

Quantum Technologies and Nanoscience

Novosibirsk State University

Degree or qualification is awarded: **Master's degree**

Language of study: **English**

Mode of study: **full-time**

Duration: **2 years**

Availability of free education: **no**

Price: **5 200 USD per year**

Programme webpage at the university website:

<https://english.nsu.ru/admission/programs/master-s-degree-programs-english/quantum-optics-and-nanosciences/>

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Quantum Technologies and Nanoscience is an emerging field in modern physics and engineering. It opens a way to a quantum revolution which will result from the development of novel devices, based on quantum effects of superposition and entanglement. Recently, IBM created a quantum processor with cloud access for everybody. In 2019 Google claimed quantum supremacy. A Nobel Prize was awarded jointly to Serge Haroche and David J. Wineland "for ground-breaking experimental methods that enable measuring and manipulation of individual quantum systems" (Nobel Prize in Physics, 2012). The progress in semiconductor technology led to development of novel light-emitting structures which had been recognized by a Nobel Committee. The Nobel Prize in Physics 2014 was awarded jointly to Isamu Akasaki, Hiroshi Amano and Shuji Nakamura "for the invention of efficient blue light-emitting diodes which has enabled bright and energy-saving white light sources".

Novosibirsk is a leading research center in quantum technologies, semiconductor physics, optics, and laser technology. The master program "Quantum Technologies and nanoscience" provides opportunities to perform a research project with leading Russian research teams in experimental or theoretical physics, and to learn from the lectures given by recognized experts in the field. A publication in the peer-review international scientific journals is expected after the end of the project. We believe that this is a good starting point for research career in one of the most rapidly developing fields.

We have international collaboration with the best research centers worldwide. This includes University Wisconsin-Madison (USA), Physikalisch-Technische Bundesanstalt (Germany), Ecole Polytechnique and Institut d'Optique (France), Aston University and Open University (UK). The students will acquire the following skills:

- Planning projects in the field of quantum technologies and nanoscience;
- Development of theoretical models of dynamics of complex quantum systems;
- Ability to perform experimental research with complex modern equipment;
- Scientific communication in the field and presentation of results.

The students will learn the basics of modern quantum optics and quantum information, atomic spectroscopy, including laser cooling and trapping, fiber optics, silicon photonics and properties of low-dimensional systems.

The main aim of the program is to form a bridge for motivated students between undergraduate and PhD study. As the result of training the graduates of the MEP acquire knowledge and skills of qualified specialists in the field of modern optics and novel technologies.

Specializations within this programme