Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Enhanced Proton Beam Focusing due to Proximal Target Structures on the 1.25 kJ OMEGA EP Laser[1] CHRIS MCGUFFEY, J. KIM, B. QIAO, F.N. BEG, UCSD, M.S. WEI, P. FITZSIMMONS, M. EVANS, R.B. STEPHENS, General Atomics, J. FUCHS, S.N. CHEN, LULI, France, P.M. NILSON, D. CANNING, D. MASTROSIMONE, LLE UR, M.E. FOORD, H.S. MCLEAN, LLNL — Understanding how to generate and control laser-driven proton beams has shown significant progress in the last 15 years. However, to exploit promising applications, practical aspects must be addressed, such as the effect of structures holding the target and dynamics when the beam enters any sample. Using the $1.25kJ$, $10ps$ OMEGA EP BL laser and spherically curved C targets we studied the spot size of a high-density proton beam directed at a Cu foil using three target mounting configurations: 1 on a stalk, 2 with an open-sided wedge structure on the back, and 3 with a conical structure. The brightness of Cu $K\alpha$ fluorescence from the center of the foil was weakest from the stalk-mounted target, 5x brighter with the wedge, and 8x brighter with the cone, indicating enhanced focusing due to the structures. Plasma features and fields from the interaction were temporally and spatially resolved using proton radiography from a separate broad-spectrum proton beam ($0 - 40MeV$) driven by OMEGA EP SL. We also discuss a follow-on experiment that will study transport of the proton beam through various materials.

[1]This work was supported by the DOE/NNSA NLUF program, Grant DE-NA0002034.

Chris McGuffey
UCSD

Date submitted: 12 Jul 2013 Electronic form version 1.4