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The project of Kirkpatrick –Baez focusing system for beam diagnostics on the SKIF

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The Siberian Ring Radiation Source (SKIF) is an upcoming 4th-generation SR source under construction in Novosibirsk, Russia. The designed beam emittance for SKIF is 75 pm-rad, which corresponds to a beam size of 6 micrometers at the observation point within the dipole magnet. The transverse beam dimensions are essential parameters for tuning and reliable operation of the facility. The SKIF diagnostic suite includes a double-slit interferometer operating in the ultraviolet region of the spectrum. This device's spatial resolution should be sufficient to measure the radial size of the beam to an accuracy of 10 percent. These diagnostics will be used during the commissioning of SKIF and afterwards. Although an additional source of information on beam dimensions and dynamics would be desirable for assurance, taking into account the record designed value of beam emittance. The application of X-ray optics and the Kirkpatrick-Baez focusing system seem to be the most suitable options. The article discusses the project of this system, which will acquire X-rays from a SKIF dipole magnet. Simulations of the heat load on the mirrors, means of compensation of thermo-induced surface distortion (thermo-bump) and the spatial resolution of the KB system are described. The choice of scintillator screens, expected temporal resolution, and sensitivity of the diagnostics are discussed as well.

Footnotes

Funding Agency

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Primary author: MESHKOV, Oleg (Budker Institute of Nuclear Physics)

Co-authors: GLUSHKOV, Egor (Institute of Applied Physics); MALYSHEV, Ilya (Institute of Applied Physics); DOROKHOV, Victor (Budker Institute of Nuclear Physics)

Presenter: MESHKOV, Oleg (Budker Institute of Nuclear Physics)

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