

On the 90th anniversary
of Professor Ernst Anatoliyovych Pashitskii
(1936–2023)



Ernst Anatoliyovych Pashitskii — Doctor of Physical and Mathematical Sciences, Professor, and Corresponding Member of the National Academy of Sciences of Ukraine — passed away at the age of 86, a few years before what would have been his 90th birthday on December 16, 2026. A brilliant physicist, he made fundamental contributions to condensed matter physics and played an important role in the development of theoretical physics in Ukraine. Equally, he was a remarkable teacher and mentor who formed several generations of Ukrainian physicists.

Ernst Anatoliyovych was born on December 16, 1936, in Zhytomyr. His father, Karl Karlovich Bagants, a German communist, had emigrated to the USSR in the early 1930s; in 1937 he left to fight in the International Brigades in Spain and was killed in battle the following year. His mother, Lidiya Fedorovna Bagants, was a music teacher. In 1941, Erik, his mother, and his grandmother were evacuated to Guryev, Kazakhstan, and the hardships of that wartime childhood remained with him for the rest of his life. The family returned to Zhytomyr in 1944, where his mother married Anatoly Efimovich Pashitskii, who adopted Erik and gave him his name. In 1951, the family moved to Kyiv. Erik graduated from high school with a silver medal in 1954 and entered the Physics Department of Taras Shevchenko National University of Kyiv. Upon graduating in 1959, he

joined the Institute of Physics of the National Academy of Sciences of Ukraine (NASU) in the gas electronics department, where he began his lifelong career, initially working on problems in plasma physics.

A decisive stage in his formation as a scientist came with his postgraduate studies at the I. V. Kurchatov Institute of Atomic Energy, where he was immersed in the creative intellectual atmosphere of the theoretical group led by Academician M. A. Leontovich. E. A. Pashitskii regarded his supervisor, A. B. Mikhailovskii, together with Leontovich himself, as his principal mentors in plasma physics. He completed his postgraduate studies in 1965 and returned to Kyiv to defend his candidate's dissertation, "Problems of the Theory of Stability of Nonequilibrium Plasma".

Then he became fascinated with another field of physics, the physics of superconductivity and, in particular, with what would later be recognized as high-temperature superconductivity. The technological promise of superconductivity was by then widely appreciated, yet the common opinion was that the standard phonon mechanism of superconductivity could not sustain a critical transition temperature above roughly 40 K. Physicists worldwide were accordingly searching for alternative mechanisms capable of raising this threshold toward the more practically attainable temperature of liquid nitrogen, near 100 K. In 1967, Ernst A. Pashitskii proposed

one such mechanism: a non-phonon pathway to superconductivity arising from the interaction of electrons with acoustic plasmons. He discussed the idea widely and recalled with particular warmth his conversations with A. I. Akhiezer and V. G. Bar'yakhtar — the latter of whom he liked to call, half in jest, his “godfather” of superconductivity. The work appeared in 1968 in the “Journal of Experimental and Theoretical Physics”, reviewed by the leading authority in the field, G. M. Eliashberg, who decided to discuss this article directly with the young author and continued to discuss his later work with him for years afterward. It was this paper that first established E. A. Pashitskii, still a young scientist, as a serious voice in the field. His doctoral dissertation, “Collective Effects and Superconductivity in Systems with Coulomb Interaction”, followed in 1974, and the study of superconductivity remained the central thread of his scientific life thereafter.

When high-temperature superconductivity was experimentally discovered in layered cuprate compounds, E. A. Pashitskii was already among the recognized authorities on the subject. His scientific interests extended well beyond superconductivity proper. He carried out extensive studies of the electronic and structural properties of fullerenes and carbon nanotubes, and developed a theory of superfluid helium, resolving the long-standing puzzle of the extremely low density of the standard single-particle condensate, introducing the concept of a two-particle boson condensate, and constructing a quantitative theory of the spectrum of elementary excitations, which includes a description of the roton minimum. Reflecting on the breadth of his scientific life in his memoir “My Life-Being”, he wrote with characteristic candor: “I was often engaged in solving several quite different problems at once, and this gave my daily scientific work its reliability and stability: if one problem resisted solution — as is not uncommon in our line of work — then luck would find me in another, drawn from a wholly different field of physics”.

That restless breadth carried him, late in his career, back to the hydrodynamic problems with which he had begun. From the 1990s onward, he developed a nonlinear hydrodynamic theory of vortex structures, applying it to phenomena as varied as tornadoes in the Earth’s atmosphere and magnetohydrodynamic vortices in the solar atmosphere. In his final years, with undiminished enthusiasm, he turned to cosmology, proposing an original model of a first-order phase transition over the scalar curvature of the early universe, followed by an epoch of inflationary expansion.

Ernst Anatoliyovych is also well known for pioneering work in the field of surface physics, which was awarded the State Prize of the Ukrainian SSR in Science and Technology in 1987. Later, his contributions to the theory of coherent quantum states were recognized with the State Prize of Ukraine in Science and Technology for 2005–2006; when a rule limiting recipients to a single lifetime award was subsequently introduced, Ernst A. Pashitskii withdrew his own candidacy from consideration.

Over the course of his career, he supervised six students to the candidate’s degree, three of whom went on to earn doctorates of their own, and he published more than 200 papers in leading scientific journals. For thirty years he lectured on theoretical physics in the Physics and Radiophysics departments of Taras Shevchenko National University of Kyiv. As deputy editor-in-chief, he played an important role in producing the unique encyclopedic dictionary “Solid State Physics”, for which he and other members of the editorial board were awarded the S. I. Pekar Prize of the NASU. He was, throughout his life, a gifted communicator of science to the wider public: he authored the popular-science book “Superconductivity and Superfluidity in Science and Technology”, the university textbook “Fundamentals of the Theory of Superconductivity”, and numerous articles for popular science journals; he lectured widely, belonged to the Znamnya (“Knowledge”) society, and served as scientific consultant to the Kyiv Popular Science Film Studio. His science-fiction stories appeared in the magazine “Tekhnika Molodyozhi”, and a novella co-written with A. Rozhen, “The Journey Will Be Dangerous”, drew many young readers toward science.

Beyond his scientific accomplishments, Ernst Anatoliyovych was a man of broad education, deeply versed in music, painting, and literature. He came to poetry late, in the 1980s, writing at first playful verses for friends and colleagues before coming to feel that poetry, at times, came to him instead of words from his inner world. Without ever claiming the title of poet, he published two collections of verse, in 2006 and 2011. Science was his Muse, and it runs through much of his poetry. To one poem he affixed as an epigraph the verse from Ecclesiastes (1:18) — “For in much wisdom is much grief: and he who increases knowledge increases sorrow” — and answered it with his own credo as scientist and man: “He who is burdened with knowledge must know his fate, harsh and simple: the heavy path to knowledge is bound with sorrow! So, walk it more cheerfully, and never stand still!”

Those who knew him remember a man who was life-loving, courageous, and uncompromising in equal measure — unfailingly sociable, quick to form warm and lasting friendships, generous in his empathy, and genuinely glad in the successes of others. Science remained his life’s devotion to the very end; even through serious illness, he continued to work and to take pleasure in creative thought, retaining to the last an almost childlike wonder at the beauty of the universe and at the mind’s capacity to understand it.

This special issue brings together reviews and research articles contributed by scientists working in solid-state physics, many of them students, collaborators, and friends of Ernst Anatoliyovych (Erik) Pashitskii. His memory will remain cherished by all who had the privilege of knowing him.

E. G. Galkina, A. S. Kovalev