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Tracking simulation of longitudinal beam dynamics in a triple RF system for electron storage rings

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For diffraction-limited storage rings, a triple RF system scheme has been proposed, aimed at achieving longer bunch lengthening or meeting the specific requirements of longitudinal injection. In such a system, the choice of RF cavity parameters plays a critical role in the longitudinal beam dynamics, which typically requires precise analysis through macroparticle tracking simulations. This paper extends STABLE code [T. He et al., Phys. Rev. Accel. Beams 24, 104401 (2021)] to investigate the longitudinal dynamics of the triple RF system proposed for the Hefei Advanced Light Facility (HALF) storage ring. The simulation results reveal that two key factors limit bunch lengthening.

Footnotes

Funding Agency

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Yes

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