

DPP11-2011-020016

Abstract for an Invited Paper
for the DPP11 Meeting of
the American Physical Society

Ramp Compression of Carbon above 50 Mbar on NIF

RAYMOND SMITH, Lawrence Livermore National Laboratory

The National Ignition Facility (NIF) offers unprecedented opportunities to push the limits of condensed-matter and materials physics. By using ramp-compression techniques on NIF we have generated pressures into the multi-TPa regime on carbon and 1 TPa on iron. Our multiple step samples are driven from hohlraum x-radiation with a characteristic radiation temperature history determined by our laser drive: 176 beams with 0.4-1MJ of energy in a ramp laser profile up to 30ns in duration. We employ Lagrangian sound speed analysis to determine high-pressure compressibility and information on dynamic strength and the existence of high-pressure structural phase transformations. These experiments represent an order of magnitude increase in the maximum pressure achievable under ramp compression and generate conditions relevant to the core states of the giant planets. I will report on these experiments, and plans for upcoming x-ray diffraction experiments on NIF