

# TERAHERTZ SPINTRONICS AND MAGNONICS OF FERRO- AND ANTIFERROMAGNETS

Moscow Institute of Physics and Technology (National Research University)

Degree or qualification is awarded: **PhD (Candidate of Science)**

Language of study: **English**

Mode of study: **full-time**

Duration: **4 years**

Availability of free education: **yes**

Price: **375 000 RUB**

Programme curator: **Denis Ustyuzhaninov**

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## Entry requirements:

- Master's degree / equivalent in a related field
- B2 level of English
- Good track record of publications related to the topic of the intended research
- Strong research proposal 1,500 - 3,500 words

## Research supervisor:

[Sergey Nikitov](#)

PhD, DSc

## Supervisor's research interests:

Theoretical and experimental study of mechanisms of electric current, mechanical stresses and electric potential influences on physical properties of conducting and dielectric ferroand antiferromagnetic heterostructures having eigenfrequencies in the microwave and terahertz frequency range, to investigate nonequilibrium processes in these structures, and to develop concepts of signal processing and logic devices based on antiferromagnets, magnonic networks and nanoelements under the influence of Dzyaloshinskii- Moriya interaction in the microwave and terahertz frequency regime.

## Research highlights:

- Technological and experimental equipment to create and study nanoscale magnetic samples.
- Collaboration with leading research groups(Prof. Dr. Dirk Dr. Grundler – Ecole Polytechnique Fédérale de Lausanne(EPFL), Laboratory of Nanoscale Magnetic Materials and Magnonics; Michal Mruczkiewicz – Institute of Electrical Engineering Slovak Academy of Sciences (IEE SAS), Physics and Technology at Nanoscale; Philippe Pernod – Institute of Electronics Microelectronics and Nano Technology, Ecole Centrale de Lille;A. I. Stognij – Scientific-Practical Materials Research Centre of NAS of Belarus, Belarus).
- Additional founding by Russian Foundation for Basic Research and Russian Science Foundation.

## Supervisor's specific requirements:

- Basics of solid state physics.
- Advanced knowledge of physics of magnetic phenomena.
- Analytical, numerical or experimental methods of magnetic properties study.
- Basics of analytic geometry, computational mathematics, computer programming.

## Main publications:

- Magnonics: a new research area in spintronics and spin wave electronics. Phys. Usp. 58 1002–1028.

- Towards graded-index magnonics: Steering spin waves in magnonic networks. Phys. Rev. B 92, 020408R.
- Voltage-Controlled Anisotropy and Current-Induced Magnetization Dynamics in Antiferromagnetic- Piezoelectric Layered Heterostructures. PHYSICAL REVIEW APPLIED 13, 044080 (2020).

## **Specializations within this programme**