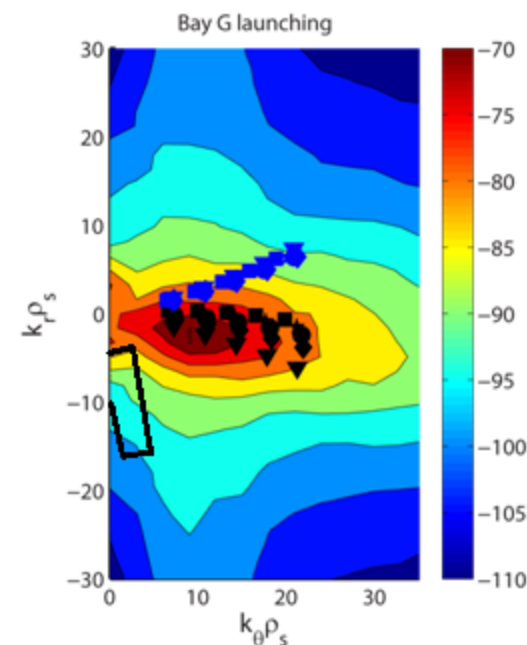
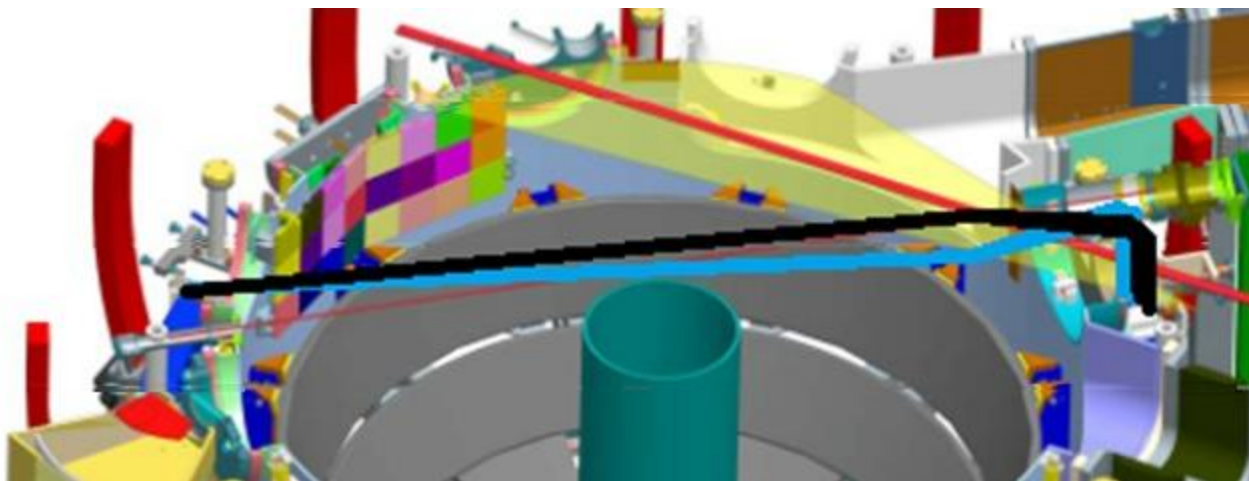


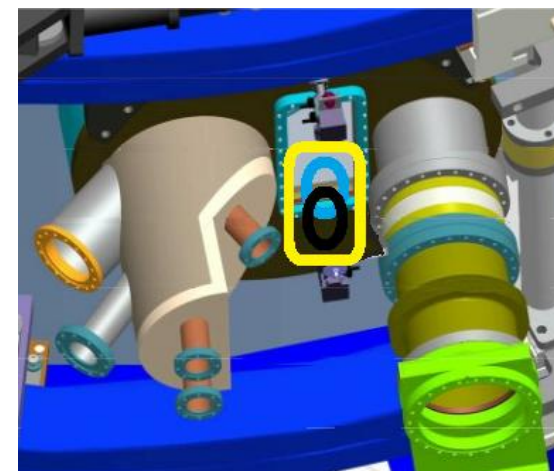
Turbulence & Transport Measurement via High-k and

FIReTIP

K.C. Lee, Y. Ren, C.W. Domier, UC Davis/NSTX research team

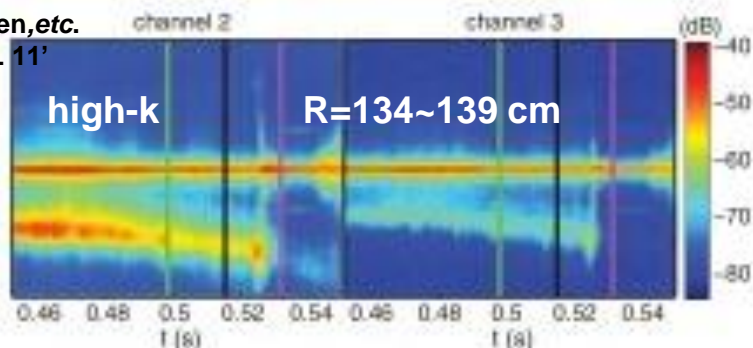


- 600 GHz FIR laser launched from Bay G as the probe beam (CO₂ laser pumped FIR laser)
- Scattered beams are collected through a collection mirror at Bay L
- 2D wavenumber spectra measured with two scattering schemes: ETG, k_θ/k_r scan
- Target scattering system performance:
 - 5-8 channels of heterodyne 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: $R \geq 110$ cm
 - Minimal detectable density fluctuation: similar to the present high- k scattering system



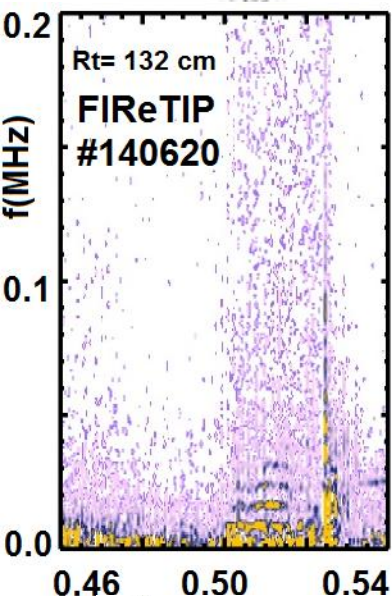
T & T Measurement via High-k Scattering & FIRETIP

Y. Ren, etc.
PRL 117



key words of 5 year T&T plan

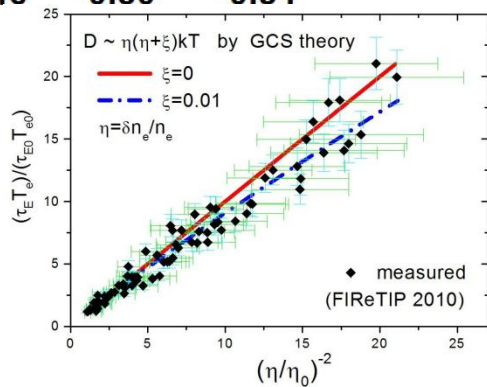
- Measurement of low-k & high-k turbulence, reduced v^* , higher I_p & B_T
- Understanding turbulence, global confinement, diffusivity, ST



- Determining **dominant instability** e-/i-transport, support FNSF/Pilot , PMI, ITER

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

- 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 (+polarimetry) by new detectors.
- High-k/FIRETIP upgrade : new high-k source, optics fabrication, relocation , etc. (~ 2 years)



Back up on schedule

time	tasks
now ~ 2. 2012	<ol style="list-style-type: none">1. set up new CO2 laser/ FIR laser for 600GHz high-k source2. design new high-k optics and support framework
first year (3.2012 ~ 2.2013)	<ol style="list-style-type: none">1. purchase high-k local oscillator (solid state multiplier source and subharmonic mixers)2. fabricate high-k collection optics3. set up new high-k in UCD lab4. fabricate new Stark-tuned FIR for FIReTIP5. design new FIReTIP optics
second year (3.2013~ 2.2014)	<ol style="list-style-type: none">1. fabricate FIReTIP system in UCD and ship to PPPL2. purchase new waveguide detector for sensitivity improvement3. install FIReTIP on NSTX4. install high-k on NSTX

estimated cost : \$375k/y