Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Parallel Electron Force Balance and the L-H Transition[1] T. STOLTZFUS-DUECK, A. DIALLO, S. ZWEBEN, PPPL, S. BANERJEE, Institute for Plasma Research — In a popular description of the L-H transition, energy transfer to the mean flows directly depletes turbulence fluctuation energy, resulting in suppression of the turbulence and a corresponding transport bifurcation. However, electron parallel force balance couples nonzonal velocity fluctuations with electron pressure fluctuations on rapid timescales, comparable with the electron transit time. For this reason, energy in the nonzonal velocity stays in a fairly fixed ratio to electron thermal free energy, at least for frequency scales much slower than electron transit. In order for direct depletion of the energy in turbulent fluctuations to cause the L-H transition, energy transfer via Reynolds stress must therefore drain enough energy to significantly reduce the sum of the free energy in nonzonal velocities and electron pressure fluctuations. At low $k_\perp$, the electron thermal free energy is much larger than the energy in nonzonal velocities, posing a stark challenge for this model of the L-H transition.

[1]Work supported by U.S. DoE contract DE-AC02-09CH11466.

Timothy Stoltzfus-Dueck
Princeton Univ

Date submitted: 14 Jul 2016 Electronic form version 1.4