Abstract Submitted
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Kr ion Laser-Induced Fluorescence using a tunable diode laser near 729nm for Sheath experiments[1] GREG SEVERN, CHRIS YIP, University of San Diego, Dept. of Physics, NOAH HERSHKOWITZ, University of Wisconsin-Madison, Madison, WI, USA — We have succeeded in obtaining a laser-induced fluorescence (LIF) signal from Kr^+, (83.8 amu) 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, ${}^4D_{7/2}$, proved to be sufficiently populated in a low temperature DC plasma discharge ($T_e \sim 1eV, n_i \sim 10^9 cm^{-3}$) to produce a high quality signal. We present results ofion velocity distribution functions (IVDFs) obtained by deconvolution. The principal complication in unfolding an IVDF from the measured LIF signal is the presence of the 4 main isotopic contributions, ${}^{86}Kr^+$,${}^{84}Kr^+$, ${}^{82}Kr^+$, and ${}^{80}Kr^+$. Hargus et al. [1] have applied deconvolution techniques successfully to Kr II LIF signals from this transition for the case of Hall Thruster plasmas, in which ion temperatures are very large compared with the isotope shifts. Sheath formation experiments (multiple ion species plasmas) will operate in a much cooler regime for which the requirements for deconvolution techniques are more stringent.

[1] W.A. Hargus, Jr., et al., Rev.Sci.Instrum. **83**, 103111 (2012)

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Greg Severn
University of San Diego, Dept. of Physics

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