

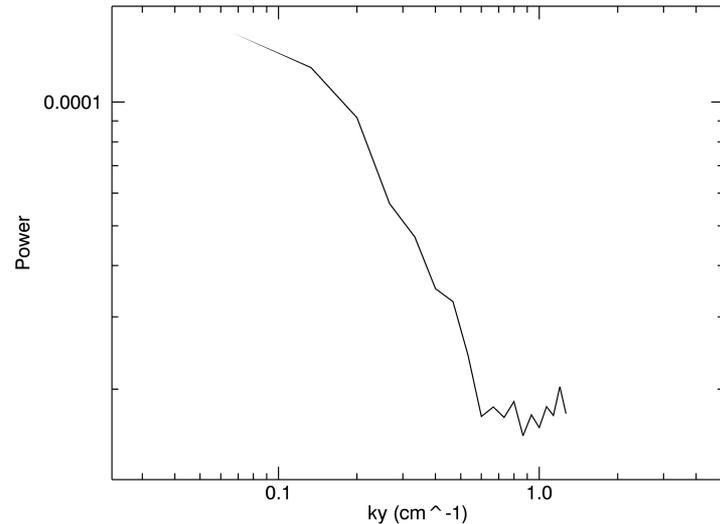
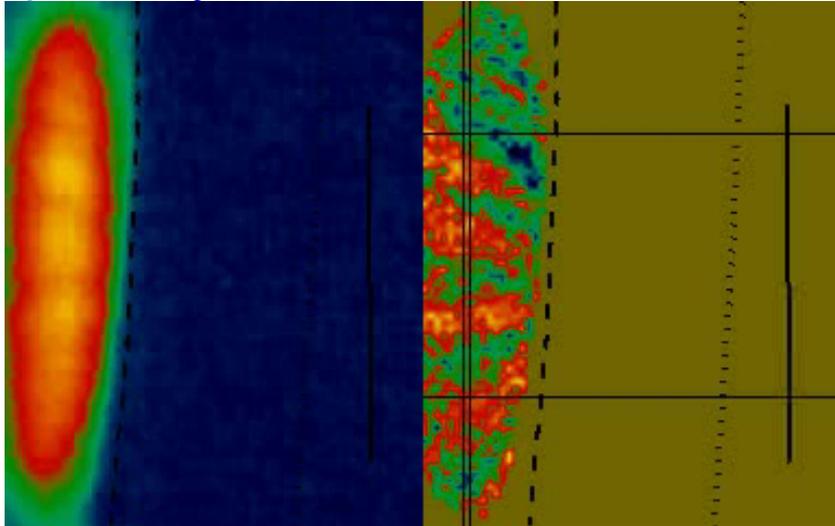
Investigating small-scale edge turbulence with GPI

Noah Mandell, Stewart Zweben, Walter Guttenfelder,
Yang Ren, Steve Sabbagh

NSTX T&T Forum 2015
2/25/2015

Motivation & GPI Optics Upgrades

- 2010 GPI data included shots that showed small-scale (sub-cm) structure → consistent with ETG turbulence
- Zoom optics upgrade will allow 2-3x zoom to enhance spatial resolution of optics so that ~2-3mm structure can be resolved
- Other upgrades to fiber bundle, etc will allow better signal-to-noise ratio, possibly faster frame rate for movies



Shot 139955, t=365.9-366.1 ms (80 frames)

Experiment Goals

- Measure fluctuation (w,k) spectra of edge turbulence from GPI movies made using new magnifying zoom lens
- Examine how edge turbulence changes with ∇T_e , ∇n_e near separatrix
- Compare with theory (Guttenfelder) and other diagnostics (e.g. high-k scattering, Ren) to assess whether observed fluctuations are characteristic of ETG turbulence or other theorized modes
- Determine role of turbulence in stiff T_e profiles near separatrix (as suggested by Canik et al, 2011)

Plasma Conditions

- Calibration: Require scans of B_T or I_P to align local B field with GPI optical view to optimize small-scale resolution, guided by EFIT (Sabbagh)
- This will require 5-10 dedicated shots (~2 hours), with GPI gas puffing. Could be an XMP.
- Main experiment: H-mode, with and without Lithium wall conditioning
- With lithium, density gradient is weakened and ETG is predicted to be more unstable in pedestal (Canik et al)
- Can piggy-back on other XPs for additional data as allowed