

A Systematic Subject Field of Space Research

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Abstract — Authors of the given scientific article attempt systematically comprehend the subject area of space research. For these purposes, the role of the principle of unity of object and subject matter in the formation of the cosmology object and its structure is first revealed. Using a mental experiment, a picture of cosmic reality and its fundamental and general scientific concepts and principles are created. On this methodological basis, a holistic model of the subject area of space knowledge is constructed.

The space reality sciences are of particular interest, methodological complexity and value. An important place among them has the problem of the subject area of space research formation. To solve it, in modern astronomy it is necessary to apply new methods of knowledge. A method of systematic philosophical analysis in this subject area knowledge is a leading one. At the same time, the systematic-philosophical analysis and the appropriate approach to the study of the subject area of astronomy allows identifying and justifying cosmology as an integral system of knowledge.

The ontological foundations of modern astronomical knowledge allow us deeply comprehend the objective world, cosmic reality as a self-organizing and self-developing system, and also help lay the foundation for the construction of an integral model of the subject of modern space science.

Modern astronomical science faces important epistemological and logic-methodological challenges: find out what is the subject and the structure of cosmos science. This type of analysis is associated with the reconstruction of the subject in its integrity and consistency.

Keywords — *object of space exploration; subject of space's cognition; the structure of the cosmology subject; the picture of cosmic reality; the cosmos; cosmic evolution; non-standard model of the Universe; system analysis; cosmic thinking style.*

I. INTRODUCTION

In the modern era, the sciences of space reality are of particular epistemological interest, methodological complexity and value. An important place among them takes the problem of the subject's area of space research formation. It is necessary to apply new methods of knowledge in modern astronomy. A method of system-philosophical analysis seems to the authors to be as a constructing one of the subject area of

cosmic knowledge. At the same time, the system-philosophical analysis and the appropriate approach to the study of the subject area of astronomy allows identifying and justifying cosmology as an integral system of knowledge.

What is the content of the subject area of the modern space science in the system-philosophical dimension?

System-philosophical aspects of the subject area of modern cosmology include the following gnoseological problems: the problem of the relationship between the object and the scope of space research; the problem of determining the scope of research and the structure of modern astronomy; the problem of the cosmic reality picture formation, its structure and content, as well as its functions.

The basis of modern cosmology is the epistemological principle of the unity of the object and the scope of astronomical research. Thus, the objects of space research include in their structure fragments, levels of organization, forms and types of movement and development of space world. Space objects in modern astronomy are micro -, macro- and mega-levels, which are parts of a single, integral objective world, which is represented in it by stars, planets, galaxies and other space formations. At the same time, the ontology as a theory and one of the main sections of philosophical knowledge is the methodological substantiation of space objects research. The ontological foundations of modern astronomical knowledge allow scientists to comprehend the objective world, space reality as a self-organizing and self-developing system in a proper way, and to understand the foundation for a holistic model of the modern space science subject's construction.

II. OBJECT, SUBJECT OF MODERN COSMOLOGY AND ITS STRUCTURE

What is the nature of the modern cosmology subject and its structure?

The subject of space knowledge reflects the basic, essential aspects and properties of the astronomical research object. The content of the scope of cosmic knowledge displays in the sign-conceptual form complex, contradictory phenomena and processes of the objective-real world, namely: attraction and repulsion, compression and recession, order and chaos,

cyclicity and advance, reversibility and irreversibility, formation and destruction, harmony and disharmony, and many other contradictory phenomena and processes of cosmic reality. The gnoseological nature of the astronomy's subject allows identifying and justifying cosmology as an integral theoretical system of knowledge.

In modern scientific and research papers, cosmology is usually understood as the doctrine of the Universe and as an integral self-developing objective system based on the study results of the most common properties (homogeneity, isotropy and recession) of the Universe's sphere. The Universe is directly accessible to astronomical observations and is based on the results of cosmological synthesis of quantum mechanics, quantum field theory, special and general relativity theory, as well as solving the problems of openness or isolation of the Universe, etc. [Bogolyubov, Tyurin, 1990:57-71], [Kanke, 2003:113-140], [Naidysh, 1999:303-355], [Tararoyev, 2006:142-150]. The "branching" parallel Universes models are formed on this methodological basis in modern astronomy. The hypotheses of "Big Bang", unsteady phenomena and processes of cosmic reality are put forward, as well as the so-called "anthropic principle", which essence is in establishing the necessary connection of human activity with the physical factors of the Universe and the Solar system, in particular, with universal interactions and elementary particles' masses.

In general, the concepts of the space scope presented in modern literature are mainly correct scientific interpretations with positive evaluations. However, it should be noted that the listed interpretations of the astronomy's subject implement the principle of the object and subject's unity of space research not deep enough.

For a more complete and deep understanding of this problem, authors propose a new systemic vision of the space science subject. In this regard, cosmology is the highest form of development of astronomical knowledge. It is a system of interlinked common principles, laws and categories reflecting complex and contradictory cosmic realities. As a result cosmology of social material and spiritual activity of people is an ideal expression in the sign and conceptual oriented form of objective laws, functioning and development of the cosmic world. In methodological and gnoseological terms, the nature of the astronomy's subject determines the space object of its research. Therefore, an important task of the system analysis of the modern space science is distinguishing the object and the subject of its research. The object of the astronomical knowledge includes parts, forms, types, levels of organization of the material cosmic world, to which the active and cognitive activity of the subject (human) is directed.

The subject of astronomy has main, essential properties and features of a space object, obtained due to cognitive and practical activity of the subject. The main structural difference between the scope and the object of astronomical research is that the subject of astronomical knowledge includes only the main, essential properties and processes of the space object.

Modern astronomical science faces important gnoseological and logical-methodological tasks to find out

what is the subject and structure of space science. This analysis of the space science subject is associated with the reconstruction of the subject in its integrity and consistency. In this sense, the subject of astronomical science has a complex structure.

The structure of modern cosmology includes sciences, exploring the laws of space phenomena and macro-level processes (celestial mechanics, astrophysics, astrodynamics, astrometry, etc.); sciences, investigating space phenomena and processes of the mega-level (extragalactic astronomy, relativistic cosmology, etc.); science, studying the laws of the micro world associated with the phenomena and processes of studying stars, planets, galaxies, etc., as well as early origin stages and the evolution of the Universe using the cognitive apparatus of mechanics (quantum microphysics, quantum electrodynamics, etc.). Cosmogony occupies a special place in the structure of modern astronomy, exploring the origin, formation, and development of space objects and their systems (planets of the Solar system as a whole, stars, planets, galaxies, etc.).

At the present time, the cosmogony of the Solar System (Planetary Cosmogony) and Star Systems (Star Evolutions) has achieved the highest level of development. So, from the second half of the XX century the hypothesis about the origin of the solar system and its planets from a single substrate, namely a cold gas-dust cloud or a nebula received the contribution and development in planetary cosmogony. The first scientific steps were made by Kant and Laplace, modern scientists such as O. Yu. Schmidt, F. Hyle, A. Cameron (USA), E. Schatzmann (France) continued the further research.

According to the modern cosmogony, the time of the formation and evolution of the Universe stems approximately from 2×10^{10} years ago, that can be counted from the moment of so-called "Big Bang". Evolution of planets stars and galaxies began from this cosmic event, which led to the emergence of the Universe as an infinitely expanding, pulsating and self-developing space system.

The methodological analysis of single concepts and theories of astronomical knowledge considered in the article requires scientific and theoretical synthesis undoubtedly, combining them into a single integrated system of knowledge - theoretical astronomy (cosmology).

At the same time, the scientific picture of the world fulfills the function of unification and generalization in any modern fundamental science, including cosmology, being as a logical structure of interrelated generic and general scientific concepts and principles of science [Korolev, 2013: 22-27], [Loyfman, 1984 : 59-64], [Taburkin, 2013: 284-287].

Therefore, in the modern philosophy of cosmology, the most important and at the same time still poorly developed problem is one of the astronomical picture of the worldformation. Nevertheless, modern cosmology has already made a definite contribution to the development of the astronomical picture of the world creation [Krushanov, 2014: 86-92], [Krushanov, 2015: 53-59], [Naidysh, 1999: 303-355], [Tararoyev, 2006: 142-150].

The astronomical picture of the world or the picture of cosmic reality acts as the highest synthesis of theoretical knowledge in the space sciences. To substantiate this statement in modern astronomy, it is necessary to create a special theoretical model consisting of the basic theoretical concepts and principles existing inside this structure.

It is considered that the following interrelated and interacting fundamental and general scientific concepts and principles can be included in the logical structure of the picture of cosmic reality, namely: the concepts of space (cosmic reality), cosmic evolution, cosmic activity, cosmic consciousness, etc. At the same time, the concept of cosmos or cosmic reality is the main, system-forming and system-organizing element in the logical structure of the astronomical picture of the world.

The modern understanding of the cosmos is formed and perfected primarily based on philosophical and theoretical ideas and hypotheses concerning the origin and evolution of the Universe. Namely: on the Kant-Laplace' hypothesis about the formation of the solar system and its planets on the basis of dust-like masses (XVIII century.), on the new universal picture of the world developed by F. Engels which is built on two dialectical principles and the concept of the unity of the world and the principle of the historical development of the world (XIX century.); on the A. Einstein's construction of special and general theories of relativity as a natural scientific foundation for the universal principle of the unity of space-time structures with a moving and developing objective world (early XX century); on the constructed theories of the expanding Universe of A. Friedman and the moving galaxies of E. Hubble (XX century). In the modern era, scientific concepts of the cosmos are also developed on the theory of the "Big Bang" [Guth, Smeynhard, 1984: 56-58], [Silk, 1982: 250], [Tutukov, 1999: 17-24].

Thus, in modern science in the concept of cosmos, the objective world is displayed as a self-organizing and self-developing integral entity. In this sense, the space expresses the unity of existing, infinite and unlimited in time and space, and in forms of its manifestation. From these positions, the Cosmos (the Universe) is explored by the cosmology as a general theory of relativity with quantum theory and on this basis solves the problem of its openness and closure and outlines methodological ways of forming a unified concept of an integral world.

The concept of cosmos receives a more adequate and meaningful expression on the basis of inclusion into the logical structure of the astronomical picture of the world having a genetical closeness to the concept of cosmic evolution.

As is known, the study of cosmic evolution is primarily concerned with modern cosmology. Cosmic evolution also occupies an important place in the general structure of the field of space research. It arose on the A. Einstein's general theory of relativity. Therefore, cosmic evolution, in contrast to the former classical celestial mechanics of I. Newton, began to call relativistic in the non-classical and post-non-classical periods. It should be noted that relativistic cosmology

developed on the ideas and principles of the general theory of relativity, therefore at the initial period of its development it was based on the geometry of the Universe, developing on the concept of curvature of four-dimensional space-time.

The modern stage in the development of cosmology is associated with the further development and formation of new models of cosmic evolution [Taburkin, 2012: 228-230], [Shaposhnikova, 2012].

A significant influence on the formation of the modern concept of cosmic evolution was rendered by our Russian scientist A.A. Friedman, who first proved that the Universe is mostly filled with gravitating matter and therefore it can not be stationary, but should expand or contract periodically. In order to justify these theoretical conclusions, scientists began to use the empirical discoveries of extragalactic astronomy, proving the expansion of the Universe. The American astronomer E.P. Hubble established in 1929 that the light coming from distant galaxies shifts toward the red end of the spectrum experimentally. This experiment testified the process of removing galaxies from the observer (principle or "Doppler effect") and thus proved the Friedman's nonstationary model of the Universe expansion.

Next stage in the development of modern cosmology is connected with the further substantiation of the universe expansion concept. For this purpose, the famous American physicist J. Gamow (Russian by origin) proposed in 1948 a new model of the "Big Bang", according to which the process of expanding the Universe came from a certain special singular state. In addition, Gamow suggested that as a trace from the "Big Bang" should remain microwave radiation of low energy, corresponding to the radiation of an absolutely black body heated only to 5K (approx.-268oC). Gamow's assumption was confirmed in the studies of other American physicists A. Penzias and R. Wilson. Therefore, in 1965, when studying the "radio noise" of the Galaxy based on communication with "the Echo" satellite, they found the background radiation coming from all sides, later named by our domestic astrophysicist I.S. Shklovsky "relic radiation". At the same time, most modern cosmologists recognize the presence of cosmic microwave background radiation supporting the model of the "Big Bang" or "hot" Universe [Guth, Smeynhard, 1984: 56-68].

In modern cosmology, among many different hypotheses concerning the origin and evolution of the Universe, the most common one is the stationary model of the "Big Bang". This concept is confirmed by some empirical and theoretical propositions: first, using experimental data obtained by extragalactic astronomy about the continuous removal of the farthest galaxies from the observer and their systems; secondly, the initial assumption in 1948 of the presence of cosmic microwave radiation (J. Gamow), and then the further discovery in 1965 of cosmic microwave radiation (A. Penzias, R. Wilson) named after the relic one, as if it carried the information about the early history of the Universe (I.S. Shklovsky); thirdly, the hypothesis of the destruction of symmetry between microparticles and the forces acting inside them. There is still a lot of obscure, unexplored, controversial

in the stationary model of the origin and evolution of the Universe. For example, the problem of the structure and state of the substrate bases of the original Universe remains unsolved.

Cosmology supports the hypothesis of a quark model of the origin and evolution of the Universe. Researchers suggest that quarks as hypothetically existing micro particles are the material basis for constructing elementary particles of the micro world. It is emphasized that justifying the correctness of a proposed model, explains the structure and state of the primary Universe. However, the quarks themselves have not yet been found in modern space research in the free state. Therefore, one of the modern scientists astrophysicists S. Weinberg said that the mystery of the existence of isolated free quarks would become one of the most important problems of theoretical physics [Wainberg, 2000: 132]. Moreover, this quark model of the origin and evolution of the Universe causes objections from many scientists because the quarks themselves are only hypothetically existing micro particles and are not directly observed experimentally in space research so far.

The hypothesis of a pulsating universe was also singled out in the structure of modern cosmology. According to this hypothesis, we can assume that in the course of its evolution, the Universe was exposed and subjected to periodic expansion and contraction. The hypothesis of a pulsating Universe is designed to explain the presence of a gigantic number of photons in the cosmic world, which was formed during cycles of expansion and contraction. This cosmic model makes possible to identify and clarify the main problem in the bowels of a giant cosmic world, namely, the sources and driving forces of its changes and development. Reasons of self-organizing, self-movement of the Universe seem to be contradictory ones of interconnection and interaction of the expansion and compression fracture and formation, cyclic and progressivity, reversibility and irreversibility et al. Theoretical analysis of these contradictions, manifested in the Universe with numerous diverse qualities and properties, allow investigators to make a methodological conclusion that one can not spread the individual aspects and manifestations of the Universe to the entire cosmic world because of its complexity and not homogeneity. However, modern cosmologists did not find any empirical evidence to support the compression of the Universe. Nevertheless, modern cosmology is on the verge of discovery and empirical substantiation of this cosmic phenomenon ("black holes", "neutron star", etc.) [Hawking 1988: 157], [Cherapachuk 1999: 26-37].

The beginning of the eighties of the 20th century is also characterized by the hypothesis that the Universe was born as a manifestation of a gigantic fluctuation in the vacuum [Leskov, 2003], [Narlikar, 1985], [Chernin, 2001]. On its basis, cosmology scientists try to explain the destruction in the Universe of the symmetry between matter and antimatter, as well as the diverse forces of interaction between elementary particles and their fields. This hypothesis has gained notable popularity especially in recent years, as it contains a possible attempt to decipher the state of the Universe before its "Big

Bang". In this case, the fluctuation hypothesis of the universe allows us to create a hypothetical model of its initial origin. Thus, according to the fluctuation model, the Universe originated from an initial vacuum, which had colossal energy and was in an extremely unstable state. Presumably, cosmic repulsive forces prevailed in this excited vacuum, which "inflated" the space they occupied, and the energy released during this process leading to its rapid heating. The gigantic rise in temperature and the enormous pressure of the excited vacuum led the Universe to the "Big Bang". After the "Big Bang" there was a sharp drop in temperature and pressure, and in the future the expansion of the Universe took place according to the scenario of the "standard model".

E. Yanch put forward a hypothesis of the origin and evolution of the Universe, which is based on the scientific and humanistic consequences of self-organization and self-development [Yanch, 1999: 143-158]. Its main hypothetical assumptions are reduced to the following points: 1) symmetry breaking, expressed in the predominance of matter over antimatter as a source of cosmic evolution; 2) the emergence on this basis of various kinds of cosmic forces - gravitational, electromagnetic, strong and weak ones; 3) the origin at a certain stage of the evolution of the Universe of life - a "fine superstructured physical reality"; 4) the complication of life and the emergence on this basis of the coevolution of organisms and ecosystems; 5) the emergence of social evolution and the formation of a specific substance associated with the thinking activity of man; 6) inclusion in the self-organizing universe of man for giving the global evolution of humanistic meaning.

This is a brief description of the most important and basic modern hypotheses of the origin and evolution of the Universe. Unfortunately, all of them are probabilistic-presumptive, but nevertheless giving an approximate answer to some questions on elucidating the general laws of self-organization, self-movement and self-development of complex phenomena and processes of the cosmic world.

III. THE ASTRONOMICAL PICTURE OF THE WORLD AND ITS METHODOLOGICAL FUNCTIONS

Astronomical picture of the world and its logical structure in the methodological aspect determines the style of cosmic thinking and serves as the basis for general trends and strategies for the development of modern astronomical knowledge.

First, the picture of cosmic reality determines and explains the ontological function in the development of astronomical cognition. This function expresses the connection between astronomical science and the objects of the cosmic world. The meaning of the ontological function is that the astronomical picture of the world forms representations about the real objects of the cosmic world. Its fundamental and general scientific concepts and principles act as system-forming ontological elements, which are not contradictory with individual theoretical concepts of cosmology. On this basis, astronomical pictures of the world are sometimes defined as

disciplinary ontologies, connecting each other with another part of objective cosmic reality. In the very concept of the astronomical picture of the world, a special "image" or "model" of the cosmic world is expressed. At the same time, their individual space objects of investigation have a more graphic character than complex abstractions of specific astronomical sciences. Due to the functioning of the picture of cosmic reality it is possible to get a more vivid picture about the nature and trends of the development of modern astronomical knowledge.

Secondly, the generalization and systematization of astronomical knowledge because of the picture of cosmic reality in modern science is realized much more profoundly and fully. Created by individual astronomical sciences, cosmic pictures of the world set as their main goal the systematization of knowledge of different levels of their generalization. Synthesis and systematization of the cosmic sciences are associated with the identification and definition of fundamental, general scientific concepts and principles that make possible to elucidate the place and role of specific regularities in the general structure of astronomical knowledge. Individual pictures of inanimate and living natural reality, formed by separate natural sciences, represent a system of scientific knowledge, a different level of their generalization, which is developed on their synthesis and integration. Therefore scientific pictures of the world of particular sciences, for example, physics, chemistry or biology, will be parts of a more general natural-science picture of natural reality. The natural scientific picture of the world will be an integral part of the universal (philosophical) picture of the world as a whole. It should also be noted that individual scientific theories and concepts form the concepts, laws and principles by which the concrete facts of the real objects are elucidated and projected. Moreover, the scientific pictures of the world of separate disciplines in their logical structure include the basic ontological concepts and principles that enable to understand the place and role of specific theoretical concepts and laws in the general system of scientific knowledge. As for modern astronomy, the function of the picture of cosmic reality is also considered one of the most important in the systematization and integration of astronomical knowledge. The picture of cosmic reality, as the highest synthesis of astronomical scientific knowledge, forms a new, deeper systemic vision not only of individual cosmic objects, but also of the cosmic world as a whole.

Thirdly, the astronomical picture of the world acts as a special space research program. The complex process of systematization and integration of astronomical knowledge develops a picture of cosmic reality preparing a scientific basis for studying the internal mechanism of such generalization. As is known, the neopositivist concept of the philosophy of science as the basis for the systematization of knowledge in science offered only theory. At the same time, it should be noted that a significant part of Western European scholars have already paid attention to the role and importance of the formation of cultural, historical and philosophical aspects in the development of scientific knowledge. Among them,

analysis and discussion of some forms and types of development of scientific knowledge as research programs deserve special attention, (for example, the research programs of I. Lakatos). In this sense, all research programs functioning in modern astronomy can be characterized as follows: first, in clarifying the role of ontological ideas in cosmology, and in general, and the picture of cosmic reality, in particular; secondly, in the realization of the importance of interdisciplinary research in the generalization and systematization of astronomical scientific knowledge; thirdly, in recognition of continuity in the development of astronomical knowledge. Only in this case the picture of cosmic reality can be recognized as the result of the implementation of the research program, as well as the implementation of some research programs in the development of cosmology in general.

IV. METHODOLOGICAL FOUNDATIONS OF MODERN COSMOLOGY

What methodological attitudes can be identified in modern cosmology for the formation and development of astronomical knowledge?

The following principles and provisions are included in the logical structure of the methodological foundations of modern astronomy: 1) the application of the principles of objectivity, universal communication, integrity and consistency, development, etc. as universal methods and methods for the study of space objects and the Universe as a whole; 2) the recognition of fundamental cognition on the basis of scientific and rational methods, methods and means not only structural and systemic, but also the historical aspect of the organization, functioning and development of the Universe; 3) the use of the method of observation as a methodological tool of empirical study of Space, giving the opportunity in the all-wave and extra-optical ranges to obtain information about non-stationary processes (cosmic rays, neutrinos, etc.) in the Universe; 4) the inclusion of a model or thought experiment, as an additional methodological tools of empirical and theoretical research of Space, making it possible to construct a hypothetically primary model of the Universe (a model before the "Big Bang" and a model after the "Big Bang").

Are the social and philosophical aspects in the development of modern cosmology generated? Yes, they are. The existence of these aspects can be justified as follows.

Firstly, the philosophical and methodological principle of the unity of cosmic reality and the world of human activity, the gnoseological overcoming of isolation between the subject and the object of cosmic research, and the improvement of the correlation between interrelation and interaction, exerts the greatest influence on the development of modern cosmology. It should be noted that in modern cosmology, the relationship between the subject and the object of cosmic research acquires a deep, dialectical meaning. In modern astronomical science, cosmic studies are understood not as a monologue of a person with cosmic reality, but rather as a dialogue with it. In this case, in modern astronomical science, the objectivity of the Cosmos can not be separated from the person's (subject)

research activity. The organic unity of the objective cosmic world and human activity in modern astronomical science inevitably requires a change in the ideal, "value-neutral space exploration." The objective and true study of "human-sized space systems" also makes it possible to include axiological (value) factors in modern astronomy in their description, explanation, understanding and forecasting.

Secondly, at the present time a very specific so-called "anthropic principle" has been formed in science, which is first of all an important fundamental principle of cosmology. The emergence of the anthropic principle is explained by the fact that it establishes the connection of man as an observer with objective phenomena and processes of the cosmic world. The meaning of the anthropic principle is expressed in the fact that the entire infinite, diverse cosmic reality must be viewed as a complex self-organizing and self-developing system that includes the human factor as its necessary moment. At the same time, the presence of a mankind as an observer not only changes the overall picture and structure of the observation, but in general it is a necessary condition for the formation of the material objective and ideal-value platform of this picture. In modern cosmology there are basically two types of anthropic principle: weak and strong ones.

The first type of anthropic principle expresses in science the direction according to which the position of the universe is special, due to its compatibility with the existence of a human being as an observer. Therefore, the emergence of a person in an expanding or dispersing universe must be associated with a certain stage of its evolution and development. The second type of anthropic principle in modern science forms the position according to which the universe should be exactly at a certain stage of evolutionary development and have necessary conditions for the existence of human observations. In this connection, modern science considers a humankind to be a "single observer", who cannot be distinguished from the surrounding objective world. It is impossible to imagine a human being independent of his own cognitive and practical actions, and to eliminate him from the process of obtaining and developing scientific knowledge. A considerable part of modern scientists quite clearly represents that the synthesis of the space's problems with the problems of studying sociocultural reality brings a new humanistic meaning to the content of astronomical knowledge.

That is why recently, the study of the cosmic world includes the problems studied by sociology, economics, psychology, ethics, aesthetics, philosophy, religion and many other social and human sciences. At the same time, the influence on space research in social and human sciences is growing and increasing. It should also be noted that in the philosophical aspect, the anthropic principle embodies the philosophical idea of the relationship between a man and the universe, the infinite and diverse cosmic world that was put forward even in the ancient period and developed by a number of philosophers and naturalists (Protagoras, Anaxagoras, Bruno, Tsiolkovsky, Teilhard de Chardin, Vernadsky, Chizhevsky, Krip, Dyson, Hoyle and others). The anthropic principle admits both religious and scientific interpretations.

According to the religious interpretation, the anthropic qualities and properties of the universe predominantly look like "confirmation of faith in the creator who designed the world so that it meets our requirements exactly" (Hoyle). The scientific interpretation of the anthropic principle is based on the knowledge of the fundamental possibility of the natural being of many worlds, embodying the most diverse combinations of physical parameters, concepts and laws. At the same time in some world spaces fairly simple, single-line stationary physical states are realized, while in other spaces of the Universe it is possible to form and develop complex and super complicated physical objects and systems, including the emergence and development of living entities in their diverse forms and species. In general, the anthropic principle becomes important, especially at the present time with the growth of human space activity and observation of the radical turn of modern science towards the social and humanitarian problems.

Third, in the structure of the socio-philosophical foundations of modern astronomical knowledge, it is important and necessary to single out such an element as cosmism. In modern philosophy, in science and culture, cosmism is interpreted as a philosophical world view, which includes knowledge of the cosmos and the concept of a man as a "citizen of the world", as well as the doctrine of the microcosm, like the macro and megacosmos. In the concept of cosmism, the main, fundamental ideas are the ideas of the unity of man with the cosmos, cosmic nature and man, the cosmic scale of human thought and human activity.

As is known, the ideas of cosmism first arose in ancient culture, developed in Western European philosophy; however, they received the widest distribution and deep justification in Russia. At the same time, the reasons for such a large-scale development of space views in Russia should be sought in the following positions: first, this circumstance is connected with the peculiarities of the formation and development of nineteenth-century Russian philosophical thought, which sought to present man as a complex atomic being and a complex social phenomenon, all the diverse socio-cultural richness and peculiarities of individual spiritual life, and at the same time organically connected with universal cosmic world, and secondly, such a wide spread of cosmism in Russia is explained by the emerging trend of realizing the connection between the concept of cosmism and evolutionary views, which had great success and recognition in Russia, and thirdly, the formation of Russian cosmism was associated mainly with its two directions.

One could explain cosmism based on mythology, Orthodox and social quest for justice, ensuring the truth, eternity and universality of ideas. Representatives of this trend included Russian philosophers: N.F. Fedorov, V.S. Soloviev, N.A. Berdyaev. Another branch of Russian cosmism is organically connected with the progress of natural science knowledge and is developed by naturalists. Representatives of this area were N.A. Umov, K.E. Tsiolkovsky, V.I. Vernadsky, A.L. Chizhevsky and others. It should be mentioned about artistic-poetic or art criticism of Russian cosmism, whose representatives are rightfully considered N.A. Morozov,

A.V.Sukhovo-Kobylin, V. Bryusov, V. F. Odoevsky, F. I. Tyutchev, A.N. Scriabin, M.V. Nesterov and many others. In general, the basic ideas of Russian cosmists have had a significant impact on the subsequent development of philosophy, culture and science and, above all, the formation of socio-cultural and philosophical foundations of modern astronomical knowledge.

Fourth, in modern philosophy, cosmology and culture, it is necessary to clearly understand such a system-forming idea that could ensure the unification of all intellectual resources of the planet and on this basis unite the majority of the population, all communities, political parties and public organizations for the sake of survival, development and creation of mankind on the Earth and in the Cosmos. "Today the techno-technological potential of man has become equal to the planetary one, it has become cosmic, but at the same time the" second nature "of man - the technogenic world - has "absorbed" its spiritual essence. A true existential perspective for mankind should be sought in true spirituality, in switching interest from the pursuit of elusive and transient material to reaching the boundless and infinite, truly eternal spiritual ... The true goal of development is not in high technologies (it is only a tool and means), but in a higher level of understanding and embodiment of the meaning of human life and the world. [Shabaturova, 2016: 9-11, 18].

Such an integral general scientific foundation, in our view, is a picture of the noospheric reality or the concept of the noospheric development. In the structure of the concept of noospheric movement, it is possible to include such fundamental concepts and principles as the noosphere, noospheric reality, noospheric activity, noospheric consciousness, noospheric development, the evolution of the noosphere based on harmony and humanism. Modern science represents the noospheric movement as a reasonably and appropriately managed self-development of nature, society and man, in which satisfaction of the vital needs of the population is carried out without detriment to the population of future generations of people. Therefore, there is a need for joint exploration of the cosmos, the biosphere and society, the subordination of their common goal of preserving, surviving and further improving humanity. This goal can be achieved only if the basic phenomena and processes of the organization, functioning and development of the cosmos, the noosphere and the biosphere of the Earth are controlled by the reasonable, expedient and purposeful activity of man. At the same time, the principle of the noospheric movement proceeds from the fundamental affirmation of the unity of the cosmos, near-earth nature, society and man, the comprehension of existing global problems and the need for their immediate resolution, the transition to solving regional and local problems of ecology and nature management, uniting people's efforts in searching for and defining the general limits of life on our planet, the formation of a certain type of people with cosmic and noospheric thinking. The principle of the noospheric movement considers the formation of the cosmo-noospheric consciousness and culture as a whole, as a natural and necessary action of a reasonably intelligent person who

aspires to comprehend the laws of the universe, and wisely manage the social and natural phenomena and processes of the cosmic world on the basis of harmony, self-regulation and self-organization.

V. CONCLUSION

Thus, the development of the system basis for the subject area of modern space research is of considerable methodological interest not only for understanding the problem of the relationship between the object and the subject of astronomical knowledge, the definition of the subject of astronomy and its structure, the correlation and mutual influence of the object and the subject of research, the use of multiple approaches, principles and mutually exclusive concepts, but also for the formation of its highest level of generalization and systematization - picture of cosmic reality, further improvement of general theoretical, methodological device cosmic philosophy and cosmology, in particular, and for the effective application of the scientific knowledge of complex phenomena and cosmic world processes. In addition, the systematic nature of the subject area of space research and ontologies makes it possible to identify and substantiate integrative strategies for the further development of man, society, nature and the cosmos on the basis of harmony, humanism, self-organization and self-development, not excluding other worthy and more effective invariants.

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