

Abstract Submitted  
for the DPP12 Meeting of  
The American Physical Society

**First ion temperature profiles in the boundary of Alcator C-Mod<sup>1</sup>**

DAN BRUNNER, BRIAN LABOMBARD, MICHAEL CHURCHILL, BRUCE LIPSCHULTZ, ROMAN OCHOUKOV, CHRISTIAN THEILER, DENNIS WHYTE, MIT PSFC, ALCATOR C-MOD TEAM — The ion temperature is an important parameter in the boundary of magnetic fusion devices, playing a role in the sheath heat flux, total plasma pressure, plasma potential, and sound speed. High spatial resolution measurements of  $T_i$  and  $T_e$  profiles are needed to evaluate these quantities and to unfold the rates of cross-field heat transport in each species. To this end, we have developed two specialized scanning probes: an Ion Sensitive Probe (ISP) and a Retarding Field Analyzer (RFA). Alcator C-Mod is a challenging environment for probes, with parallel heat fluxes comparable to that expected in reactors, 100's MW/m<sup>2</sup>, necessitating the use of refractory materials in compact, optimized geometries. The two probes, along with Charge-eXchange Recombination Spectroscopy (CXRS) measurements of B<sup>5+</sup> ions, allow important cross-checks to be performed. Preliminary results indicate good agreement between the ISP and RFA. Comparison with B<sup>5+</sup> CXRS is also favorable. In ohmic-heated, sheath-limited plasmas the ratio of  $T_i/T_e$  is  $\sim 3$  (150 and 50 eV) at the separatrix and increases to  $\sim 5$  (50 and 10 eV) at the limiter boundary. Experiments with conduction-limited plasma conditions are planned and will be reported. Implications for boundary electron and ion heat transport will also be discussed.

<sup>1</sup>This work supported by USDoE award #DE-FC02-99ER54512.

Dan Brunner  
MIT PSFC

Date submitted: 10 Jul 2012

Electronic form version 1.4