

Viktor Pavlovich Silin (on his eightieth birthday)

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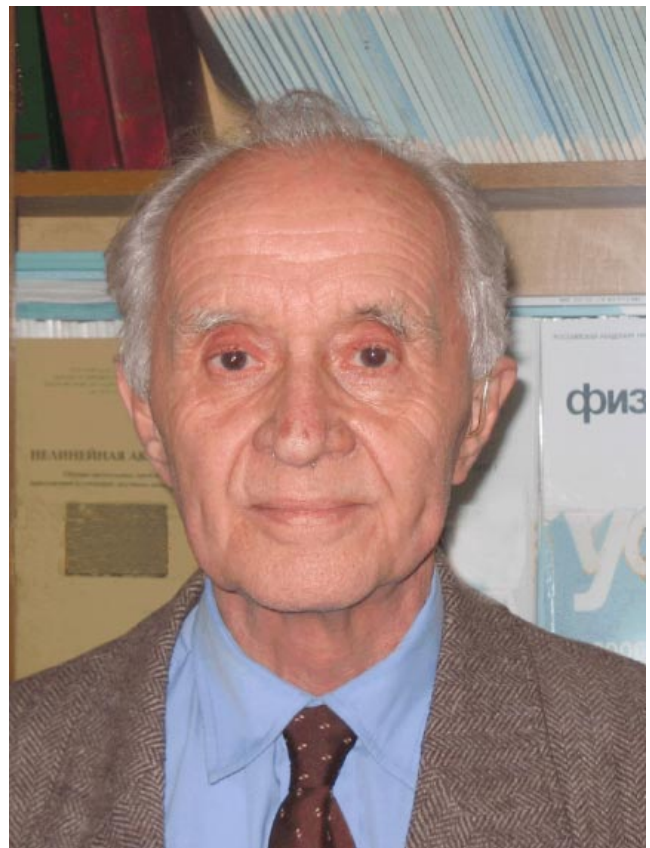
Viktor Pavlovich Silin, outstanding theoretical physicist and Corresponding Member of the Russian Academy of Sciences (RAS), who has greatly contributed to the progress of plasma physics and solid state physics, celebrated his eightieth birthday on May 26, 2006.

Silin's entire creative career is inseparable from the P N Lebedev Physics Institute (FIAN) where he started working immediately after graduating in 1949 from Moscow State University and where rose step by step from Junior Researcher (1949) to Head of the Division of Solid-State Physics (1989–1995). He published some 700 scientific papers in various fields of physics, including a dozen monographic reviews for *Physics–Uspekhi* and *Proceedings of the Lebedev Institute of Physics*, and wrote four monographs.

In his first ten years at the Theoretical Department of FIAN, Silin worked in quantum field theory and the theory of elementary particles. Among his papers from this period, deserving special mention are those on the extension of the Tamm–Dankov approximation, which at that time made it possible to achieve a more profound understanding of the nature of nuclear interactions. In parallel to this activity, Silin started working on the theory of many-particle systems and obtained a number of fundamental results in the theory of Fermi liquid in metals.

Later on, Silin focused his efforts in two directions: the theory of condensed media, and gas plasma physics.

Quite a few of Silin's results in the theory of metals and semiconductors became an inseparable component of the physics of condensed media. Among his most impressive achievements we wish to single out his prediction of spin waves in normal metals, the theoretical description of absorption of acoustic waves in normal metals and conducting magnets, the prediction of quantum spin waves, the derivation of collision integrals that permitted the analysis of kinetic and optical properties of semiconductors in quantizing magnetic fields, the development of a new phenomenological approach to describing magnetic phenomena in ferro- and antiferromagnets, a unified description of magnetic and elastic properties of Invar alloys, the prediction of surface quantum waves, the development of the nonlocal electrodynamics of Josephson junctions, and the prediction of new Josephson vortex structures and of the effect of quantization of Josephson vortex velocities. Most of the results listed above formed the foundation of novel avenues of research and were developed further in numerous papers published by Silin's followers. Silin himself and his pupils continue to work in a number of research fields. Thus, they have devoted considerable attention in recent years to the theory of vortices in Josephson junctions and in layered Josephson structures.



Viktor Pavlovich Silin

In plasma physics Silin carried out fundamental studies on the kinetic theory and stability of plasma. He was able to derive expressions for collision integrals in rapidly oscillating and strong electric and magnetic fields, which led to a number of important results in the theory of absorption of HF radiation, in the theory of transfer in strong magnetic fields, and in the theory of the generation of higher radiation harmonics. Silin's work in drift wave theory played an important role in the progress of the physics of inhomogeneous magnetoactive plasma. Also widely known are his works on the relativistic plasma theory and the theory of fluctuations of microscopic distributions; on the theory of transfer phenomena due to ion sound and the kinetic theory of drift-dissipative instabilities, and on the kinetic theory of interactions of plasma waves.

Silin's publication of 1965 on parametric resonance in plasma was of fundamental importance for understanding the properties of plasma in strong electromagnetic fields. It produced a broad resonance in the entire scientific community, stimulated an intense surge of activity in studying various nonlinear processes in plasma, and formed a launching pad for numerous research programs. Silin and his pupils laid the foundations of the theory of parametric instabilities

and parametric turbulence, with applications to the problem of the interaction of plasma with high-power laser radiation.

Silin also contributed importantly to developing the theory of ion-sound turbulence. It became clear, after a long series of papers written in collaboration with his pupils, that the stage was reached in the theory at which it was possible to provide a quantitative description of the anomalous charge and heat transfer, of turbulent heating, and of the spectrum of ion-sound turbulence.

Another series of papers written by Viktor Pavlovich Silin on nonlinear electrodynamics was devoted to the penetration of strong electromagnetic fields into plasma: the theory of self-consistent nonlinear waveguides and a nonstationary theory of the dynamic effect of high-power radiation on moving plasma. Many of the results derived in this research program were later confirmed in experiments.

Silin was twice awarded the State Prize of the USSR: in 1970 for work on the theory of Fermi liquid, and in 1987 for his work in nonlinear plasma theory. Silin's achievements were rewarded with two Orders of the Red Banner of Labor. He was also given the honorary title 'Distinguished Scientist of the RSFSR'. Silin is a member of the Editorial Board of the journal *Fizika metallov i metallovedenie (Physics of Metals and Metallurgy)*, Deputy Editor-in-Chief of the journal *Kratkie soobshcheniya po fizike (Short Communications: Physics)*, and a member of the 'Plasma Physics' Learned Council of RAS. He was for years and years the principal organizer and the driving force behind the All-Union Conferences on the Interaction of Electromagnetic Waves with Plasma, and also sat on organizing committees of a number of the largest international conferences on plasma physics.

In addition to his intense research load, Silin pays great attention to training new generations of scientists. Over many years he is engaged in pedagogical work at the Moscow Engineering Physics Institute (MIFI) as Professor. The courses he gives, 'Hydro- and gas dynamics' and 'Physical kinetics', have lifted many a generation of students to a level that allows them to join, seemingly without problems, active theoretical research in plasma physics and hydro- and gas dynamics. Silin and his disciples have successfully trained a large number of well-known specialists who work in the USA, Europe, and Asia.

Silin built up his large physics school and founded the Sector of the Theory of Plasma Phenomena at the Lebedev Physics Institute. Among his pupils are more than 30 Candidates of Sciences, ten of whom have received DSc diplomas. For many years now Silin has chaired the colloquium that he created on plasma physics and solid-state physics; scientific discussions at this colloquium stimulate speakers to take a fresh look at the problem in question and constitute a brilliant learning ground for young scientists.

Silin, a socially active member of the community, has worked over many years in various social bodies and occupied leading administrative positions in science.

Whatever happens, his never wilting interest in physics and his passion to acquire new knowledge do not let him leave science for other pastures. These days he works with the same abandon that he manifested while a young man, and he publishes 10 to 20 papers a year. He is surrounded with young people — his students and postgraduates — but also with now mature former pupils. Silin shows special attention to the youngest scientists, which is especially crucial in these years of the problematic existence of science as such, making

great efforts to support them and transmitting to them his burning interest in and devotion to science.

Viktor Pavlovich Silin is fully active and brimming over with projects and aspirations, despite his eighty years of age. We wish him good health and complete success in bringing his creative plans to fruition.

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