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Measurement of argon neutral velocity distribution functions near an absorbing boundary in a plasma[1] ZACHARY SHORT, DEREK THOMPSON, West Virginia University, TIMOTHY GOOD, Gettysburg College, EARL SCIME, West Virginia University — Neutral particle distributions are critical to the study of plasma boundary interactions, where ion-neutral collisions, e.g. via charge exchange, may modify energetic particle populations impacting the boundary surface. Neutral particle behavior at absorbing boundaries thus underlies a number of important plasma physics issues, such as wall loading in fusion devices and anomalous erosion in Hall thruster channels. Neutral velocity distribution functions (NVDFs) are measured using laser-induced fluorescence (LIF). Our LIF scheme excites the 1s4 non-metastable state of neutral argon with 667.913 nm photons. The subsequent decay emission at 750.590 nm is recorded synchronously with injection laser frequency. Measurements are performed near a grounded boundary immersed in a cylindrical helicon plasma, with the boundary plate oriented at an oblique angle to the magnetic field. NVDFs are recorded in multiple velocity dimensions and in a three-dimensional volume, enabling point-to-point comparisons with NVDF predictions from particle-in-cell models as well as comparisons with ion velocity distribution function measurements obtained in the same regions through Ar-II LIF.

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