

Abstract Submitted  
for the DPP15 Meeting of  
The American Physical Society

**Fundamental Restructuring of the Collisional Presheath Near Electron-Emitting Surfaces**<sup>1</sup> MICHAEL CAMPANELL, Lawrence Livermore National Laboratory — Recent work showed that intense electron emission can make the sheath potential become positive. This “inverse sheath” differs strongly from the “space-charge limited sheath” predicted in conventional models. Here we show that intense emission also makes the plasma interior restructure. The collisional presheath structure is dominated not by ion acceleration but by emission thermalization. Since the sheath potential is positive, emitted electrons are not accelerated away from the surface. They enter the presheath with low velocities and actually have a higher spatial density than the hotter plasma electrons by a ratio  $\sim \sqrt{T_{ep}/T_{emit}}$ . This leads to a surprising result that the quasineutral plasma density must increase from the bulk towards the presheath edge, opposite from the case of Bohm presheaths. The force balance throughout the plasma interior is altered by the electrons originating from the surface. Simulation and experimental evidence of “inverted presheaths” will be shown. The results could be pertinent to various plasma systems with intense emission. \*M.D. Campanell, POP 22, 040702 (2015).

<sup>1</sup>Prepared by LLNL under Contract DE-AC52-07NA27344. LLNL-ABS-674970

Michael Campanell  
Lawrence Livermore National Laboratory

Date submitted: 22 Jul 2015

Electronic form version 1.4