

Abstract Submitted  
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**K-Shell Absorption Spectroscopy at Low Temperatures in Pre-heat Experiments** R. EPSTEIN, H. SAWADA, V.N. GONCHAROV, D. LI, P.B. RADHA, S.P. REGAN, Laboratory for Laser Energetics, U. of Rochester, R.C. MANCINI, University of Nevada, Reno — K-shell absorption spectroscopy has been applied to thin aluminum layers in shock-heated planar foils. With quantitative analysis based on detailed atomic kinetics, line shapes, and K-edge shifts, this technique has been extended as a temperature ( $T_e$ ) and density ( $n_e$ ) diagnostic to the lowest applicable temperatures. Comparisons between the conditions inferred from both measured and simulated spectra reveal biases characteristic of absorption spectroscopy in sampling realistic ranges of conditions within the signature layer. The spectrum analysis is based on least-squares parameter estimation, which takes into account the degradation of  $T_e$  and  $n_e$  estimates by uncertainties in other unknown quantities such as background emission levels. Other absorption spectral effects, including  $1s$ - $3p$  absorption lines and L-shell ionization edges, are evaluated as  $T_e$  and  $n_e$  diagnostics in other possible low-temperature applications. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-FC52-92SF19460.

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