

PROBLEM OF THE PHYSICAL REALITY'S STRUCTURE IN MODERN PHILOSOPHY OF SCIENCE

Problem of the structure of physical reality in the context of the methodological and conceptual installations of contemporary philosophy of science. The nature of reality in the context of contemporary philosophy of science is explored. Author argues that the construction of a unified view of reality can be implemented in the proposed multidimensional holistic model of reality.

Keywords: physical reality, the structure of reality, a concept model, theoretical object.

The problem of reality as a scientific and philosophical problem arises in various modifications at different stages of the historical development of mankind. In our opinion, today we are not talking about the construction of any single theory but rather, it is required to reveal the set of meanings that the concept under consideration contains. The spectrum of reality in the historical context is diverse and often vague. In particular, it was not easy to accept a new view of reality for the physicists of the early twentieth century.

Philosophers and methodologists of science, giving the definition of the category "reality", meet with difficulties. Thus, in his preface to volume I "Ideas" Husserl wrote: "I would most willingly exclude the word "real" burdened with a heavy load, if only a suitable substitute for him had been presented" [4, p. 24]. This idea is supplemented by Roger Penrose, the author of the monograph "The path to reality": "In fact, you can ask: what is reality? This question was raised thousands of years ago, and over the centuries, people tried to answer it variously. Today, staggering back from the heights of modern science, we prefer to take a more unbiased position. Instead of trying to answer the question "what is it?", most of modern physicists try to get around it. These physicists claim that the question is incorrectly posed: one should not ask what reality is, but how it manifests itself" [9, p. 850]. First of all, the fact of coexistence within the framework of one and the same science of various descriptions needs to be clarified, that is, descriptions which seem not to meet with each other.

After all, with the help of differential and integral calculations in the form of mathematical formulas, mechanical, electrical, and optical phenomena can be presented. However, reducing them to a coherent cascade of formulas, into a single system is very problematic. The fields of physics turn out to be too autonomous. And now more and more unifying theories are being created. Today this is expressed in the desire to unite four fundamental interactions within the framework of the concept of super-integration. It was also found that physical vacuum as the basic concept of quantum field theory is not absolute nothing, empty space, but a state with significant physical qualities that manifest themselves in real physical processes. So, for example, if a certain energy is applied to a vacuum, then a photon will be born. The well-known native philosopher V. Nalimov introduces for the first time the concept of a semantic vacuum as an analog of a physical vacuum proceeding from the ontology of two realities – physical and psychic [8, p. 1-23]. Analyzing the current state of scientific ideas of physicists about matter formulated in the 20th century, the scientist simultaneously turns to the concepts and representations of ancient philosophical systems, comparing them with new scientific ideas.

The world arises simultaneously from two principles, which complement each other: elementary particles and fields of physical systems that are continual in nature [8, p. 30]. Physical quantities characterizing their state have a continuous distribution. The possibility of a single discrete wave description of the phenomena of the microworld is realized in quantum field theory by introducing a new concept – secondary quantization, which represents a special method for describing fields (systems with an infinite number of degrees of freedom) with the help of operators whose action determines the absorption or generation of quanta of the field. V. Nalimov

notes that our attempts to describe psychic phenomena in their deep understanding, connected with the appeal to the unconscious, look like modern concepts of quantum field theory. Discreteness and continuity are again not the same reasons for mental existence, but only different manifestations. Or, in other words, a person is one of the possible states of the semantic field.

It is important to pay attention to the fact that the semantic field, like the physical field, plays the role of the medium in which the interaction takes place. A person interacts with himself, V. Nalimov thinks, using discrete words or symbols. This process is carried out by generating words and (or symbols) and understanding them. In the language of physics, this sounds like the emission and absorption of quanta of the semantic field. The very possibility of particle interaction in quantum field theory is realized by absorption and generation of virtual particles, which follows from the Heisenberg uncertainty relation, which determines the blurriness of the state of the physical system. Something similar happens in the psychic reality: the semantic interaction of people, which is described by Nalimov with the help of a model based on the Bayes theorem, is possible only taking into account the blurriness of both the human psyche and the semantics of words and symbols [8, p. 61-62].

The development of science unexpectedly refined the rule of the unity of reality, taking into account the existence in it of separate (sharply differing in content and methods of studying phenomena) within which scientifically established facts are closed. These are the so-called "quantum steps" of Weisskopf [2, p. 46-53]. It is believed that in strictly defined energy ranges there are closed levels of structurally uniform phenomena separated from each other by energy thresholds, which form the energy hierarchical global structure of the Universe.

If now we go step by step down the quantum steps from the most known energy level down, "then the structure of the universe is revealed as a large integral dynamic metaphor: small substructures of matter do not participate in the energy exchange until the average energy reaches the level of quantum excitation" [6, p. 62].

According to the metaphorized ontology of the quantum ladder of the universe, the pyramid of physical theories itself undergoes a transformation. Because of the infinite variety of natural phenomena that are available for description by means of classical physics, we are moving towards mathematically abstract theories, which are phenomenologically not directly related to the sensory macrocosm.

The question that always worries natural scientists is how to represent reality at such high energy levels that an experimental confirmation will not be possible here. The image of a closed system of concepts indicates that each theory has a certain sphere of application preliminarily outlined by the main metaphors of reality when it is created and is constantly refined. It can be assumed that each theory has a closed, internally consistent system of abstractions that will forever remain true in a particular field of application. Moreover, the transition from one fundamental theory to another always creates a precedent for a strict correspondence between them, as a result of which a hierarchy of fundamental theories arises that is formed by "proto-physics" and by means of which the abstractions of theories "Higher level" indirectly, but still "rooted" in the reality of the observed natural phenomena [6, p. 67].

In the scientific literature, there is another variant of an attempt at a hermeneutic transition from the classical basis of "authentic reality" to the reality of higher-level theory, related to the principle of correspondence. As it is well known, N. Bohr formulated this principle purely physically for the first time. However, very soon the principle was given a general methodological meaning, as a result, in fact, it now means acknowledging the fact that in describing the results of any microscopic theory one should use the terminology used in the macrocosm. In fact, the "hermeneutic channel" of translating the observed reality between its various species was laid.

A natural starting point in such a meaningful interpretation of the theory a critical parameter of the quantum stage becomes, which guarantees that the conceptual design constructed on its basis is protected from semantic contradictions. The critical parameter also performs another important function: with its help, the previous theory is transformed into a proto-physics, which

provides us with interpretational meanings that are understandable to us and thereby provides a "meaningful interpretation".

So, the proto-physics includes all the previous physics, which is real for a certain quantum step. These or other general ontological assumptions regarding the structure of the universe and methodological principles for the construction and "docking" of specific theories contribute to the formation of a certain architecture of physics. At the same time, old fundamental theories, such as classical mechanics, do not disappear anywhere and can not disappear, since they play an active proto-physical role in the formation and adoption of new theories and the structure of physics as a whole. In this sense, "classical mechanics as a" proto physics "forms the basis of all theoretical physics ..." [6, p. 68]. Further, the hierarchy of proto-physical reliability is formed by the classical theory of relativity, quantum mechanics, and so on.

Special attention should be paid to quantum physics, which makes an attempt to solve some methodological problems related to the understanding of physical reality. It is known that in modern studies of fundamental physics, there are several variants of interpretations of quantum theory.

Discussions are held about these interpretations, but, as E.A. Mamchur says, "I have never heard of any scientist saying that these discussions are useless, since all interpretations have a right to exist. On the contrary, the pathos of discussions is that scientists are trying to find out which of them corresponds to the real state of things in the micro-world "[7, p. 80]. Our attention is drawn to two versions of this interpretation: the theory of hidden de Broglie parameters, Bohm and the interpretation of Everett and Wheeler. The theory of hidden parameters assumes that quantum objects and their properties exist as elements of reality and exist even when they are not observed, just as objects of classical physics.

The most radical supporters of this point of view even argue that indeterminism, which allows for the objective existence of chance, is unacceptable, it is absent for microobjects, as well as for objects of classical physics. The cases that require the application of probabilistic methods in quantum physics are due to our ignorance. This ignorance arises in the observer because of the hidden parameters of the physical system that are not available to him. Knowing these parameters would allow the observer to get rid of the probable approach and obtain data on the predictable behavior of quantum objects, as it is possible for classical objects [3, p. 159].

The basic principle of D. Bohm's concept is that the reality of being is one, it is an indivisible whole, which is the basis of the universe and which embraces both matter and consciousness. Accordingly, from this perspective, the process of evolution is not a product of something new, but only a new manifestation of what is primary, the unity of all that exists, because it is the diversity of forms and the infinity of possibilities for the existence of the same thing. Evolution is a series of successive transitions, i.e. a posteriori distribution function, which at the next stage becomes a priori, turning into a new filter.

Another extreme variant of the interpretation of quantum physics is the interpretation proposed by the American theoretician H. Everett and later supported by J. Wheeler and B. de Witt. The wave function in this interpretation describes not objectively existing potential possibilities, but a set of really existing "worlds-Universes" in which different possibilities are realized [3, p. 162]. From this point of view, there is not one Universe with a certain reality, but many different universes, each of which can be described by a certain "project" of reality. Every time in the measurement, when quantum mechanics assumes that the result will be with some probability one way or another, the Universe splits into a multitude of variants, so that one result is realized in one universe, and the other one realizes the other. Splitting is also experienced by the observer himself, but he is not able to feel himself as many copies, so he identifies himself with one of them, regarding other copies non-existing.

Subsequently, the idea of splitting the universes in this concept was replaced by the idea of the primordial existence of many worlds. An example of a physical picture of reality constructed in accordance with the requirements of this concept can serve as a model proposed by K.P. Stanyukovich, according to which "Metagalactics is only a structural fraction in the many-dimensional hierarchy of" particles "of the infinite universe. In other systems like our Metagalaxy,

there may be other energy reserves, the speed of light, and particle sizes (by our scales). These systems can arise as a result of the interaction (collision) of "particular" or fluctuations of even more large-scale structural formations "[1, p. 258].

These concepts of reality have both supporters and opponents. The fact is that any model of reality proposed by a specialist in a specific field of science contains many methodological and logical contradictions, and therefore their criticism is often justified. In particular, F. Anderson writes: "The physics of elementary particles has only a limited opportunity to explain the structure of the universe. The reality has a hierarchical structure, each level of which is to a certain extent independent from other levels. At every stage absolutely new laws, concepts and generalizations are needed, which require no less inspiration and creativity than the previous ones. Psychology is not applied biology, nor is biology – it is not applied chemistry "[10].

Along with the internal "stratification" of physics, her relations with other sciences change. It is important to note here that the failures of those who sought to create a universal theory in which all phenomena would have been thoroughly explained led to the birth of a multitude of scientific ontologies. Each science hastened to acquire its own reality. Physical, chemical, biological, etc. were added to the physical reality, and the spread of the methodological ideals of natural science to a complex of social and human sciences led to the appearance in the language of researchers of such concepts as "Historical reality", "linguistic reality", etc. Due to the development of science, this new situation required philosophical reflection and interpretation. Philosophers with enthusiasm set about creating models that could combine different realities into a single whole.

The idea of an integral reality presupposes that we need to consider the universe as a whole, characterized by an infinite duration, the beginning and end of the development of which we are not allowed to observe. The metaphor on which the modern philosophy of science insists is that reality is infinitely diverse and at the same time unique in its integrity. In the process of its investigation, we know one by one its properties and facets. N. Goodman in "Methods of Building the World" emphasized that an essential result of modern philosophy is that "it began with the Kantian replacement of the structure of the world by the structure of the spirit and eventually came to replace the structure of concepts with various structures of symbolic systems of science, philosophy, arts " [5, p. 85].

So, today, the philosophers of science propose a model of multidimensional integral reality that serves as a theoretical construct within which the proposed metaphor can be realized and with which we will also build our knowledge in all fields of science in the future. The emergence of this concept is caused by the presence of the basic attitudes of modern science: multidimensionality, multifactority and integrity, which should be considered in the context of modern attitudes of the holistic philosophy of science.

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Проблема структури фізичної реальності у сучасній філософії науки

У статті ми аналізуємо проблему фізичної реальності в контексті сучасних уявлень про її структуру, оскільки, на наш погляд, саме ті концепції, що не отримали загального визнання в науковому товаристві, найбільш рельєфно розкривають нам методологічні та концептуальні можливості побудови єдиної наукової картини реальності. Метою нашого дослідження в цьому контексті є аналіз поняття фізичної реальності. Крім того, доцільно показано, що на сучасному етапі розвитку філософії науки вважається цілком доцільним введення поняття структури фізичної реальності. Для досягнення поставленої мети передбачається виконання таких завдань: по-перше, виявити філософсько-методологічне значення фізичної реальності в історичному розвитку науки, по-друге, дослідити поняття структури фізичної реальності як основної настанови сучасної науки щодо побудови єдиної картини світу.

Основним завданням сучасної філософії науки є спроба побудови єдиної картини світу. Оскільки наукова картина оперує поняттям реальності, то для реалізації цього проекту варто сформулювати загальне уявлення про саму реальність, яке постає в процесі виявлення єдиної структури рівнів, кожен з яких охоплює визначений «фрагмент» реальності.

У межах сучасної космофізики ця проблема формулюється як питання про реальність об'єктів, які моделюються теоретичним мисленням. У філософії, а відтак і в методології природничих наук, проблема реальності постає у вигляді цілого комплексу «тривіальних запитань»: у який спосіб теоретичні конструкції(моделі) реальності дедалі більше віддаляються від емпіричного базису науки; чи є об'єкти науки єдино можливими конструкціями на цьому емпіричному базисі; як співвідносяться існуючі основи природничих наук з новими уявленнями про структуру фізичної реальності?

Показано, що смисл метафори “вежа протофізичної достовірності” полягає в тому, що “звичайна” реальність “трансляється” на вищі рівні абстракцій, оскільки осмисленим залишається аналіз об'єкта певного квантового рівня мікросвіту лише разом з макроскопічним приладом, з яким він взаємодіє, але який, проте, розроблено й розраховано (і це – сутнісне уточнення) на основі теорії цієї квантової сходинки.

Ключові слова: фізична реальність, структура реальності, концепція, модель, теоретичний об'єкт.

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