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TAE measurements for the validation of the M3D-K code

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U Illinois
U Maryland
U Rochester
U Washington
U Wisconsin*

**M. Podestà, G.-Y. Fu
(and many others)**

NSTX Results Review

December 2010, PPPL

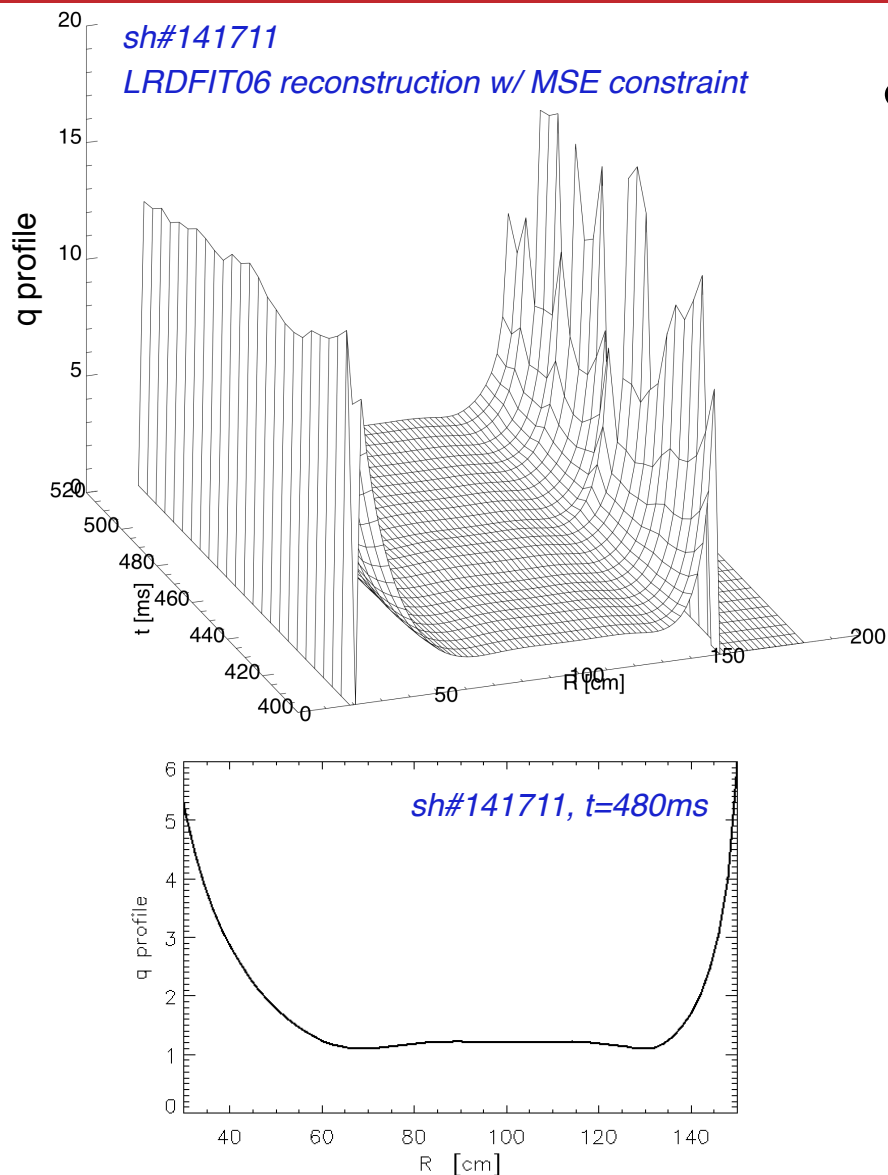
*Culham Sci Ctr
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XP-1015 : collected a complete dataset on TAEs for theory/experiment comparison

- Successful XP run on Oct. 7th, 2010
 - Good “TAE scenario” achieved
 - L-mode, center-stack limited Deuterium plasma
- Diagnostic upgrades resulted in improved measurements of TAE mode structure
 - More reflectometer channels
 - BES (24 channels for XP-1015)
- Now working on input data for simulations of TAEs and fast-ion losses
 - “Best case” shot(s) identified : [shot #141710 \(#141711\)](#)
 - Equilibrium reconstruction done
 - Working on TRANSP runs
 - Plan to benchmark M3D-K (and SPIRAL, others?) against data *soon*

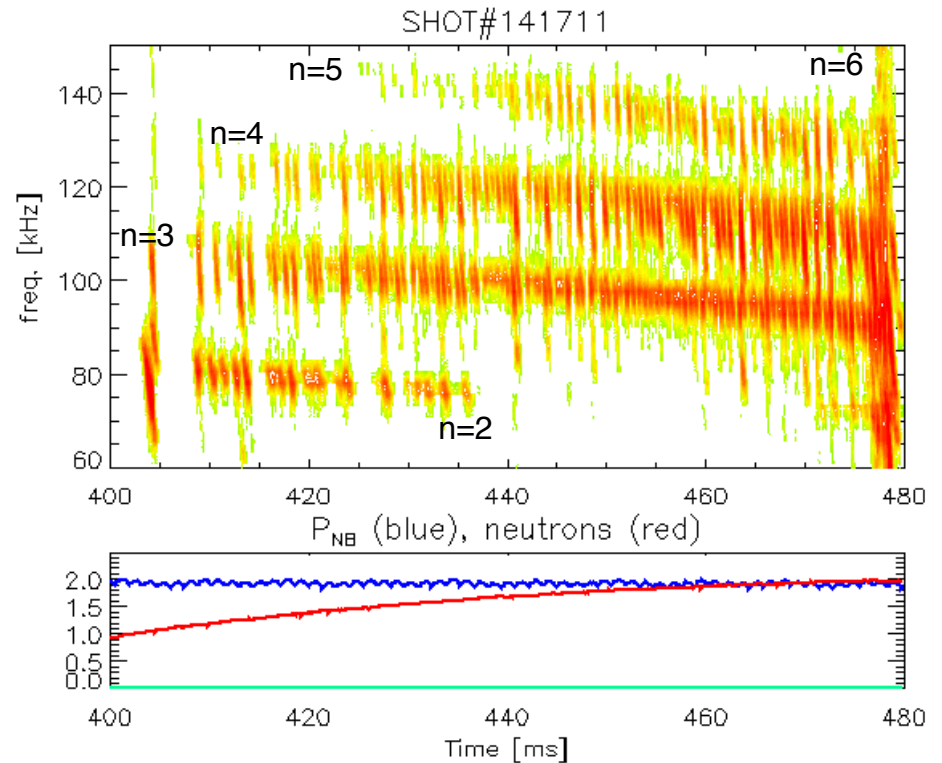
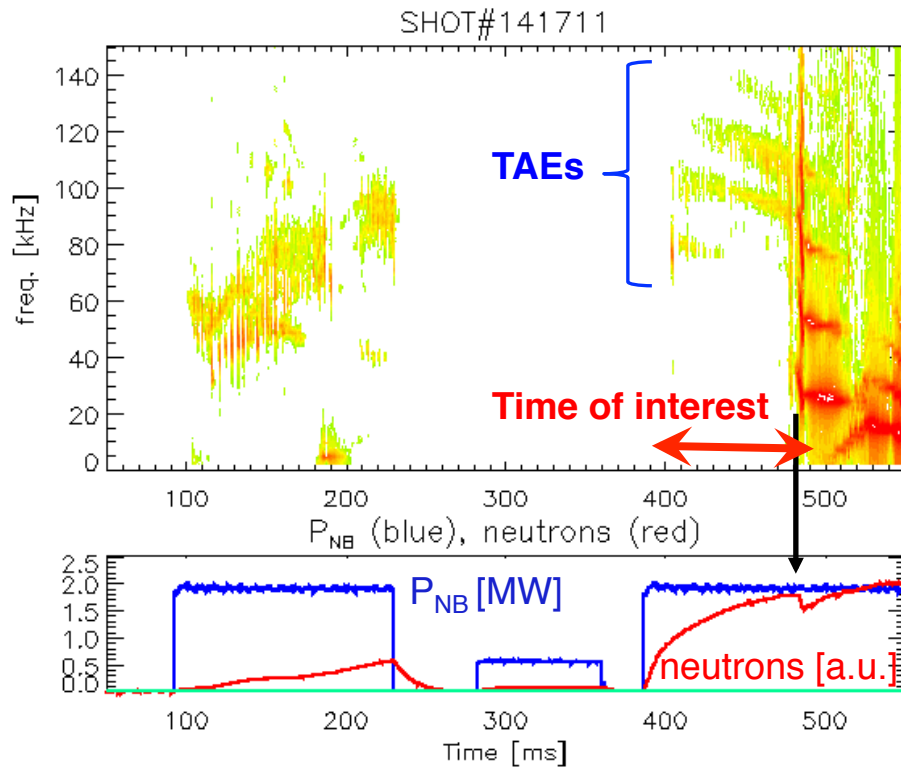
Experimental scenario :

$P_{NB} < 3\text{MW}$, $n_e \sim 3 \times 10^{19} \text{m}^{-3}$, $T_i \sim T_e = 1 - 1.5 \text{keV}$



- NB-heated, L-mode plasmas
 - Plasma limited on center-stack
 - NB power and timing varied to affect mode stability
 - Plasma profiles slowly evolving in time
 - Slightly reversed q profile
 - Safety factor evolution reconstructed through LRDFIT code constrained by MSE data

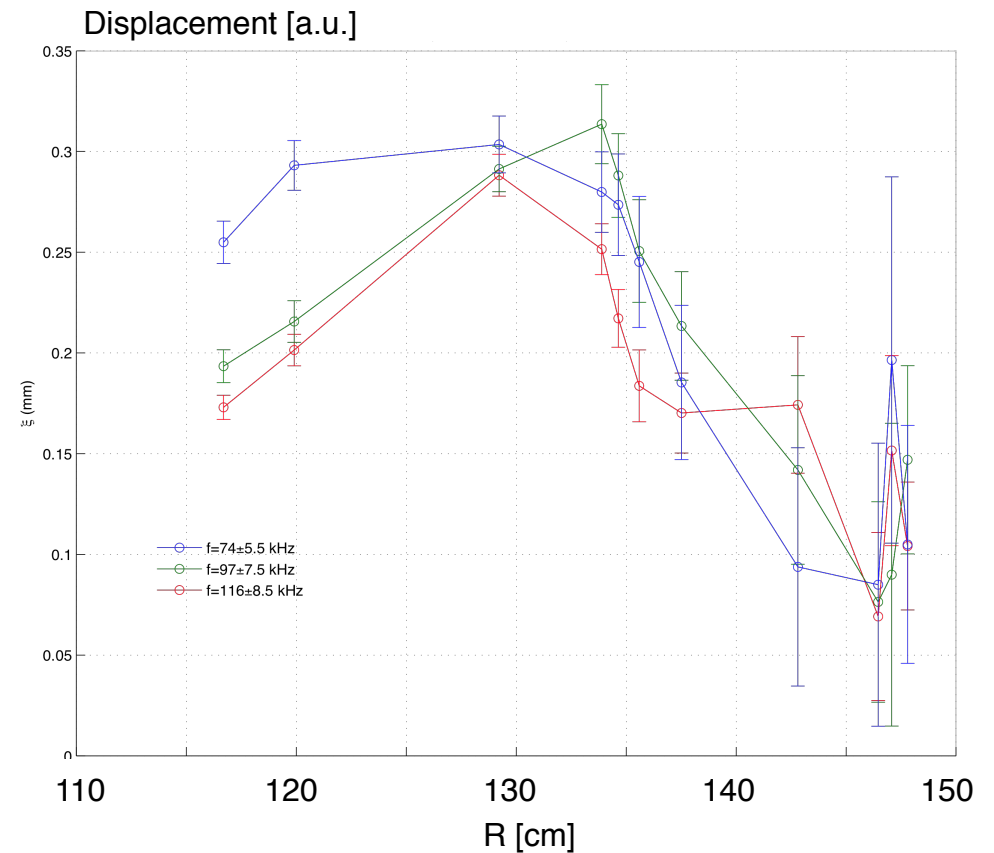
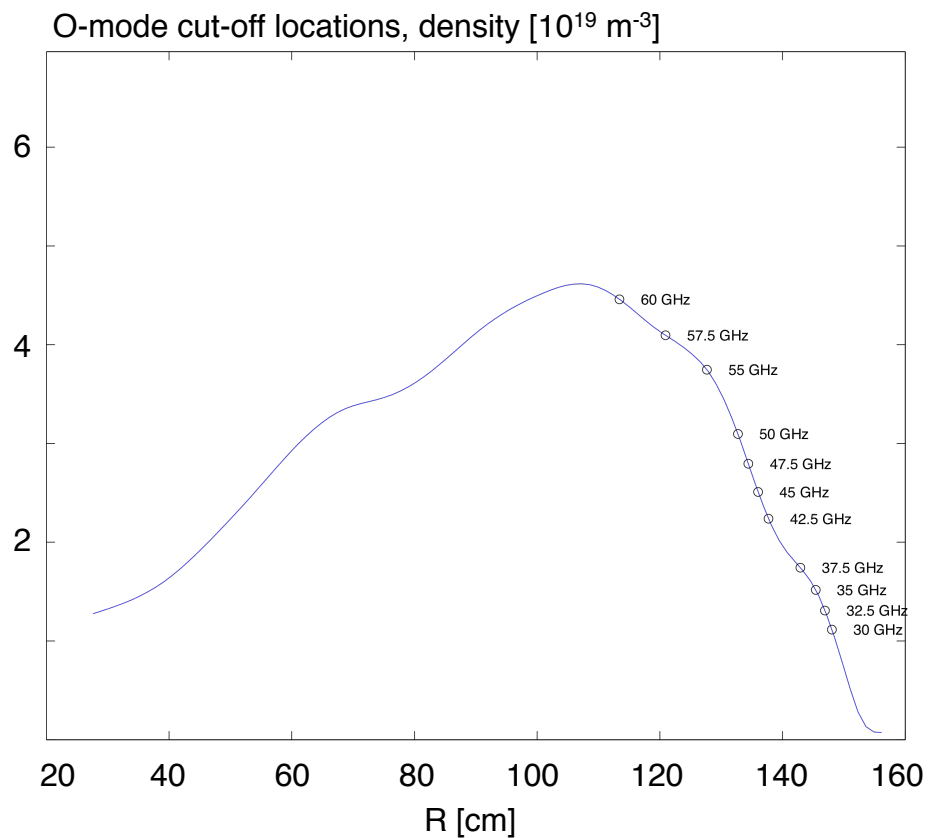
TAEs with low toroidal mode number ($n=2 \rightarrow 6$) are observed, with dominant $n=2-4$ modes



- TAEs observed in 60–150 kHz range
- Similar to previous experiments: bursting/chirping TAEs and occasional avalanches (leading to fast ion losses)

Upgraded UCLA reflectometer provides accurate measurements of TAE mode structure

sh#141707, t=463ms



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