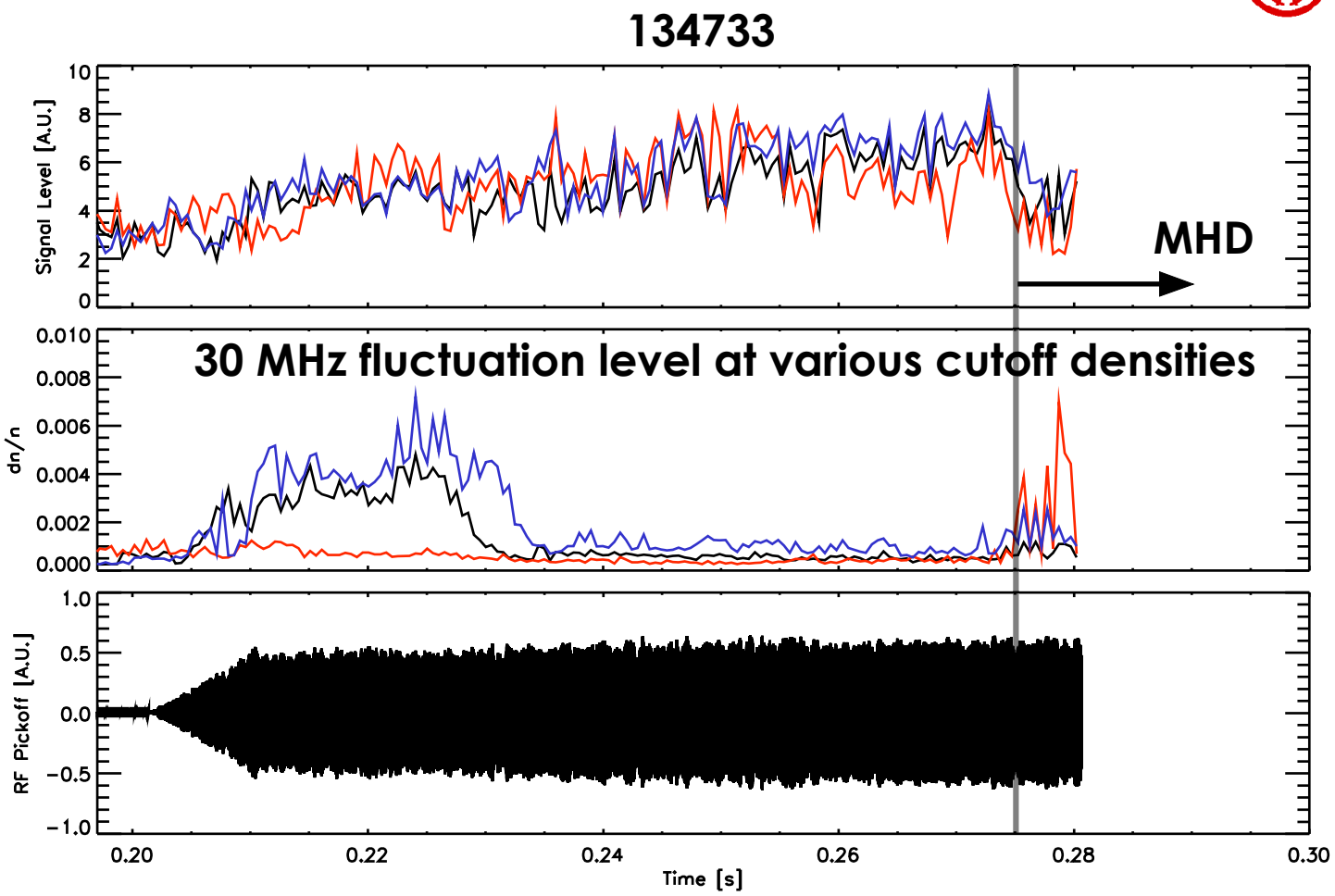
Radial Amplitude of δn(r) (and δE(r)) Induced by HHFW With Reflectometry - S. Kubota, et al.

- **Use reflectometers to resolve the electric field structure of HHFW in the ST. Comparison with model/code results for propagation and absorption.**
  - Better understanding of physics of propagation and absorption in the ST.
  - Interaction between RF wave, instabilities in the core and edge.
- **δn associated with RF waves have been measured in the past using reflectometry: (modulation of cutoff layer -> phase modulation problem).**
  - DIII-D (Lee et al.), scannable fixed-frequency heterodyne (amplitude profile radially scanned, shot-to-shot).
  - NSTX (Wilgen et al.), FMCW (RF waves and parametric decay instability at edge near antenna). Absolute level of δn?
  - TST-2 (Ejiri et al.), fixed-frequency quadrature and FMCW (**amplitude radial profile during a single shot**). Used this method on NSTX.
- **For NSTX, goal is to measure the radial profile of δn associated with the HHFW and associated instabilities at Bay J location:**
  - Use both FMCW (13-53 GHz) and heterodyne reflectometer (42 GHz).
  - Modifications to FMCW system completed at end of 2008.
  - **Extensive noise check and PoP completed in 2009.**

2009 Measurements



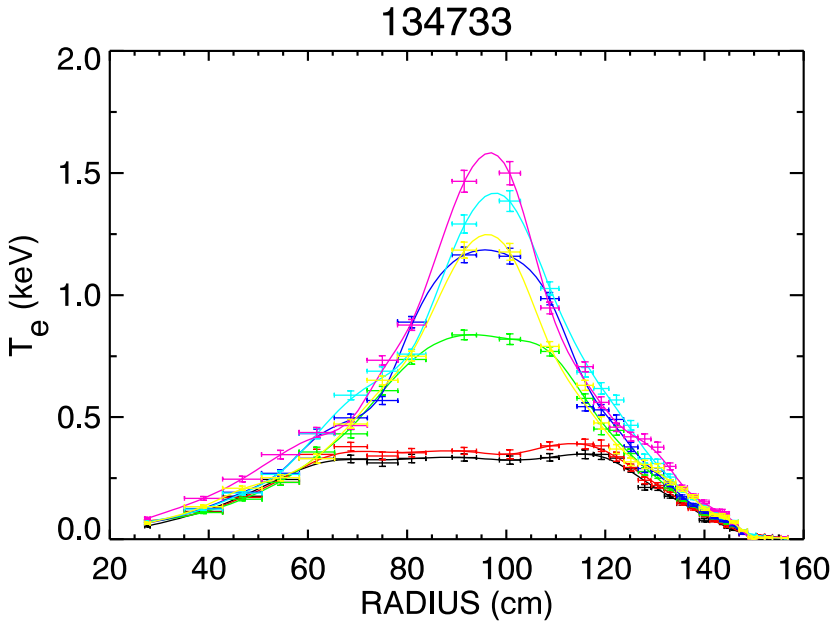
2.26×10^{13} cm^{-3}
2.16×10^{13}
1.76×10^{13}

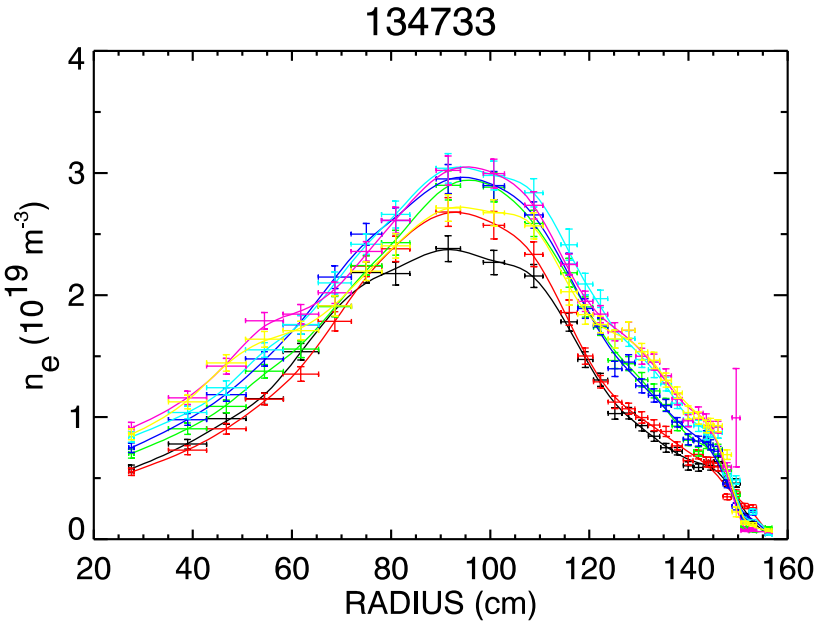
- **Preliminary results:**
  - RF waves at Bay J are **core localized**.
  - MHD seen to **redistributes wave amplitude** towards edge.

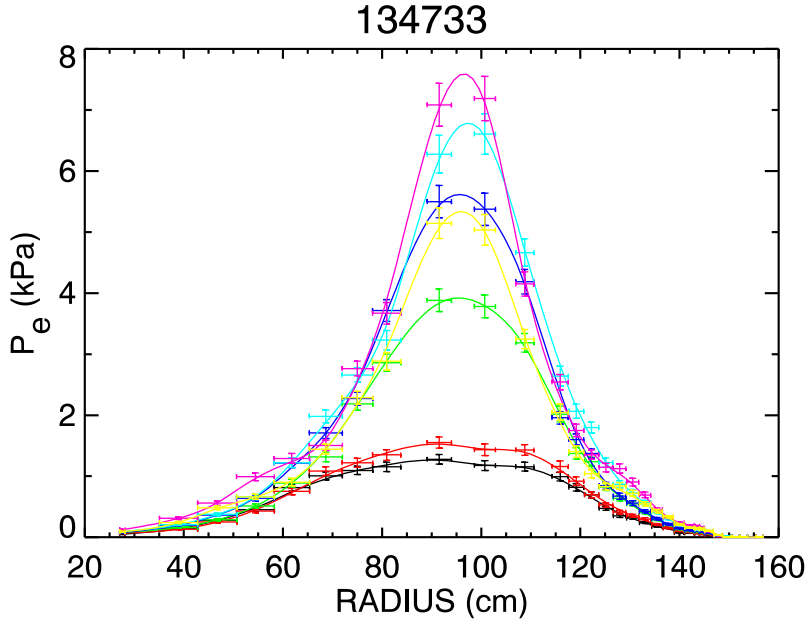
Requested Machine Time: ~0.5-1 day

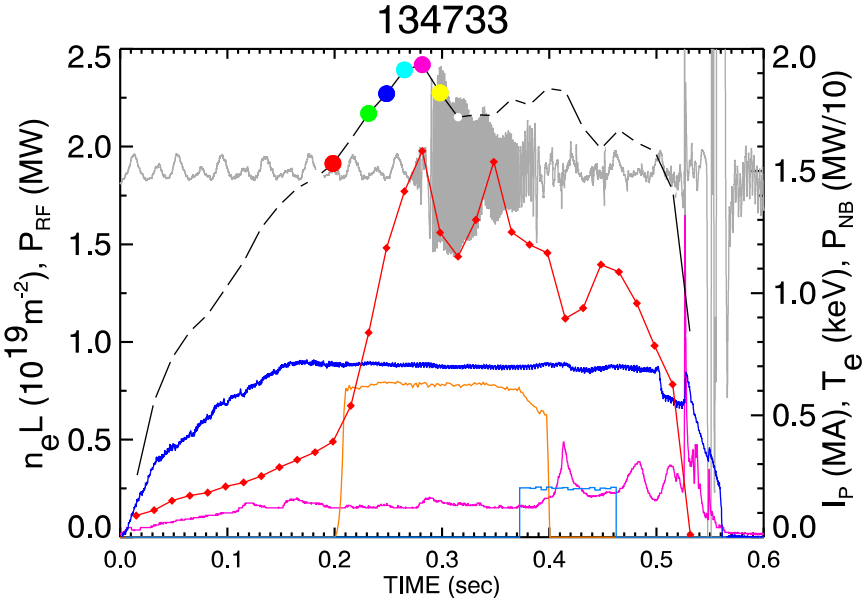
- **Experimental Plan:**
  - Suitable target is L-mode (D or/and He plasmas), peak density ~2-3x10^{13} cm^{-3}.
  - Vary k_ϕ (wavenumber and direction) and power.
  - Phasing of ±30°, ±90°, ±150°, power modulated during shot.
  - Either D or He, required number of shots:
    2 x 6 = 12 (**~15 shots or 0.5 days**).
  - For D and He shots, **~30 shots or 1 day**.
- **Relevance:**
  - Connection with FY2010 Research Milestone (R10-2).
  - Provides measurements for direct comparison with codes.
- **Diagnostics:**
  - FMCW and 42 GHz reflectometers, ORNL reflectometer, MPTS, IR camera, optical SXR.

Extra


134733
T_e (keV)
RADIUS (cm)


134733
n_e (10^{19} m^{-3})
RADIUS (cm)


134733
P_e (kPa)
RADIUS (cm)


134733
$n_e L$ ($10^{19} m^{-2}$), P_{RF} (MW)
I_P (MA), T_e (keV), P_{NB} (MW/10)
TIME (sec)