Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

**Survey and Optimization of Laser-Driven Ion Beams**[1] SASIKUMAR PALANIYAPPAN, JUAN FERNANDEZ, RAHUL SHAH, BRIAN ALBRIGHT, JIM COBBLE, DONALD GAUTIER, CHRIS HAMILTON, CHENGKUN HUANG, LIN YIN, JIM WILLIAMS, Los Alamos National Laboratory, BJORN HEGELICH, UT Austin, DANIEL JUNG, Queens University Belfast, LOS ALAMOS NATIONAL LABORATORY TEAM, UT AUSTIN COLLABORATION, QUEENS UNIVERSITY BELFAST COLLABORATION — Laser-driven ion acceleration mechanisms have been studied in a series of experiments at the Trident laser facility. Access to multiple such mechanisms has been enabled by a variety of laser targets, ranging from nanofoil targets of different materials to foams that provide near-critical-density plasmas. The operative physics has been constrained by an extensive set of diagnostics, including ion spectrometers, electron spectrometers, frequency-resolved optical gating of the reflected and transmitted laser beams, and a transmitted-laser-beam profiler. Ion acceleration has been observed in both the regimes where the laser plasma remains opaque and where it becomes transparent. In some cases a measure of ion-spectral control has been demonstrated, beyond the typical Maxwellian ion distribution. Simulations have been performed to clarify our understanding of the underlying physics. In this presentation, the salient ion-beam results are shown, along with key measurements that identify the dominant acceleration mechanism. The theoretical considerations behind the observed performance optimizations are summarized.

[1]This work is sponsored by the LANL LDRD Program.

Sasikumar Palaniyappan
Los Alamos National Laboratory

Date submitted: 11 Jul 2013 Electronic form version 1.4