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Impact of collective effects on beam stability in the FCC-ee main rings and the high-energy booster

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The electron positron Future Circular Collider (FCC-ee) is considered the primary contender for the next major particle accelerator within the European Strategy for particle physics, aiming to achieve unprecedented luminosities to enable precise measurements of Z, W, and H bosons along with the top quark. Despite its potential, the FCC-ee project faces significant operational and design challenges, especially in managing collective effects such as space charge, wake fields, coherent synchrotron radiation, intra-beam scattering, and beam-beam interactions. The FCC-IS Feasibility Study brings together experts to address these challenges under one umbrella. This paper presents an updated status of the collective effects studies for FCC-ee main ring and high-energy booster, examining their implications and exploring potential mitigation strategies to prevent resulting instabilities.

Footnotes

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