Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Proton acceleration by multi-terawatt interaction with a near-critical density hydrogen jet[1] ANDY GOERS, LINUS FEDER, GEORGE HINE, FATHOLAH SALEHI, DANIEL WOODBURY, J.J. SU, DENNIS PAPADOPOULOS, University of Maryland, College Park, ARIE ZIGLER, Hebrew University of Jerusalem, HOWARD MILCHBERG, University of Maryland, College Park — We investigate the high intensity laser interaction with thin, near critical density plasmas as a means of efficient acceleration of MeV protons. A promising mechanism is magnetic vortex acceleration, where the ponderomotive force of a tightly focused laser pulse drives a relativistic electron current which generates a strong azimuthal magnetic field. The rapid expansion of this azimuthal magnetic field at the back side of the target can accelerate plasma ions to MeV scale energies. Compared to typical ion acceleration experiments utilizing a laser- thin solid foil interaction, magnetic vortex acceleration in near critical density plasma may be realized in a high density gas jet, making it attractive for applications requiring high repetition rates. We present preliminary experiments studying laser-plasma interaction and proton acceleration in a thin (< 200 μm) near-critical density hydrogen gas jet delivering electron densities $10^{20} - 10^{21} cm^{-3}$.

[1]This research was funded by the United States Department of Energy and the Defense Advanced Research Projects Agency (DARPA) under Contract Number W911-NF-15-C-0217, issued by the Army Research Office.

Andy Goers
University of Maryland, College Park

Date submitted: 15 Jul 2016 Electronic form version 1.4