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Application and Analysis of the Isoelectronic Line Ratio Temperature Diagnostic in a Planar Ablating-Plasma Experiment at the National Ignition Facility R. EPSTEIN, M.J. ROSENBERG, A.A. SOLODOV, J.F. MYATT, S.P. REGAN, W. SEKA, M. HOHENBERGER, Laboratory for Laser Energetics, U. of Rochester, M.A. BARRIOS, J.D. MOODY, LLNL — The Mn/Co isoelectronic emission-line ratio from a microdot source in planar CH foil targets was measured to infer the electron temperature (T_e) in the ablating plasma during two-plasmon–decay experiments at the National Ignition Facility (NIF). We examine the systematic uncertainty in the T_e estimate based on the temperature and density sensitivities of the line ratio in conjunction with plausible density constraints, and its contribution to the total T_e estimate uncertainty. The potential advantages of alternative microdot elements (e.g., Ti/Cr and Sc/V) are considered. The microdot mass was selected to provide ample line strength while minimizing the effect of self-absorption on the line emission, which is of particular concern, given the narrow linewidths of mid-Z emitters at subcritical electron densities. Atomic line-formation theory and detailed atomic-radiative simulations show that the straight forward interpretation of the isoelectronic ratio solely in terms of its temperature independence remains valid with lines of moderate optical thickness (up to ~ 10) at line center. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

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