



SIBERIAN CIRCULAR
PHOTON SOURCE

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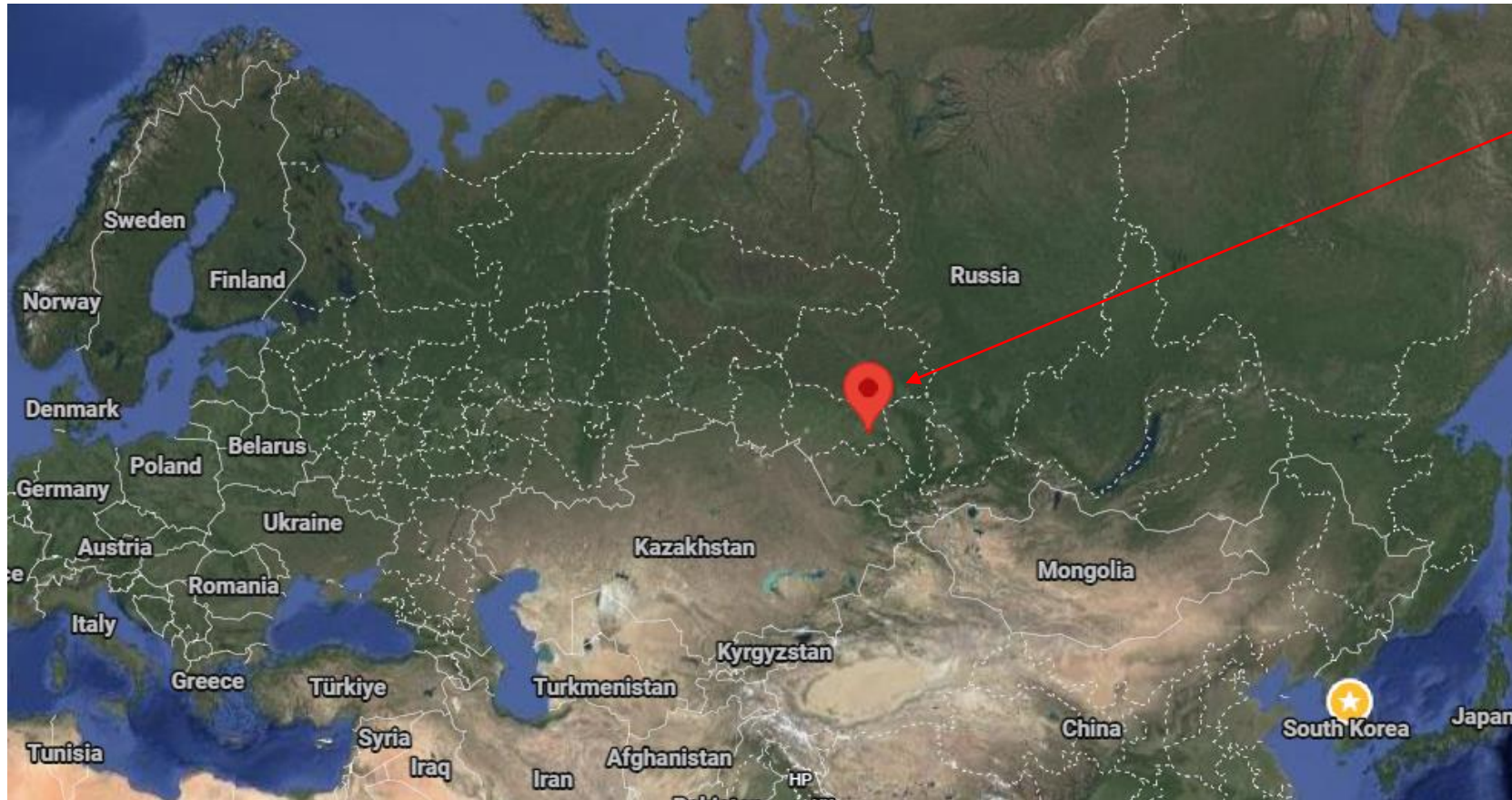
Budker Institute of Nuclear Physics
SKIF Synchrotron Radiation Facility
Novosibirsk State University

Novosibirsk, Russia

Beam commissioning of the linear accelerator of the SKIF Synchrotron Radiation Facility

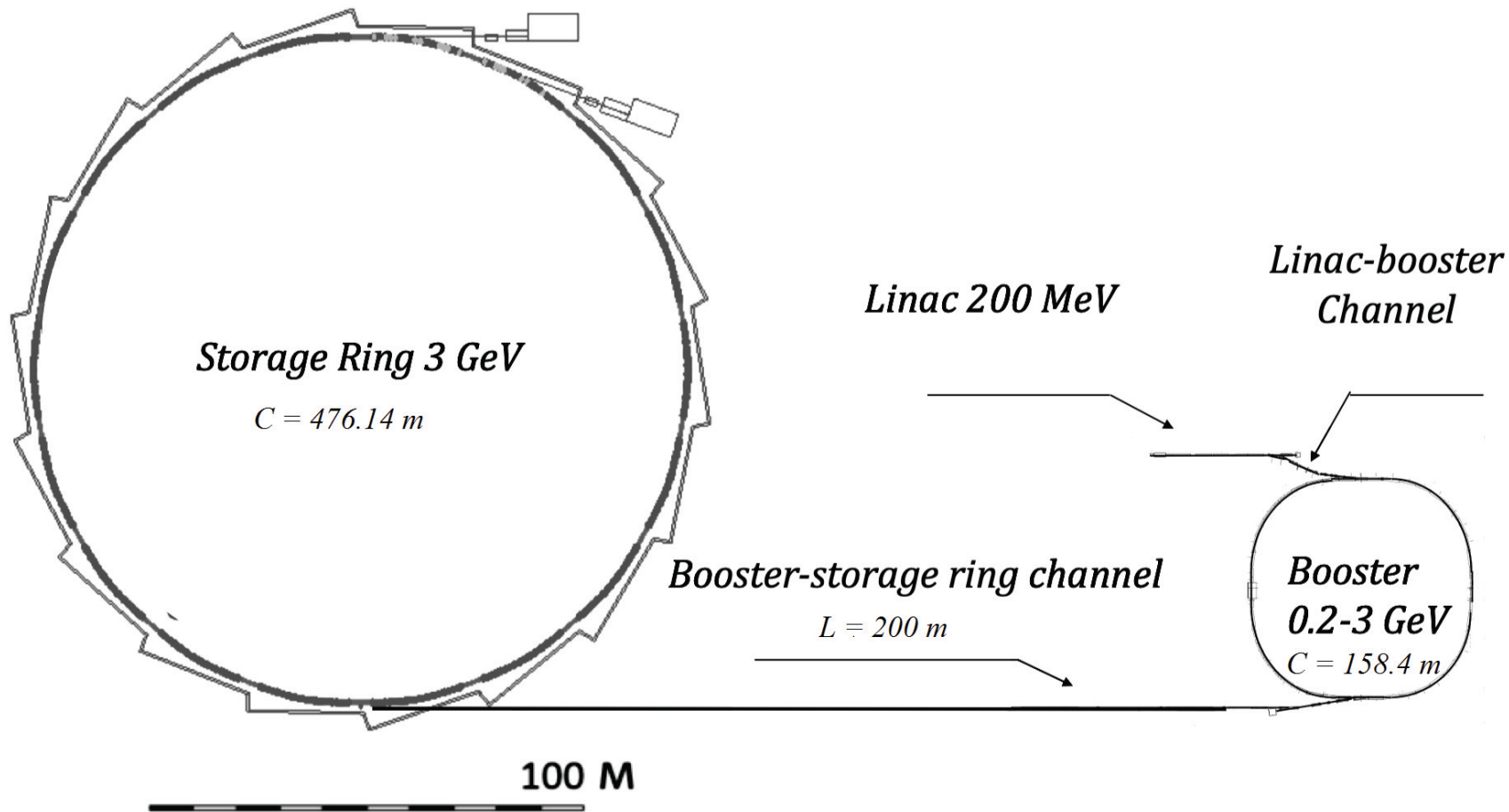


SKIF synchrotron radiation facility



SRF SKIF is a 4th generation light source in Koltsovo, Russia (near Novosibirsk)

SKIF synchrotron radiation facility



Timeline

2018–2020: design and approval

2021: beginning of building construction and manufacturing

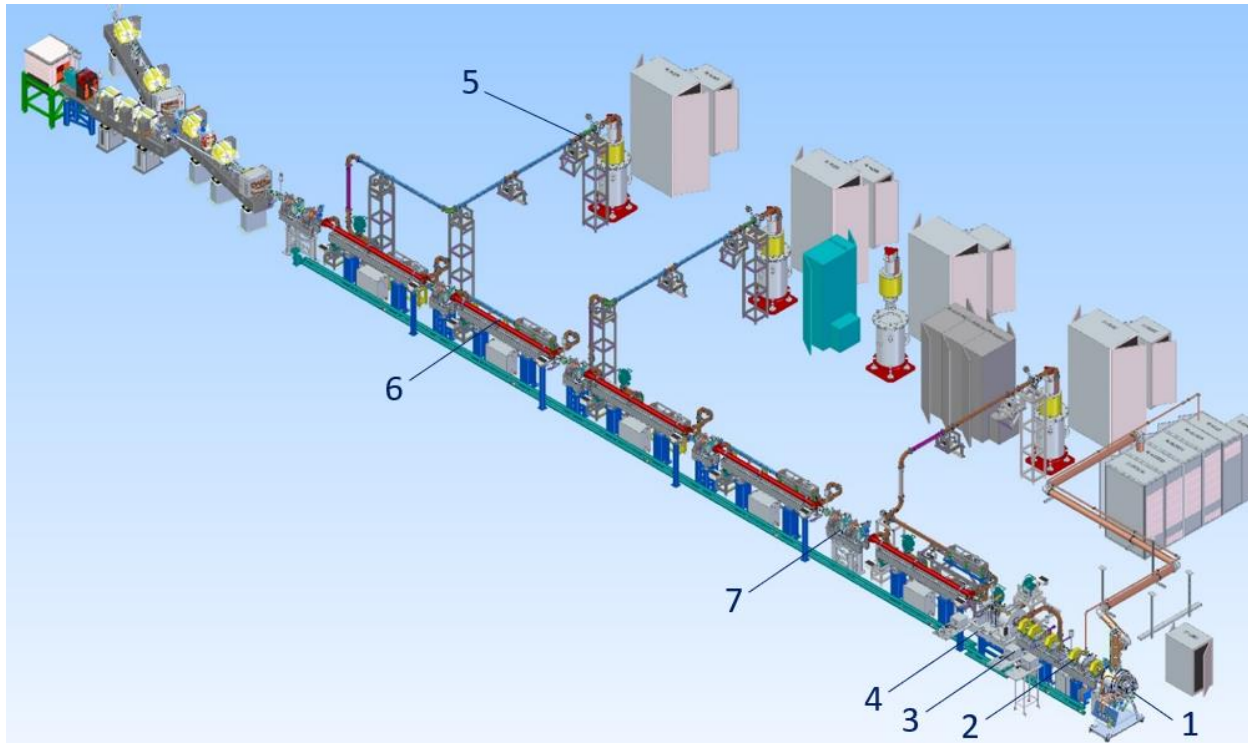
2022: test facility Linac-20 assembling and commissioning

end of 2024: linac first commissioning

may 2025: booster commissioning

(plan fall 2026): storage ring commissioning, first user experiments

SKIF Linear Accelerator

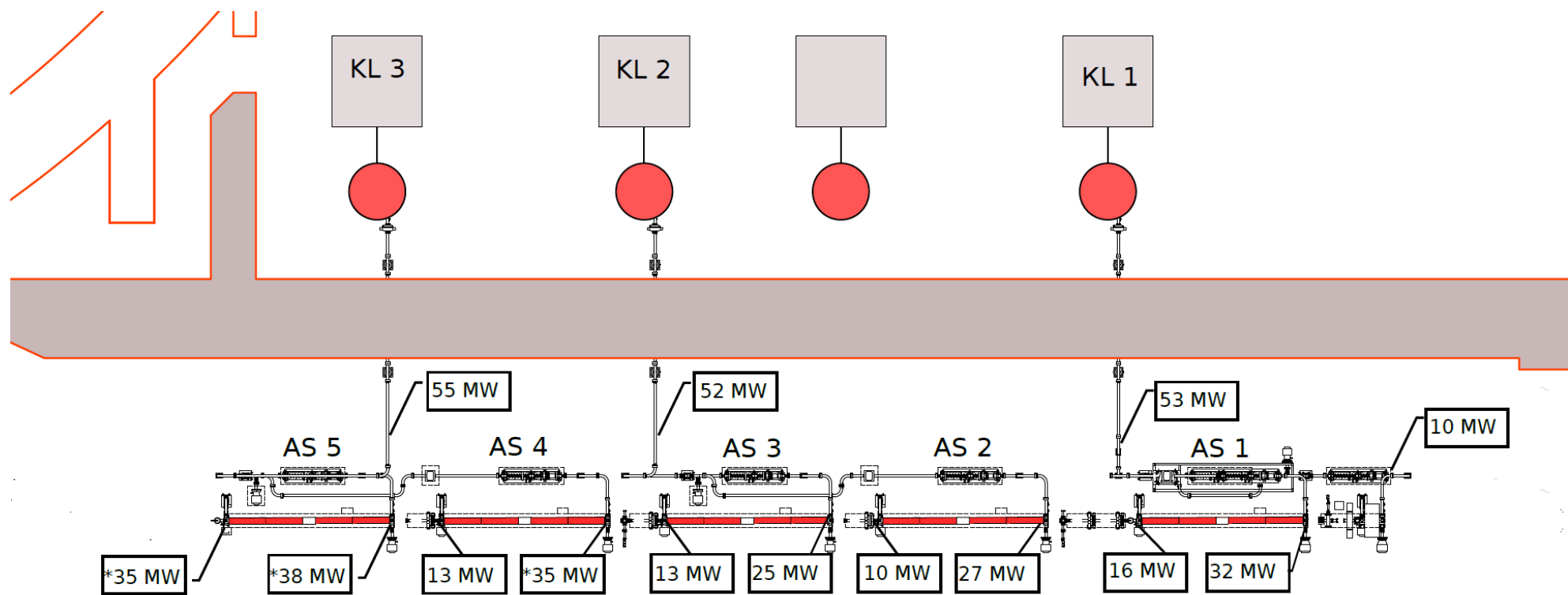


Commissioned linac beam parameters

Parameter	Value
Energy	205 ± 5 MeV
Repetition rate	1 Hz
Number of bunches	55
Bunch charge	0.3 nC
Total beam charge	16.5 nC
Geometrical emittance	100/107 nm
Energy spread	$\leq 1\%$

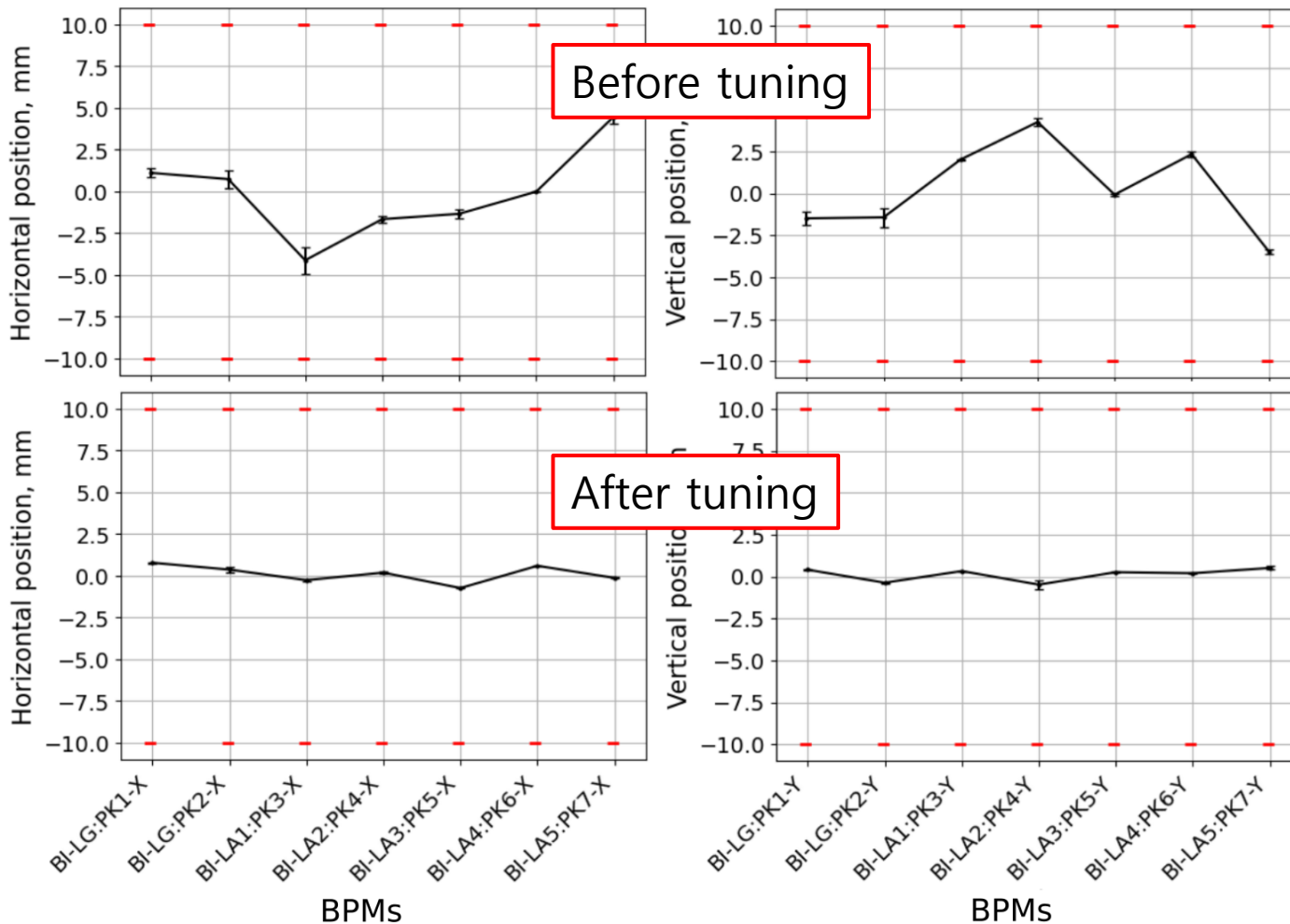
Linac & transport channel 3D model: 1 – RF gun 178.5 MHz, 2 – Third-harmonic buncher 535.5 MHz cavity, 3 – Solenoids, 4 – Preaccelerator 2856 MHz, 5 – Klystron (50 MW, 2856 MHz), 6 – Accelerating structures, 7 – Quadrupole lenses

RF POWER COMMISSIONING

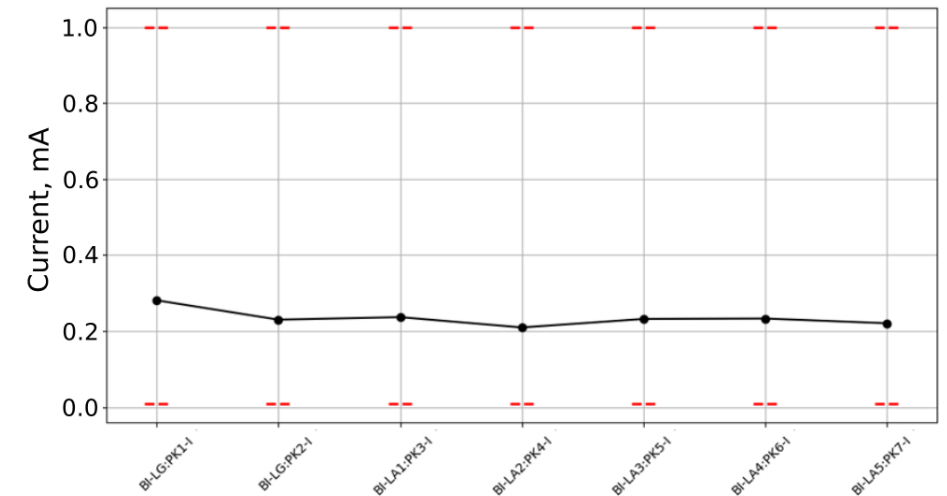


RF power measurements in the waveguide system of the SRF SKIF linac

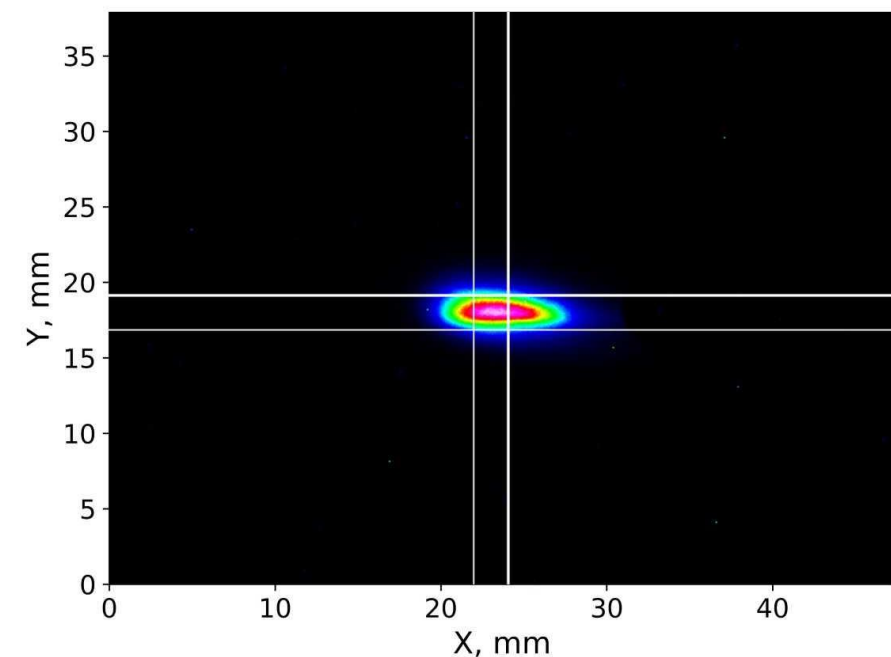
Tuning of the beam transverse dynamics



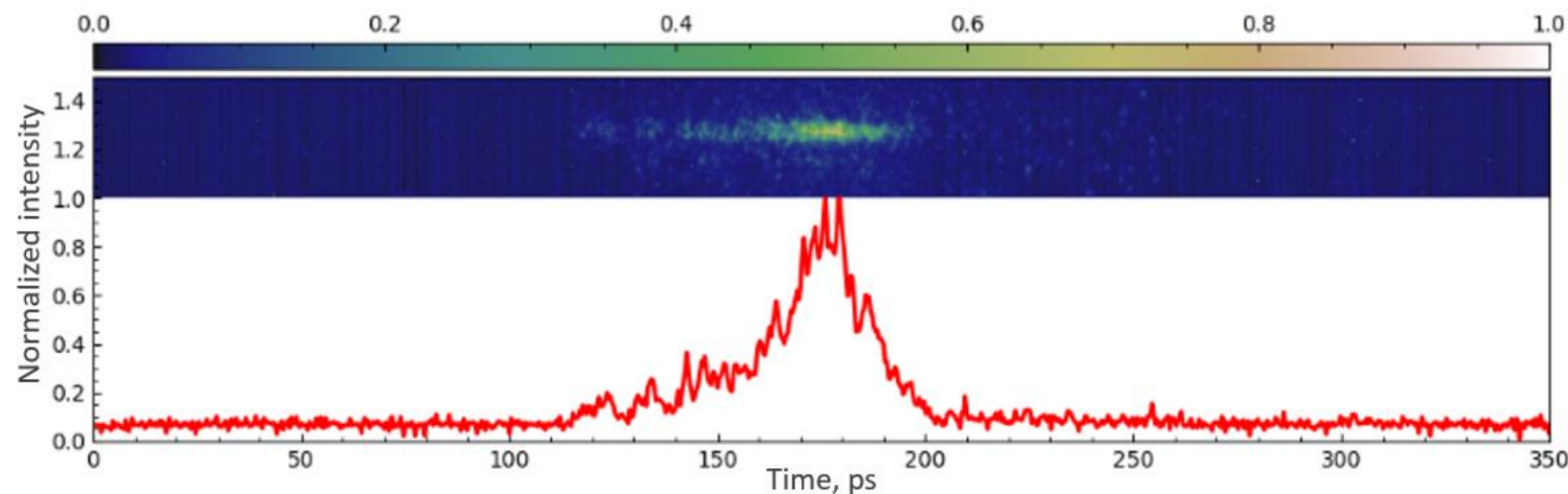
- Reduced RMS offset from (2.48 ± 0.42) mm to (0.50 ± 0.075) mm – horizontal, from (2.50 ± 0.28) mm to (0.38 ± 0.11) – vertical
- Beam current transmission has been increased to almost 100%



Beam images

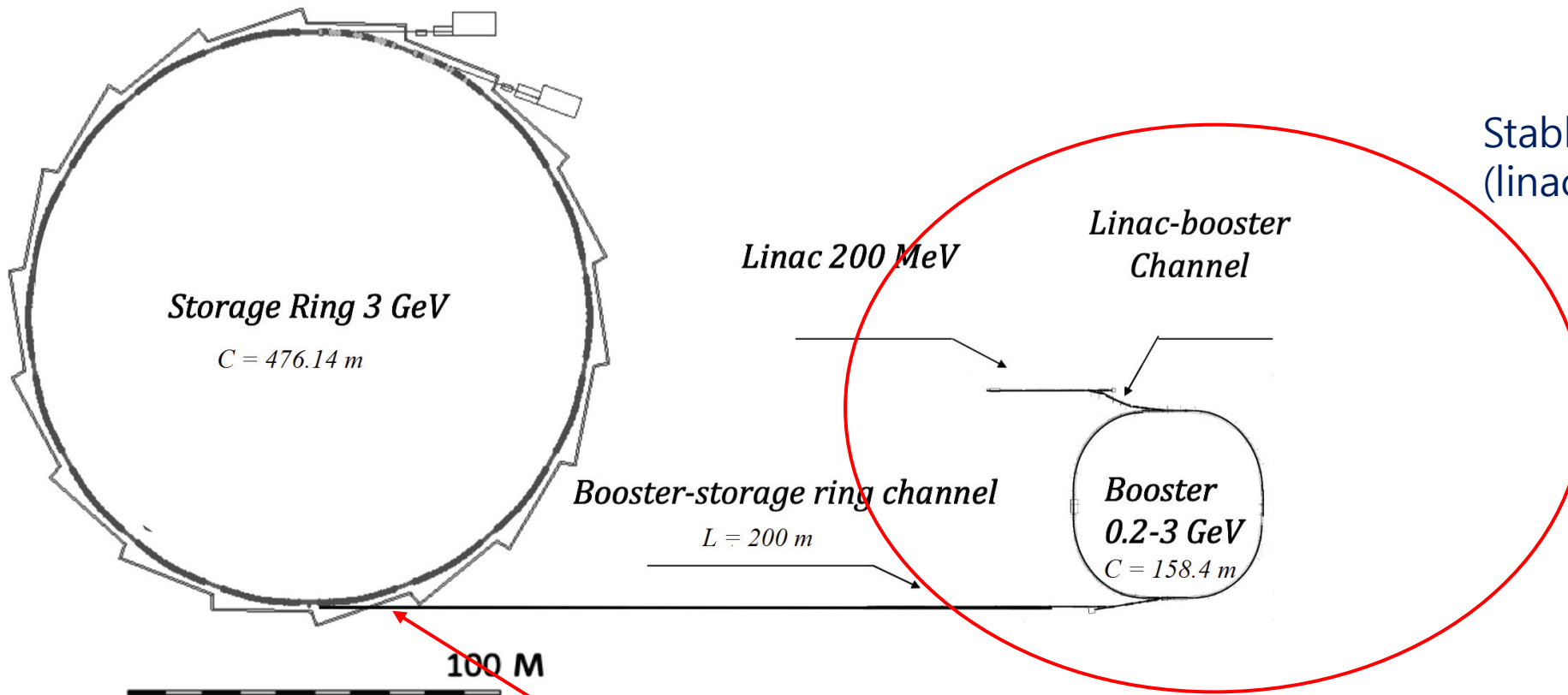


Beam image after the first dipole magnet in the transport channel at the energy of 205 ± 5 MeV



Longitudinal beam profile after the preaccelerator (25 ps FWHM)

SKIF synchrotron radiation facility



Stable operation of the injector
(linac + booster synchrotron)

July 2026: 3 GeV beam passage through the booster-SR channel

References

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