Министерство
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Российской Федерации

The Ministry of Education and Science of the Russian Federation

Mega-Science research infrastructure

By Sergey Salikhov
Director of Department for Science and technology , Ministry of Education and Science of the Russian Federation

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Russia's contribution to the development of Mega-Science research infrastructure in Europe

Mega-Science research infrastructure	Russian Federation Funding
The European X-ray Free Electron Laser (XFEL)	306 000 000 EURO
European Organization for Nuclear Research (CERN)	110 000 000 EURO
Facility for Antiproton and Ion Research (FAIR)	178 000 000 EURO
International Thermonuclear Experimental Reactor (ITER)	1 000 000 000 EURO

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Participation of Russian scientists in fundamental properties of matter research world-wide in 2013 year

Centers	The number of Russian scientists working in World research centers	Funding of Russian scientists working in World research centers (thousand USD)
CERN	72	6217
DESY	12	680
Gran Sasso	9	140
KEK	5	300
FNAL	3	190
BNL	4	220
CLAK	1	35
Overall	106	7782

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Development of advanced research infrastructure in the Russian Federation

Project	Initiator	Funding (mln. EURO)	Time of realization
Tokamak "Ignitor “	NRS “Kurchatov institute”	400	2014-2020
High flux research reactor, PIK complex	NRS “Kurchatov institute”	375	2014-2019
Special Synchrotron Radiation Source of the 4th generation, SSRS-4	NRS “Kurchatov institute”	1 000	2014-2020
Complex of Superconducting Rings for Heavy Ion Colliding Beams, NICA complex	JINR	346	2014-2020
eXawatt Center for Extreme Light Studies (XCELS)	RAS, Institute of applied physics RAS	806	2014-2023
Electron-Positron Collider (Super-Tau- Charm Factory)	Budker institute of nuclear physics	263	2014-2020

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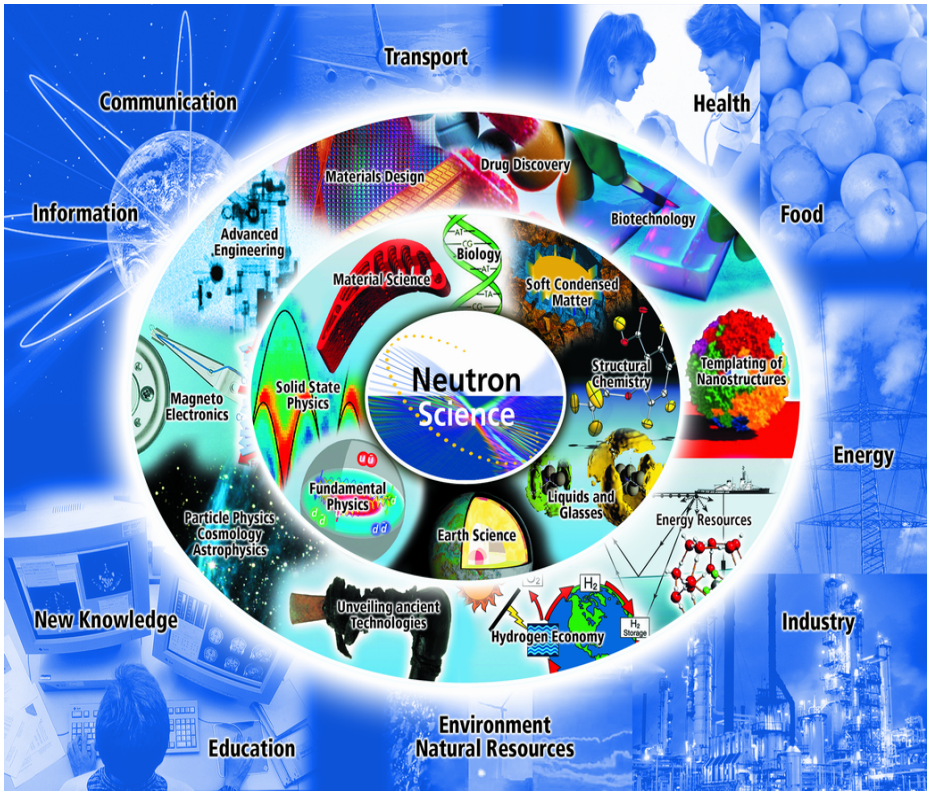
PIK complex

- acquisition of new data on atomic nuclei and fundamental interactions;
- new data on properties of nanomaterials and on the methods of their production;
- new data on structure and properties of biological objects, chemical compounds, polymers;
- production of radioisotopes for medicine and industry, treatment of tumors, nondestructive testing;
- complex project for a wide range of specialists – physicists, chemists, biologists, materials scientists and engineers.



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NICA Complex

International Cooperation

Armenia	*DPRK*	*Mongolia*
Australia	*France*	*Poland*
Azerbaijan	*Georgia*	*Romania*
Belarus	*Germany*	*RSA*
Bulgaria	*Greece*	*Russia*
Brazil	*India*	*Serbia*
CERN	*Italy*	*Slovakia*
China	*Japan*	*Ukraine*
Cuba	*Kazakhstan*	*USA*
Czech Rep.	*Moldova*	*Uzbekistan*
		Vietnam

The fundamental issues to be addressed:

- search and study of new phases of baryonic matter, which have not been observed before;
- understanding nature of bonds between quarks in nucleons;
- search for the reasons of symmetry violations in strong interactions;
- explaining the mechanism of emergence of the World, consisting of matter at the absence of antimatter in our part of the Universe.

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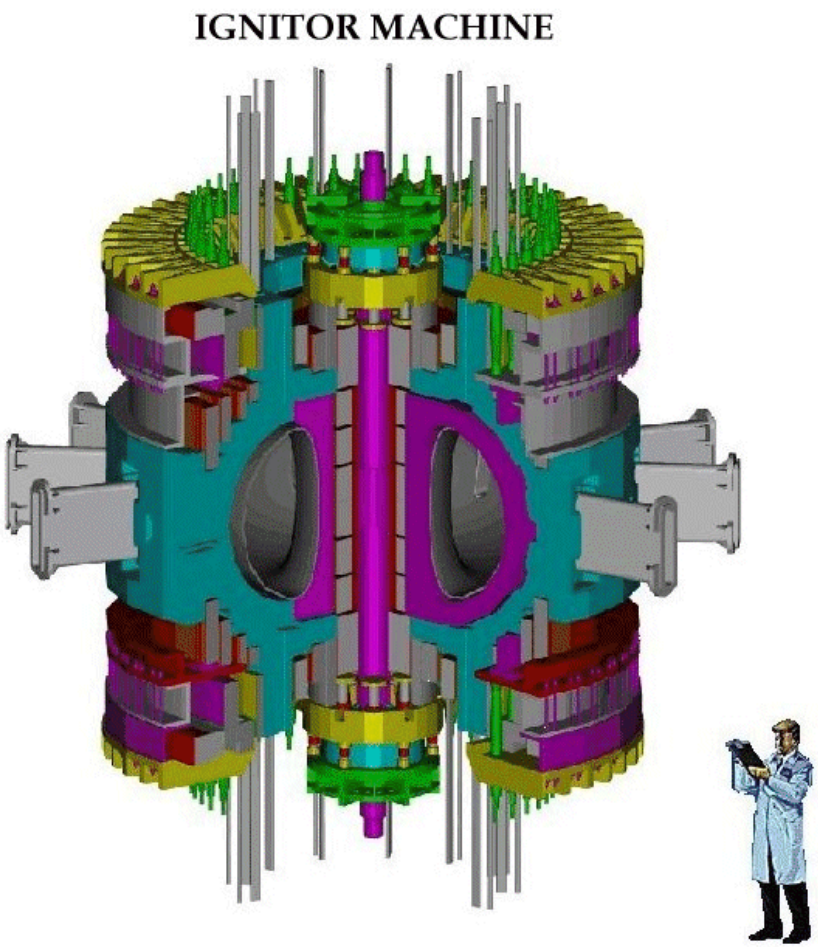
IGNITOR



Aimed at creation of the world's first tokamak with a stationary very strong magnetic field in which

very strong current will heat up dense deuterium-tritium plasma up to 100–120 million degrees –

necessary for excitation of thermonuclear fusion reactions –

achived without additional power heating

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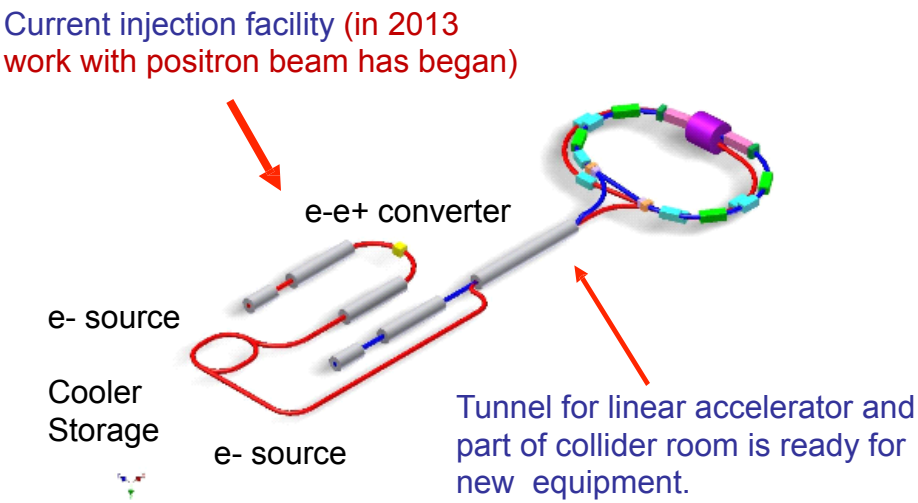
Large Electron Positron (Collider)



The fundamental issues to be addressed:

- studies on mixing in system of D-Mensons;
- search of CP-violating effects in charm particle decay;
- search of new physics in rare or prohibited in Standard Model decays of tau-lepton;
- search of lepton number violation;
- search of CP- and T-violation of tau-lepton decay.

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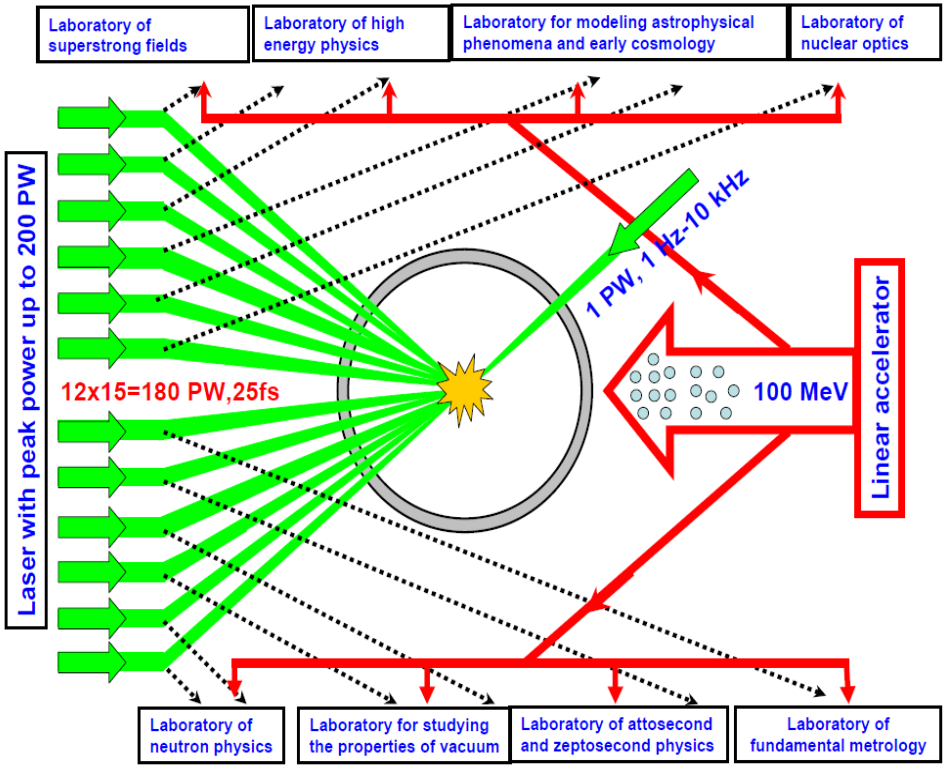
XCELS – eXawatt Center for Extreme Light Studies

The world most powerful laser infrastructure to study new science and applications at the emerging interface between high-field physics and high-energy physics

PEARL	0.5 PW	Front-end for XCELS-Proto	2007
PEARL 10	5 PW	Technological upgrade of PEARL	2014
XCELS - Proto	2 x 10 PW	Scaling of PEARL to d30 cm DKDP	2016
XCELS	12 x 15 PW	Final	2019



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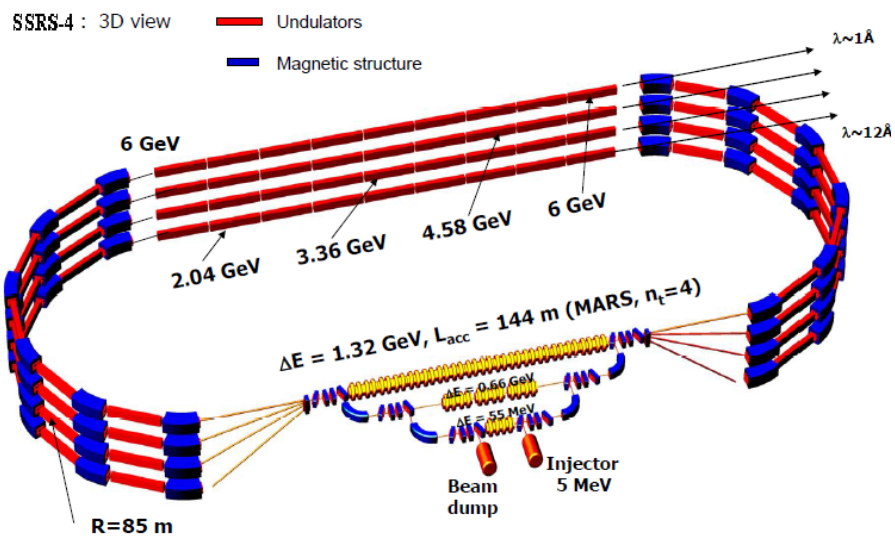
(SSRS-4)
Special Synchrotron Radiation Source of the 4th generation

based upon the synchrotron radiation source of the 2nd generation and 15 experimental stations

The Project aims at creation of principally new problem-oriented X-ray radiation source – namely 4-th generation synchrotron radiation source (SSRS-4) with extremely high spatial coherence, comparable to laser emission, record brightness and time structure.

Preliminary scheme of the SSRS- 4



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Thank you for your attention!

Sergey Salikhov
Director of the Department for Science and Technology,
Ministry of Education and Science of the Russian Federation