

Transport barriers and anomalous diffusion in a strongly magnetized, low temperature plasma in the MDPX device

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A number of studies using the Magnetized Dusty Plasma Experiment (MDPX) device have focused on understanding the physical, thermal, and transport characteristics of the capacitively coupled plasma (CCP) configuration in the presence of strong magnetic fields above 1 Tesla. In the studies presented in this work, a moving probe is inserted into a low temperature argon plasma operating at neutral gas pressures from 5.3 to 16 Pa (40 to 120 mTorr), RF power ~ 1 W, and a magnetic field above 1 Tesla. As the probe is withdrawn from the plasma, an “imprint” of the probe in the form of a channel of diminished visible light emission that persists for 2 to 10 seconds, depending on the neutral pressure. This phenomenon is reproducible over a range of neutral pressures and magnetic fields. So far, it has been observed for magnetic fields, $B \geq 1$ Tesla. This presentation will describe the experimental configuration, provide images and videos of this phenomenon, and will discuss some of the initial modeling that is being performed to understand these observations.

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