Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Shortpulse-contrast maximum energy limitations in high-energy, ultra-intense laser proton acceleration M. SCHOLLMEIER, M. GEISSEL, A. SEFKOW, B. ATHERTON, SNL, K. FLIPPO, D. OFFERMAN, LANL, S. GAILLARD, HLSI, T. KLUGE, T. BURRIS-MOG, HZDR, A. AREFIEV, B. BREIZMAN, UT Austin — We report on experiments with the Z-Petawatt (ZPW) laser at Sandia Nat'l Labs and TRIDENT at Los Alamos Nat'l Lab using mm-sized foils and mass-limited targets of various thicknesses. Both lasers have the same intensity on target, but they show significant differences in pulse contrast from the ns-regime up to 1 ps before the main peak. Thin-foil targets yield average (peak) maximum energies of 51 (61) MeV for an optimum thickness. A further reduction of the transverse dimensions to 250x250 microns leads to an upshift of the optimum target thickness, and yields 57(75) MeV average (peak) maximum proton energy. It will be shown that this upshift and the overall maximum energy limitation is a result of the finite rise time of the laser pulse. Sandia National Labs is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corp., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. This work supported by US DOE/NNSA, performed at LANL, operated by LANS LLC under contract DE-AC52-06NA25396.

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Date submitted: 14 Jul 2011 Electronic form version 1.4