

Abstract Submitted
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Measurement of ion-acoustic fluctuations using high frequency laser-induced fluorescence in the presheath of a biased electrode¹ RYAN HOOD, SCOTT BAALRUD, LUCAS BEVING, ROBERT MERLINO, FREDERICK SKIFF, University of Iowa — Ion-acoustic fluctuations driven by strong flows in the presheath are observed using a high frequency laser-induced fluorescence (LIF) diagnostic. Ion fluctuation spectra are resolved spatially through the presheath region of a positively and negatively biased electrode. Measurements are made using a recently developed field programmable gate array (FPGA)-based LIF system. The system can measure ion fluctuation spectra up to 1 MHz using a correlation function method. Ion-acoustic fluctuations are observed near 500 kHz, about half of the ion plasma frequency, throughout the presheath and for positively and negatively biased electrodes. The fluctuation power is observed to increase significantly when the electrode is biased above the plasma potential. However, the fluctuation power does not vary greatly with distance from the electrode. These observations are consistent with a recent theory that predicts the presence of a long-range electron presheath, in which the fast electron flow enhances ion-acoustic fluctuations.

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