

Symposium on the Philosophical Problems of Astronomy in the USSR Academy of Sciences

Usp. Fiz. Nauk 110, 469-470 (July 1973)

A symposium on the philosophical problems of modern astronomy, dedicated to the 500th Anniversary of the birth of Copernicus, was held on December 12-15, 1972 by the Scientific Council on the Philosophical Problems of Natural Science in the Presidium of the USSR Academy of Sciences and by the Institute of Philosophy, USSR Academy of Sciences.

The symposium heard papers by V. A. Ambartsumyan and V. V. Kazyutinskiĭ on "Philosophical Problems of Study of the Universe," V. L. Ginzburg on "New Physical Laws and Astrophysics," Ya. B. Zel'dovich and I. D. Novikov on "Problems of Contemporary Cosmology," A. L. Zel'manov on "Gnoseological Aspects of Cosmology," G. I. Naan on "Philosophical Problems of Cosmology," and I. S. Shklovskiĭ on "Philosophical Problems Related to Sentient Civilizations in the Universe."

The paper of Ambartsumyan and Kazyutinskiĭ was basically concerned with new cosmogonic conceptions of powerful explosive processes in the Universe (as regular phases in cosmic evolution), on the formation of stars and star systems as a result of dismemberment of dense and even superdense protomatter. These ideas, which are being developed by the Byurakan school of Astronomers, are juxtaposed to the concepts of the "classical trend" in astronomy, according to which cosmic objects are formed as a result of condensation of rarefied matter.

The ideas of the Byurakan school are set forth in detail in a collection recently (1972) published by Nauka (Dept of Physico-mathematical Literature) in a second revised and expanded edition under the title "Problems

of Modern Cosmogony," with Ambartsumyan as editor. Articles in this collection: V. A. Ambartsumyan, "Nonstationary Objects in the Universe and Their Significance for Investigation of the Origin and Evolution of Celestial Bodies;" L. V. Mirzoyan, "Cosmogony of the Stars and Galaxies;" G. S. Saakyan, "The Theory of Superdense Celestial Bodies;" S. K. Vsekhsvyatskiĭ, "Cosmogony of the Solar System;" and V. V. Kazyutinskiĭ, "The Present State of Cosmogonic Theory."

The symposium paper of Ambartsumyan and Kazyutinskiĭ posed the question as to whether the complex nonstationary phenomena observed in the Universe, in the course of which density varies by millions of times and the strength of the gravitational fields may reach unheard-of values, might lead to difficulties of theoretical interpretation that conflict with the hitherto known laws of theoretical physics and lead to the formulation of new laws.

In their papers, neither of the two physicists—Ginzburg and Zel'dovich—denied the possibility in principle of a transition from known physical theories to more generalized theories that are valid under certain extreme conditions. As Ginzburg put it, the new physics is "unquestionably necessary in the field of relativistic quantum theory, elementary-particle theory, and elsewhere." In astronomy, "the applicability of the general theory of relativity near singularities is undoubtedly limited." However, since "the theory of galactic nuclei is inadequately developed and much remains unclear, even in principle, in this area," physicists "see no need at the moment for recourse to new physical conceptions

in order to explain processes in clusters of galaxies and galactic nuclei."

The subject matter of the two symposium papers that were devoted in some measure to physics have been published in recent volumes of *Uspekhi Fizicheskikh Nauk* (see, for example, Ambartsumyan's paper on "Contemporary Natural Science and Philosophy" (96, No. 1 [Sov. Phys. Usp. 11, No. 5]), Zel'dovich's paper on the "Hot Model of the Universe" (89, No. 4 [9, No. 4])). Ginzburg's paper was published in "Voprosy Filosofii" (November, 1972).

Separate publication of the symposium materials is planned.

¹⁾The "black hole" does not have a true magnetic field; it is as though it had "swallowed" the magnetic field in the same way that the gravitational field deals with light and neutrinos in the case of the "black hole." This is one reason why the "black hole" does not produce pulsar effects.

²⁾The biological results of exposure that were obtained in the studies carried out jointly with the IEKO are set forth in separate reports by L. A. Sevast'yanova and R. L. Vilenskaya and by A. Z. Smolyanskaya and R. L. Vilenskaya.

Translated by R. W. Bowers