Abstract Submitted
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Experimental Studies of Laser-Induced Fluorescence of Kr^{+1} GREG SEVERN, TIM WELSH, Dept. of Physics, University of San Diego, San Diego, CA, 92110, NOAH HERSHKOWITZ, Dept. Engineering Physics, University of Wisconsin, Madison, Madison WI 53706 — We have succeeded in obtaining a laser-induced fluorescence (LIF) signal from Kr^+ in a low temperature Kr plasma discharge, using a diode laser, for a wavelength near 729nm. An atomic energy level scheme that is accessible to diode lasers is ${}^4D_{7/2} \rightarrow {}^4P^0_{5/2} \rightarrow {}^4P_{5/2}$. The metastable state, ${}^4D_{7/2}$, one of several possible metastables states for excitation, proved to be sufficiently populated in the in a low temperature DC plasma discharge ($T_e \sim 1eV, T_i \sim 1/40eV, n_i \sim 10^9 cm^{-3}$) to produced a high quality signal. The excitation wavelength is nominally 729 nm, and the detected photon is nominally 473 nm. We used an extended cavity diode laser in the Littrow configuration (Sacher-Lasertechnik TEC-100-0730-20). 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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