

Abstract Submitted  
for the DPP11 Meeting of  
The American Physical Society

**Observation of long range coherent OTR from LPA electron beams** JEROEN VAN TILBORG, CHEN LIN, KEI NAKAMURA, ANTHONY GONSALVES, NICHOLAS MATLIS, THOMAS SOKOLLIK, SATOMI SHIRAISHI, CARL SCHROEDER, CARLO BENEDETTI, ERIC ESAREY, WIM LEEMANS, Lawrence Berkeley National Laboratory, LOASIS PROGRAM COLLABORATION — We report the observation of coherent optical transition radiation (COTR) from electron bunches that have propagated for up to 4 m from the exit of the laser plasma accelerator (LPA). This measurement indicates sub-percent-level slice energy spread of the LPA-produced electron beams. Transition radiation images, produced by electrons passing through two separate foils (located from the LPA at 2.3 m and 3.8 m) were recorded with a high resolution imaging system. Transition radiation in the visible wavelength regime was measured at signal levels of more than two orders of magnitude greater than expected from incoherent emission, indicating that femtosecond structure on the electron beams persisted over meter-scale propagation distances. This persistence implies an upper limit for the slice energy spread on the sub-percent level. Furthermore, for a selection of shots the coherent enhancement from the 3.8-m foil was higher than the closer 2.3-m one, consistent with dynamic changes of the bunch structure due to beam velocity bunching. Experimental results and modeling efforts will be presented. This work was supported by US DOE Contract No. DE-AC02-05CH11231.

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Date submitted: 18 Jul 2011

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