Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Non-LTE modeling of the radiative properties of high-Z plasma using linear response methodology[1] MARK FOORD, JUDY HARTE, HOWARD SCOTT, Lawrence Livermore National Laboratory — Non-local thermodynamic equilibrium (NLTE) atomic processes play a key role in the radiation flow and energetics in highly ionized high temperature plasma encountered in inertial confinement fusion (ICF) and astrophysical applications. Modeling complex high-Z atomic systems, such as gold used in ICF hohlraums, is particularly challenging given the complexity and intractable number of atomic states involved. Practical considerations, i.e. speed and memory, in large radiation-hydrodynamic simulations further limit model complexity. We present here a methodology for utilizing tabulated NLTE radiative and EOS properties for use in our radiation-hydrodynamic codes. This approach uses tabulated data, previously calculated with complex atomic models, modified to include a general non-Planckian radiation field using a linear response methodology. This approach extends near-LTE response method [1] to conditions far from LTE. Comparisons of this tabular method with in-line NLTE simulations of a laser heated 1-D hohlraum will be presented, which show good agreement in the time-evolution of the plasma conditions. [1] R.M. More, T. Kato, S.B. Libby and G. Faussurier, J Quant Spectrosc Radiat Transfer, 505 (2001).

[1]This work was performed under the auspices of the U.S. Dept. of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344

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Date submitted: 14 Jul 2017 Electronic form version 1.4