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Study of single bunch effect in PETRA-IV storage ring

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This paper analyzes the single bunch effect due to impedance in PETRA-IV storage ring. With an established impedance element database, the geometrical impedance is generated accordingly. The resistive wall impedance is obtained through the ImpedanceWake2d simulation. The H6BA lattice is now considered as the baseline design and applied for the simulation study. It is required that the ring can be operated with and without damping wigglers, which results in two sets of natural equilibrium beam parameters. In this paper, we will show the influence of the impedance on the electron beam in both scenarios. We conclude that with the help of a 3rd-order harmonic cavity and chromaticity equal to 6, the single bunch current threshold is above 2 mA. At the nominal emittance ratio $\kappa=0.1$, the Touschek lifetime is around 10 hours

Footnotes

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