LEADER IN THEORETICAL AND MATHEMATICAL PHYSICS DEVELOPED IN THE REPUBLIC OF MOLDOVA

Together with my brother, Vsevolod Moskalenko, we graduated from the faculty of physics and mathematics of the Kishinev State University (KSU) in 1951. As one of the most eminent graduate students, Vsevolod Moskalenko was kept at the university to continue his improvement and work as an assistant in the field of theoretical physics, teaching the students and performing the practical courses. We studied the theoretical physics under the guidance of Professor Vladimir Malyarov, who arrived each week from Odessa by a biplane and delivered his lectures on quantum mechanics in a brilliant form in 1950.

However, we have written our diploma theses under the guidance of Professor Yurii Perlin, who began to work in KSU in the 1950/1951 academic year. We were the first diploma students; our theses were related to the theory of polarons in semiconductors. The polaron problem was an important topic in theoretical physics in that period of time as an example of an interaction of the electron with the quantum field. In that period of time, the papers by Bogoliubov and Tyablikov, by Landau and Pekar, by Feynman, Toyozawa, and other appeared. They attracted our attention; together with our colleagues Evghenii Pokatilov, who graduated from KSU in 1950, and Victor Kovarskii, who graduated from KSU in 1952, we have organized a seminar to discuss these papers.

The first results obtained by Vsevolod Moskalenko in the theory of polarons published in the fiftieth years were mentioned by H. Haken in his review article dedicated to the theory of polarons published abroad and rewritten in the Soviet Union. A decisive role in the scientific life of Vsevolod Moskalenko was played by the influence of the scientific school created by the outstanding theoretical physicist and mathematician N.N. Bogoliubov at M.V. Lomonosov Moscow State University (MSU) and V.A. Steklov Mathematical Institute of the Academy of Sciences of the USSR. A happy event in the Vsevolod Moskalenko's life happened in 1958–1959, when he was sent as a young promising researcher for two years to MSU to improve his qualification and perform his candidatus scientiarum thesis. It was an extraordinary period of time for theoretical physics, because one year earlier, in 1957, J. Bardeen, L.N. Cooper, and J.R. Schrieffer (BCS) formulated their microscopical theory of superconductivity. It was based on the idea of the Bose–Einstein Condensation (BEC) of Cooper pairs of electrons forming the bound, composed quasi-boson particles due to the electron–phonon interactions. Almost immediately, the BCS theory was reformulated by N.N. Bogoliubov using the coherent unitary transformation of the Hamiltonian in a similar way with his microscopical theory of superfluidity elaborated 10 years earlier in 1947. The difference consists in the use of the Bose operator description in the case of superfluidity and the Fermi operators in the case of superconductivity.

At the same time, N.N. Bogoliubov underlined the necessity to generalize the BCS theory taking into account the energy band structure of the real superconductors with many overlapping energy bands. This problem was solved by young researcher Vsevolod Moskalenko; in October of the same 1958 year, his paper was submitted to press. To better understand this unusual period in the development of physics, one can remember that, in the same 1958 year, in Moscow scientific school of academician L.D. Landau, young theoretical physicist A.A. Abrikosov elaborated his theory of vortices in superconductors, which were later referred to as Abrikosov filaments.

In the same period of time in Kiev the possibility to achieve the BEC of excitons and their superfluidity was suggested. This possibility was implemented experimentally much later.

Returning from Moscow to Kishinev, Vsevolod Moskalenko brought with him the best traditions of the academician N.N. Bogoliubov's scientific school, such as the high scientific level, high requirements to himself, and democracy in the personal contact with the colleagues, collaborators and doctorands. I remember that all of us taking parts in his seminars in the 1960s years began to study the methods of the quantum field theory in applications to the quantum statistics and to the condensed matter physics. These methods form the foundation of theoretical and mathematical physics; they are based on the perturbation theory, where the kinetic energy of the particles is supposed to be much greater than their interaction energy. All his scientific life Vsevolod Moskalenko worked in the first flight of the theoretical physics in Moldova and concentrated his efforts on the solution of many principal problems, such as the theory of superconductivity, the theory of spin glasses, and the theory of strongly correlated electron systems. He realized that, in the last case, the usual methods of theoretical physics cannot describe the new phenomena discovered in nature. And these efforts were consequently prolonged till the last years of his life. Just his interest in new and principal aspects of theoretical physics is reflected in our common study of the Chern–Simons theory and in its application to describe the interaction of a two-dimensional electron–hole system with quantum point vortices. Our paper will be published in the present issue.

Professor Vsevolod Moskalenko was elected a corresponding member of the Academy of Sciences of Moldova in 1970 and a full member in 1976. He was the founder of a Scientific School in the Theoretical and Mathematical Physics, in the frame of which, under his guidance, 20 candidatus scientiarum theses and 5 doctor habilitat theses were defended. More so, an independent daughter school was created under the guidance of Professor Maria Palistrant as a ramification of the main trunk of theoretical physics being dedicated to the multiband theory of superconductivity and related problems. In the frame of this school, 7 doctor of science theses were defended and 2 theses are under preparation.

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