New Initiatives for International Cooperation for Nuclear Education in Russia

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1. National Research Nuclear University MEPhI - a networking university

In Soviet time MEPhI was an all Soviet Union coordinator of nuclear education in republics Ukraine, Belarus, Kazakhstan … etc

NRNU MEPhI:

- **Main Educational and Research Partner of Rosatom**
  - One of Two First Research Universities (2008)
  - 21 branches
  - Located in 15 Federal Districts and in 20 atomic cities throughout Russian Federation
- **Combines 11 Higher Education Institutions and 20 colleges:**
  - Over 38 thousand students;
  - over 1500 professors and associated professors.

1. National Research Nuclear University MEPhI – Russian Nuclear Education Network

RANKING (2013)

INTERNATIONAL

226-250	Times Higher Education (THE)
74	Subject List Physical Science (THE)
5	SCImago Institutions Ranking
4	Webometrics

Among Russian Universities

RUSSIAN NATIONAL

1 - 3	Global Competitiveness Program
3	Interfax Agency
1	Russian Training Foundation
7	Expert Ranking Agency

MEPhI, Moscow

IATE, Obninsk

Nuclear Energy Complex (10 NPP – *Rostov, Novovoronezh, Kalinin, Beloyarsk*)

Nuclear Research Complex (46 Research Institutes – *RIAR, IPPE, GIDROPRESS, VNIIAES*)

Nuclear and Radiation Safety Complex (Production Plant «Mayak», Siberian Chemical Plant, 17 facilities)

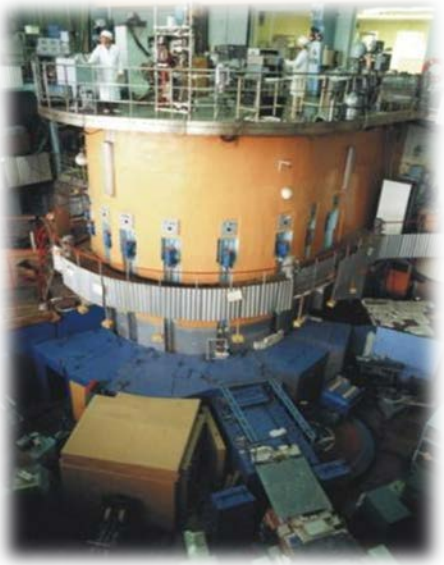
Nuclear Defense Complex (VNIIEF, VNIITF, more than 20 facilities)

VITI, Volgodonsk

DITI, Dimitrovgrad

1. National Research Nuclear University
MEPhI is Russian Nuclear Education Center (more than 40 programs)

- Nuclear reactors and power installations
- Nuclear power plants
- Radiation safety of human and the environment
- Security and non-proliferation of nuclear materials
- Physical protection, control and accounting of nuclear materials
- Material science and technology of new materials
- Nuclear and particle physics
- Theoretical physics
- Plasma physics
- Physics of kinetic phenomena
- Applied mathematics
- Medical physics
- Electronics and automation in physical facilities
- Device and methods of for quality control and diagnostics
- Nuclear and business management
- and others



Over 150 modern laboratories and educational-research centers, research nuclear reactor and 5 subcritical assemblies are available for education and training.

1. National Research Nuclear University MEPhI is Training and Retraining Center (more than 200 programs at MEPhI regional branches)

- Modern nuclear installations
- Safety of the nuclear fuel cycle
- Nuclear and radiation safety
- Culture of nuclear material management
- Technological aspects of nuclear non-proliferation
- Environmental protection
- Methods of reactor material diagnostics
- Methods for uranium and nonuranium isotopes separations
- Reliability of nuclear reactors and risk management
- Applied spectrometry of nuclear radiation
- Systems of the mathematical support of the exploitation of VVER type reactors
- Quality control in nuclear industry
- Nuclear physics methods in nanotechnologies
- Mass-spectrometric methods of isotope and element analysis
- others

2. Russian National Nuclear Innovation Consortium

Leading managing companies such as:

- **Rosenergoatom (10 NPP)**
- **TVEL (5 Plants)**
- **Science and Innovations centre (12 Research Institutes)**
- **Atomenergomash (5 Plants)**
- **Techsnabexport**

Most engaged scientific centres:

- **Kurchatov Institute**
- **Russian Federal Nuclear Centre in Sarov**
- **Russian Federal Nuclear Centre in Snezhinsk**

The Association of Universities «Consortium of Rosatom Supporting Universities»

1. National Research Nuclear University MEPhI www.mephi.ru MEPhI
2. Ivanovo State Power Engineering Institute named after V.I. Lenin www.ispu.ru IPSEU
3. Moscow State Technical University named after Bauman www.bmstu.ru BMSTU
4. National University of Science and Technology "MISIS" www.misis.ru MISIS
5. National ResearchTomsk Polytechnic University www.tpu.ru TPU
6. National Research University "Moscow Power Engineering Institute" www.mpei.ru MPEI
7. Nizhny Novgorod State Technical University n.a. R.E. Alekseev www.nntu.nnov.ru NSTU
8. D. Mendeleyev University of Chemical Technology of Russia www.muctr.ru MUCTR
9. St. Petersburg State Polytechnical University www.spbstu.ru SPbSPU
10. Ural Federal University n.a. the first President of Russia B.N. Yeltsin www.urfu.ru UrFU
11. Etc…

2. Russian National Nuclear Innovation Consortium
Russian National Nuclear Innovation Consortium tasks

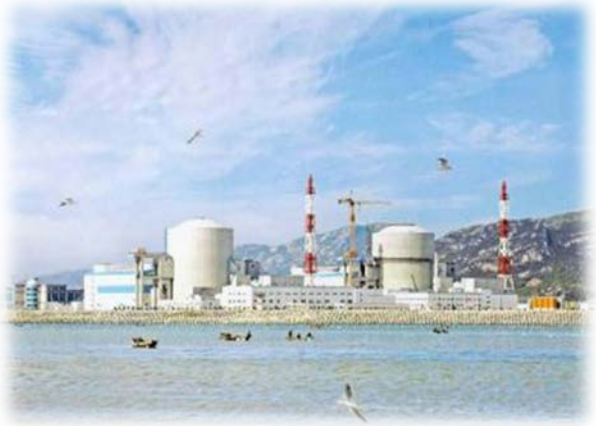
NNIC Tasks:

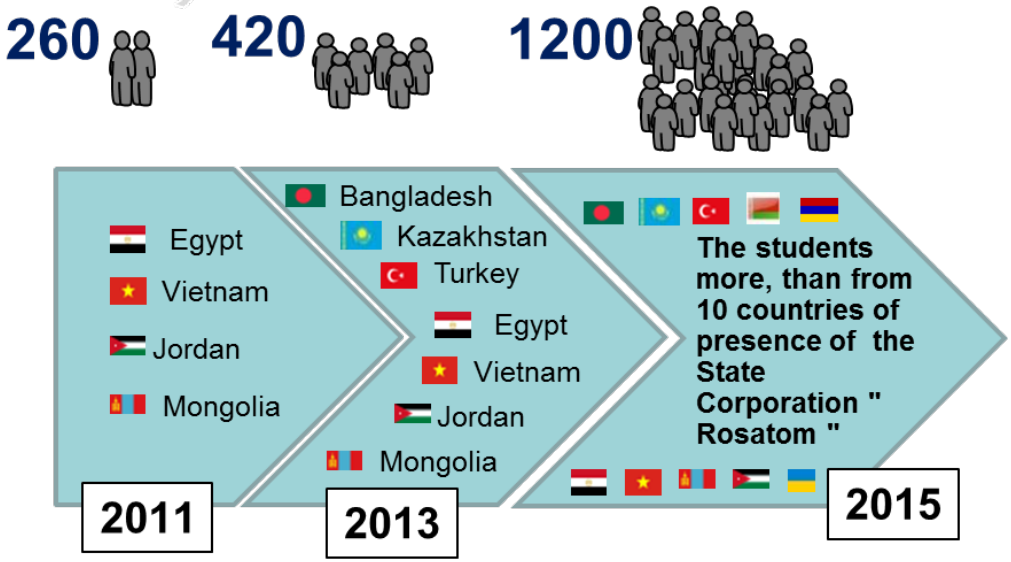
- *Professional and public accreditation of curriculum and certification of university graduates' qualifications*
- *Integration of research, education and industrial potential of NNIC members.*

NNIC
The National Nuclear Innovation Consortium

Heat Power Engineering and Thermal Engineering
Power Engineering and Electrical Engineering
Nuclear Power and Thermophysics
Nuclear Physics and Technologies
Power Engineering
Materials Science and Materials Engineering
Applied Physics
Electronics and Automatics of Nuclear Facilities
Nuclear Reactors and Materials
Nuclear Plants: Construction, Exploitation and Engineering
Isotope Separation Technologies and Nuclear Fuel
Engineering of Production Machines and Complexes
Chemical technology of materials in modern power industry
Heat Power Engineering and Thermal Heating
Power Engineering and Electrical Engineering
Nuclear Power and Thermophysics
Nuclear Physics and Technologies
Power Engineering
Materials Science and Materials Engineering
Applied Physics

3. Rosatom – MEPhI collaboration for foreign students training





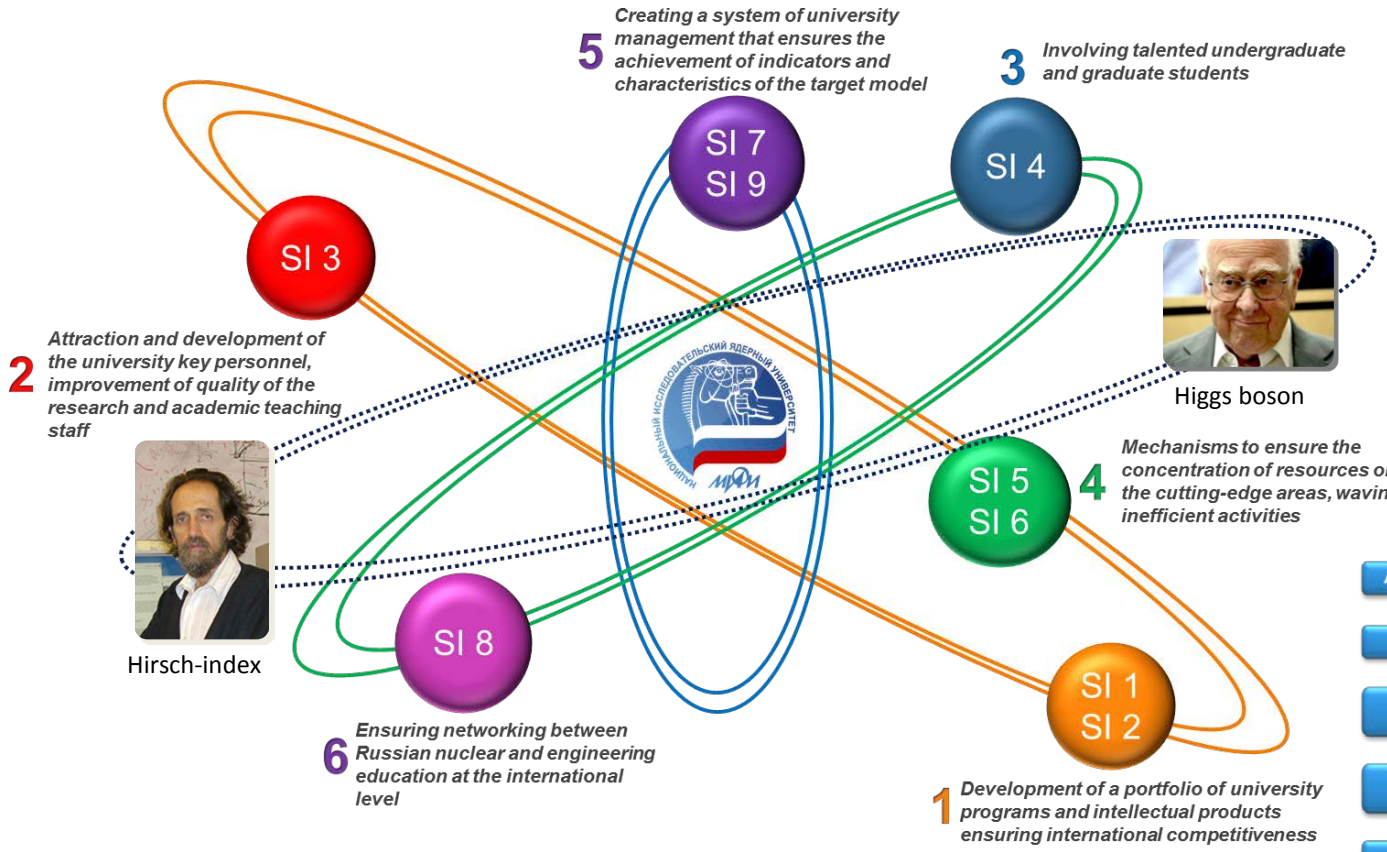
3. Rosatom – MEPhI collaboration for foreign students training International cooperation in nuclear education

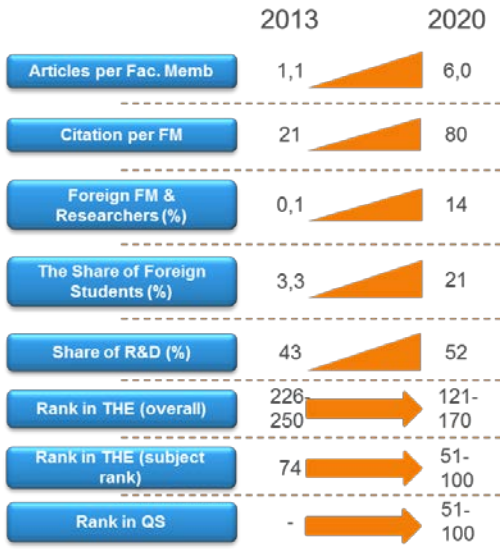
- Training & Retraining of foreign students and specialists in the field of nuclear engineering and hi-tech.
- Cooperation with nuclear educational networks (MEPhI has agreement with ENEN and ANENT).
- Cooperation with the foreign nuclear universities for development common master of research programs, postgraduate training, curricula analysis and enhanced (MEPhI has agreement with more than 20 universities from USA and Europe).
- Participation at the IAEA activity and representation of the Russian Federation at the World Nuclear University. NRNU MEPhI – IEAE Practical Arrangements.

3. Rosatom – MEPhI collaboration for foreign students training

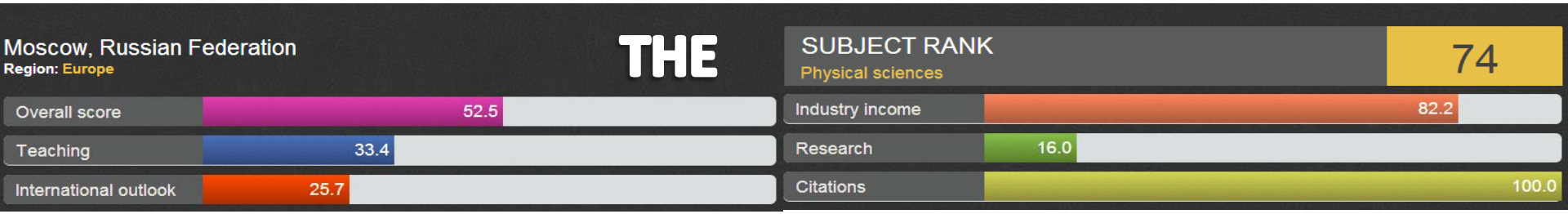
The Russian localization of the IAEA Cyber Learning Platform CLP4NET installed in the NPNU MEPhI to support national and international educational and training activities

4. Competitiveness growth program
Program Atomistic Model



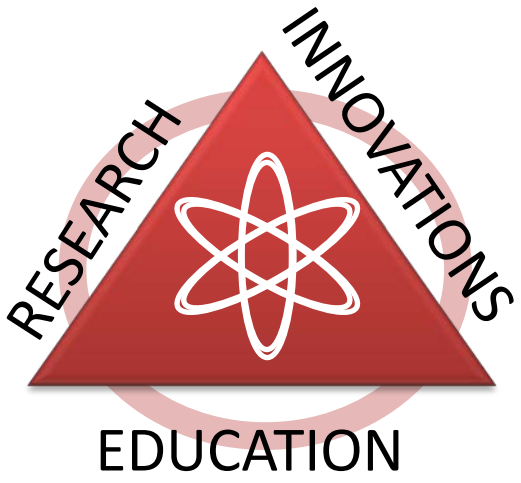


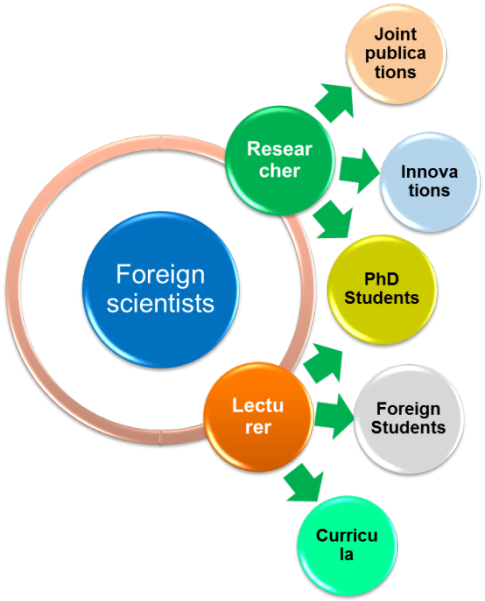
4. Competitiveness growth program
Times Higher Education (subject ranking, 2013)

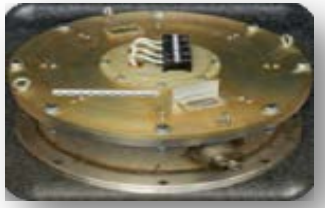


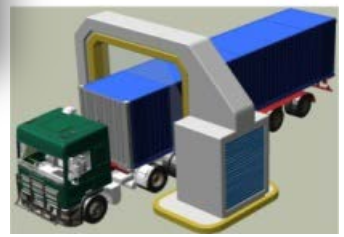
Indicator			Criteria	Implementation measures
2012	2013	2020		
Teaching				
20,9	***33,4***	***52,4***	• Reputation assessment in education • The share of faculty members with a degree • The number of students per faculty member • Revenue per faculty member • The number of postgraduates defense / Number of graduates	• Growth reputational component of education (now only 6 points out of 100) • Expansion work with alumni and major employers • Increase the proportion of masters, specialists and postgraduates
International outlook				
18,8	***25,7***	***79,0***	• Share of foreign faculty members • Share of foreign students • The share of research articles with international co-authors	• Increasing number of foreign students and the faculty members; • Increasing number of joint publications with foreign researchers

4. Competitiveness growth program
Recent achievements:
Triplicity: Education – Research – Innovations









Centres of Excellence
Centre for Nuclear Systems and Materials
High-Energy Physics Centre
Centre “Plasma and Laser Technology”
Centre of Nanotechnologies
Cyber Security Centre
Nuclear Security and Safety
… etc…

Mega science
CERN , DESY
BNL , LANL,…, USA
MIT, Stanford, USA
IAEA
INFI, Italy
KEK, Japan
AMC, Netherlands

Industrial products
Isotopes
Nanoelectronics
Superconductivity products
Lasers
Portal diagnostic systems
Nuclear medicine devices
Optoelectronics

5. Final remarks
Planned activities under the IAEA/MEPhI cooperation

- Assistance in implementing the IAEA initiative on Virtual Nuclear Management University;
- Collecting and preserving information on peaceful use of nuclear science and technology through the Russian International Nuclear Information System (INIS) Center;
- Assistance in implementing the educational laboratories of Virtual Nuclear laboratories for CLP4NET and "Turbine-installation of NPP with VVER-1000 reactor“ simulator;
- Develop and implement the selected courses using the CLP4NET or other suitable platform (3 Master’s degree programs on Nuclear Engineering, Nuclear Reactors and Nuclear Nonproliferation);
- Assistance in implementing the IAEA/ICTP School of NKM, August 2014 ;
- A set of regional workshops on “The role of computer-based educational laboratories in Nuclear Engineering University Programmes”;

5. Final remarks
New possible activities under the IAEA umbrella

- Cooperation with regional networks;
- Establish a new network for Nuclear Education (CIS, EvrAzES, …) and develop together with other countries curricula, training programs and training materials on nuclear power and non-power applications;
- Build public awareness of the benefits of nuclear technology and its applications; Support the IAEA in implementation of the selected courses in Member States.
- Cooperation with foreign nuclear universities and training organizations for development of master and bachelor programs and postgraduate training.

Thank You for Your Attention