NSTX NOVA PHOTONICS *Supported by* U.S. DEPARTMENT OF ENERGY | Office of Science

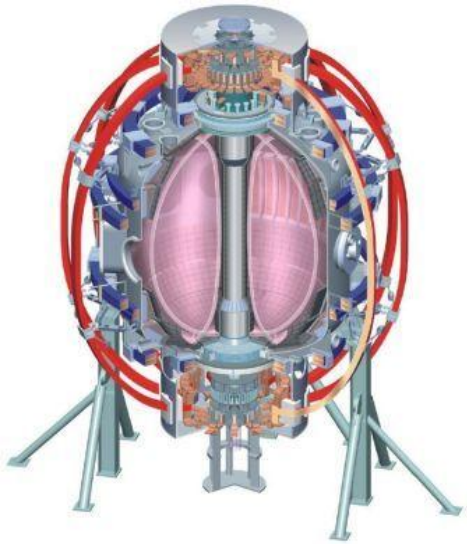
Measurement of residual turbulence in ITBs and explaining high-k bursts

College W&M
Colorado Sch Mines
Columbia U
CompX
General Atomics
INEL
Johns Hopkins U
LANL
LLNL
Lodestar
MIT
Nova Photonics
New York U
Old Dominion U
ORNL
PPPL
PSI
Princeton U
Purdue U
SNL
Think Tank, Inc.
UC Davis
UC Irvine
UCLA
UCSD
U Colorado
U Illinois
U Maryland
U Rochester
U Washington
U Wisconsin

Howard Yuh, Nova Photonics

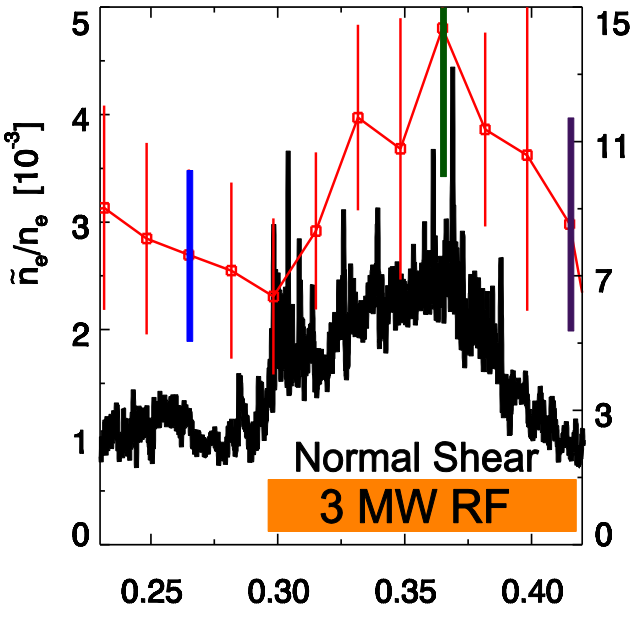
Work supported by US DOE contract nos. DE-AC02-09CH11466 & DE-FG02-99ER54520

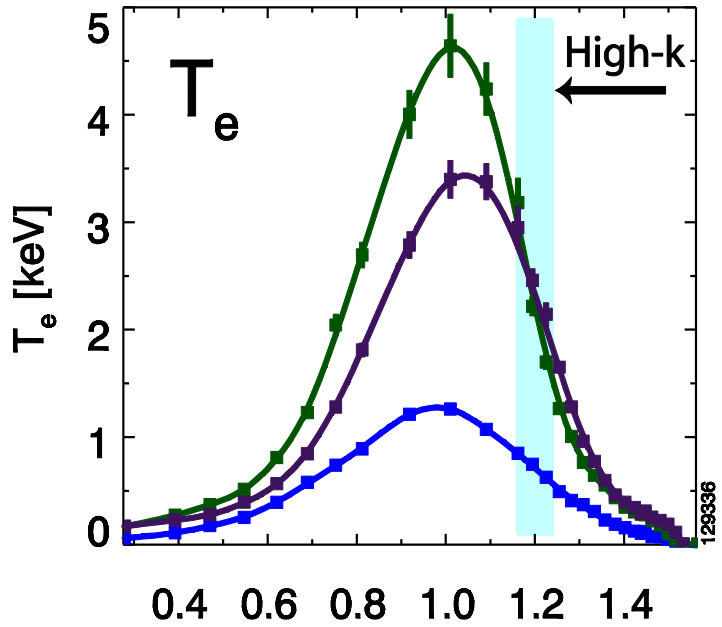
NSTX T&T Group XP review
May 31st, 2011

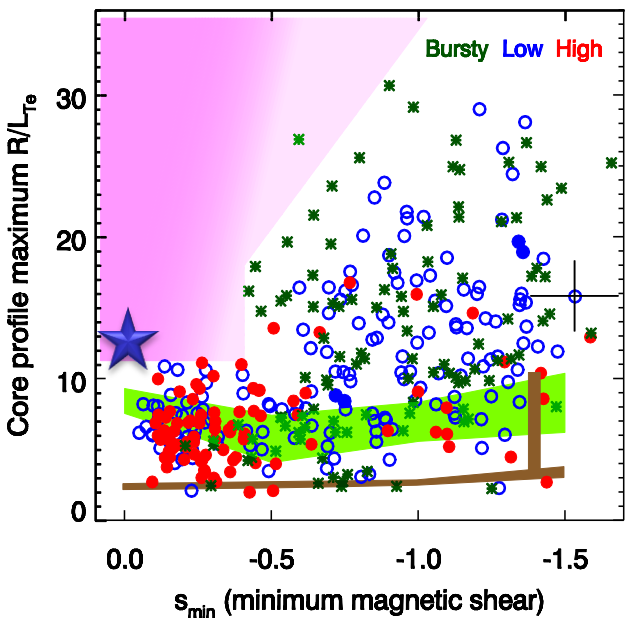


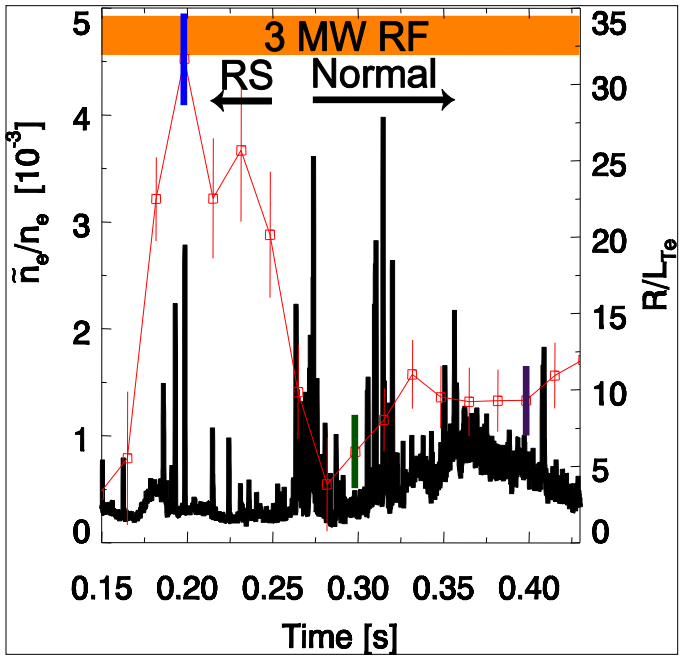
Culham Sci Ctr
U St. Andrews
York U
Chubu U
Fukui U
Hiroshima U
Hyogo U
Kyoto U
Kyushu U
Kyushu Tokai U
NIFS
Niigata U
U Tokyo
JAEA
Hebrew U
Ioffe Inst
RRC Kurchatov Inst
TRINITI
KBSI
KAIST
POSTECH
ASIPP
ENEA, Frascati
CEA, Cadarache
IPP, Jülich
IPP, Garching
ASCR, Czech Rep
U Quebec

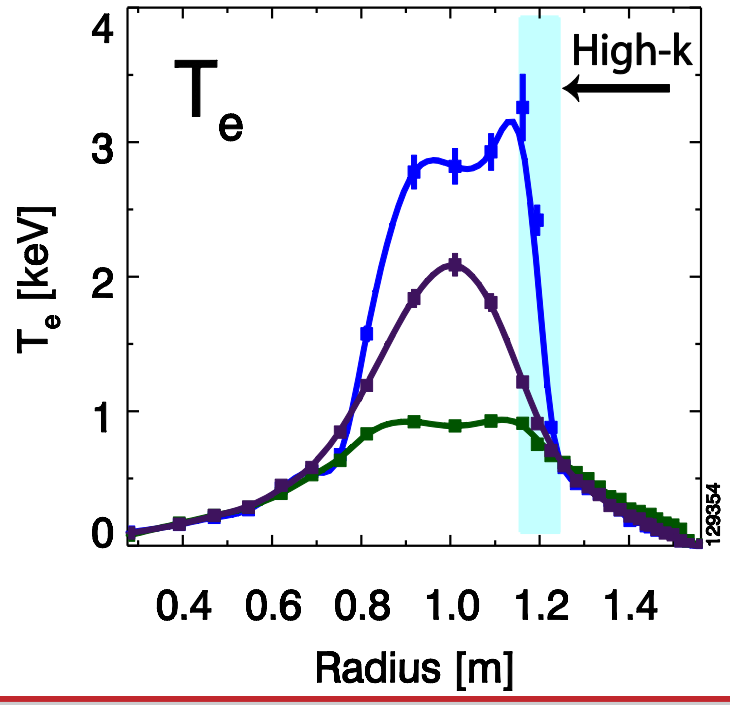
Continuous high amplitude fluctuations limit T_e gradients under normal shear, bursts limit e-ITB

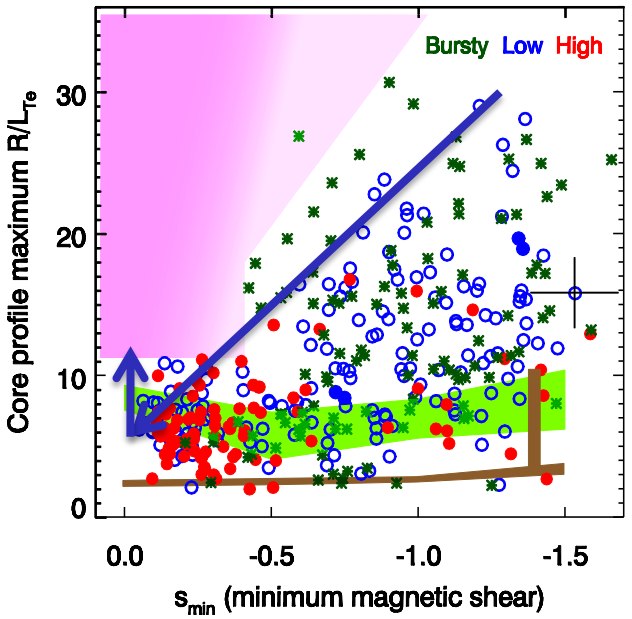




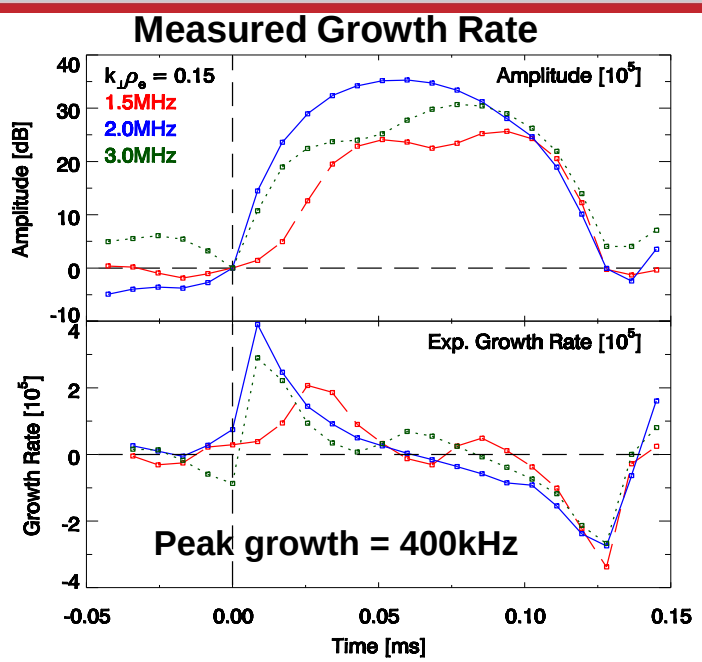




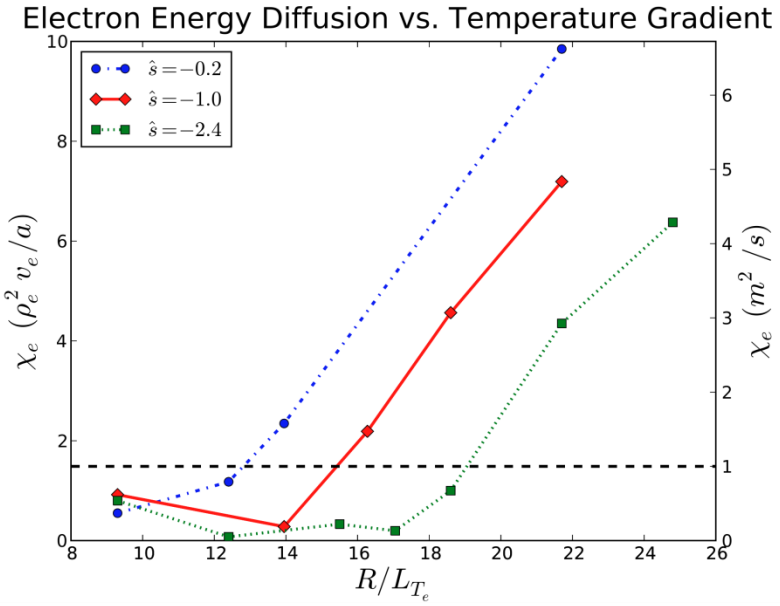


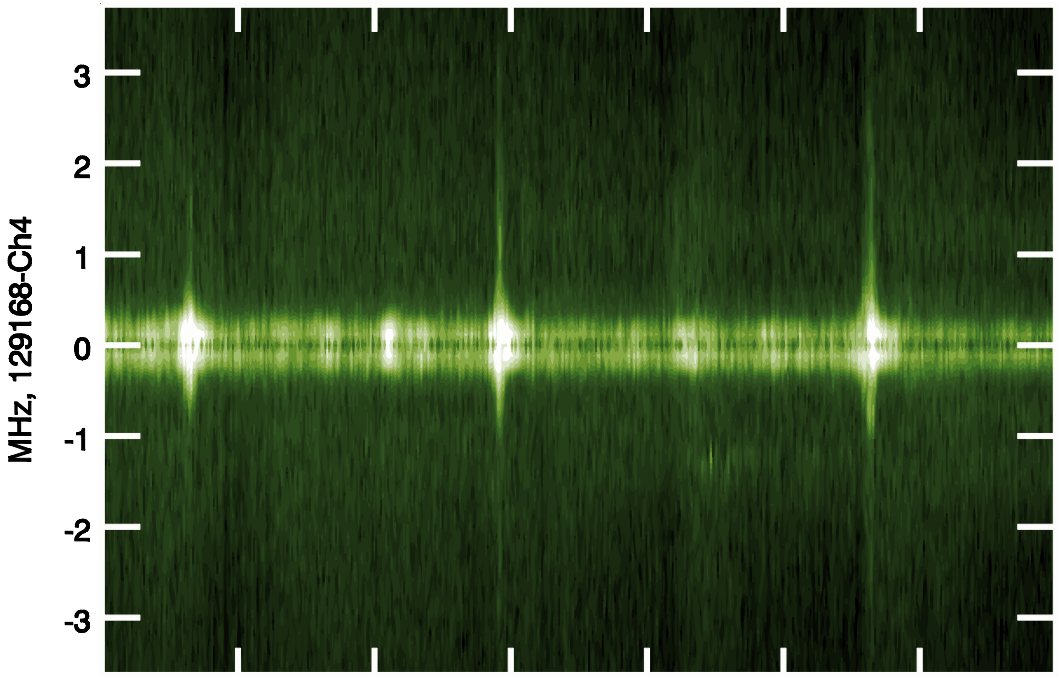


ETG bursts persist even under strong reverse shear at elevated R/L_{Te}

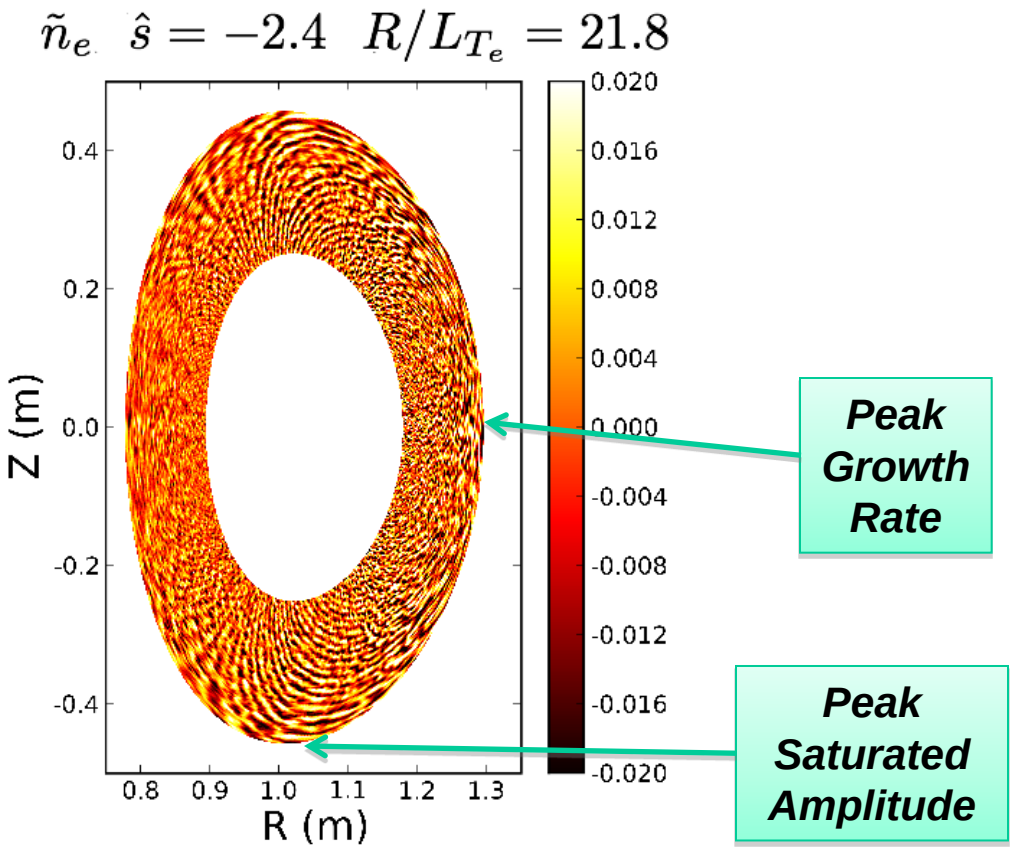


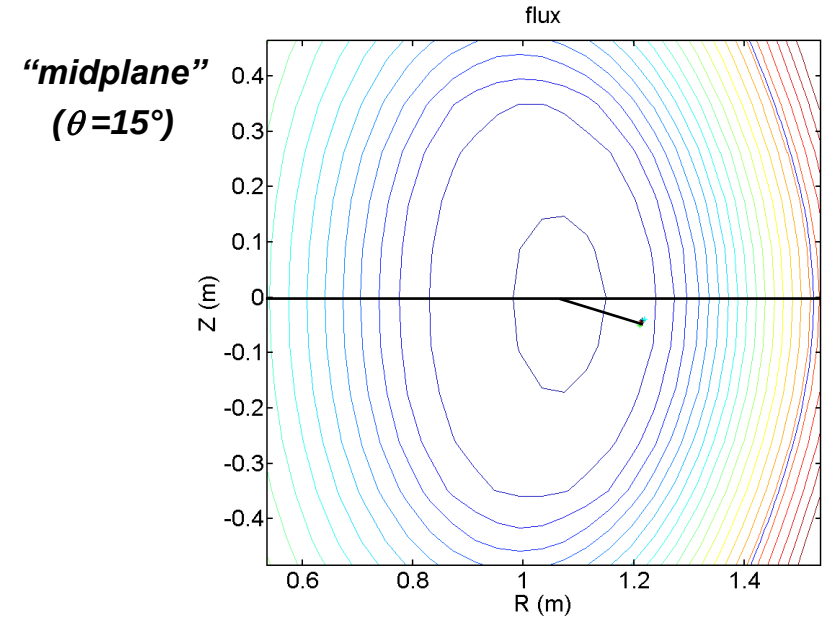
- e-ITBs appear to be limited at an non-linearly upshifted critical gradient
- ETG turbulence structure is simulated to have a strong
- High-k mirrors can be steered to view well below midplane, at approx. 60 deg poloidal angle

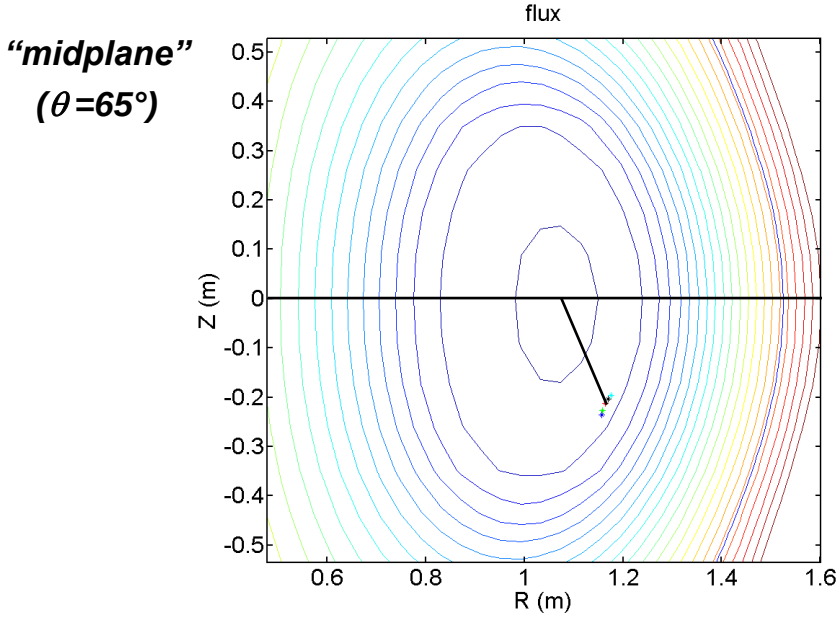




ETG turbulence spectrum changes with poloidal angle, high-k can measure off-midplane

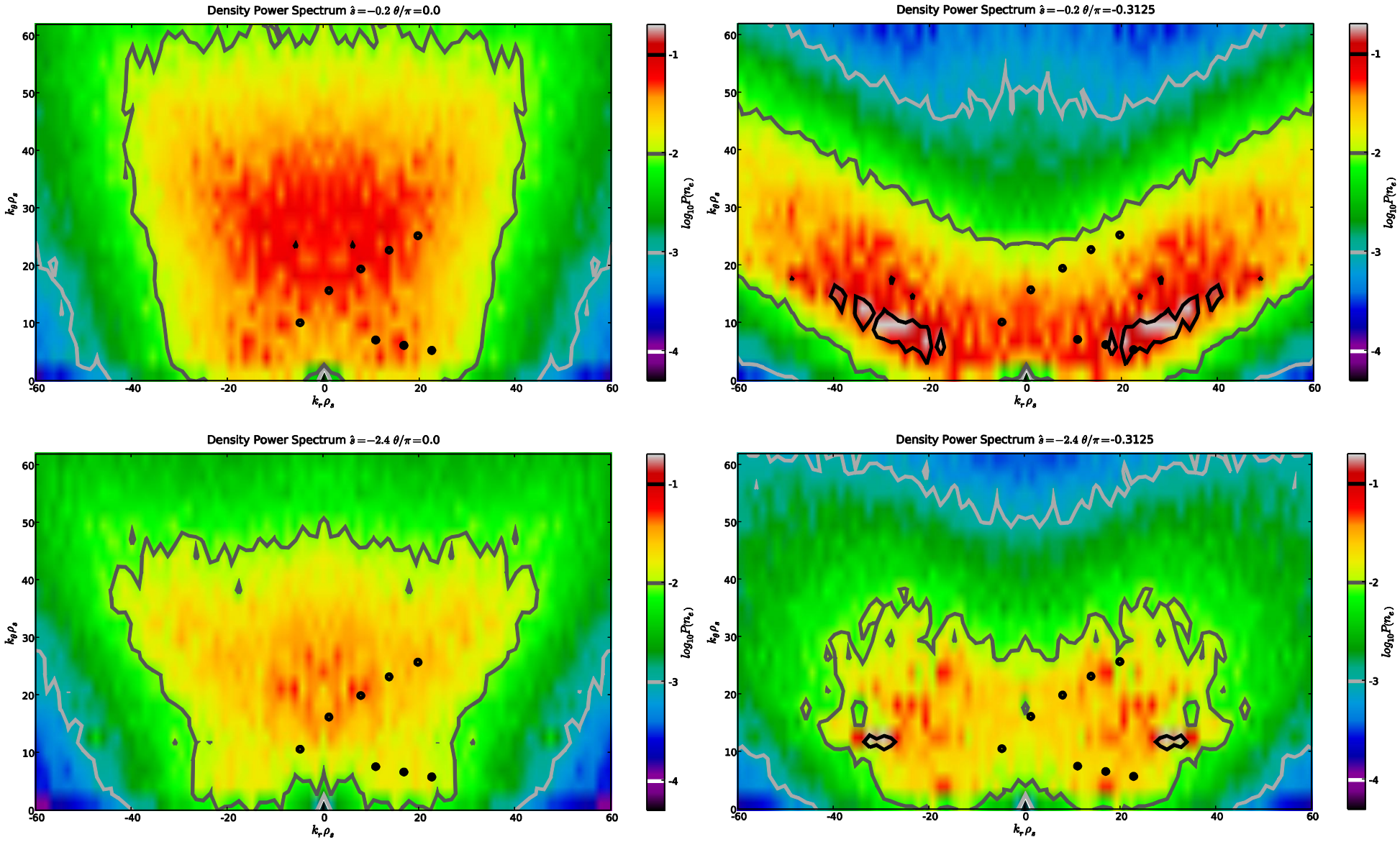






- High-k mirrors can be configured to measure at a significant poloidal angle
- How to distinguish poloidal angle effect vs. k-space?

Simulation contour plots of density fluctuation spectra



Proposed run plan

- 1 half days allocated for XP1067
- Recreate 2008 XP829 e-ITB shots
- High power RF (2MW+) deuterium plasmas
  - NBI-A for MSE if possible (XP829)
  - RF only (XP821) with beam blips if necessary

- High-k starting in off-midplane position
  - Plenty of data at midplane
  - Shot to shot evolution of magnetic shear often occurs at XP start, varies with density
  - Move high-k to midplane. Test cell access necessary.

- 2nd half day will be using high-k at an intermediate poloidal angle to complete scan if 1st half day successful