Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Ion flow and sheath structure near positively biased electrodes[1]
RYAN HOOD, BRETT SCHEINER, SCOTT BAALRUD, University of Iowa, MATTHEW HOPKINS, ED BARNAT, BENJAMIN YEE, Sandia National Laboratories, ROBERT MERLINO, FRED SKIFF, University of Iowa — Measurements of the ion velocity distribution function (IVDF) and plasma potential were made near small positively biased electrodes using laser-induced fluorescence (LIF) and an emissive probe. The effect of dielectric around the electrode was tested and compared with a 2D particle-in-cell (PIC) simulation. Both measurements and simulation reveal that if the electrode is embedded within a surrounding dielectric, ions are accelerated toward the electrode to approximately 0.5 times the ion sound speed before being deflected radially by the electron sheath potential barrier. The axial potential profile in this case contains a virtual cathode. In comparison, when the surrounding dielectric is removed, both the ion flow and virtual cathode depth are dramatically reduced. These measurements suggest that the ion presheath from the dielectric may enclose the electron sheath of the electrode resulting in a virtual cathode that substantially influences the local ion flow profile.

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

Ryan Hood
University of Iowa

Date submitted: 13 Jul 2016 Electronic form version 1.4