Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

X-ray spectroscopic signatures of ion species separation in ICF implosions on OMEGA PETER HAKEL, SCOTT HSU, HANS HERRMANN, YONG HO KIM, MARK SCHMITT, GRIGORY KAGAN, AARON MCEVOY, JAMES COLGAN, CHRISTOPHER FONTES, DAVID KILCREASE, MANOLO SHERRILL, RICK RAUENZAHN, Los Alamos National Laboratory — This work aims to provide a direct measurement of the species separation through experimental inference of the ion density profiles, and comparisons of the data with simulations that explicitly model multi-ion-species diffusion. We also describe the development of a new code capable of modeling x-ray spectral emission from ICF capsules that accounts for the effects of spatial gradients in species distributions throughout the target. This new code named FESTR also allows the inclusion of NLTE, opacity, and Stark broadening effects on x-ray spectral line emissions. We show preliminary results from an OMEGA campaign to obtain direct measurements of ion species separation via advanced analysis of x-ray spectroscopy and spectrally resolved imaging data. These were symmetric direct-drive implosions of CH capsules with deuterium and trace argon gas fills. The implosions were designed to be in a collisional, diffusive regime and to take advantage of interspecies diffusion between the D and Ar driven by temperature gradients in the hot spot. X-ray spectral line emissions and narrowband images from He-like and H-like Ar ions are used to infer the spatial separation of Ar from D.

Peter Hakel
Los Alamos National Laboratory

Date submitted: 20 Jul 2015 Electronic form version 1.4