Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

First Laser-Accelerated Ion Observations From the Omega EP Laser at 1000 J in 10 ps[1] K.A. FLIPPO, M.J. SCHMITT, J.C. COBBLE, D.C. GAUTIER, D. OFFERMANN, LANL, T. BARTAL, S. CHAWLA, F.N. BEG, UCSD, P.M. NILSON, LLE, Univ. of Rochester, A. MACPHEE, S. LE PAPE, D. HEY, A. MACKINNON, LLNL — The efficient generation of ion beams using short intense laser pulses has many applications including active interrogation, providing a temporally-precise perturbation source for ICF capsule implosions, and providing a hot spot for ion fast ignition schemes. All applications benefit by improvements in the laser-to-ion conversion efficiency. For example, ion fast ignition fusion which promises order-of-magnitude reduction in laser driver energies, requires a conversion efficiency of order 10% to avoid the short-pulse lasers from becoming impractically large and expensive. Presently, ion acceleration at the shortest pulse lengths ($\tau_{pulse} < 1$ ps) has been limited. For integrated fast ignition experiments short-pulse laser energies in excess of 10's of kJ will be required necessitating longer pulse lengths on the order of $\tau_{pulse} \geq 10$ ps. There is a lack of experimental data in this pulse length regime. For the first time the OMEGA EP laser has been focused onto small foils with 1000 J in 10 ps to produce proton beams up to nearly 50 MeV with high efficiencies. Results of ion energy and conversion efficiency as a function of target size, target thickness, and intensity will be presented.

[1]This work supported by US DOE/NNSA, performed at LANL, operated by LANS LLC under Contract DE-AC52-06NA25396.

Kirk Flippo
Los Alamos National Laboratory

Date submitted: 20 Jul 2009 Electronic form version 1.4