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Criticality of powering failures of the main bend circuits in the FCC-ee at the Z-pole energy

Monday 2 June 2025 16:00 (2 hours)

The electron-positron Future Circular Collider (FCCee) will have a first phase of operation at the Z-pole energy of 45.6 GeV. To reach the target luminosity, a total of 11200 bunches with 2.14e11 charges will be used accounting for a stored energy of 17.5 MJ per beam. Given the small beam emittances, the beam energy density in turn reaches extremely high values. The potential to induce severe damage to the accelerator components must be carefully evaluated for different failure scenarii. The effects of a powering failure of one of the main dipole and quadrupole circuits are described and discussed . The combined effects of the time-dependent fields, the transient synchrotron radiation effects and the impact of energy tapering are self-consistently simulated with the Xsuite tracking code. The results are expressed in term of orbit shift, optics changes and particle losses. The criticality of these failures and possible mitigations are discussed.

Footnotes

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Author: DOMANGE, Delphine (European Organization for Nuclear Research)

Co-authors: Dr WIESNER, Christoph (European Organization for Nuclear Research); HERNALSTEENS, Cédric (European Organization for Nuclear Research); Dr WOLLMANN, Daniel (European Organization for Nuclear Research); UYTHOVEN, Jan (European Organization for Nuclear Research); BAUCHE, Jeremie (European Organization for Nuclear Research)

Presenter: Dr WIESNER, Christoph (European Organization for Nuclear Research)

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