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Creation of Pure Frozen Gas Targets for Ion Acceleration using Short Pulse Lasers EDWARD MCCARY, FLORIAN STEHR, XUEJING JIAO, HERNAN QUEVEDO, PHILIP FRANKE, University of Texas, RONALD AGUSTSSON, FINN OSHEA, ROBERT BERRY, DENNIS CHAO, KAYLEY WOODS, Radiabeam Technologies, DONALD GAUTIER, Los Alamos National Lab, SAM LETZRING, Retired, BJORN HEGELICH, University of Texas — A system for shooting interchangeable frozen gas targets was developed at the University of Texas and will be tested at Los Alamos National Lab. A target holder which can hold up to five substrates used for target growing was cryogenically cooled to temperatures below 14 K. The target substrates consist of holes with diameters ranging from 15μm-500μm and TEM grids with micron scale spacing, across which films of ice are frozen by releasing small amounts of pure gas molecules directly into the vacuum target chamber. Frozen gas targets comprised of simple molecules like methane and single element gasses like hydrogen and deuterium will provide novel target configuations that will be compared with laser plasma interaction simulations. The targets will be shot with the ultra-intense short-pulse Trident laser. Accelerated ion spectra will be characterized using a Thomson Parabola with magnetic field strength of 0.92T and electric field strength of 30kV. Hydrogen targets will be additionally characterized using stacks of copper which become activated upon exposure to energetic protons resulting in a beta decay signal which be imaged on electron sensitive imaging plates to provide an energy spectrum and spacial profile of the proton beam. Details of target creation and pre-shot characterization will be presented.

Edward McCary
University of Texas

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