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Baseline concept and future prospects for the FCCee collider top-up injection

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The FCC-ee (Future Circular Collider) is a high-luminosity lepton collider study at CERN. Strong effects from quantum fluctuations, beamstrahlung, and Bhabha scattering limit the expected lifetime to well below one hour. Top-up injection continuously refills the colliding bunches to maximize the integrated luminosity.
The current baseline aims at using conventional on-axis injection and a thin magnetic septum. However, the beam size at higher energy modes and the limited off-energy dynamic aperture at lower energy modes make the on-axis condition challenging to achieve. The conventional scheme also raises machine protection concerns, as the circulating beam is subject to a fast one-turn bump towards the thin septum during the injection process.
This contribution presents the status of the top-up injection scheme for every energy mode of the FCC-ee collider. We then discuss the existing challenges and potential variations to the baseline scheme in view of mitigating operational challenges and machine protection risks.

Footnotes

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