Abstract Submitted
for the SHOCK07 Meeting of
The American Physical Society

**Brillouin-scattering Determination of the Acoustic Properties of Polymers at High Pressure** DANA DATTELBAUM, LEWIS STEVENS, EDWARD ORLER, Los Alamos National Laboratory, Los Alamos, NM 87545, MUHTAR AHART, RUSSELL HEMLEY, Geophysical Laboratory, Carnegie Institute of Washington, 5251 Broad Branch Road NW, Washington, D.C. 20015 — Brillouin scattering is a powerful tool for probing the elastic properties of materials. Coupled with high pressure environments, such as those accessible using diamond anvil cells, the method can reveal rich materials physics under extreme conditions, and provide fundamental data for the development of equations-of-state. For the first time, the acoustic properties of three polymeric elastomers have been measured from ambient pressure to 12 GPa. While both transverse and longitudinal modes were observed for all three polymers, transverse modes were only observed at elevated pressures, with the pressure on-set of observable modes differing for the polymers studied. From the measured acoustic properties, elastic constants, moduli, and Poisson's ratios were calculated as a function of pressure. P-V isotherms were also constructed, and fit to a range of empirical/semi-empirical isothermal equation-of-state (EOS) forms. From this analysis, the isothermal bulk modulus and its pressure derivative were obtained for the polymers interrogated, and the static results were compared to available shock wave compression data.

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Date submitted: 23 Feb 2007 Electronic form version 1.4