Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Scaling of midplane separatrix density with power at divertor detachment onset[1] A.W. LEONARD, GA, M.A. MAKOWSKI, A.G. MCLEAN, LLNL, P.C. STANGEBY, Univ. Toronto — The midplane separatrix density at divertor detachment onset is found to increase with higher parallel heat flux, $q_{||}$, flowing into the divertor, but at a slower rate than expected from simple scaling models. The separatrix density will be an important parameter in determining the compatibility of divertor heat flux control with robust pedestal operation and high core confinement in future devices. The parallel heat flux is examined by separately varying several parameters, including injected power, plasma current, toroidal field and injected impurities. Several methods are employed to locate the separatrix in this critical region of steep density gradients, including magnetic equilibrium reconstruction, power balance assumptions and spatial fiducials from other diagnostics. All methods exhibit a slower than the $q_{||}^{5/7}$ scaling predicted by a simple two point model. The nonlinear dependence of divertor radiation with power and density is one of several factors leading to this difference.

[1]Supported in part by the US DOE under DE-FC02-04ER54698 & DE-AC52-07NA27344.

A.W. Leonard
GA

Date submitted: 17 Jul 2015 Electronic form version 1.4