Sergeĭ Yakovlevich Nikitin (Obituary)

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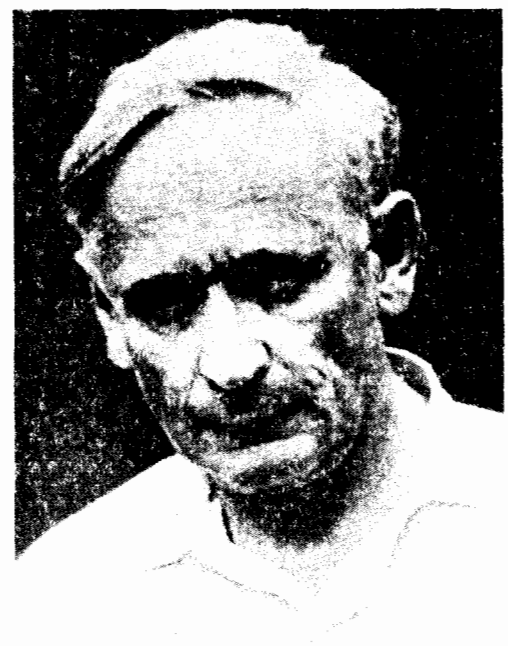
Sergeĭ Yakovlevich Nikitin, an outstanding Russian experimental physicist and doctor of physical and mathematical sciences, died on 3 September 1990.

Nikitin was born on 3 April 1916 in Taganrog. After he graduated from high school in Leningrad he studied at a factory training school, specializing in lathe work. For more than a year he worked at the State Optico-Mechanical Factory. In 1934 he became a student at the Institute for Communication Engineers, and after a year he transferred to the engineering physics department of the Leningrad Polytechnical Institute, from which he graduated in 1938.

Nikitin's scientific career began in 1938 as a graduating student of the Leningrad Physicotechnical Institute. His professors were A. F. Ioffe, A. I. Alikhanov, and I. V. Kurchatov. His diploma paper, which was prepared under the direction of Alikhanov, was devoted to a study of the shape of the β spectra of ThC and RaC nuclei. Prior to 1941 Nikitin worked at the β decay laboratory of the Leningrad Physicotechnical Institute, and during this time he developed a magnetic spectrometer with double focusing, which made it possible to analyze the shape of the upper end of spectra.

From the beginning of the war, Nikitin, like a number of his colleagues at the institute, participated in research to protect the ships of the Baltic fleet from mines, "demagnetization." In 1943 he was awarded a medal "For the Defense of Leningrad." From 1944 to the beginning of 1946 Nikitin worked at the Institute of Physical Problems, and in 1944 he defended his candidate's dissertation. At this time he began research on cosmic rays, and along with A. I. Alikhanov, I. Ya. Pomeranchuk, and others, participated in the creation of a station on Mount Aragats (this station was the embryo from which the Yerevan Physics Institute arose). Nikitin developed a method of measuring weak pulses from proportional counters. This method was used to detect the great admixture of particles with increased ionization (that is, heavy particles) in cosmic rays. This research was the basis for his doctoral dissertation, which he defended in 1949.

In 1946 Nikitin became one of the first members of the then newly-created Laboratory No. 3 of the USSR Academy of Sciences, now the Institute of Theoretical and Experimental Physics, where he worked to his last day. Nikitin participated in the creation of the main physics equipment for the institute. Under his direction, a system to regulate an experimental heavy water reactor was constructed in 1948–1949 at the institute. It was distinguished by its extremely accurate recording of the position of the regulating rods. This made it possible to record in the automatic reactor regulation mode small changes in reactivity when absorbers or fissionable materials were introduced into the core. Nikitin, Alikhanov, and V. V. Vladimirskiĭ used this method to measure physical constants needed in reactor construction. Of the research conducted by Nikitin at the reactor one should also note his study of the scattering of cold neutrons by deuterium and tritium, which were very complex studies from a technical point of view.



SERGEĬ YAKOVLEVICH NIKITIN
(1916–1990)

Nikitin directed the cyclotron at the institute. Using the "blinking target" method in a neutron spectrometer Nikitin measured the fission cross sections and the full cross sections of many nuclei, and for several elements he was the first to do so. Improvement of this method made it possible to measure the dependence of the number of secondary neutrons emitted in the act of fission on the energy of the initial neutrons.

Under Nikitin's direction the cross sections for proton-proton scattering at energies of 300-600 MeV were measured at the phasotron of the Joint Institute of Nuclear Research.

Nikitin completed a series of experiments on parity violation in weak interactions. He measured the longitudinal polarization of electrons in the β decay of the nuclei of Au, Cu, etc. On his initiative, a group of scientists at the Institute of Theoretical and Experimental Physics completed a series of experiments studying the violation of CP parity in the decays of neutral K mesons.

Nikitin was one of the first in the world to build bubble chambers and to develop a method of processing photographs. In the first hydrogen chambers, which were developed at the Institute of Theoretical and Experimental Physics, Nikitin studied the generation of π^+ mesons by protons, multiple generation of π mesons, and elastic processes.

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Using the two-meter hydrogen bubble chamber at the institute, which was created under Nikitin's direction, a series of studies were conducted in intermediate-energy hadron physics. This was the first observation of significant polarization of Λ hyperons formed in baryon exchange processes. One of the important directions for research pursued in recent years at Nikitin's laboratory was the study of hadron spectroscopy, in particular, a search for exotic resonances which do not correspond to the simplest quark classification. Such resonances are predicted by various theoretical approaches, and arise naturally in the framework of models based on quantum chromodynamics. In experiments headed by Nikitin, indications were obtained of the existence of exotic baryon resonances with isotopic spins $I \leqslant 5/2$ in the mass spectrum of the $\Delta^{++}\pi^{+}$ system, which is formed in the reactions $\pi^{+}p \rightarrow p\pi^{+}\pi^{+}\pi^{-}\pi^{0}$ and $\pi^{+}p \rightarrow p\pi^{+}\pi^{+}\pi^{-}$.

Since 1945 Nikitin has taught at the Moscow Engineering-Physics Institute, and to the end of his days he directed the seminar at the Institute of Theoretical and Experimental Physics. He always found time and energy to talk to young people, to teach them, and he knew how to learn from others.

Nikitin was an unusually charming person, bold and intelligent. He was always free of any official ideology, governing himself in thought and deed with the notions of common sense and what is now bashfully called "common human values." He could never suffer foolishness or meanness. Many of his colleagues and others are grateful for his support.

Translated by C. Gallant