JINR

PROGRAMMES
ON ACADEMIC TRAINING

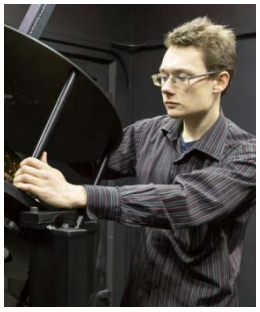
JINR University Centre
Attracting youth to science

Outreach
activities

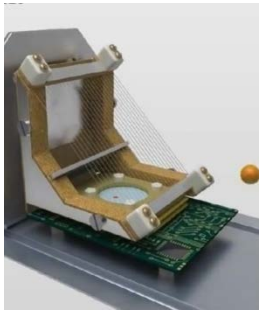
Skill
improvement

School
teachers

Students &
postgraduates



Training
of engineers



Modern
educational
programmes

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UC Director
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Perspectives for Joint Science and Academic Training at FAIR and NICA

16.11.2016

PROGRAMMES for students & postgraduates

- Bachelor's, Master's & PhD theses at JINR
- International student practices
- Summer student programme
- Hands-on workshops for future engineers
- Virtual laboratory of nuclear fission
- Training course in CATIA-GDML Geometry Builder

PROGRAMMES for school students

- Interschool physics and mathematics open classroom
- Centre of additional education PRIMER
- 'NICA Mega-science project' demo lesson

PROGRAMMES for physics teachers

- International scientific schools at JINR and CERN
- Videoconferences with schools from JINR Member states

Outreach PROGRAMMES

- Festivals of science
- Days of physics in Dubna
- Visits to the JINR labs
- 3D tours around JINR basic facilities
- Popular lectures on modern science
- Renovated JINR museum

Brief history of JINR educational programmes

1956 – JINR is established

1961 – Moscow State University branch is founded in Dubna (D.I. Blokhintsev, V.I. Veksler and S.N. Vernov)

1991 – JINR University Centre is established

1995 – JINR PhD programme is launched

1994 – Dubna International University (DIU) is founded

2003 – Education programme in physics is started at DIU

2004 – International Summer Practices are started at JINR

2014 – Summer Student Programme at JINR is launched

2014 – Scientific-engineering group at JINR UC is established

JINR fields of theoretical and experimental research

- Theoretical physics
- Particle physics
- Relativistic nuclear physics
- Heavy ion physics
- Low and intermediate energy physics
- Nuclear neutron physics
- Condensed matter physics
- Radiation biology and radiobiological investigation
- Information technologies and modern computational techniques

Start your career at JINR

Why?

- World-class scientific research
- Wide range of research areas
- Qualified supervision
- Fruitful contacts
- International collaboration
- Variety of training programmes

Bachelor's, Master's & PhD theses at JINR

JINR has the departments of the following universities

SAINT PETERSBURG STATE UNIVERSITY

We enable students and postgraduates from the Member States Universities to prepare their qualifying papers at JINR

International 3-week student practices

Started in **2004**

Total number of participants – **1267**

Practice participants

- build a picture of the JINR fields of research
- can work at the basic facilities of the Institute under supervision of the leading experts
- have an opportunity to choose a future research supervisor
- make fruitful contacts
- enjoy the Russian culture

1 stage, May
Egypt

2 stage, July
Bulgaria, Poland,
Romania, Slovakia,
Czech republic, Azerbaijan

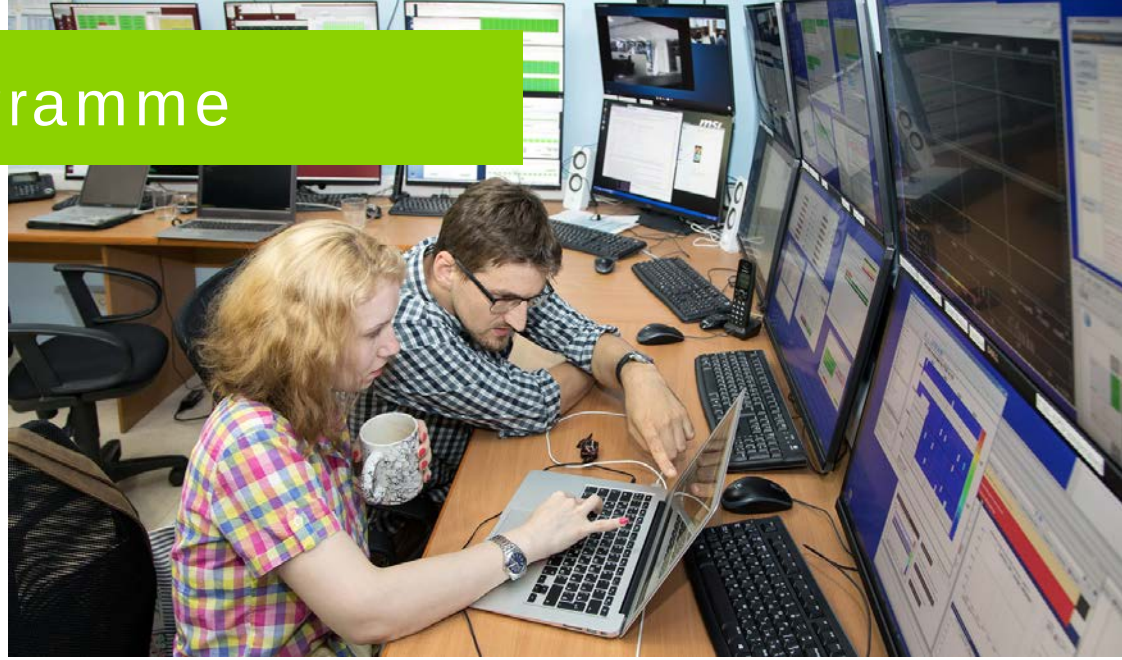
3 stage, September
RSA, Belarus,
Cuba, Serbia

Summer student programme

Started in **2014**

Total number
of participants – **80**

- Competitive selection
- Longer term (6-8 weeks)
- Advanced level of projects

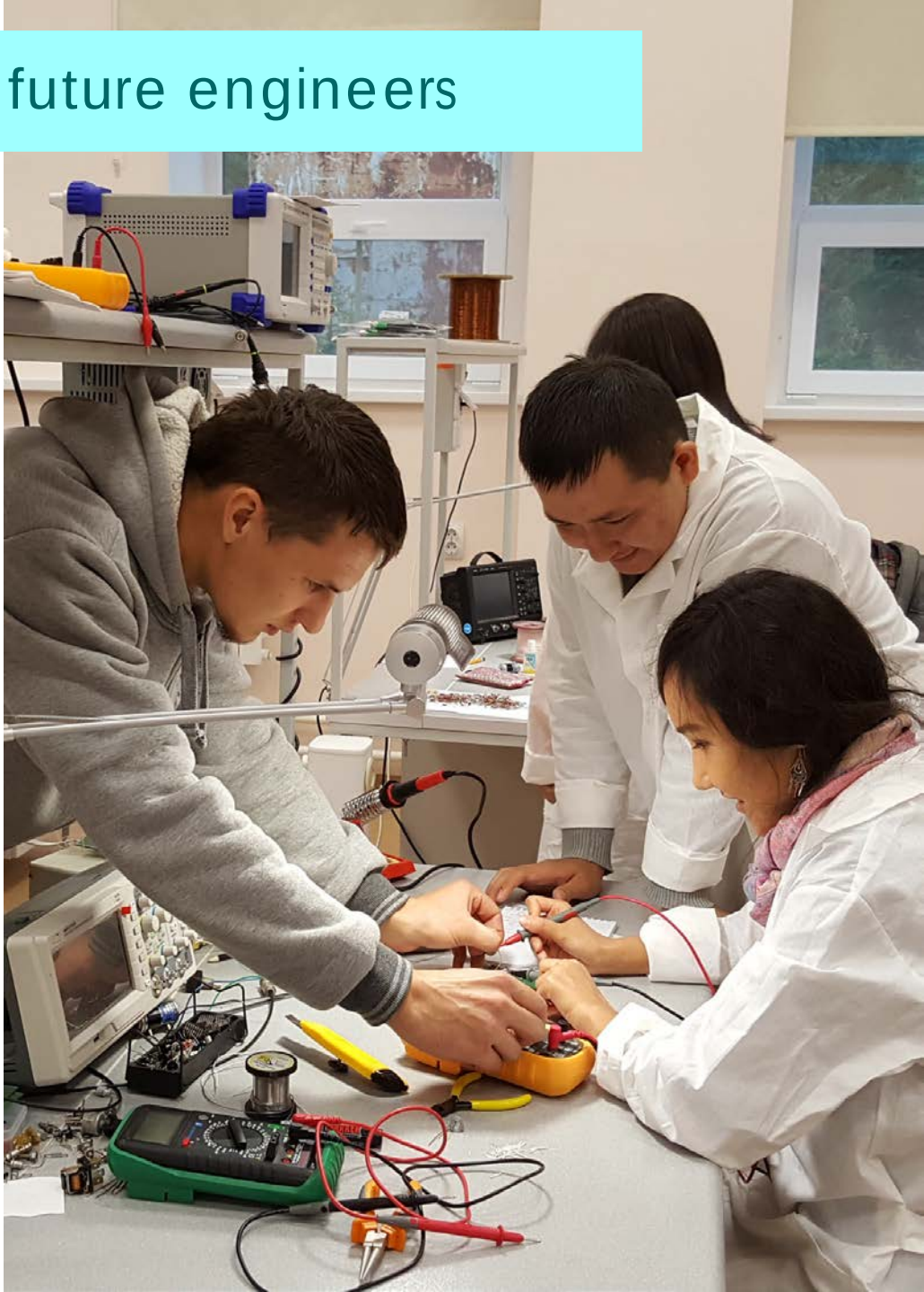


students.jinr.ru

Application procedure for the JINR SSP-2017 starts on January, 16

Hands-on workshop for future engineers

- Basics of nuclear physics
- Radiation protection and safety
- Particle detectors
- Vacuum technology
- RF technology
- Magnets
- Electronics and automation



Main directions:

- Development of training programmes
- Acquisition of practical skills
- Enhanced training

Linac-200 at JINR

100 MeV electrons now
240 MeV by this Christmas
800 MeV by 2020

Current in bunch – **15 μA**
Bunch width – **2 μs** Bunch frequency – **10-250 Hz**
Focal spot **~ 1 mm** can be defocused up to **20 mm**
'Training' beam – **22 MeV**

Future plans: Series of training courses at Linac-200

- Accelerator and beamline operation
- Beam diagnostics
- Magnet optics
- Detector response to the electron beam and gamma rays

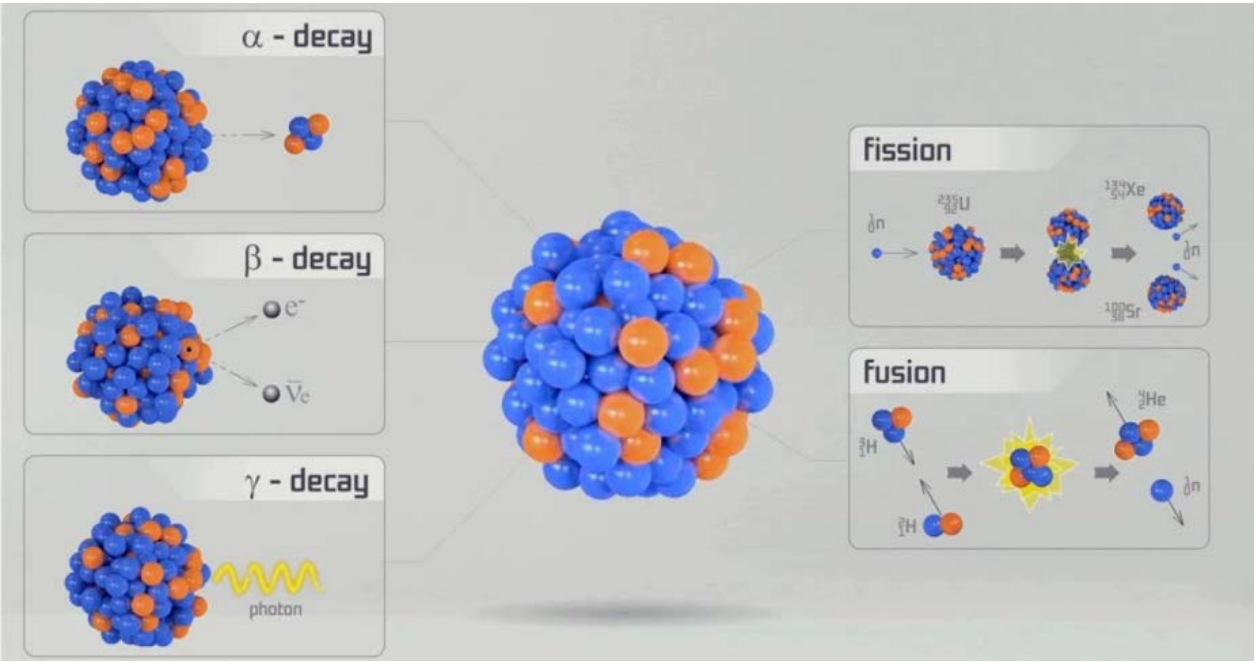
Key ideas:

- Thematical blocks lasting 1-3 weeks
- Online booking available
- Creative unsupervised work encouraged
- Discussion sessions with the qualified scientists and engineers
- Technical assistance provided
- Use of e-Learning techniques
- All the materials available both in English and Russian

Perspectives:

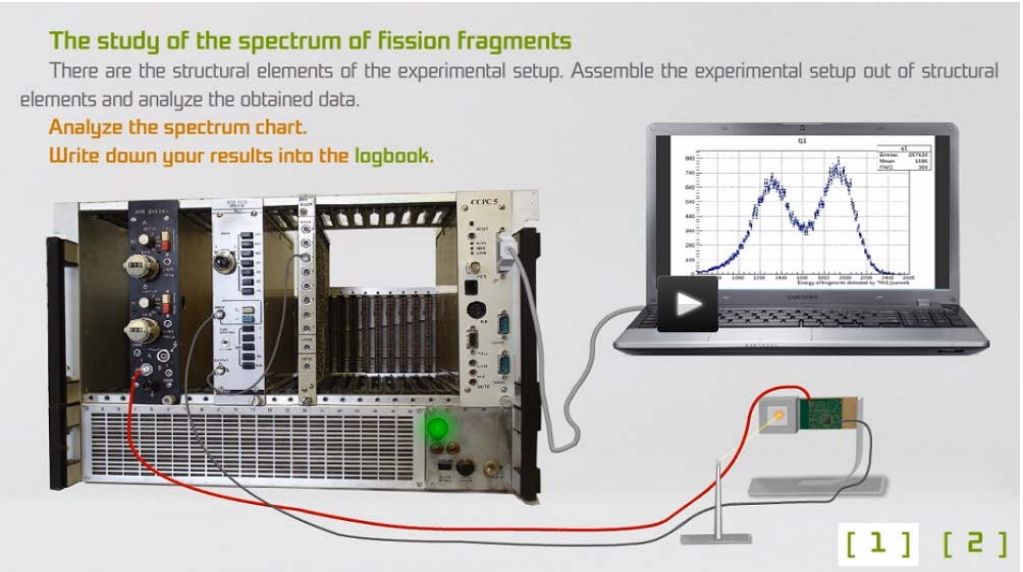
- Synchrotron radiation (provided the Linac energy raises up to 800 MeV)
- Radiation processing technology and materials science, radiobiology
- 'Toy' physics experiments: study of giant dipole resonance, electron scattering in atomic nuclei, nuclear form-factors, etc.

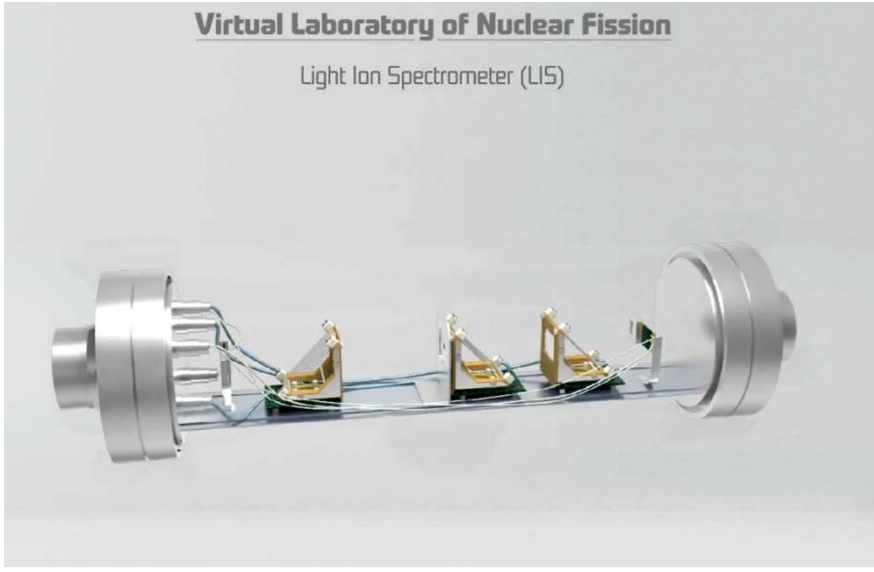
Virtual Laboratory of Nuclear Fission



- Theory
- Experiment
- Electronics and Data acquisition system
- Data analysis

Virtual and online laboratory research

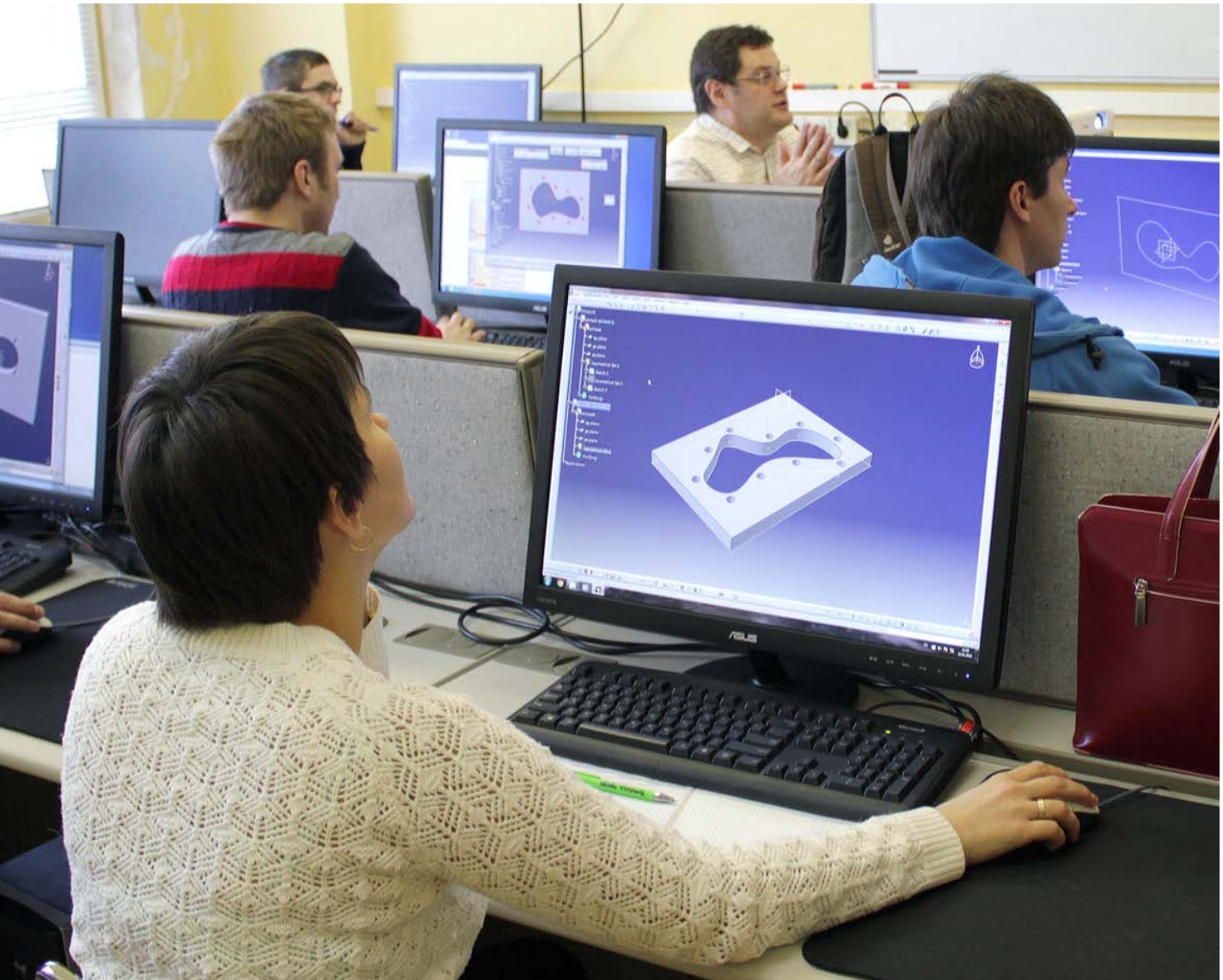


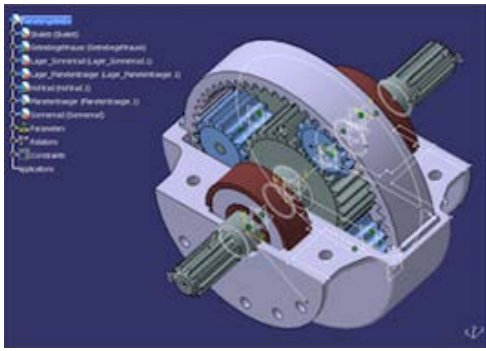


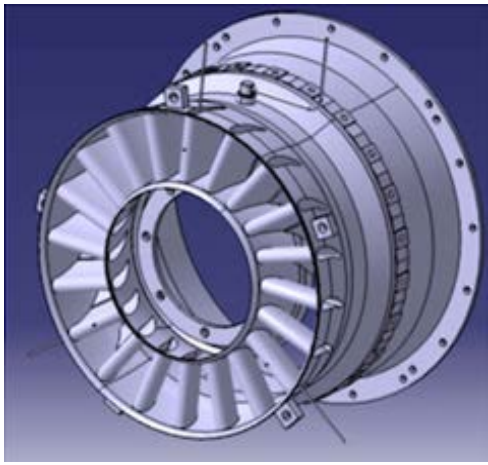
Training course in CATIA-GDML Geometry Builder

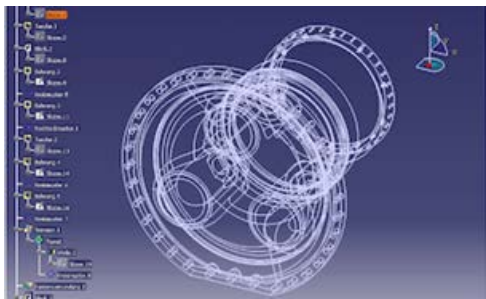
JINR University Centre
Attracting youth to science

FRRC FAIR-Russia Research Center FAIR









International scientific schools for physics teachers at JINR and CERN

Basic components:

- Visits to experimental facilities;
- Lectures;
- Hands-on activities;
- Meetings with research physicists;
- Communication with colleagues from different regions.

What do we want to achieve?

- Raise and maintain the interest of students in modern science.
- Motivate students to study science and engineering at universities.
- Prepare the future generation of scientists and engineers.
- Show that **Science is alive**!

Schools at JINR

Bringing Science closer to School

Schools at CERN

Videoconferences

JINR University Centre together with CERN hold videoconferences with schools from JINR Member States

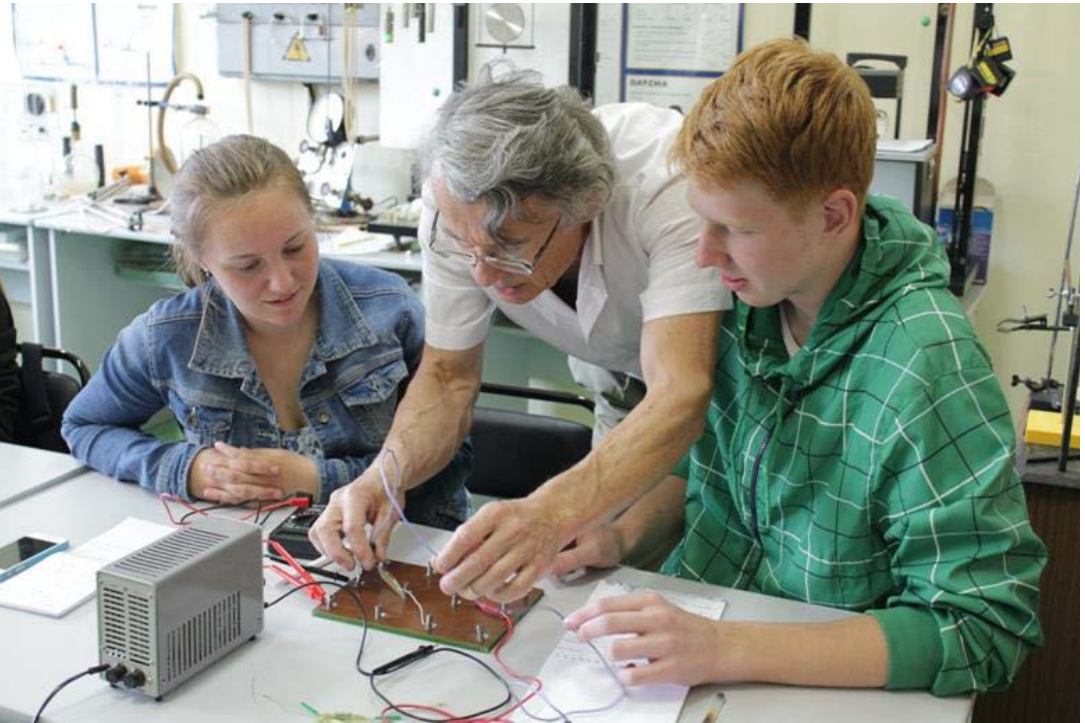
Interschool physics and mathematics open classroom

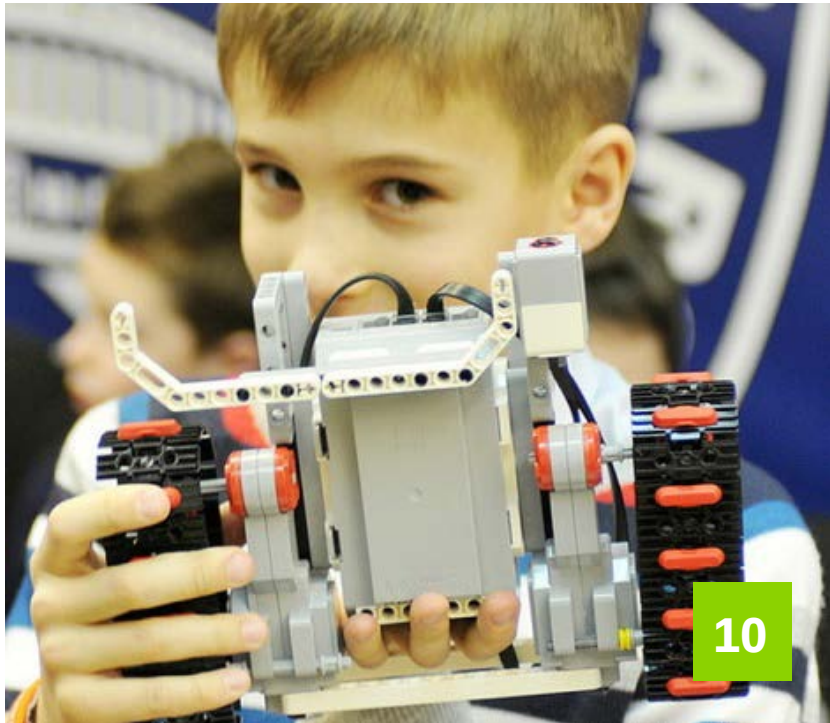
Applied physics informatics & mathematics

Natural science

Robototronics

Centre of additional education ‘PRIMER’





Festivals of science

- Outreach
- Communication with wide audience

Days of physics in Dubna

Days of physics in Dubna

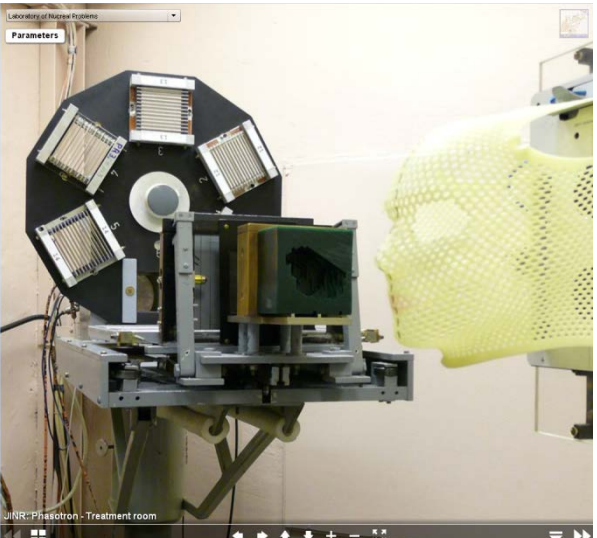
3D tours around JINR basic facilities

Parameters

Nuclotron – Superconducting heavy ion synchrotron	
Circumference, m	251.5
Ions	from p up to A>100
Maximum magnetic rigidity, T·m	43
Maximum energy	12 GeV for protons, 6 GeV/u for A/Z = 1/2
Intensity, particles per pulse	from 10^5 (heavy ions) up to $5 \cdot 10^{10}$ (d)
Magnetic field ramp, T/s	up to 2
Slow extraction spill duration, s	up to 10
Alvarez-type DTL LU-20	
Length of the cavity, m	14.5
Maximum fore-injector voltage, kV	700
Output proton energy, MeV	20
Output ion (Z/A ≥ 1/3) energy, MeV/u	5
Peak current, mA	10
RF frequency, MHz	150

JINR: Nuclotron - Internal target - 2014

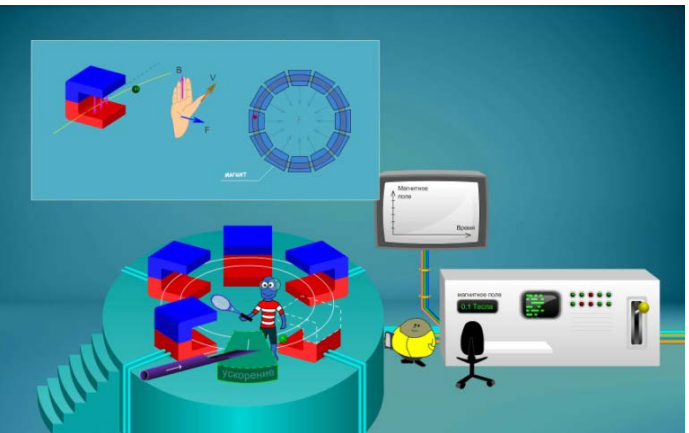
uc.jinr.ru, ‘JINR basic facilities’ section

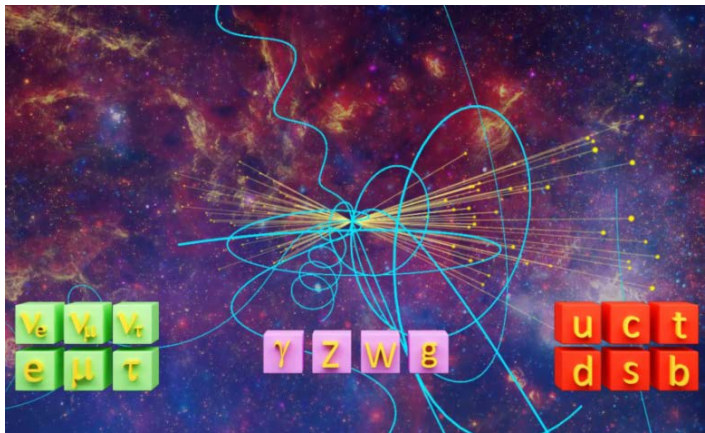


Visits to the JINR labs

for students and teachers

‘NICA Mega-science project’ demo lesson

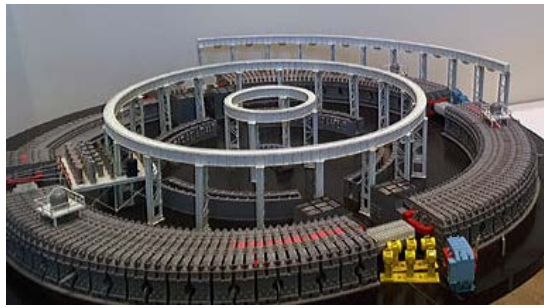




Popular lectures on modern science

- Modern science in simple words
- Entertaining particle physics for school students
- Lab work using real experimental data

Renovated JINR museum



Thank you
for your attention