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X-ray spectroscopy of L-shell krypton emission[1] ENAC GALLARDO-DIAZ, ROBERTO C. MANCINI, DYLAN T. CLICHE, KYLE R. CARPENTER, University of Nevada, Reno, PATRICK ADRIAN, JOHAN FRENJE, Massachusetts Institute of Technology, UNR-MIT COLLABORATION — X-ray spectroscopy of direct- and indirect-drive implosions is a powerful diagnostic of the core plasma conditions achieved in experiments. We discuss the temperature and density dependence of the x-ray line emission of L-shell krypton ions afforded through the characteristic sensitivities of the atomic level populations and charged state distributions and detailed Stark-broadened spectral line shapes due to plasma electric microfields, respectively. We have found that krypton-tracer atomic concentrations in the range from 0.02% to 0.04% of the main fill gas produce krypton L-shell n=4-2 line emission with values of optical depth that are less than 1 and intensity comparable to previous observations of argon K-shell spectra. In particular, modeling calculations suggest that L-shell emission of Be- and Li-like krypton ions can be used to diagnose electron temperatures in the 1.5keV to 3keV range in dense implosion cores. Furthermore, since the photon energy ranges of krypton L-shell and argon K-shell emissions are comparable, streaked and imaging spectrometers employed for argon spectroscopy[1] can be used for krypton L-shell as well. [1]D. T. Cliche and R. C. Mancini, Applied Optics **58**, 4753 (2019).

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