

Leon Mikhaïlovich Biberman (on his seventieth birthday)

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Corresponding Member of the Academy of Sciences of the USSR Leon Mikhaïlovich Biberman, a prominent physicist, a specialist in the fields of plasma physics, thermal physics, current problems of power production, will celebrate his seventieth birthday on April 7, 1985.

L. M. Biberman was born on April 7, 1915 in the city of Poti. In 1941 he graduated from the Moscow Power Institute in which, while still a student, he began working on the problem of the theory of radiation transfer under the direction of V. A. Fabrikant. During 1941–1945 L. M. Biberman in the ranks of the Soviet Army participated in the Second World War and was awarded two medals. In 1945 he returned to the Moscow Power Institute.

The principal direction in Biberman's scientific activity at the end of the 1940's and the beginning of the 1950's was the development of the theory of radiation transfer in spectral lines. He showed that the diffusion concepts of the traditional transfer phenomena are in this case inapplicable. In this connection the kinetic equations for photons of a given frequency turn out to be unsuitable for the solution of the aforementioned problem. Much more productive is the analysis of the number of resonance excitations. The resulting integral kinetic equation for this quantity is known in the literature as the Biberman-Holstein equation and occupies a central place in the investigation of the kinetics of excited resonance states in a gas, in a plasma, and in condensed media.

Biberman's papers on the theory of the photographic effect of electrons on matter, on the theory of electron microscopy and also papers in which the method of double probing, which has become a classic method in plasma diagnostics, was proposed for the first time, all belong to these exceptionally fruitful years. At the same time L. M. Biberman together with V. A. Fabrikant and N. G. Sushkin undertook the well-known experiment on the diffraction of sequentially travelling electrons.

During the second half of the 1950's Biberman undertook the solution of the complicated physico technical problem—the development of the theory of radiative heat transfer. Already in his papers of 1955–1957 Biberman for the first time showed that in the motion of a space vehicle through the dense layers of the atmosphere the emission of the shock wave arising in front of the vehicle gives a significant, and at high velocities the principal, contribution to aerodynamic heating. The results of these papers were uti-



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lized in calculations concerning the thermal shielding of Soviet space vehicles.

In the following years as a result of work by many groups a new field of gas dynamics was created—radiative gas dynamics, in the development of which Biberman played an important role.

In the course of solution of such an important applied problem a broad range of physical problems arose the formulation of which is due to Biberman. Among them is the necessity to obtain reliable data on the optical properties of a low-temperature plasma. Biberman undertook a systematic study of the optical properties of hot gases and plasma. The monograph "Optical properties of hot air" published seventeen years ago is up to the present time a reference for re-

searchers and engineers.

In 1965 Biberman began work in the Institute of High Temperatures of the Academy of Sciences of the USSR in which he organized the Theoretical Division. Here he and his students completed a series of papers on the theory of nonequilibrium low-temperature plasma. General approaches were developed which made it possible to regard a low-temperature plasma as a unified system of atoms in their ground and excited states, of electrons of different energy ranges, and of ions of different kinds. These approaches have become traditional in the study of kinetics of a nonequilibrium low-temperature plasma.

Devoting much attention to the solution of applied problems, Biberman then utilized the results of the theory for the investigation of nonequilibrium phenomena in the passage of intense shock waves in gases, in the investigation of processes in a magnetohydrodynamic generator based on a nonequilibrium plasma in the study of prebreakdown phenomena in gases.

Biberman devoted considerable attention to problems of current plasma power production. Among them are the development of the theory of a magnetohydrodynamic laser, the solution of the problem of radiative-convective heat exchange in the channel of a magnetohydrodynamic generator, the search for a more efficient realization of the idea of a magnetohydrodynamic generator using a nonideal plasma.

Biberman devoted more than 30 years to pedagogic ac-

tivity. His deep understanding of physics manifested itself in the breadth of his scientific interests, and also in the clarity and elegance of the methods he used. As an example of this we call attention to two investigations of recent years. In one of them he explained a feature in the mobility of electrons in helium at a temperature of a few degrees, and in the other he analyzed the nature of the condensation of supersaturated steam in an external electromagnetic field.

In 1979 Biberman was elected a Corresponding Member of the Academy of Sciences of the USSR. For fruitful scientific activity he was awarded the Order of the Red Banner of Labor. L. M. Biberman is very active in the training of scientific manpower, devoting much time and energy to the education of scientific youth. Among his pupils there are seven doctors and a large number of candidates of science.

L. M. Biberman is involved in extensive scientific-organizational activities. He is the chairman of the Scientific Council of the Academy of Sciences of the USSR on the problem "the physics of low-temperature plasma," and is a member of the executive of the division of physico-technical problems in power production of the Academy of Sciences of the USSR.

L. M. Biberman attains his seventieth birthday full of creative power, energy, and new interesting ideas.

Translated by G. M. Volkoff