

Aleksandr Iosifovich Shal'nikov (on his seventieth birthday)

A.S. Borovik-Romanov, N.V. Zavaritskii, B.N. Samoïlov, M.S. Khaikin,
and Yu.V. Sharvin

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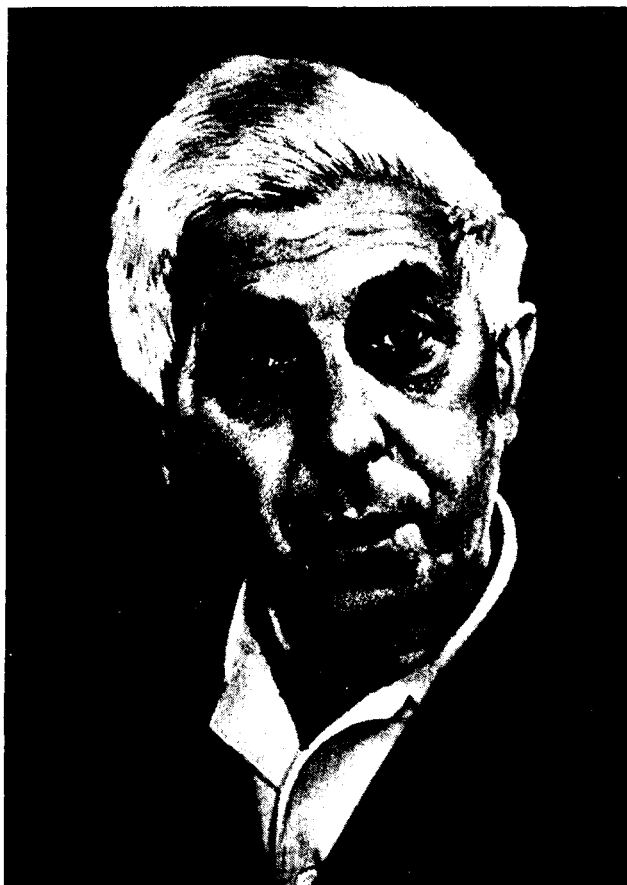
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Corresponding Member of the USSR Academy of Sciences Aleksandr Iosifovich Shal'nikov, a prominent Soviet physicist, celebrated his seventieth birthday on May 10, 1975. Shal'nikov's more than half a century of dedicated work in the physics laboratory has won him wide recognition as a brilliant experimental physicist. Throughout this time, his range of interests and the scope of his activity expanded vigorously. At the beginning of his creative career, when Soviet physical instrumentation was just learning to stand alone, Shal'nikov devoted much time and effort to the development and perfection of various physical instruments—photon counters, iconoscopes, electron-diffraction cameras, diffusion pumps, etc. At the Leningrad Physico-technical Institute, where Shal'nikov began his work as a scientist, he was concerned with the range of problems associated with the evaporation and condensation of various substances in high vacuum.

In 1935, at the invitation of P. L. Kapitza, Shal'nikov went to work in the USSR Academy of Sciences Institute of Physics Problems, and since that time his principal scientific interests have been in the area of low-temperature physics—the physics of superconductors and liquid and solid helium. In addition to his work in these fields, Shal'nikov carried out a number of complex and responsible engineering studies that led to successful solution of problems of great national importance in 1947–1955. More recently, he has rendered considerable aid in the development of cryosurgery by developing a number of high-precision and, at the same time, simple and reliable instruments for surgical work done by tissue freezing.

Stylistically, Shal'nikov's work is characterized by profound physical intuition, original approaches to new problems, brilliant inventiveness in the creation of new methods, and thoroughgoing virtuoso performances in implementing them. His work in the laboratory consists of a steady flow of experiments in which each step and each grain of scientific truth is appraised in all of its aspects.

Shal'nikov obtained the first fundamentally important results in certain new areas that later attracted the interest of numerous successors. Thus, he discovered the sharp increase in the critical fields for thin superconductive films as compared to bulky superconductors. As early as 1938, Shal'nikov condensed a metal onto a surface that had been cooled to helium temperatures and also observed a significant increase in the critical temperatures of the films. These clever experiments enabled him to obtain reliable proofs of the two-phase nature of the intermediate state in superconductors and to estimate the dimensions of the domains in this two-phase system.



In the laboratory, Shal'nikov has investigated the thermal and electromagnetic properties of superconductors from various aspects, and it will be difficult to overestimate his part in developing our present-day conceptions of superconductivity.

In the early 1960's, Shal'nikov began a series of studies of the properties of liquid and solid helium. After investigating the mechanism of electric-charge motion in liquid helium, Shal'nikov took on the much more difficult problem of investigating the electrical, thermal, and mechanical properties of solid helium crystals. The preparation of crystals of record purity and perfection was decisive to success in this area. In these crystals, which have very high thermal conductivity, it was possible to observe a new phenomenon—Poiseuille flow of the phonon gas. The high lattice perfection of these crystals enabled Shal'nikov to observe the motion of electrical charges in them and to investigate the mechanism of this process. He also produced

the first results in the extremely interesting field of study of the uncommon mechanical properties of these crystals.

Shal'nikov's productive scientific activity has received high appreciation from the Soviet Government: he has been awarded three USSR State Prizes and five Orders of the USSR.

Shal'nikov gives generously of his energy, temperament, and superior teaching ability in the cause of training scientific cadre. In directing his laboratory at the Institute of Semiconductor Physics and the Moscow State University Laboratory of Low-temperature Physics, which he created, and in his daily work alongside his students and graduates, Shal'nikov has inspired a fair-sized school of experimental physicists.

His encyclopedic knowledge of the techniques of the physical experiment and his inexhaustible energy have enabled Shal'nikov to organize and serve as full-time Editor-in-Chief of the Journal *Pribori i Tekhnika Eksperimenta* (Experimental Instruments and Techniques), the principal Soviet publication devoted to methods of experimental research. During the time that

has passed since its founding (nearly two decades), the journal has become widely known and recognized, and its thickness and circulation have more than doubled; it has also become an organizer and repository for the dissemination of supplementary detailed information on the development of experimental techniques in the form of detailed articles deposited by its editors. This practice has for several years now eliminated delays in the publication of publishable papers and thereby substantially improved the effectiveness of the journal.

To this we add that now, as earlier, one of the most reliable ways to obtain not only information, but also assistance and encouragement in the solution of a new experimental problem is to turn directly to Shal'nikov himself for advice, with confidence in his unfailingly sympathetic nature and his lively interest in science and people.

Aleksandr Iosifovich's friends, colleagues, and students cordially wish him good health and further success in his work.

Translated by R. W. Bowers