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PERSONALIA

ALEKSANDR IOSIFOVICH SHAL'NIKOV

(On his 60th birthday)

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**M**AY 10, 1965 was the 60th birthday of Aleksandr Iosifovich Shal'nikov, one of the most brilliant Soviet masters of physical experiment.

Shal'nikov is deeply possessed by a passion for physical experiment. While still in school he started as a laboratory assistant in the physics department, and attracted with his skillful hands the attention of the physics teacher. On enrolling in the physico-mechanical department of the Leningrad Polytechnic Institute, he started in the very first year to work as an assistant in the vigorously growing institute, in the laboratory of N. N. Semenov. After a short time, Shal'nikov's reputation was firmly established at the institute as that of a subtle master of experiment, capable of devising the most brilliant methods and overcoming various difficulties arising in the construction of physical instruments and installations. During those years, when the laboratories were incomparably worse equipped than now, this knowledge was decisive in the success of many an experiment.

After a few years, Shal'nikov's renown as a skillful experimenter, always ready to help with advice or with his own hands, has become so widespread that his laboratory has become the place of steady pilgrimage from many various scientific and technical institutions for help and advice. This continues to this day.

The first ten years of Shal'nikov's scientific activity were devoted to a rather broad group of questions, predominantly of physico-chemical nature. Foremost among these was the creation of a method of obtaining arbitrary atomically-dispersed mixtures. The gist of the method was to evaporate atoms of two substances in vacuum, from two evaporators, and to condense them on a deeply cooled surface. This method has made it possible to mix practically all substances, including some which were not hitherto finely miscible because of their large chemical affinity. By regulating the rate of evaporation of the components, it was possible to obtain any desired ratio between them. When heated even slightly, such mixtures turned explosively into chemical compounds.

A second interesting project completed during that period was a new method of obtaining colloids. In connection with the demand on the part of the industry for synthetic rubber, it became necessary to develop



methods for obtaining colloidal solutions of alkaline metals in organic liquids. Shal'nikov developed new methods of producing such colloids.

Along with these physico-chemical investigations, Shal'nikov paid much attention to the creation and perfection of various physical instruments—light meters, iconoscopes, electron-diffraction instruments, diffusion pumps, and others.

In 1935 P. L. Kapitza invited Shal'nikov to the institute he was then organizing in Moscow. Together with Kapitza, Shal'nikov devoted much effort and skill to make the Institute of Physics Problems of the Academy of Sciences one of the leading modern centers of experimental research.

In the Forties and Fifties, Shal'nikov's scientific

interests were in the field of the basic and then still puzzling phenomenon of superconductivity. He was a pioneer in the investigation of the properties of thin semiconducting films, which can withstand much stronger magnetic field than bulk samples without destruction of superconductivity. He succeeded in explaining the nature of the special "intermediate" state of superconductors, proving by means of several subtle and clever experiments that this state is a very finely dispersed mixture of superconducting and normal (nonsuperconducting) layers and filaments.

Comprehensive investigations of the thermal, magnetic, and high-frequency properties of superconductors were carried out in his laboratory, and his contribution to the evolution of the present-day concepts of superconductivity can hardly be overestimated.

In the postwar years of specially vigorous development of Soviet science and technology, Shal'nikov was called upon many times to help in various tricky cases. Like a master surgeon, he traveled with his own special set of tools and instruments, and his help usually led to a successful solution of a perplexing problem. During the same time, he developed original instruments for measurement and control purposes.

Shal'nikov's scientific activity involved simultaneously much pedagogical work on the training of scientific personnel. He has been for many years in charge of the laboratory at the Institute of Physics Problems and of the low-pressure laboratory he organized at the Moscow State University. Many of his students have gone on to independent studies, but he is surrounded in both laboratories, as always, by many young researchers, with whom he works on a great variety of problems in low-temperature physics, expending much effort, time, and energy on the difficult daily cares involved in facilitating the scientific work of his students.

Among the many people who call on Shal'nikov for help and advice in recent years, those receiving perhaps most attention are surgeons. Having become

greatly interested (as is the case with any new subject he tackles) in collaboration with physicians, Shal'nikov has recently developed a simple and reliable instrument for subtle brain operations, based on the use of low temperatures. This instrument has by now become part of surgical practice.

Shal'nikov was the founder and editor in chief of the journal "Pribory i tekhnika eksperimenta" (Experimental Instruments and Techniques), one of the major authoritative journals devoted to physical research procedures. This is the tenth year that Shal'nikov, a major specialist in the field, guides energetically the activity of this journal, which plays a major role in the development of techniques for physical experiments in Soviet scientific institutions.

No matter how extensive and burdensome his cares and duties are as a leader, director, consultant, editor, member of all sorts of scientific councils, and "simply" a responsive and good person, he continues, as always, his own scientific work, performing numerous responsible tasks with his own hands, experimenting, and observing new phenomena with live and penetrating interest. Recently Shal'nikov has been studying the flow of electricity and heat through solid helium, growing in his own laboratory helium crystals that exceed in purity and perfection the crystals of any other substance.

Shal'nikov's fruitful scientific work has been highly valued by the Soviet government: he was awarded three State prizes and five orders of the USSR.

The enthusiasm, the deep scientific curiosity, and the ardent participation, generously offered by Shal'nikov in each undertaking, always evoke sincere admiration and good-humored envy on the part of his friends, co-workers, and students, who are glad to wish him health and many years of vigorous scientific activity.

Translated by J. G. Adashko