Abstract Submitted
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Thermal conductivity measurements of proton-heated warm dense aluminum[1] A. MCKELVEY, G. KEMP, P. STERNE, A. FERNANDEZ, R. SHEPHERD, M. MARINAK, A. LINK, G. COLLINS, LLNL, H. SIO, MIT, J. KING, R. FREEMAN, OSU, R. HUA, C. MCGUFFEY, J. KIM, F. BEG, UCSD, Y. PING, LLNL — We present the first thermal conductivity measurements of warm dense aluminum at 0.5-2.7 g/cc and 2-10 eV, using a recently developed platform of differential heating. A temperature gradient is induced in a Au/Al dual-layer target by proton heating, and subsequent heat flow from the hotter Au to the Al rear surface is detected by two simultaneous time-resolved diagnostics. A systematic data set allows for constraining both thermal conductivity and equation-of-state models. Simulations using Purgatorio model or Sesame S27314 for Al thermal conductivity and LEOS for Au/Al release equation-of-state show good agreement with data after 15 ps. Predictions by other models, such Lee-More, Sesame 27311 and 29373, are outside of experimental error bars. Discrepancy still exists at early time 0-15 ps, likely due to non-equilibrium conditions. (Y. Ping et al. Phys. Plasmas, 2015, A. Mckelvey, et al. Sci. Reports 2017).

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