

Abram Leonidovich Zel'manov (Obituary)

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Abram Leonidovich Zel'manov, a prominent Soviet scientist, doctor of physico-mathematical sciences died on 2 February, 1987 in his seventy-fourth year. His name is associated with the introduction and development of the branch of science which later received the appellation of mathematical cosmology. In Zel'manov's papers several methods were created which were widely accepted: chronometric invariants, kinematic invariants, and the monad formalism. For Zel'manov the main aim was picking out from the mathematical apparatus of cosmology those quantities which would be free of arbitrariness in their mathematical description, and which would be invariant with respect to some kind of transformations; quantities which could be observed and measured. Zel'manov insisted that an adequate description of the world surrounding us can be given only by the theory of an inhomogeneous anisotropic universe. His ideas are utilized in analyzing the deviations from the standard Friedmann cosmology and, possibly, will be fully required for the description of the Universe on an ultragreat scale.

The mathematical methods developed by Zel'manov are used not only in cosmology, but also in the astrophysics of compact objects. Soviet and American authors base their work on his papers in analyzing the behavior of electromagnetic and gravitational fields in the neighborhood of neutron stars and black holes.

Working on the theory of an inhomogeneous anisotropic universe Zel'manov pondered on the possible connection between the diversity of physical conditions and the existence of intelligent life. To him belongs the soaring phrase that characterizes the essence of the anthropic principle so aptly: "Apparently we are witnesses of processes of certain types because processes of other types occur without witnesses."

Generally speaking philosophical problems of natural science occupy an important place in Zel'manov's creative output. Although being a gentle and deliberate person he adopted a solid position of principle whenever he had to deal with the foundations of the theory of relativity and relativistic cosmology. Zel'manov did not escape hard times, for three years—1952–1954—he had to put scientific work aside. But Zel'manov managed not only to continue work on relativistic cosmology himself, but also to educate a whole constellation of pupils. Beginning in 1942 and practically until his last days Zel'manov gave, sometimes with interruptions, courses of lectures on the general theory of relativity and cosmology. *Probably these were the first in our country systematic courses of lectures on these subjects. Many spe-*



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cialists in gravitation and cosmology regard themselves as being direct or indirect pupils of Zel'manov.

Zel'manov's publications are well known both in the USSR and abroad. He repeatedly took part in the work of Soviet and international scientific conferences, and has written several articles for encyclopedias.

The scientific and pedagogic activity of Zel'manov has been recognized by several medals, and a citation from the Presidium of the Supreme Soviet of the RSFSR. Deepest modesty and the highest degree of intelligence were characteristic of this man. We shall always miss the opportunity of live intercourse with Abram Leonidovich Zel'manov.

Translated by G. M. Volkoff