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First-Principle Simulations of Electron-Bunch Compression using a Large-Scale Lienard-Wiechert Solver

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We present first-principle simulations of coherent synchrotron radiation (CSR) using the large-scale LW3D code [Ryne, R. D., et al. "Large scale simulation of synchrotron radiation using a Lienard-Wiechert approach." Proc. IPAC 46 (2012).] which computes the Lienard-Wiechert fields in 3D from the total number of particles in the bunch. We have applied a straightforward adaptation in the LW3D code to perform self-consistent CSR computations and simulated the resulting beam dynamics as the bunch travels throughout a single bend. We compare our results with the 1D theory and explore the self-consistent effects when simulating a bunch undergoing bunch compression.

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