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Present Status and Future Prospects of Kurchatov Synchrotron Radiation Source



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**JOINT US-CERN-JAPAN-RUSSIA SCHOOL
on Particle Accelerators**

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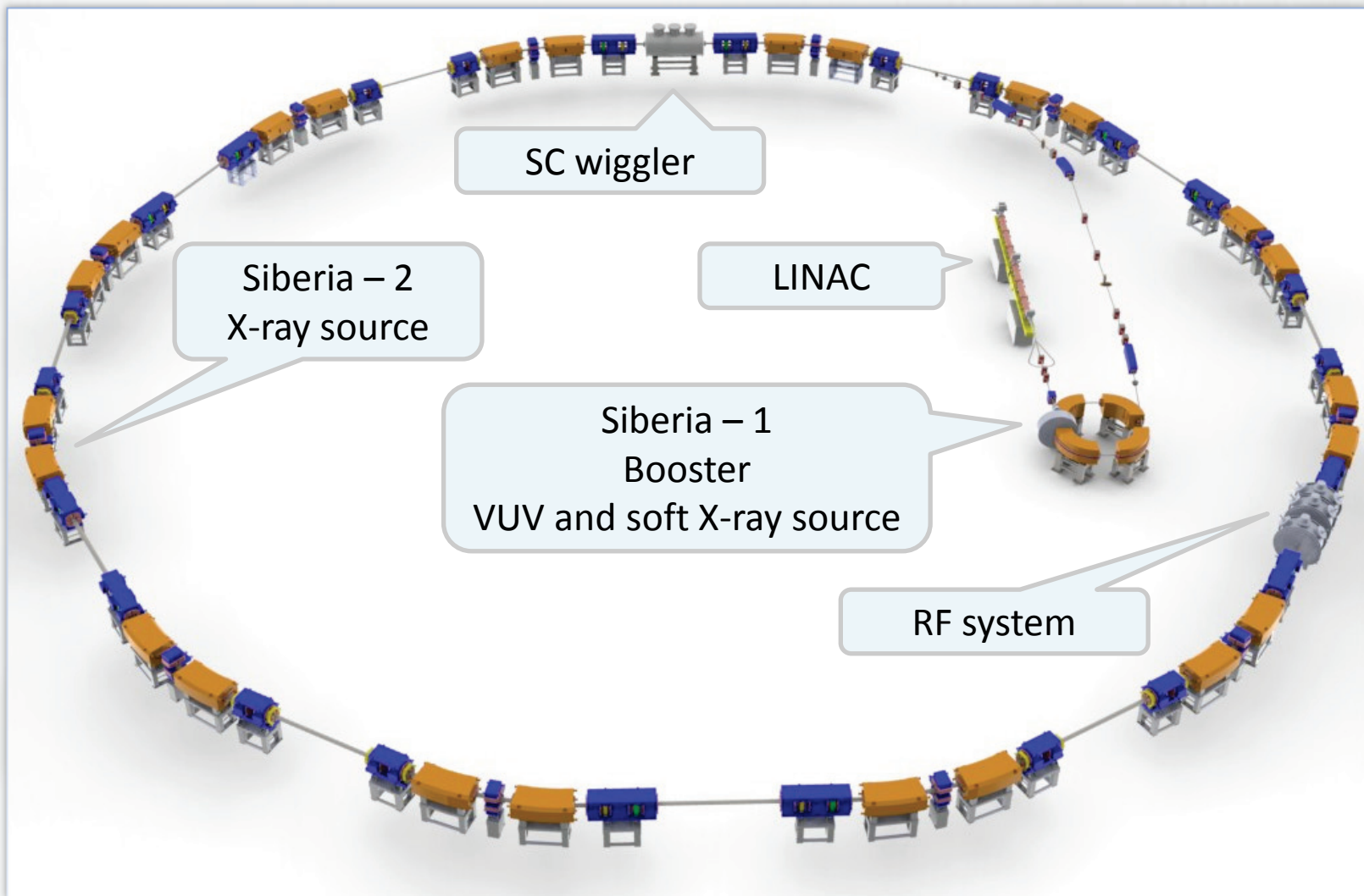
**What is Kurchatov synchrotron
radiation source?**



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Kurchatov synchrotron radiation source layout



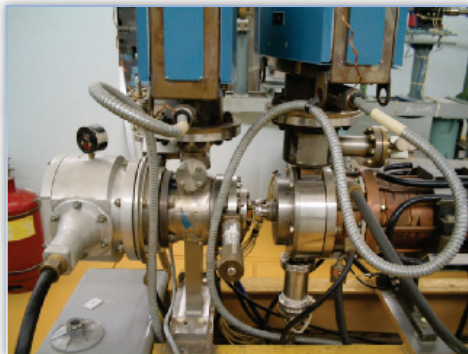
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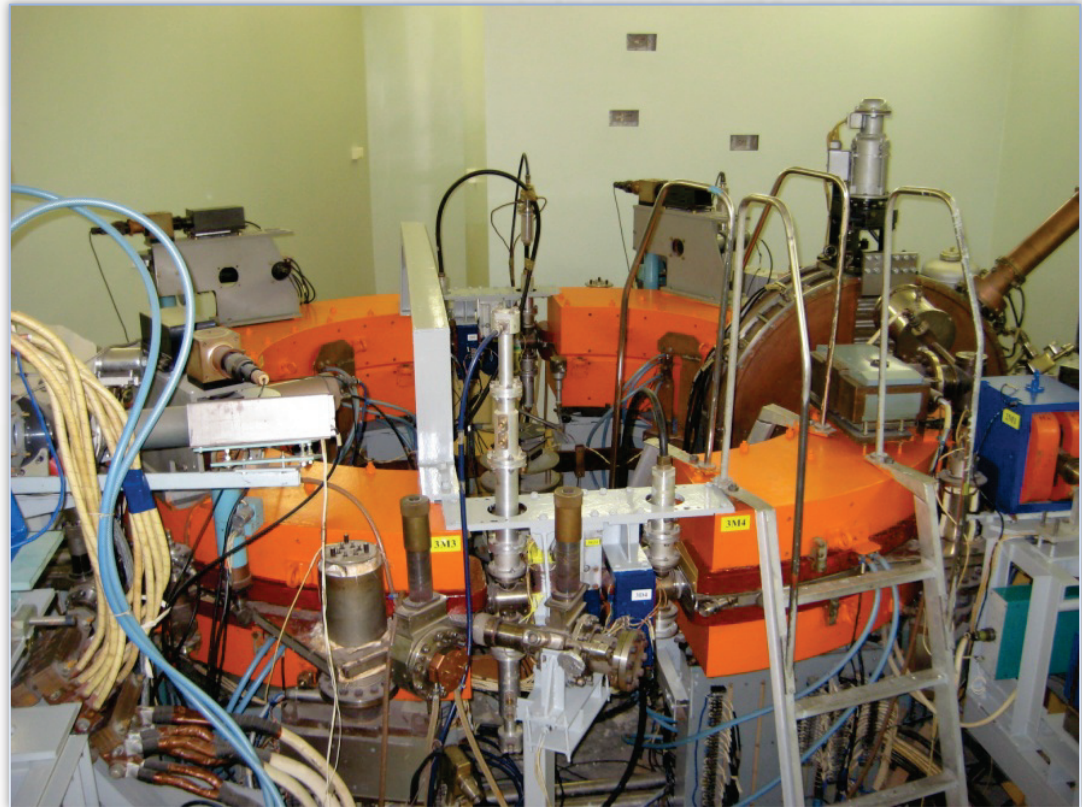
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LINAC, $E_b = 80$ MeV



Electron gun, $E_b = 40$ keV



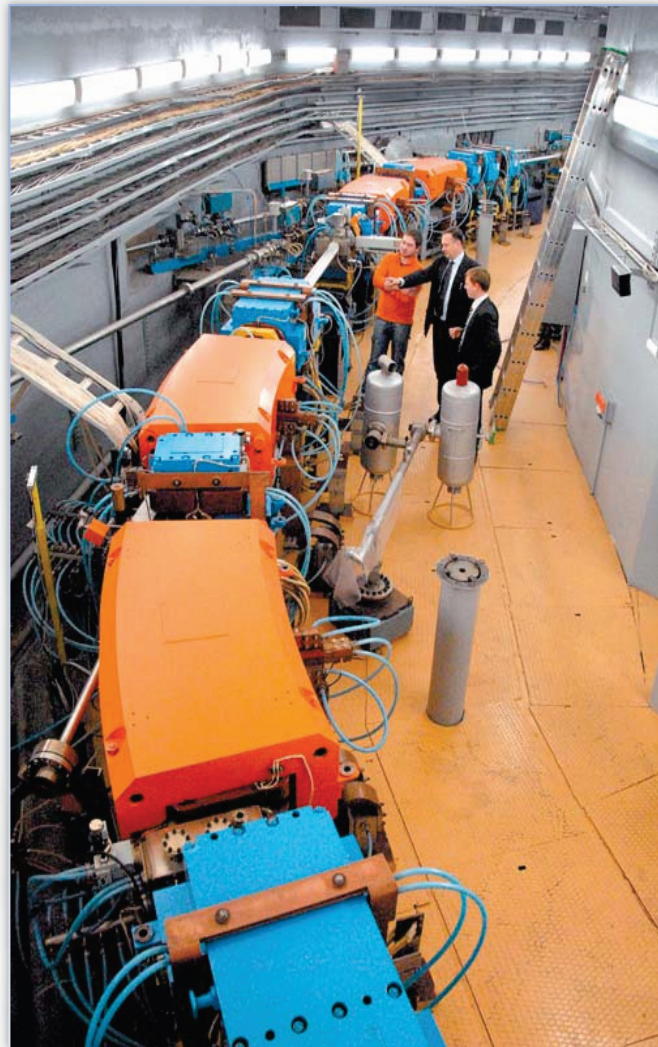
Storage ring Siberia-1,
 $E_b = 450$ MeV



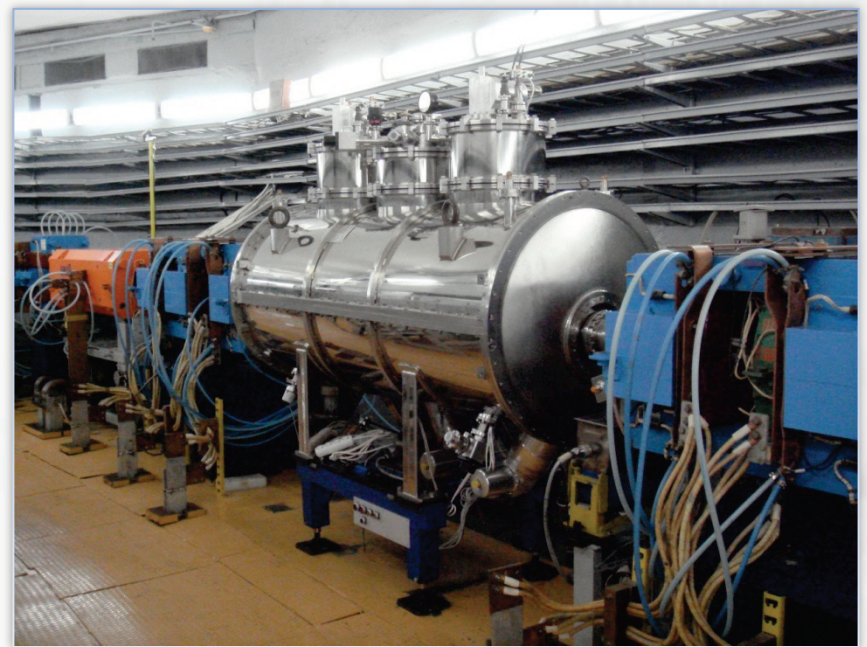
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Storage ring Siberia-2, $E_b = 2.5 \text{ GeV}$



Superconducting wiggler,
 $B_{\text{max}} = 7.5 \text{ T}$



Current status

Siberia – 2:

beam energy	2.5 GeV
beam current	180 mA
beam life time	~ 20 h (at $I_b = 160$ mA)
	~ 35 h (at $I_b = 70$ mA)

Siberia – 1:

beam energy	450 MeV
beam current	250 mA
beam life time	1.5 h (at $I_b = 250$ mA)

Experimental stations:

- 10 - operate with SR from BMs of Siberia-2
- 3 - operate with SR from BM of Siberia-1
- 3 - under construction and will operate with SR from BMs
- 3 - under construction and will operate with SR from SC wiggler



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Experimental stations

FS

Station for photoelectron spectroscopy

SPECTR

Station for condensed matter spectroscopy

LOCUS

Station for luminescent and optical studies

SAS

Station for small-angle scattering

HPXO

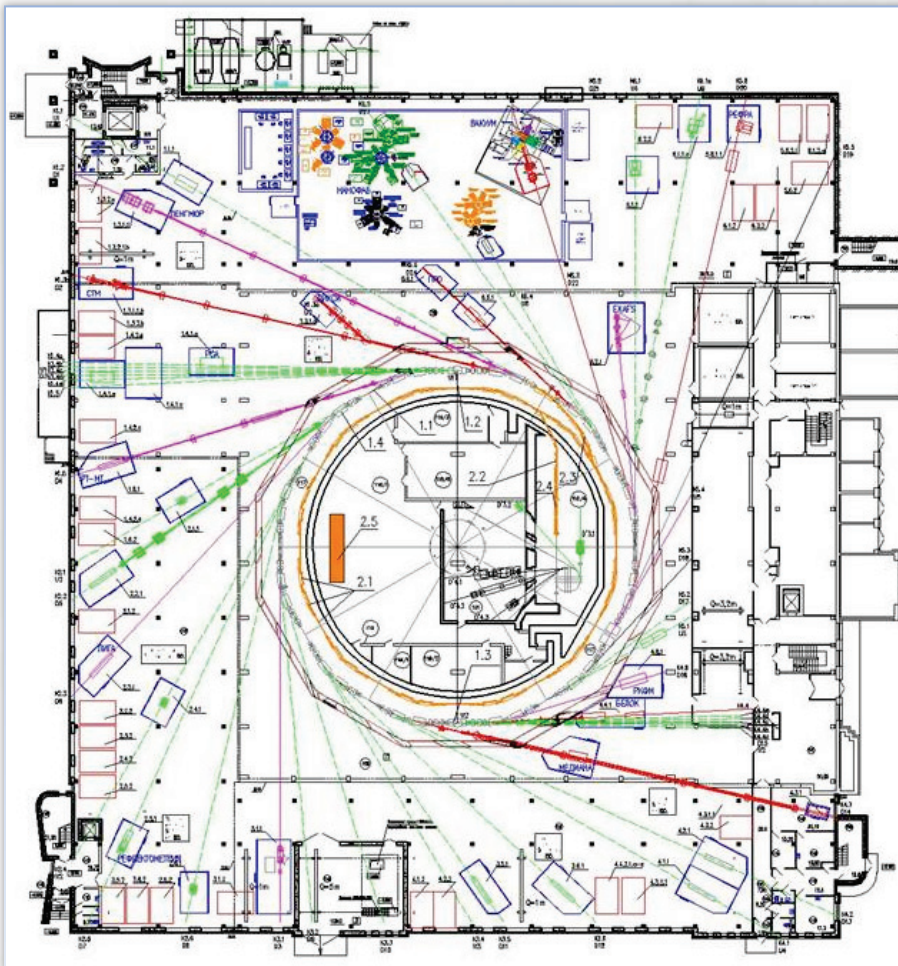
Station for high-precision X-ray optics

LANGMUR

Station for organic film

X-RAY MOVIE

Station for time-resolved small-angle diffraction



LIGA

Station for high-precision X-ray lithography

EXAFS

Station for fluorescence EXAFS spectrometry

REFRA

Station for X-ray refractive optics

XCMS

Station for X-ray crystallography and material science

PC

Station for protein crystallography

MEDIANA

Station for complex studies on medical diagnostics



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Main research activities

Nanodiagnostics and materials science

atomic structure, macromolecular structure, nanofilms, hetero-structures, superlattices, nanoclusters, fine-dispersed medium, radiation-induced defects, carbon nanostructures and etc.

Nanotechnology

molecular beam epitaxy, Langmuir-Blodgett technique and etc.

Biotechnology

protein crystallography, bio-organic films on the surface of the liquid and etc.

Microsystem technology

LIGA technology

Fundamental research

materials at super high pressures, "cosmic" crystals, X-ray optics and etc.

Living systems and nuclear medicine

new methods of medicine diagnostics, permolecular structure of biological tissues and fluids and etc.

Dual technology

nondestructing test of critical parts, forensic examination and etc.

Metrological support of nanotechnology

spectroradiometry, metrology of layered structures and etc.



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Modernization of Kurchatov synchrotron radiation source.



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Upgrade of RF system
of Siberia-2

New SR beam line
at Siberia-1

New nanosecond
generators

New automatic
control system

**Modernization
of SR source**

Feedback system

New SR beam lines
at Siberia-2

Use high brilliance optical
structure of Siberia-2

New insertion
devices at Siberia-2

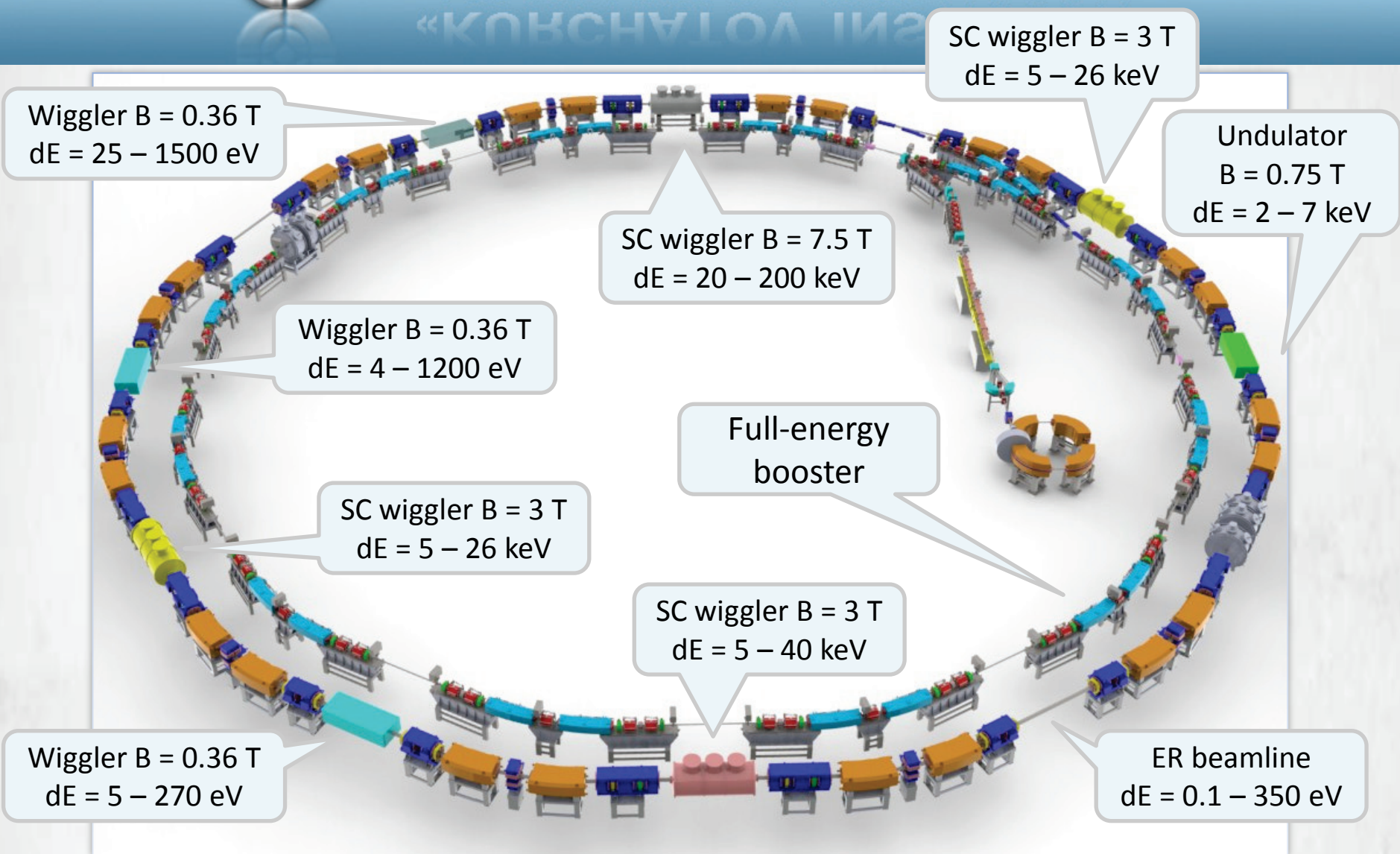
Full-energy
booster synchrotron



LINAC upgrade



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Kurchatov synchrotron radiation source layout after upgrade

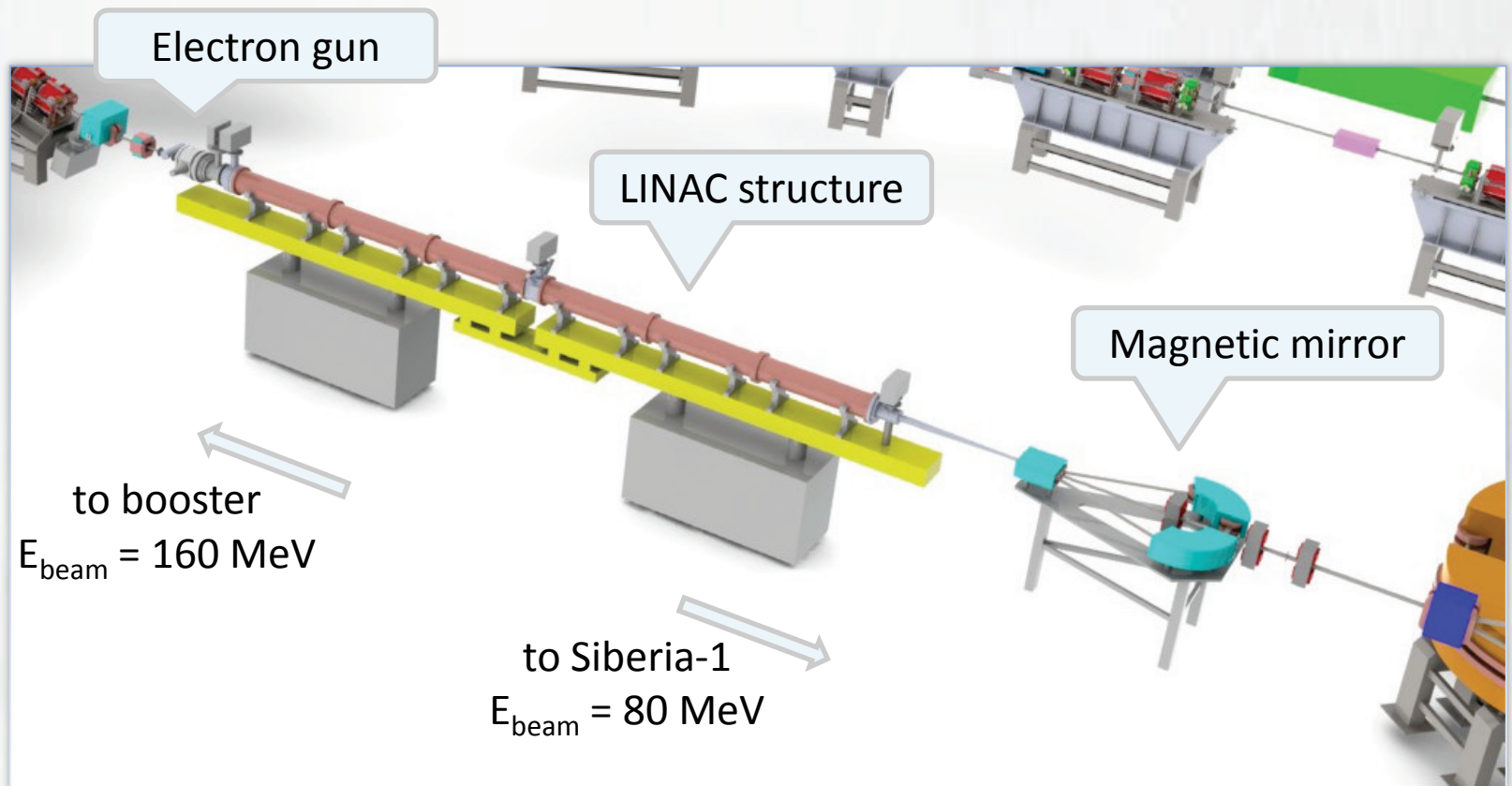


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LINAC after upgrade





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Instead of conclusion

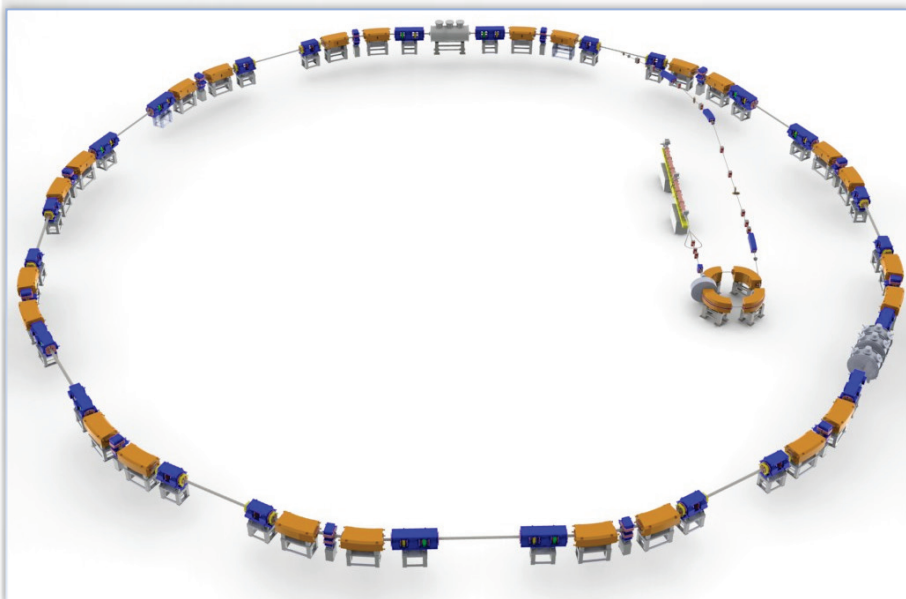
2-nd generation
light source



Modernization



3-rd generation
light source





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Thank you for your attention!