

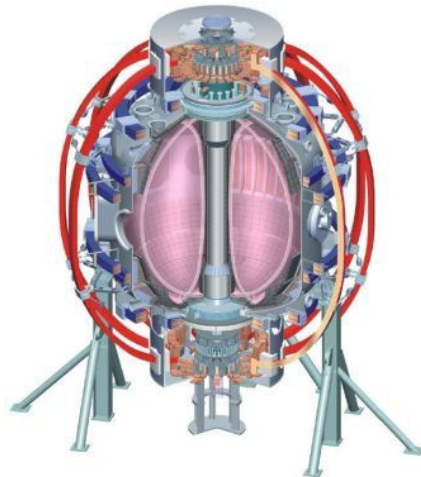
Turbulence and transport measurement on EP H-mode triggered by 3-D field

K.C. Lee, UC Davis

C.W. Domier, N.C. Luhmann, Jr., W-C. Tsai (UC Davis), H.K. Park (POSTECH), R. Maingi(ORNL), Y. Ren, R. Kaita, (PPPL)
and the NSTX Research Team

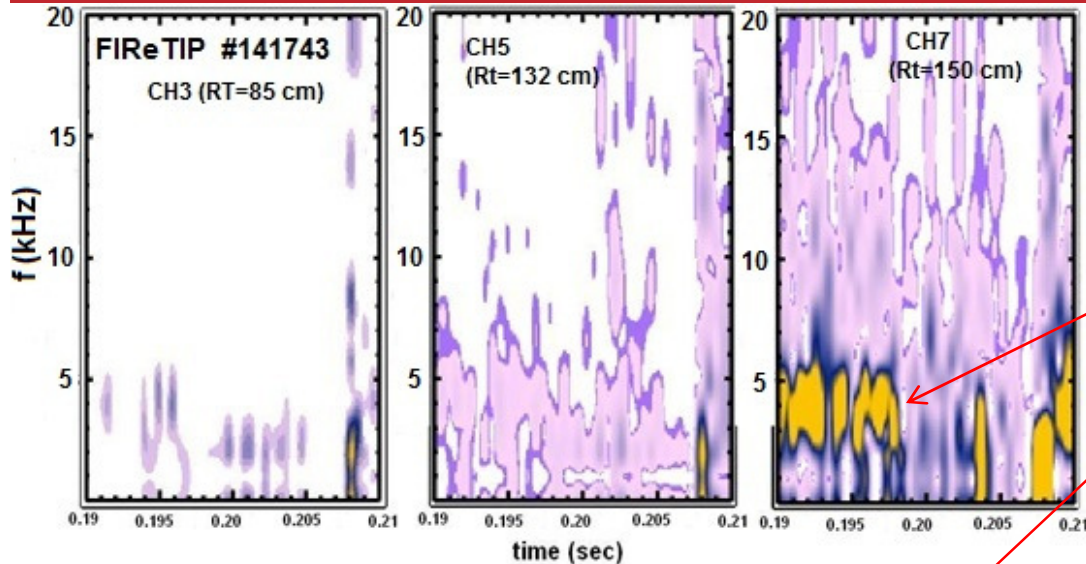
NSTX Research Forum
B318, PPPL
Mar 17, 2011

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



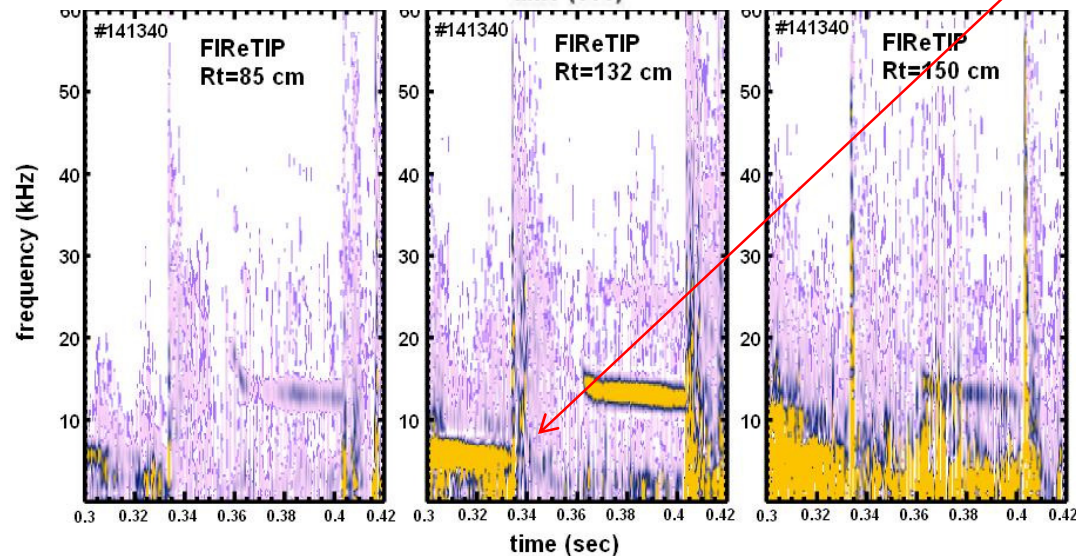
Culham Sci Ctr
U St. Andrews
York U
Chubu U
Fukui U
Hiroshima U
Hyogo U
Kyoto U
Kyushu U
Kyushu Tokai U
NIFS
Niigata U
U Tokyo
JAEA
Hebrew U
Ioffe Inst
RRC Kurchatov Inst
TRINITY
KBSI
KAIST
POSTECH
ASIPP
ENEA, Frascati
CEA, Cadarache
IPP, Jülich
IPP, Garching
ASCR, Czech Rep
U Quebec

Turbulence measurement of EPH-mode by FIREtIP



- FIREtIP n_e fluctuation spectrum
- H-mode vs. EPH-mode

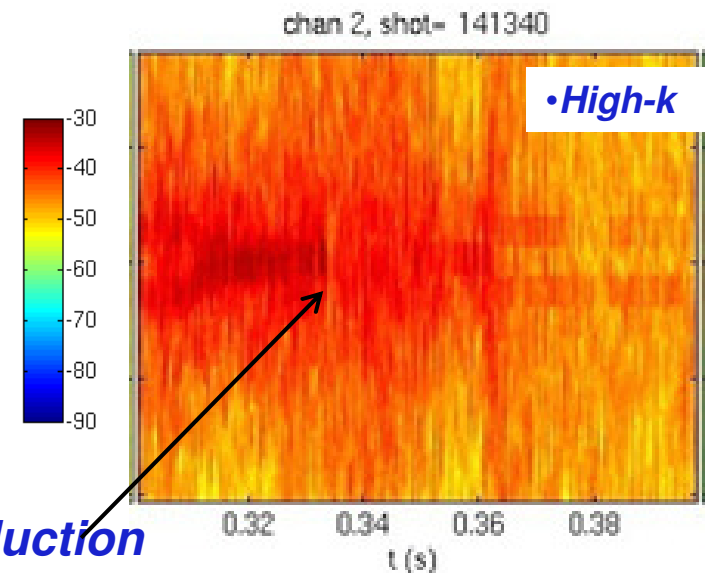
- L\H transition
- EPH- mode transition



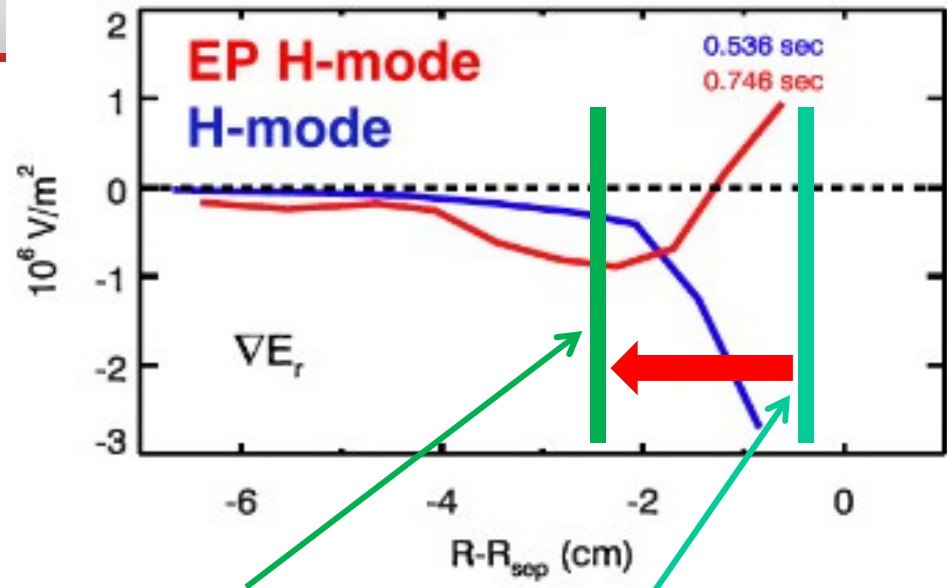
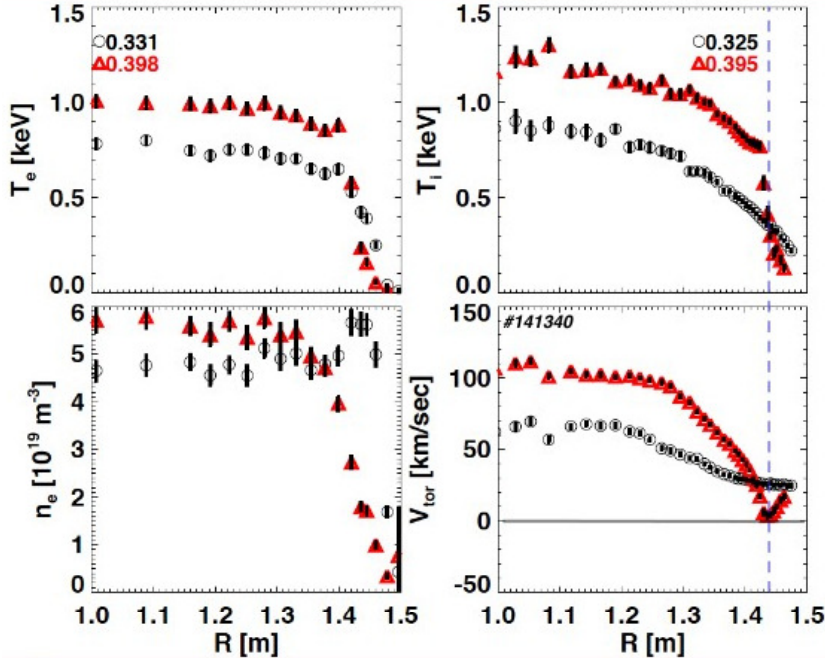
- both reduced fluctuations
- but at different location

• Intensity : magenta < dark blue < yellow

• reduction



► EPH-mode triggered by large ELM either naturally or with external 3D field

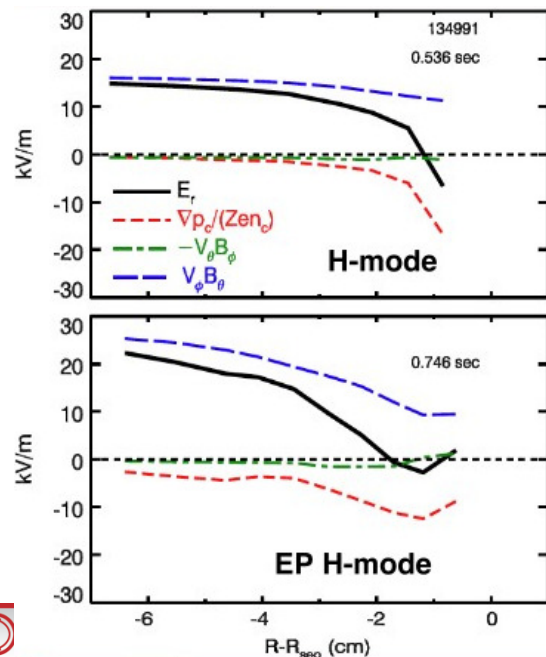


•EPH-mode transport barrier •H-mode transport barrier

► mechanism of turbulence suppression;
ExB shearing? or $\nabla^2 E \rightarrow 0$ by GCS theory

$$Re = \frac{4\epsilon_0}{\pi} \eta^2 \frac{B}{m_i n_i (\sigma_{i-n} n_n)^2 v_{\perp}} \nabla^2 E$$

► n=3 applied field in conjunction with
q=3 coincidence of EPH-mode?



[Maingi et al., PRL, 2010]



Enhanced Pedestal H-mode XP

- ▶ many questions on the mechanism of EPH-mode triggering (by large ELM); ExB shearing, $\nabla^2 E \rightarrow 0$, q-profile, toroidal velocity change, impurity...
- ▶ why density and temperature risings are opposite (very different) to H-mode?

XP1064 (2010) was done using beta-control to extend EPH period.

- attempt EPH-mode access while scanning q-profile
- attempt EPH-mode access while changing the conditions of 3-D field
- 1 day