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Anthropic principle as a cosmological and philosophical problem

The paper examines Cosmos – Man – Consciousness interrelations on the basis of the dialectical-materialist principle, cultivated in E. Ilyenkov's cosmological hypothesis and philosophical heritage. It is argued, that a social form of matter being inscribed in the structure of the Universe, is not an accidental but the necessary condition of maintaining the entire system of world matter interaction.

The Anthropic principle is one of the principles of modern cosmology, revealing the dependence of man's life as a complex system and a cosmic being on physical parameters of the Universe. At first glance, the numerical values of new dimensionless fundamental physical parameters seem to be subordinated to no natural regularity. However, physicists have found that if these parameters at least slightly differed from their observed values, life could not have formed. For example, if we reduce the proton mass by only 30%, then no atoms except hydrogen ones would exist in our physical world and as a result life would become impossible.

Science and materialistic philosophy comprehend the world as a unified material reality, the main spheres of its being are the inorganic world, the organic world and the world of social intelligent life. According to the conventional classical picture of the Universe of the XX century, the main spheres of reality emerged sequentially as a result of a giant evolutionary process, spontaneously creating, figuratively speaking, a subordinate "ladder of being" in which the social world and human consciousness are the highest achievement of the cosmic evolution. The comprehension of the interaction and dependence of all objects in the Universe, as well as the idea that world is "arranged" in the way creating possible conditions for the human's being emergence – stimulated science and philosophy to put forward the Anthropic principle.

The term "Anthropic principle" for the first time was represented by B. Carter at 1973 Kraków symposium honoring Copernicus' 500th birthday. A theoretical astrophysicist, B. Carter, articulated the Anthropic Principle in reaction to the Copernican Principle, which states that humans do not occupy a privileged position in the Universe. As B. Carter argued, "Although our situation is not necessarily *central*, it is inevitably privileged to some extent" [2, p. 3225-3233]. He also claimed that what we expect to observe must be reduced to the conditions necessary for our existence as observers.

Along with the general formulation of the Anthropic principle, its modifications as "weak Anthropic principle" (WAP), "strong Anthropic principle" (SAP), Participatory Anthropic principle (PAP) by J. Archibald Wheeler and "finalist

Anthropic principle" by F. Tipler are known. The formulation of the strong Anthropic principle, according to B. Carter, states: "The universe (and hence the fundamental parameters on which it depends) must be such as to admit the creation of observers within it at some stage [2]. As to Barrow and Tipler SAP formulation "The Universe must have those properties which allow life to develop within it at some stage in its history"[3]. It looks very similar to Carter's SAP, but unlike the case with Carter's SAP, the "must" is an imperative.

The Anthropic principle's interpretation with all its heuristic value for modern physics still plays the role of the hypothetical, speculative knowledge, belonging "rather not to physics, but to metaphysics", according to G. Gorelik [4, p. 384]. The Anthropic principle is often criticized for lacking falsifiability which allows critics of the Anthropic principle to define it as a non-scientific concept. At the same time the weak Anthropic principle stating "conditions that are observed in the universe must allow the observer to exist", is supported in mathematics and philosophy.

In metaphysics itself, the idea of man – Universe relationship has been established since Antiquity and developed by a number of philosophers and natural scientists (Protagoras, Anaxagoras, J. Bruno, K. Tsiolkovsky, T. de Chardin, F. Krik, F. Dyson, F. Hoyle and others). One may say that metaphysics has set a common worldview orientation for scientific physical evidence of the unity and interconnection of all objects and processes in Nature, including the existence of a human being itself.

In the metaphysical sense, the substance always retains its universal attributes. The attributive properties of matter as a substance, proved by materialist philosophy, are: self-movement, space, time, qualitative inexhaustibility, structuredness, property of reflection, etc. Evolution of forms of reflection exclusively in human society reaches the level of consciousness, rational cognition of the external world.

Human life activity is a qualitatively new stage in the development of the Universe. Unlike the previous stages of matter development, the rational sphere of life or the noosphere is evolutionarily first *purposefully* developing system of the Universe. Thanks to the mind, man transforms himself and near and far surrounding reality. In this sense, a man's mind and his organized will as a social being is regarded to be a geological and cosmic force [5, p. 288], capable to intervene and change matter both within the Earth's atmosphere and beyond it.

Nowadays, the field of human activity extends not only to the near-Earth space; the person is interested in the colonization of space outside the Earth, in our solar system, and in a far-sighted realms (other stellar systems). In that regard, the importance of the Anthropic principle is increasing. The development of outer space is connected with finding the conditions suitable for organic and intelligent life. On the whole, the achievements of modern science are already sufficient for construction of research bases outside the Earth, but the creation of autonomous colonies in the cosmos suitable for man's living – is still among hypothetical possibilities and is rated as science fiction.

Nevertheless, enthusiasts of colonization believe that there are enough resources to create such a settlement on the Moon and the planets nearest to the

Earth, first of all, Mars. Until now, the signs of life outside the Earth, at the time of mankind, have not found. Despite this, scientists and engineers are optimistic, so, with regard to the Red Planet, they are sure that life on it is "rather inevitable than possible in the future" [6].

Based on the assumption that the intelligent life and the physical parameters of the Universe are interconnected, foundation of extraterrestrial settlements (and, in general, conditions suitable for life), is required, respectively, to launch the "chain" of the evolutionary process advantageous for emergence of life. This process through which the biosphere and the climate of the planet is changed with the help of technology to make it more suitable for earth-like life, acquired the name "terraforming". A number of ideas on terraforming have been put forward in relation to the Mars. One such idea is to release greenhouse gases into the atmosphere in order to increase the temperature and pressure which guarantees possibility of liquid water on the surface. Another idea (however, rejected by the community of scientists), is belonged to E. Musk, the head of SpaceX and the enthusiast in the colonization of Mars. He believed the most rapid achievement of a constant temperature rise in the atmosphere of the Mars can be achieved by nuclear bombardment of the planets' poles (where carbon dioxide is absorbed in the soil) [7]. The director of NASA's planetary research unit offered his one idea – to surround the Mars with an artificial magnetic shield to help the planet partially to restore the atmosphere.

The promotion of the ideas and theories mentioned above obviously confirms the position of the dialectical-materialist philosophy that matter as the substance of thinking that exists. Thinking is identical with being as it reflects the objective nature of reality ideally. The world is infinite, though the scientific mind has the power to master its order and thereby to balance its existence as free and increasingly self-governing one. There is nothing in natural phenomena including the way to other stars and planets the future generations are able to overcome.

This optimism can be overshadowed by the problem known in physics as the "thermal death" of the Universe. The death of the Universe in the distant future is inevitable. According to the laws of thermodynamics, closed thermodynamic systems tend to the most probable equilibrium state, that is, to a state with maximum entropy. In the case of the Universe this means that in the absence of "energy output channels" the most probable equilibrium state is a state of transformation of all types of energy into thermal energy.

The latter means an equable distribution of heat energy throughout the matter, after which all known macroscopic processes in the universe will cease, which will lead to the cessation of life. But this process also means a limit in the existence of thinking matter, that is, such an obstacle of Nature to an intelligent life, which it is physically unable to overcome. (Scientists still can not confirm or disprove the theory of thermal death of the universe, so we will come out of the "entropy" scenario as yet most substantiated by physics).

It seems relevant to refer to the early work of the famous Russian philosopher E. Ilyenkov "Cosmology of the Spirit" [7], who made an attempt, without departing from the principles of scientific philosophy, to assume such a situation of the death of thinking matter in which both the "coincidence" of its end

and the beginning would simultaneously occur. The philosopher insists on the thesis that there is no thinking without matter, but the reverse can also be stated, that there is no matter without thinking.

Indeed, according to E. Ilyenkov, physics and astronomy still have data on the process of scattering matter and the motion of stellar bodies (thermal death), but the natural-science study has not yet shown the reverse process – the process of the revival of the dead worlds, the process of transformation of the iced pair of world spaces into a red-hot nebula. The hypothetical and even phantasmagoric explanation represented by E. Ilyenkov on its scale surpasses all the constructions of the greatest natural philosophers and moral dreamers of the past.

E. Ilyenkov's assumption concerns clarifying the objective role of thinking matter in the world interaction and, specifically, in the revival of the cosmic spaces, in which it exists. He writes about the cosmological duty of the world spirit – the self-sacrificing mission of thinking beings. They, by sacrificing themselves, "produce a consciously cosmic catastrophe – causing a process that is the inverse to the thermal dying of cosmic matter, i.e. they cause a process leading to the revival of dying worlds in the form of a hot gas's cosmic cloud and steam. Speak plainly, thinking proves to be a necessary mediating link, thanks to which "rejuvenation" of the world matter by fire is only made possible, it is the one immediate "acting cause" that brings the endless reserves of associated motion to an actual action, similar to what it does today, when destroying an artificially small the number of nuclei of a radioactive substance, it puts the beginning of a chain reaction" [7, p. 433].

Such is the metaphysical resolution of the contradiction between the infinite possibilities of the thinking mind and the finiteness of its physical existence in the definite space of the world matter. In our opinion, this clarification preserves the truth over materialist ontology and doctrine of substance and its attributes. It also clarifies the importance of the Anthropic principle in the cosmology with reference to the role of human thinking in the fate of the Universe, which is discussed in metaphysics.

Conclusions

The paper reveals the connection between the Anthropic principle of cosmology and metaphysical constructions regarding man – Universe relations. It is claimed that metaphysics has set a common worldview orientation for scientific physical evidence of the unity and interconnection of all objects and processes in the Nature, including man's existence. The thesis of the dependence of the physical parameters of the Universe and the reverse thesis of the dependence of the world transformation of matter on the conscious and purposeful behavior of the human mind are substantiated. It is given a well-known natural-philosophical hypothesis of E. Ilyenkov dedicated to the cosmological duty of thinking matter, originated to justify the existence of the opposite possibility to the thermal dying of cosmic matter and to confirm the eternity of thinking in the world cycle.

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