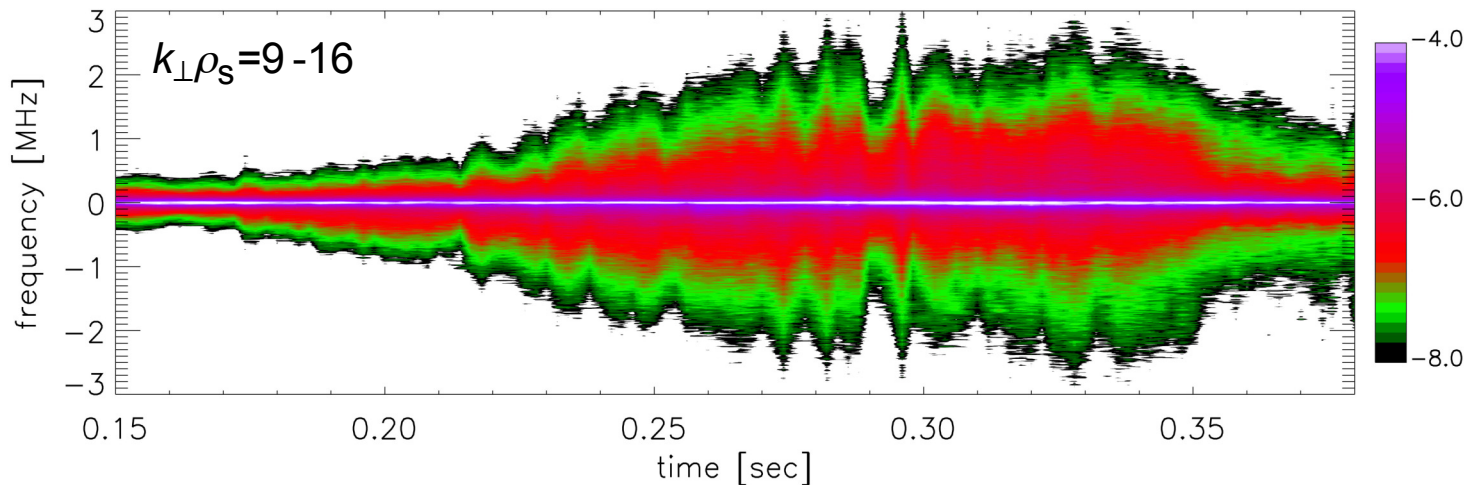
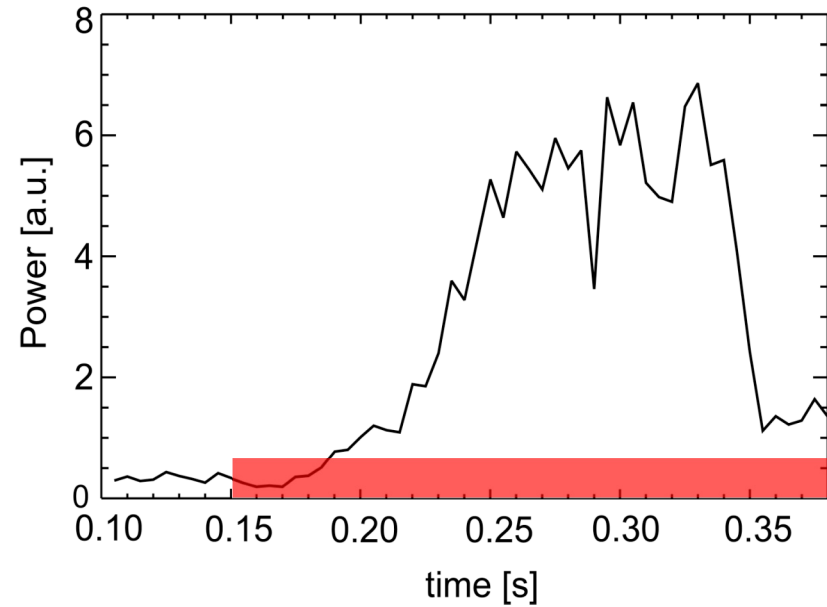
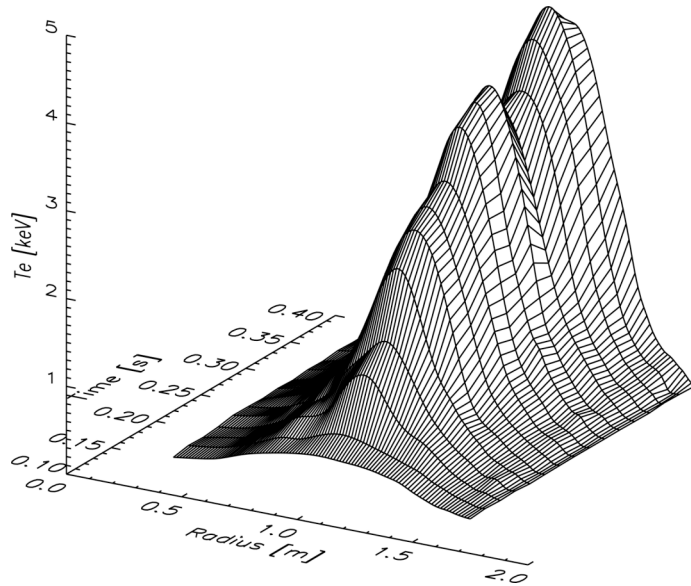


High-k Turbulence in NSTX

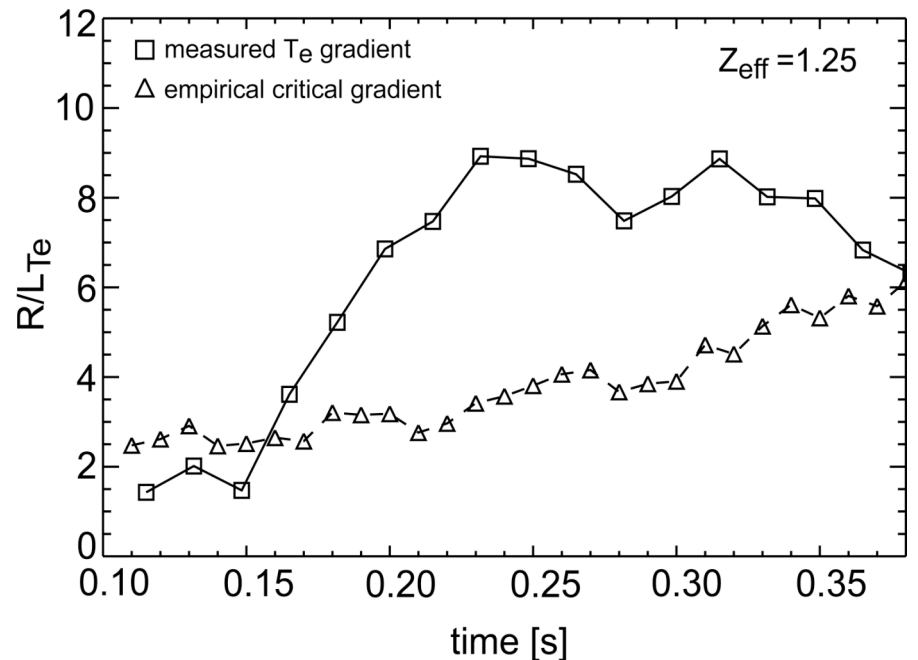
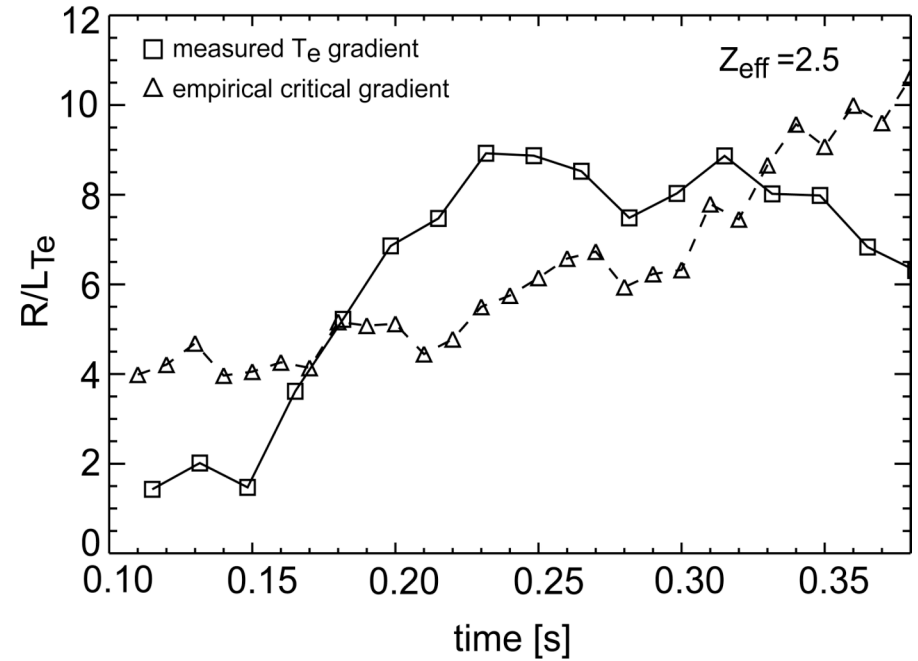
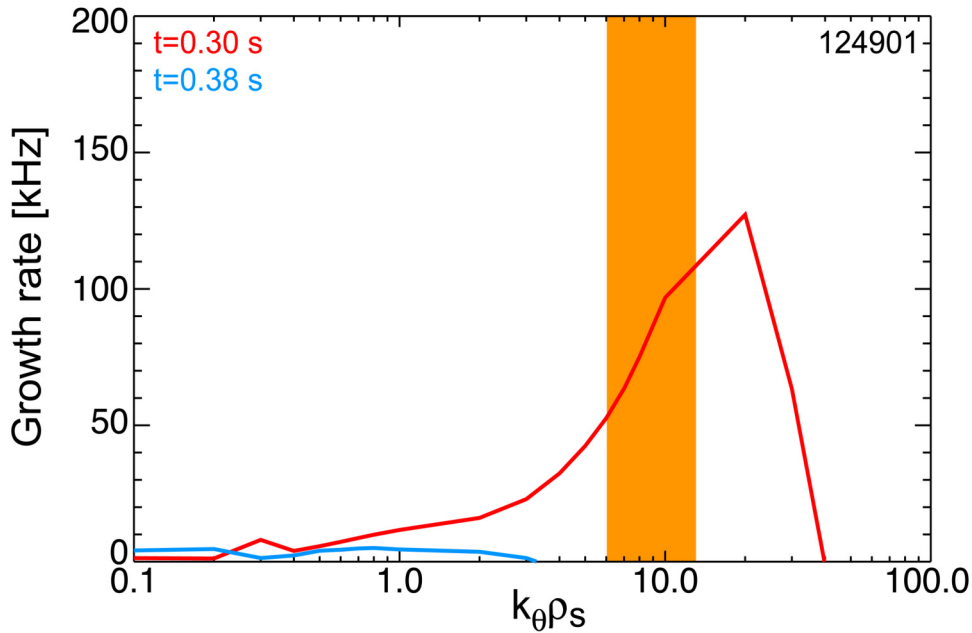
E. Mazzucato

- Main results from XP-735:
 - HHFW electron heating in He plasmas drives turbulent fluctuations with $k_{\perp}\rho_s \gg 1$



- Approximate agreement with predictions of linear gyrokinetic GS2 code

$$(R/L_{Te})_{crit} = \max \left\{ \begin{array}{l} (1 + Z_{eff} T_e / T_i)(1.3 + 1.9 s/q)(1 - 1.5 \epsilon)(1 + 0.3 \epsilon dk/d\epsilon) \\ 0.8 R/L_n \end{array} \right\}$$



The leading term in Jenko's critical gradient – $1 + Z_{eff} T_e / T_i$ – suggests:

- Comparison of fluctuations in He and D plasmas, i.e., different values of Z_{eff}
- Comparison of fluctuations in plasmas with different heating powers (both HHFW and NBI) and plasma densities, i.e., different values of T_e / T_i

Half-Day Experimental Plan - RF heating

- *Plasma Conditions*
 - Helium and Deuterium, $B_T=5.5$ kG, $I_p=700$ kA, $n_o=1.5-2.0 \times 10^{19} \text{ m}^{-3}$, optimum gap for minimum plasma-antenna interaction
- *RF Conditions*
 - Power=1-2 MW
 - Phase = -90°
 - Pulse > 200 ms
- *NBI Conditions*
 - 70 kV short blips (30-50 msec) during RF for CHERS
 - 90 kV short pulse (50 msec) at end of RF for MSE
- *Coherent Scattering Conditions*
 - Inboard (~ 1.2 m)

Total # shots: 12 (D) +12 (He) + shots for D-He changeover

Rest of experimental plan

- To be decided after first half-day run (outboard measurements, density scan, NBI ...)

Shot list for half-day run

Ref. Shot 124901: $B_T = 5.5$ kG, $I_p = 700$ kA, $E_{NB1} = 70$ kV, $E_{NB2} = 90$ kV
 $k_{||} = -7$ [m⁻¹] (or best RF coupling)

#	Filling Gas	P_{RF} [MW]	Δt_{RF} [s]	Δt_{NB1} [s]	Δt_{NB2} [s]	R_{scat} [m]
1	D	2.0	0.15-0.45	0.15-0.20	0.0-0.0	1.20
2	D	2.0	0.15-0.45	0.15-0.20	0.0-0.0	1.20
3	D	2.0	0.15-0.45	0.25-0.30	0.0-0.0	1.20
4	D	2.0	0.15-0.45	0.25-0.30	0.0-0.0	1.20
5	D	2.0	0.15-0.45	0.35-0.40	0.0-0.0	1.20
6	D	2.0	0.15-0.45	0.35-0.40	0.0-0.0	1.20
7	D	2.0	0.15-0.45	0.0-0.0	0.40-0.45	1.20
8	D	2.0	0.15-0.45	0.0-0.0	0.40-0.45	1.20
9	D	1.0	0.15-0.45	0.15-0.20	0.0-0.0	1.20
10	D	1.0	0.15-0.45	0.25-0.30	0.0-0.0	1.20
11	D	1.0	0.15-0.45	0.35-0.40	0.0-0.0	1.20
12	D	1.0	0.15-0.45	0.0-0.0	0.40-0.45	1.20
13	He	2.0	0.15-0.45	0.15-0.20	0.0-0.0	1.20
14	He	2.0	0.15-0.45	0.15-0.20	0.0-0.0	1.20
15	He	2.0	0.15-0.45	0.25-0.30	0.0-0.0	1.20
16	He	2.0	0.15-0.45	0.25-0.30	0.0-0.0	1.20
17	He	2.0	0.15-0.45	0.35-0.40	0.0-0.0	1.20
18	He	2.0	0.15-0.45	0.35-0.40	0.0-0.0	1.20
19	He	2.0	0.15-0.45	0.0-0.0	0.40-0.45	1.20
20	He	2.0	0.15-0.45	0.0-0.0	0.40-0.45	1.20
21	He	1.0	0.15-0.45	0.15-0.20	0.0-0.0	1.20
22	He	1.0	0.15-0.45	0.25-0.30	0.0-0.0	1.20
23	He	1.0	0.15-0.45	0.35-0.40	0.0-0.0	1.20
24	He	1.0	0.15-0.45	0.0-0.0	0.40-0.45	1.20