

**Abstract Submitted for the 52nd Annual Meeting  
Division of Plasma Physics  
November 8–12, 2010, Chicago, Illinois**

Category Number and Subject: 4.1.2. High-intensity, short pulse laser  
plasma interactions

☐ Theory      ☒ Experiment

**Stochastic Ultra-Intense Laser-Plasma Interactions**, RB Stephens, G Lee, J Jaquez, K Akli, *General Atomics*; A Krygier, L Van Woerkom, *Ohio State U*; D Symes, S Hawkes, C Hooker, N Booth, R Pattathil, *Rutherford Appleton Lab.*; T Yabuuchi, F Beg, *UCSD* – Characterization of ultra-intense, short-pulse laser plasma experiments has evidenced fluctuations of up to 2x in electron number and spot size from K-edge emission [1]. Stochastic interaction of the laser with preplasma is possible, but there have not been sufficient repetitive measurements to investigate the cause. We report on an experiment designed for this issue on the Gemini-Astra laser at RAL. Its capability for 1 ppm, 10 J, 0.25 ps shots allowed 10 repeated, nominally identical shots during scans of prepulse conditions. Laser-plasma coupling was measured with x-ray spectrometers recording the fluorescence intensity from buried Cu and Ni layers. Both refluxing (35  $\mu\text{m}$  thick) and non-refluxing (>1000  $\mu\text{m}$  thick) foils were used; the former measured deposited energy, the latter the number of electrons. Care was used to minimize variance in target dimensions and fluorescence measurements so that measured variance could be related to the Laser Plasma interaction. Results will be discussed.

[1] RB Stephens, et al, PR E **69**, 066414 (2004)