Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

High Energy Electron Acceleration from Underdense Plasmas with the OMEGA EP Laser THOMAS BATSON, ANTHONY RAYMOND, KARL KRUSHELNICK, LOUISE WILLINGALE, University of Michigan, PHIL NILSON, DUSTIN FROULA, DAN HABERBERGER, ANDREW DAVIES, WOLFGANG THEOBALD, Laboratory for Laser Energetics, Unversity of Rochester, JACKSON WILLIAMS, HUI CHEN, Lawrence Livermore National Laboratory, ALEX AREFIEV, University of Texas, Austin — Experiments performed using the OMEGA EP laser system studied channeling through an underdense CH plasma, as well as the energy spectra, pointing, and divergence of a direct laser accelerated (DLA) electron beam. An intense, ps scale laser pulse propagating through an underdense plasma results in the expulsion of electrons from along the laser axis to form a channel [1]. Electrons can then be injected from the channel walls into the laser path, which results in the DLA of these electrons and the occurrence of a high energy electron beam [2]. The 4 omega optical probe diagnostic was used to characterize the density of the plasma plume and channel density, while proton radiography was used to observe the electromagnetic fields of the channel formation. 2D particle-in-cell simulations are used to investigate the effects of the plasma density and laser parameters on the channel behavior and electron spectra. This work was supported by the National Laser Users' Facility (NLUF), DOE.

[1] Willingale et al., Physical Review Letters, 106, 105022 (2011)
[2] Willingale et al., New Journal of Physics, 15, 025023 (2013)

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Date submitted: 24 Jul 2015 Electronic form version 1.4