

Abstract Submitted  
for the DPP19 Meeting of  
The American Physical Society

**Investigations of ION Orbit Loss In L-H Transition n DIII-D.**

NICHOLAS PIPER, WESTON STACEY, Georgia Institute of Technology — We have recently shown<sup>1</sup> that a change in Ion Orbit Loss is involved in the L-H transition in several DIII-D shots, and are now investigating the DIII-D L-H data for evidence of changes in the parameters that determine, via conservation requirements, the minimum ion energy for which an ion can be ion orbit lost. In order to maintain charge neutrality in the presence of ion orbit loss in the edge plasma, it is necessary to have an inward current of either ions or neutrals from the SOL to replace the ions that are ion orbit lost from the edge plasma. It is proposed that the compensating “return” currents arising from ion orbit loss in large part determine the radial electric field in the tokamak edge plasma. Setting the current produced by ionization/charge exchange equal to the negative of the IOL “return” current plus the viscous current, one can solve for the radial electric field required for charge neutrality in the presence of ion orbit loss.<sup>2,3</sup> [1] N. A. Piper & W. M. Stacey, *Plasma Phys Control Fusion* 61, 055007 (2019). [2] K. C. Lee, *Phys. Plasmas* 13, 062505 (2006); [3] K. C. Lee, *Phys. Plasmas* 24, 112505 (2017)

Weston Stacey  
Georgia Institute of Technology

Date submitted: 10 Jul 2019

Electronic form version 1.4