Abstract Submitted
for the GEC13 Meeting of
The American Physical Society

Simultaneous Filtered and Unfiltered Light Scattering Measurements in Laser Generated Air Sparks[1] CHRISTOPHER LIMBACH, RICHARD MILES, Princeton University — Elastic laser light scattering may be used to measure the thermofluidic properties of gases and plasmas, including but not limited to density, temperature and velocity. Most of this information is contained within the spectra of the scattered radiation. This may be measured directly through dispersion or indirectly, by passing the light through an atomic or molecular vapor filter with known absorption features. In this work, filtered and unfiltered laser light scattering is used to diagnose air sparks generated by a 1064nm Q-switched laser. The probe laser consists of a second Q-switched Nd:YAG laser frequency doubled to 532nm. Simultaneous unfiltered and filtered images of the scattering are captured by a Princeton Instruments ICCD camera by using a 50mm diameter concave re-imaging mirror. The filter consists of a well-characterized molecular Iodine cell. In the shock wave formed by the laser spark, spatially resolved measurements of density, temperature and radial velocity are extracted and compared with theory and models. Measurements in the spark core probe the ion feature of the electron Thomson scattering, from which n_e and T can be extracted with the assumption $T_e = T_i$.

[1]Partial funding was provided by General Electric Global Research Center: Niskayuna, New York. The first author is also supported by a National Defense Science and Engineering Graduate Fellowship.

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Date submitted: 30 Jul 2013 Electronic form version 1.4