Introduction

Development of representations about world around

Bases of modern representations about the world have created Galileo Galiley (1564-1642). Its works have defined a victory of heliocentric system of the world. Its contribution to mechanics is especially significant: the law of inertia, the law of addition of movements, a principle of a relativity of movement, etc. Galileo has struck Aristotle to dogmatic representations about absolutely easy bodies (fire, air). In a number of witty experiences it has shown, that air — a heavy body. It even has defined its relative density in relation to water.

Basis of outlook Galilee is recognition of existence of the world outside of and irrespective of human consciousness. It considered that the world is infinite, and the matter is eternal. In all processes occurring in the nature, nothing is destroyed and not generated — there is only a change of a relative positioning of bodies or their parts. The matter consists of absolutely indivisible atoms, its movement — unique, universal mechanical moving. Heavenly bodies are similar to the Earth and submit to uniform laws of mechanics. All in the nature is subordinated strict mechanical causality.

The original purpose of science Galileo saw in search of the reasons of the phenomena. The knowledge of internal necessity of the phenomena is the maximum step of knowledge. As a starting point of knowledge of nature Galileo considered supervision, and a basis of a science — experience. It rejected attempts схоластов to extract true from comparison of texts of the recognized authorities and by the abstract philosophizing's. Galileo approved, that a problem of the scientist — "…*To study the great book of the nature, that also is the present subject of philosophy"*. Those who blindly held the opinion authorities, not wishing independently to study natural phenomena, Galileo named "*Obsequious minds*", considered their unworthy a rank of the philosopher and branded as "*Doctors of cramming*". Per 1737 ashes Galilee has been transferred to Florence and burying near to Michelangelo.

From times Galilee development of physics occurs in the form of constant change of epoch of absolute rationalism and an absolute formalism. The period up to 1740 hundred years was the period of full domination of supporters of the doctrine Reno (1596-1650) about the vortical nature of a matter. In particular, in 1690 Huygens has published the treatise about light, constructed on a hypothesis of a vortical ether. I.Bernulli, its son D.Bernulli, Maclaurin, Euler, Biot, Maupertuis, Leibniz were supporters близкодействия through a vortical ether. R.Descartes and Huygens have theoretically ground and have given clearness to discoveries Galilee.

The next hundred years have passed in an atmosphere of physics of Newton (1643-1727). Already in "Beginnings" (1687) Newton departs from Descartes hypotheses of an ether. It enters the First Law contradicting it:

"*Any body continues to be kept in the condition of rest or uniform and rectilinear movement, while and as it is not compelled the enclosed forces change this condition*".

In proceedings of that time before to do mathematical calculations, it was necessary to state and prove precisely and clearly initial principles as it did, for example, Descartes. But Newton has not considered necessary to explain the mechanism of this law the hypothesis, through existing representations. Remains not clear, how "*Are forced*" To change of movement the bodies which are being widely spaced. The reasons of the most inertial movement have not been found out. Newton has not offered the model explaining the nature "inertial" and "gravitational" masses of all known substances. For comparison we shall result the formulation of the law of inertia Galilee, published in 1638:

"Any physical body which is based or moving in the physical environment with constant speed rectilinearly or on a circle around of the center of inertia will continue this movement eternally if other physical bodies or environment will not render resistance to this movement. Such movement is movement by inertia".

Absolutely unreasonable was at Newton and the law of gravitation which it borrowed at Hooke. In "Beginnings" it diligently avoids a question on the reasons of gravitation, simply stepping through this explanation. That Newton put the physics outside of the standard physics of that time, outside of a science. Too its style, a method and demonstrative schemes were alien to much. It was difficult to that generation to refuse common sense and to accept the Newton theory of long-range action where transfer of forces and movements speaks «divine will».

Though Newton was dialectics, but its followers have transformed his relative formalism in absolute. A boundary of change of epoch became work Sigorn "the Physical and mathematical proof of impossibility and insufficiency of whirlwinds" (1740). "*Since then*, — the historian of a science Rosenberg speaks,— *Descartesical was as though it is eradicated from ground natural sciences. It has become, as earlier a word scholasticism, the general concept of all bad, an essential designation of all science barrenness, a frightening example of fantastic philosophizing, scare, which greater and small children of a science are frighten"*. All physical representations, certainly, have remained, but more often in the form of names to the unknown reasons. Adherents of "the pure description" "hypotheses did not invent". However the mathematical analysis of the phenomena during this period has reached rather big height. It is enough to mention "the Analytical mechanics" Lagrange (1788).

The epoch of a descriptive formalism again proceeded almost hundred years. But process of a science has revived картезианство in even greater shine, than earlier. The society needed new ideas, and formalists give them essentially could not. As often happens, forces of progressive scientific movement have arisen in the beginning not in the official scientific environment. Physician Jung (1773-1824) and the engineer of means of communication Fresnel (1788-1827) became founders of wave optics in the beginning of XIX century. They have explained the phenomena of diffraction and an interference on the basis of mechanical representations about an ether.

For the future works of M. Faraday (1791-1867) had the greatest value. The son of the smith who has learnt on the bookbinder, it became the founder of the doctrine about an electromagnetic floor, has opened laws of an electromagnetic induction and laws электролиза. It has entered representation about power lines, has opened the phenomena of Para magnetism and diamagnetism, has established rotation of a plane of polarization of light in a magnetic field. It in 1832 has stated an idea that distribution of electromagnetic interactions is the wave process occurring to final speed.

Michael Faraday did not accept idea of action of forces in an electric floor on distance. It trusted in continuous communication between cooperating bodies. Particles, approved Faraday, are connected by plaits — charging tubes. In the beginning of each tube there is unit of a positive charge, and in the end — unit of a negative charge. Movement charging трубок causes magnetic force.

A.G.Stoletov wrote: «*Never since times Galileo the worldhave not seen such the amazing and various opening which have left one head*». However during lifetime of the scientist official academicians did not recognize «plebeian imaginations of "this" laboratory watchman and the half-educated person».

Final turn to rational materialism in a physical science occurs in 1858 .когда there was work Helmholtz (1821-1894) « About the integrals of the equations of hydrodynamics corresponding vortical

movements «. Work Helmholtz was preceded with development of the vortical theory of a matter in works of a lot of the largest scientists: Navire (1785-1836), Cauchy (1789-1857), Poisson (1781-1870), Hamilton (1805-1865), Stokes (1819-1903), McCulloch (1809-1847.) Helmholtz has proved, that circulation of speed of a liquid along some contour is constant, if operating forces have potential. It concerns and to the electrostatic phenomena. Meanwhile, besides forces of friction, all electrodynamics contains the forces which are not having potential. In electrodynamics we deal with constant occurrence and destruction of electromagnetic whirlwinds. Itself Helmholtz in work "About break movement of liquids" considers the phenomena of impact and "relative breakness" (quantization) as conditions of default of the theorem of preservation of whirlwinds.

Navier considered ether as the incompressible liquid possessing viscosity. Viscosity of ether was considered by it as the reason of interactions between particles of substance and ether, and also between ether and particles of substance. Cauchy considered ether as the continuous environment and operated with pressure and deformations in each point of space. In works on optics Cauchy has given mathematical development of theory Fresnel and theories of dispersion. In the further it was found out, that the given explanation leads actually to interpretation of a magnetic field as moving of particles of ether that contradicted the fact of existence insulator displacement. In the works Cauchy started with the assumption of a constancy of density of ether in all environments. Considering ether as the elastic environment, Cauchy analyzed processes of polarization of light. Green considered ether as the continuous elastic environment. Proceeding from the law of the conservation of energy applied to the deformed elastic body, it has considered reflection and refraction of light in crystal environments.

In the listed mechanical models the nature of ether and the reason of that the ether behaves as an elastic body, were not found out. Geometrical research of a surface of a light wave is carried out mathematical works of McCulloch. The continuous ether was considered as environment in which potential function is square-law function of corners of rotation. Though the theory the McCulloch is the theory of the elastic environment, and about any electromagnetism in it is not present the words received by it of the equation, in essence, coincide with the equations of electromagnetic theory Maxwella. Comparison with other theories of an elastic ether shows, that essential positive feature of the theory of McCulloch consists available concepts of vortical movement. The McCulloch theory is a vortical theory of ether.

However, first of all, at an estimation of the contribution to the theory of ether it is necessary to name names of Thomson-Kelvin and J. J. Thomson. They unite a field, a matter and an electricity in a single whole indissolubly connected with each other on the basis of the vortical theory. In the book "About vortical movement" (1869) Thomson-Kelvin marks that "*Mathematical problem of this work — to illustrate a hypothesis that the space is continuously filled by an incompressible liquid without friction on which no external forces operate and that the material phenomena of any sort depend exclusively on movement in this liquid*". In 1883 Thomson has published the fundamental treatise under the theory of whirlwinds «On the motion of vortex rings». Thomson's general problem is to define suitability of vortical hypotheses for construction of the absolute kinetic theory of a matter. It is interesting to note, that the most fascinating theory of fundamental particles now, the theory of strings, has the certain similarity with Thomson's vortical atoms. One of the basic objects of this theory - the closed string - a small loop which has the areas current around of it, remind of a whirlwind of a radio liquid in Thomson's atom.

In 1888 in work «About some appendices of dynamic principles to the physical phenomena « J. J. Thomson has made an attempt to construct adinamic mechanics. Its purpose — to reduce concept of potential energy to concept of kinetic energy of the expanded system, and any force to consider as acceleration, i.e. an increment of quantity of movement in unit of time. In the latent weights and

movements which form the mechanism of “potential forces” weights and movements of whirlwinds of surrounding space (“an ideal liquid”) are.

As to the major sciences about the nature — electromagnetism and optics they are completely obliged by the development to vortical representations about a structure of a matter. In 1856 Thomson has come to conclusion, that magnetic forces have vortical character. In 1858 Helmholtz has published the treatise about vortical movement. And further on the foreground figure J. Maxwell acts (1831-1879). Per 1861-62 there was a known model of electromagnetic field. The current in it is considered as progress, and display of magnetism — as rotary movement of mechanical ether. In 1864 there was «a Dynamic theory of an electromagnetic field». In it the electrodynamics model on the basis of consideration of movement of a vortical field is in detail discussed. In 1871 has appeared the well-known treatise « the Electricity and magnetism «. Having convinced earlier in complexity of rational interpretation of radio model of the electromagnetic phenomena, Maxwell has passed here to rather formal treatment of a question. In its work two basic laws of electric and magnetic action are generalized: the law of electromagnetic induction Фарадея and the law of Ampere for the magnetic forces caused by currents. Maxwell has theoretically shown an opportunity of existence of electromagnetic waves and pressure of light.

Revolutionary works of Maxwell long did not admit an official science. Considered, that its power lines is only mathematical lines. Spoke, that Maxwell equations are written by means of impact of the big finger (Poincare) almost the Lord the god (Boltzmann).

In 1887 of Hertz (1857-1894) has invented ways of reception and reception of electromagnetic waves. It has shown that these waves possess characteristic wave properties of reflection, refraction, an interference and polarization. It has continued theoretical works Maxwella. The hertz has given to Maxwell equations a modern kind. In 1889 of Hertz has published work « About the basic equations of electrodynamics of moving bodies «. In 1895 P.N.Lebedev (1866-1912) for the first time has received millimetric waves and has established their properties. In 1901 it for the first time has found out and has measured pressure of light upon a firm body, and in 1909 — on gases, having confirmed quantitatively Maxwell theory.

Among physicists H.A. Lorentz (1853-1928) used huge authority these years. It has created the classical electronic theory (microscopic electrodynamics) on the basis of Lorentz-Maxwell equations. These equations describe fields in any point of space (including internuclear and intratomic fields). Averaging of these equations leads to Maxwell equations. Lorentz adds to the equations expression for the force acting on a charge in an electromagnetic floor. Lorentz was widely known as the author of classical works on electrodynamics of moving environments. It has established validity of the Maxwell equations In all in regular intervals and rectilinearly moving systems of readout at the certain existential transformations from one inertial system of readout to another (Lorentz's transformations). For an explanation of negative results of experience of A.A. Michelson (1852-1931) which has been put in 1881, Lorentz has put forward the assumption of reduction of the longitudinal sizes of bodies in a direction of movement.

Thus, development of physics in XIX century has closely brought to creation of physical model of a matter on the basis of a vortical field. It was necessary to connect it to quantum mechanics which beginning Planck (1858-1947) has put M. In 1900 it has offered the formula for quantization of energy осциллятора: $E = h\nu$. In 1913 Niles Bohr (1885-1962) has put forward planetary model of atom on which the spectrum of radiation of atom of hydrogen has been calculated. It is classical model in the basis considered a proton and электрон as material points between which forces of an attraction operate. Электроны atoms in model rotated around of a kernel as planets rotate around of the Sun. Quantum

effects did not speak, and were postulated. The model as a whole mismatched the quantum mechanics. In it there was no, for example, a place электронам in a s-condition, i.e. not having the orbital moment, though their existence — the skilled fact. In model of the Niles Bohr there was no evident physical representation of interaction of planetary atom with other objects. There was no explanation of the mechanism of absorption and emission of photons. It was not clear, how rotating on orbit electrons can keep atoms in a molecule.

The model of the Niles Bohr was last large model of a passing epoch of rational materialism in the physicist. There came the next centenary idealistic period of formalism when "nuki" it is possible to explain any "tuki". It has begun under influence of philosophical principles of E. Mach (1838-1916). Mach has refused from Newton representations about absolute space, time and movement, and also concept of mass as measures of quantity of substance. "*The world is only a complex of sensations*" — he approved. The problem of a science is to describe these sensations from a position of the observer. Only relative movements, time intervals, speeds and accelerations are experimentally observable. Hence, Mach approved, movements of bodies (accelerated too) can be certain only in relation to other bodies. "The physical idealism" of Mach ("the Matter disappears, — there are only equations") has played the important role in outlooks of physicists XX century.

In 1905 A. Einstein (1879-1955) has published paper about the special theory of relativity. In it two postulates were entered: independence of speed of light from speed of a source and equality of all inertial systems (a principle of relativity). On the base of the last postulate and the formalism of Maxwell equations, A. Einstein comes to conclusion, that Newton conceptions of absolute space and absolute time, and, hence, concept of an ether become empty. Affirmed, that for distribution of electromagnetic waves light environment is not so necessary. The noun to a word "to oscillate" has been thrown out. According to ideas of Mach absence of that we do not feel was postulated. "*Unless the Moon is existed when I do not look at it?"* — Einstein asked.

In 1910 Einstein wrote the paper "The Principles of relativity and its consequence". He approved that "*It is impossible to create the satisfactory theory, not having refused from existence of the certain environment filling all space*". Later in works "the Field and the theory of a relativity" (1920) and "About a field" (1924) Einstein has changed the point of view concerning existence of an ether, however this circumstance is little-known and has not affected the attitude to an ether from the majority of physicists-theorists.

The statement about proportionality of weight of a body of its energy also has not been supported by physical model as it has made Дж. Дж. Thomson in 1903 for the connected weight of a field. In the further questions of the accelerated movement and gravitation became a subject of the general theory of relativity. Trying to coordinate a principle of equivalence with invariance of a four-dimensional interval, Einstein has come to idea of dependence of geometry of space-time from a matter. That had been gave the status of physical object to four-dimensional space-time Minkovskiy.

In A. Einstein's later works many times explained the position in relation to ether. It emphasized, that it has excluded from examination only "Absolutely based space", having attributed space-time property of the physical environment: duration and extent. Thus properties physical space-time and ether appear identical owing to what it is possible to refuse introduction of the term "ether" as excessive. A. Einstein has devoted last 40 years of the life to search of the theory of a uniform field. He wrote:

"...*Physical space and a field are only various expressions for the same things*...".

"I*t is possible to tell, that the general theory of a relativity above allots the space by the physical properties; thus, in this sense the ether (field) exists*..".

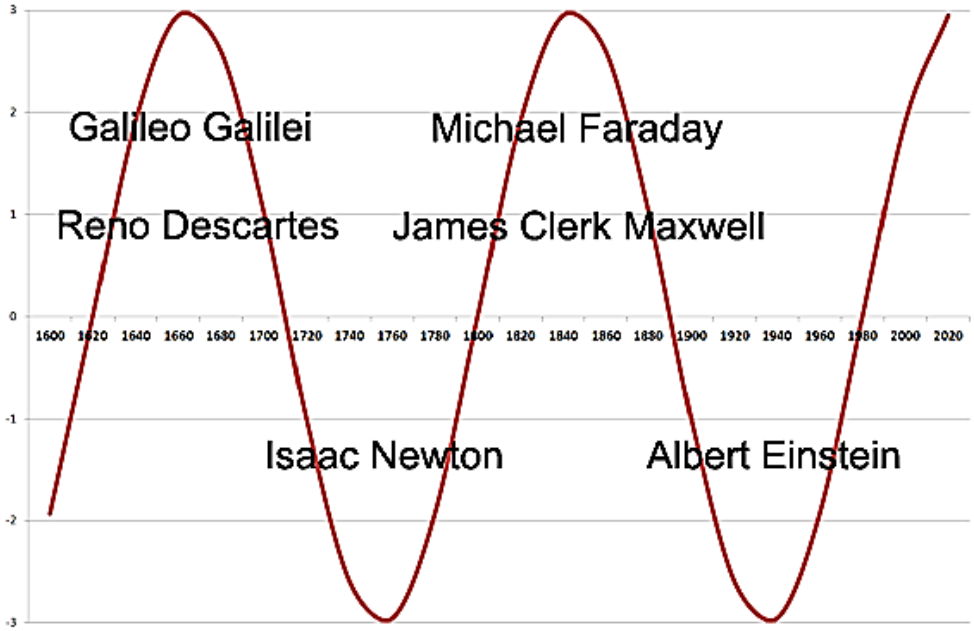
"*This rigid 4-space of the special theory relativity there is to some extent an analogue motionless 3D G.A.Lorents...'s fields... Thus, Descartes was not so is far from true, when believed, that existence of empty space should be refused*".

"*... Elementary particles of a matter by the nature represent not that other, as condensations of an electromagnetic field...*".

To A. Einstein's honor, he was to the end of a life doubted of correctness of the ideas. Here that it wrote on a slope of years: "*It seems to them, that I in silent satisfactory look at results of my life. But close all looks absolutely differently. There is no one concerning which I would be assured, that it remains firm, and I am not convinced, whether I am in general on a correct way*".

Einstein's followers have finished its relative formalism to inadmissible extreme measures. Essence have replaced with number — so easier! Again for hundred years domination of formalistic methods was established. Mathematical models were simply adjusted to experimental results. Only singles-enthusiasts continued to build vortical models of a field. Among them Z.A.Tsejtlin, V.F.Mitkevich, V.A.Atsjukovsky, etc are.

In figure the sine wave curve of change of the periods is. Absolute rational-physical and absolute formal-mathematical methods of the description of world around for last 400 years are shown. Half cycle length of 90 years.



In especially formal channel the quantum mechanics developed. From which the ether has been expelled also and is replaced by «virtual particles» being in a likelihood condition. It has been declared, that classical concepts are not valid at the quantum approach, wreck of habitual foundations is the usual phenomenon, and objects of a microcosm to present it is evidently impossible. To put it briefly, the quantum physics is the special world of the illusions accessible only devoted.

Certainly, for such approach there were strong reasons. Attempts of modeling an electron as a small hard indivisible ball of finite sizes did not succeed either. Electron's sizes were determined on the basis of electromagnetic origin of its mass:

$$r_e = \frac{e^2}{mc^2} = 2{,}8 \cdot 10^{-15} \text{ м}$$

If we suppose that the value of electron impulse proper moment equal to h/2, then the speed of electron rotation around its axis in the equator $v = r_e\omega$ can be found:

where $\alpha = e^2/hc = 1/137$.

$$\frac{h}{2} = \frac{2}{5} m r_e^2 \omega = \frac{2}{5} m r_e v, \quad v = \frac{5}{4}\frac{c}{\alpha} \approx 170 \cdot c,$$

In order to get an experimental value of the proper moment, an electron must rotate around its axis so fast that the linear speed in the equator should be 170 times as large as the speed of light.

Models in the micro world of physics were rejected which reminds of refusal from green grapes by the fox from a fable. For several decades a phenomenological, abstract formal-mathematical method of describing physical phenomena had predominated. It was considered indecent dilettantism to speak about the essence and mechanism of micro world processes.

Classical physics broke its teeth when dealing with an electron model. But the answers to the questions of the nature of things were not given by quantum mechanics either: it is quite obvious that to attach a charge to a wave packet is much more difficult than to a ball. It appeared that mathematics did not help either — Schrödinger's equation does not take at all such a fundamental property of electron as spin, other wave characteristics require special interpretation. In fact the phase speed of spreading de Broil's wave is much greater than the light speed, other characteristics — the wave length, frequency and phase — bear no relation to physical characteristics. The amplitude of wave function cannot be determinate from Schrödinger's equation. It can be calculated from the conditions of normalization, which does not have any relation to wave description: $|\psi_n|^2$ is determined as density of calculus of probability of distributing an object characterized by state ψ_n in space (energy E_n, impulse moment M^2 and moment projection M_z for some direction).

The wave function does not allow in the main to determine a trajectory of particle movement, on which at any moment of time coordinates and a particle impulse could be known with any possible accuracy. However the quantum mechanics the accuracy of determining the mean values of impulse and coordinates are linked by Heisenberg's correlation) $\Delta p_x^2 \Delta x^2 >= h^2/4$ and cannot be determined accurately together. Particles are spread all over the space. That is why they say about probability of finding a particle in the given state in the given area.

Thus, quantum mechanics took only the part of kinematics and refused in the main modeling and searching for the causes of physical phenomena. The similar situation is with quantum electrodynamics and nuclear physics. Much phenomenological regularity of electromagnetic phenomena and nuclear interaction have been found and calculated. This allowed making a rapid leap in the scientific-technological progress for a shot period. But then it becomes necessary to penetrate into the innards structure of physical processes being described.

At present even specific terminology cannot be applied properly and definitely which leads to ambiguous interpretation: a substance is a matter, and electromagnetic field is a "specific" kind of matter. Does it mean that the matter is double-faced? The same strange things can be found in relation to ether: the ether does not exist and cannot exist, but there is a "physical vacuum" that possesses such properties and energetic that the ether would burst with envy if it existed.

Let us look from this angle at electromagnetic wave: on the one hand, they are defined as interdependent fluctuations of electric and magnetic fields, on the other hand — as a stream of photons. However, an electric field is induced by an electric charge, whereas a magnetic field is induced when a charge is in the state of motion. The fact that photons have no change means that there is neither electric no magnetic field — then what is there that could be fluctuating? Electromagnetic fluctuations spread in vacuum, i.e. in space where there is nothing but a field. However, on the other hand, an electromagnetic field is a stream of photons, hence; an absolute vacuum is filled with photons. Can it be so?

Another question can arise. How can spherical-symmetric electric field of an atom nucleus become saturated while electrons rotate? It is known that the Earth rotation round the Sun does not prevent Mars gravitation to the Sun. However, in a hydrogen atom rotation of an electron round the nucleus fully stops the effect of the field at any distances and in any states of an electron. Why can't several electrons rotate round a proton?

Doesn't the explanation of the fact that nucleons in the nucleus are attracted owing to the exchange interaction seem to be far-fetched: if one proton emits something and another absorbs that something, why are they nevertheless attracted?

It is considered that elementary particles are pointed and structure less. However, they have a mass, change, spin and magnetic moment. Common sense makes us believe that "an electron is inexhaustible as an atom".

It is difficult to understand, but physics does not deal with "things" and matter any more. Gravitation is no longer an inseparable, primordial attribute of matter, — now it only presents the result of a definite type of its motion. And the motion itself was reduced to distortion of space and change of time — these are categories that are philosophic rather than physical. Up to now the field remains an unknowable thing in itself. "Virtual" particles and "virtual" vacuum appeared. It seems that all physics in its basis became virtual.

Now they speak of transportation of protons without having any idea of what a photon is. We speak of "strong" and "weak interactions", of "nuclear" forces and "not say everything": are these mechanical forces or forces of unknown nature? And by the way, one lows and regularities in micro- and macro world are the same or different?

Nature is common for all real. They state, for example, that spin is a pure quantum phenomenon, which have no analogy in a macro world. But don't the Earth and the Sun have their own moment. They state that ratio of indetermination is valid only for a micro world. But even at small speeds in every given moment of time a body is and is not in the given point. It would be more correct to speak about interval, in which the body is. Questions like "What is the speed of the body in the given point?" or "What is the frequency of the swings of the pendulum at the given moment?" are incorrect. To determine the speed of the body it is necessary to watch its motion within distance Δs for time interval Δt. To determine the frequency of the pendulum it is also possible for some periods of its swings.

Laws of nature are not specific for some individual interval of energy, speed or some sizes of objects. The matter is that individual properties of objects or certain parameters become distinctly apparent within these intervals.

At present, in physics there is no model in which a clear idea of nature of the micro world was given. There is no answer to the basic questions of fundamental notions of physics either:

- What is a mass?
- What is gravitation?
- What is an electric field?
- What is a magnetic field?
- What are electromagnetic waves?
- What is the structure of elementary particles and photons?
- Where can ant substance are found?
- How do charges interact?
- How can quantization occur in the micro world?
- How can electrons interact with photons?

- What is strong interaction?
- What is the structure of an atom?
- What holds atoms inside molecules?
- What is the "dark energy"?
- What is the "dark matter"?
- How did the universe?

If one glances over the diversity of the surrounding world one cannot keep from noticing that stability of the Universe is based on dynamic equilibrium with object rotating. Stars in Galaxy are rotating in a spiral, planets are rotating round there axis and round the stars, electrons, atoms and molecules are also in the state of continuous rotation. It is natural to presuppose that formation of particles from the initial matter took place in the form of vortexes. Extending the idea, we are going to get answers to the majority of the questions asked. The present book does not contain any other propositions. The aim of the theoretical investigation is not carrying out revolution in physics, but searching for a physical sense and visual demonstration of the principal physical notions in the micro world. To stress that we interpret only generally accepted conventional notions, references in the book are made exclusively to the most famous manuals of physics, but not to original theoretical works.

The main idea of the present book is physical laws and the laws of conservation in particular, are the same for the macro and micro world. The law of conservation of energy provides eternal existence of matter. The law of conservation of impulse provides continuous motions of matter. The law of conservation of impulse moment provides stability of the structure of matter.

The given work is written with the purpose to show unity of a field, a matter and electricity. To show on model of development of the nature. We want to reveal structure of details of the universal machine, to state the simple, clear and distinct ideas accessible to common sense.

The centenary epoch of a formalism in the physicist has ended. New ideas which would provide progressive development for many years forward are necessary to us. To put forward them it is possible only, learning essence of a universe. This book is the answer to command of time. This book is not too original, it only in a small measure revives that have made great: Galileo Galilei, Reno Descartes, Huygens, Robert Guk, Isaac Newton, Thomas Jung, Ogjusten Jean Frenel, Jacob Bernulli, Lui Mary Anry Navire, Ogusten Lui Cauchy, Simeon Deny Poisson, William Rouan Gamilton, Georges Gabriel Stokes, Warren McCulloch, Michael Faraday, James Clerk Maxwell, G. G. Thomson, V. Thomson-Kelvin, Albert Einstein, Max Plank, Niles Bohr, Werner Heisenberg and many other things.