Turbulence &Transport Measurement via High-k and FIReTIP

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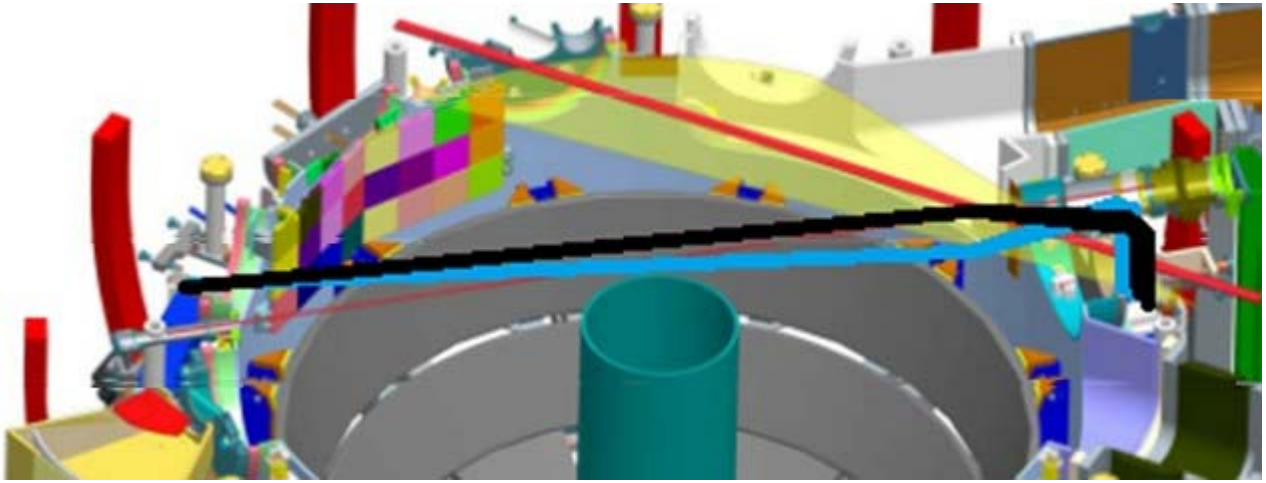
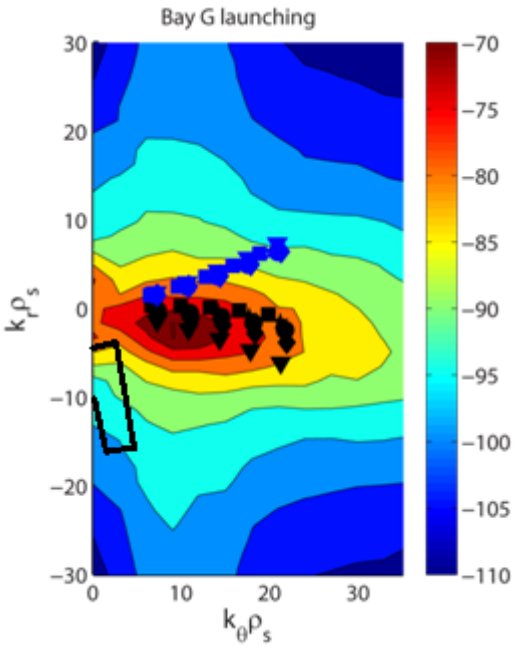
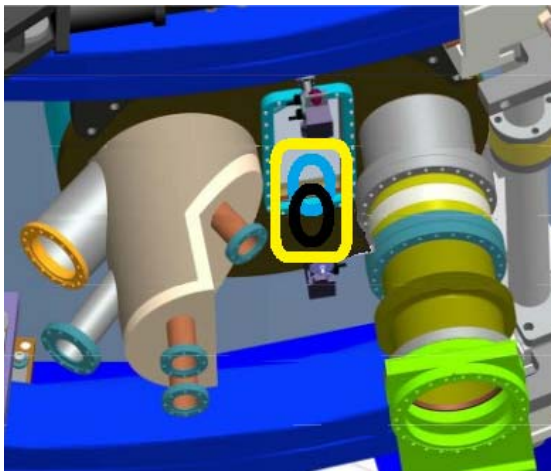




- 600 GHz FIR laser launched from Bay G as the probe beam (CO_2 laser pumped FIR laser)
- Scattered beams are collected through a collection mirror at Bay L
- 2D wavenumber spectra measured with two scattering schemes: ETG, k_θ/k_r scan
- Target scattering system performance:
  - **5-8 channels of heterodyne receiver: Wave propagation direction resolved**
  - **k resolution and *range*: 2-5 cm^{-1} and 10-30 cm^{-1}**
  - **Radial resolution: 2-6 cm**
  - **Radial range: R>=110 cm**
  - **Minimal detectable density fluctuation: similar to the present high-k scattering system**



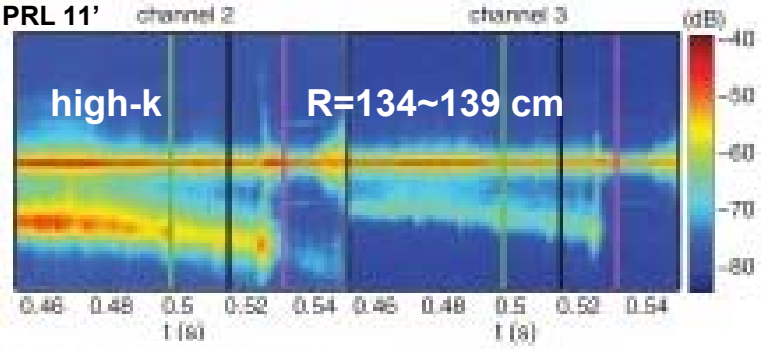
T &T Measurement via High-k Scattering & FIReTIP

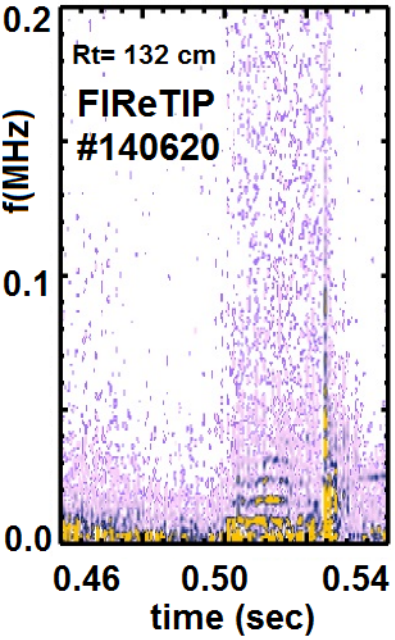
key words of 5 year T&T plan ⇨

- Measurement of low-k & high-k turbulence, reduced v*, higher Ip & B_T
- Understanding turbulence, global confinement, diffusivity, ST
- Determining dominant instability e-/i- transport, support FNSF/Pilot , PMI, ITER

ETG, ITG, TEM, ZF, GCS, ExB shear etc..

Y.Ren,*etc.*
PRL 11'





- High-k measured ETG suppression after ELM (by grad n_e)
- FIReTIP fluctuation showed suppression with different spectrum. other ex) EPH-mode, L/H transition, ELM rotation, GCS induced diffusion
- FIReTIP II: 4 MHz band width, two color edge density measurement, enhanced resolution.
- High-k/FIReTIP upgrade : new high-k source, optics fabrication, relocation , etc. (~ 2 years)

Back up on schedule

time	tasks
now ~ 2. 2012	1. set up new CO2 laser/ FIR laser for 600GHz high-k source 2. design new high-k optics and support framework
first year (3.2012 ~ 2.2013)	1. purchase high-k local oscillator (solid state multiplier source and subharmonic mixers) 2. fabricate high-k collection optics 3. set up new high-k in UCD lab 4. fabricate new Stark-tuned FIR for FIReTIP 5. design new FIReTIP optics
second year (3.2013~ 2.2014)	1. fabricate FIReTIP system in UCD and ship to PPPL 2. purchase new waveguide detector for sensitivity improvement 3. install FIReTIP on NSTX 4. install high-k on NSTX

estimated cost : $375k/y