



Moscow Institute of Physics and Technology

Rector Nikolay Kudryavtsev
March 24, 2016



About MIPT



**Founded in 1946
by Nobel Laureats**



Pyotr
Kapitsa



Nikolay
Semenov



Lev
Landau

10 Nobel Laureates – MIPT professors and alumni

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**



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”*

Outstanding Alumni



A. Geim
(Manchester)

Nobel Prize 2010



K. Novoselov
(Manchester)



A. Polyakov
(Princeton)

Fundamental Physics Prize



A. Kitaev
(Caltech)

Planck Medal



V. Mukhanov
(Munich)



R. Sunyaev
(Munich)

**Heineman
Prize**



V. Fortov
(RAS President)

**Global Energy
Prize**



D. Yan
(ABBYY
\$300M*)



R. Timashev
(VMware
\$500M*)

Hi-Tech Entrepreneurs


*annual revenue



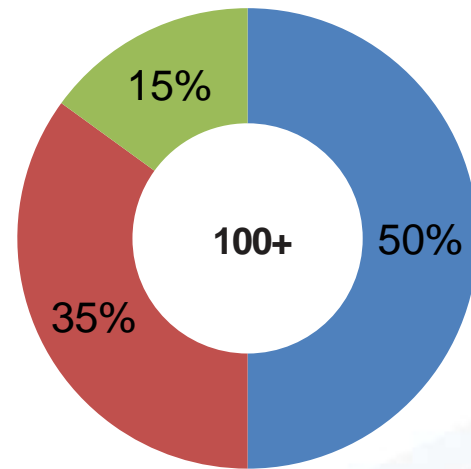
V. Gapontsev
(IPG Photonics
\$800M*)

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
- Industrial organizations
- Hi-tech companies



Phystech system transformation

MIPT 1.0

**Education on campus, research off campus
1946-2005**

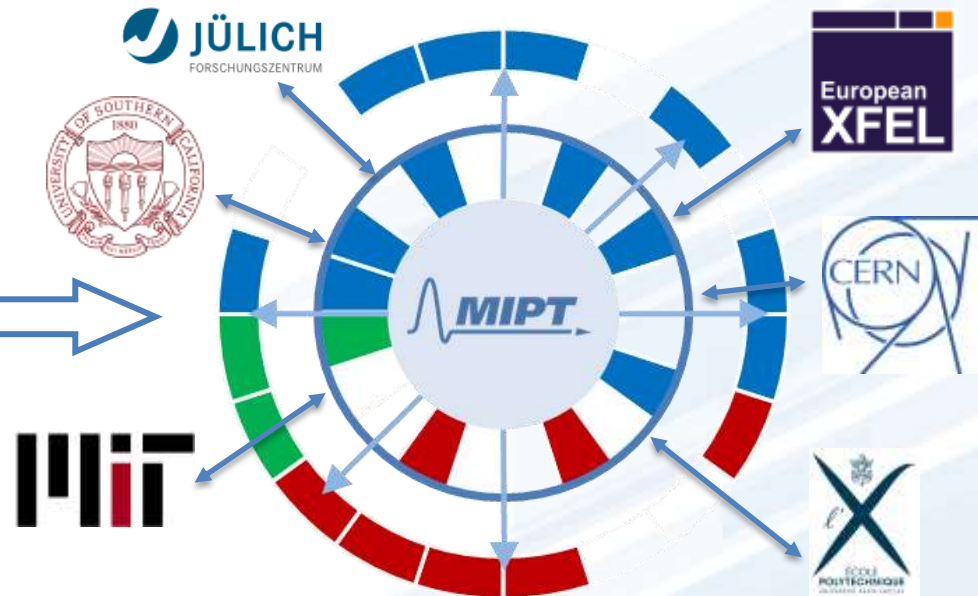
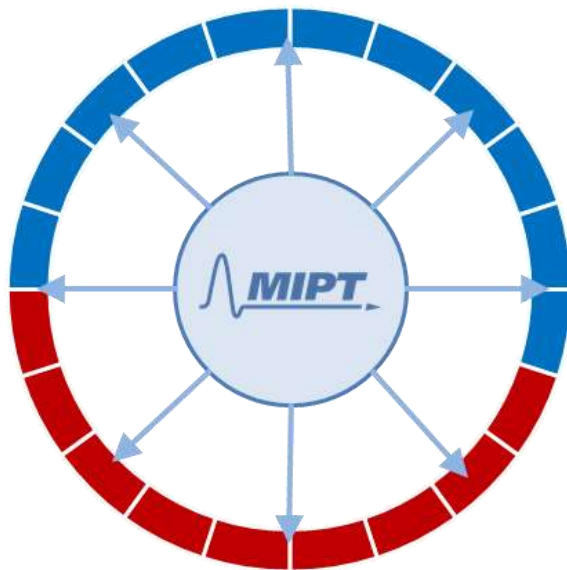
- ✓ Selecting the most talented and creative school graduates
- ✓ Involving leading scientists in teaching
- ✓ Individual work with students
- ✓ Learning by doing in the best laboratories

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

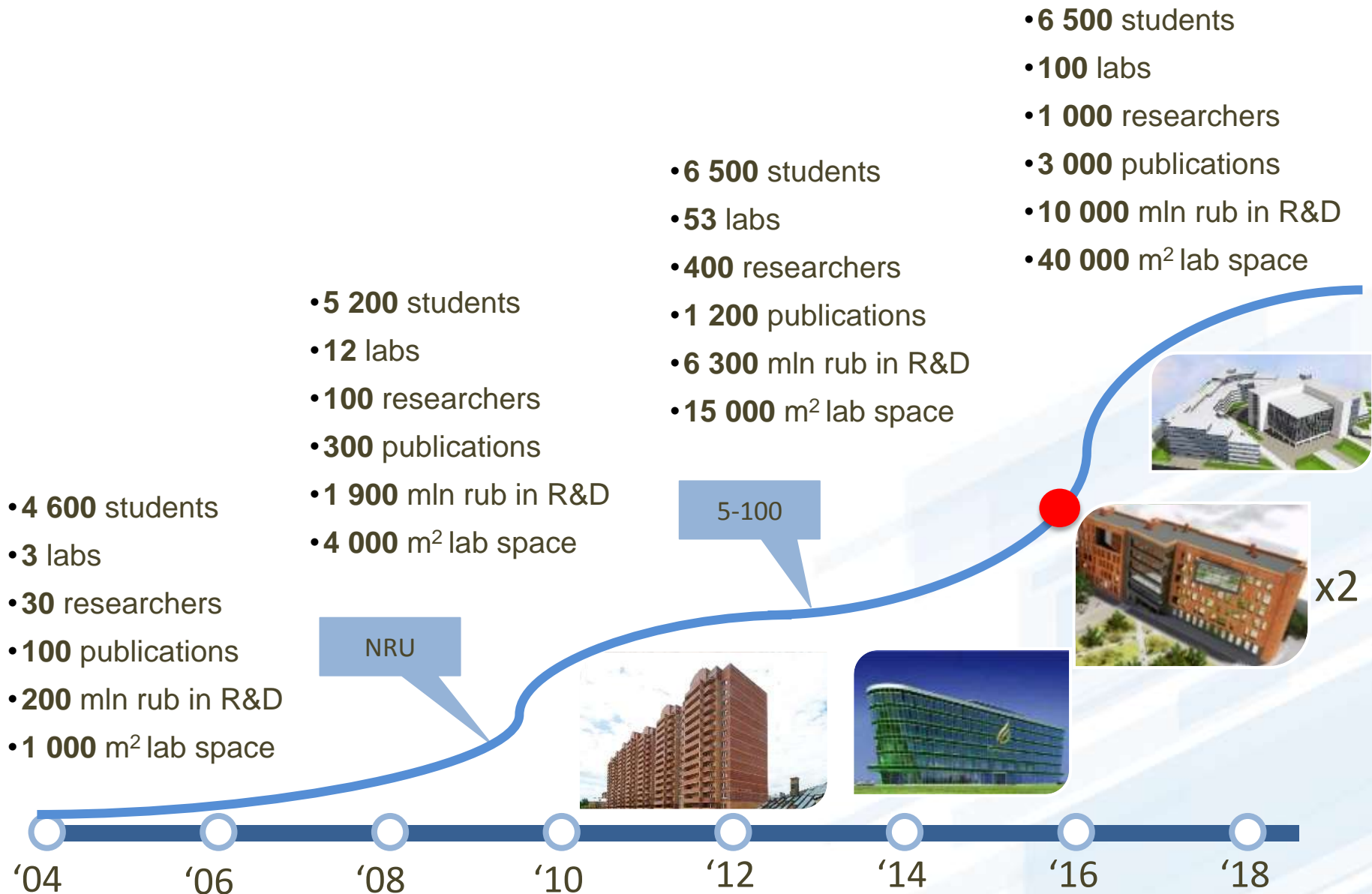
6 April 2015



Valentin Borschevskiy,
Deputy Head of Lab,
Membrane Proteins Lab



Roadmap of MIPT development



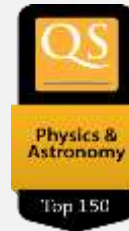
Centers of Excellence

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)



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



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



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



KapitalInstitute
Alexander
F. ANDREEV



Ecole Polytechnique Lausanne
Philippe GILLET



Schlumberger
Ashok BELANI



NHS
England
NHSEngland
Malcolm GRANT



TU Delft
Delft University
Dirk Jan
VAN DEN BERG



KAIST
Sung-Mo Kang



ÉCOLE
POLYTECHNIQUE
Paris
Ecole Polytechnique Paris
Jacques BIOT



IASS
Carlo RUBBIA



ETHZ
Ralph EICHLER



Kurchatov Institute
Evgeniy P. VELIKHOV

International Partnership

90 international partners in 50 countries

TOP UNIVERSITIES



RESEARCH ORGANIZATIONS



MEGA-SCIENCE COLLABORATIONS



Education at MIPT

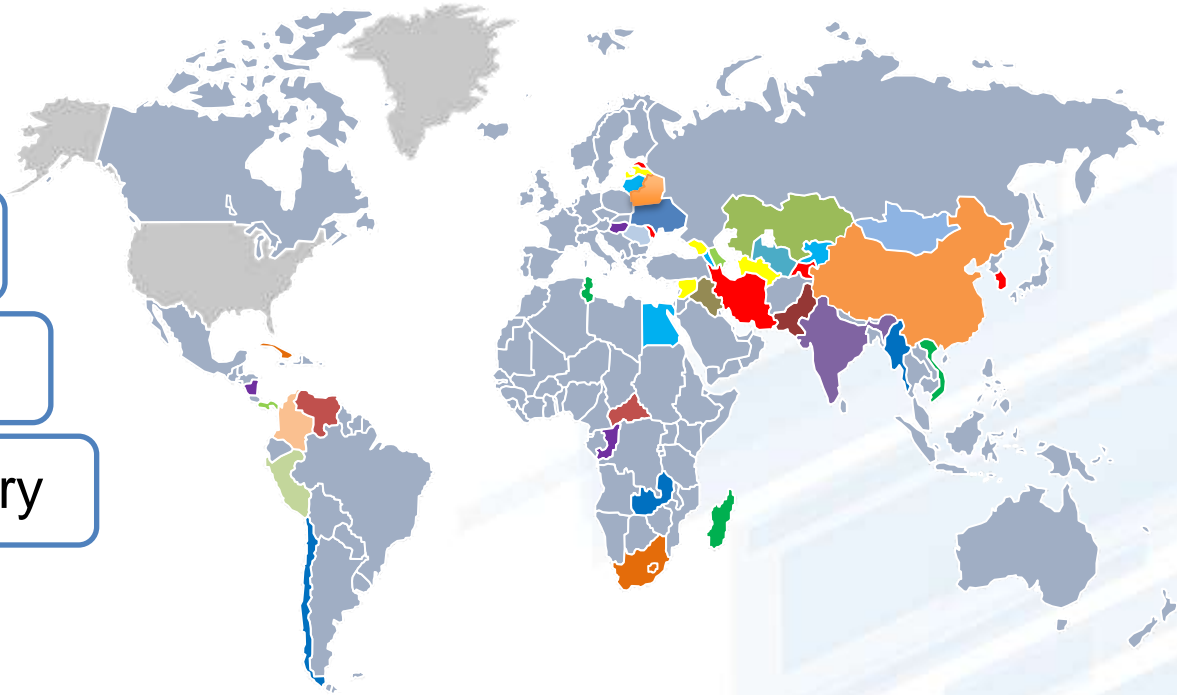
7000 students from 46 countries

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