

RF Compression of sub-relativistic space-charge-dominated electron bunches for single-shot femtosecond electron diffraction

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van Oudheusden, T.

Paper	Title	Page
THP179	RF Compression of Sub-relativistic Space-charge-dominated Electron Bunches for Single-shot Femtosecond Electron Diffraction	

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We demonstrate radiofrequency compression by more than 2 orders of magnitude of 95 keV space-charge-dominated ellipsoidal electron bunches to sub-100 fs durations^{1*},^{**}. These bunches have sufficient charge and are of sufficient quality to capture a diffraction pattern with a single shot, which we demonstrate by a diffraction experiment on a polycrystalline gold foil. The compression results from velocity bunching after inversion of the positive space-charge-induced velocity chirp. This inversion is induced by the oscillatory longitudinal electric field of a 3 GHz radio-frequency cavity. The arrival time jitter is measured to be 80 fs.

* *T. van Oudheusden et al., J. Appl. Phys. 10², 093501 (2007).*

** *T. van Oudheusden et al., submitted to Phys. Rev. Lett., arXiv:10⁰⁶.2041v1.*