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Heat load study of insertion devices for the Iranian Light Source Facility

Thursday 18 September 2025 16:40 (1 hour)

The parameters for seven insertion devices (IDs) have been determined for the Iranian Light Source Facility (ILSF). To calculate the heat load on the vacuum chambers, the power irradiated from the IDs is simulated using Synrad. Analytical formulas are also employed to verify the Synrad results and optimize the mesh size. Simulations reveal that the most severe case occurs when the Solid-State Electron Spectroscopy Beamline (ESCA) operates in vertical polarization mode. In this mode, ESCA generates a total power of 7.14 kW at a beam current of 400 mA, with the majority of the power being absorbed by the first dipole vacuum chamber and the adjacent pumping port. Specifically, 4.4 kW of synchrotron radiation power is deposited over a 20 cm length of the first dipole chamber. Consequently, thermal and mechanical simulations are performed using ANSYS to calculate the maximum temperature and assess the thermal stresses on these vacuum components.

Footnotes

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Author: KARIMI, Hossein (Iranian Light Source Facility)

Presenter: KARIMI, Hossein (Iranian Light Source Facility)

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