Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Characterization of the Imploding Plasma Sheath in Triple Nozzle Gas-Puff Z-pinches at 1 MA[1] ERIC LAVINE, SOPHIA ROCCO, JAY ANGEL, EUAN FREEMAN, WILLIAM POTTER, JOHN GREENLY, DAVID HAMMER, BRUCE KUSSE, Cornell University — Triple nozzle gas-puff implosions on the 1 MA, 220 ns COBRA generator at Cornell University provide an efficient source of intense x-ray radiation and are of interest for magneto-inertial fusion studies with an applied magnetic field. These implosions are susceptible to the magneto-Rayleigh-Taylor instability (MRTI); however, observations indicate that they are more stable than predicted by simple MRTI theory. Furthermore, the instability growth rate, characterized by an effective Atwood number, is observed to depend on gas species and initial fill density. Detailed measurements of the plasma parameters in the imploding plasma sheath can help to provide an explanation for these observations and can be used to validate simulation codes. To this end, we have used collective Thompson Scattering, Zeeman polarization spectroscopy, and laser shearing interferometry to characterize the imploding plasma sheath at a radius of 1 – 1.5 cm with 0.25 mm spatial resolution. The preliminary results of this study are presented here.

[1]Research supported by NNSA stewardship sciences academic programs under DOE cooperative agreement No. DE-NA0003746

Eric Lavine
Cornell University

Date submitted: 29 Jun 2020 Electronic form version 1.4