

Abstract Submitted  
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**Laser Induced Fluorescence of the Iodine Ion** WILLIAM HARGUS,  
Air Force Research Laboratory, Edwards AFB, CA — Iodine ( $I_2$ ) has been considered as a potential electrostatic spacecraft thruster propellant for approximately 2 decades, but has only recently been demonstrated. Energy conversion efficiency appears to be on par with xenon without thruster modification. Intriguingly, performance appears to exceed xenon at high acceleration potentials. As part of a continuing program for the development of non-intrusive plasma diagnostics for advanced plasma spacecraft propulsion, we have identified the I II  $5d^5D_4^o$  state as metastable, and therefore containing a reservoir of excited state ions suitable for laser probing. The  $5d^5D_4^o - 6p^5P_3$  transition at 695.878 nm is convenient for diode laser excitation with the  $5s^5S_2^o - 6p^5P_3$  transition at 516.12 nm as an ideal candidate for non-resonant fluorescence collection. We have constructed a Penning type iodine microwave discharge lamp optimized for I II production for table-top measurements. This work demonstrates I II laser-induced fluorescence in a representative iodine discharge and will validate our previous theoretical work based on the limited available historical I II spectral data.

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