3

VISION | MISSION | GOALS

MEPhI IS A LEADING NATIONAL UNIVERSITY

that develops elite specialists for careers in the Medicine, Science , nuclear industry, IT, engineering and other hi-tech sectors in the Russian economy.

MEPHI MISSION

is to accumulate, generate, promote and apply scientific knowledge to address the global challenges of the twenty-first century, as well as to provide innovative transformations in Russia to develop the country's competitive position in the global energy and non-energy high-technology sectors.



MEPhI STRATEGY

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is to be a global leader in education, science & innovation in science, medicine, biomedicine, nuclear science, radiation science, information technology, and engineering. The university seeks to make a significant contribution to the innovation-driven growth and competitive position of the Russian economy.

MEPhI GOALS

is to shape trends in science, education and innovation in collaboration with its partners. The University engages in active partnerships with scientific organisations and companies and participates in a number of regional clusters, industry and research consortia, and professional associations. The University also extends and strengthens international partnerships with foreign universities and research organisations, focusing on the joint development and promotion of educational programs in new and breakthrough areas.

UNIVERSITY AS A PLATFORM

MEPhI is a **platform of opportunities** for employees, students, graduates, industry players, technological and R&D partners **both in Russia and abroad.**

The platform system **enables** MEPhI **to react swiftly** to rapid and massive technological changes in industries high-tech.

The openness of the University as a platform is ensured through high quality, flexibility and speed of response **to market changes**.

At the same time, the platform enables the University to carry out its mission of accumulated knowledge promotion and discoveries at a whole new level **through a variety of forms of engagement among all platform participants.**



ENGAGING IN NATIONAL PROJECTS

NATIONAL PROJECTS

MEPhI contributes to the development of the Russian Federation by sharing its best practices and launching high social impact projects in the regions of presence, in accordance with Federal Projects approved in Russia in 2018 in the areas of "Human capital", "Comfortable living environment" and "Economic growth".



NATIONAL PROJECT "SCIENCE"

AICCUN	among TOP 5 countries GLOBALLY	number of articles in international databases	
	>20%	of Russian and foreign leading scientists	
	x1,5 ARTICLES	in Q1 Q2 (WoS and Scopus)	









International academic staff, share



FOSTERING INNOVATION IN EDUCATION & INTERNATIONAL NETWORKING



EDUCATION MODEL



1

of education in the regions of presence

16

international ucation Education Life-long learning Silling Silling Life-long learning Silling Silling Life-long learning



Life-long continuing education offering for schoolchildren, students and specialists Pre-university Olympiads HPE SVE FVE Professional certification

COMPETENCIES PROFILE

Individual learning paths Enhanced education Elective courses Individual curricula

Environment for student development Residential & Recreational facilities Students associations and clubs Science Diplomacy Centre

Blended learning Distance learning centre On-line lectures and materials VR technologies Digital learning environment (LMS)



TOP-100 graduate employment rate and employer- student connections 2019

Forbes

2nd RANK

by education quality 2019

ROSSIYA 🥯 SEGODNYA

1st RANK

Cross-cutting skills

among engineering universities in the University Demand Ranking 2018

world **skills**

7 MEDALS Worldskills international championship Kazan 2019



FOSTERING INNOVATION IN EDUCATION & INTERNATIONAL NETWORKING

CHANGING EDUCATION PARADIGM



1 st among Russian universities by the number of courses on the edX platforms

98 total number of on-line courses by the end of 2019

>300 000 registered students

from **50** Regions

CROSS-DISCIPLINARY AREAS

- SAFE ENERGY
- O-TECHNOLOGY

TOP 5

- MEDICINE: CANCER TREATMENT
- CYBERSECURITY
- ROBOTICS AND AI

EXPORT OF EDUCATION



18

International students from 57 countries among them **33** countries of interest of SC Rosatom Presence Over **20** adjusting programs and events

340 international students completed internships at resource centres

24 direct export of education programs in 13 countries

International staff, share 1st among Project 5-100 universities

EDUCATION TOP **PROGRAMS**

- Nuclear Physics and Technology
- Information Technology
- **Kazakh** Medical Physics
 - Business Informatics Economics and Management
 - Nuclear Physics and Technology Business Informatics Economics and Management
- General medicine
- Uzbekistan Medical Physics

Nuclear Physics and Technology

- China International Relations
 - **Business Informatics** Economics and Management
- India General medicine Information Technology
- Malaysia Information Technology Electronics and Nanoelectronics

DIRECT EXPORT OF EDUCATION BRANCH IN UZBEKISTAN

The opening ceremony of the first international branch campus of National Research Nuclear University MEPhI was held on the 3rd September 2019 in Tashkent. SC Rosatom's CEO, Alexey Likhachev, mentioned in his speech that the opening of MEPhl's campus in Tashkent is one of the most significant events of the year and has a fundamental importance for Uzbekistan.





MEPhI -

23



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- Partner university
- Joint training program
- O Double degree program

- University of Rochester
- University of Michigan
- University of Illinois
- University of Buffalo

O BRASIL

- Federal University of Espiritu Santo
- Federal University of Pernambuco

BOLIVIA

- University of San Andres
- University of San Simón

INNOVATION RESEARCH IN THE SEARCH OF **EXCELLENCE**

EFFICIENT WHEELCHAIR CONTROL

MEPhI developed a decomposition method for a multi-channel control system based on extended BCI (brain-computer interface) that is designed to help users of robotised wheelchairs.



ACCIDENT TOLERANT FUEL: HOW TO INCREASE NUCLEAR **REACTOR SAFETY**

surface of zirconium tubes at 1200 °C for 400 seconds.

MEPhI scientists developed a projective chromium-containing coating for accident-tolerant nuclear reactor fuel element containers. They studied the composition, structure and thickness of the coatings using electron- and ion- microscopy. The researchers chose the optimal composition of coatings preventing the oxidation of the external

WHAT IS ARTIFICIAL INTELLIGENCE GOING TO BE FOR THE HUMANITY

An emotional artificial intelligence (AI) modeling is one of the hot topics for scientists at MEPhl. They are studying human emotions using an experimental platform based on virtual and mixed reality (monitoring eye movement), as well as electromyography and automated facial expression analysis. They are planning the improvement and empirical validation of social-emotional cognitive architecture ("eBICA").

PROSPECTS OF NANOTECHNOLOGY FOR **CANCER TREATMENT**

MEPhI scientists created a new type of contrast agent for MRIs based on nanoparticles of porous silicone that may be used both in diagnostics and therapy of oncological diseases. The use of silicone nanoparticles is one of the most promising methods for cancer nanotheranostics. These particles are not harmful and may be heated to 42 °C and higher using radio waves that locally destroy cancer cells.

to create molecular-sized microchip elements. They were

able to model the changes in the agitated molecules of an





ULTRA-THIN LIGHT-ABSORBING FILMS

MEPhI scientists made ultra-thin multilayered films that can be used in the electronics and power sectors in the future. To accomplish this, they singled out the conditions for the thermal-chemical synthesis of hetero-structures based on the transition metals' dichalcogenide compounds MoS₂, WS₂, MoSe₂ and WSe₂. These films are capable of acting as photocatalysts, which makes the process of obtaining solar-fuel components, including hvdrogen and oxygen, from water more effective without the use of expensive platinum-group metals.



COMPRESSION OF DIGITAL HOLOGRAMS WITH RATIOS OF 380

A method to compress holographic information by 380 times have been demonstrated at MEPhI. The new method enables the compression of holographic video from 1 TB to 1 GB, while retaining high quality in the reconstructed images. To this end, after the hologram is recorded, a spectrum analysis is held, the specific components are separated, and wavelet decomposition and wavelet processing are undertaken.

displays.

ENERGIZE DEVELOPMENT

ADVANCING GLOBAL COLLABORATION STRONGER TOGETHER



GETTING REAL: RESEARCH — EDUCATION — ACTIVITIES — LIFE

SCIENTIFIC AND EDUCATIONAL INFRASTRUCTURE



STUDENTS LIFE BEYOND STUDY



STUDENT SELF-GOVERNANCE MEPhI Student Council MEPhI Dormitory Council MEPhI Student construction brigades MEPhI Student Media Centre MEPhI Charity Centre MEPhI Volunteer Centre



MEPhI Bowling Club Sports history centre Sambo Club Rugby Club EXPlosion hip hop team

CULTURE MEPh1 cultural project centre Eighth Creative Union Quanto di Stella vocal studio MEPh1 academic male choir MEPh1's CARPE DIEM chamber choir MEPh1 visual arts centre Vernost patriot club Poetry club MEPh1 rock laboratory

SCIENCE MEPhl Student Research Society Centre of academic diplomacy Case club



LOOKING **BEYOND** SELF

PRE-UNIVERSITY

Equipped with modern laboratories and computer classrooms. Key disciplines are taught by highly professional lyceum teachers and university professors with a strong focus on project-related activities. Research is undertaken at the departments and research and educational centres of the university

Ath AMONG BEST **IT** - TECHNOLOGY ORIENTED SCHOOLS IN RUSSIA, 2019 RANK

ROSATOM SCHOOL

200 schools

in **31** cities

>10 000 scholars of E-Courses and Online lectures

36 atom classes

in **29** cities

Participants All-Russian Student Olympiads 2018 214

OLYMPIADS

>30 000

2014

The number of winners and nominees of Olympiads organized by the Russian Council of School Olympiads

79

SPORTS AT MEPHI

MEPhI is also going strong at sports such as sambo, fitness aerobics, also selected to represent Russia national rugby team at the European Championship 2019

CASE CLUB «PROEKTORIA»

3 joint Rosatom -

 Energy technology Health technology

Material Technology

500 students and

DEVELOPMENT

workshops

TEACHERS

200 teachers attended

PROFESSIONAL >3 000

проектория

teachers

professional orientation

MEPhI cases in:

rugby, badminton, sports tourism, cheerleading. In 2018-2019 MEPhI athletes participated in 30 All-Russian competitions. More than 50 MEPhI students are prizewinners of the All-Russian competitions in sambo, sports tourism, fitness, step aerobics, hip-hop. The men and women's national teams of the rugby club, which history has more than 55 years, are regulars at the finals of the Championships of the Russian Federation and Moscow Cup Competitions. MEPhI student is

SILVER STUDENTS

Continuing education courses for the additional professional program "CAD Engineering Design" are held for persons of pre-retirement age at SIPT MEPhI. This is an initiative of the Union Agency for the Development of Professional Communities and Workers "Young Professionals (WorldSkills)".

CHARITY

charity festivals "From Heart to Heart" have been held annually since 2012

NETWORK

SCHOOL

>27 000 students in

grades 5-11

from **57**

Regions of the **Russian Federation**

>4 000

problem-oriented programs in cooperation with industry partners

2013

>50

MAKING A MARK: RANKINGS

NATIONAL RANKINGS



INTERNATIONAL RANKINGS

MEPhl is a leader among Project 5-100 universities by the year on year presence in TOP-100 subjects rankings — **THE Physical Sciences QS Physics & Astronomy**



QUOTATION

INTERNATIONAL EXPERTS ABOUT MEPHI



SAMUEL CHAO CHUNG TING Nobel Laureate in Physics, Massachusetts Institute of Technology, USA

This is my second visit to MEPhl. Scientists from MEPhl are very good. Earlier, they were involved in a very important international experiment called PAMELA and made a very important contribution. The AMS experiment is much more precise. We are very hopeful that we will be able to work with them



PARAS PRASAD Distinguished Professor of Chemistry, Physics, Medicine and Electrical Engineering of the New York State University USA

MEPhl is uniquely positioned, having different aspects of physics, nuclear technology and biomedicine, and can influence the development of biomedicine not only in Russia but all over the world.



FEDERICO ANTINORI Head of ALICE Collaboration, Switzerland

MEPhI has made a great contribution to the development of the ALICE experiment. MEPhI graduates have had a role to play from early on, when the possibility of experimenting with heavy ions was only discussed at CERN. I would say that without them, ALICE would not exist as we see it now.



MARCO DURANTE

Director of the Biophysics Department of GSI Helmholtz Centre for Heavy Ion Research, Germany

In my opinion, MEPhI is moving in the right direction in developing scientific research jointly with foreign counterparts. As I understand it, the university is seeking to become one of the most advanced universities in the global rankings. It is a very ambitious goal and the development of international collaboration should help achieve it.



ZHANGBU XU Head of the International STAR Collaboration, USA

The cooperation between MEPhI and STAR has a long history that includes scientists as well as MEPhI's students. Their work attitude and professionalism are well known.



BDULLA ARIPOV rime Minister, Uzbekist

For a Hi-tech project aimed at building the first nuclear power station in Uzbekistan, specialists with modern knowledge are needed. I am sure that the new branch will fully meet the demand for highly qualified engineering and technical skills at the level of international education standards and graduates will be able to solve the most important scientific, technological and operating challenges for the benefit of the nuclear power industry.



WILLIAM MAGWOOD Director-General, OECD Nuclear Energy Agency, Austria

I am pleased to be in one of the most well-known and leading Russian universities with a nuclear focus. MEPhI students have already left a very good impression – doctoral students were doing an internship with us and proved to be very efficient. The guys took part in ROSTOV 2 modelling and contributed to the development of NEA's research and experimental center database. I am sure that our cooperation with MEPhI will be very beneficial and we will achieve outstanding results together.



ANTON FOJTÍK Professor at the Technical University of Liberec, Cze

MEPhl's reputation in the academic community has improved in recent years, I would put the university into the 50-100 range already now, and this is a great achievement considering how many good universities are there in the world

QUOTATION

EXPERTS ABOUT MEPhI



ALEXEY LIKHACHEV Director General of Rosatom State Corporation

Each year, at least one-third of graduates from MEPhI and its branches come to work at our companies, whereas for nuclear professions this figure reaches 80 percent. We do not put any barrier between Rosatom and MEPhI. In this sense, we are one family not only in Russia, but in a wider international nuclear community as well. This unity gives us power.



Academician of the Russian Academy of Sciences, Scientific Leader of the Flerov Laboratory of Nuclear Reactions at the Joint Institute for Nuclear

of my development when I was a student and later when I embarked on my independent career. Today, MEPhI pursues the same mission that was there when it was established. I am really pleased that people receiving a broad education here apply their knowledge, energy and



NATALIA NIKIPELOVA President of JSC "TVEL" Fuel Company

TVEL Fuel Company has a long-time collaboration with MEPhI aimed for development of the industry-oriented science and technologies with focus, among others, on the advanced nuclear technologies. TVEL company values and encourage MEPhl's development and transformation which accommodates implementation of the best practice and latest trends in to formation of the scientific and engineering agenda as TVEL Fuel Company will always need highly qualified staff.



Head of the Department of Radionuclide Diagnostics and Positron Emission Tomography, Federal State Budgetary Institution "Scientific Research Center for Cardiology", Ministry of Health of the Russian Federation

development of nuclear medicine with the support of such world class specialists as MEPhI graduates.



VLADIMIR UIBA Director of the Federal Medical-Biological Agency of the Russian Federation (FMBA)

Academic and research and management staff of the MEPhI are working continuously to bring the quality of the education to the next level, adopts creativity as a search of meaning and closely cooperated with leading national research centers.



ARSENIY BRYKIN

professional training, special attention is paid to economics and management, as it is not enough to develop a product, it is important



MIKHAIL EREMETZ Head of laboratory at the MPI of Chemistry, Germany

I graduated from MEPhI in 1973 and can admit that the University still shows the highest level of students training and scientific research. It can be proved by the unique experiment that we conducted in collaboration with European Synchrotron Research Facility (ESFR, Grenoble, France). The great expertise in synchrotron research gained at the LaPlas, MEPhI allows for better understanding of the very nature of high-temperature superconductivity. Issues addressed by the MEPhI approach the very frontier of world science.



The MEPhI students' training is outstanding. They successfully master practical knowledge in our joint educational project TECHNOATOM. No surprise, that there is a healthy competition among our internal



MEPHI ORGANISED A WINTER SCHOOL FOR PARTICIPANTS OF THE "I AM A PRO" NATIO-NAL STUDENT CONTEST IN NUCLEAR PHY-SICS AND TECHNOLOGY

The contest offers career lifts for students, as they can be employed by market leaders and/ or continue their education in leading Russian universities. Over three days, students and young specialists from different parts of Russia received an intensive immersion into the profession from recognised experts, who described current nuclear power trends and developments and networked with the students.



MEPHI HAS JOINED THE OPEN EDUCATION NATIONAL PLATFORM

As an association member, the university contributes to a wider adoption of a digital learning environment and works to improve the quality and accessibility of education throughout the entire country. The Open Education project is an educational platform that offers online courses on introductory disciplines.



COOPERATION UNDER THE MEPHI STUDENT INTERNSHIP PROGRAMME AT THE OECD HAS BEEN CONFIRMED IN A MEMORANDUM

William D. Magwood, the Director General of the OECD Nuclear Energy Agency (NEA) and the rector of MEPhI signed a memorandum on cooperation for a student internship programme. The internship programme gives an opportunity to qualified candidates to improve their analytical and technical skills as well as gain experience working at an international organisation.



YOUNG SCIENTISTS FROM MEPHI RECEIVED A MOSCOW GOVERNMENT AWARD

An official awards ceremony for young scientists who made remarkable progress in research and new technology development was held in the Kremlin Palace.





WINNERS IN THE SMART GRID CATEGORY OF THE NATIONAL TECHNOLOGY INITIATIVE OLYMPIAD HOSTED BY MEPHI

MEPhl hosted the final round of the National Technology Initiative Olympiad in the Smart Grid category. The NTI Olympiad is the first Russian team engineering contest for scholars and students that is held by the NTI, ASI and RVC. The teams competed against each other: the winners were expected to build the best grid and write the best management algorithm. Also, the participants were allowed to sell electricity to their competitors on other teams.



MEPHI STRENGTHENS COOPERATION WITH BRICS UNIVERSITIES IN BIOMEDICINE

National Research Nuclear University MEPhl signed a four-party agreement with three BRICS universities: the University of Delhi (India), the Shenzhen University (China) and the University of Pernambuco (Brazil). The agreement signed by MEPhl rector Mikhail Strikhanov will make it possible to develop joint projects in education and science, particularly in biomedicine. Representatives of MEPhl discussed with their counterparts from the University of Pernambuco the progress of joint research for the nanoparticles for biomedicine project intended to develop new methods of oncological disease treatment and talked about new developments in clinical decision support systems.



MEPHI STUDENTS WIN THE NATIONAL STUDENT OLYMPIAD IN PHYSICS

MEPhl hosted one of the stages of the National Student Olympiad among Higher Vocational Education (HVE) Institutions. MEPhl student Aynur Galiev won the National Student Olympiad in Physics, while another MEPhl student, Vladislav Chausov, won the international round. This year, the university will host five Olympiads from the HVE list. HVE winners and medallists may enrol in MEPhl's master's degree programmes without exams, whereas the Olympiad prize holders are eligible for benefits.

50

51



MEPHI TAKES PART IN A NETWORK PROJECT ON PROMOTING ARTIFICIAL INTELLIGENCE

MEPhI joined a network project for AI promotion together the University 20.35 platform, the Agency for Strategic Initiatives (ASI) and a number of IT companies, including Mail.ru Group, Kribrum, Skyeng, Bigdata team and GIL. The Charter on Educational Space Digitalisation and Cooperation Agreement was signed by MEPhI and the Association of Technology Communities (Kruzhok).



Students were awarded medals in 6 categories of skills. MEPhI was part of a wider national team and together with a Rosatom team took part in the competition in eight skill categories. Nine MEPhI students were announced as winners of the WorldSkills contest (22-27 August, Kazan).



MEPHI & ROSATOM JOINT FORESIGHT SESSIONS

The session gathered representatives from university StrAUs an SC Rosatom management teams. New formats of personnel training required for the development of the industry has been one of the topics. In particular, the training of personnel for the civilian nuclear sector and development of new businesses.



ON 3RD SEPTEMBER, TASHKENT SAW THE OPENING OF THE FIRST FOREIGN BRANCH CAMPUS OF NATIONAL RESEARCH NUCLEAR UNIVERSITY MEPHI

"Opening of the first foreign branch campus of National Research Nuclear University MEPhI in Tashkent — is one of the major events this year that has an utmost significance for Uzbekistan. We are honored, proud and challenged at the same time that the opening had happened in Uzbekistan"— said Alexey Likhachev, Director General of SC Rosatom.

MEPHI STUDENTS

MEPhI





