

Lev Iosifovich Gudzenko (Obituary)

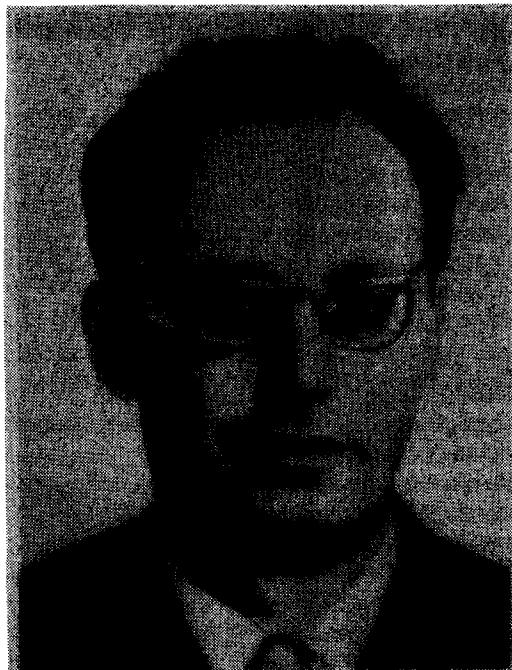
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Lev Iosifovich Gudzenko, a remarkable Soviet physicist, died prematurely on March 18, 1978. His outstanding talent was most clearly expressed in his knack of finding unexplored but promising areas of research, and his ability to formulate problems in an unconventional fashion. L.I. Gudzenko had an unusually broad range of scientific interests. He published papers on the kinetics of low-temperature plasmas and radio engineering, on astrophysics and methods of medical diagnostics, on biology and on the theory of atomic collisions. Altogether, he was the author of about 150 papers, 2 books, and 7 inventions. Many of his ideas were highly original.

L.I. Gudzenko was born on July 28, 1927 in Kiev but in 1934 his family moved to Moscow. In 1944, he completed externally his intermediate education and then attended the Moscow Power Institute for three years. Further studies were interrupted by heart trouble, but were renewed at the Extramural Division of the Physics Faculty of Moscow State University, from which Lev Iosifovich graduated in 1954. His entire scientific activity was connected with the P. N. Lebedev Physics Institute of the Academy of Sciences of the USSR which he joined in 1950 as an electronics laboratory assistant.

We shall not pause to list in detail all the researches of L. I. Gudzenko and will confine our attention to the two main areas that are particularly associated with his name. One of them, which he initiated as far back as the late 1950's when his researches were directed by S. M. Rytov, was concerned with fluctuations in general self-oscillatory systems. The main problem was to establish the dependence of the statistical properties of fluctuations in the system on its dynamic properties. The results obtained through this research subsequently enabled L.I. Gudzenko to formulate a general correlational approach to the solution of converse problems in the statistical theory of oscillations, which he himself formulated. The essence of these problems is to use observed statistical properties at the output of an uncontrolled object to determine its internal dynamic properties. Lev Iosifovich developed this approach in relation to various uncontrolled objects such as, for example, the sun and the human heart. He was able to develop an original model of cyclic solar activity (it is described in his book, "In Search of the Nature of Sunspots," Znanie, M., 1972). He proposed a new method for the diagnostics of cardiac activity, based on correlation analysis of cardiograms, and suggested a fundamentally new method of analyzing the effectiveness of elementary processes in gases and plasmas. It is also important to note his



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discovery of an unexpected property of a relaxation generator with internal fluctuations, namely, the special self-stabilization of phase (it was previously considered that the phase was subject to diffusion-type drift). L. I. Gudzenko's researches into the converse problems of the statistical theory of oscillations were published in the Proceedings of the Physics Institute of the Academy of Sciences of the USSR [Tr. Fiz. Inst. Akad. Nauk SSSR 90 (1976)].

The other major area of L. I. Gudzenko's research was lasers based on a recombinationally nonequilibrium plasma (plasma lasers). Here, L. I. Gudzenko put forward the fundamental ideas and actively directed their development. The work of Lev Iosifovich and his collaborators resulted in a substantial contribution to the solution of such problems as mechanisms of population inversion in supercooled plasmas, methods of producing supercooled plasmas, the theory of gas lasers, and the development of x-ray lasers and laser reactors. All this work was published in the collection of papers mentioned above and in greater detail in the book "Plasma Lasers" by L. I. Gudzenko and S. I. Yakovlenko (Atomizdat, M., 1978), the publication of which Lev Iosifovich was not to see. This particular field is now well established and has attracted the attention of many researchers.

L. I. Gudzenko's success in such very different areas of research was possible not only because of his talent and intuition, but also because of his insistence on scientific fundamentals and his ability to defend his ideas even when they were in conflict with established views. In selecting a particular problem, he was interested, in the first instance, in its true scientific value. Lev Iosifovich was always driven not by his existing skills, but by an internal need for new things, without fear of controversy or great complication, or even of the danger of finishing up in an unexplored "foreign" territory where there was always the risk of acquiring the reputation of a dilettante.

L. I. Gudzenko devoted much of his energy to under-

graduates, graduate students, and young collaborators. They were all attracted by Lev Iosifovich's characteristic liking for new formulations of problems, and the lively and creative atmosphere of his seminars. While full of ideas himself, L. I. Gudzenko always found time to stimulate and assist the development of new ideas put forward by his pupils and collaborators.

Lev Iosifovich died at the height of his creative powers without completing much of his current work. Those of us who were lucky enough to know him closely, and to work with him, will always remember this wise and kind man, for whom scientific research was the essence of life.