

Abstract Submitted  
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**Development of the Motional Stark Effect with Laser-Induced Fluorescence (MSE-LIF) Diagnostic**<sup>1</sup> ELIZABETH L. FOLEY, FRED M. LEVINTON, Nova Photonics, Inc. — The motional Stark effect with laser-induced fluorescence (MSE- LIF) diagnostic is under development to extend the MSE magnetic pitch angle diagnostic to lower fields (  $< 0.5$  T) and enable measurement of magnetic field magnitude as well as direction. The technique involves injecting a low energy-spread neutral hydrogen beam (30 kV, 30 mA) into plasma, and using a collinear laser to excite transitions from the  $n=2$  to  $n=3$  atomic states in the beam atoms. The subsequent fluorescence from the same transition (Balmer-alpha, near 650 nm for the Doppler-shifted beam) is observed, and its splitting and polarization due to the  $\mathbf{E} = \mathbf{v} \times \mathbf{B}$  electric field in the beam frame is used to determine the background magnetic field magnitude and direction. This poster will present recent results from MSE-LIF development, including magnetic field measurements at very low field ( $< 0.01$  T) in neutral gas based on an enhanced LIF phenomenon, a comprehensive collisional-radiative model which determines the population fractions in the  $n=1, 2$  and  $3$  states of the beam as the states mix in applied magnetic and electric fields, as well as upgrades to the experimental apparatus that will enable measurements in intermediate fields (0.01 - 0.2 T) in plasma.

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Elizabeth L. Foley  
Nova Photonics, Inc.

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