

Abstract Submitted  
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**Kr ion Laser-Induced Fluorescence using a tunable diode laser**

**near 729nm**<sup>1</sup> GREG SEVERN, TIM WELSH, University of San Diego, NOAH  
HERSHKOWITZ, University of Wisconsin-Madison — We are working to produce

an ion flow diagnostic for Kr II ions using diode laser based laser-induced fluorescence (LIF). We have found an atomic energy level scheme that is accessible to diode lasers:  ${}^4D_{7/2} \rightarrow {}^4P_{5/2}^0 \rightarrow {}^4P_{5/2}$ . Excitation is nominally at 729 nm, and the detected photon is nominally at 473 nm. The metastable state,  ${}^4D_{7/2}$ , should be the one most populated in the low temperature plasma discharges that we will create for these experiments ( $T_e \sim 1eV, T_i \sim 1/40eV, n_i \sim 10^9 cm^{-3}$ ). The extended cavity diode laser is in the Littrow configuration (Sacher-Lasertechnik TEC-100-0730-20). LIF measurements of molecular iodine will be made simultaneously and will be compared with the molecular iodine absorption spectrum measurements of Gerstenkorn & Chevillard for absolute wavelength calibration. Successful completion of these experiments will provide a new ion velocity diagnostic for Kr ions which will aid in at least 3 basic plasma science experiments: 1) Hall Thruster ion plume measurements, 2) sheath formation in the case of multiple ion species plasmas (with 3 ion species), and 3) studies of the comparison between ion velocities of metastable state rare gas ions and known ground state ion mobilities.

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