Abstract Submitted
for the GEC19 Meeting of
The American Physical Society

Intensity Distribution in the Focal Area of Ionizing Dual Gaussian Laser Pulses in Air[1] MATTHEW R. NEW-TOLLEY, MIKHAIL N. SHNEIDER, Princeton University, RICHARD B. MILES, Texas A&M University — The localized energy deposition which accompanies dual laser pulse sequences has been proposed for use in remote sensing and efficient combustion systems. The presence of the plasma region created by the first pre-ionizing pulse allows energy from the second laser to be efficiently deposited in a specific location. Previous experiments and fluid simulations have made clear that the relative position of the beam waists dictate which fluid structures will dominate the motion of the surrounding fluid following the laser pulse. These studies however, manually selected the location of the beam waist and did not account for the distortion of the beams by the plasma region. In this study we simulate the application of a pre-ionizing UV nano-second laser pulse followed by a second higher-energy IR pulse. Each laser pulse is temporally discretized, and a split step Fourier code applied to calculate the local intensity at each grid point. The local intensity is used to calculate the rate coefficients of multiphoton and avalanche ionization processes. The modified gas composition is then used to recalculate the refractive index at each grid point. This study looks at the effect of the plasma region on the near-focus intensity distribution of the laser pulses.

[1]This work was supported by DOD-AFOSR award AWD1005727. M. N-T acknowledges support from a PPPL Program in Plasma Science and Technology Fellowship (PPST).

Matthew New-Tolley
Princeton University

Date submitted: 30 May 2019 Electronic form version 1.4