Abstract Submitted
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X-ray heating of laboratory photoionized plasmas at Z[1] R MANCINI, T LOCKARD, D MAYES, University of Nevada, Reno, G LOISEL, J BAILEY, G ROCHAU, Sandia National Laboratories, J ABDALLAH, C FONTES, Los Alamos National Laboratory, D LIEDAHL, Lawrence Livermore National Laboratory, I GOLOVKIN, Prism Computational Sciences — In separate experiments performed at the Z facility of Sandia National Laboratories two different samples were employed to produce and characterize photoionized plasmas. One was a gas cell filled with neon, and the other was a thin silicon layer coated with plastic. Both samples were driven by the broadband x-ray flux produced at the collapse of a wire array z-pinch implosion. Transmission spectroscopy of a narrowband portion of the x-ray flux was used to diagnose the charge state distribution, and the electron temperature was extracted from a Li-like ion level population ratio. To interpret the temperature measurement, we performed Boltzmann kinetics and radiation-hydrodynamic simulations. We found that non-equilibrium atomic physics and the coupling of the radiation flux to the level population kinetics play a critical role in modeling the x-ray heating of photoionized plasmas. In spite of being driven by similar x-ray drives, differences of ionization and charged state distributions in the neon and silicon plasmas are reflected in the plasma heating and observed temperatures.

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