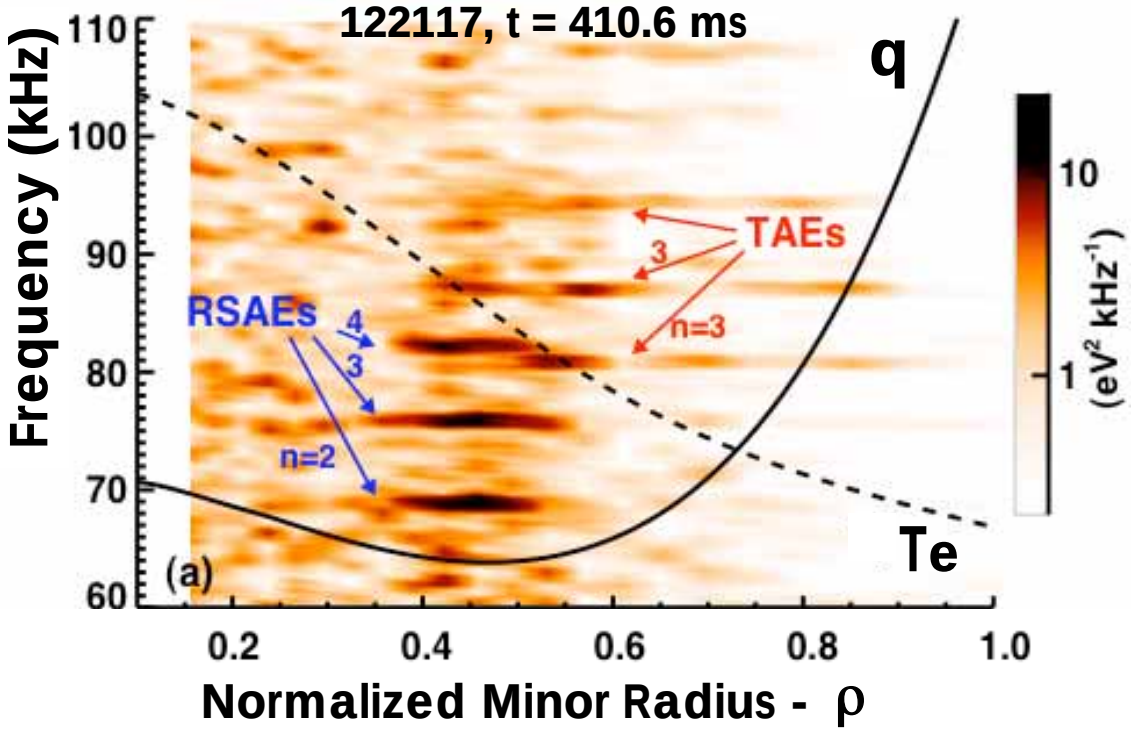
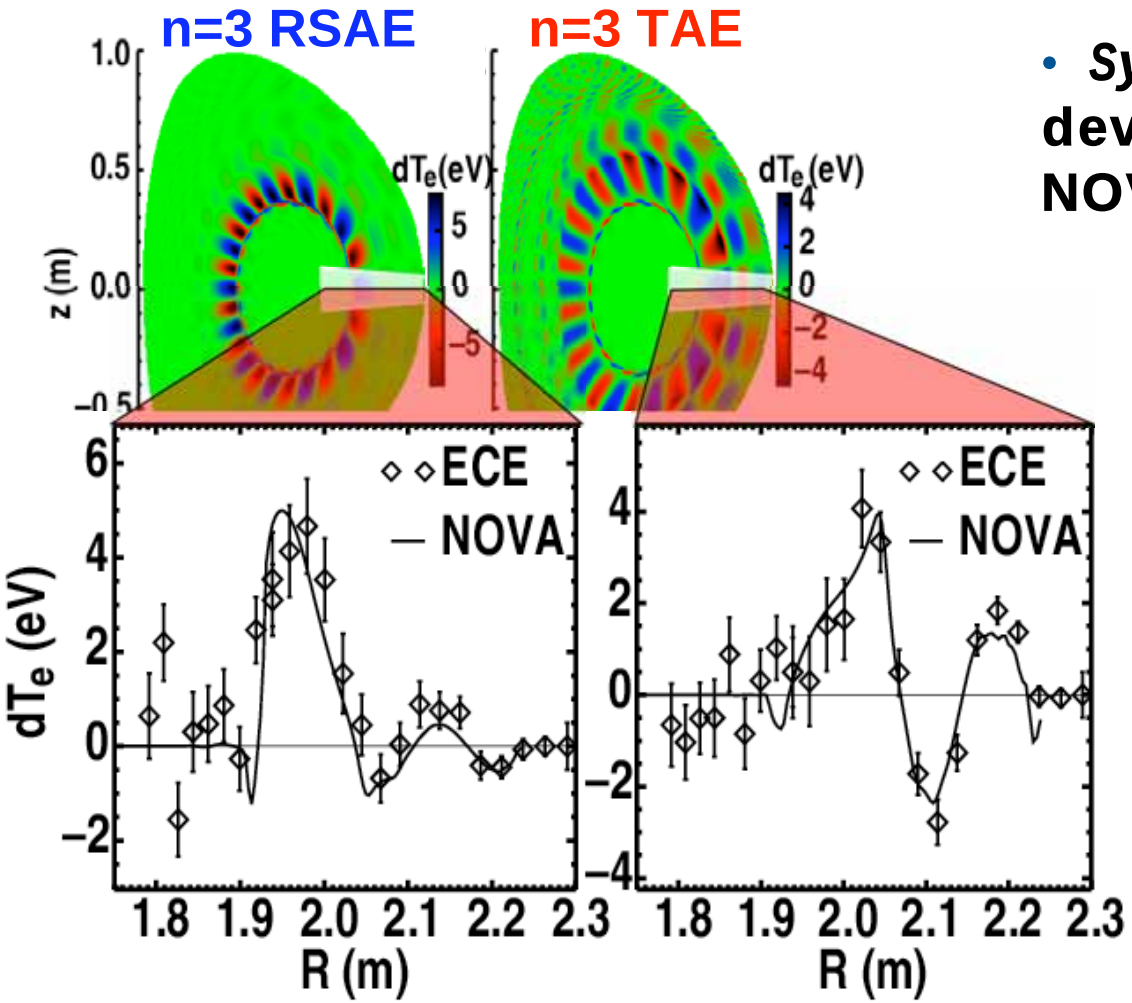
Analysis of ECE Channels Reveals Alfvén Eigenmode (AE) Structure



- RSAEs are peaked near q-min as expected
- TAEs are more global and extend to the edge

Radial profile of ECE radiometer power spectra identifies radial eigenmode structure

NOVA Predicted Electron Temperature Perturbation Structure Agrees Well With ECE Measurements



Van Zeeland PRL 97, 135001 (2006)

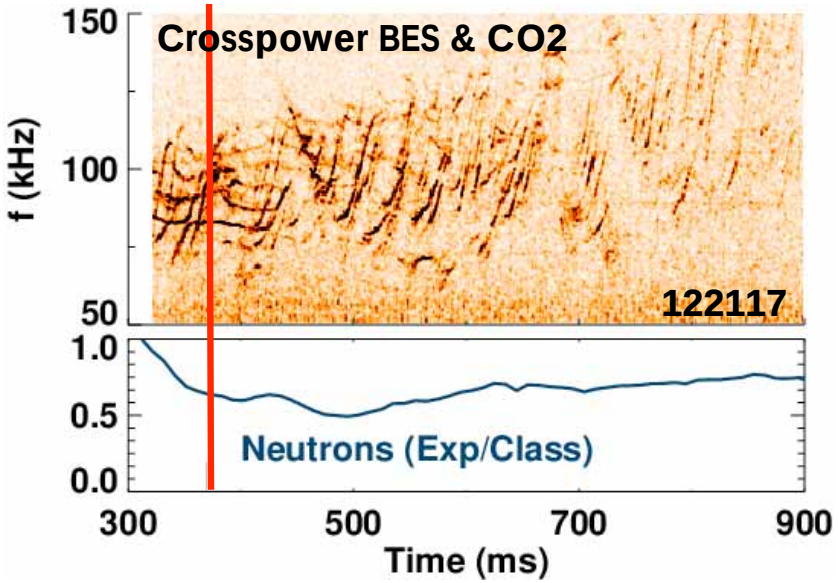
*PPPL

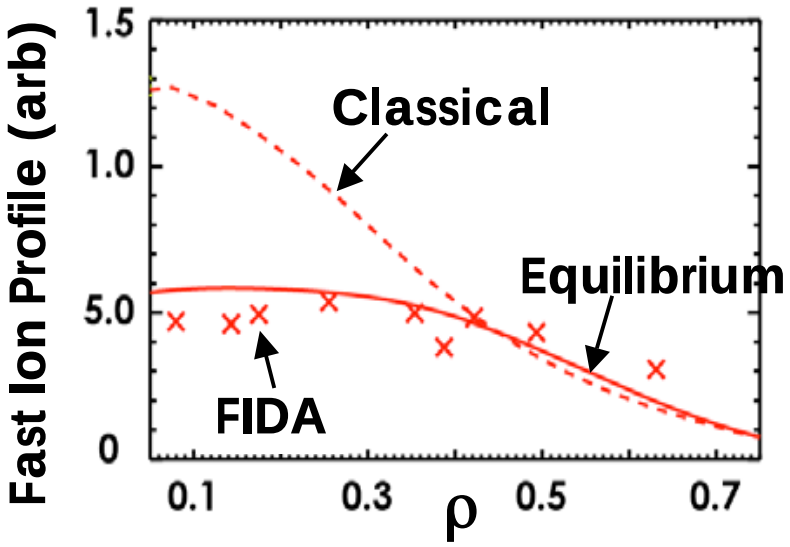
- ***Synthetic Diagnostic*** **developed to compare NOVA* prediction to ECE data**

- **Predicted eigenmode scaled using least squares fit to ECE data**

- **Directly addresses key goal of USBPO -EP topical group: *to benchmark theoretical codes and predictions for eigenmode structure against existing devices***

New Multichannel Dα Measurements Reveal AE Degradation of Fast Ion Confinement in AT plasmas





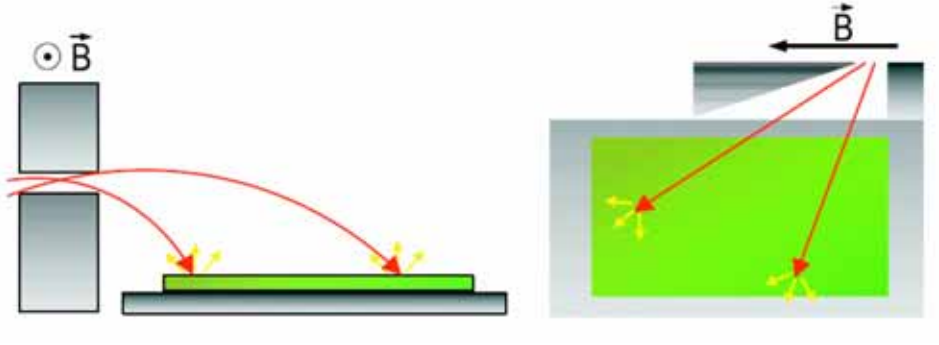
- Upgraded radial FIDA array shows the fast-ion density profile is flattened during periods of strong AE activity
- The fast-ion pressure profile inferred from the equilibrium is also very flat
- The classical profile computed by TRANSP peaks on axis

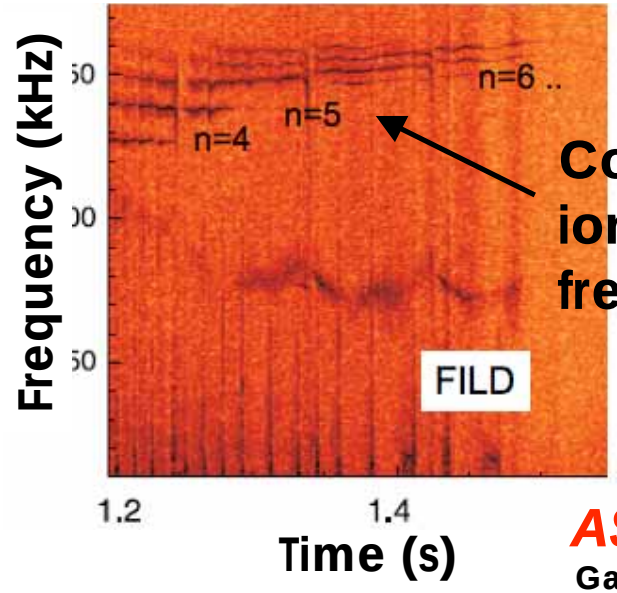
Addresses goals of both USBPO and ITPA : *to measure fast ion transport by beam-driven AEs* (with the further benefit of well diagnosed eigenmodes)

**Heidbrink, PPCF 46 (2004) 1855; Luo, RSI 77 (2006) accepted.*

Future Fast-ion Diagnostic Capabilities Desired for More Detailed Phase-Space Resolution

Pitch-angle resolving loss detector with high bandwidth - *Fast Scintillator*





Coherent fast-ion losses at TAE frequencies

ASDEX

Garcia Muñoz APS (2006)

The current DIII-D FI diagnostics (FIDA, Neutrons, Equilibrium Pressure) measure broad regions of phase space

Local phase-space measurements needed to isolate physics

How can we advance NSTX and DIII-D Research in this area?

- Array of pitch-angle resolving loss detectors on DIII-D to complement FIDA?
  - NPA detectors to back up FIDA data?

- useful internal diagnostics for NSTX?
  - higher resolution spatial measurements, more channels

- Theory gap:
  - No self consistent multimode simulation
  - No good understanding of data, not even close!