

Abstract Submitted
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Optimization of the LBNL Laser Wakefield Accelerator as a Compact, Powerful Terahertz Source¹ GUILLAUME PLATEAU, NICHOLAS MATLIS, JEROEN VAN TILBORG, KEI NAKAMURA, CAMERON GEDDES, CSABA TOTH, CARL SCHROEDER, ERIC ESAREY, WIM LEEMANS, Lawrence Berkeley National Laboratory, LOASIS TEAM — At LBNL, laser wakefield accelerators (LWFA) routinely produce ultrashort electron bunches with energies up to 1 GeV [1]. As femtosecond electron bunches exit the plasma they radiate a strong burst in the terahertz range [2,3] via coherent transition radiation (CTR). Measuring the CTR properties allows non-invasive bunch-length diagnostics [4], a key to continuing rapid advance in LWFA technology. We present measurements demonstrating both the shot-to-shot stability of bunch parameters, and femtosecond synchronization between the bunch, the THz pulse, and the laser beam. In addition we present a technique for enhancing CTR generation from LWFA-produced electron beams, increasing its suitability for applications.

[1] W.P. Leemans et al., Nature Physics 2, 696 (2006);

[2] W.P. Leemans et al., PRL 91, 074802 (2003);

[3] C.B. Schroeder et al., PRE 69, 016501 (2004);

[4] J. van Tilborg et al., PRL 96, 014801 (2006)

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