Abstract Submitted
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Ionization and heating trends observed in a laboratory photoionized plasma experiment at Z[1] DANIEL MAYES, ROBERTO MANCINI, University of Nevada, Reno, JAMES BAILEY, GUILLAUME LOISEL, GREGORY ROCHAU, Sandia National Laboratories — An experimental effort is ongoing to create and study laboratory photoionized plasmas relevant to the extreme conditions in x-ray binaries and active galactic nuclei. Astronomers seeking to understand such objects rely on photoionization models developed mainly from theory because this regime has long been experimentally inaccessible and is only beginning to be thus examined with devices such as the Z-Machine at Sandia National Laboratories. The experiment employs the intense broadband x-ray flux emitted during the collapse of a Z-pinch to drive and backlight a neon photoionized plasma contained within a cm-scale gas cell with atom number densities of 10^{17} to 10^{18} cm^{-3}. At the available gas cell positions, the x-ray flux reaches a peak of order 10^{12} W/cm^2. Combinations of these parameters afford an order of magnitude range in ionization parameter, allowing for the study of trends in astrophysically relevant photoionized plasmas. Through K-shell line absorption spectroscopy, the resulting plasma conditions (i.e. ion areal densities, charge state distribution, and electron temperature) are determined, which can be compared with simulation results to test atomic kinetics and heating models for photoionized plasmas.

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Daniel Mayes
University of Nevada, Reno

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