

Sergei Valentinovich Izmailov (Obituary)

M. G. Veselov, L. E. Gurevich, Ya. B. Zel'dovich, N. I. Kaliteevskii, V. V. Novozhilov, Yu. V. Novozhilov, V. I. Perel', O. M. Todes, E. D. Trifonov, L. D. Faddeev, and V. Ya. Frenkel'

Usp. Fiz. Nauk **150**, 175–176 (September 1986)

Sergei Valentinovich Izmailov, a well-known theoretical physicist, professor and Doctor of Physical-Mathematical Sciences, passed away on October 31, 1985.

Sergei Valentinovich Izmailov was born in St. Petersburg on May 14, 1909; his father was a railway engineer, his mother was a physician.

The scientific and pedagogical career of S. V. Izmailov began after his graduation in 1930 from the Faculty of Physics and Mathematics at the Leningrad Polytechnical Institute. Already in his student days he attended Ya. I. Frenkel's scientific seminar, becoming a regular participant. Ya. I. Frenkel', whose lectures on theoretical physics Sergei Valentinovich attended at the Polytechnical Institute, was his first scientific supervisor and undoubtedly had a lasting influence on the development of Sergei Valentinovich as a theoretical physicist.

S. V. Izmailov's first theoretical investigations were in thermodynamics and hydrodynamics, carried out between 1933 and 1938 during his stay at the Institute of Chemical Physics. Investigating, at the suggestion of Yu. B. Khariton, the theory of shock waves he obtained results that served as the foundation of further studies in that field and were included in textbooks and monographs. At the same time, in cooperation with Ya. I. Frenkel' and O.M. Todes he carried out one of the first studies of the kinematics of topochemical reactions, which yielded a prediction of the temperature dependence of the maximum reaction rate.

Sergei Valentinovich's main research interests, however, were in the field of quantum physics. In 1940–1955 he completed a cycle of studies in quantum electrodynamics which continued and extended V. A. Fock's research in the field. In these studies he deduced general expressions for the electromagnetic interaction Hamiltonians of spin $1/2$, 0 , and 1 particles.

Already in those years Sergei Valentinovich concluded that further progress in the theory of elementary particles required the introduction of new degrees of freedom, which he termed internal. In fact in his 1947–1948 papers (some of them co-authored with A. Z. Dolginov) he introduced the idea of what today are known as the dynamical particle symmetries. Subsequently, Sergei Valentinovich and E. E. Fradkin published a series of papers on the theory of particles with spin $3/2$ and higher half-integral spins.

Concurrently with his investigations of elementary particles Sergei Valentinovich worked on the quantum theory of solids. From 1938 onwards he worked on the theory of ion-electron and secondary electron emission. He improved the existing theories by taking into account the target atom recoil and inelastic reflection of primary electrons. Together



SERGEI VALENTINOVICH
IZMAILOV
(1909–1985)

with G. A. Rozman he investigated the neutral pair vacancies in alkali-halide crystals.

In the 1960s S. V. Izmailov worked productively in the V. G. Khlopin Radium Institute. In studies carried out with I. I. P'yanov he formulated the cascade evaporation model of the formation of complex nuclei and fragments in collisions of high-energy protons with nuclei. This model was further elaborated in the present-day "caking model". Prompted by the need for improved photographic methods of recording nuclear emissions Sergei Valentinovich worked on the theory of sensitivity of ionographic emulsions. In the course of studying the formation of a latent image in emulsion grains he took into account the fluctuating sensitivity of individual grains and suggested a probabilistic approach to solving the latent image problem in halogenide single crystals irradiated by light pulses of varying intensity and duration.

Sergei Valentinovich always complemented his scientific

ic research with pedagogical activity, which he undertook immediately upon graduating from the Polytechnical Institute.

In 1938, on the initiative of I. V. Kurchatov, S. V. Izmaïlov began to teach at the A. I. Gertsen Pedagogical Institute in Leningrad. He continued to teach there until his last days; there he also spent the first difficult months of the siege of Leningrad. From 1948 until 1972 Sergei Valentinovich served as the head of the theoretical physics and astronomy department at the Institute.

The depth and originality of his courses in electrodynamics, statistical physics, quantum mechanics, and elementary-particle physics was born of his own intensive research in those fields. The pedagogical talent of Sergei Valentinovich found an outlet in his 1962 text "A Course on

Electrodynamics", which met with wide acceptance.

Sergei Valentinovich always had an interest in the history and methodology of physics. He authored a number of studies on historical and philosophical questions in physics and unfailingly took part in conferences and meetings devoted to the history and philosophy of the natural sciences.

Sergei Valentinovich's interests and abilities far exceeded the confines of physics. He was a man of great culture and wide interests, enriching all those who met him. At the same time he was unusually modest, caring, and kind.

The friends, colleagues, and students of Sergei Valentinovich will always remember him fondly.

Translated by A. Zaslavsky