



# 270th anniversary of Lomonosov Moscow State University



It is no exaggeration to say that Moscow University (now Lomonosov State University) has played a crucial role in the development of physics in Russia and has had a great influence on science in the entire world. Physics was first studied at the university immediately after its foundation, in the Faculty of Philosophy. As Lomonosov himself envisioned, the Department of Experimental and Theoretical Physics (now Department of Physics) was established. Many outstanding physicists, including eight Nobel laureates, studied and worked within the walls of the university. To date, significant experience in research and teaching physical disciplines has been amassed. Moscow University is rightfully considered one of the world leaders in the field of physics. It conducts research in almost all present-day areas of physics and astronomy and applies the achievements in physics in related fields: medicine, biology, cognitive sciences, etc. Many research results are being actively adopted in manufacturing.

Significant progress has been achieved in the creation of the latest technologies. Researchers at Moscow University are involved not only in the software implementation of artificial intelligence systems, but also in their design in the form of microcircuits, optical elements, etc. Quantum algorithms are used to speed up the training of neural networks. Moscow State University has established the Institute for Advanced Research in Artificial Intelligence and Intelligent Systems. The goal of the institute is to conduct fundamental and applied work, as well as interdisciplinary research using artificial intelligence.

The development of quantum computers is another of the most important current thematic areas. Scientists from Moscow University and the Russian Quantum Center were the first in Russia to start operating the first 50-qubit neutral rubidium atoms quantum computer prototype. The prototype was successfully tested on December 19, 2024, laying an excellent foundation for the development of quantum computers to a level of 300 or more qubits. Subsequently, it is planned to move from computers that execute only low-complexity algorithms to full-fledged universal quantum computers.

The laws of quantum physics make it possible to ensure absolute secrecy in data transmission. Moscow University has developed and successfully tested a fully automatic fiber-optic quantum communication system. The university is now a key participant in the Inter-University Quantum Communication project. An even more ambitious task is to implement space communications. A project was launched under an agreement with JSC Russian Railways.

This special issue of *Physics–Uspekhi* (*Phys. – Usp.* **68** (4) 317–430 (2025)) [*Usp. Fiz. Nauk* **195** (4) 335–454 (2025) in Russian], dedicated to the 270th anniversary of Moscow State University, contains articles and research papers by physicists from Moscow University, introducing the readership to achievements in some areas of physics and related sciences, and providing a brief history of the development of physics at the University.

*Viktor Antonovich Sadovnichy*

Rector of Lomonosov Moscow State University,  
Academician of the Russian Academy of Sciences