



**ЯЗЫК ОБУЧЕНИЯ:
АНГЛИЙСКИЙ**

СПЕЦИАЛИЗАЦИЯ КВАНТОВЫЕ МАТЕРИАЛЫ

СОВРЕМЕННЫЕ
КВАНТОВЫЕ И
НАНОФОТОННЫЕ
СИСТЕМЫ

СОВРЕМЕННЫЕ
КВАНТОВЫЕ И
НАНОФОТОННЫЕ

**Программа магистратуры
СОВРЕМЕННЫЕ КВАНТОВЫЕ И
НАНОФОТОННЫЕ СИСТЕМЫ**

НАНОФОТОННЫЕ
СИСТЕМЫ

Основной акцент специализации — теоретические методы моделирования материалов, в которых многочастичные квантовые корреляции качественным образом меняют свойства систем.

Студентов ждёт углубленное изучение спинтроники, аналитических и численных методов моделирования свойств материалов.

IITMO



ПРЕПОДАВАТЕЛИ

Михаил Портной	профессор, курс «Математические методы в физике»;
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Роман Полозков	в. н. с., курс «Квантовая теория многих тел».

ВСТУПИТЕЛЬНЫЕ ИСПЫТАНИЯ

- Медалист/победитель олимпиады «Я-профессионал»
- Победитель Конкурса докладов конгресса молодых ученых
- Конкурс портфолио
- Конкурс лучших научных работ стажировок физического факультета
- Конкурс стипендий физического факультета
- Победитель/призёр Мегаолимпиады
- Вступительный экзамен
- Перезачёт результатов государственной итоговой аттестации



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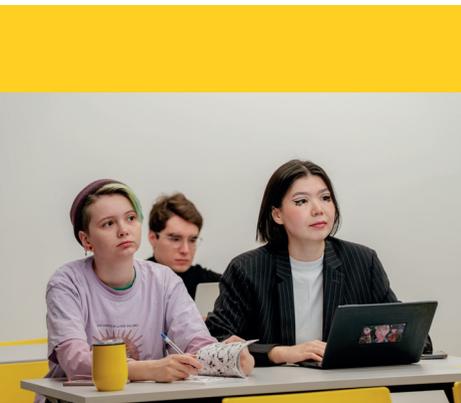
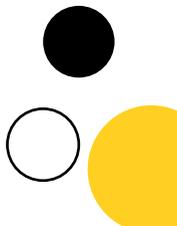
Подробное описание
программы на нашем сайте

ITMO

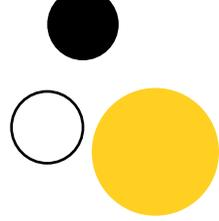


Master's program in Advanced Quantum and Nanophotonic Systems 2023

Get an education in the field of modern physics!



Welcome to ITMO!



AQNS Master's program of ITMO provides foreign students with an opportunity to study at one of the Russia's leading and most innovative higher education institutions for 2 years, and to experience the history and culture of St. Petersburg, the cultural capital of Russia.

Studying at ITMO University, you will not only develop academically and professionally, but also obtain intercultural experience and valuable personal skills, which will, no doubt, contribute to your CV and advance your future career.



Not to mention the fun you'll have exploring our beautiful city of St. Petersburg and the rest of Russia while hanging out with people from all over the world!

The Faculty of Physics

The Faculty of Physics of the ITMO is a creative synergy of honorary professors, young ambitious scientists and students. During the 10 years of working together, we have grown from a small laboratory into a large research center, where the most relevant research areas are developing today and educational programs are implemented



>98
PhD students

At the Faculty, students get a high-quality education in the field of physics. Many of our students are full-fledged members of the scientific center. Our graduates are working in the best laboratories and high-tech companies around the world.

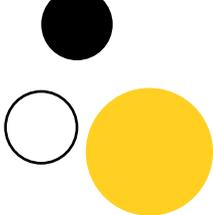


>140
postdoctoral
researchers

We are engaged in theoretical and experimental research in areas such as nanophotonics, metamaterials, topological photonics, radio physics, quantum optics, plasmonics, etc. The works are published in world-level peer-reviewed scientific journals.



>260
students



Advanced Quantum and Nanophotonic Systems master's program

The program gives deep knowledge in fundamental physics and provides experience in laboratory, technology, and numerical simulations, which are essential for industry or academic career.

The study program covers the fundamentals of electrodynamics, quantum mechanics, and solid-state physics.

Our researchers provide a wide range of special courses, including up-to-date courses in nanophotonics, quantum optics, numerical methods, and others. The program offers intensive laboratory studies in the research center facilities: optical and radiofrequency devices, laser writing technique, nanotechnology fabrication.

The program includes four specializations:

Quantum Materials

Nanophotonics

Hybrid Materials

Computer Modeling of Quantum
and Nanophotonic Systems

Nanophotonics

Nanophotonics plays an important role in modern science, from fundamental research to medicine and information technology. ITMO's Nanophotonics specialization is the only one in this field in Russia and one of the few programs in the world that trains specialists in nanophotonics and metamaterials. During their training, students not only gain knowledge and skills working on projects but also actively participate in advanced international research.



Andrey Bogdanov

The Head of the Specialization
Candidate of physical and mathematical sciences (Russian degree equivalent to PhD)
Assistant Professor



Ivan Iorsh

The Head of the Specialization
PhD, Candidate of physical and mathematical sciences (Russian degree), Dr. habil. in physics and mathematics

Quantum Materials

This specialization focuses on theoretical methods for modeling materials (and, in general, condensed matter) using multiparticle quantum correlations qualitatively changing the properties of systems. It provides an in-depth study of spintronics, as well as analytical and numerical methods for first-principles materials modeling. In the course of their training, students will take part in projects on quantum mechanical modeling of materials properties and study machine learning methods used in quantum physics and quantum computing.

Hybrid Materials

Mainly focused on interdisciplinary research, the specialization is aimed at students with different career backgrounds (physicists, chemists, materials scientists, or biologists) wishing to carry out research at the intersection of disciplines. Students of the Hybrid Materials specialization study the basics of numerical modeling, materials science, experimental nanophotonics, and organic chemistry. All students will have the chance to work on projects under the supervision of specialists with an extensive interdisciplinary background. Our graduates are in demand in various research fields such as metal-organic frameworks (MOFs), targeted drug delivery, biosensors, and so on.



Valentin Milichko

Candidate of physical and mathematical sciences (Russian degree equivalent to PhD) Assistant Professor



Alexey Shcherbakov

PhD, Candidate of physical and mathematical sciences (Russian degree) Lecturer

Computer Modeling of Quantum and Nanophotonic Systems

The track is focused on training specialists in computational physics. This field combines fundamental physical education with applied mathematics, computer science, and programming. Our students take

Our students take courses in numerical and mathematical methods, and programming along with continuing lectures in specific subdisciplines of physics, which they can choose from other tracks in accordance with their preferences. Graduate projects can be done in any research direction presented at the Megafaculty since a need for the solution of complex computational problems may arise in any direction of modern science.

Scientific work

From the very beginning, students actively participate in the scientific work of the research center. They are not listeners, but equal members of the research team, which is one of the top groups in the area of nanophotonics and metamaterials. A deep dive into the Faculty life will allow you to achieve fast and effective professional growth in various research areas.



Current experimental facilities

Microwave division:

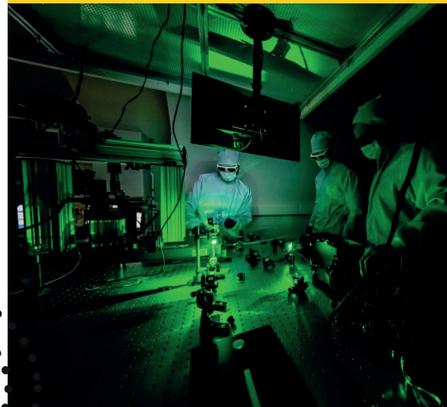
- anechoic chamber
- network analyzers
- amplifiers
- CNC milling machines

Perovskite division:

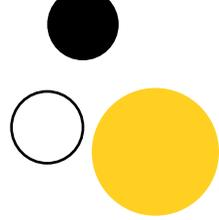
- four MBraun gloveboxes with a vacuum chamber;
- surface measurements; device fabrication

Optical division:

- NSOM
- Raman spectrometers
- Dark-field microscopes
- AFM + fs-laser
- 2D,3D laser lithography



Career opportunities



The program opens doors to the best PhD programs in the field of physics and engineering at leading universities all over the world. The Center of Nanophotonics and Metamaterials has a large network of industrial partners both in Russia and worldwide. After completing our program, you will be qualified to apply for a job in such companies as Soft, IBM, Huawei, and STMicroelectronics, or continue your scientific career in ITMO laboratories.

Partners:



Technical University
of Denmark



HUAWEI

SAMSUNG



Australian
National
University

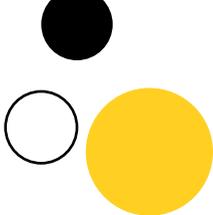


UNIVERSITY OF ICELAND



UTS

Extracurricular activities and facilities



Scientific seminars

We invite researchers and industrial partners from all over the world to our weekly seminars

Morning coffee and tea

Every Tuesday at 12:00

Free 24/7 co-working areas

Scholarship opportunities

Open Doors Scholarship Project for Prospective Master's Students

Portfolio Contest

Faculty of Physics' Scholarship for international students

Government Scholarship

Conditions and main dates

Annual tuition fee: 379 000 rubles

Accommodation: ITMO's dormitory

Study period: September, 2023 – July, 2025

Application deadline: August 11

Useful links: [ITMO](#) [The Faculty of Physics](#)

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Office hours (Monday – Friday, 10 am – 5 pm)

Apply