

**Abstract Submitted for the 55th Annual Meeting  
Division of Plasma Physics  
November 11-15, 2013  
Denver, Colorado**

Category Number and Subject:

Theory    Experiment

**Characterizing the Outer Divertor Leg Transition to Full Detachment,\*** A.G. McLean, S.L. Allen, M.E. Fenstermacher, C.J. Lasnier, W.H. Meyer, G.D. Porter, V.A. Soukhanovskii, *Lawrence Livermore National Laboratory*; B.D. Bray, T.N. Carlstrom, A.W. Leonard, C. Liu, *General Atomics*, D. Eldon, *University of California San Diego*, M. Groth, *Helsinki University of Technology*, P.C. Stangeby, C.K. Tsui, *University of Toronto* – Experiments at DIII-D have explored the transition from an attached to fully detached divertor condition in L- and H-mode with an unprecedented level of detail. Improved divertor Thomson scattering capturing  $T_e \leq 1$  eV, coupled with high resolution spectroscopic studies of molecular and neutral emissions, and Stark broadening of the deuterium Paschen series provide essential data for modeling the transition to detachment. 2-D  $T_e$  and  $n_e$  profiles of the outer leg reveal movement of the ionization front away from the plate not replicated in modeling. Measured Paschen and molecular emissions suggest the onset of recombination occurs prior to, and to a greater extent than modeled. These data help guide and expose any missing physics in predictions for detached operation in future devices.

\*This work supported in part by the US Department of Energy under DE-AC52-07NA27344 and DE-FC02-04ER54698.