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Simulation study of enhancing laser-driven multi-keV line-radiation through application of external magnetic fields[1] G. ELIJAH KEMP, J.D. COLVIN, K.B. FOURNIER, M.J. MAY, M.A. BARRIOS, M.V. PATEL, J.M. KONING, H.A. SCOTT, M.M. MARINAK, LLNL — Laser-driven, spectrally tailored, high-flux x-ray sources have been developed over the past decade for testing the radiation hardness of materials used in various civilian, space and military applications. The optimal electron temperatures for these x-ray sources occur around twice the desired photon energy. At the National Ignition Facility (NIF) laser, the available energy can produce plasmas with $\sim 10\,keV$ electron temperatures which result in highly-efficient $\sim 5\,keV$ radiation but less than optimal emission from the $> 10\,keV$ sources. In this work, we present a possible venue for enhancing multi-keV x-ray emission on existing laser platforms through the application of an external magnetic field. Preliminary radiation-hydrodynamics calculations with HYDRA suggest as much as $2-14\times$ increases in laser-to-x-ray conversion efficiency for $22-68\,keV$ K-shell sources are possible on the NIF laser – without any changes in laser-drive conditions – through the application of an external axial $50\,T$ field.

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