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Spectroscopic Determination of Temperature and Density Spatial Profiles and Mix in Inertial Confinement Fusion Implosion Cores[1] LESLIE WELSER, ROBERTO MANCINI, TAISUKE NAGAYAMA, University of Nevada, Reno, JEFFREY KOCH, RICCARDO TOMMASINI, NOBUHIKO IZUMI, STEVE HAAN, Lawrence Livermore National Laboratory, IGOR GOLOVKIN, Prism Computational Sciences, JACQUES DELETTREZ, SEAN REGAN, VLADIMIR SMALYUK, Laboratory for Laser Energetics, DONALD HAYNES, Los Alamos National Laboratory — This work is focused on extracting temperature and density gradients from data obtained in indirect drive ICF implosions. Imaging was provided by the Multi-Monochromatic X-ray Imager (MMI). Two new spectroscopic techniques have been developed to characterize the core gradients. The emissivity ratio of Lyβ/Heβ is analyzed first to extract temperature, and either emissivity or intensity equations are then solved to infer density. The idea of solving intensity equations permits consideration of the opacity effect. In order to extract the mixing spatial profile, the optically-thick Lyα line is brought into the analysis. Two mix models have been used to independently estimate the level of mixing, and the results show reasonable agreement with the experimental data analysis.

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