Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Multi-scale/Multi-field Turbulence Measurements to Rigorously Test Gyrokinetic Simulation Predictions on DIII-D[1] T.L. RHODES, W.A. PEEBLES, L. SCHMITZ, E.J. DOYLE, J.C. HILLESHEIM, L. ZENG, G. WANG, UCLA, C.H. HOLLAND, G.R. TYNAN, UCSD, A.E. WHITE, MIT-PSFC, G.R. MCKEE, Z. YAN, U. Wisc.-Madison, J.C. DEBOO, K.H. BURRELL, C.C. PETTY, GA, D. MIKKELSEN, PPPL — The progress in rigorously testing gyrokinetic turbulence simulations through a series of carefully designed experiments is described. A unique array of multi-field, multi-scale turbulence diagnostics is utilized, including new measurements of TEM-scale $\tilde{n}$, turbulence flows, $\tilde{n}_e - \tilde{T}_e$ crossphase, as well as previously available ITG and ETG scale $\tilde{n}$ and low-k $\tilde{T}_e$. Turbulence and transport response to T_e/T_i was quantified for QH-mode, low-rotation Hybrid H-mode, and L-mode cases. Little variation with T_e/T_i of low-k through high-k $\tilde{n}$ was found in L-mode; however, $\tilde{T}_e$ varied strongly. In contrast, low-k $\tilde{n}$ increased substantially with T_e/T_i in the Hybrid H-mode. These and other measurements, including particle transport via gas puff modulation, will be compared to linear and nonlinear gyrokinetic simulations.

[1]Work supported by US DOE under DE-FG02-08ER54984, DE-FG02-07ER54917, DE-FC02-99ER545412, DE-FG02-08ER54999, DE-FC02-04ER54698, and DE-AC02-09CH11466.

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Date submitted: 19 Jul 2010 Electronic form version 1.4