

Abstract Submitted  
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**Instantaneous velocity fields in a hypersonic wake**<sup>1</sup> YIBIN ZHANG, DANIEL RICHARDSON, STEVEN BERESH, KATYA CASPER, MELISSA SOEHNEL, RUSSELL SPILLERS, Sandia National Laboratories — The cold wake behind a slender object in hypersonic flow offers a challenging environment for off-body measurements. Femtosecond Laser Electronic Excitation Tagging (FLEET) is a simple (single-laser, single imaging system) diagnostic that permits flowfield visualization without seeding or physical probes. FLEET optical and imaging parameters are tailored for measurements in the wake of a sharp cone in Mach 8 nitrogen flow, over freestream Reynolds numbers from  $4 \times 10^6/\text{m}$  to  $14 \times 10^6/\text{m}$ . Fluorescing FLEET lines for 1D velocity measurements and crosses for 2D measurements are written into the flow. The signal-to-noise ratio and tagging efficiency are maximized by using third harmonic FLEET at 267 nm, which has never before been implemented in a hypersonic test case. Flow tagging captures prominent wake features such as the separation shear layer, wake turbulence and two-dimensional velocity components.

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