Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Laser Interferometry and X-ray Absorption Spectroscopy of Photoionized Neon Gas Jets using the 1MA Zebra Generator[1] KYLE SWANSON, VLADIMIR IVANOV, ROBERTO MANCINI, DANIEL MAYES, ENAC GALLARDO-DIAZ, RYAN SCHOENFELD, NOAH HUERTA, University of Nevada, Reno — Laboratory produced photoionized plasmas provide a method to systematically explore plasma conditions relevant to astrophysical phenomena. Neon and argon, mm-scale supersonic, gas jets have been used for photoionization experiments on Zebra, a university scale, 1MA and 0.5 TW, pulsed-power generator. A broadband X-ray flux of 15-20kJ is emitted from the implosion of a gold Z-pinch wire-array. The 25-30ns X-ray pulse photoionizes the gas jet as well as backlights it for x-ray absorption spectroscopy. Vertical and side-on laser diagnostics covering 1064, 532, 266, and 213nm, are employed to diagnose the neutral and photoionized jet via air-wedge interferometry, Mach-Zehnder interferometry, and shadowgraphy. A program has been developed to analyze Mach-Zehnder and air-wedge interferometry data allowing for accurate analysis. Interferometry and x-ray absorption spectroscopy measure electron areal densities in the range 1-3.5E18 cm-2. Volumetric electron density measured from laser interferometry is in the range of 1-4E19 cm-3. Average charge state measurements calculated from the X-ray absorption spectroscopy analysis and interferometry are 5.8 and 6.2, respectively. The absorption spectra indicate the photoionized neon plasma is mainly populated by B-, Be- and Li-like neon ions.

[1]This work is supported by DOE NNSA HEDLP grant DE-NA0003875.

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Date submitted: 29 Jun 2020 Electronic form version 1.4