Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Utilizing Gas Jets to study Laboratory Photoionized Plasmas[1] KYLE SWANSON, VLADIMIR IVANOV, ROBERTO MANCINI, DANIEL MAYES, ENAC GALLARDO DIAZ, University of Nevada, Reno — Photoionized plasmas are important for astrophysical objects such as x-ray binary systems, active galactic nuclei, and planetary nebulae. Laboratory photoionized plasmas enable systematic studies and provide data to test plasma theory and benchmark modeling codes. Supersonic gas jets represent an attractive platform for photoionized plasma experiments. Experiments, at the 1MA Zebra pulsed power accelerator of the University of Nevada Reno, photoionize supersonic gas jets by a 25ns-duration broadband x-ray flux of a z-pinch. In this short time gas jet motion is negligible, and the x-ray flux drives the gas without undergoing attenuation through a window or tamper material. Neon, argon, and nitrogen gases have been investigated. Mach-Zehnder interferometry at 266nm, dual-color air wedge interferometry at 266 and 532nm, multi-color shadowgraphy at 266, 532, and 1064nm were used to probe the neutral gas jet as well as the photoionized plasma. A cylindrically bent KAP crystal spectrometer was employed for x-ray transmission spectroscopy. Interferometry and x-ray spectroscopy showed electron areal densities of 1-3.5x10^{18} cm^{-2}, and electron number densities of 1-4x$10^{19}$$cm^{-3}$.

[1]This work was sponsored by DOE NNSA HEDLP Grant DE-NA0003875, DOE Office of Science Grant DE-SC0014451.

Kyle Swanson
University of Nevada, Reno

Date submitted: 03 Jul 2019 Electronic form version 1.4