Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Investigation of charged-particle response of CR-39 nuclear track detector relevant for spectrometer design R. PRZYBOCKI, B. LAHMANN, G. D. SUTCLIFFE, P. ADRIAN, A. BIRKEL, T. JOHNSON, N. V. KABADI, J. PEARCY, R. A. SIMPSON, H. SIO, E. DOEG, R. FRANKEL, M. GATU JOHNSON, J. A. FRENJE, C. K. LI, F. H. SEGUIN, R. D. PETRASSO, MIT — High Energy Density (HED) plasmas are generated by taking millimeter-sized capsules filled with fusion fuel (such as deuterium and tritium) and imploding them using high energy lasers. Our experiments use CR-39, a plastic nuclear track detector used at HED laser facilities. Charged particles leave trails of damaged chemical bonds in the plastic which can be revealed through chemical etching and recorded with an automated microscope system. This detection through mechanical means is preferred to electromagnetic detectors because of its insensitivity to large electromagnetic fields (x-rays) associated with fusion reactions. Here we present data collected at MIT's Linear Electrostatic Ion Accelerator (LEIA) to measure CR-39 detection efficiency of D-D protons at incident angles up to 50 degrees. Understanding the CR-39 response to charged particles at an angle is essential to designing a D-D neutron spectrometer at the Z facility, which uses CR-39 to detect protons incident at an angle. In addition, we measure detection of D-He3 protons on Wedge Range Filter (WRF) Spectrometers at incident angles relevant for experiments at the National Ignition Facility (NIF). This work was supported in part by the U.S. DoE, SNL, LLE and LLNL.

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Date submitted: 03 Jul 2019 Electronic form version 1.4