



Contribution ID: 735

Type: **Poster**

## Exploring the Regime of Validity of Global Gyrokinetic Simulations with Spherical Tokamak Plasmas

*Wednesday, 19 October 2016 14:00 (4h 45m)*

Plasma turbulence is considered one of the main mechanisms for driving anomalous thermal transport in magnetic confinement fusion devices. Based on first-principle model, gradient-driven gyrokinetic simulations have often been used to explain turbulence-driven transport in present fusion devices, and in fact, many present predictive codes are based on the assumption that turbulence is gradient-driven. However, using the electrostatic global particle-in-cell Gyrokinetic Tokamak Simulation (GTS) code [1], we will show that while global gradient-driven gyrokinetic simulations provide decent agreement in ion thermal transport with a set of NBI-heated NSTX H-mode plasmas, they are not able to explain observed electron thermal transport variation in a set of RF-heated L-mode plasmas, where a factor of 2 decrease in electron heat flux is observed after the cessation of RF heating. Thus, identifying the regime of validity of the gradient-driven assumption is essential for first-principle gyrokinetic simulation. This understanding will help us more confidently predict the confinement performance of ITER and future magnetic confinement devices. The work is supported by DOE and computational resource is provided by NERSC.

[1] W.X. Wang et al., Phys. Plasmas 17, 072511 (2010)

### Paper Number

EX/P4-35

### Country or International Organization

USA

**Primary author:** Dr REN, Yang (Princeton Plasma Physics Laboratory)

**Co-authors:** Dr LEBLANC, BENOIT (PRINCETON PLASMA PHYSICS LABORATORY); Dr DOMIER, Calvin (UNIVERSITY OF CALIFORNIA AT DAVIS); Dr SMITH, David (University of Wisconsin-Madison); Dr MAZ-ZUCATO, ERNESTO (PRINCETON PLASMA PHYSICS LABORATORY); Dr YUH, Howard (NOVA PHOTONICS, INC.); Dr BELL, RONALD (PRINCETON PLASMA PHYSICS LABORATORY); Dr KAYE, Stanley (Princeton Plasma Physics Laboratory, Princeton University, Princeton NJ, 08543 USA); Dr ETHIER, Stephane (princeton plasma physics laboratory); Dr GUTTENFELDER, Walter (Princeton Plasma Physics Laboratory); Dr WANG, Weixing Wang (Princeton University Plasma Physics Laboratory)

**Presenter:** Dr REN, Yang (Princeton Plasma Physics Laboratory)

**Session Classification:** Poster 4

**Track Classification:** EXW - Magnetic Confinement Experiments: Wave-plasma interactions; current drive; heating; energetic particles