Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

Estimates of the Electric Field in Fast Ionization Waves BENJAMIN YEE, University of Michigan, BRANDON WEATHERFORD, EDWARD BARNAT, Sandia National Laboratories, JOHN FOSTER, University of Michigan — The non-equilibrium nature of fast ionization waves (FIWs) makes an assessment of energy transport difficult. Their high fields and short-lived nature complicate even the most simple diagnostics and tends to preclude the application of any physical probe. On the other hand, optical probes generally require the excitation, equilibration, and decay of atomic or molecular states, each of which takes a finite amount of time. In the case of an FIW, measurement of optical transitions will necessarily take place in the afterglow of the plasma. Fortunately, the electron and excited state densities produced by the wavefront are essentially fixed for a few hundred nanoseconds after the pulse. We propose a technique which uses measurements of the absolute metastable and electron densities to determine an effective electric field in the wavefront. The approach is evaluated for self-consistency and is in compared with other estimates of the electric field in similar discharges.

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Date submitted: 15 Jun 2012 Electronic form version 1.4