

PERSONALIA*IL'YA MIKHAĬLOVICH LIFSHITZ*

(on his fiftieth birthday)

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JANUARY 13, 1967 marked Il'ya Mikhaĭlovich Lifshitz's fiftieth birthday. Corresponding member of the USSR and Ukrainian Academies of Sciences, Lifshitz is best characterized by the originality of his scientific subject matter and the establishment of an active school of theoretical physicists—a subdivision of Landau's school.

Lifshitz's works are numerous. Their distinguishing features are their nontrivial nature, their unusual presentation, and the novelty of their approach. To a physicist attempting a cursory examination of papers by Lifshitz it may appear that they are somewhat academically mathematical; a careful reader will, however, sense their deep physical nature. Mathematics, which Lifshitz masters perfectly, carries out a subsidiary function—the development of the apparatus does not become a purpose in itself. However, the novel physical presentation often requires new mathematical assumptions and methods which Lifshitz introduces with great skill.

The main subject of Lifshitz's scientific activity is the general theory of the condensed state of matter: the dynamical theory of the crystal lattice, the electron theory of metals, problems of the energy spectrum of disordered systems, etc. However, as in the case of all great theoreticians, his interests are not confined to the main subject. "Sidelines" are very significant. They resulted in the theory of zone refining of metals and the theory of diffusion pumping, a study of the interaction of nuclear radiation with matter, and an explanation of the mechanism of coalescence of solid solutions. All these "by-products" exhibit Lifshitz's rare ability to approach a problem far removed from theoretical physics with physical methods and assumptions. His intuition appears to allow him to separate in the most complex phenomenon its chief, determining features.

Solid state physics is one of the most actively developing fields of contemporary physics. The flow of theoretical works in solid state physics is enormous. Lifshitz's works stand out sharply, and it is precisely they which often result in a new approach and stimulate experimental development.

One of the main problems of quantum physics of the condensed state is the problem of determining the energy spectrum. It was Lifshitz's idea to reconstruct the energy spectrum of condensed systems from ex-



perimental data and he provided the basis for the possibility of solving such a problem. I. M. Lifshitz showed that a reconstruction of Bose branches of the spectrum is possible from the temperature dependence of the thermodynamic characteristics, whereas the reconstruction of the considerably more complex Fermi branches of the spectra of metals requires one to resort to various fine effects in a magnetic field.

I. M. Lifshitz and his students have made an important contribution to the creation of the contemporary electron theory of metals. The geometrical terminology now used in the work on the physics of metals has been adopted entirely from the works of the Khar'kov school. There exists now a special field of the physics of metals devoted to the determination of the electron energy spectrum.

For his work on the electron theory of metals Lif-

shitz has been honored with the international Simon Prize awarded by the British Royal Society.

His work on the dynamical theory of real crystals has for more than two decades determined the development of this timely field of solid state physics. This work includes the first analysis of the energy spectrum of crystals with defects, and, in particular, the discovery of local and quasilocal levels; the thermodynamics of layered and chain structures has been set up; a theory has been proposed of one of the principal processes of plastic deformation—the twinning process. A consistent theory of isotope solutions has been established.

For the series of works on crystal lattice vibrations the Praesidium of the USSR Academy of Sciences awarded Lifshitz the Mandel'shtam prize.

A natural continuation of the work on the theory of the energy spectrum of real crystals was the investigation of the electron energy spectrum of disordered systems and of the quantum states giving rise to this spectrum.

A large number of papers by I. M. Lifshitz is connected with physical kinetics. He explained the kinetics of the destruction of the superconducting state by a magnetic field and by a current. He was the first who succeeded in tracing the extremely peculiar kinetics of second-order phase transitions.

A large part of these results are recent. Lifshitz's creative activity has not slowed with time, but has increased: the words "he is at the prime of his creative power" have when referring to him the most literal sense.

In addition to his scientific research work in the field of solid state physics, I. M. Lifshitz gives much of his attention to scientific organizing work and to lecturing activities. He is the chairman of the Council of Solid State Theory of the USSR Academy of Sciences, and has directed for many years the Division of Theoretical Physics of the Physico-technical Institute in Khar'kov and the department of statistical physics and thermodynamics at the Khar'kov University; in recent years he has been organizing the special "Solid State Theory" course at the Physics Faculty of Moscow University.

Marking this important point of Il'ya Mikhaĭlovich Lifshitz's life, his friends and students wish him many years of fruitful activity.

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