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Analysis of space- and time-resolved Ar K-shell emission in ICF experiments and determination of plasma spatial structure I.E. GOLOVKIN, J.J. MACFARLANE, P.R. WOODRUFF, Prism Computational Sciences, Inc., J.E. BAILEY, G.A. ROCHAU, R.J. LEEPER, Sandia National Laboratories, Albuquerque — We present a novel method to determine spatial distributions of the plasma temperature, density and relative fuel-pusher material fractions (mix) based on the analysis of space- and time-resolved spectroscopic data obtained in ICF implosion experiments. The determination of space-dependent plasma characteristics provides important constraints for radiation- hydrodynamics calculations and improves the understanding of implosion physics. Determination of the plasma spatial structure is a complex inverse problem with a non-trivial dependence of spectroscopic observables on the plasma distributions. We will present the genetic-algorithm-based analysis of the data and demonstrate that the plasma conditions can be successfully determined. All spectral simulations are performed using a suite of codes contained in the SPECT3D Imaging and Spectral Analysis package. We will discuss the details of the calculations based on the analysis of synthetic experimental data generated with known plasma distributions.

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