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The Langmuir's Paradox: Can the Ion Acoustic Instability at the Sheath Edge Thermalize the Ions Too?[1] CHI-SHUNG YIP, NOAH HERSHKOWITZ, University of Wisconsin - Madison Madison, WI, USA, GREG SEVERN, University of San Diego, San Diego, CA, USA — Recently a theoretical prediction was that in single-species plasmas, ion-ion collisional friction is enhanced by the ion acoustic instability [1]. The theory predicted that the instability will not only enhance the thermalization of the electrons, but will also, near the sheath-edge, thermalize the non-Maxwellian tail of the ion velocity distribution function (IVDF), caused by charge exchange in the presheath. The theory also predicted that this instability disappears through collisional damping as neutral pressure of the plasma increases. This experiment aims to verify this theory by measuring the IVDFs near the sheath edge in a multi-dipole chamber discharge in Argon and Xenon gas for a variety of neutral pressures and electron temperatures. The threshold parameters of the phenomenon are explored. The IVDFs are determined by Laser-Induced Florescence, the electron temperature is measured by a Langmuir probe and the plasma potential towards the boundary is measured by an emissive probe.

[1] S.D. Baalrud, et al. "Instability-enhanced collisional effects and Langmuir's paradox," Phys. Rev. Lett, **102**, 245005 (2009)

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