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Properties of superradiant spontaneous THz undulator radiation by an RF compressed electron beam

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Velocity bunching, sometimes called rectilinear rf bunch compression, is a common technique to generate femtosecond MeV electron bunches from a photoinjector system. Such ultrashort beam can be used to generate coherent THz radiations, in particular, coherent undulator radiation (CUR). However, beam properties such as beamsizes, transverse emittance, bunch length and energy spread after bunch compression have significant effects on angular and spectral distributions of CUR. In this study, we perform space charge tracking of electron beam in the NSRRC photoinjector when its booster linac being operated near zero crossing phase in rf bunch compression and the resultant electron distribution of the output beam is then used for calculation of incoherent and coherent undulator radiation from a 10-cm period planar undulator by an algorithm based on Lienard-Wiechart potential. We also compared the radiation properties for cases of multiple bunch and single bunch operation with the same total charge.

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Footnotes

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Yes

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