

In memory of Lev Naumovich Bulaevskii

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Lev Naumovich Bulaevskii, an outstanding theorist who worked in the field of condensed matter physics, died on January 8, 2025 in Walnut Creek, California, USA.

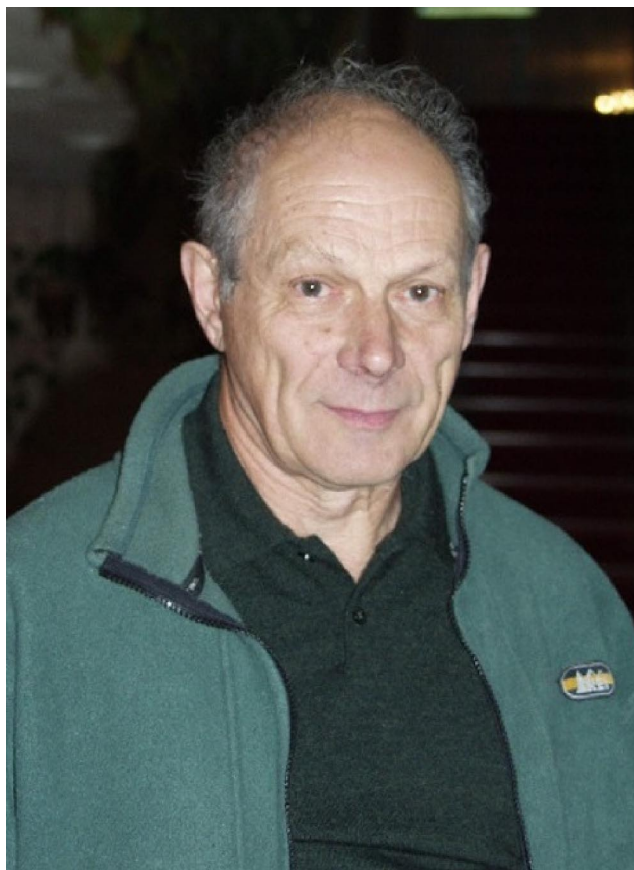
L.N. Bulaevskii was a regular contributor to the journal *Uspekhi Fizicheskikh Nauk* (UFN), where he published over 20 papers. He was a student of Vitaly Lazarevich Ginzburg. His pioneering work had a profound influence on the physics of superconductivity, vortex matter, and quantum magnetism.

During his long and fruitful scientific career, which lasted over six decades, he made a significant contribution to the understanding of the relationship between magnetism and superconductivity. His research was also related to layered and strongly disordered superconductors, Josephson junctions, vortex matter, the conducting properties of materials in confined geometry, and other problems in quantum electron physics. His theoretical ideas not only deepened our fundamental understanding of condensed matter physics, but also served as a guide for numerous experimental discoveries.

Born on November 18, 1935 in the city of Gorky (now Nizhny Novgorod again), Bulaevskii showed interest in physics from his early years. He graduated from Gorky University and then entered the postgraduate course at the P.N. Lebedev Physical Institute of the USSR Academy of Sciences (FIAN) in Moscow, where he later defended his candidate thesis under the supervision of Vitaly Lazarevich Ginzburg. This thesis on exchange interaction in crystals and molecules laid the foundation for his future research in condensed matter physics.

In the 1960s and 1980s, Bulaevskii was part of the dynamic research community at FIAN, where he worked in the Theoretical Department headed by V.L. Ginzburg (the future winner of the 2003 Nobel Prize in physics), side by side with the most brilliant minds in theoretical physics in the Soviet Union. The condensed matter physics group (headed by David Abramovich Kirzhnits) was engaged in many topical problems. Lev Bulaevskii, Evgenii Maksimov, Daniil Khomskii, Oleg Dolgov, and Aleksandr Sobyenin shared a small room in FIAN. Working days at the Institute were concentrated on the regular Tuesday seminar on superconductivity and V.L. Ginzburg's famous Wednesday All-Moscow physical seminars. Meetings at these seminars promoted lively debates and kept the researchers informed about current discoveries.

Bulaevskii's attitude towards physics was scrupulous, combining a deep understanding of experimental data and exact theoretical predictions. He always tried to find effects that might be observed and used to verify the existing predictions. Bulaevskii's research made a determining contribution to many fields of condensed matter physics. His work in the 1970s on the Josephson super-



Lev Naumovich Bulaevskii
(18.11.1935 – 08.01.2025)

conducting ferromagnetic junction predicted the existence of the π junction, which later found application in spintronics and quantum information science. He performed a pioneering examination of layered superconductors and strongly disordered superconductors near the Anderson metal–dielectric transition.

With the discovery of high-temperature superconductors in the late 1980s, Bulaevskii's earlier studies concerning layered superconductors and Josephson vortices became particularly topical. His 1992 papers with Ledvij and Kogan, describing the properties of the vortex lattice in oblique magnetic fields, quickly became classical and fostered the current understanding of vortex matter in high-temperature materials. The work on Josephson plasma resonance demonstrated its usefulness as a powerful instrument for investigating vortex states, which exerted influence on numerous experimental studies.

In 1991, L.N. Bulaevskii moved to the USA, first to the University of Iowa, and then worked at the Los Alamos National Laboratory. His time in Los Alamos was fairly productive for him with close communication with experimentalists.



Lev Naumovich Bulaevskii at conference Vortices in Josephson Structures: giving a talk and discussing with colleagues A.O. Sboichakov and K.I. Kugel' (June 9–19, 2015, Kiten, Bulgaria; photo by M. Gaifullin).

Lev Naumovich was a constant source of inspiration for many young colleagues, who took on his inquisitive approach to physics, active participation at seminars, and a keen ability to discern the difference between important and less pressing problems. Many of his students became famous scientists. His infectious passion for physics gave rise to countless unforgettable discussions, which even now continue to response with those who had the pleasure of working with him.

Lev Naumovich loved nature, was actively involved in tourism, and kayaked in Karelia. Later, he came to love the nature of the American Southwest, exploring the deserts, plateaus, and canyons surrounding Los Alamos.



Bulaevskii and Batista walking with their wives in Oregon, 2015.

His colleagues remember him as a calm, wise man, but at the same time a lively and kind man, whose passion for physics and the study of nature was truly remarkable. After an official retirement in 2013, L.N. Bulaevskii remained deeply involved in scientific research. He collaborated with the University of Oregon (USA) and the International Institute of Physics in Natal (Brazil) and continued writing scientific papers and participating in international conferences in his eighties.

L.N. Bulaevskii's studies brought him several awards, including the 2015 A.A. Abrikosov Prize, which he shared with Masashi Tachiki and Aleksei Koshelev, for their novel work on Josephson vortex dynamics and plasma oscillations in high-temperature superconductors. In 2000, he was elected a member of the American Physical Society.

The influence of L.N. Bulaevskii's personality went far beyond the framework of his research. For his students, postgraduates, and postdocs he was a tutor who combined scientific rigor with kindness and genuine concern. His former students and young colleagues retain warm memories of Lev Bulaevskii, not only as a teacher, but also as a friend. Lev



Awarding of 2015 A.A. Abrikosov Prize to Bulaevskii, Koshelev, and Tachiki at International Conference on Vortex Physics in Spain (see <https://www.ifimac.uam.es/ifimac-news/abrikosov-prize-2015/>).

Naumovich was held in high esteem by his fellow physicists, and his work continues to inspire new research in the fields of superconductivity, magnetism, and quantum materials in general. His papers are still being read and his influence can be seen in the style of many young scientists for whom he was a mentor.

A scientist, tutor, and researcher of both nature and the world of physics—Lev Naumovich Bulaevskii left warm memories among his colleagues and friends.

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