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Impedance and Wakefield Studies of the EIC RCS 591 MHz Five-Cell Cavity

Tuesday 12 August 2025 16:00 (2 hours)

The Electron-Ion Collider (EIC) is a next-generation accelerator complex designed to enable high-luminosity collisions between highly polarized electrons and light ions (e.g., He-3). A central component of its Electron Injection System (EIS) is the Rapid Cycling Synchrotron (RCS), which accelerates a single 28 nC electron bunch from 750 MeV to 5, 10, or 18 GeV using an array of 591 MHz five-cell superconducting RF (SRF) cavities—eight at the current design stage. To ensure stable acceleration of high-charge bunches, we conducted detailed impedance and wakefield studies of the SRF cavity structure using both frequency- and time-domain methods. Wakefield solvers (ECHO3D, ECHO1D, CST), eigenmode analysis, and multi-particle tracking with ELEGANT were employed to evaluate longitudinal and transverse impedance effects and to determine instability thresholds. These studies provide critical input for the cavity design and operating parameters required to preserve beam quality and stability in the RCS.

Please consider my poster for contributed oral presentation

No

Would you like to submit this poster in student poster session on Sunday (August 10th)

No

Footnotes

Funding Agency

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I have read and accept the Privacy Policy Statement

Yes

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