Abstract Submitted for the DPP14 Meeting of The American Physical Society

Positron Production Using a Laser-Wakefield Electron Source¹ G.

JACKSON WILLIAMS, Lawrence Livermore National Laboratory and UC Davis, Dept of Applied Science, FELICIE ALBERT, HUI CHEN, Lawrence Livermore National Laboratory, JAEBUM PARK, Lawrence Livermore National Laboratory and UC Davis, Dept of Applied Science, BRADLEY POLLOCK, Lawrence Livermore National Laboratory — Positron generation using wakefield-accelerated electrons driven into a second mm-scale target was investigated using the Callisto Laser at the Jupiter Laser Facility at Lawrence Livermore National Laboratory. This technique² is in contrast to previous experiments that use direct laser-target interactions to create positron-electron pairs,³ and has the potential to make laser-produced positron sources widely available to smaller scale laboratories. Monte Carlo simulations show a near-collimated (<10 mrad) wakefield electron beam produces a positron beam with a significantly larger divergence angle (>100 mrad) due to multiple small angle coulomb scattering, resulting in an emitted pair density of 10^{13} particles/cm³. At the Callisto Laser, we did not observe a signal consistent with positrons using two different charged particle spectrometers. This could be due to a high noise environment and a large detection threshold.

¹This work was performed under the auspices of the U.S. Department of Energy (DOE) by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344 and funded by the LLNL LDRD program under tracking code 13-LW-076 and 12-ERD-062.

²G. Sarri et al., Phys. Rev. Lett., 110:255002, Jun 2013.

³H. Chen et al., Phys. Rev. Lett., 105:015003, Jul 2010

G. Jackson Williams Lawrence Livermore National Laboratory

Date submitted: 11 Jul 2014 Electronic form version 1.4