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18.07.2008
The agreement on the establishment of JINR was signed on 26 March 1956 in Moscow.
Founders
Discoveries

I. More than 40 discoveries, including:

- 1959 – nonradiative transitions in mesoatoms
- 1960 – antisigma-minus hyperon
- 1963 – element 102
- 1972 – postradiative regeneration of cells
- 1973 – quark counting rule
- 1975 – phenomenon of slow neutron confinement
- 1988 – regularity of resonant formation of muonic molecules in deuterium
- 1999-2005 – elements 114, 116, 118, 115 and 113
- 2006 – chemical identification of element 112

- 46 prestigious academic and state awards, and prizes of Russia, Bulgaria, Georgia, Romania, Czech Republic, Uzbekistan and other countries.
I. JINR – Russia Agreement

The Agreement was signed by V.Putin on his first working day as Acting President on 2 January 2000.
<table>
<thead>
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<th>JINR in figures</th>
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<tbody>
<tr>
<td>JINR’s staff members ~ 5500</td>
</tr>
<tr>
<td>researchers ~ 1200</td>
</tr>
<tr>
<td>including from the Member States ~ 500 (but Russia)</td>
</tr>
<tr>
<td>Doctors and PhD ~ 1000</td>
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</table>
II. JINR’s Scientific Activities
In 2005 the JINR Scientific Council approved the road map of the Institute’s strategic development for the next 10-15 years.
JINR’s facilities

**Nuclotron** (superconducting synchrotron) has been operating since 1993

**Cyclotron U400** has been operating since 1979

**Cyclotron U400M** has been operating since 1993

**Phasotron** (synchrocyclotron) has been operating since 14.12.1949

**Neutron pulsed source IBR-2** has been operating since 1984
Major Scientific Directions:

- High Energy Physics
- Nuclear Physics
- Condensed Matter Physics
“Road Map” in the field of Particle Physics

The main home facility (today):
Nuclotron complex of Veksler-Baldin Laboratory of High Energies

Future plan: creation of NICA.
Priorities in Particle Physics

• origin of mass
• properties of neutrinos
• properties of the strong interaction, including properties of nuclear matter (search of the mixed phase)
• the origin of the matter-antimatter asymmetry in the Universe
• the unification of particles and forces including gravity
NUCLOTRON & accelerator complex:

- advanced programme (basic and applied) on heavy ion physics

- stages of the Nuclotron development:
  1. upgrade of the Nuclotron to achieve its project parameters ($A \sim 200$, $5 \text{ GeV/n}$ for heavy ions, polarized beams)
  2. conceptual project: creation of Nuclotron-based Ion Collider Facility (NICA/MPD) ($\sqrt{s_{NN}} = 9 \text{ GeV}$)

Participation in the external experiments:

- CERN – the main partner in PP (participation in more than 20 projects)
- Russia: IHEP, INR RAS, BINP SB RAS, …
- Germany: GSI, DESY, …
- USA: FNAL, BNL, LLNL, …
- France: IN2P3/CNRS, …
- Italy: INFN, …
- Japan: KEK, RIKEN…
- China: IHEP CAS, CIAE, …
NICA/MPD: The proposed extension of JINR basic facility for generation of intense heavy ion and light polarized nuclear beams aimed at searching for the mixed phase of nuclear matter and investigation of polarization phenomena at the collision energies up to $\sqrt{s_{NN}} = 9$ GeV.

- No new buildings, no additional power lines
- No extra heat, water cooling power
- Fixed target experiments could be also continued
- Polarized deuterons collision mode is foreseen
“Road Map” – in the field of Nuclear Physics:

- Heavy Ion Physics
- Nuclear Physics with Neutrons
- Low and Intermediate Energy Physics

The main home facilities (today):
Cyclotrons U400 and U400M,
accelerator complex DRIBs-I, Phasotron.

Future plans:
- U400R, U400MR, accelerator complex DRIBs-II
- construction of the IREN facility (first stage)
- construction of the IBR-2M reactor
Priorities in Heavy Ion Physics

- Physics and chemistry investigations of the superheavy nuclei with $Z \geq 112$; structure and properties of the neutron-reach light exotic nuclei

- Development of the FLNR Cyclotron Complex

- Heavy ion interaction with matter; applied research.

To accomplish these tasks, the FLNR Cyclotron Complex will be upgraded for producing intense beams of accelerated ions of stable ($^{48}$Ca, $^{58}$Fe, $^{64}$Ni, $^{86}$Kr) and radioactive ($^{6}$He, $^{8}$He) isotopes.
<table>
<thead>
<tr>
<th>Number</th>
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First Accelerator in Dubna

Synchrocyclotron has been operating since 14 December 1949

(reconstructed in 1984 into Phasotron)
Low and Intermediate Energy Physics

Fundamental research:

Non-accelerator physics

- Experimental investigation of neutrino properties via nuclear spectroscopic methods (NEMO, TGV, SuperNEMO, G&M and GEMMA)
- Searching for the dark matter in the Universe (DM-GTF, EDELWEISS-2)
- Experimental investigation of the space symmetry in nuclear semi-leptonic processes (AnCor)

Accelerator physics

- Experimental investigation of the muonic catalysis on nuclear fission reactions (TRITON)
- Systematic experimental investigation of decay characteristics of radioactive nuclides and nuclear structures (YASNAPP-2 ISOL)
applied research: hadron therapy and electronuclear investigations with the installation “Subcritical Assembly at Dubna” (SAD).

Medico-technical complex of hadron therapy

Beams layout for hadron therapy at the JINR Phasotron

Proton therapy

γ-therapy
“Road Map” – in the field of Condensed Matter Physics
The IBR-2 reactor is included in the 20-year European strategic programme of neutron scattering research.

Pulsed reactor with neutron flux $10^{16}$ n cm$^{-2}$ s$^{-1}$ has been operating since 1984
Priorities in the field


- Strongly correlated electronic systems. Magnetism and superconductivity.

- Material and engineering sciences.
Priorities in radiobiological research

- genetic effects of accelerated heavy ions
- investigation of molecular photo- and radiobiological processes in eye structures (retina and lens) irradiated by heavy charged particles;
- modeling of biological effects of cosmic radiation at the Nuclotron beams
JINR’s partners are about 700 institutions located in 60 countries.
EDUCATIONAL PROGRAMME

JINR UNIVERSITY CENTRE

More than 300 students and postgraduates from Member States are trained at the UC

Chairs:
 MSU  MIPT  MEPI  MIREA  others

JINR is a school of excellence for the Member States!

“Dubna” International University

The UC offers graduate programmes in the fields of:

- Elementary Particle Physics
- Nuclear Physics
- Theoretical Physics
- Condensed Matter Physics
- Technical Physics
- Radiobiology

Dubna International Advanced School on Theoretical Physics

A vitally important task is attracting of young people from all the Member States to science

More than 50 innovation projects have been prepared for the SEZ.
Welcome to JINR (Dubna)