Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Coherent anti-Stokes Raman Spectroscopy Study of Highly Compressed Deuterium BRUCE BAER, WILLIAM EVANS, CHOONG-SHIK YOO, Lawrence Livermore National Laboratory — High density (> 0.3 mol/cm^3) hydrogen and its isotopes have been studied intensely over the past three decades. Although many spectroscopic methods have been applied, none utilizes a multiphoton technique. Coherent anti-Stokes Raman Spectroscopy (CARS) has now been applied to samples over one megabar for the first time to accurately determine the density at which the bandgap of deuterium is 4.66 eV. This method yields very precise Raman shifts, linewidths and third order polarizability ratios since it avoids the problems associated with strain induced diamond fluorescence above a megabar. The pressure dependent third order polarizability ratios can indicate the location of the bandgap. We will present evidence for extrapolating the metallization pressure using these results and the implications on the phase diagram. This work has been supported by the LDRD and PDRP programs at Lawrence Livermore National Laboratory, University of California under the auspices of the U.S. Department of Energy under Contract No. W-7405-ENG-48.

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Date submitted: 17 Nov 2006 Electronic form version 1.4