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Ion flow characterization of the plasma boundary in a helicon plasma[1] DEREK THOMPSON, UMAIR SIDDIQUI, JULIANNE MCILVAIN, ZACHARY SHORT, EARL SCIME, West Virginia University, Department of Physics Astronomy — Experimental investigation of plasma interface physics is critical for verifying plasma boundary models. In addition to strongly affecting discharge volume bulk properties, plasma boundary interactions are particularly important for fusion energy devices and for electric propulsion, where walls can be degraded via plasma bombardment. We present the results of two experiments. In the first experiment, the magnetic field is aligned parallel to an absorbing boundary and ion-neutral collisions are varied while measuring bulk ion flows with laser-induced fluorescence (LIF). The data are compared to drift models and indicate that collisional diffusion accounts for ion transport toward the boundary, except when low-frequency electrostatic fluctuations are present in the plasma. When fluctuations are observed, the classical model underestimates radially outward ion flow. In the second experiment, an absorbing boundary is placed at oblique incidence to the background magnetic field. Ion distributions near the boundary are measured with LIF to investigate how the electric fields, present at plasma interfaces, affect ion flows and transport near the boundary surface. These experiments represent the first radial and 3D measurements of ion flows in these scenarios.

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