

Abstract Submitted
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Comparison of measured metastable ion density with laser induced fluorescence, to electron number density determined with a Langmuir probe, in Ar plasmas as a function of pressure YOUNG-CHUL GHIM(KIM), Dept. Engineering Physics, UW-Madison, Madison, Wisconsin 53706, NOAH HERSHKOWITZ¹, Dept. Engineering Physics, UW-Madison, Madison, Wisconsin 53706 — The laser induced fluorescence (LIF) signal intensity measured with a diode laser in Ar plasmas is compared to Langmuir probe determined electron number density (n_e). Plasmas with $n_e \sim 10^9 \text{ cm}^{-3}$ and $T_e \sim 1 \text{ eV}$ are generated for pressures varying from 0.05 - 5.00 mTorr in a dc multidipole hot filament discharge. The Ar II excitation transition at 668.614 nm is adopted to create Ar ion metastable fluorescence, and the metastable Ar ion velocity distribution functions (ivdfs) in bulk plasmas are measured. The area under the ivdf curve increases as the pressure is raised, with a maximum signal area at 0.6 mTorr. Then the area decreases with further increases in pressure, whereas the electron number density increases monotonically. The LIF signal has not yet been found at neutral pressure greater than 5 mTorr. In addition, the profile of the area normalized to the electron number density shows that the ratio is fairly constant over the presheath regime and increases as the diagnosed volume gets closer to the sheath.

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