

# Abstract Submission Template

SAND2018-1764C

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-title-

Ultrafast Laser Diagnostics to Interrogate High Pressure, Highly Collisional Plasma Environments

-/title-

-abstract-

The implementation and demonstration of laser-collision induced fluorescence (LCIF) generated in atmospheric pressure helium environments is presented in this communication. As collision times are observed to be fast ( $\sim 10$  ns), ultrashort pulse laser excitation ( $< 100$  fs) of the  $2^3S$  to  $3^3P$  (388.9 nm) is utilized to initiate the LCIF process. Both neutral induced and electron induced components of the LCIF are observed in helium afterglow plasma as the reduced electric field ( $E/N$ ) is tuned from  $< 0.1$  Td to over 5 Td. Under the discharge conditions presented in this study (640 Torr He), the lower limit of electron density detection is  $\sim 10^{12}$  e/cm<sup>3</sup>. Spatial profiles of the  $2^3S$  helium metastable and electrons are presented as functions of  $E/N$  to demonstrate the spatial resolving capabilities of the LCIF method.

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