

Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Investigation of Ion Acoustic Wave Instabilities Near Positive Electrodes¹ RYAN HOOD, FENG CHU, SCOTT BAALRUD, ROBERT MERLINO, FRED SKIFF, University of Iowa — Electron sheaths occur when an electrode is biased above the plasma potential, most often during the electron saturation portion of a Langmuir probe trace. Through the presheath, electrons are accelerated to velocities exceeding the electron thermal speed at the sheath edge, while ions do not develop any appreciable flow. PIC simulations have shown that ion acoustic instabilities are excited by the differential flow between ions and electrons in the presheath region of a low temperature plasma. We present the first experimental measurements investigating these instabilities using Laser-Induced Fluorescence diagnostics in a multidipole argon plasma. The plasma dispersion relation is measured from the power spectra of the imaged LIF signal and compared to the simulation results. In addition, optical pumping is measured using time-resolved LIF measurements and fit to a model in order to determine the diffusion rate, which may be enhanced due to the instability.

¹This research was supported by the Office of Fusion Energy Sciences at the U.S. Department of Energy under contract DE-AC04-94SL85000.

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Date submitted: 14 Jul 2017

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