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Characterization of the radiation environment in the FCC-ee tunnel

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The Future Circular electron-positron Collider (FCC-ee) at CERN will provide collisions at four interaction points along a 91 km ring, with beam energies ranging from 45.6 GeV (Z pole) to 182.5 GeV (ttbar threshold). The radiation environment along the accelerator varies significantly, with different dominant sources depending on location and operational mode. Accurate characterization of this environment is essential for the design and placement of machine equipment, particularly electronic systems and beam instrumentation. In this study, the Monte Carlo code FLUKA is used to characterize tunnel radiation levels from the main sources, including radiative Bhabha scattering, synchrotron radiation, beam-gas interactions, and the beamstrahlung dump. The results at the Z pole and ttbar threshold for both the interaction regions and arcs are presented to guide early-stage design considerations and to quantify exposure risks for electronics at potential installation locations.

Footnotes

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Yes

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