Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Optical Ion Velocity Diagnostics in the Interaction of a Laser Produced Plasma and an Ambient Magnetized Plasma ROBERT DORST, PETER HEUER, MARTIN WEIDL, DEREK SCHAEFFER, CARMEN CONSTANTIN, STEPHEN VINCENA, SREEKRISHNA TRIPATHI, WALTER GEKELMAN, University of California, Los Angeles, DAN WINSKE, Los Alamos National Laboratory, DAVID LARSON, Lawrence Livermoore National Laboratory, CHRISTOPH NIEMANN, University of California, Los Angeles — Measuring particle velocities is crucial to understanding plasma dynamics in the study of diamagnetic cavity formation, anomalous magnetic diffusion, plasma instabilities, and collisionless shock formation. We present two methods of measuring super-Alfvénic particles in a laser-produced plasma (LPP). The first uses a high spectral resolution monochromator to measure fluorescence from beam ions to determine velocity distributions by charge state. Fluorescence traces were time-integrated to conduct a low resolution spectroscopic survey. The resulting spectra can be compared to NIST and collisional-radiative model data in order to evaluate the population densities and temperatures. Additionally, we propose an innovative application of laser induced fluorescence (LIF) on an expanding, super-Alfvénic LPP. LIF is a widely used, noninvasive optical technique that can determine ion distributions, velocities, and qualitative concentrations with a high degree of spatial and temporal resolution. By using collisional-radiative simulations, we have identified the configurations with the best signal to noise ratio SNR. Hybrid simulation results are displayed to help visualize the expected results.

Robert Dorst
University of California, Los Angeles

Date submitted: 08 Jul 2019 Electronic form version 1.4