Abstract Submitted
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Broadband-To-Monochromatic X-ray conversion of Zr $K_{\alpha,\beta}$ Lines and High-Energy-Density (HED) Plasma Diagnostics[1] ANIL PRADHAN, S. LIM, S. NAHAR, C. ORBAN, Ohio State Univ - Columbus — Experimental and theoretical studies of the formation of K_α, K_β X-ray complexes from high-Z elements are of interest in diverse areas such as HED plasma sources and biomedical applications. Conversion of bremsstrahlung-to-monochromatic (B2M) X-ray K_α, K_β lines is studied using a broadband 150 KV X-ray generator and a solid Zirconium target. We carried out Breit-Pauli atomic structure calculations for all possible fine-structure components of transition arrays leading to the formation of K_α and K_α complexes in H- to F-like Zr (Z=40), and other high-Z elements up to platinum and gold (Z=78,79) [1,2]. Fine structure averaged energies and cross sections for K_α and K_β resonances in each ionization state of Zr are presented. Such K_α resonances [1,2] have been observed in X-ray laser produced warm dense matter at the LCLS-XFEL at SLAC [3]. Numerical simulations using the code FLYCHK indicate temperature and density sensitivities in laser-irradiated plasmas.

[1] Pradhan et al, J. Phys. Chem. A **113**, 12356 (2009)
[2] Nahar et al, Can. J. Phys. 89, 483 (2011); Nahar & Pradhan (2014)
[3] S. M. Vinko et al, Nature **482**, 59 (2012).

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Sultana Nahar
Ohio State Univ - Columbus

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