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12.48 Novel temperature diagnostic accuracy tests in photon-driven plasmas at the Z facility.

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We have developed a platform on Z for the study of photoionized plasmas (G. Loisel et al., PRL 119, (2017)). These experiments have measured, for the first time in the laboratory, the radiative recombination continuum (RRC) from photoionized plasma that is used by astronomers to determine the temperature of accretion-powered plasmas around compact objects. As an example, the RRC from H- and He-like states in Vela X-1 and Cygnus X-3 has been used to infer accreted plasma temperatures in 4-70 eV, thus confirming photoionization. Faint RRC emission from H-like to He-like silicon along with the He-like np-1s (up to n=14) series were observed in Z data. Simultaneously, the temperature is inferred from recorded absorption spectrum under the partial LTE assumption. This unique combination provides a test on the accuracy of the partial LTE assumption and the accuracy of the RRC technique when potential line blending, line broadening and continuum lowering could affect the slope of the continuum. We discuss how these techniques could benefit a wider range of high energy density plasmas. ++ Sandia National Laboratories is a multimission laboratory managed and operated by NTESS LLC, a wholly owned subsidiary of Honeywell International Inc. for the U.S. DOE's NNSA under contract DE-NA0003525

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