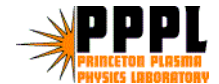


Some Thoughts on Future NSTX Experiments

presented by **T.S. Hahm**

Feb 19, 2007 1

Hahm



Electron Thermal Transport

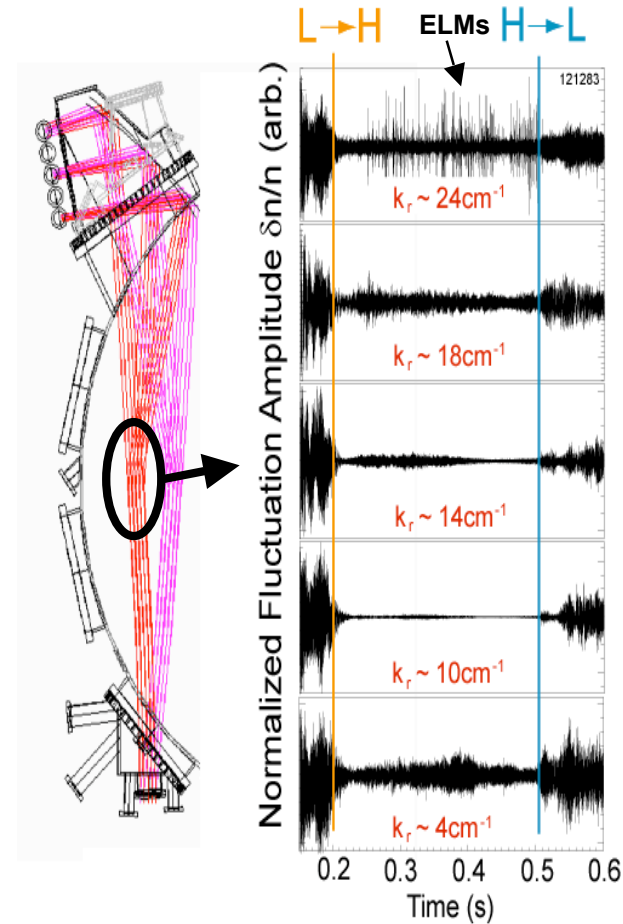
Elucidate possible role of high- k fluctuations in anomalous electron thermal transport

From Core measurements :
pursue identification of TEM, ETG, Micro-tearing, ...
with accompanying gyro-kinetic analyses

From high-B side density fluctuation measurements:
TEM, ETG: strongly Ballooning outside
 μ -tearing: extended along field line

From k_y scan of frequency spectrum
with ExB Doppler correction (MSE, or CHERS):

TEM, ETG: $\omega < \omega_{*n} + \omega_{*Te}$:dispersive
 μ -tearing : $\omega = \omega_{*n} + c \omega_{*Te}$, $c < 1$: less dispersive



H. Park et al.,

Transport Barrier Physics

From HHFW or early NBI expts:

address role of RS, low order rational q (with MSE capability)
look for changes in ambient fluctuations during ITB formation,
explore $T_i \sim T_e$ regime.

RS: TEM reduction due to precession reversal ?

Can e-fishbone (a symptom of precession reversal, eg., Wong) be excited in NSTX ? : High energy electrons in HHFW plasmas $\sim \alpha$ particles in ITER ?
small orbits/machine size, near isotropic distribution function

--> coordination with energetic particle phys. and wave experts:

Elimination of ETG streamers?

Measure high-k fluctuations during ITB formation !

Low Order Rational q :

ZF produced by microturbulence : measure with new diagnostics?

or

by Alfvénic modes? --> coordination with energetic particle phys.

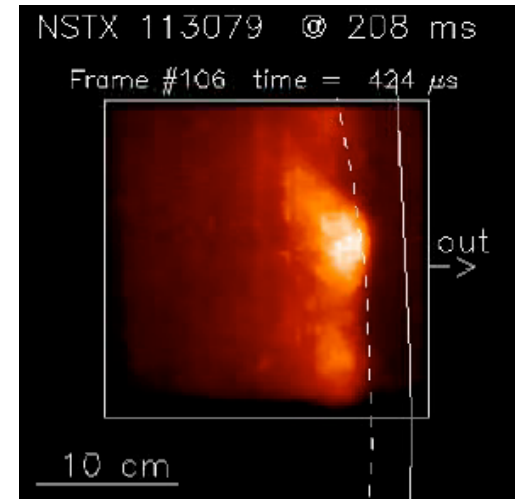
Edge Turbulence

Clarify causal relation with **simultaneous** measurements of turbulence at disparate scales

H-mode usually initiates at outer edge

where larger scale fluctuations including blobs exist (GPI by Zweben et al.) .

Elucidate possible role of high-k fluctuations in residual anomalous electron thermal transport in H-mode plasmas



From probe measurements (eg., Boedo,...),

Calculate the Reynolds stress during L-H transition,

(Let Bruce Scott check it from his simulation)

Further quantify

the observed trend of holes coming inward, and blobs going outward

(~ generic property of a marginal system?)

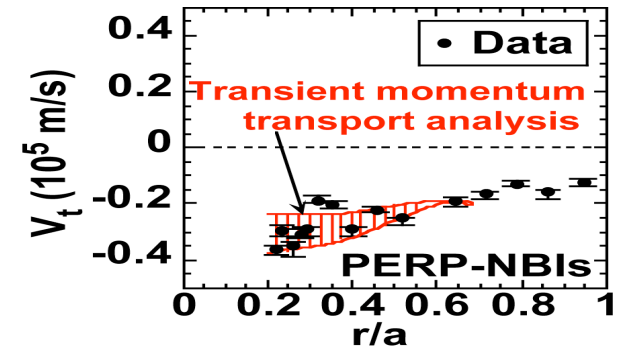
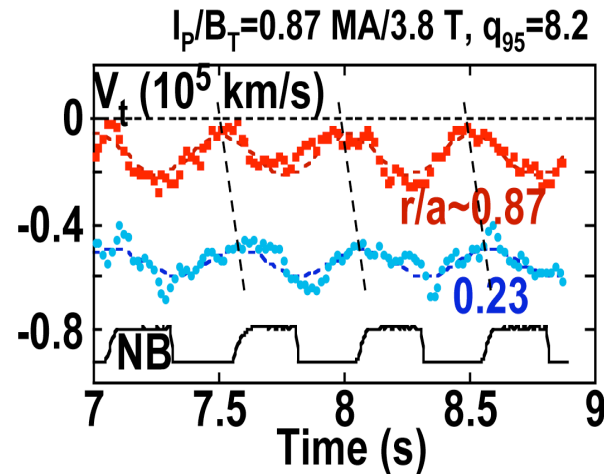
Look for turbulence spreading

(from edge toward core) after H-L back transition.

Perturbed Momentum Transport Experiment

JT-60U

momentum pinch
from perturbative
NBI experiments



Courtesy: M. Yoshida

With excellent diagnostics in **NSTX** (CHERS, MSE) experience from **TFTR**, and theory capabilities (GTC, GTC-Neo, Analytic theory) including SciDAC; **Momentum Transport Study** is an outstanding topic in which **PPPL** should put more effort.

momentum transport diffusivity

