Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Proton Accelerated from a Laser Driven Z-Pinch[1] MICHAEL HELLE, DANIEL GORDON, DMITRI KAGANOVICH, US Naval Research Laboratory, YU-HSIN CHEN, RSI, Inc., JOHN PALASTRO, ANTONIO TING, US Naval Research Laboratory — We will present experimental and numerical results of intense laser acceleration of protons from a sharp near critical density plasma-vacuum interface. Protons were accelerated from a hydrodynamically tailored gaseous hydrogen target using the 10TW TFL laser at NRL. At sufficiently high plasma densities (>7x10^{21} cm^{-3}), the observed proton beam characteristics were consistent with the Target Normal Sheath Acceleration mechanism. At lower densities (<7x10^{21} cm^{-3}), the protons were characterized by a <700keV axial beam with a high-energy halo and energies approaching 2MeV. 3D PIC simulations indicate that these energetic protons result from a laser driven Z-pinch that collapses at the plasma-vacuum interface. Further experimental results and laser-plasma scaling will be discussed.

[1]This work is supported by the DoE and NRL Base Program.

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Date submitted: 23 Jul 2015 Electronic form version 1.4