

Abstract Submitted  
for the DPP06 Meeting of  
The American Physical Society

**Asymmetric explosion of laser-irradiated Hydrogen gas cluster plasmas** YU-HSIN CHEN, SANJAY VARMA, VINOD KUMARAPPAN, HOWARD MILCHBERG, University of Maryland — We present the results of an experiment in which we irradiate small clusters of Hydrogen gas molecules with intense, variable width sub-picosecond laser pulses. The hydrogen clusters are thought to undergo coulomb explosion after laser electric field ionization, and therefore should emit ions in a uniform angular distribution. However, using time-of-flight measurements, we have found that ions are emitted preferentially in the direction of polarization of the laser pulse. This asymmetric behavior is characteristic of much larger inert gas clusters with highly charged ions. We explore the dependence of the asymmetry on pulse duration, laser energy and cluster size. We also use a new two-arm time-of-flight detector setup to examine angular distributions for fixed laser polarization. Finally, we use Single-shot Supercontinuum Spectral Interferometry [1] to measure pump-induced transient index change for much greater hydrogen cluster densities in order to extract anisotropies in the real and imaginary cluster polarizabilities.

[1] K.Y. Kim, I. Alexeev, and H.M. Milchberg, Appl. Phys. Lett. 81, 4124 (2002).

Yu-hsin Chen  
University of Maryland

Date submitted: 21 Jul 2006

Electronic form version 1.4