

# Booster ring

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The beam lifetime at FCC-ee will be limited to less than one hour, because of radiative Bhaba scattering and beamstrahlung. In order to keep the luminosity on the high level of  $10^{35} \text{ cm}^{-2}\text{s}^{-1}$  continuous top-up injection is required. Therefore, besides the collider, that will operate at constant energy, a fast cycling booster synchrotron will be installed in the same tunnel.

The injection energy to the booster synchrotron will be around 6-20 GeV. Such small energies together with the large bending radius not only create an ultra-small beam emittances, but also requires very low magnetic fields close to the limit of technical feasibility.

While the main challenge for the injector chain is the production of the high currents up to 1.45 A for operation at the Z threshold at 45.6 GeV the booster must provide stable beam dynamics for a large range of beam energies in a range from 6 GeV to 175 GeV.

This paper will focus on the challenges and requirements for the top-up booster design arising from low magnetic fields and collective instabilities and present the status of the lattice design.

**Author:** HARER, Bastian (CERN)

**Co-authors:** HOLZER, Bernhard (CERN); OIDE, Katsunobu (High Energy Accelerator Research Organization (JP)); TYDECKS, Tobias (CERN); PAPAPHILIPPOU, Yannis (CERN)

**Presenter:** HARER, Bastian (CERN)

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