Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

Shockwave compression of Argon gas at several initial densities DANA DATTELBAUM, PETER GOODWIN, DANIEL GARCIA, RICHARD GUSTAVSEN, JOHN LANG, TARIQ ASLAM, STEPHEN SHEFFIELD, LLOYD GIBSON, JOHN MORRIS, Los Alamos National Laboratory, LOS ALAMOS NATIONAL LABORATORY TEAM — Experimental data of the principal Hugoniot locus of *gas-phase* noble gases are rare. The majority of Hugoniot data is either from shock tube experiments on low-pressure gases or from plate impact experiments on cryogenic, liquefied gases. In both cases, physics regarding shock compressibility, thresholds for the on-set of ionization, and dissociation chemistry are difficult to infer for gases at intermediate densities. We have developed an experimental target for gas gun-driven plate impact experiments on gases at initial pressures between 200-1000 psi. Using optical velocimetry, we directly determine shock and particle velocities on the principal Hugoniot locus, as well as clearly differentiate ionization thresholds. The target design also results in multiply shocking the gas in a quasi-isentropic fashion yielding off-Hugoniot compression data. Using an impactor with higher impedance than the drive plate, we are able to achieve initial particle velocities well in excess of the impactor velocities. We will describe the results of plate impact experiments on Ar with initial densities between 0.02-0.05 g/cm^3. By coupling optical fibers to the targets, we have measured the time-resolved optical emission, spectrally-resolved with a spectrometer coupled to an optical streak camera, and with a 5-color optical pyrometer for temperature determination. The experimental results are compared with hydrodynamic simulations using ideal gas and Sesame tabular equations of state.

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Date submitted: 29 Jan 2015 Electronic form version 1.4