

## Vladimir Georgievich Kadyshevsky 1938-2014

On 24 September, the scientific leader of JINR, Vladimir Georgievich Kadyshevsky, died suddenly. A prominent scientist in elementary-particle theory and high-energy physics, he had an unfailing interest in the most challenging and principle issues in physics, creative approaches in research, and a rich intuition.



Kadyshevsky

Kadyshevsky was born on 5 May 1937 in Moscow. He studied at the Suvorov Military School in Sverdlovsk from 1946 to 1954, before entering the physics department of the Lomonosov Moscow State University (MSU). He immediately expressed an interest in theoretical physics. In 1959 his diploma thesis "On Mass Spectrum and Fundamental Length in Field Theory" won first prize and was awarded the medal of the USSR Ministry of Education at the All-Union Olympiad for students' theses. He graduated in 1960 and continued his studies as a postgraduate under Nikolai Bogoliubov. He successfully defended his PhD thesis in 1962, before starting work at the Laboratory of Theoretical Physics of JINR.

From 1964, Kadyshevsky published a series of papers dedicated to the covariant Hamiltonian formulation of quantum field theory. He worked out a unique diagram technique that, unlike the well-known Feynman technique, operates on amplitudes on a mass surface. Its application to the problem of the interaction of two relativistic particles allowed him to reduce the number of variables and establish the 3D integral equation for the relativistic scattering amplitude that is now known as the Kadyshevsky equation. His approach allows the transfer of research methods, intuition and experience accumulated in the theory of analogous non-relativistic systems - for example, few-nucleon atomic nuclei - to the sphere of elementary-particle physics. The Kadyshevsky equation is today used for practical calculations of hadron-hadron interactions and for the description of the quark structure of hadrons.

His name is also connected with the relativistic formulation of quantum field theory in quantized space-time that satisfies the unitarity requirements and the generalized causality condition. His internationally acknowledged work in this field foreshadowed research in non-commutative geometry in the 1990s that is now the focus of theoreticians' attention. In the theory of internal symmetry, Kadyshevsky postulated

a number of correlations for effective cross-sections and the masses and magnetic moments of hadrons that have been proved experimentally. Even before the Standard Model of electroweak interactions was constructed, he studied lepton-hadron symmetries that are revealed in weak processes.

Kadyshevsky became professor at MSU in 1970 and for many years was head of the Elementary Particle Physics Chair. Many of his students have become successful, well-known scientists, working in scientific centres in Russia and abroad. On numerous occasions he guided the work of schools for young scientists, international symposia and conferences. On his initiative a new university - the International University of Nature, Society and Man - was opened in Dubna in 1994, and a year later he became its president.

After being head of a group of Soviet physicists working at Fermilab in the years 1977-1978, Kadyshevsky later led JINR's activities for the DELPHI experiment at CERN's Large Electron-Positron collider in the years 1983-1985, in particular guiding related theoretical research. Then, at the suggestion of Bogoliubov, he was elected to be director of the Laboratory of Theoretical Physics of JINR in 1987. In this position, he made an important contribution to promotion of the scientific traditions of the Dubna theoretical school, and to the development of broad international co-operation.

In 1992, Kadyshevsky became head of JINR, a position he held until 2005. During these difficult years, he and his colleagues managed not only to maintain the institute but also to enhance its position considerably. In this period, experiments on Russia's first superconducting accelerator of relativistic nuclei - the Nuclotron - began; the research reactor IBR-2 was upgraded to provide neutron beams with record parameters; the synthesis of new superheavy elements was carried out; and there was much progress in the development of programmes in particle physics at JINR and at other large scientific centres around the world. From 2005, in his position as the institute's scientific leader, he contributed greatly to the development of the main scientific trends and international co-operation at JINR.

He undertook a range of scientific organizational activities. He was member of the Presidium of the Russian Academy of Sciences, and of the Expert Advisory Board under the chairman of the Russian Federation Accounts Chamber. For a number of years he was president of the Union of Scientific Societies of Russia and a member of the board on particles and fields of the International Union of Pure and Applied Physics. His scientific achievements brought a number of prizes, and he was an honorary doctor of several foreign universities, as well as an honorary or foreign member of various academies.

Vladimir Kadyshevsky was an active advocate of values of fundamental science. He strived to increase the public prestige of Russian science and the Russian Academy of Sciences. He had a strong sense of responsibility, devotion to science, ambition and an extraordinary commitment to work. These features combined in his character with a natural refinement, amiability and kind attitude towards people. His friends, students and colleagues will always remember him in their hearts.

- *Staff members of JINR.*