic loop as closed through inversion gives this phenomenon a sufficiently clear and logical explanation. A **magnetic loop** is a sub-micro-magnetic flux curved by an antiphase closure, the twisting of which causes it to twist and, as it were, return to its previous state, which generates an eternal self-rotating movement.

In the descriptive approach based on the ontology of the fundamental principle of complementarity [5] [6] [7] [8] [9] the following conclusion is made:

A magnetic monopole is a sub-micro-magnetoelectric circuit and a quantum-mechanical unit of the matrix of the etheric Quantum Medium, which, due to the effect of reconnection, performs self-motion of a two-cycle revolution (spin oscillations) with emission-absorption of magneto-plasma quanta, has a vector spin potential and creates a vibrational background of the etheric Quantum Medium.

The geometric representation of the magnetic monopole is considered in more detail in [6]. The main thing is that, based on the ontology of the complementary principle, the Mobius

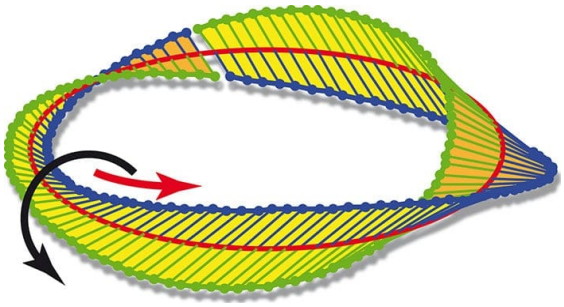
strip with one 180-degree turn is taken as the basis of the initial **geometric form of the magnetic monopole** – ***the form of the quantum phenomenon***.

Thus, the **magnetic monopole is the initial unit whose polarities,** so to speak, **are closed in one topology**. The framework properties of the Mobius magnetic monopole are its InfoGenome. The main InfoGenome of the magnetic monopole is its **inversion**, which mediates spiralization, the two-cycle nature of the reversal or spin, the charge potential, quantum breathing and the hydrodynamic property of spontaneous bifurcation (fibration) with doubling of the magnetic flux. [5][6][7][8][9]

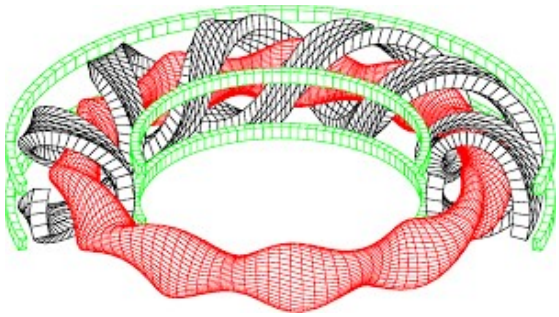
As shown in [6], the unit of the etheric Quantum Medium in the form of a dynamic topologically closed magnetic loop-monopole (Mobius strip) does not indicate a mathematical abstraction of a physical point, but, as can be seen from the proposed illustration, such a unit takes a form with a specific **physical content** that determines the vortex nature of the magnetic field and the ability to interact with the current structures of the etheric magneto-plasma.

The vortex nature of the magnetic field is represented by a Mobius spiral, and the shape of the currents inside such a spiral has the configuration of a wrapped sinusoid. That is, both the magnetic lines themselves and the energy current produced by them have the form of a Mobius spiralization.

To visualize such a spiralization I used the illustrations below from various publications, including those devoted to stellarators [13]. In particular, it is clear from the illustrations that, when creating stellarator equipment, engineering thought follows steadfastly the same patterns used by Nature itself.



[14]



[13]

In the condensed etheric medium, magnetic monopoles exhibit collective effects. One of such collective effects observed in cosmology is the self-generating **hydromagnetic dynamo**, in which spontaneous high-speed division of magnetic loops-monopoles occurs with doubling of the magnetic flux, which is a way of forming atoms and, accordingly, objects of the cosmic medium: stellar-planetary systems and galaxies. When cosmic objects are formed, the hydromagnetic dynamo effect remains active inside the object and is the **quantum generator** that processes the etheric magneto-plasma inside a planetary or stellar body. Also, continuous conversion of magneto-plasma occurs inside each atom in the process of atomic dynamics of internal movements and its quantum symbiosis with the etheric Quantum Medium. [8] [9]

In the process of dividing magnetic loops-monopoles and their geometric transformation into dipoles, the transformation of etheric substance into baryonic matter occurs, in other words, the polarization of etheric monopoles and the actualization of the external magnetic field occurs. All baryonic (manifested) matter is in a state of dipole (bi-polarity).

Bi-polarity or dipole is a state of magnetism that has an external manifested magnetic field similar to a strip magnet, the ends of which demonstrate different polarities. That is, the bi-polarity phase is the phase of transition of magnetism from the mono-polarity phase to the dipole phase, limited by the poles. Such a state can be called the externally manifested state of magnetism.

The presence of etheric substance in a state of monopole ensures its neutrality, which essentially works as a principle of "non-interference" in the interactions between dipole elements (objects).

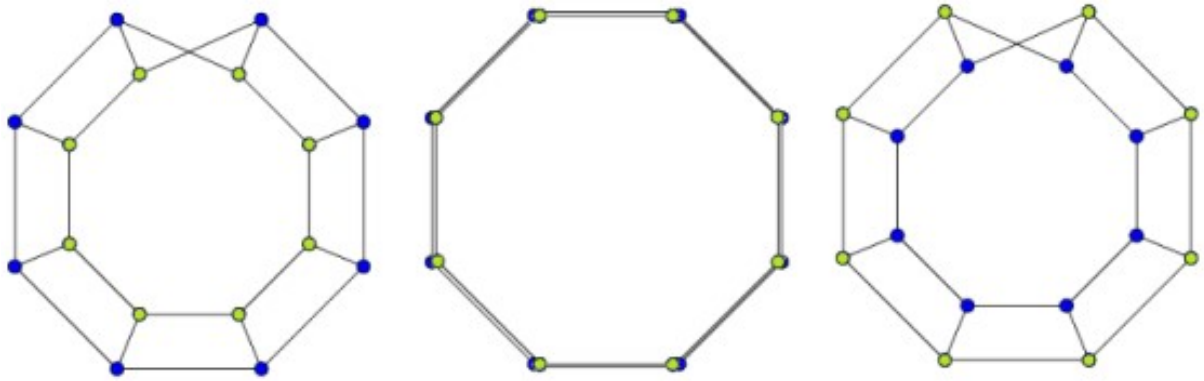
Taking into account the above, it can be said that the search for the hypothetically predicted magnetic "***Dirac monopole***" in its interpretation as a **uni-polar unit** is the misconception that arose for objective reasons at a certain stage of understanding the issues of magnetism, which still has its established character. It is inherited from previous incomplete views and is still spreading within the framework of the Standard Model and other theories of the PEP and in active attempts to detect this uni-polar unit in experiments conducted over the past 10-15 years.

In my work [6], when analyzing the experiments, I expressed the following thought. Yes, according to P. Dirac's statement, the idea of a magnetic monopole is elegant enough that Nature itself did not use it. But considering a magnetic monopole as a uni-polar unit contradicts the essence of the duality of magnetism and is a weak philosophy. In the experiments, attention should be directed to finding where the opposite polarity is at the time when the monopole demonstrates the illusion of uni-polarity.

In the application of the geometric analogue of the complementarity principle – the Mobius strip – to this question, the presence of this illusion is illustrated quite well using the graph "***Mobius ladder***".

If we paint the edges of the Mobius strip before gluing it together in different colors and represent it mathematically as a graph "***Mobius ladder***", then this experiment will give a clear visualization of how the outer membrane of such a dynamic granule in the process of quantum breathing becomes first one color, then another, that is, it demonstrates first one phase of polarity, then another.

«***Mobius ladder***» graph (A).



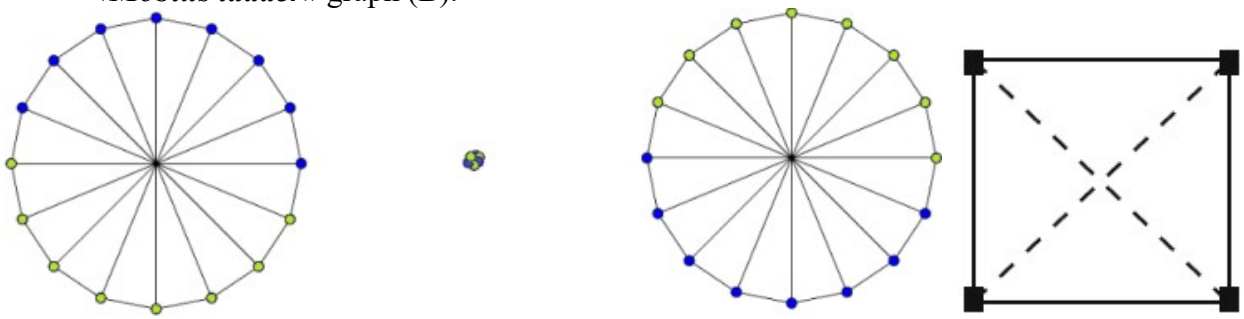
Phase "INHALATION". Phase "EXHALATION". Phase "INHALATION". [6[93]]

Each phase of "inhalation" and "exhalation" turns the figure inside out and vice versa. "The process of breathing is by definition a series of nonequilibrium states in an open system, constantly fed with energy from the environment due to the opposite dual phases of "inhalation"

and "exhalation". The features of the living mechanics of oscillating breathing allow us to take a significantly new look at several unsolved problems in the fundamentals of the physics of the micro-world. This is also a very important observation of analogies in different planes of being, which can help interpret the experiments with quasi-monopoles that have been conducted over the past decade and a half from 2008 to the current 2024. [94] - [116]". [6]

These same phases of quantum breathing can be displayed using another representation of the same graph, the "***Mobius ladder***", thanks to the "rubber" capabilities of topology, which allows us to expand the figurative representation of the change of mutually inverse phases of oscillations in the dynamics of Mobius torsion (spinning). It should be noted that this same change of oscillation phases is displayed geometrically in the well-known "***Pauli square***".

«***Mobius ladder***» graph (B).



Phases: ***"Inhalation – Exhalation – Inhalation"***. [6[93]]

"***Pauli square***".

Each phase of "exhalation" during compression (shrinkage) turns the figure by 180 degrees or, if we can say, turns it inside-out, in other words, produces a **topological revolution**. I believe that the phases of quantum breathing of Mobius Monopoles, depicted in the form of such graphs, can help to see the creation of an imaginary illusion of uni-polarity of such units.

It can be confidently stated that it was the presence of such an illusion that could be the reason for the hypothetical assumption of a magnetic monopole as a uni-polar structure. But uni-polarity essentially contradicts the universalism of the principle of complementarity, since a mono-structure as a single whole must have a complementary (antiphase) **partition** "two in one" to implement the **dynamics of internal movement-spinning**. Without this partition, which gives it the mechanism of movement, it simply cannot exist. It is the change of phases of the oscillations of the etheric Magnetic Monopole in its Möbius configuration that creates the illusion that the Magnetic Monopole is a uni-polar structure that can exist in the nature of things in two separate forms – with one radial pole or the other.

At the beginning of quantum mechanics P. Dirac imagined a magnetic monopole in exactly this form and he also assumed the presence of magnetic charges by analogy with electric charges, which at that time were and are still imagined by academic science as **separate entities** in the structure of an atom.

A geometric solution to this issue based on the Möbius strip shows that the idea of a single uni-polarity is a kind of delusion. In turn, the geometric visualization of atomic charges ("***proton-electron***") based on Möbius geometry is represented by **a single physics for the proton-electron together**. The assumption of such physics was once expressed by W. Heisenberg when analyzing the equation of P. Dirac. In the configuration of the Mobius ring, the polarities are topologically closed in a wave packet and, oscillating, the magnetic monopole

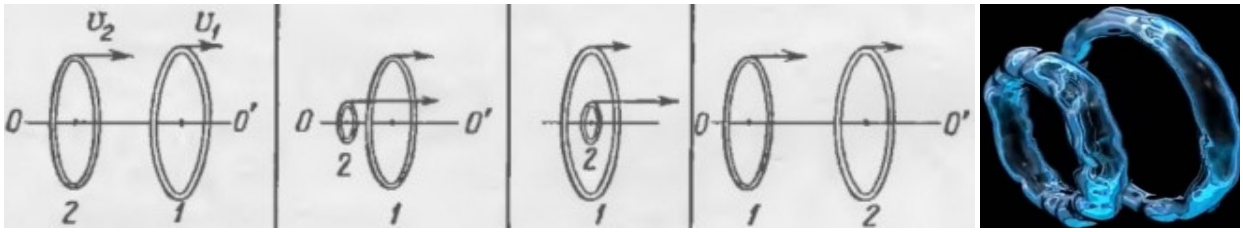
essentially demonstrates a polar vibration – sometimes with one pole, sometimes with the other pole outward, and with the opposite pole – inward.

Two illustrations below – (1) and (2) – have been made by me from two-color paper, one side of which is white and the other is black. In illustration (1), the Mobius strip is turned outward only in white, and in illustration (2), the same strip, but turned outward in black. Each of these phases of the "black-white" oscillations creates the illusion of uni-color or uni-polarity. It would also be appropriate to say that these two color states are an analogy to the elements of binary logic, namely, "0" and "1". That is, the spinning of the Mobius Monopole with its inversion and change of “color” is essentially the physical basis of binary coding in the spatial matrix fabric of the ethereal Quantum Medium.

(1)  **(2)** 

Polarity itself is related to the vector of direction of magnetic lines, which are closed with inversion. Magnetism exists as a natural duality, mediated by the Fundamental Principle of Complementarity, which manifests itself differently in different variants, but at the same time preserves the original InfoGene of duality, closed in antiphase.

As this is illustrated by the geometric solution, the illusion of uni-polarity created by the dynamics of monopole spinning is nothing more than the result of the reciprocity of magnetic oscillation phases. The change of magnetic monopole oscillation phases demonstrates practically the same effect as the change of neutrino-antineutrino oscillation phases, when the dynamics of oscillations shows a reversal "from face to inside out" and "from inside out to face", but only with a slightly different geometry of this method of reversal. In the case of neutrinos, this occurs in analogy with the leapfrog of smoke rings indicated in the experiments of G. Helmholtz. [6 [133]]



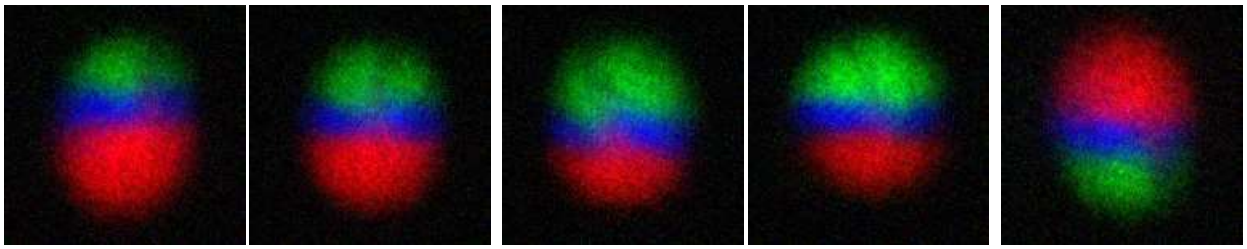
Smoke ring hodgepodge [133] and neutrino oscillations [131], [132], [118]» [6]

The application of the Möbius strip geometry format to the visualization of the magnetic monopole structure geometrizes its representation and, as a consequence, provides a basis for describing its quantum mechanics and magnetoelectric properties.

In the context of the conclusions regarding the Möbius Magnetic Monopole from the descriptions of experiments on the creation of magnetic monopoles given in [6], the most correlating with the proposed format are the descriptions of the experiments of 2014-2015 and publications discussing their results. [6 [102] [103] [106] [107]]

In January 2014, the authors of the publication "***Observation of Dirac monopoles in a synthetic magnetic field***" [6 [102]] noted the fact that, although analogs of magnetic monopoles have been discovered in exotic spin ices and other systems, there has been no direct experimental observation of Dirac monopoles in a medium described by a quantum field, such as superfluid helium-3.

"These real-space images provide conclusive and long-awaited experimental evidence of the existence of Dirac monopoles. Our result provides an unprecedented opportunity to observe and manipulate these quantum mechanical entities in a controlled environment " [6 [102]]



a) b) c) d) e)

Extended Data Figure 2 j Additional representative images of Dirac monopoles. [6 [102]]

My comments: illustrations a) and e) look similar to the «***Mobius ladder***» graph (B).

In January 2014, the author of the publication "***Quantum cloud simulates magnetic monopole***" [6 [103]] tells the following about this experiment:

"Möttönen, who is a co-author on the latest paper, says that the monopole in the new study is closest to the real deal because the structure is identical to that of a Dirac magnetic monopole. Not all physicists agree. "In some ways this is closer to what a real monopole would look like, but in some ways it's further," says Arttu Rajantie, a theoretical physicist at Imperial College London.

Steven Bramwell, a physicist at University College London who pioneered work on monopoles in spin ices, says that the experiment is impressive, but that what it observed is not a Dirac monopole in the way many people might understand it. "There's a mathematical analogy here, a neat and beautiful one. But they're not magnetic monopoles," Bramwell says. "You have to do a sideways jump – a bit of lateral thinking in your mind – to project these onto magnetic monopoles," he adds.

Dirac famously said that he would be "surprised" if nature had made no use of such an elegant idea as the magnetic monopole. Physicists are still looking for natural monopoles, including in rocks and lunar samples, and in experiments using particle accelerators. Simulated monopoles provide a stronger foundation for these searches, says Möttönen. "You could ask, is this structure Dirac predicted actually possible? Now we have seen that it is possible, there's one more reason why the magnetic monopole as a fundamental particle should exist." [103]

The **May 2017** publication "***Physicists Experimentally Observe Decay of Quantum Monopole***" [6 [107]] notes the following facts about the experiment [6 [106]]:

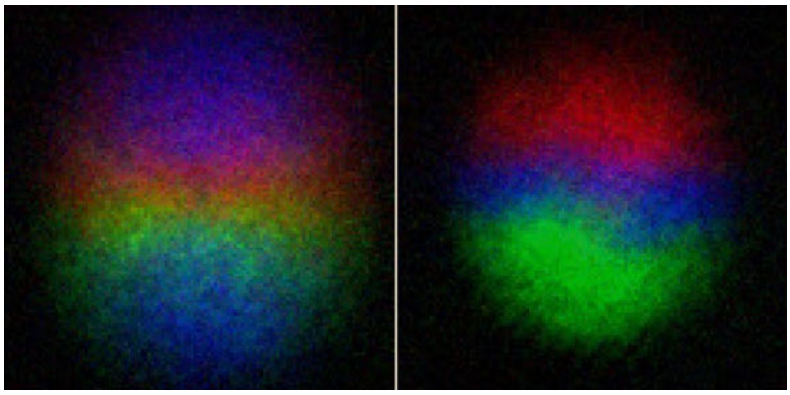
«"In 2014, we experimentally realized a Dirac monopole, that is, Paul Dirac's 80-year-old theory where he originally considered charged quantum particles interacting with a magnetic monopole," said co-lead author David Hall, professor of physics at Amherst College.

"And in 2015, we created real quantum monopoles," added co-lead author Dr. Mikko Möttönen, professor of quantum computing at the University of Jyväskylä and senior scientist in the Department of Applied Physics at Aalto University.

"Whereas the Dirac monopole experiment simulates the motion of a charged particle in the vicinity of a monopolar magnetic field, the quantum monopole has a point-like structure in its own field resembling that of the magnetic monopole particle itself."

Now the team has produced an observation of how one of these unique magnetic monopole analogues spontaneously turns into another in less than a second.

"Sounds easy but we actually had to improve the apparatus to make it happen," said study first author Tuomas Ollikainen, a doctoral candidate at Aalto University». [6[107]]



Left: experimental side image of the quantum monopole.
Right: after 0.2 seconds, the quantum monopole has decayed into the Dirac monopole. The different colors represent the direction of the internal magnetic state of the atoms and the brightness corresponds to particle density. Image credit: Tuomas Ollikainen.» [6 [107]]

My comments on the results image: It is obvious from the illustrations that the monopole has simply turned inside out, just as shown above in the «***Mobius ladder***» graph (A).

It is necessary to emphasize the importance of the question of the geometric representation of the monopole as the initial magnetic ring with inversion, since all the main questions related to the structure of the atom are a consequence of the geometric structure of the initial spatial unit.

Returning to the above-mentioned phases of matter (monopole and dipole), we can illustrate them quite clearly in the format of a geometric analogue of the complementarity principle – the Mobius strip – and show geometrically what the meaning of these two phases of the phenomenon of magnetism is. The transformation of a magnetic monopole into a magnetic dipole is carried out by the method of fibration of a vortex magnetic monopole formation, in other words, its bifurcation with doubling of the InfoGenome. [7]

The process of spontaneous division of a vortex formation – a monopole – is a hydrodynamic property of vortices. It can be called filamentary splitting or fibration phases into fibers along the line of the Mobius curvature.

Fibration is a process of bifurcation with doubling of the original InfoGenome of duality. In the fibration method, the original InfoGenome is transferred to each generated unit with the formation of new **symmetries and asymmetries**. And the **quantization of charges** is mediated by this very method of self-copying, from which the multiplicity of the obtained total charge to the minimum logically and practically follows.

The hydrodynamic property of spontaneous bifurcation of the magnetic loop is inherent in units of the etheric Quantum Medium to the same extent as these same phenomena occur in the aquatic environment, since the etheric Quantum Medium is a kind of magnetoplasmic liquid or, as Nobel laureate H. Alfven, the father of magnetohydrodynamics (MHD), called it, ***living plasma***.

"H. Alfven pointed out that the overwhelming majority of all matter in the universe is in the state of physical plasma, similar to a kind of gas consisting of magnetic particles. Based on this, Alfven assumed that the forces acting on plasma due to magnetism should be at least comparable in their effect to gravity." [20]

As it logically follows from the proposed geometric format, the "***magnetic particles***" of H. Alfven, which constitute the essence of physical plasma as the matter of the Universe, are magnetic monopoles with initial framework properties that are substantial and are transmitted to all the products of the etheric Quantum Medium and remain in them as ***universal ingredient*** that Nobel laureate F. Wilczek described in his book [21]:

"*There is a certain primary ingredient of physical reality that fills space-time and from which everything else is formed.*

Every fragment or element of space-time has the same basic properties, the same as any other fragment.

And this primary ingredient of reality is alive, because it is constantly filled with quantum activity.

This is what makes space a multilayer superconductor (or, in other words, a superfluid fluid with a whole spectrum of different properties)."

And the **quantum activity** of these monopoles-ingredients is determined by the above-mentioned method of their self-movement, behind which lies the essence of the unity of the entire world order. This idea was formulated in parallel by the scientist V. Tatur:

"*... the essence of the unity of the world should be sought in a special form of self-movement of matter, in a special structure of this self-movement, from which all other features of the world necessarily grow. This special form of self-movement, having given birth to all other forms of movement of matter, exists together with them, simultaneously constituting their essence.*" [22]

And also this same idea sounds in the article of professor of the University of St. Petersburg, Doctor of Technical Sciences Rubashkin V.Sh.:

"*... the world environment has a gigantic, even by the scale of the energy of the microworld, internal energy. This energy is not something brought in from outside – it is a way of existence of the world environment. And this is completely consistent with the previously formulated ontological postulate –* ***all being is movement****.*

*From general **ontological** considerations it follows that under certain specific conditions the internal energy of the world environment can be transferred to elementary particles and generate them*." [23]

At this point, we should recall some more facts from the history of modern science, which indicate that the scientific community could have discovered much earlier the secret of Nature that is connected with the magnetic monopole and the method of its bifurcation as a method of generating elementary particles of matter – atoms.

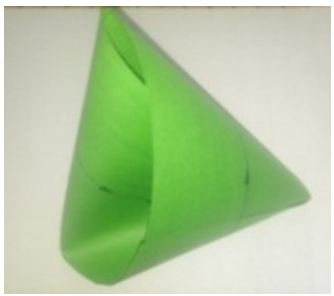
Firstly, **in 1953**, the structure of DNA double helix and then the method of its replication were discovered. Secondly, the image of the Mobius strip was constantly spinning in the field of V. Pauli's thoughts, and his famous phrase about "***bifurcation and reduction of symmetry***" still remained a secret: "***Bifurcation and reduction of symmetry," he says in one letter, "that's where Faust's poodle is buried!***" [11, p. 288]

In his memoirs, W. Heisenberg notes: "I once asked Wolfgang why he attached such great importance to the process of bifurcation, and received approximately the following answer: "... The process of bifurcation, or dividing, as I imagine it, could explain a lot to us here, because it somehow very naturally expands the space of nature, thereby creating the possibility of new symmetries. In the ideal case, one could think that all real symmetries arose as a consequence of such bifurcations." [12, pp. 342-343]

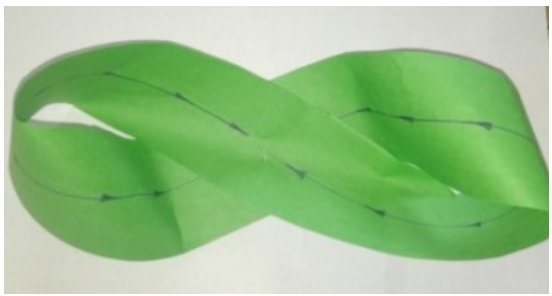
It must be said that W. Pauli was very close to understanding through insight that elegant secret of Nature, with the help of which the growth of matter from within is carried out and which, having been discovered by that time in cell biology, could be successfully transferred to the plane of quantum phenomena. However, at that time these hints and guesses were not formed so compositionally as to give a sufficiently clear geometric visualization of what later began to develop in quantum physics algebraically without a figurative representation of it.

Geometrically, the bifurcation (fibration) of a magnetic monopole with the doubling of its InfoGenome and the formation of new symmetries can be illustrated using a paper experiment with a Mobius strip, cutting it symmetrically in the middle and along the line of curvature. Let us consider the first three phases of fibrations of a magnetic monopole using the example of a paper experiment, understanding that the actions are performed with a magnetic loop closed through inversion.

1. FIRST PHASE OF FIBRATION.


Mobius Monopole.


FIBRATION.


Mobius Dipole.

In the first phase of fibration, the first doubling of both the inversion itself (the initial duality) and the length of the Mobius ring occurred. In this case, the following form of duality

was formed – two mirror-asymmetric inversions in the form of a two-armed "***eight***" or lemniscate with a crossing of the Mobius curvature line. In other words, a geometric configuration of a two-armed Mobius Dipole was formed.

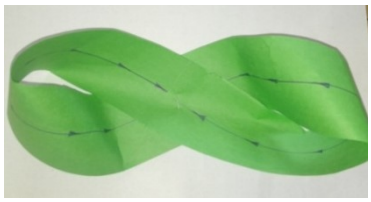
As can be seen, the presence of inversion determines the spatial curvature and helicity of the Mobius ring. The resulting doubled ring has a doubled inversion or helicity and a corresponding twist of the Mobius curvature line, leading to the crossing effect. Helicity is also associated with the concept of "***spin***" and with the concept of "***energy***".

At the same time, a new interrelation was actualized, providing a balanced retention and functioning of two arms according to the principle of feedback through the crossing of the Mobius curvature line.

This crossing forms a **tension and balancing tensor** between two arms of the magnetoelectric Mobius dipole ring with two inversions. Considering the functionality of the new interrelation in maintaining the balance of the two arms when their parameters change and holding the arms together, providing mutual support to each other, this interrelation is identified as **a gravitational interrelation**, which, according to the meaning of the root word of the term "***gravity***", is mutually supporting for dipole-bound objects both in cosmology (planet and star) and in the micro-world of the atom (proton-electron).

A detailed examination of these issues is covered in the work "***3. Basic Element of Nature. Mobius Geometry. Gravity. Model of the Atom***" [8].

2. THE SECOND PHASE OF FIBRATION.



Mobius Dipole.



FIBRATION.



Two entangled Mobius Dipoles.

In the second phase of fibration, the next doubling of the InfoGenome occurred and the next form of symmetry was formed – duality of two Mobius Dipoles (two "eights"), interconnected according to the principle of chain links (**quantum entanglement**). As can be seen, the Mobius inversion mediates the link type of coupling of magnetic rings in the process of filamentary division of the original magnetic ring, that is, a topological knot is formed.

As it is visualized, obtaining a topological knot is mediated by the inverse closure of the magnetic loop. Until now, no theorist has proposed to consider the magnetic loop as closed inversely and, therefore, the properties of such a closure have not been considered.

As illustrated by the first two phases of fibration, at each stage of bifurcation a new type of symmetry is formed. At the first stage – symmetry of two arms, at the second – symmetry of two dipoles. In addition to symmetries, new asymmetries are formed. At the first stage, the spiralization of the Magnetic Dipole arms is mirror-asymmetrical, at the second stage, the spiralization of the dipoles is also mirror-asymmetrical.

The elegance and simplicity of such a structure of the magnetic monopole during its further fibrations creates a variety of atomic elements based on the algorithms of bifurcation, which in turn gives a variety of atoms and forms of the material world during the emergence of atomic chemical compounds.

3. THE THIRD AND SUBSEQUENT PHASES OF FIBRATION.

The third and subsequent phases of fibrations lead to further multiplication of the Möbius Magnetic Dipoles connected in a **topological knot**, as well as their **polarization in the radial direction.** The formation of a universal "**Center-Periphery**" scheme occurs, which is directly related to the structure of an atom, cell, bioorganism, society and space systems. In this scheme, the process of further growth of the structure and the formation of new symmetries and asymmetries continues, which is not considered in this paper.

Here it is important to show the process of charge quantization based on the fibration of a magnetic monopole and its multiplicity to the minimum charge, which is actualized precisely in the first phase of fibration together with its mirror-asymmetric opposite charge and the simultaneous manifestation of an external magnetic field and mass. [8]



Mobius Dipoles connected into one topological node.

With further formation of the "Center-Periphery" scheme, the Center-core is formed from some of the Magnetic Dipoles' shoulders, and the orbital Periphery is formed from the asymmetric mirror shoulders, which is connected to the Center radially through the Centers of Balancing and Tension of all dipoles, which form a **gravitational tensor** around the quantum core.

The "Center-Periphery" scheme is the next type of complementary duality, in which the formation of a concentrated Core and a more rarefied Periphery remote from it occurs. These issues are covered in more detail in the work [8].

The paper experiment version demonstrates the fact that in the process of successive filamentary splitting of the Mobius Monopole in the phases of its fibrations, its stepwise geometric transformations and stepwise growth of matter from the inside out occur.

In the first phase of bifurcation, the InfoGene of inversion is copied with doubling and transferred to each arm. Thus, each arm of the dipole has an inverse spiralization of 180 degrees and, accordingly, an actualized **minimum charge**. The direction of spiralization mediates the sign of the charge. The arms of the Magnetic Dipole have a mirror-asymmetric spiralization. Based on this, one arm can be assigned a **minus sign**, and its mirror-asymmetric one can be assigned a **plus sign**.

The interconnected arms of the Mobius Magnetic Dipole in the current paradigm of physics are called, respectively, "***electron-proton***". As can be seen from the properties of the

Mobius geometry, in essence, in the dipole structure there is nothing more than a **topological reversal** of the "charge", when the minimum "charge" becomes opposite to itself in sign, undergoing a mirror-asymmetric reversal, passing the point of gravitational crossing.

The gravitational tensor is the point of tension and balancing of the dipole arms, which functions on the principle of scales with a moving axis. The magnetic dipole becomes the first atomic element – hydrogen – when the **symmetry decreases** and the gravitational balancing point shifts toward one of the arms, which becomes the core, and the opposite one plays the role of the periphery. [8]

A paper experiment demonstrates the fact that the minimum "charge" (inversion) in each phase of fibration is copied and transferred to the arms of dipole formations, in which the total positive "charge" (spiralization) of some arms is equal to the total negative "charge" (spiralization) of other arms, mirrored by them asymmetrically, which is equivalent to the fact that the number of "***electrons***" is equal to the number of "***protons***", as explained in the current paradigm based on particles. And the total "charge" of the resulting system formation (atom) Z is equal to the sum of the dipole formations in the decomposed state "***proton-electron***" (state of opposite charge).

Simultaneously with the dipole two-arm formations in the "***proton-electron***" state, dipole formations in the **neutral state** of the Mobius pseudo-ring are present in the atom, when the arms ("***proton-electron***") of the Magnetic Dipole are coaxially nested into each other and the structure acquires external neutrality.

This state corresponds to what is called "***neutron***" in the current paradigm. The dipole state "***neutron***" is preserved only in the structure of the atom. In the free state, the magnetic dipole pseudo-ring unfolds and again acquires a two-arm structure with opposite "charges". This is the basis for the beta decay of the "neutron". (These issues are partially touched upon in other works by the author).

In the illustrations below, the Magnetic Dipole is presented in its two states, geometrically transformable into each other. This once again emphasizes the constructive idea expressed by predecessors who created the legacy of the physics of etheric space, that in the spatial structure there are only **geometric transformations** and the emphasis must be on the **geometric methods of mathematics**.

MOBIUS LOOP TRANSFORMATION.

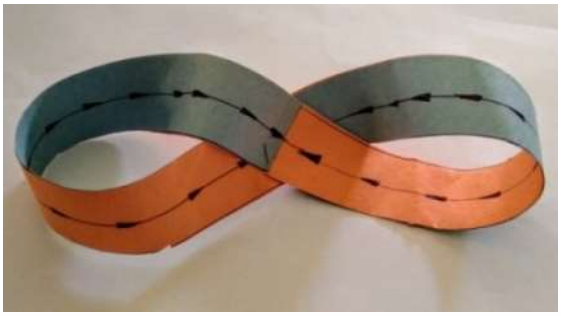


Figure-of-eight dipole – "proton-electron".



Double pseudo ring – "neutron".

These transformations are directly related to the processes that occur in the geometry of the space of the etheric Quantum Medium during the generation of its objects: atoms, stellar-planetary systems, galaxies, bio-organisms. All of them are the products of the etheric Quantum

Medium from its initial generative granules-monopoles as "seed elements". And the Geometry of Mobius quite clearly demonstrates the fact that in the spatial fabric there is nothing but the dynamics of changes in spatial geometry, as W. Clifford asserted in his program. [7 [47] [48] [49] [50]]

"In the picture of the world presented by Clifford, not only the gravitational force of attraction generated by curvature is visible. According to the given theses, in essence EVERYTHING that happens in nature comes down to dynamic changes in the geometry of space. Therefore, it is natural and convenient to study and describe this dynamics based on geometric methods of mathematics." [10]

In the context of this topic of charge quantization, it is also necessary to identify the phases of the fibrations of the Mobius Magnetic Monopole with algebraic spinors in quantum physics. [7], [8]

"The first spin theory that gives a correct mathematical formulation of "a two-valuedness that cannot be described classically" was proposed by Pauli in his work in 1927. Avoiding the construction of any visual kinematic models, Pauli introduced the doubled Hilbert space H2⊗H (the space of wave functions), the vectors of which are two-component spinors. Thus, for the first time in physics, two-component spinors and the first doubling appeared. The subsequent doubling (bispinors, H4⊗H space) was proposed by Dirac in 1928. The next doubling leads to hypertwistors in the Hilbert space H8⊗H. Hypertwistors are vectors of the fundamental representation of the Rumer-Fet group SO(2,4)⊗SU(2)⊗SU(2)', which gives a group-theoretical interpretation of the periodic table of elements. Spinors, bispinors and twistors are special cases of a hypertwistor." [17] [7 [69]]

As shown in the three phases of fibrations, the geometric transformation of the Mobius Magnetic Monopole (MMM) into a two-component magnetic dipole (MMD) is accompanied by the first doubling of the InfoGenome. The formation of coupled Magnetic Dipoles is accompanied by the second doubling of the InfoGenome. The subsequent doubling of the InfoGenome already leads to the Periodic Table of Elements.

As can be seen, the stepwise nature of the geometric transformations of the Magnetic Monopole, illustrated by the phases of fibrations, gives a geometric display of the descriptive paradigm of doubling spinors in quantum mechanics, the citation of which is given above.

The **geometric solution** based on the phases of the fibrations of the Mobius strip (magnetic ring-monopole) clearly illustrates the "ambiguity that defies classical description" designated by W. Pauli, or, in other words, duality, which in the universal method of copying through bifurcation is transmitted to its copy and the structure is doubled. That is, through the bifurcation of the Magnetic Monopole with the doubling of its InfoGenome, there is a stepwise generation of matter from within with the formation of new symmetries and asymmetries. The formation of atomic elements of the first two periods is clearly presented in [8]. And it is precisely **on the method of bifurcation/fibration that the process of charge quantization and its multiplicity to the minimum is based**.

Taking into account the above, it can be seen that the single minimum charge (inversion) is copied in the progressive process of fibration during the formation of dipoles in the act of polarization of a magnetic monopole, is transferred to each of the dipole arms and never changes.

The **charge** is mediated by a 180-degree inversion in the closure of the polarities of the magnetic loop into one topology, which preserves this size of the turn during self-copying and it is not broken down into smaller components. This is the **meaning of the topological invariant of the concept of "charge".**

Here it is necessary to especially emphasize the indisputable fact that the multiplicity of the minimum charge is formed due to the growth of the structure from within by the method of fibration/bifurcation through the stepwise doubling of monopole InfoGenome, that is, due to the multiplication of the original in the method of self-copying, and not due to the fragmentation of something original to the minimum which may also suggest further continuation of division.

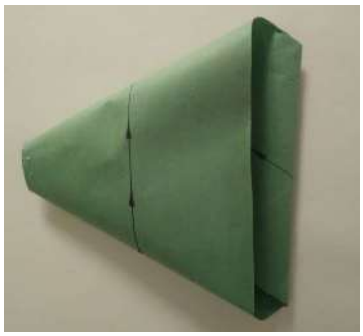
It is precisely the representation of elementary particles and, accordingly, the minimum charge as a result of fragmentation that gives rise to the division of the minimum charge into three quarks in the current views of the Standard Model.

In turn, the proposed geometric visualization clearly demonstrates that if the quantization of charges and their multiplicity to the minimum is mediated by the fact of the presence of a natural magnetic monopole, then in Nature there is no charge fractional to the minimum. All baryon matter is an act of polarization of etheric matter, passing from a state of monopolarity to a state of bipolarity. Etheric matter is monopole elementals as a seed, on the basis of which stepwise geometric transformations and the generation of baryon matter occur.

Hence the following conclusion: the representation of quark charges as 1/3 of the minimum is a weak philosophy and an erroneous judgment. Such a judgment can take place in the presence of a paradigm of infinite division of matter into smaller particles and the logic associated with such a representation.

The proposed approach to the ontologies of the complementarity principle and its geometric analogue – the Mobius strip – can also answer the question of what physical essence is taken for quarks in the current paradigm of particles. Works [6] [8] include coverage of these issues.

The following answer will be brief. The Mobius strip with a minimum aspect ratio (magnetic monopole) is laid out in three equilateral triangles that have vector potentials of different directions. These triangular areas are Möbius turns of the plane with a change in the sign of the mirror plane (according to P.A. Florensky). Each arm of the Magnetic Dipole obtained from the monopole contains an inversion and both arms can be represented in the version of a separate original Mobius ring. A double Mobius pseudo ring displaying a "neutron" is also.


Hypothetical quarks, which are not observed in nature in an isolated state, may be nothing more than a convenient theoretical abstraction, which in some approximation may correspond to the real natural structure and be described using the apparatus of algebra as particles. Most likely, what is taken for the permanently bound state of quarks, i.e. their confinement, is the result of alternating spin (spinor) vortex self-motions in the internal space of a magnetic ring on the geometry of the Mobius strip, which can be conditionally divided into

three geometric triangular spaces that perform spinor turns relative to each other, which lead to the loss and introduction of energy, i.e. to the emission and absorption of magneto-plasma.

CONCLUSION.

From all of the above, it is concluded that the **discreteness** of the emission and absorption of quanta is mediated by the geometry of the Mobius ring in the state of a monopole and dipole. The **quantization of charges** and the **multiplicity of charges to the minimum** are due to the method of bifurcation/fibration of the Magnetic Monopole in the act of its polarization and geometric transformation into a Magnetic Dipole with the actualization of the external magnetic field and polarities, gravitational interrelation, the property of charge and mass, as well as the further growth of system formation in the process of self-copying with the actualization of the link interrelation (quantum entanglement).

The **fibration phases** show that the **quantization of charges** is directly related to the parameters of the magnetic monopole in the geometry of the Mobius strip and the process of its bifurcation, in which the growth of the structure and copying of the basic properties occur. In the copying method, the minimum charge is transferred to each dipole arm, receiving a conditional opposite sign in accordance with the spiralization of the dipole components relative to each other. It is also shown that in the dipole components the opposite sign of the charge is nothing more than a **topological flip**, and the charge itself is a **topological invariant**.

Also, a very important conclusion is that the proposed approach to explaining the multiplicity based on the magnetic monopole fibrations in the Mobius strip execution excludes the version of further charge fragmentation, as is observed in the approaches of the Standard Model regarding the proposed structure of nucleons (proton and neutron) based on quarks, when each of the nucleons is assumed to consist of three quarks with charges fractional in the amount of 1/3 of the known minimum.

As demonstrated, the geometric solution to this issue turns out to be quite simple and elegant.

Practice shows that the current particle paradigm is unable to provide clear answers to many questions concerning the phenomena of quantum physics and atomic structure.

We can only state the fact that theoretical approaches based on particles were a certain stage of knowledge, which gave rise to the corresponding theories. Many of them are wonderful brainchildren of the mathematical apparatus of algebra and contribute to its effective development, to some extent moving away from the description of reality. But this is the path that has been laid out so. And a **crisis situation** is a good chance to start thinking differently, rather than sticking to established views as dogmas. This is precisely what Nobel laureate and Breakthrough Prize laureate in physics G. 't Hooft emphasizes in his interview with ***Scientific American*** in **April 2025**. [18]

G't Hooft believes that «The real challenge is not in answering old questions but rather in finding new, better questions for whatever problem you're addressing.

If you believe right from the beginning that quantum mechanics is a theory that gives you only statistical answers and never anything better than that, then I think you're on the wrong track. And people refuse to drop the idea that quantum mechanics is some strange kind of supernatural feature of the particles that we will never understand. No! We will understand, but we need to step backward first, and that's always my message in science in general: before you

understand something, just take a few steps back. Maybe you have to make a big march back, all the way back to the beginning». [18]

In the article "***March-throw to the beginning of quantum mechanics***" [24] I highlighted a number of aspects of quantum mechanics that need to be returned to, and proposed new approaches to revising previous views.

And then, this does not mean at all that the previously chosen path of unifying the Theory of Relativity and Quantum Mechanics is the only possible one for achieving the cherished goal of constructing the Theory of Everything, which must first of all be ontological. Both theories can be a preamble to another new fundamental theory, the emergence of which simply must be assumed according to common sense, since knowledge is not revealed immediately in its entirety, but presupposes an algorithm of unfolding in time and the stepwise nature of cognition.

«The point is, however, that if gravity really corresponds to the curvature of space and time, as we must conclude from the successes of Einstein's theory of General Relativity, then Quantum Mechanics predicts quantum fluctuations in this curvature that, at the tiniest distance scales, grow out of control. This means that either gravity theory, or Quantum Mechanics, or both, must be replaced by some superior paradigm... Whatever paradigm this would be, it is likely to entirely reform our understanding of the fundamental interactions, answering all our present questions at one stroke». [19]

The latest survey in the journal ***NATURE,*** published on July 30, 2025, found the following:

«Physicists disagree wildly on what quantum mechanics says about reality. First major attempt to chart researchers' views finds interpretations in conflict». [25]

It should be assumed that this survey will be the starting point for a meaningful and radical revision of the basic tenets of quantum mechanics and its reformatting within the framework of the general universalism of the unified laws of Nature.

"Respondents differed radically on whether the wave function represents something real (36%) or is simply a useful tool (47%) or something that describes subjective beliefs about experimental outcomes (8%). This suggests that there is a significant divide between researchers who hold 'realist' views, which project equations onto the real world, and those with 'epistemic' ones, which say that quantum physics is concerned only with information." [25]

"Over the past century, researchers have proposed many ways to interpret the reality behind the mathematics of quantum mechanics that seem to produce startling paradoxes. In quantum theory, the behavior of an object is characterized by its wave function: a mathematical expression calculated using an equation developed by the German physicist Erwin Schrödinger in 1926. The wave function describes the quantum state and its evolution as clouds of probabilities." [25]

That is, "researchers still disagree on how best to describe the physical reality underlying these mathematical formulas." [25]

On this matter, the following can be said. It is an undeniable fact that at the time of the birth of quantum physics, its founders received a number of insights mainly in the language of algebra and without any vivid figurative ideas. This elevated quantum mechanics to the rank of a seemingly mystical science. This mysticism was well fed by the approach that existed at that time to the atomic structure and to various kinds of discrete radiation phenomena, elevated to the status of particles, which they are not. It was precisely the assignment of particle properties to quantum radiation and vice versa – the assignment of the properties of quantum radiation to

particles, that gave rise to the scientific mysticism regarding quantum science, due to which quantum physics fell out of the category of classical laws.

This raises the question of “how best to describe the physical reality underlying these mathematical formulas.” To describe reality, it is necessary to take a step back and put everything in its places, which will allow us to understand to what extent what the formulas describe corresponds to actual reality and how to represent it.

Questions. Isn't it paradoxical that the fathers of quantum physics, from the moment of its inception, created equations without a figurative representation of them, and, a century later, their followers, raised on these equations, continue to torture "Schrödinger's cat" and select an appropriate description of reality for it, making attempts to interpret it??? Isn't this one of the main problems of quantum physics, namely, trying to interpret reality under the created equation? Or is it simply necessary to classify questions and equations into those that correspond to the category of radiations subject to wave equations, and those that correspond to the category of particles and to which these equations are not applicable?

Doesn't there arise an urgent need here to **ask new questions** that concern, first of all, general philosophical views on the world in its integral unity and with its unified classical laws, to distinguish between the understanding of the phenomenon and its essence, and only then to deal with the state of the "**cat**" as part of the physical world, not forgetting that the "**cat**", even if the experiment is mental, is baryonic matter in biological form, and the quantum world is the world of radiations emanating from each baryonic atom of the "cat" and Quantum Medium. This is the difference, as discussed above and shown in [4][5][6][13].

Perhaps G. 't Hooft expressed very accurately the idea that "«**the real challenge is not in answering old questions but rather in finding new, better questions for whatever problem you’re addressing.**" [18]

Perhaps ***NATURE*** survey will be a starting point for revising the understanding of quantum mechanics and possible reformatting of its theoretical basis within the framework of the general universalism of the unified laws of Nature. The reality we observe originates in the quantum sub-micro-world, which is not an exception to the general rules of Nature. And the way the quantum world is described at the current stage using mathematical formalism does not mean that this description can create a specific idea of the quantum world, since quantum physics initially began to develop on the basis of those ideas about the micro-world of matter that took place during the period of the beginning of the development of QM, as well as in the complete absence of clarity, that is, figurative representation.

This is where the cause of all the problems lies, since historically the quantum world of discrete radiation was accepted by physicists as the world of elementary particles and then all the costs of this philosophy followed. The philosophical underpinnings of the Copenhagen interpretation are so well established that many adherents "just drink the soft drink of Copenhagen philosophy without really understanding what it is," says Robert Spekkens, who studies the foundations of quantum mechanics at the Perimeter Institute for Theoretical Physics in Waterloo, Canada. [25]

LIST OF REFFERENCES.

1. Dirac, Paul (1931). "Quantised Singularities in the Electromagnetic Field". Proceedings of the Royal Society A. 133 (821). London: 60. Bibcode:1931RSPSA.133...60D. doi:10.1098/rspa.1931.0130.

2. П.А.М. Дирак, магнитный монополь, https://www.booksite.ru/fulltext/1/001/008/072/405.htm

3. 't Hooft, G. (1974). "Magnetic monopoles in unified gauge theories" (PDF). Nuclear Physics B. **79** (2): 276–284. Bibcode:1974NuPhB..79..276T. doi:10.1016/0550-3213(74)90486-6. hdl:1874/4686.

4. Polyakov, A. M. (1974). "Particle Spectrum in the Quantum Field Theory" (PDF). JETP Letters. ***20*** *(6): 194–195.* ISSN 0370-274X.

5. Antoniya Ilyinskaya (Kulak L.A.) «Substance. Atom. The Theory of Everything», monograph, Altaspera Publishing & Literary Agency, Toronto, Canada, January 2020 https://www.lulu.com/en/en/shop/antoniya-ilyinskaya/substance-atom-theory-of-everything/paperback/product-124rw8wr.html?page=1&pageSize=4

6. Kulak L.A., 1. Quantum medium. Möbius geometry. Magnetic monopoles // «Академия Тринитаризма», М., Эл № 77-6567, публ.29420, 27.03.2025 https://www.trinitas.ru/rus/doc/0016/001k/00165814.htm

7. Kulak L.A., 2. Quantum entaglement. Möbius geometry. The "yin-yang" symble. Phases of fibration // «Академия Тринитаризма», М., Эл № 77-6567, публ.29435, 03.04.2025 https://www.trinitas.ru/rus/doc/0016/001k/00165821.htm

8. Kulak L.A., 3. Basic element of nature. Möbius geometry. Gravity. Model of atom // «Академия Тринитаризма», М., Эл № 77-6567, публ.29446,12.04.2025 https://www.trinitas.ru/rus/doc/0016/001k/00165828.htm

9. Kulak L.A., 4. Hydromagnetic dynamo. Möbius geometry. Method of formation of atoms // «Академия Тринитаризма», М., Эл № 77-6567, публ.29464, 23.04.2025 https://www.trinitas.ru/rus/doc/0016/001k/00165837.htm

10. Kulak L.A., «Clifford parallels. Gravitation. Atom», // «Академия Тринитаризма», М., Эл № 77-6567, публ.28464, 13.05.2023 http://www.trinitas.ru/rus/doc/0016/001h/00165322.htm

11. Javier Tello Marmolejo, Mitzi Urquiza-González, Oscar Isaksson, Andreas Johansson, Ricardo Méndez-Fragoso & Dag Hanstorp «Visualizing the electron`s quantization with a ruler», *Scientific Reports* **volume 11**, Article number: 10703 (2021), 25 May 2021 https://www.nature.com/articles/s41598-021-89714-2

12. «Астрономия, алгебра, геометрия, физика». Сайт Кирсанова Александра с лекциями по теоретической физике, астрономии, линейной алгебре, топологии и геометрии. 1.3 Квантование зарядов. alexandr4784.narod.ru

13. «An Introduction to Stellarators», https://suli.pppl.gov/2023/course/SULI_Paul_2023_Stellarators.pdf

14. https://physicsworld.com/a/how-to-twist-light-into-a-mbius-strip

15. Гейзенберг В. Философские взгляды Вольфганга Паули // Шаги за горизонт. М.: Прогресс, 1987. С. 283–289.

16. Гейзенберг В. Физика и философия. Часть и целое. М.: Наука, 1990.

17. Vadim Varlamov, «О соединении материи и формы: теоретико-групповой подход» December 2023, Metaphysics 50(4):41-59 https://www.researchgate.net/publication/378156383_O_SOEDINENII_MATERII_I_FORMY_TEORETIKO-GRUPPOVOJ_PODHOD

18. «Quantum Physics Is on the Wrong Track, Says Breakthrough Prize Winner Gerard 't Hooft», Sientific American, April 8, 2025 https://www.scientificamerican.com/article/breakthrough-prize-winner-gerard-t-hooft-says-quantum-mechanics-is-nonsense/

19. Gerardus 't Hooft, Biographical. https://www.nobelprize.org/prizes/physics/1999/thooft/biographical/

20. Stuart Clark, «Our Magnetic Universe: The forgotten force that sculpts the cosmos», New Scientist, October 8-14, 2022. Pp. 34-37

21. Frank Wilczek. «The Lightness of Being: Mass, Ether, and the Unification of Forces». Basic Books, 2008.

22. Татур В.Ю., О Всеобщем Бытия // «Академия Тринитаризма», М., Эл № 77-6567, публ.14126, 05.01.2007 http://www.trinitas.ru/rus/doc/0202/010a/02021109.htm

23. Рубашкин В.Ш. «Физика частиц – логико-философский комментарий», http://vphil.ru/index.php?option=com_content&task=view&id=1161&Itemid=52

24. Кулак Л.А., Марш-бросок в начало квантовой механики // «Академия Тринитаризма», М., Эл № 77-6567, публ.29621, 12.08.2025 https://www.trinitas.ru/rus/doc/0016/001k/00165926.htm

25. Elizabeth Gibney, «Physicists disagree wildly on what quantum mechanics says about reality, *Nature* survey shows, First major attempt to chart researchers' views finds interpretations in conflict», ***NEWS FEATURE*** Published 30 July 2025 https://www.nature.com/articles/d41586-025-02342-y