



**2025 is the International Year
of Quantum Sciences and Technologies
(on the 100th anniversary of quantum physics)**



DEAR READERS!

The United Nations proclaimed 2005 the International Year of Quantum Sciences and Technologies. The celebration of the 100th anniversary of quantum physics should draw public attention to the special importance of this science and its applications in everyone's life.

The fundamentals of quantum mechanics were laid, in fact, within three years, from 1925 to 1927. Back in 1900, Max Planck assumed that the energy of atomic radiation exists in discrete portions. Albert Einstein called them quanta. However, the rapid development of quantum theory occurred a little later, in the mid-1920s, thanks to the work of Niels Bohr, Werner Heisenberg, Erwin Schrödinger, Max Born, and other outstanding scientists.

In 1923, Louis de Broglie supposed that particles could exhibit wave properties. This idea underlies wave mechanics, founded by Erwin Schrödinger. Almost simultaneously, in 1925, Werner Heisenberg, Max Born, and Pascual Jordan developed matrix mechanics. In 1925, Wolfgang Pauli formulated the exclusion principle. In 1926, a relativistic generalization of the Schrödinger equation (Klein–Fock–Gordon) was proposed. In 1927, Werner Heisenberg derived the uncertainty relation, and Niels Bohr formulated the complementary principle. Paul Dirac proposed a relativistic equation for fermions in 1928.

Quantum physics underlies all phenomena and has long been a part of everyday life. One of the first and most important applications was the creation of weapons based on the fission of heavy nuclei and synthesis of light nuclei. Radical changes occurred due to the creation of lasers and their use in communications and technologies. Macroscopic quantum effects of superconductivity and superfluidity turned out to be fundamentally new amazing phenomena. Modern electronics (integrated circuits, transistors, microprocessors) are used even in everyday life. Modern medicine cannot be imagined without electron microscopes, NMR tomographs, isotopes, hard radiation, and positron annihilation spectroscopy. Today, great attention is drawn by the problem of creating quantum computers, quantum calculations, quantum communication, and cryptography.

The broad popularization of quantum physics beyond the professional community is aimed at developing fundamental science, creating new technologies, improving the quality of people's lives, and, ultimately, the progress of all humankind.

Celebrating this anniversary, the editorial board of the journal *Uspekhi Fizicheskikh Nauk* (UFN) plans to publish a number of reviews and papers in the anniversary section Quantum Sciences and Technologies: on the 100th anniversary of quantum mechanics.

UFN Editorial Board