Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Validating gyrokinetic simulations of plasma turbulence in the Texas Helimak[1] TESS BERNARD, ORAU, General Atomics, ERIC SHI, LLNL, MANAURE FRANCISQUEZ, MIT, KENNETH GENTLE, Univ of Texas, Austin, AMMAR HAKIM, GREGORY HAMMETT, PPPL, NOAH MANDELL, Princeton Univ, TIMOTHY STOLTZFUS-DUECK, PPPL, EDWARD TAYLOR, Univ of Texas, Austin — Using the computational plasma framework Gkeyll, we present the first continuum gyrokinetic simulations of plasma turbulence in the Texas Helimak, a simple magnetized torus experiment [1,2]. The device has features similar to the scrape-off layer region of tokamaks, such as bad-curvature-driven instabilities and sheath boundary conditions, which we include in our model. A bias voltage can be applied across conducting plates to drive $E \times B$ flow and study the effect of velocity shear on turbulence suppression. We performed simulations of grounded and limiter-biased scenarios, which produced equilibrium profiles and fluctuation amplitudes that approach experimental values. Comparison with experimental data also illustrated some important quantitative differences, and we discuss how including additional physical and geometric effects in our model improves agreement with experiment. [1] Bernard et al., PoP 26(4), 042301 (2019). [2] Bernard, UT Austin PhD thesis (2019).

[1]Supported by US DOE contracts DE-SC0014664, DE-FG02-04ER-54742 and DE-AC02-09CH11466.

Tess Bernard
ORAU, General Atomics

Date submitted: 03 Jul 2019 Electronic form version 1.4