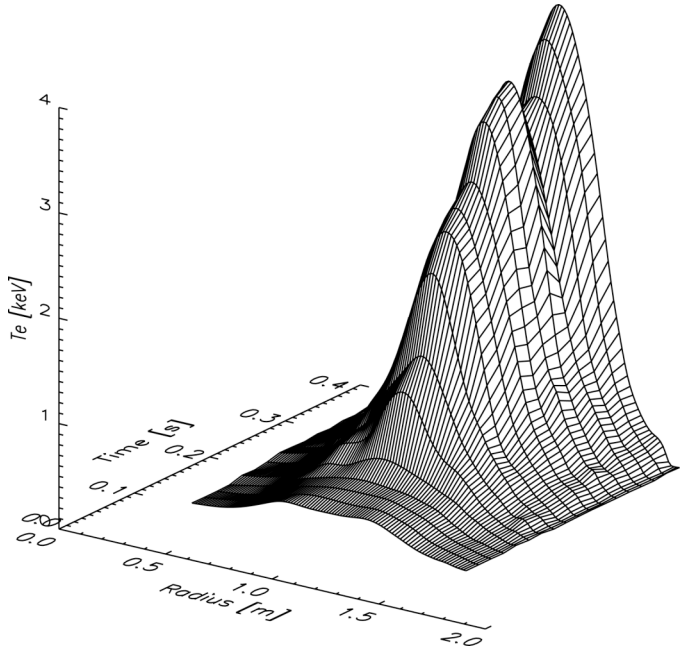
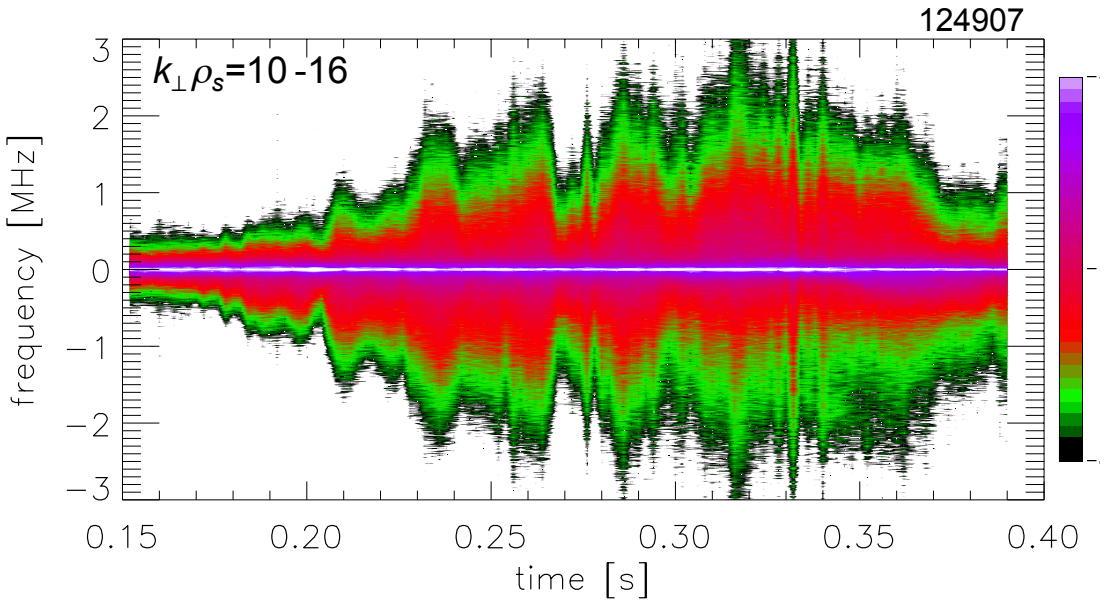
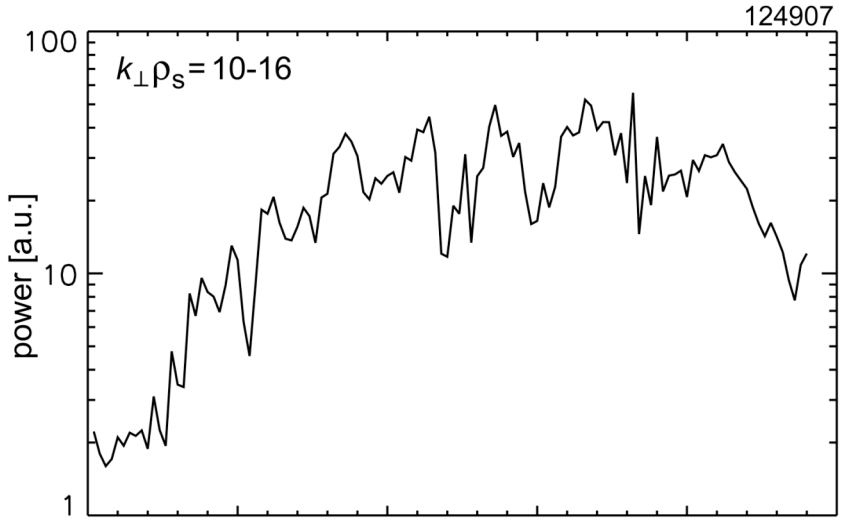
XP-821: High-k turbulent fluctuations in NSTX

- *This XP is a continuation of XP-735. Main results from the latter are:*
  - *HHFW heating in He plasmas drives turbulent fluctuations with $k_\perp \rho_s >> 1$*







Motivation

- *Plasma remained close to marginal stability, as defined by Jenko's critical gradie*

$$(R/L_{T_e})_{crit} = (1+Z_{eff}T_e/T_i)(1.3+1.9\ s/q)(1-1.5\ \varepsilon)(1+0.3\ \varepsilon\ dk/d\varepsilon)$$

where ($Z_{eff}\,T_e/T_i$) was the leading term for the plasma conditions of XP-735

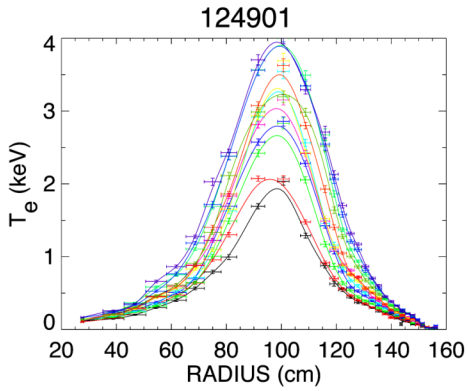
- *Question: what is the plasma response to a departure from marginal stability?*

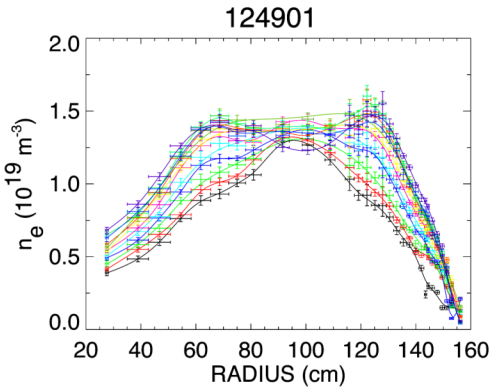
- *Experiments from Tore Supra (G.T. Hoang et al., PRL 87,125001 (2001), W. Horton et al., PoP 11, 2600 (2004)) indicate:*

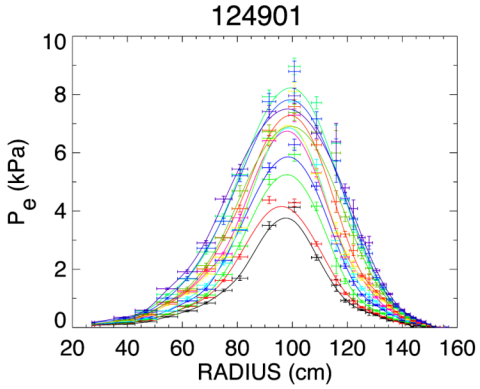
$$q_e \propto T_e^{\alpha}\left[(R/L_{T_e})-(R/L_{T_e})_{crit}\right] \qquad \text{with } \alpha \approx 3/2$$

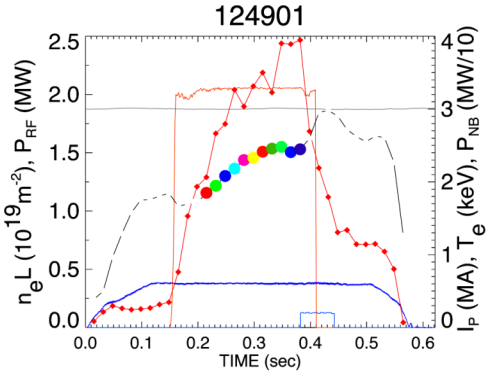
- *We can modify the critical gradient by changing either Z_{eff} , i.e., switching from He to D, or the temperature ratio, i.e., varying heating power and plasma density*

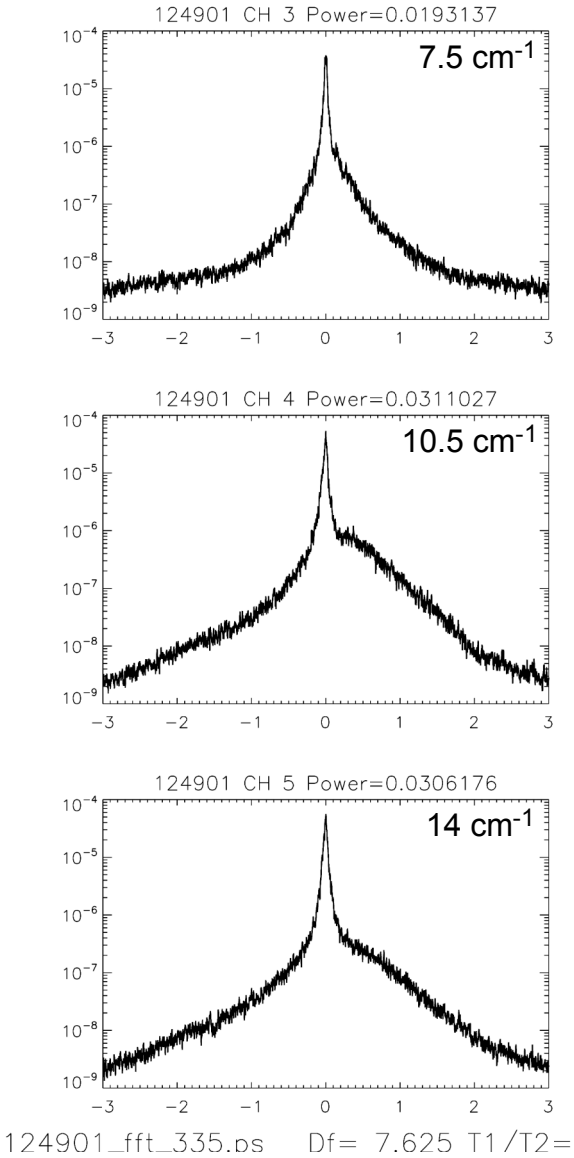
XP-735: June 2007



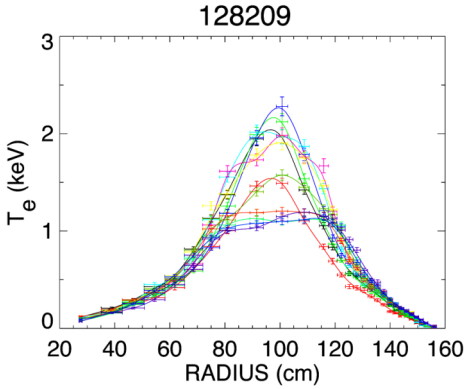


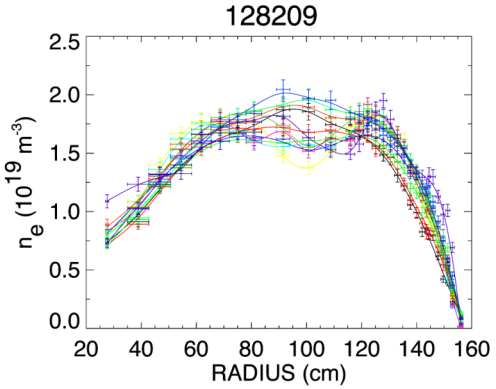


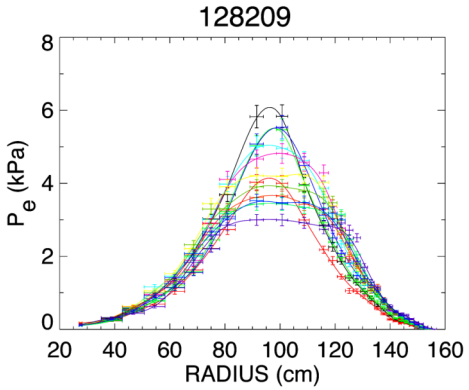


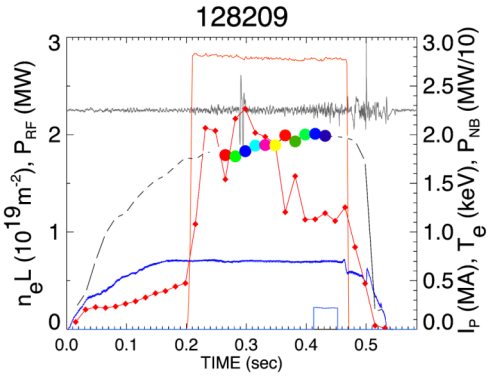


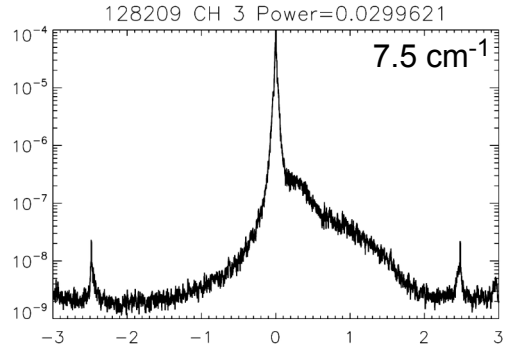
XP-821: April 2, 2008; 4.03 pm



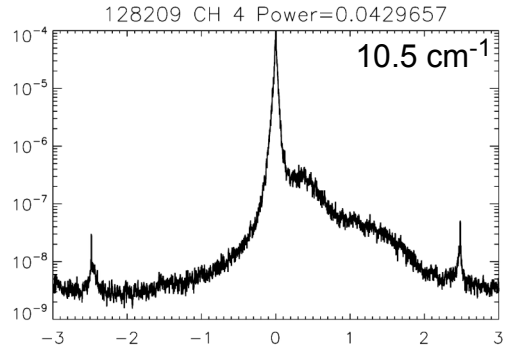




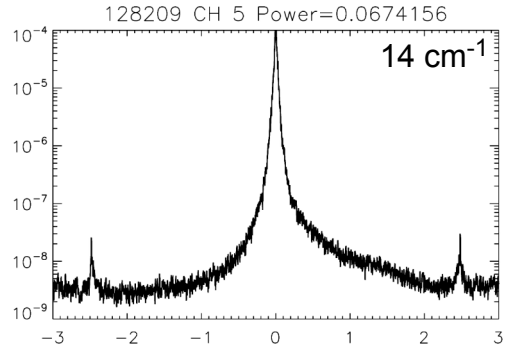




+9 dB



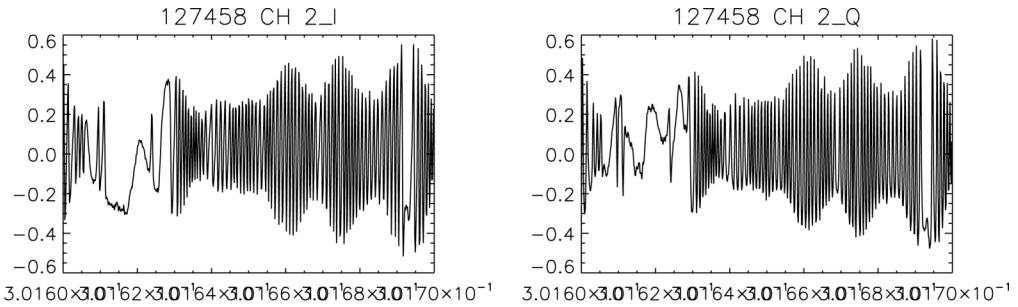
+3 dB

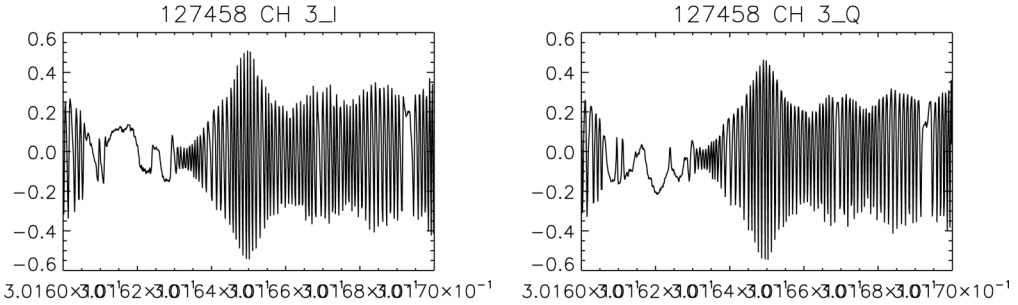


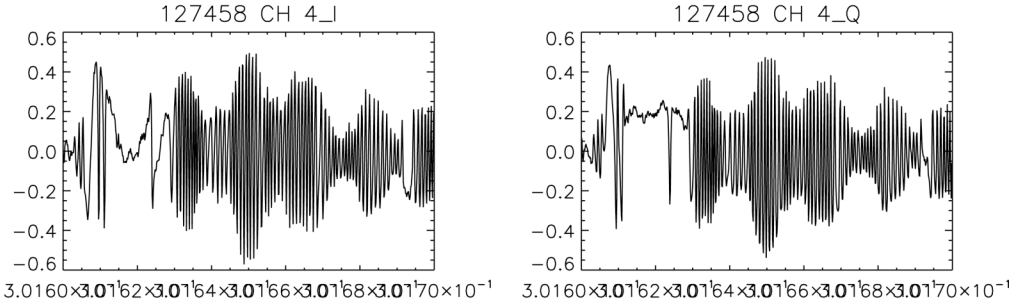
+0 dB

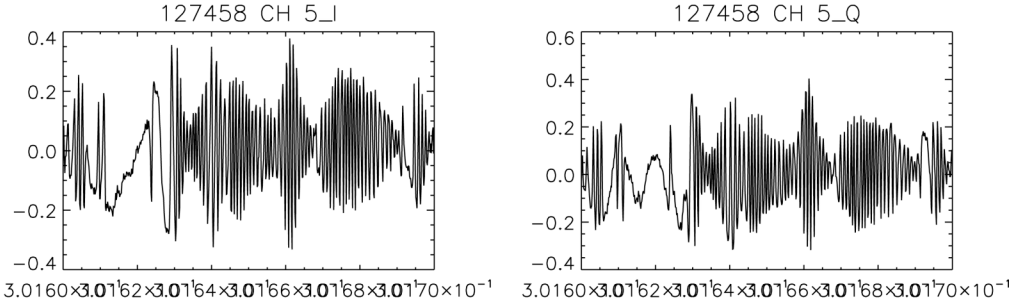
128209_fft_295.ps Df= 6.451 T1/T2=(

Tube's Failure?









127458_fast.ps