Contribution ID: **42** Type: **not specified**

Design Study of a Pre-Booster Damping Ring for the FCC e+e- Injector

Monday 22 August 2016 11:00 (20 minutes)

The FCC-ee injector complex needs to produce and to transport a high-intensity e+/e- beam at a fast repetition rate of about 0.1 Hz for topping up the collider at its collision energy. A basic parameter set exists for all the collider energies, assuming a 10 GeV linac operating with a large number of bunches being accumulated in the existing SPS, which serves as pre-accelerator and damping ring before the bunches are transferred to the high-energy booster. The purpose of this study is to provide the conceptual design of an alternative damping & accelerator ring, replacing the SPS in the present scheme. This ring will have injection energy of around 6 GeV and extraction energy of around 30 GeV. Apart from establishing the basic parameters of the ring, the study work will include the optics design and layout, single particle linear and non-linear dynamics optimization, including magnetic and alignment error tolerances. The study will also contain some basic estimation of collective effects, including intra-beam scattering, single and multi-bunch instabilities and impedances, two-stream effects (e-cloud and ion instabilities) and address the issue of synchrotron radiation handling. In this presentation, as a part of these studies, basic parameters of the ring, optic design and layout will be presented.

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Session Classification: Young Scientists' Forum

Track Classification: Accelerator design and technologies