Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Ion Acceleration from Pure Frozen Gas Targets using Short Pulse Lasers[1] EDWARD MCCARY, FLORIAN STEHR, Univ of Texas, Austin, FINN O'SHEA, Radiabeam Technologies, XUEJING JIAO, Univ of Texas, Austin, RONALD AGUSTSSON, ROBERT BERRY, DENNIS CHAO, Radiabeam Technologies, DONALD GAUTIER, Los Alamos National Lab, SAMUEL LETZRING, HERNAN QUEVEDO, Univ of Texas, Austin, KALEY WOODS, Radiabeam Technologies, BJORN HEGELICH, Univ of Texas, Austin — A system for shooting interchangeable frozen gas ice targets was developed and tested on the Trident laser system at Los Alamos National Lab. A target holder which could hold up to five substrates used for target growing was cryogenically cooled to temperatures below 14 K. The target substrates consisted of holes with diameters ranging from 15μm-500μm and TEM grids with micron scale spacing, across which films of ice were frozen by releasing small amounts of pure gas molecules directly into the vacuum target chamber. The thickness of the ice targets was determined by using alpha spectroscopy. Accelerated ion spectra were characterized using a Thomson Parabola with magnetic field strength of 0.92T and electric field strength of 30kV and radio-chromic film stacks. Hydrogen targets were additionally characterized using stacks of copper which became activated upon exposure to energetic protons resulting in a beta decay signal. The beta decay was imaged on electron sensitive imaging plates to provide an energy spectrum and spacial profile of the proton beam. Results of the interchangeable, laser-based ion accelerator will be presented.

[1]Work Supported by NIH grant.

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Date submitted: 12 Jul 2014 Electronic form version 1.4