Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Characterization of broadband fluctuations in wide-pedestal QH-mode plasmas on DIII-D[1] C.M. MUSCATELLO, K.H. BURRELL, GA, N.C. LUHMANN, JR., UCD, G.R. MCKEE, UW Madison, B. TOBIAS, PPPL — Edge broadband fluctuations observed in wide pedestal quiescent H-mode plasmas may play an important role in driving transport necessary for stabilizing the edge to kink-peeling modes, thought to lead to ELMs. Density fluctuation measurements from BES and MIR independently observe periodic bursts in the pedestal that show up spectrally as broadband fluctuations. The period of the fluctuation bursts correlate with the period of enhanced bicoherence in the frequency range of the fluctuations, suggesting nonlinear coupling of turbulence. Time-delay estimation analysis of the 2D BES data shows strong evidence of a low-frequency zonal flow in the pedestal with a period matching that of the bursts. The carbon pressure gradient and EB velocity, determined from CER, and ECE emission also oscillate with the same period. This behavior can be described as a quasi-stationary, limit-cycle oscillation and modeled by a set of predator-prey equations relating the zonal flow, equilibrium flow, and turbulence amplitude.

[1]Supported by the US DOE under DE-FC02-04ER54698, DE-FG02-99ER54531, DE-AC02-09CH11466.

C.M. Muscatello
General Atomics

Date submitted: 14 Jul 2016 Electronic form version 1.4