

Lev Emmanuilovich Gurevich (Obituary)

Zh. I. Alferov, Yu. N. Efremov, V. E. Golant, V. L. Gurevich, B. P. Zakharchenya, G. G. Zegrya, I. P. Ipatova, V. I. Perel', N. N. Pariiskii, and A. D. Chernin

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Professor Lev Emmanuilovich Gurevich, a prominent Soviet theoretical physicist, one of the oldest members of the A. F. Ioffe Physico-technical Institute of the Academy of Sciences of the USSR, died in Leningrad on 28 June 1990.

L. E. Gurevich was born on 14 June 1904 in Paris into the family of a professional revolutionary and journalist E. L. Gurevich. On graduation from the Leningrad Polytechnical Institute he was awarded the diploma of Electrical Engineer, and his first publication was on the subject of theoretical problems of electrical engineering. Its title was "The problem of regulating high-voltage transmission lines of great length and power". Already in 1926, while still a student, a paradox characteristic for that time, Lev Emmanuilovich began lecturing at the Mining Institute. Having early established himself as a brilliant pedagogue he in the course of his entire life taught in the different higher educational institutions of Leningrad. Everywhere he found talented pupils. Having been for many years the head of the sector of solid-state theory in the Physico-technical Institute he opened the door into science to tens of young theoretical physicists, who working now in different fields of physics and in different cities remember him with gratitude as their first teacher. He was one of those who created a school of theoretical physics in our country. He was the author of several monographs and popular books, including a book that was a first in world literature in which physical kinetics was presented as an independent branch of theoretical physics.

The range of Gurevich's scientific interests was very wide. His publications include problems in physical kinetics, molecular physics, and plasma physics. But the most significant, fundamental results were achieved by him in two fields—solid-state physics and astrophysics.

In solid-state physics the most widely known set of his publications is devoted to the effect of phonon drag of electrons. He was the first to show that a number of kinetic effects in metals and semiconductors (in the first instance the thermoelectric and thermomagnetic phenomena) are determined to a significant extent by the "phonon wind", i.e., by the nonequilibrium nature of the phonon system. Later he showed that a lack of equilibrium of a different type among phonons ("heating of phonons") plays an essential role in the problem of "hot" electrons in semiconductors. These publications were of the nature of theoretical predictions and subsequently under their influence an entire field of experimental investigations appeared in which Gurevich's ideas were confirmed and developed further. In recent years in connection with the use of ultrashort laser pulses a new wave of interest emerged in lack of equilibrium among phonons and its influence on hot electrons.

An extensive series of Gurevich's investigations was de-



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voted to a detailed study of waves and instabilities in solids. In the course of these investigations he discovered new types of waves in semiconductors and in metals which can exist and be generated under nonequilibrium conditions. One of the most striking phenomena are the thermomagnetic waves that exist in conductors in the presence of a temperature gradient.

A characteristic feature of the scientific output of Lev Emmanuilovich was, as a rule, the fact that his ideas at which he arrived as a result of a deep theoretical analysis later on became the basis for extensive experimental investigations.

His papers devoted to scattering of light by free carriers in solids, to the propagation and absorption of sound, to the anomalous Hall effect and to many other problems of solid-state physics are widely known. From the mid-1940's an important place in the scientific output of Lev Emmanuilovich was occupied by problems of astrophysics and cosmology. In an extensive series of papers in 1945–1950 written in part together with his close friend professor A. I. Lebedinskii, Lev Emmanuilovich put forward a number of new physics ideas due to which it became possible to develop significantly and to make more concrete the theory of the early stages of

the formation of the solar system in the course of the process of gravitational condensation. Also in these papers a foundation was created of stellar cosmogony; the theory elaborated by Lev Emmanuilovich of the condensation of stars from a rarified gaseous dust medium became an integral component of modern ideas concerning star formation. He injected into cosmogony the spirit of large-scale physics. The development of this science continues now in the direction which Lev Emmanuilovich energetically defended in the sharp discussions of cosmogony in the early 1950's. Among the investigations of Lev Emmanuilovich on the theory of structure and evolution of stars, his investigations of 1947–1954 in which he proved the possibility of repeated thermonuclear explosions in thin outer layers of a star have acquired particular significance at the present time; this idea has become the basis of the theory of bursters—flaring-up x-ray stars, which were discovered in the 1970's. The study of the general laws of evolution of dense stellar systems that was begun in 1950 was continued in Gurevich's publications of 1969–1971 in which he gave the theory of violent processes capable of taking place in dense central portions of galactic nuclei and quasars and producing significant energy release character-

istic for these astronomical objects. Gurevich preserved and developed the Friedmann tradition in cosmology in those years when the theory of an expanding universe was under attack motivated by absurd ideological motives. In the 1960's he organized in the Physico-technical Institute an actively working cosmological school, the most prominent achievement of which became the theory of the initial vacuum state of the Universe. In these publications of Lev Emmanuilovich, and his students E. B. Gliner and I. G. Dymnikova in 1965–1975 a new direction in cosmological theory was established which then received the appellation of inflationary cosmology and underwent an exceptionally fruitful development in hundreds of scientific articles published in the recent decade by theoreticians of many countries.

Lev Emmanuilovich had a limitless love of science. He had faith in science as the most gratifying form of human activity. He had a faith in the high meaning of life, knew how to live, and endured with fortitude the calamities that fell to his lot. He was happy in his science and knew how to transmit this feeling to his colleagues and students.

Translated by G. M. Volkoff