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Fast loss simulations for the FCC-ee

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The electron-positron Future Circular Collider (FCC-ee) is a proposed high-energy lepton collider that aims to reach unprecedented luminosity and precision in the measurement of fundamental particles. To fully profit of such performance, it is crucial to keep detector backgrounds under control and operate the machine safely. Due to the high stored beam energy and to a number of complex operational features required at FCC-ee (e.g. the top-up injection scheme), controlling the backgrounds to the physics experiments becomes even more challenging. Recent studies on collective effects have shown that high impedance in the FCC-ee can lead to fast rise-time instabilities, where the beam amplitude grows exponentially, leading to beam loss within a few turns. Although a feedback system is being developed to mitigate this instability, failure scenarios of this feedback system need to be explored. This paper presents the study of the effects of this instability, in order to understand the possible implications for the machine and the experiments.

Footnotes

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