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The Role of Zonal Flows and Predator-Prey Oscillations in Triggering the L-H Transition and in Internal Transport Barriers[1] L. SCHMITZ, L. ZENG, T.L. RHODES, J.C. HILLESHEIM, W.A. PEEBLES, UCLA, G.R. MCKEE, Z. YAN, U. Wisconsin, R.J. GROEBNER, K.H. BURRELL, General Atomics, G.R. TYNAN, J.A. BOEDO, UCSD, W.M. SOLOMON, PPPL — Low frequency Zonal Flows (ZFs) have been observed to trigger the L-H transition near the power threshold, by either an extended predator-prey limit cycle oscillation (LCO [1]) or a short ($\sim 0.5 - 1.5$ ms) ZF burst executing only part of one limit cycle. Localized turbulence suppression ($k_\theta \rho_s \sim 0.5$) is initiated as the ZF shearing rate approaches the turbulence decorrelation rate. Turbulence-flow correlations (via Doppler Backscattering) show that the ZF amplitude and shear initially lag the rms fluctuation level by 90° during LCO, transitioning to 180° as the increasing ion pressure gradient and resulting equilibrium **E**x**B** shear secure the final transition to ELM-free H-mode. In a separate experiment, localized suppression of electron-scale fluctuations ($k_\theta \rho_s \sim 3$) by ZF shear is also observed in an internal thermal electron transport barrier. However, in contrast to the L-H transition, here the density fluctuation level is always anti-correlated (180° out of phase) with the ZF shearing rate.

[1] L. Schmitz et al., Phys. Rev. Lett. **108**, 155002 (2012).

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