

Experimental Study of Parametric Dependence of Electron-gyro Scale Turbulence on NSTX

- **First observation of density gradient stabilization of electron-gyro scale turbulence (Ren *et al.*, PRL 2011)**
 - Large density gradient increase induced by an ELM event
 - Density gradient stabilization most effective at $k_{\perp}\rho_s \lesssim 10$
 - A factor of two decrease in effective thermal diffusivity after the ELM event
 - Quantitative agreements with linear gyrokinetic stability analysis for ETG modes
 - Linear gyrokinetic stability analysis for low-k instability has been performed
 - TRANSP and Irdfit analysis performed
- **Collisionality dependence of electron-gyro scale turbulence**
 - More than a factor of two change in collisionality achieved
 - Local ρ_e , β_e , n_e and q_{95} kept approximately constant
 - Turbulence spectral power decreased as collisionality increases
 - ETG mode is calculated to be unstable from linear gyrokinetic stability analysis
 - Linear gyrokinetic stability analysis for low-k instability has been performed
 - TRANSP and Irdfit analysis performed

What else is Needed for the Talk

- **First observation of density gradient stabilization of electron-gyro scale turbulence**
 - Nonlinear GYRO simulations (help needed from Walter Guttenfelder)
 - ITG-TEM simulations before and after the ELM event
 - To see whether low-k turbulence is suppressed by experimental ExB shear
 - ETG simulations before and after the ELM event
 - Consistent with experimental observation of k spectrum change?
 - Several radial locations if possible
 - BES measurement (help needed from Dave Smith)
 - Any low-k turbulence present?
- **Collisionality dependence of electron-gyro scale turbulence**
 - Nonlinear GYRO simulations (help needed from Walter Guttenfelder)
 - ITG-TEM simulations with experimental ExB shear at low and high collisionality
 - To assess the role of low-k turbulence in transport
 - ETG simulations with a scan in collisionality
 - To assess how collisionality changes ETG spectrum and ETG-driven electron thermal transport
 - BES measurement (help needed from Dave Smith)
 - Any low-k turbulence present?