

In memory of Volodymyr Oleksandrovych Shcherbina
(1935–2023)



On January 19, 2023, an outstanding Ukrainian mathematician, one of the leading specialists in the field of mathematical physics, Doctor of Physics and Mathematical Sciences, Professor Volodymyr Oleksandrovych Shcherbina passed away. Volodymyr Oleksandrovych was born on February 3, 1935 in the city of Makeevka Donetsk Oblast. During the war, the family of Volodymyr Oleksandrovych went to evacuation and returned to Kharkiv when the war ended, where Volodymyr Oleksandrovych graduated from school number 135. After finishing school, he entered Kharkiv Polytechnic Institute. But in 1952, Volodymyr Oleksandrovych, following the advice of Naum Ilyich Ahiezer who noticed a talented student, transferred to the Faculty of Physics and Mathematics of Kharkiv University (V.N. Karazin Kharkiv National University now), where he studied first as a student and then as a PhD student.

From 1960 to 1974, Volodymyr Oleksandrovych worked for the Institute for Low Temperature Physics and Engineering of the Ukrainian Academy of Sciences of the USSR occupying a position of the deputy head of the Department of Mathematical Physics headed by Academician V.O. Marchenko. In 1974, V.O. Shcherbina started work for Kharkiv University being invited by Naum Ilyich Ahiezer to head the Department of Mathematical Physics and Computational Mathematics instead of him.

In May 1964, Volodymyr Oleksandrovych defended his candidate dissertation “Regularization of Products of Generalized Functions of the Type of Causal Functions of Quantum Field Theory”, and in December 1975, doctoral dissertation “Some Properties of R -Operation for Fields with Local Interaction”.

Volodymyr Oleksandrovyh was a scientific advisor of many well known Kharkiv's mathematicians such as I.D. Chuyeshov, I.Yu. Chudinovych, O.V. Uvarov, V.D. Hordevskyi, E.O. Kohut, O. Ohanyan and others. He made a significant contribution to the development of quantum field theory, in particular, the theory of renormalization, initiated by such outstanding scientists as Dyson, Feynman, Tomonaga, Schwinger, etc. The results of the Academician N.N. Bogolyubov's school were developed by Volodymyr Oleksandrovyh and his students in such directions as the construction of an S -matrix of T -exponents type for the case of meson-nucleon interaction and other spinor theories, analysis of the tensor structure of vertex functions, derivation of infinite system of nonlinear integro-differential equations for vertices of these functions and the proof of the theorem on the existence and uniqueness of its solution for a certain class, the study of the connection between the theory of scattering in cases of Minkowski and Euclidean spaces, the Thirring model, methods of regulation of rations and renormalizations to eliminate infrared and ultraviolet differences, etc. These achievements made it possible to introduce a strict mathematical justification in those sections of the quantum field theory, where only the argumentation of the physical level of rigor was applied. Volodymyr Oleksandrovyh and his students used specific and unconventional methods such as an introduction of counterterms for further searching asymptotics depending on the limit behavior of truncation parameters and interaction constants; the construction of generalized functions of many variables concentrated on special hypersurfaces of the Minkowski space and other spaces with indefinite metric; thorough analysis of the mathematical structure of scattering matrix (especially for the case of fields with local interaction); graphs theory (in particular, strongly connected Feynman diagrams). As a result, there was a significant deepening of the achievements in quantum electrodynamics for more complex models and theories.

In the 1980s, Volodymyr Oleksandrovyh was engaged in studying other subjects, namely, boundary value problems, including a three-dimensional Laplace equation and in regions with corners; the method of discrete vortices for Neumann's problem, etc.

In the 90s, Volodymyr Oleksandrovyh also made a big contribution to the construction of Independent Ukraine being elected as a deputy of the Verkhovna Rada of Ukraine. He took an active part in the political life of the country and scientific life of V.N. Karazin Kharkiv National University.

Volodymyr Oleksandrovyh always attracted people by charging them with his energy and optimism. His students, colleagues and friends remember his great knowledge in the most diverse areas of life and the aptness of his favorite sayings.

The bright memory of Volodymyr Oleksandrovyh Shcherbina will remain in the hearts of all who knew him. We express our sincere condolences to the relatives, friends and colleagues of Volodymyr Oleksandrovyh in connection with this heavy loss.

Editorial board