Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Complications with flush-mounted probe analysis beyond sheath-expansion[1] A.Q. KUANG, B. LABOMBARD, D. BRUNNER, MIT PSFC — In a reactor relevant divertor, the heat-flux onto the target plate would be too large and traditional proud Langmuir probes will melt. By making the probes flush with the surface of the target plate they become nearly as robust as the divertor plates themselves. However, without a theoretically rigorous derivation of the sheath thickness, sheath expansion has been a primary concern for the interpretation of flush mounted probe data [1,2]. Following the installation of a flush-mounted Langmuir probe system at Alcator C-Mod (toroidally-elongated and field-aligned to give it a 'rail' geometry) that effectively mitigates the effects of sheath expansion down to incident field line angles of 0.5 degree [3], further complications have arisen that cannot be explained by sheath-expansion. The 'rail' probes systematically measure lower densities and higher temperatures but have the same pressure. The evolution of the scrape-off layer profiles measured on the divertor target plate from sheath-limited to detached regimes is also different. These are indicative of important physics, perhaps unique to conditions in a vertical-target plate divertor with small field-line attack angles, that affects the I-V characteristics and is not currently included in probe data analyses. Controlled experiments performed at Alcator C-Mod mapped out this discrepancy and the results will be presented. [1] Gunn, J. P. (1997). *Phys. of Plasma.* Vol. 4. p. 4435. [2] Weinlich, M. and Carlson, A. (1997). *Phys. of Plasma.* Vol. 4. p. 2151. [3] A.Q., Kuang, et. al. (2016). *Nucl. Mat. and Energy,* in review.

[1]Supported by USDoE awards DE-FC02-99ER54512

A.Q. Kuang
MIT PSFC

Date submitted: 06 Jul 2016 Electronic form version 1.4