

Abstract Submitted
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PIC simulations of CTR from electron bunches exiting a plasma¹

DAVID BRUHWILER, Tech-X Corp., WILLIAM PETER, consultant, PETER MESSMER, RICHARD BUSBY, JOHN CARY², Tech-X Corp., WIM LEEMANS, ERIC ESAREY, CAMERON GEDDES, Lawrence Berkeley Lab — Laser wakefield accelerator (LWFA) concepts are characterized by ultra-high gradients and ultra-short bunch lengths. Non-invasive bunch-length diagnostics, at or very near the plasma exit, are key to continuing the rapid advances in LWFA technology. These short bunches can radiate strongly at THz frequencies via coherent transition radiation (CTR) as they exit the plasma [1,2]. Careful measurements of the THz spectrum will provide the necessary bunch-length diagnostic [3], once the effects of various secondary complications have been quantified. We present particle-in-cell (PIC) simulations of characteristic electron bunches exiting a plasma, and discuss numerical issues such as transforming near-field radiation on the grid to the far-field radiation that would be observed by a detector. [1] W.P. Leemans et al., Phys. Rev. Lett. 91, 074802 (2003) [2] C.B. Schroeder et al., Phys. Rev. E 69, 016501 (2004) [3] J. van Tilborg et al., Phys. Rev. Lett. 96, 014801 (2006)

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