

MEPhI
NUCLEAR

**NATIONAL
RESEARCH
UNIVERSITY**



MOSCOW - 2015



MEPhI COMPETITIVENESS ENHANCEMENT PROGRAM

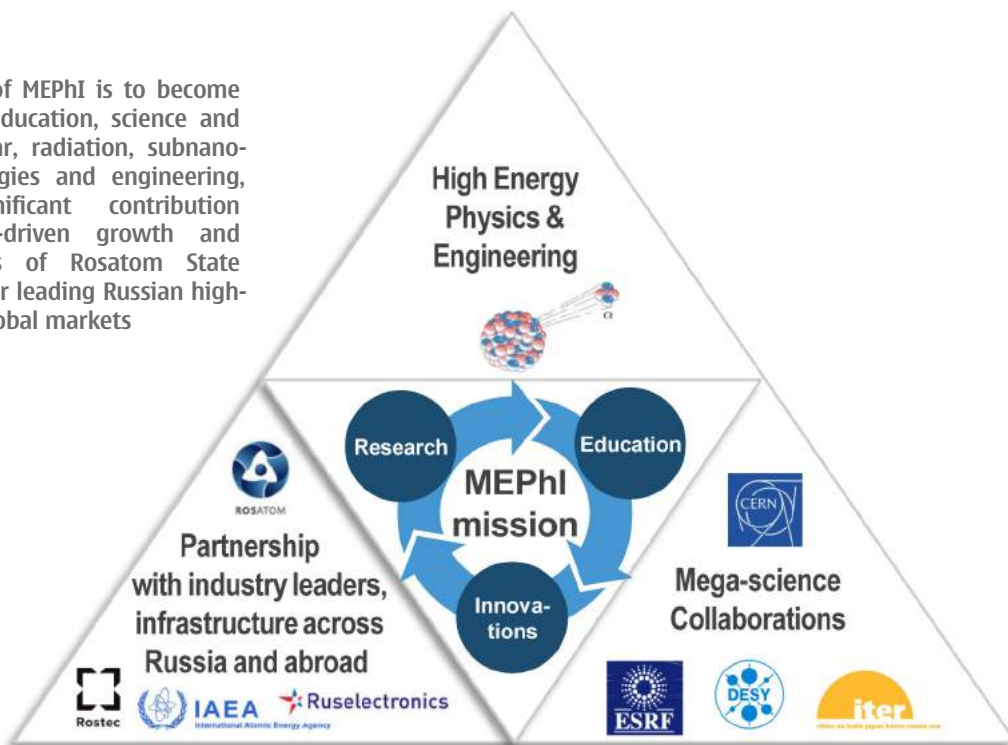


MISSION

The Mission of the University is to generate, disseminate, use and preserve scientific knowledge aiming to address global challenges of the XXI century as well as to provide innovative transformations in Russia accompanying development of the country competitiveness in the global energy and non-energy high-tech markets

STRATEGIC GOAL

The strategic goal of MEPhI is to become a global leader in education, science and innovation in nuclear, radiation, subnano- and nano- technologies and engineering, providing a significant contribution to the innovation-driven growth and the competitiveness of Rosatom State Corporation and other leading Russian high-tech companies in global markets



MEPhI STRENGTHS



ABOUT MEPhI

The University traces its history back to Moscow Mechanics Institute of Ammunitions established in November, 1942.

Its original purpose was to train specialists for the nuclear industry.

The most outstanding scientists took part in establishment and development of MEPhI including the Head of the Soviet Atomic project academician Igor Vasilyevich Kurchatov.

Six Nobel prize winners worked in MEPhI — academicians N.G. Basov (MEPhI graduate), A.D. Sakharov, N.N. Semenov, I.E. Tamm, I.M. Frank, P.A. Cherenkov.



Head of the Soviet Atomic project, one of the founders of MEPhI, I.V. Kurchatov

Outstanding Scientists – Nobel Prize winners who worked in MEPhI



N.G. Basov



A.D. Sakharov



N.N. Semenov



I.E. Tamm



I.M. Frank



P.A. Cherenkov

MEPhI

Moscow Engineering Physics Institute
(State University)

2003

Moscow Mechanics
Institute

1945

Moscow Mechanics Institute
of Ammunitions

1942

2009

National Research Nuclear
University MEPhI
(Moscow Engineering Physics
Institute)

1953

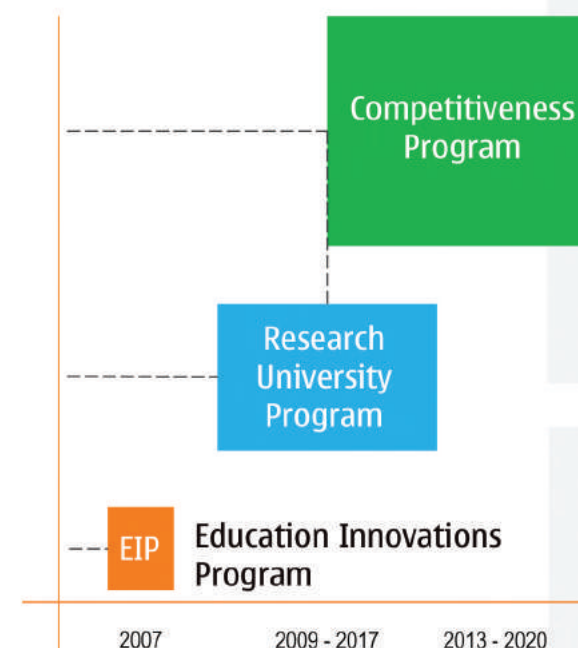
Moscow Engineering Physics
Institute (MEPhI)

MEPhI IS THE PARTICIPANT OF THE FEDERAL PROGRAMS (2007-2020)

In July 2013 MEPhI was shortlisted in governmental Competitiveness Enhancement Program as one of the winners among the Russian Universities. There were only 15 universities chosen

MAIN RESULTS

Volume of Funding



Competitiveness enhancement program 2013-2020:
Achieving global leadership in education and science
Entering the TOP-100 list of the universities world rankings
Internationalisation of the educational process
Attracting leading scientists
Attracting foreign students
Increase in publication activity
Radical renewing administrative and management personnel

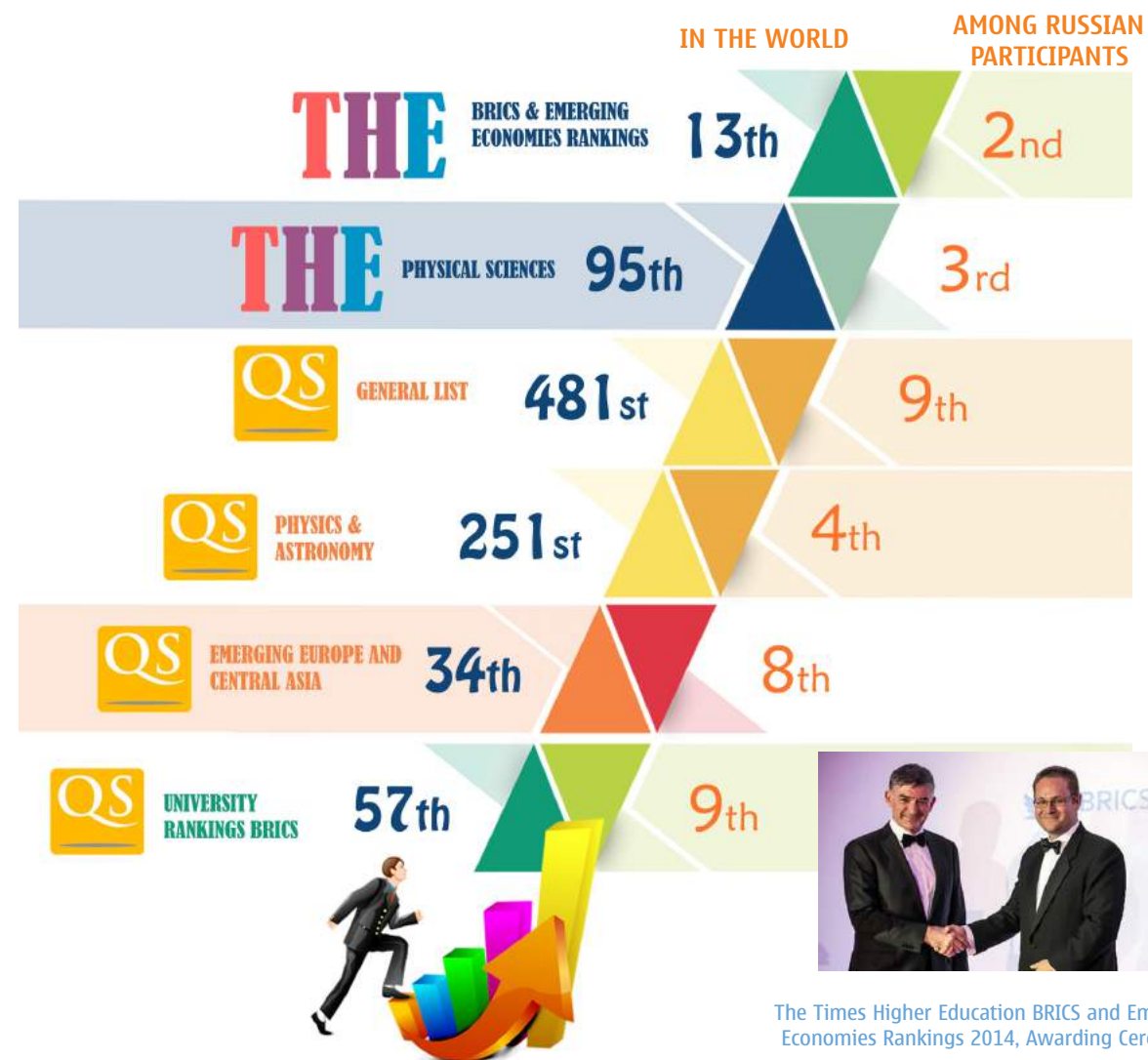
Research University Program 2009-2017:
Regionally distributed network of branches formation
Large-scale purchase of equipment for research and educational activities
Large-scale capital construction and repair

Education Innovations Program 2007:
New educational programs
New research and educational equipment
Renovation of lecture halls and laboratories

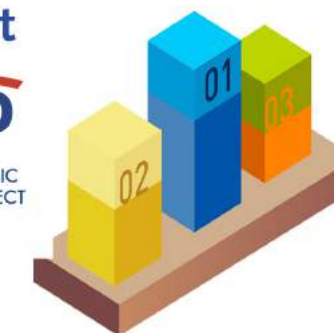


MEPHI IN THE WORLD UNIVERSITY RANKINGS

INTERNATIONAL UNIVERSITY RANKINGS 2014



Project
5100
RUSSIAN ACADEMIC
EXCELLENCE PROJECT



2014

NATIONAL UNIVERSITY RANKINGS

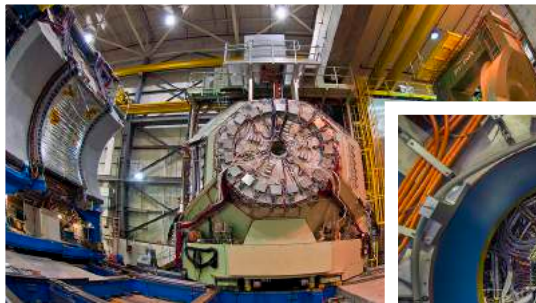




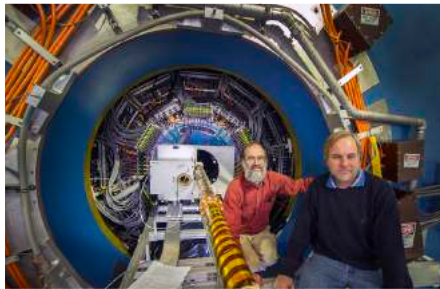
GLOBAL PHYSICS RESEARCH

PARTICIPATION IN INTERNATIONAL COLLABORATIONS

MEPhI is the participant of major international collaborations on installations of mega-science: ATLAS, ALICE, CMS at CERN; FAIR, XFEL at DESY (Germany); ITER (France); ICECUBE, PAMELA (Italy), STAR and PHENIX (USA); T2K (Japan), and others. MEPhI has started the procedure of joining the following collaborations: SHIP, NSW (CERN), LZ (USA), BELLE (Japan)



PHENIX, BROOKHAVEN NATIONAL LABORATORY



STAR, BROOKHAVEN NATIONAL LABORATORY



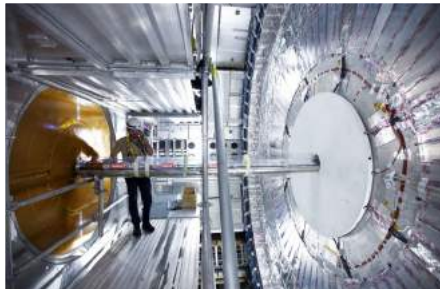
ALICE, CERN



ICECUBE, ANTARCTICA



CMS, CERN



ATLAS, CERN

CREATION OF WORLD-CLASS LABORATORIES



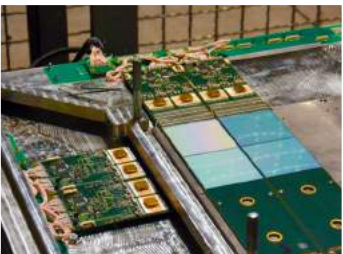
Laboratory of Experimental Nuclear Physics (in cooperation with the University of Tennessee, USA)



Laboratory of Nano Bioengineering (together with Reims University, France)



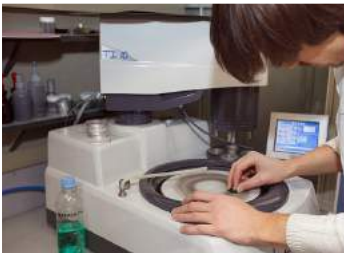
Laboratory of Specialized Integrated Circuits Development



Laboratory of Silicon Photomultipliers (in cooperation with the University of Kansas, USA)



Laboratory of Plasma-surface Interaction and Plasma Technology (in cooperation with the University of San Diego, USA)



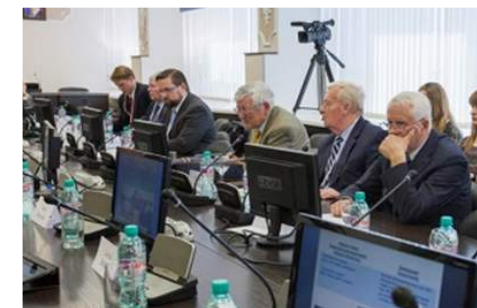
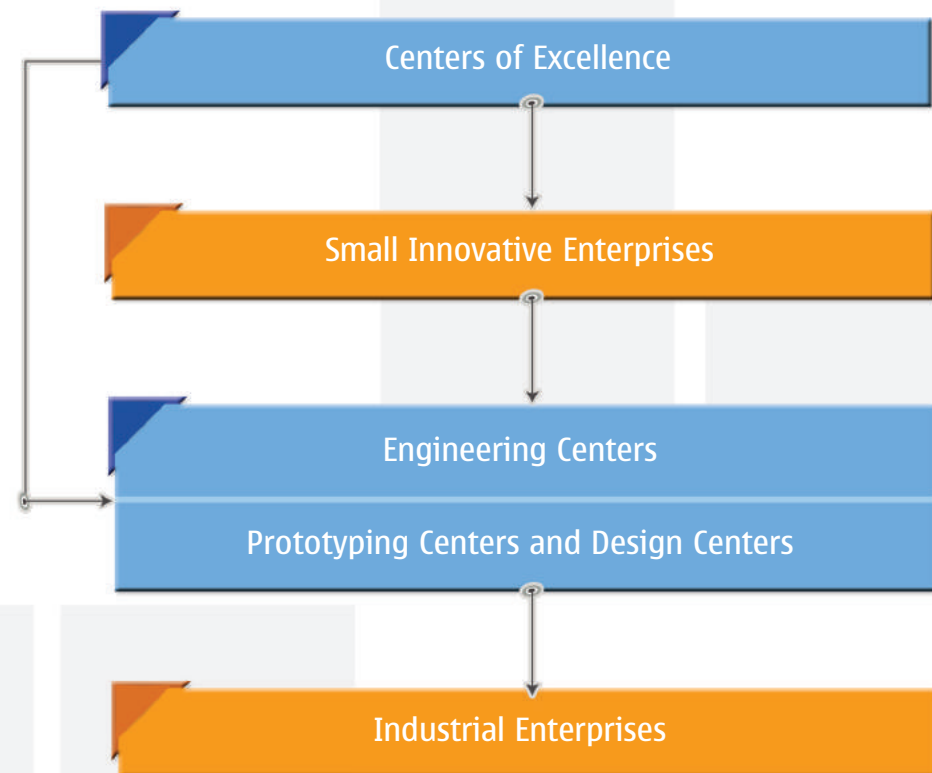
Laboratory of Electromagnetic Methods of New Materials Production (in cooperation with the University of San Diego, USA)



INTEGRATION OF EDUCATIONAL, SCIENTIFIC AND INNOVATIVE ACTIVITIES

10 Centers of Excellence were established as a part of the University research innovative and educational infrastructure to train elite specialists for leading scientific organisations and high-tech industries

UNIVERSITY INNOVATION ECOSYSTEM



Russian-American seminar on nuclear non-proliferation and countering nuclear terrorism issues



MEPhI Rector at Moscow-London teleseminar on the results of QS Rankings



Dr. Siegfried S. Hecker (Stanford University), ex-director of the Los Alamos National Laboratory (LANL), Educational conference on Nuclear Cooperation: Achievements and Perspectives, MEPhI, Moscow



IAEA mission on establishment of Nuclear Management Academy, MEPhI, Moscow



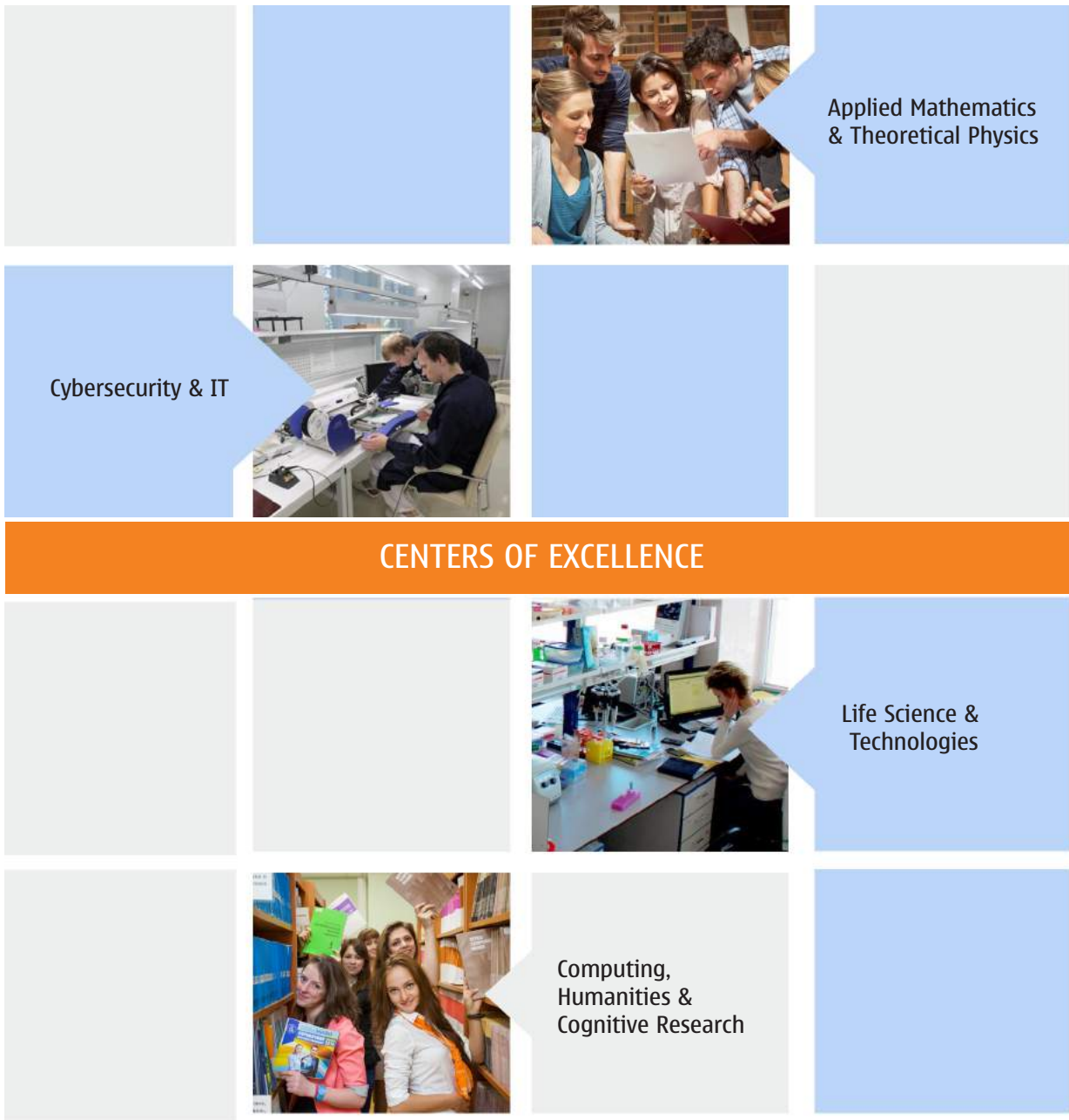
Technical universities representatives discussing engineer training issues, RIA News Agency, Moscow



Representatives of Tokyo Institute of Technology at round-table conference, MEPhI, Moscow



Discussing issues of training specialists for South African NPPs



MAIN SCIENTIFIC ACHIEVEMENTS

- In the framework of ATLAS collaboration at LHC a Transition Radiation Tracker was created and a new particle, Higgs boson, was discovered
- In the framework of STAR collaboration the existence of quark-gluon plasma was demonstrated, antihelium-4 nuclei were extracted
- Installation with PAMELA detector was created on board of Russian satellite Resurs-DK 1 and data on the existence of new additional cosmic rays source probably connected with annihilation or decay of hypothetical “dark matter” particles were obtained
- A catalogue of solar bursts within 2-20 keV range detected on board “Coronas-Photon” satellite during low solar activity was made
- Theory of quantum electrodynamic cascades in extremely strong laser field was developed
- Full-scale simulator Russian Nuclear Power Plant was developed and implemented
- The technology of terahertz radiation source creation was developed based on Smith-Purcell and Vavilov-Cherenkov radiation
- Experimental installation Pico-4 was created for modelling microelectronics products radiation stability
- Technology of neutron-capture therapy of cancerous tumour was developed at MEPhI nuclear reactor
- Endoscopic capsular complex “Landysh” was developed



Unique multipurpose Cherenkov water detector
NEVOD of MEPhI



A full-scale simulator of the 3rd unit of Kalinin NPP

R&D

Research and development

MEPhI holds the leading positions among the Russian universities both in the total volume of R&D funding (2 785 million rubles) and total R&D per 1 faculty member (3,481 million rubles)

200+

foreign scientists take part in joint scientific and educational projects of the university

70+

corporate customers from high-tech economy sectors of the Russian Federation in 2014

5

projects for high-tech production development (235 million rubles)

19

R&D projects in cooperation with industrial partners in the framework of the Federal Target Program “Research and Development of Priority Directions of Scientific and Technological Complex of the Russian Federation” (1102 million rubles)

5

fundamental and pilot studies under the Russian Science Foundation programs (135 million rubles)

62 INSTITUTIONS AND RESEARCH CENTRES OF RAS (THE RUSSIAN ACADEMY OF SCIENCES) PARTICIPATE IN JOINT RESEARCH PROJECTS

Main partner organisations: Physical Institute, Space Research Institute, Institute of General Physics, Institute of Crystallography, Institute of Applied Mathematics, Institute of Chemical Physics, Institute of Atmospheric Physics, etc



DEVELOPMENT, PROTOTYPING AND COMMERCIALISATION OF INNOVATIVE PRODUCTS

43,1

the share of income from non-budgetary sources in the income structure more than 43,1%

113

patents for invention

99

certificates of the government registration of the computer program and data bases

341

copyright items

26

know-how

20

university small innovative enterprises



A solder zirconia spacer grid of VVER and RBMK



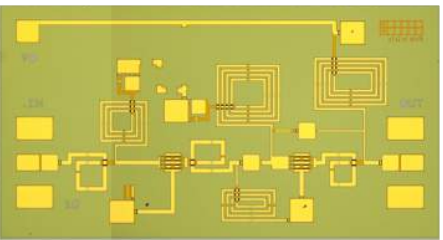
Gamma-locator for preroperative diagnostics of sentinel lymph nodes and noninvasive diagnostics of superficial cancers



Samples Ion mobility spectrometer for noninvasive diagnostics of socially important human diseases



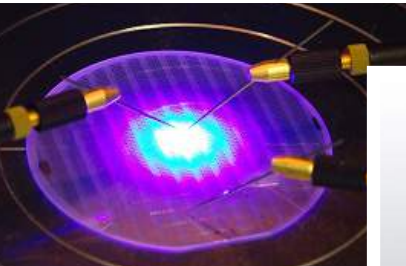
A three stage amplifier within 8-12 GHz frequency range



A unique leukemia diagnostics complex on peripheral blood samples



High efficiency ultra-bright LEDs



Neutron flux monitoring equipment for NPP, research reactors and critical experimental facilities



Endoscopic complex "Landysh" for automated recognition of pathologies and morphological changes of digestive tract



MEPhI IS A WORLD EDUCATIONAL, RESEARCH AND INNOVATION CENTER

The university is one of the leaders in engineering education in Russia



Nuclear Systems & Materials



Nanostructured Electronics



Life Science & Technologies



Nuclear Engineering



Nanostructured Electronics



Cybersecurity & IT

EDUCATION MEETS INTERNATIONAL STANDARDS



MEPhI was officially recognised as a member of the Worldwide CDIO Initiative on modernisation of engineering education in higher school (<http://www.cdio.org/>)

Modernisation and development of engineering curricula have been implemented meeting the CDIO standard requirements.

Having joined the CDIO standards MEPhI has come into line with world leaders such as Stanford University, Massachusetts Institute of Technology, California State University, United States Naval Academy, Tsinghua University (Asia Region), Chalmers University of Technology (Europe Region), etc.

INTERNATIONAL ACCREDITATION OF ENGINEERING CURRICULA

11 MEPhI engineering curricula are in Index programs, their quality corresponding to "European level" (FEANI Index).

14 curricula were accredited by FEANI in 2014 for entering FEANI Index in 2015.

The University curricula entering FEANI Index gives MEPhI graduates, who have been taught in accordance with these curricula, a chance to get the qualification of EUR ING (European Engineer) — a specialist whose qualification is recognized by all EU countries and corresponds to international requirements.



European federation of national engineering organisations

Federation Européenne d'Associations Nationales d'Ingenieurs, FEANI

COOPERATION WITH WORLD LEADING SCIENTIFIC AND EDUCATIONAL CENTERS

JOINT EDUCATIONAL PROGRAMS STARTED IN 2014

Program	University Partner
Materials in extreme conditions	MIT (USA)
Nanotechnology	UNIKO (Germany)
Graphene electronics	RWTH (Germany)
Design of microelectronic component base	TUD Dresden (Germany)
Computer simulation of materials for energy technologies	Aalto University (Finland) MIT (USA) Institute for Energy Technology (Norway) University College of Telemark (Norway) University of Exeter (UK)
Femtosecond laser physics and technology	Beijing Institute of Technology (China)

In 2014, in order to develop international research and educational programs, a number of partnership agreements on academic mobility, including agreements on “double diploma” were made

MEPhI new educational partners

- Argonne National Laboratory (USA)
- Enrico Fermi National Accelerator Laboratory (USA)
- University of Illinois (USA)
- University of Surrey (UK)
- Politecnico di Torino (Italy)
- Federal University of Rio Grande do Sul (Brazil)
- University of Nebraska, Lincoln (USA)
- 8th Research Institute (China)
- International Organization of the ITER on fusion Energy
- Baku State University (Azerbaijan)
- National Laboratory of Legnaro (Italy) and etc.



Politecnico di Torino -
University of Turin (Italy)



University of Illinois (USA)



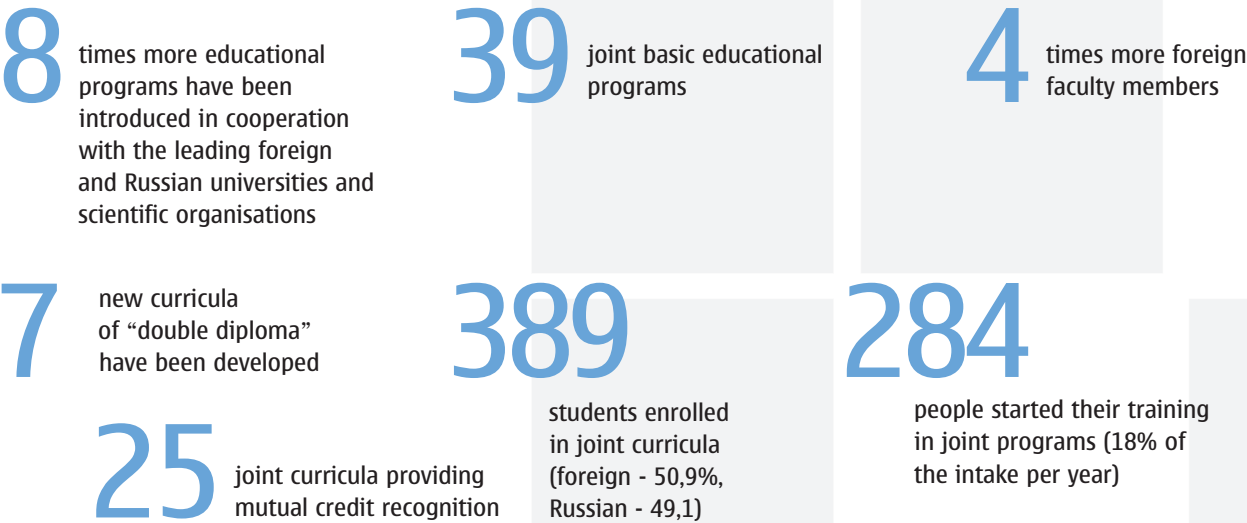
University of Nebraska, Lincoln
(USA)



University of Surrey (UK)

EDUCATIONAL PROGRAMS IN COOPERATION WITH THE LEADING UNIVERSITIES AND SCIENTIFIC CENTERS

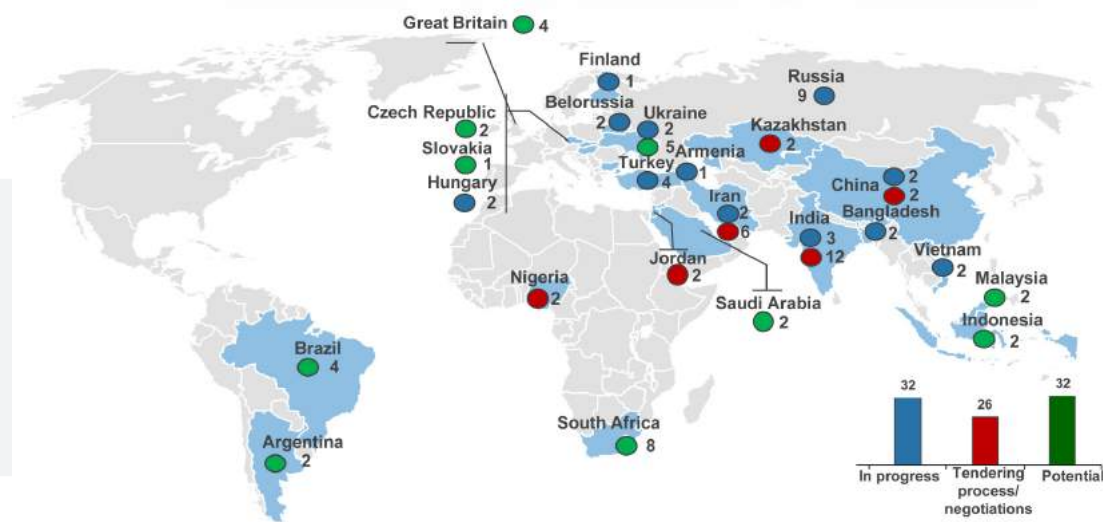
2014 FIGURES AND FACTS





TRAINING STAFF FOR INTERNATIONAL NUCLEAR PROJECTS

MEPhI in close cooperation with the State atomic energy corporation “Rosatom” is actively involved in training foreign students for subsequent maintenance of industrial facilities constructed by the State atomic energy corporation “Rosatom”



Rosatom NPP construction perspective backlog – 90 units



Tianwan Nuclear Power Plant, China



Kudankulam Nuclear Power Plant, India



Bushehr Nuclear Power Plant, Iran



TRAINING OF FOREIGN STUDENTS



Special customer service for foreign students support has been established

MEPhI organises international academic competitions, the winners have benefits when entering the university

- Nuclear physics and technology (participants from 6 countries)
- Economic security (participants from 10 countries)
- System analysis (teams from 3 countries)
- Academic competition Rosatom (participants from 10 countries)

510



510 foreign students are trained in MEPhI today, which is 6.6% of the total number of students

Proportion of foreign students enrolled in the University





PARTICIPATION IN THE WORLD NUCLEAR EDUCATION NETWORKS



The Workshop on Nuclear Knowledge Management "Formation of competence in the field of nuclear knowledge management within the university curricula" (MEPhI, 2014)

In 2014 MEPhI as a leading university of the Association "Consortium of the universities supporting the State atomic energy corporation "Rosatom" continued its work on strengthening the cooperation between Russian Nuclear Education Network and international networks of nuclear and engineering education, including ENEN, INSEN, ANENT and others.

Network control centers of nuclear knowledge management in the University sector is being developed on the basis of the Association "Consortium of the universities supporting the State atomic energy corporation "Rosatom".

A number of education modules on nuclear knowledge management have been elaborated in cooperation with the IAEA.



Experts from 30 countries took part in the School of Nuclear Knowledge Management, organized by the IAEA in cooperation with MEPhI. The IAEA Director General Mr. Yukiya Amano praised the initiative of MEPhI on certification of "Nuclear Knowledge Management Course".

The International Centre for Theoretical Physics (ICTP) Trieste (Italy), 2014



MEPhI has joined the organizers of the International Vienna Centre for Nuclear Competence (VINCC).

The main task of the Center is provision of professional training and expertise for the safe and effective use of nuclear technology and nuclear applications



A SYSTEM FOR SEARCH AND SELECTION OF TALENTED YOUTH

Contests:

Grants to young MEPhI lecturers

Grants to MEPhI postgraduate students

Grants to MEPhI students



International competition for the university PostDoc positions

The system of internal rankings of undergraduate and graduate students

Training programs for the most active and promising MEPhI students, post-graduate students, trainees, young faculty members in the leading Russian and foreign educational and research centers

In 2014 284 students got an opportunity to take training courses in such leading Russian and foreign research centers as

- Royal Institute of Technology in Stockholm (Sweden)
- the European Synchrotron Radiation Facility (Grenoble, France)
- University of Southern California (USA)
- Munich University of Ludwig Maximilian (Germany)
- CERN (Geneva, Switzerland)
- Monterey Institute for International Studies (USA) and others





INCREASING QUALITY OF FACULTY STAFF AND ADMINISTRATIVE AND MANAGERIAL PERSONNEL



- ATTRACTING YOUNG RESEARCHERS AND SCIENTISTS WITH WORK EXPERIENCE IN LEADING RUSSIAN AND FOREIGN UNIVERSITIES AND SCIENTIFIC CENTERS
- STIMULATION OF THE PUBLICATION ACTIVITY, CREATION AND DEVELOPMENT OF THE UNIVERSITY SYSTEM OF COOPERATION WITH SCOPUS AND WEB OF SCIENCE DATABASES

- IMPROVEMENT OF THE QUALIFICATION REQUIREMENTS FOR FACULTY MEMBERS AND RESEARCHERS RELATED TO THEIR PUBLICATION ACTIVITY
- IMPROVEMENT OF HR SERVICES AND UNIVERSITY RECRUITMENT SYSTEM



IMPROVEMENT OF MANAGEMENT SYSTEM

- COMMITMENT TO GLOBAL PRESENCE IN EDUCATION, SCIENCE AND INTERACTION WITH INDUSTRIAL PARTNERS
- DECENTRALISED TACTICAL AND OPERATIONAL DECISION MAKING



In 2014 the second stage of the University management system establishment was completed. The system allows to respond quickly to changing conditions on the basis of monitoring and predictive analysis of the development of science&technology and education market in specialised university segment.

A system of motivation and the key efficiency indicators for faculty members, senior management and administrative personnel have been elaborated and introduced. In 2014 100% transition of faculty members and management and administrative personnel to the effective contract was completed.

In 2014 the development of inner services took place, supporting effective education, research and innovation activities of the University, including HR service and service of international recruiting, marketing, service and support of publication activity.

The quality management system for the University international activities has been introduced. A system of internal management audit has been created.

The University management system is changing for a number of support functions (procurement, finance and economics, IT, human resources management, international cooperation). The transition to the service model has been made. The quality and speed of support functions have been significantly improved as compared to the previous years.

The University structure is undergoing transformation in order to change the existing infrastructure and to shift from faculties to Centers of Excellence and Institutes that combine educational process and scientific research.



EDUCATIONAL PROGRAMS



Areas of training	Duration	Level of education
Computer Science and Engineering	4 years	Undergraduate
Information Security	4 years	Undergraduate
Information Systems and Technology	4 years	Undergraduate
Applied Informatics	4 years	Undergraduate
Applied Mathematics and Informatics	4 years	Undergraduate
Materials Science and Technology of Materials	4 years	Undergraduate
Foreign Affairs	4 years	Undergraduate
Management	4 years	Undergraduate
Applied Mathematics and Physics	4 years	Undergraduate
Software Engineering	4 years	Undergraduate
Physics	4 years	Undergraduate
Economics	4 years	Undergraduate
Nuclear Physics and Technology	4 years	Undergraduate
Nuclear Power Plants: Design, Operation and Engineering	5 years 6 months	Specialist

Areas of training	Duration	Level of education
Information Security of Automated Systems	5 years	Specialist
Information Analytical Systems Security	5 years 6 months	Specialist
Isotope Separation Technology and Nuclear Fuel	5 years 6 months	Specialist
Economic Security	5 years	Specialist
Electronics and Automation of Physical Installations	5 years 6 months	Specialist
Nuclear Reactors and Materials	5 years 6 months	Specialist
Information Security	2 years	Master
Materials Science and Technology of Materials	2 years	Master
Economics	2 years	Master
Nuclear Power and Thermal Physics	2 years	Master
Applied Mathematics and Informatics	2 years	Master
Nuclear Physics and Technology	2 years	Master
Information Measuring and Control Systems (by industry)	4 years	Postgraduate
Mathematical and Software Support of Computers, Systems and Computer Networks	3 years	Postgraduate
Devices and Methods of Experimental Physics	4 years	Postgraduate
Solid-State Electronics, Radio-Electronic Components, Micro-and Nano-Electronics, Devices Based on Quantum Effects	4 years	Postgraduate
Plasma Physics	4 years	Postgraduate
Nuclear Power Plants: Design, Operation and Decommissioning	4 years	Postgraduate
Automation and Management of Technological Processes and Production (by industry)	4 years	Postgraduate
Physics and Astronomy	4 years	Postgraduate
Condensed Matter Physics	4 years	Postgraduate



FORMATION OF OPEN AND STIMULATING CORPORATE CULTURE PROVIDING SUPPORT AND ATTRACTION OF TALENTED FACULTY MEMBERS

The corporate culture of the University is focused on openness, internationalisation and innovation

MEPhI CORPORATE VALUES

International relations development has been accelerated in order to overcome the consequences of the former “closeness” of the University. In 2010 MEPhI became an open university.

The University alumni database has been updated and expanded. The interaction and feedback flow from alumni who work in leading international laboratories, universities and corporations have been noticeably intensified.

Further development and promotion of the MEPhI Alumni Club is performed in order to expand the contact list and engage graduates' career experience for strengthening the international appeal of the University.



**National Research Nuclear University MEPhI
(Moscow Engineering Physics Institute)**



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