HHFW Run Summary July 22 – 24, 2009

Hosea, Ryan, Taylor, Wilson et al.

July 22: Vacuum/plasma conditioning XMP26, and HHFW in He L-mode plasma XP944

- Conditioning is removing lithium deposited on antenna surfaces
- Achieved P_{RF} > 4 MW, T_e ~ 5.8 keV @ 3.7 MW and @ 2.7 MW
- Transitioning to H-mode at high power

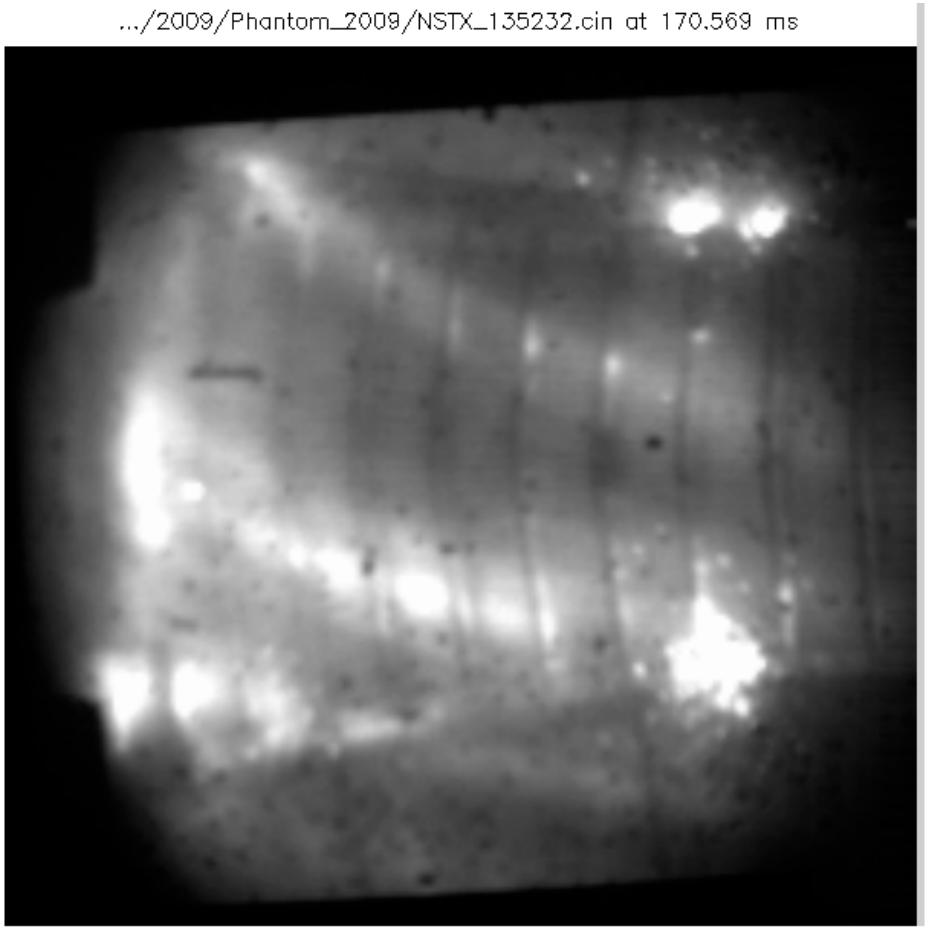
July 23: L-H Transition with HHFW in He plasma XP941 (Kaye et al.)

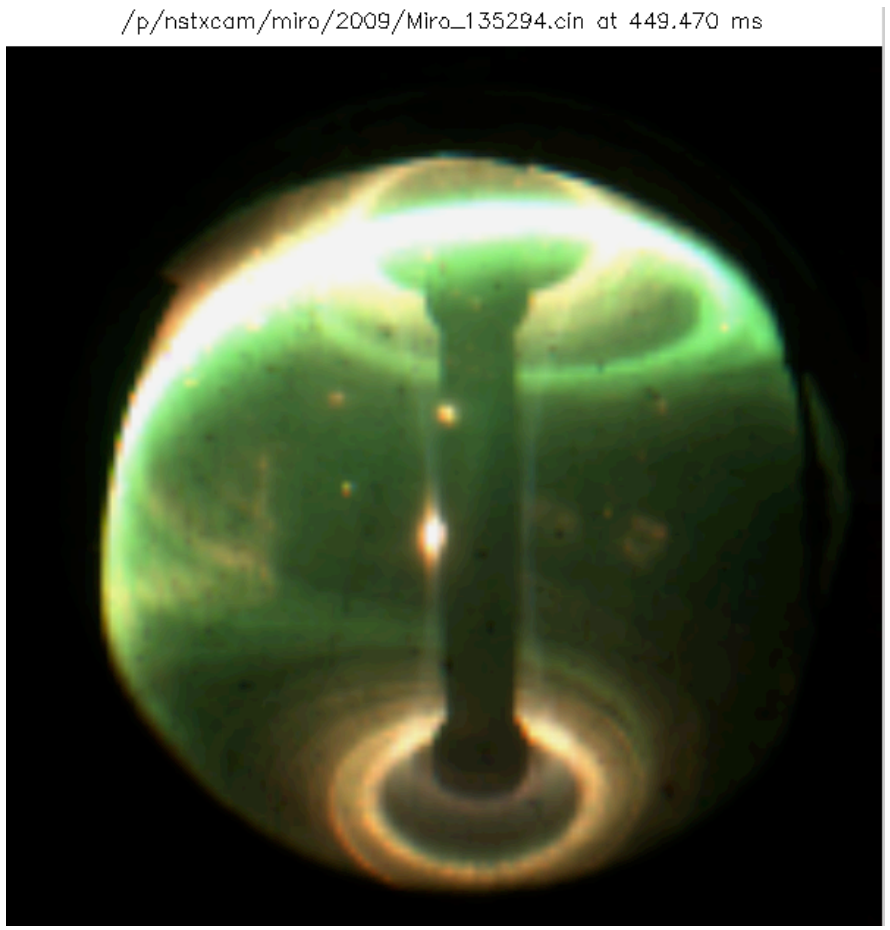
- Supported L-H transition with programmed P_{RF} pulse up to 3.7 MW
- Achieved transitions L-H and H-L without arcs
- Strong electron heating, T_e up to ~ 5.8 keV

July 24: HHFW in NB driven deuterium H-mode plasma XP946

- Relatively high n_eL operation
  - -90° with P_{RF} ~ 2.7 MW without arcs
  - -150° with P_{RF} ~ 2.5 MW without arcs
- Coupling through relatively large repetitive ELMs without arcs

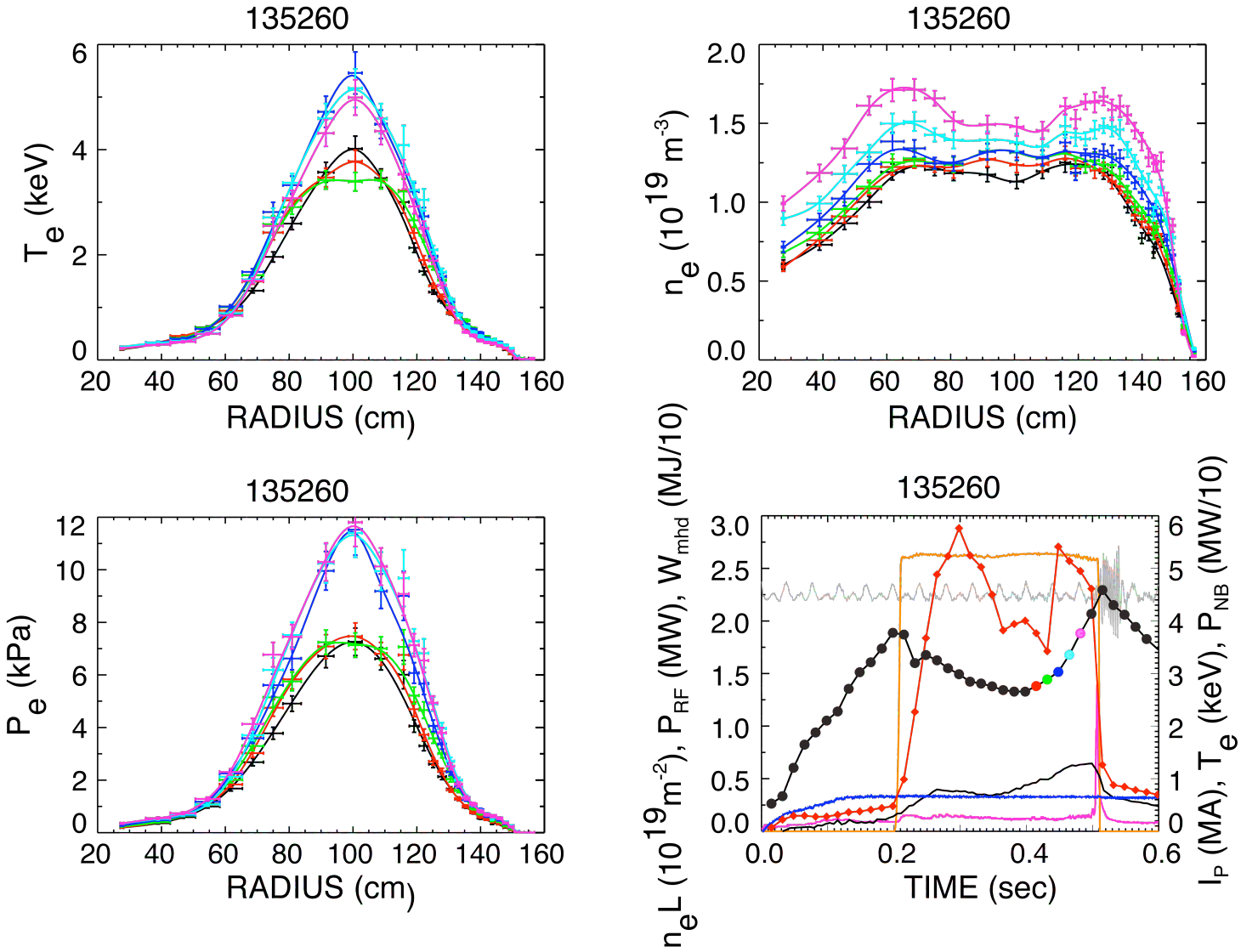
Plasma conditioning of antenna – ejection of material from antenna surfaces





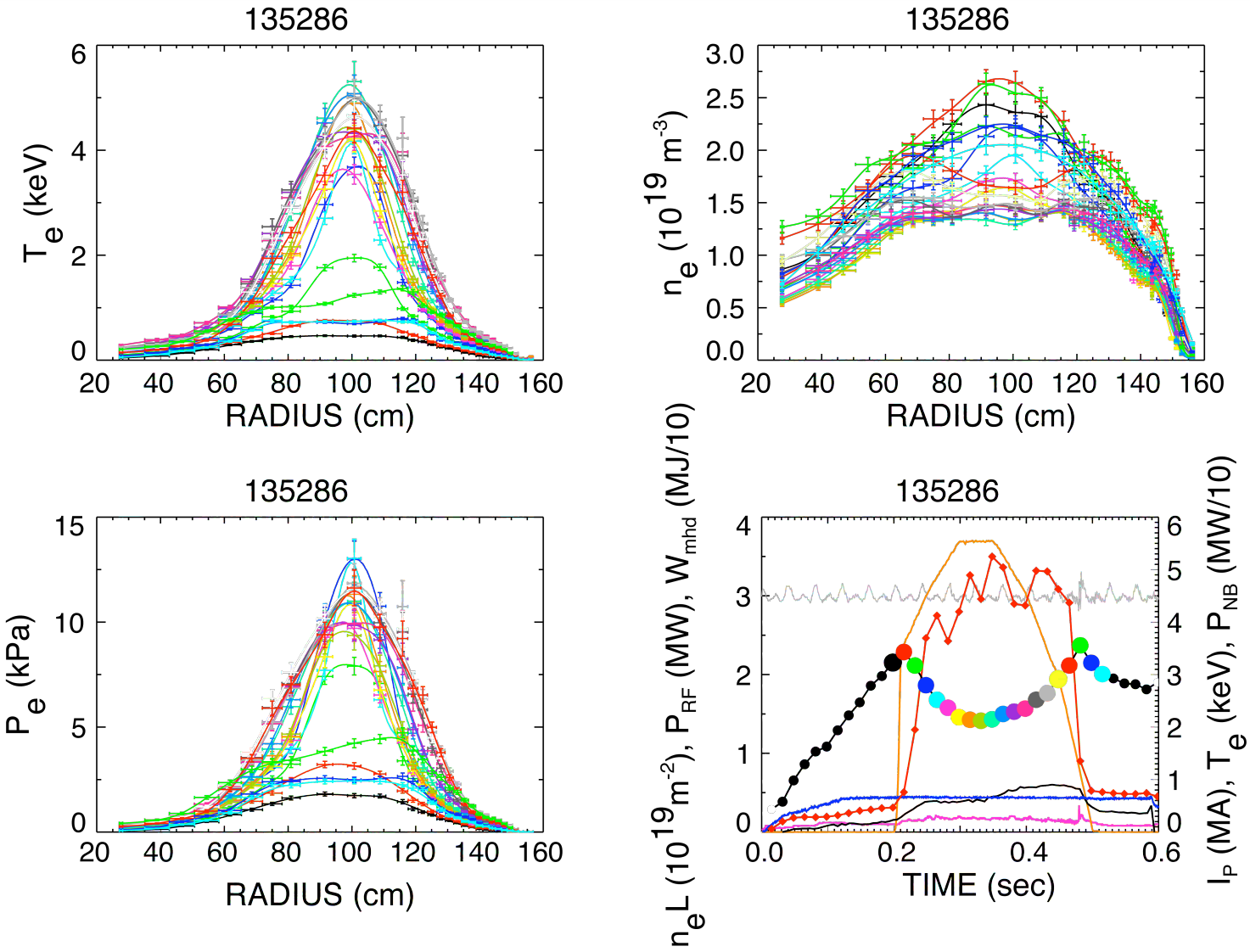
- Power limited by lithium sputtering outside of antenna enclosures (on BN limiters)
- Not limited by RF voltage on antenna
- Appears to be an RF current induced effect

High T_e for P_{RF} = 2.7 MW in He L-Mode XP944 7/22



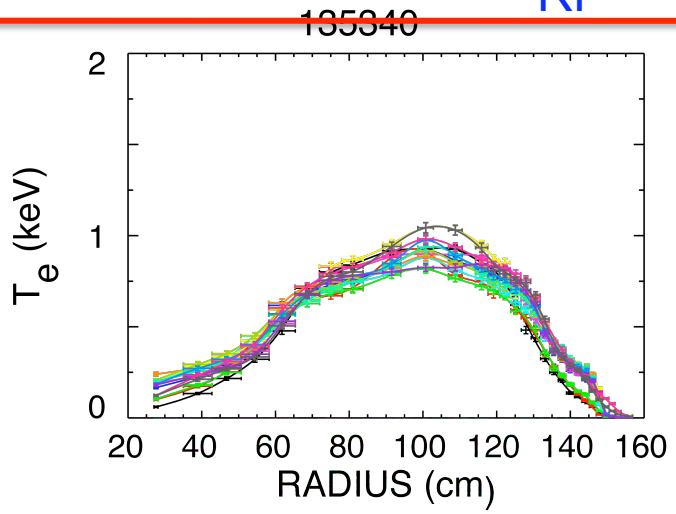
- T_e ~ 5.8 keV early and ~ 5.5 keV late in RF pulse
- Transition to H-mode at end of RF pulse

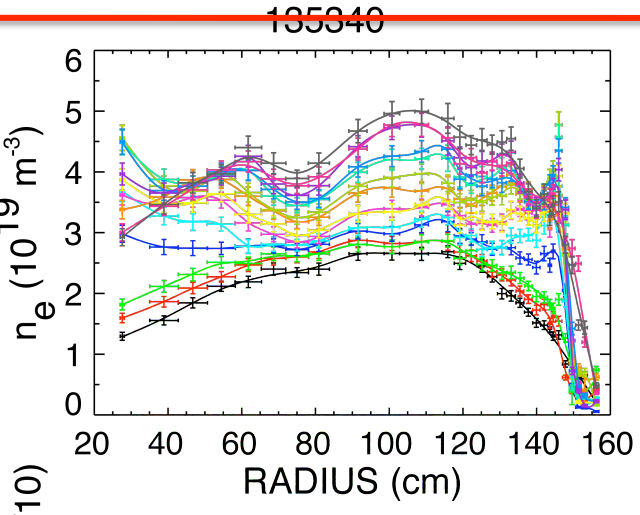
HHFW power programmed to support L-H transition study XP941 (Kaye et al) 7/23

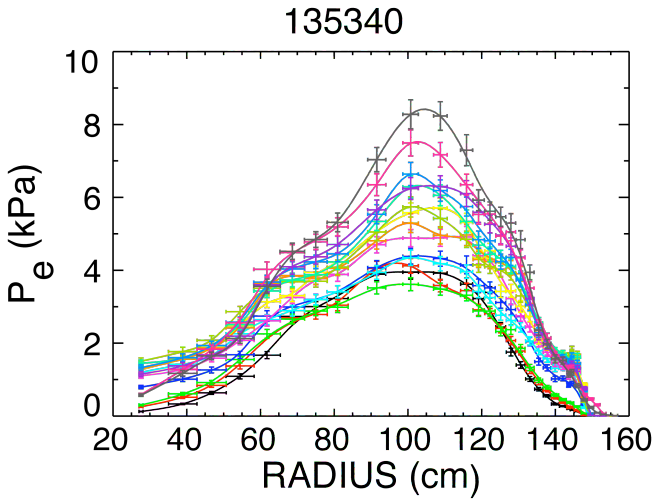


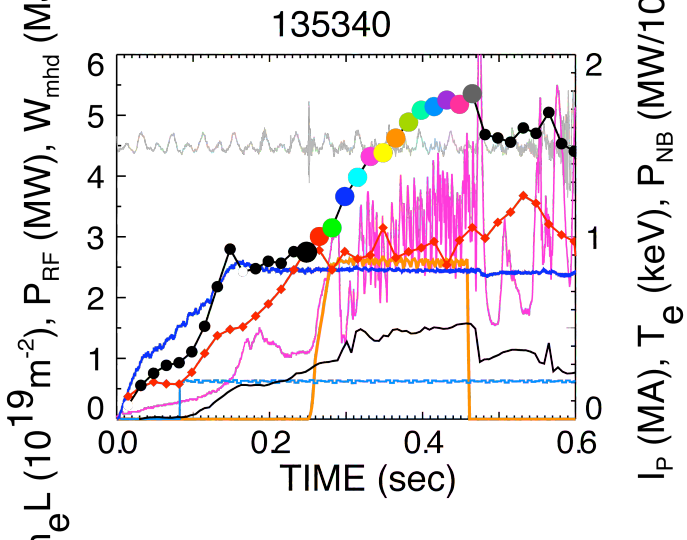
- P_{RF} programmed up to 3.7 MW without arcs after conditioning of previous day
- T_e maintained over 4 kev for much of pulse

H-mode transition sustained for -150° antenna phasing with NB at P_{RF} ~ 2.7 MW XP946 7/24





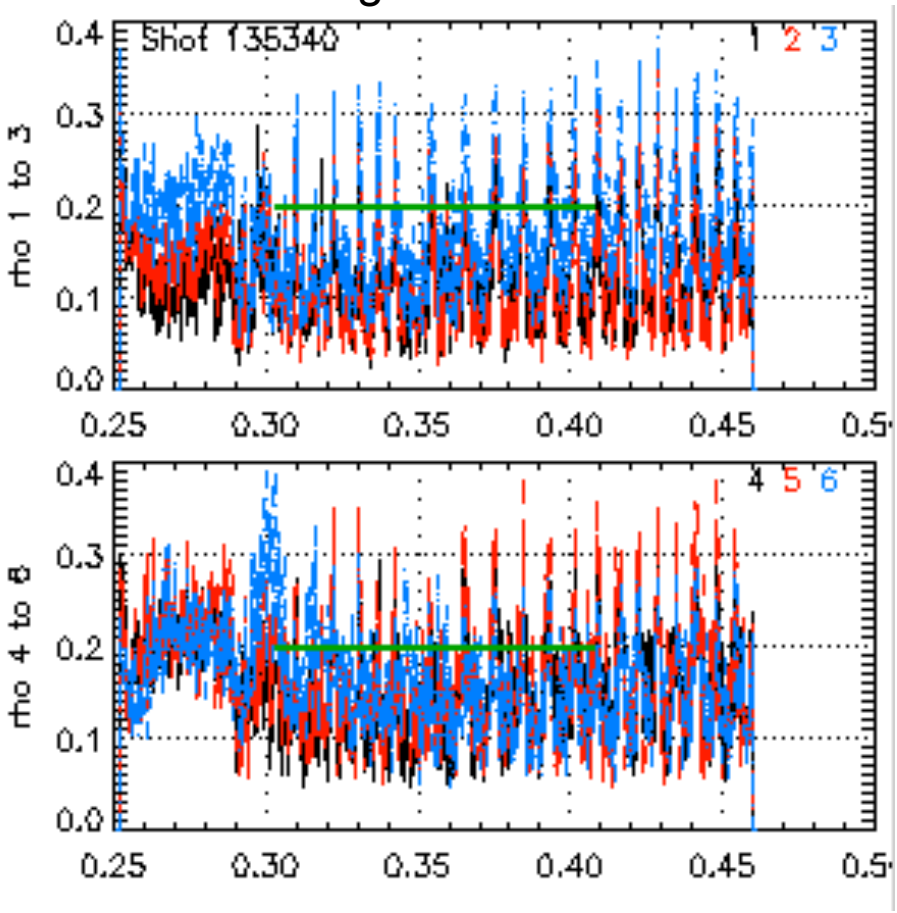




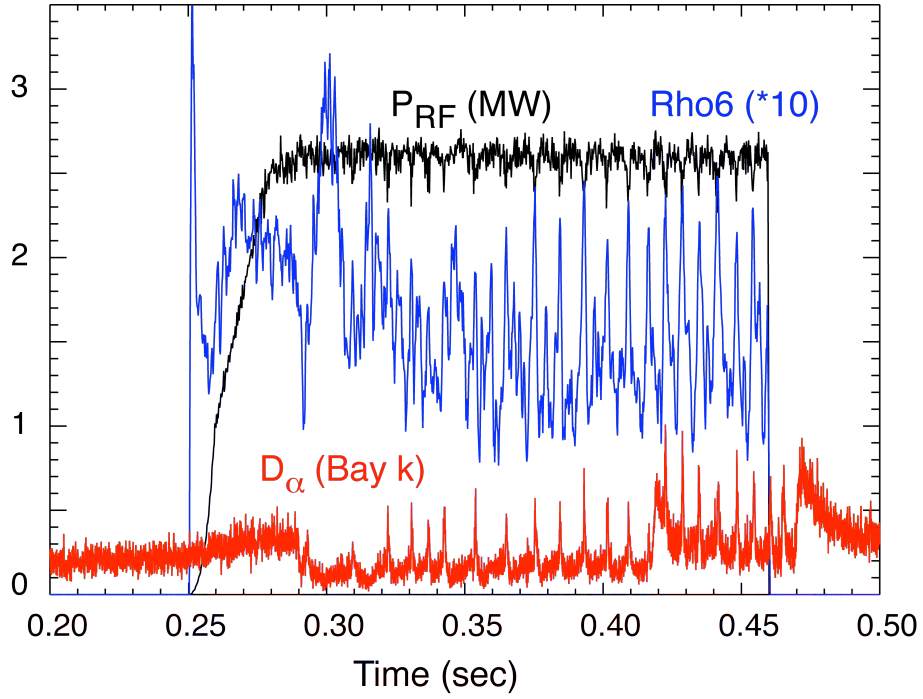
- Transition to H-mode occurs after RF turn on and without RF arc
- Coupling through ELMs maintained
- T_e profile broadened with near doubling of $n_e L$ (relatively high density case)

RF source response to ELMs 7/24

Source voltage reflection coefficients



ELM Behavior



- Coupling through ELMs possible if trip value of rho can be set to a high value (0.7 in this case)