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Radio-Frequency-Detuning Based Modeling and Simulation of Electron Bunch Train Quality

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A numerical study is carried out on the quality of the electron bunch train produced from a photoinjector based on a frequency-detuning dependent gun coupler kick. The impact of the kick on the emittance of the bunch train is modelled via three-dimensional electromagnetic field maps calculated at detuned frequencies of the gun cavity within long radio-frequency pulses. Beam dynamics simulations are performed in the so-called frequency-detuning regime. Preliminary results are presented and discussed.

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