Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Shock-Wave Acceleration of Protons on OMEGA EP D. HABERBERGER, D.H. FROULA, Laboratory for Laser Energetics, U. of Rochester, A. PAK, A. LINK, P. PATEL, LLNL, F. FIUZA, SLAC National Accelerator Laboratory, S. TOCHITSKY, C. JOSHI, U. of California Los Angeles — The creation of an electrostatic shock wave and ensuing ion acceleration is studied on the OMEGA EP Laser System at the Laboratory for Laser Energetics. Previous work using a 10-μm CO_2 laser in a H_2 gas jet shows promising results for obtaining narrow spectral features in the accelerated proton spectra.[1] Scaling the shock-wave acceleration mechanism to the 1-μm-wavelength drive laser makes it possible to use petawatt-scale laser systems such as OMEGA-EP, but involves tailoring of the plasma profile. To accomplish the necessitated sharp rise to near-critical plasma density and a long exponential fall, an $\sim$ 1-μm-thick CH foil is illuminated on the back side by thermal x rays produced from an irradiated gold foil. The plasma density is measured using the fourth-harmonic probe system, the accelerating fields are probed using an orthogonal proton source, and the accelerated protons and ions are detected with a Thomson parabola. These results will be presented and compared with particle-in-cell simulations. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944 and LLNL's Laboratory Directed Research and Development program under project 15-LW-095.

[1]D. Haberberger *et al.*, Nat. Phys. **8**, 95 (2012).

D. Haberberger
Laboratory for Laser Energetics, U. of Rochester

Date submitted: 19 Jul 2016 Electronic form version 1.4