Moscow Institute of Physics and Technology

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About MIPT

**Founded in 1946 by Nobel Laureates**

- Pyotr Kapitsa
- Nikolay Semenov
- Lev Landau

**10 Nobel Laureates – MIPT professors and alumni**

- A. Geim (Manchester)
- K. Novoselov (Manchester)
- A. Polyakov (Princeton)
- A. Kitaev (Caltech)
- V. Mukhanov (Munich)
- R. Sunyaev (Munich)
- V. Fortov (RAS President)
- D. Yan (ABBYY $300M*)
- R. Timashev (VMware $500M*)
- V. Gapontsev (IPG Photonics $800M*)

**6500 students**

**2000 faculty members**

**35,000 graduates – over 60% earning PhD**

**#1 in Russia in admission ranking (avg score 94/100)**

**Top-3 University in all Russian rankings**

**101-150 in Physics rankings: ARWU, THE, QS**

**Outstanding Alumni**

- Rafael Reif, MIT’s president, chairman of MIPT’s International Board

“There is a lot of strength MIPT has and it benefits from a tremendous reputation”
MIPT Structure

MIPT Departments

- Radio Engineering and Cybernetics
- General and Applied Physics
- Aerophysics and Space Research
- Molecular and Chemical Physics
- Physical and Quantum Electronics
- Aeromechanics and Flight Engineering
- Applied Mathematics
- Problems of Physics and Energetics
- Innovations and High Technologies
- Biological and Medical Physics
- Nano-, Bio-, Informational and Cognitive Technologies

Affiliated organizations

- Research institutes: 100+
- Industrial organizations: 50%
- Hi-tech companies: 35%
- Other: 15%
Phystech system transformation

**MIPT 1.0**

*Education on campus, research off campus*

1946-2005

- Selecting the most talented and creative school graduates
- Involving leading scientists in teaching
- Individual work with students
- Learning by doing in the best laboratories

**MIPT 2.0**

*Education and research on campus*

2006-2016

+ Attracting best researchers (incl. alumni) to MIPT
+ Creating competitive environment inside MIPT
+ Involving hi-tech companies: Intel, ABBYY, Yandex, RVC
+ International research agenda

**Key changes as a result of 5-100**

- Basic education on campus (1st – 3rd years)
- Student R&D in research institutes (3rd – 6th years)
- Student R&D in industrial organizations (3rd – 6th years)
- Student R&D in hi-tech companies (3rd – 6th years)
MIPT research achievements in 2015

Critical behavior at a dynamic vortex insulator-to-metal transition
11 Sep 2015
Alexander Golubov, Head of Lab, Quantum Phenomena in Superconducting Systems

Coherent long-range magnetic bound states in a super-conductor
12 October 2015
Vasily S. Stolyarov, Senior Research Scientist

Sub-terahertz frequency-domain spectroscopy reveals single-grain mobility and scatter influence of large-area graphene
24 Apr 2015
Boris Gorshunov, Head of Lab, Terahertz Spectroscopy

New Developments in Liposomal Drug Delivery
2015
Vladimir Chupin, Head of Chair, Biophysics

Observation of laser-induced electronic structure in oriented polyatomic molecules
5 May 2015
Oleg Tolstikhin, Associate Professor, Theoretical Physics

Crystal structure of a light-driven sodium pump
6 April 2015
Valentin Borschevskiy, Deputy Head of Lab, Membrane Proteins Lab
Roadmap of MIPT development

- '04: 4,600 students, 3 labs, 30 researchers, 100 publications, 200 mln rub in R&D, 1,000 m² lab space
- '06: 5,200 students, 12 labs, 100 researchers, 300 publications, 1,900 mln rub in R&D, 4,000 m² lab space
- '08: 6,500 students, 53 labs, 400 researchers, 1,200 publications, 6,300 mln rub in R&D, 15,000 m² lab space
- '10: 6,500 students, 100 labs, 1,000 researchers, 3,000 publications, 10,000 mln rub in R&D, 40,000 m² lab space
- '12: 6,500 students, 53 labs, 400 researchers, 1,200 publications, 6,300 mln rub in R&D, 15,000 m² lab space
- '14: 6,500 students, 100 labs, 1,000 researchers, 3,000 publications, 10,000 mln rub in R&D, 40,000 m² lab space
- '16: 6,500 students, 100 labs, 1,000 researchers, 3,000 publications, 10,000 mln rub in R&D, 40,000 m² lab space
- '18: 6,500 students, 100 labs, 1,000 researchers, 3,000 publications, 10,000 mln rub in R&D, 40,000 m² lab space

NRU
Centers of Excellence

**Fundamental Interactions and Structure of Matter**

- **Supervisor:** Prof. Ralph Eichler (ex-president of ETH Zurich)
- **Executive director:** Prof. Valeriy Kiselev
- **Staff:** 130
- **Budget:** 350 mln Rub

**Objectives:**
- Fundamental science on large-scale facilities (CERN, ITER, NRC KI, KEK)
- Innovative learning technologies (online courses)

**Quantum and Electronics Technologies**

- **Advisor:** Prof. Konstantin Novoselov
- **Executive director:** Prof. Victor Ivanov
- **Staff:** 160
- **Budget:** 800 mln Rub

**Objectives:**
- On-chip optical interconnects
- New types of nonvolatile memory
- Artificial quantum systems

**Applied Mathematics and Computing Sciences**

- **Supervisor:** Acad. Boris Chetverushkin
- **Executive director:** Prof. Konstantin Vorontsov
- **Staff:** 220
- **Budget:** 600 mln Rub

**Objectives:**
- Big data analysis and predictive modeling
- Numerical simulations

**Physics for Life Sciences**

- **Supervisor:** Prof. Raymond Stevens
- **Executive director:** Dr. Sergey Leonov
- **Staff:** 100
- **Budget:** 600 mln Rub

**Objectives:**
- Molecular mechanisms of aging and age-related diseases
- Cell and tissue engineering of heart and other organs
- Biomedical engineering

**Telecommunications & Microprocessor Technology**

- **Supervisor:** Acad. Aleksandr Kuleshov
- **Executive director:** Dr. Sergey Garichev
- **Staff:** 100
- **Budget:** 650 mln Rub

**Objectives:**
- Microprocessor technology
- Telecommunications
- Radar equipment

**Aerospace Physics & Technology**

- **Executive director:** Dr. Sergey Negodiaev
- **Staff:** 130
- **Budget:** 1 000 mln Rub

**Objectives:**
- Cosmic experiments
- HEXAFLY-INT
- Plasma engine for nuclear orbital transfer vehicles
International Board

Chairman of the Board

L. Rafael Reif, President MIT, USA

Board`s Tasks

✓ Approval of the strategic initiatives implementations
✓ Accumulation of the foreign experience of the university development
✓ Promoting MIPT in the international community
✓ Accelerating MIPT integration into the international research and educational programs
✓ Enhancing the international competitiveness of MIPT
International Partnership

90 international partners in 50 countries

TOP UNIVERSITIES

MIT

École Polytechnique

TUDelft

KAIST

École Polytechnique Fédérale de Lausanne

RESEARCH ORGANIZATIONS

Argonne National Laboratory

MEGA-SCIENCE COLLABORATIONS

CMS

Belle II

SACLA
Education at MIPT

7000 students from 46 countries

Ph.D
Master
Bachelor
Preparatory

Education at MIPT
7000 students from 46 countries

Ph.D
Master
Bachelor
Preparatory
Short-term Internship programs

Language: English
Duration: from 1 to 10 months
ECTS credits: depends on the internship program
Entry requirements:
• Bachelor’s/Master’s/PhD or equivalent degree
• 20-35 years old
• High academic results
• Proof of English language knowledge equivalent to level B2 (TOEFL iBT, IELTS or equivalent)

Conditions Provided

➢ Accommodation

➢ Medical insurance

➢ Visa
Suggestions for NU BRICS

Priorities in the BRICS NU: energy, computer science and information security, water resources and pollution treatment

The main Masters’ and PhD’s programmes proposed for the BRICS NU (with the dates of its beginning:
Neural Networks & Neural Computers, from September 1, 2015
Advanced Combinatorics, from September 1, 2015
Energy Technologies & Environmental Safety, from September 1, 2016
Beam-Plasma Systems and Technologies, from September 1, 2015
Atmosphere & ocean fluid dynamics, from September 1, 2016

Summer/winter schools, proposed for the BRICS NU
School “Moscow International Workshop ACM ICPC”, November 2016, March 2017
“Moscow International Programming Contest”, April 2017
School for young scientists "Superconducting hybrid nanostructures: physics and applications", October 1-4, 2016