Yuriĭ Vasil'evich Sharvin (on his seventieth birthday)

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The noted Soviet experimental physicist, Academician Yuriĭ Vasil'evich Sharvin, celebrated his seventieth birthday on June 24, 1989.

Yu. V. Sharvin was born in Moscow into the family of a chemistry professor. After graduating from the physics department of Moscow State University, he embarked on his scientific career in the x-ray laboratory of the L. Ya. Karpov Physicochemical Institute. Subsequently he transferred to the Institute of Physics Problems at the USSR Academy of Sciences, where he has continued working to this day.

The research of Yu. V. Sharvin has been associated with one of the most important fields in modern physics—the physics of low temperatures. His first scientific success came with experiments focused on the penetration of magnetic fields into superconductors, which he investigated in the early 1950's. The results of these experiments played a significant role in the development of the theory of superconductivity. The measurement techniques employed by Yu. V. Sharvin were a paradigm of experimental artistry; their high sensitivity made it possible to measure the very weak magnetic field dependence of the penetration depth.

During the same years Yuriĭ Vasil'evich became interested in the structure of the intermediate state. The theoretical model, developed by L. D. Landau in 1937, envisioned the intermediate state as a series of alternating normal and superconducting phases. Both the general understanding and the details of the intermediate state structure contained a number of contradictions and questionable points that required experimental investigation. The first experiments in this field were performed by A. I. Shal'nikov, who used a bismuth sensor to measure local magnetic fields, and by A. I. Shal'nikov together with K. A. Tumanov, who used a ferromagnetic powder. Yu. V. Sharvin advanced this method of directly measuring the local magnetic fields of the intermediate state by depositing a very fine layer of ferromagnetic powder on the sample after the intermediate state transition. By this technique he obtained remarkable photographs of the alternating normal and superconducting layers, which later appeared in many textbooks and monographs on superconductivity. The visual method of studying state structure was later elaborated in Soviet and foreign laboratories as a means of studying the intermediate and mixed superconducting states.

Yu. V. Sharvin's fine experimental technique in his studies of the intermediate state enabled him to complete a wide-ranging experimental program that brought him worldwide recognition. He succeeded in measuring the surface tension at the phase boundaries, as well as the anisotropy and temperature dependence of this quantity in various superconductors. These studies of the fundamental properties of superconductors were of great general scientific interest.

YURIĬ VASIL'EVICH SHARVIN

In the 1960's Yuriĭ Vasil'evich Sharvin began work on the development of microcontact techniques. In his 1965 experiments on point contacts, he observed an unexpected effect which subsequently, in the course of carefully planned and brilliantly executed experiments, led to the discovery of the dynamical intermediate state in superconductors. This state is characterized by the motion of superconducting and normal domains under the influence of the current flowing through the sample. The very first experiments measuring domain motion opened up a new field in superconductivity.

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The theory of the intermediate state developed in tandem with Yu. V. Sharvin's experimental research and was greatly influenced by his work. Today this organic confluence of experiment and theory has built this branch of superconductor physics into an elegant and largely complete edifice.

The second research field pursued by Yu. V. Sharvin concerned the electronic properties of normal metals. In 1959 he proposed and realized a new, contactless method of measuring the residual resistance of pure metals. Later this method gained wide acceptance as a means of measuring the impurity content in very pure samples. The most interesting and original contribution of Yu. V. Sharvin in this field was his observation of electron focusing in metals with the aid of microcontacts. He demonstrated that in pure metals electron beams could be focused by a process analogous to longitudinal β-focusing in vacuum. The microcontact technique of Yuriĭ Vasil'evich was later developed by his followers and students into an entire branch of electron optics in metals. Today his achievements have contributed to the tunneling spectroscopy research carried out by a group at Kar'kov university.

The inevitable passage of time failed to diminish the scientific enthusiasm and creativity of Yuriĭ Vasil'evich . In 1981 new theoretical advances rekindled his interest in the phenomena caused by the oscillation of kinetic coefficients as a function of the magnetic flux through a sample. Yu. V. Sharvin planned and carried out pioneering experiments on electron interference in disordered films of normal metals. The elegance and simplicity of these studies, combined with their experimental virtuosity wherein metallic films were deposited on micron-sized quartz filaments, are an inspiration to experimental physicists. Yu. V. Sharvin opened a new field in metal physics—the study of mesoscopic systems, which occupy the intermediate position between ordinary macroscopic samples and microscopic, atomic systems. Currently this newly established research field is actively pursued by Soviet and foreign physicists.

Yu. V. Sharvin is a scientist of great erudition and wide-ranging interests. In addition to his profound understanding of fundamental problems in modern physics, Yuriĭ Vasil'evich attaches great importance to the practical applications of scientific research. A number of technological advances due to Yu. V. Sharvin have gained acceptance in the cryogenic laboratories of our country. His highly sensitive technique of measuring low concentrations of oxygen in other gases has found practical technological applications.

As a professor of the Moscow Physicotechnical Institute, Yu. V. Sharvin has been engaged in extensive pedagogical activity. For many years he has taught a course on low temperature physics to the upper level undergraduates at the Physicotechnical Institute and supervised senior undergraduate and graduate research. The students of Yuriĭ Vasil'evich are at work in the cryogenic laboratories of many scientific institutions, both in Moscow and elsewhere, remaining in constant touch with their teacher.

Yuriĭ Vasil'evich devotes much time and effort to scientific administration and organization. He serves on the scientific councils of three leading Soviet research institutions and on the editorial board of *Fizika Nizkikh Temperatur* (Soviet Journal of Low Temperature Physics).

Yu. V. Sharvin is a scientist of world stature, esteemed in the foremost low temperature laboratories. He is one of the organizers and active participants in many international conferences and symposia, both in the USSR and abroad. For his outstanding contributions, in 1986 Yu. V. Sharvin was awarded the highest honor of the British Physical Society—the Simon Prize. His clear and profound understanding of the complex problems in contemporary physics has brought enduring benefits not only to himself but also to all his colleagues.

The many friends, students, and colleagues of Yuriĭ Vasil'evich Sharvin wish him good health and further success in his creative endeavors.

Translated by A. Zaslavsky