Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Comprehensive magnetic field characterization of O and Ar gas-puff z-pinches using spectroscopic techniques[1] NICHOLAS AYBAR, MAYLIS DOZIERES, GILBERT COLLINS, FABIO CONTI, University of California, San Diego, MARKO CVEJ, DIMITRY MIKITCHUK, YITZHAK MARON, Weizmann Institute of Science, Rehovot, DAVID REISMAN, Scientific Consultant, Albuquerque, FARHAT BEG, University of California, San Diego — Gas-puff z-pinches are a long-studied platform for producing hot dense plasma and are a well-known intense x-ray source. Knowledge of the magnetic field in gas-puff z-pinches is necessary to understand the dynamics and characteristics of the implosion including thermal conductivity, current distribution in the plasma, and instability development and mitigation in the presence of a pre-embedded axial magnetic field. Non-invasive experimental determination of the magnetic field strength in imploding plasmas is limited to a handful of techniques. Here, we present experimental results of a polarized Zeeman-based spectroscopic measurement of the magnetic field in both oxygen and argon gas-puff z-pinches obtained using a pulsed power driver (400 kA, 1.6 μs rise) at the Weizmann Institute of Science. An array of optical fibers aligned along the pinch axis coupled to a high-resolution, time-gated spectrometer allowed for spatially resolved determination of both the azimuthal and axial magnetic field strength during the implosion. This work, in part, aims to develop the diagnostic capabilities at UC San Diego to include Zeeman-based spectroscopy on gas-puff implosions using an 800 kA (200 ns rise) linear transformer driver.

[1]This work was performed under the auspices of U.S. DOE NNSA award number DE-SC0019234

Nicholas Aybar
University of California, San Diego

Date submitted: 08 Jul 2019 Electronic form version 1.4