Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Simulation study of optimizing the 3-5 keV x-ray emission from pure Ar K-shell vs. Ag L-shell targets on the National Ignition Facility[1]

G.E. KEMP, J.D. COLVIN, K.B. FOURNIER, M.V. PATEL, H.A. SCOTT, M. MARINAK, LLNL, J.H. FISHER, Fifth Gait Technologies, Inc., J.F. DAVIS, Alme and Associates — High-flux x-ray sources are desirable for testing the radiation hardness of materials used in various civilian, space and military applications. For this study, there is an interest to design a source with primarily mid-energy ($\sim 3\,keV$) but limited soft ($< 1\,keV$) x-ray contributions; we focus on optimizing the $3-5\,keV$ non-LTE emission from targets consisting of pure Ar (K-shell) or Ag (L-shell) at sub-critical densities ($\sim n_c/10$) to ensure supersonic, volumetric laser heating with minimal losses to kinetic energy and thermal x rays. However, K and L-shell sources are expected to optimize at different temperatures and densities and it is *a priori* unclear under what target and laser conditions this will occur. Using HYDRA, a multi-dimensional, arbitrary Lagrangian-Eulerian, radiation-hydrodynamics code, we performed a simulation study by varying initial target density and laser parameters for each material as it would perform on the National Ignition Facility (NIF). We employ a model, benchmarked against Kr data collected on the NIF, that uses flux-limited Lee-More thermal conductivity and implicit Monte-Carlo photonics with non-LTE, detailed configuration accounting opacities from CRETIN.

[1]This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract No. DE-AC52-07NA27344.

G. E. Kemp
LLNL

Date submitted: 10 Jul 2014 Electronic form version 1.4