Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

First-Principles Investigations on Thermal Conductivity and Average Ionization of CH Ablators Under Extreme Conditions S.X. HU, V.N. GONCHAROV, R.L. MCCRORY, S. SKUPSKY, Laboratory for Laser Energetics, U. of Rochester, L.A. COLLINS, J.D. KRESS, LANL — A plastic CH ablator (polystyrene) is often used for inertial confinement fusion (ICF) target designs. Upon intense laser or x-ray ablations, a CH ablator can be shocked to warm-dense-matter (WDM) conditions. Many-body coupling and quantum electron degeneracy are expected to play an essential role in determining the properties of such warm dense plasmas. Using *ab initio* methods of quantum molecular dynamics (QMD), we have performed investigations on the principal Hugoniot of a CH ablator,[1] the first-principles equation-of-state table of CH, and its effect on ICF simulations.[2] In this presentation, we focus on the thermal conductivity and average ionization of CH-ablators under a wide range of plasma temperatures and densities. The resulting thermal conductivity (κ) and average ionization ($\langle Z \rangle$) show large differences from the usual model predictions in the WDM regime. These results, being fitted with analytical functions of plasma density and temperature, have been incorporated into radiation−hydrodynamics codes. Their effects on the ICF implosion simulations will be presented. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944 and the Scientific Campaign 10 at LANL under Contract No. DE-AC52-06NA25396.

[1]S. X. Hu *et al*, Phys. Rev. E **89**, 063104 (2014).
[2]S. X. Hu *et al.,* submitted to Physical Review E.

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Date submitted: 21 Jul 2015 Electronic form version 1.4