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Laboratory photoionized plasma experiments at Z relevant to astrophysics[1] D. MAYES, T. LOCKARD, T. DURMAZ, I. HALL, R. MANCINI, University of Nevada, Reno, J. BAILEY, G. ROCHAU, Sandia National Laboratories, D. COHEN, Swarthmore College, R. HEETER, D. LIEDAHL, Lawrence Livermore National Laboratory — Photoionized plasmas are present in many astrophysical environments, such as accretion disks and radiatively-driven winds of x-ray binaries and active galactic nuclei. We discuss an experimental and modeling effort in which the intense x-ray flux emitted at the collapse of a z-pinch is employed to produce and backlight a neon photoionized plasma to study the atomic kinetics through K-shell line absorption spectroscopy. The plasma is contained in a cm-scale gas cell filled with neon and placed at various distances from the z-pinch. The filling pressure is monitored in situ thus providing the particle number density of the plasma. High-resolution spectra are recorded with a TREX spectrometer with two elliptically-bent KAP crystals and a set of slits to record up to six spectra per crystal per shot. The transmission data shows line absorption transitions in several ionization stages of neon including Be-, Li-, He- and H-like ions. Analysis of the transmission spectra yields the charge state distribution and ion areal-densities used to benchmark atomic kinetics calculations. In addition, the electron temperature extracted from a level population ratio is used to test heating models of the photoionized plasma.

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