

Mikhail Vissarionovich Sadovskii (on his 70th birthday)

DOI: <https://doi.org/10.3367/UFNe.2018.01.038287>

The 25th of February 2018 was the 70th birthday of Mikhail Vissarionovich Sadovskii, Academician, Chief Researcher at the Institute of Electrophysics of the Ural Branch of the Russian Academy of Sciences (RAS), and research supervisor of the Theoretical Physics Department at the Institute of Metal Physics of the Ural Branch of RAS.

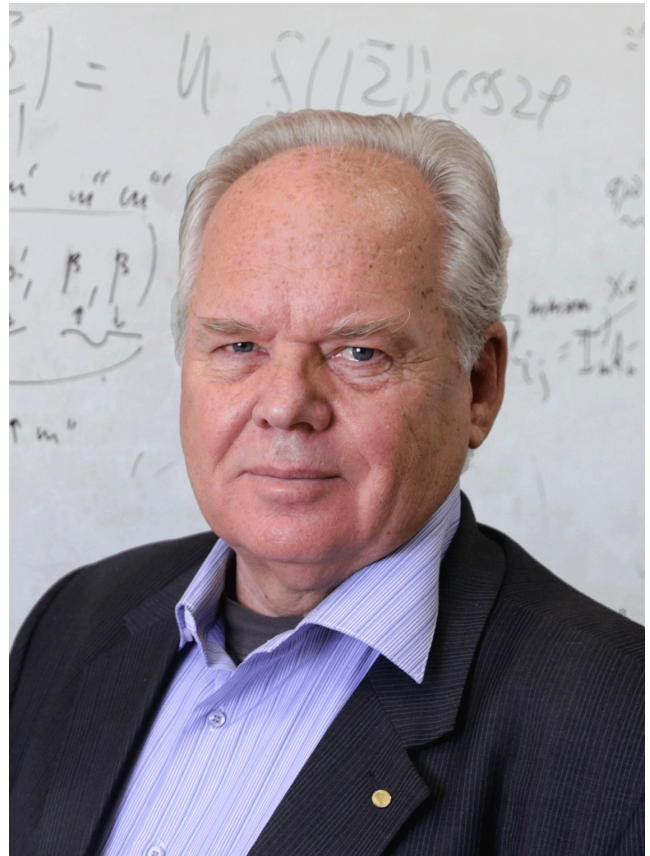
His entire scientific carrier is inseparable from the Russian Academy of Sciences. He graduated from Ural State University in 1971 and entered the postgraduate course at the Theoretical Physics Department of the Lebedev Physical Institute, where his scientific advisor was L V Keldysh. This determined the direction of his studies for many subsequent years.

From 1974 to 1987, M V Sadovskii was a research worker at the Institute of Metal Physics of the Ural Scientific Center of the USSR Academy of Sciences, and in 1987 he enrolled at the Institute of Electrophysics of the Ural Branch of RAS, then being set up by G A Mesyats, where he organized a Laboratory of Theoretical Physics and headed it for 30 years. He is now Chief Researcher in this laboratory and a scientific supervisor at the Department of Theoretical Physics of the M N Mikheev Institute of Metal Physics, the Ural Branch of RAS. At a difficult time for Russian science (1993–2002), he was Deputy Director of the Institute of Electrophysics. From 1991 to 2010, M V Sadovskii also worked as Professor at the Chair of Theoretical Physics of Ural State University.

M V Sadovskii is the author of more than 170 scientific publications, including five monographs and a number of fundamental reviews. The main areas of his scientific activity that he started when a postgraduate student at Lebedev Physical Institute are the electron theory of disordered systems and the theory of superconductivity.

He proposed a number of exactly solvable models of one-dimensional electron systems, including the original model of the pseudogap state in the fluctuation region of the Peierls transition accompanied by the formation of short-range order charge density waves exhibiting non-Fermi liquid behavior. Later on, these studies became of great importance in connection with the problem of describing pseudogaps in high-temperature superconductors.

M V Sadovskii made a significant contribution to the theory of electron localization in disordered systems. He was one of the first to apply arguments to this problem based on the scaling ideas and the instanton approach. In his studies, he developed substantially the self-consistent localization theory, which became the most important practical tool for solving localization problems in disordered systems.



Mikhail Vissarionovich Sadovskii

M V Sadovskii (together with L N Bulaevskii) proposed for the first time a generalization of the theory of ‘dirty’ superconductors to the case of systems with very short mean free paths near the metal–insulator localization transition. In particular, in these studies he presented a microscopic derivation of the Ginzburg–Landau expansion coefficients in the region of strong disorder and predicted for the first time the possibility of realizing superconductivity in the Anderson insulator phase. He was also the first to demonstrate the importance of local state density fluctuations near the superconductor–insulator transition, leading to a highly inhomogeneous state of superconductors in the vicinity of this transition.

In 1987, after the discovery of high-temperature superconductivity in cuprates, M V Sadovskii became actively engaged in the study of this new class of superconductors. Together with his students, he carried out an extensive series of works devoted to clearing up the nature of the pseudogap state in high-temperature superconductors, which refers to one of the most topical areas of the physics of these systems.

In particular, he generalized the one-dimensional pseudogap models proposed by him before to the two-dimensional case, investigated the specific features of superconductivity in the pseudogap state caused by dielectric-type short-range order fluctuations (antiferromagnetic or charge density wave type), and formulated the theory of optical conductivity in the pseudogap state.

In recent years, he proposed a new approach in the physics of strongly correlated electron systems that allowed including arbitrary ‘external’ interactions in the dynamic mean-field theory (DMFT + Σ approximation). This approach was intensely exploited by him and his colleagues to describe the properties of the pseudogap state in high-temperature superconductors, including those obtained in calculations of the electron properties of real HTSCs, i.e., compounds based on cuprum oxides (the LDA + DMFT + Σ method), and also in the analysis of the general problem of the metal–insulator transition in disordered systems with strong electron correlations (Mott–Anderson transition). More recently, this approach has been intensely developed by his group to describe the region of BCS–Bose crossover in the disordered attractive Hubbard model, which is fairly pressing for a new class of high-temperature superconductors.

After the discovery in 2008 of high-temperature superconductivity in pnictides and iron chalcogenides, M V Sadovskii supervised the pioneering LDA and LDA + DMFT calculations of the electronic spectra of these systems that proved to be highly consistent with ARPES experiments and played the decisive role in the formation of the ‘standard’ model of the electronic spectrum of new superconductors. This investigation became well known all over the world.

In 1994, M V Sadovskii was elected a Corresponding Member, and in 2003 a Full Member of the Russian Academy of Sciences. For many years, he has been a Member of Presidium of the Ural Branch of RAS and a Member of the Bureau of the Physical Sciences Division of RAS. In 2002, he became laureate of the RAS A G Stoletov Prize. In 2016, he was awarded the first Gold Medal of RAS in the name of V L Ginzburg “for theoretical studies of high-temperature superconductors”. For many years, he has been working on expert councils of RFBR and has been Deputy Chairman of the RAS Committee for the Struggle against Pseudo-science and Falsification of Scientific Research. For many years, M V Sadovskii was a member of the Council of Rectors of Ekaterinburg. He actively works on the editorial boards of the leading Russian physical journals—*JETP* and *Physics–Uspekhi*. For the last 10 years, he has also been Head of the famous Kourovka Ural Winter School of Theoretical Physicists.

In 2013, M V Sadovskii was among the members of RAS who opposed the destructive reform of RAS and set up the authoritative ‘July 1st Club’. His public activities in this area are well known. In particular, in 2016 he was the initiator of the renowned ‘Letter of 200 members of RAS’ where the failure of the governmental reform of RAS was stated and concrete measures were suggested for overcoming the crisis in which the Russian Academy of Sciences appeared to be.

At the age of 70, M V Sadovskii continues doing intense research in the hottest fields of the theory of condensed matter and takes an active part in the public life of RAS. He is full of new scientific ideas and plans. We extend best wishes to

Mikhail Vissarionovich Sadovskii on his jubilee with all our hearts and wish him good health and further success in his work for the benefit of our science.

*A F Andreev, P I Arseev, A B Borisov,
V V Brazhkin, B N Goshchitskii, E Z Kuchinskii,
G A Mesyats, A K Murtazaev, I A Nekrasov,
G N Rykovanov, V V Ustinov, M I Yalandin*