Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Characterization of Planar Cryogenic Hydrogen and Deuterium Jets with Interferometry Measurements[1] C. SCHOENWAELDER, C. B. CURRY, G. D. GLENN, F. TREFFERT, S. H. GLENZER, M. GAUTHIER, SLAC National Accelerator Laboratory — Cryogenic micro-jets are created by liquefying an ultra-high purity gas in a copper assembly cooled down to cryogenic temperatures. The liquid is continuously injected into a vacuum chamber through a micron-sized circular or rectangular aperture, where it quickly solidifies by evaporative cooling [1]. As such, this target system enables the transition to high-repetition rate high energy density science. The tunable dimensions of the cryogenic jets allow numerous plasma regimes to be systematically explored. Using 2D/3D particle-in-cell (PIC) simulations, we have identified initial target conditions to access advanced laser-driven ion acceleration mechanisms, such as Collisionless Shockwave Acceleration (CSWA). In both simulations and experiments, the dominant acceleration mechanism strongly depends on the initial dimensions and density of the target. In this work, we present high resolution interferometry measurements of cold, non-ionized planar jet targets to support the interpretation of results obtained at recent petawatt laser-driven ion acceleration experiments. References: 1. C. B. Curry, C. Schoenwaelder et al., J. Vis. Exp. 159, e61130 (2020).

[1]This work was supported by the U.S. DOE Office of Science, Fusion Energy Science under FWP 100182 and the National Science Foundation under Grant No. 1632708

Christopher Schoenwaelder
SLAC National Accelerator Laboratory

Date submitted: 10 Jul 2020 Electronic form version 1.4