

XP 526 Summary
Characteristics of the “Enhanced H-mode” in NSTX

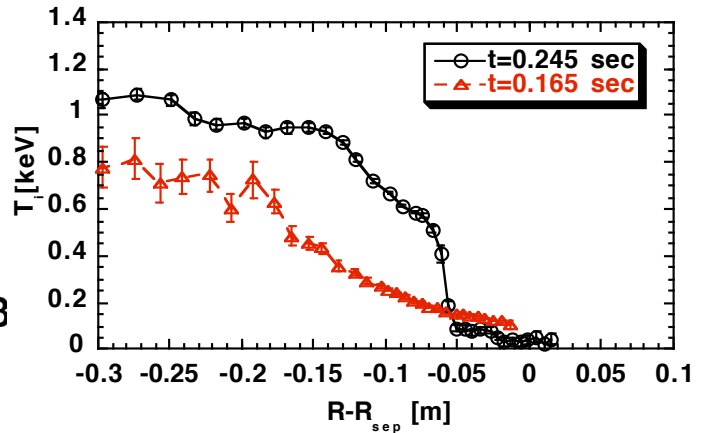
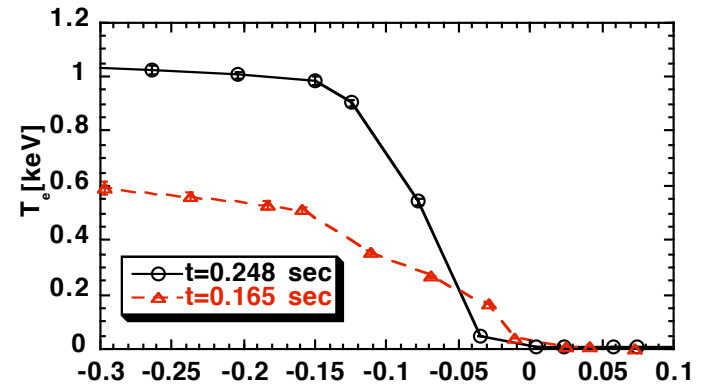
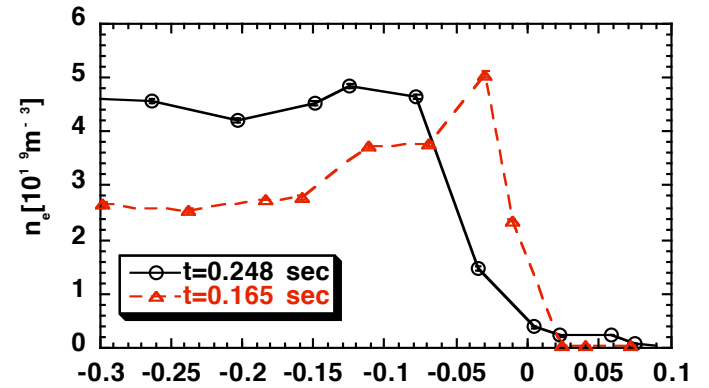
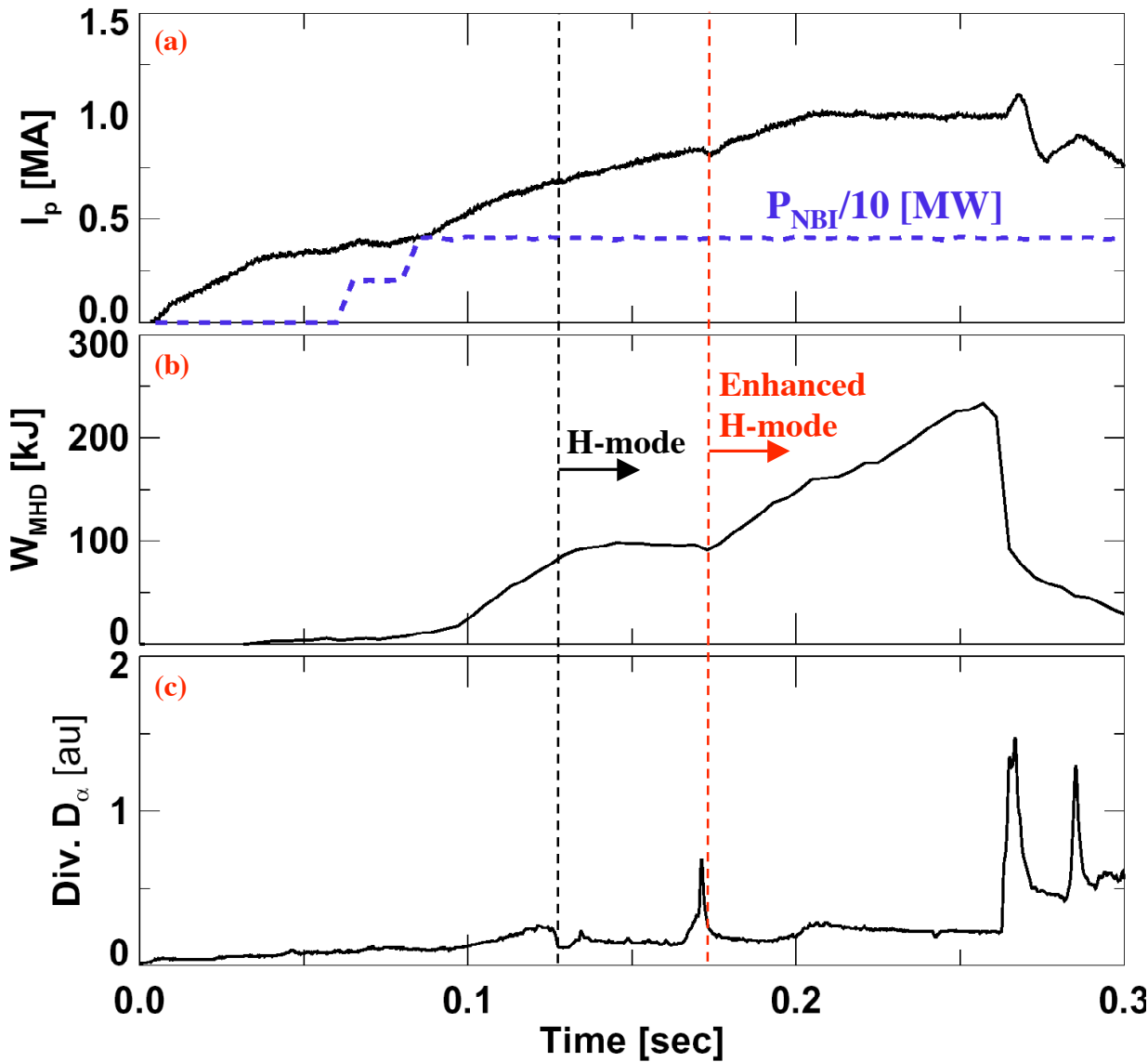
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NSTX Results Review

Princeton, NJ

Dec. 13, 2005

Transition to an Enhanced H-mode with increased pedestal T_e and T_i observed in NSTX

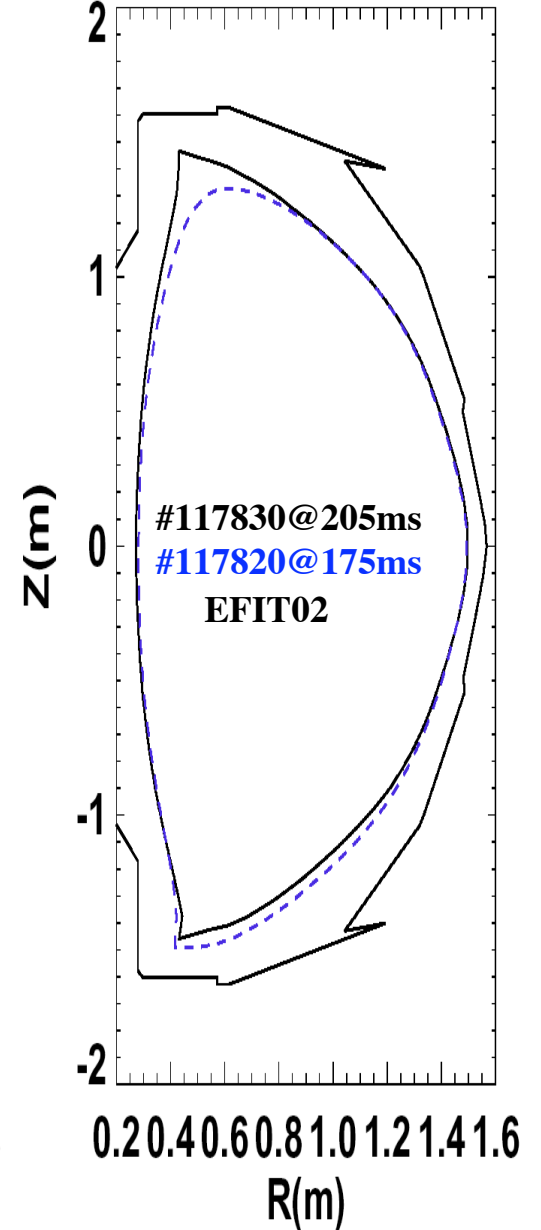
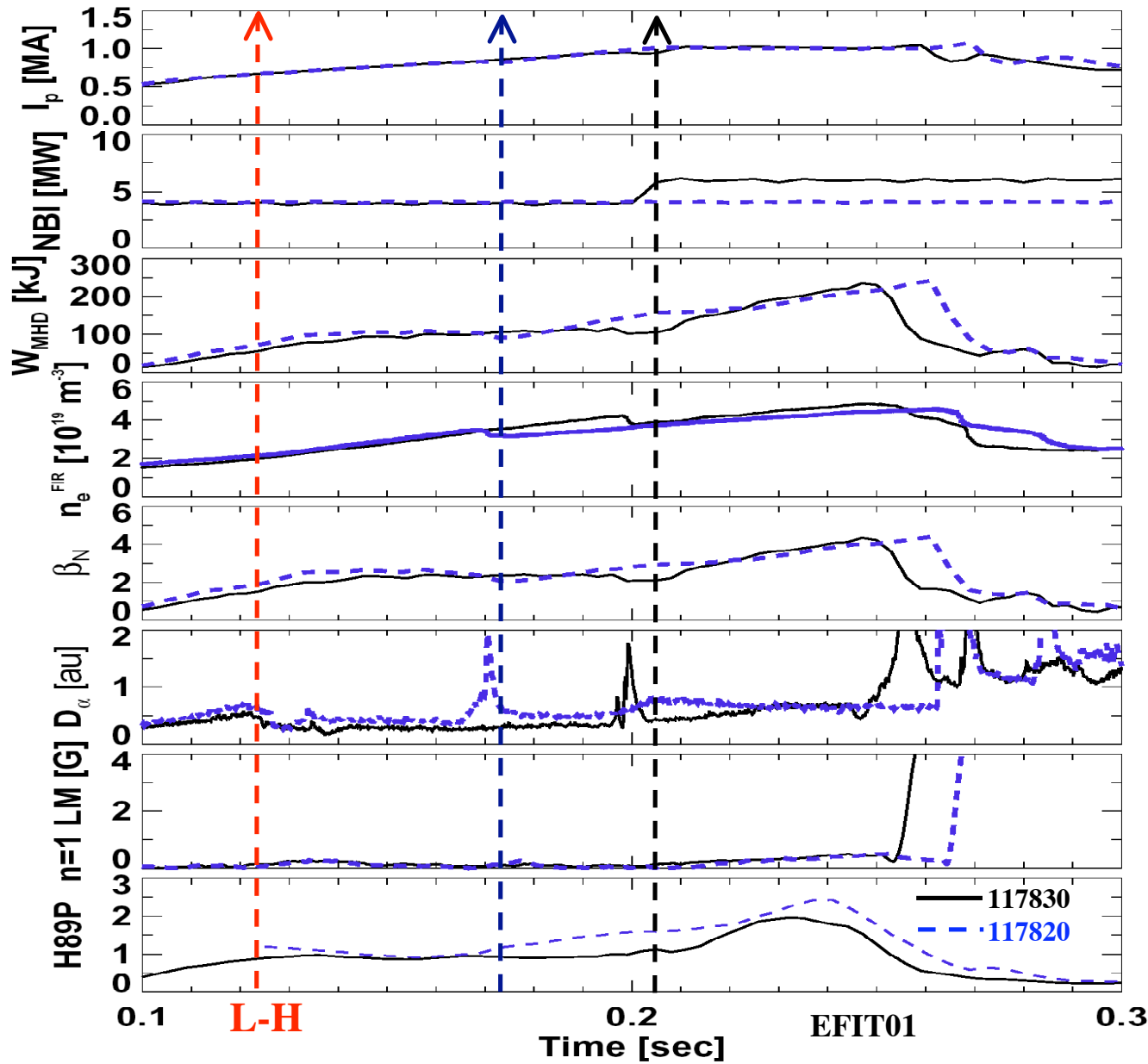


Summary

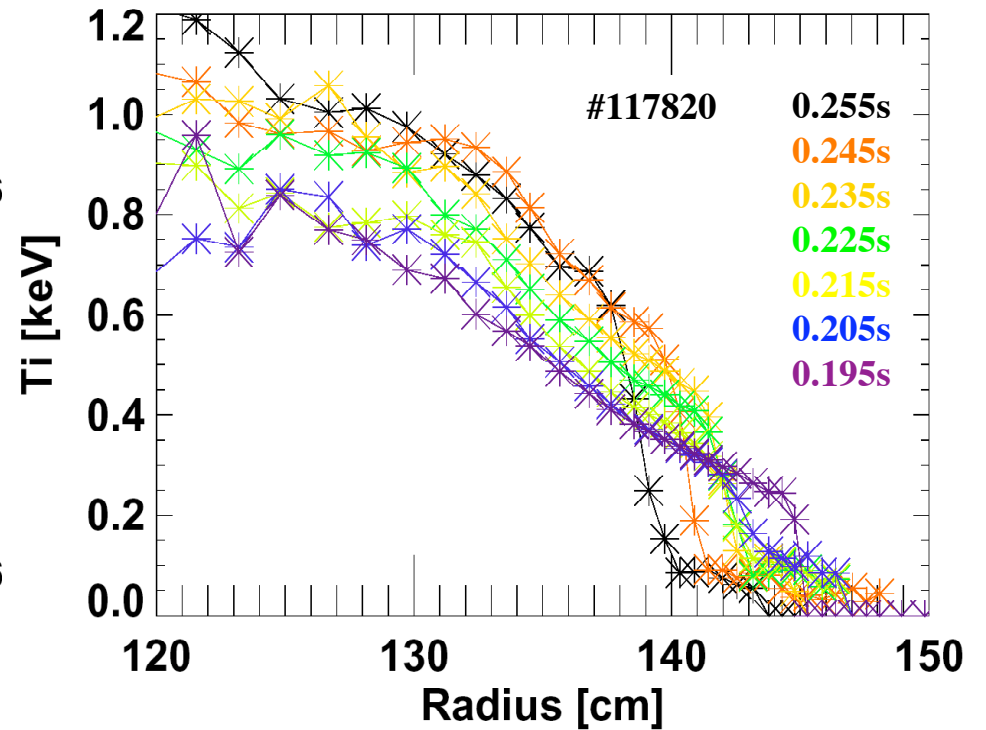
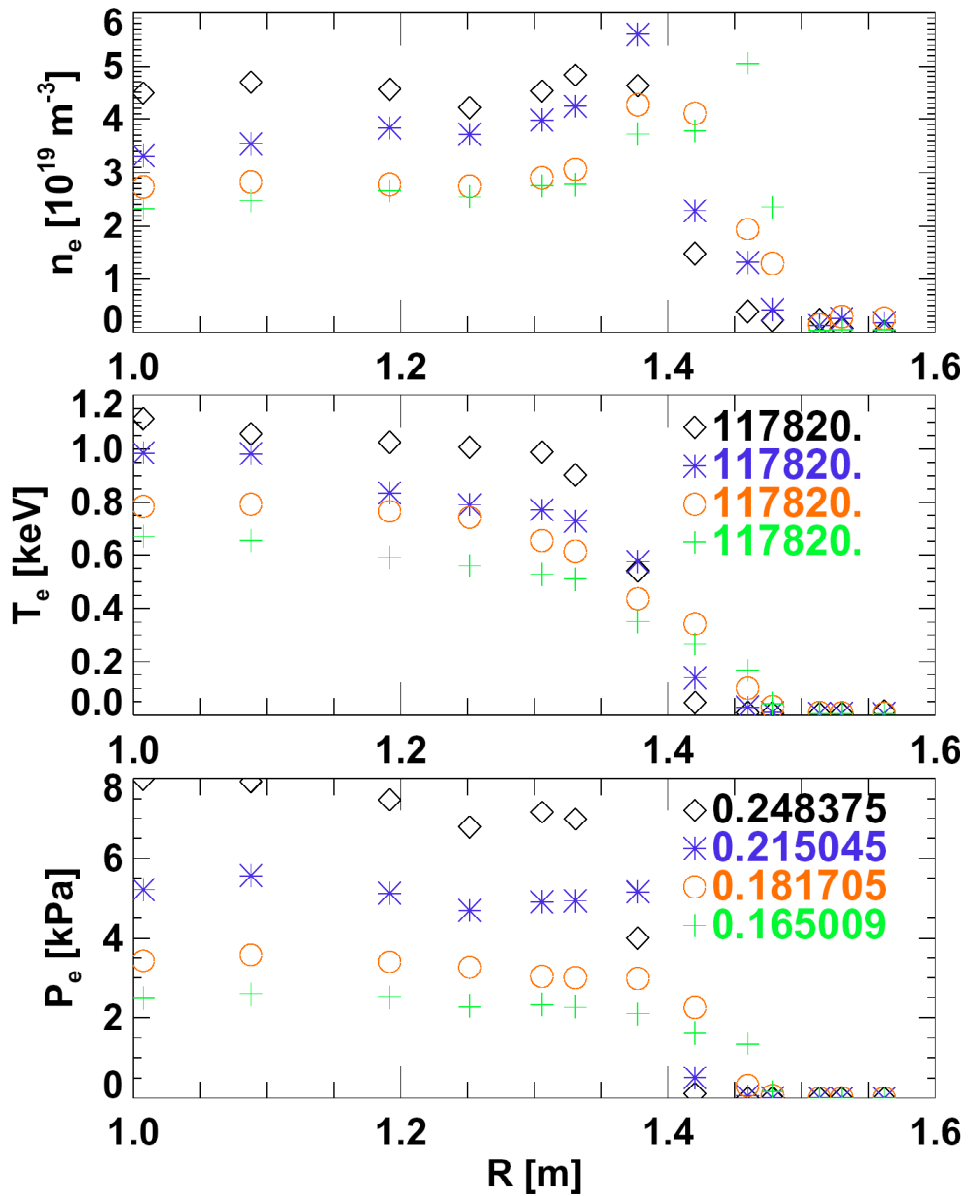


- A second transition to enhanced confinement and high pedestal $T_i \leq 650$ eV (and T_e from preliminary estimates) observed in handful of discharges during XP526
- Rather high dW/dt -> lead to high H89P $\sim 2.6-2.7$
- Triggered after global MHD mode
- Apparent power threshold: between 1 and 2 srcs
- Discharges had low/no current density over inner 15cm
- Terminated when $\beta_N \sim 4-4.5$
- Certain similarities to VH-mode

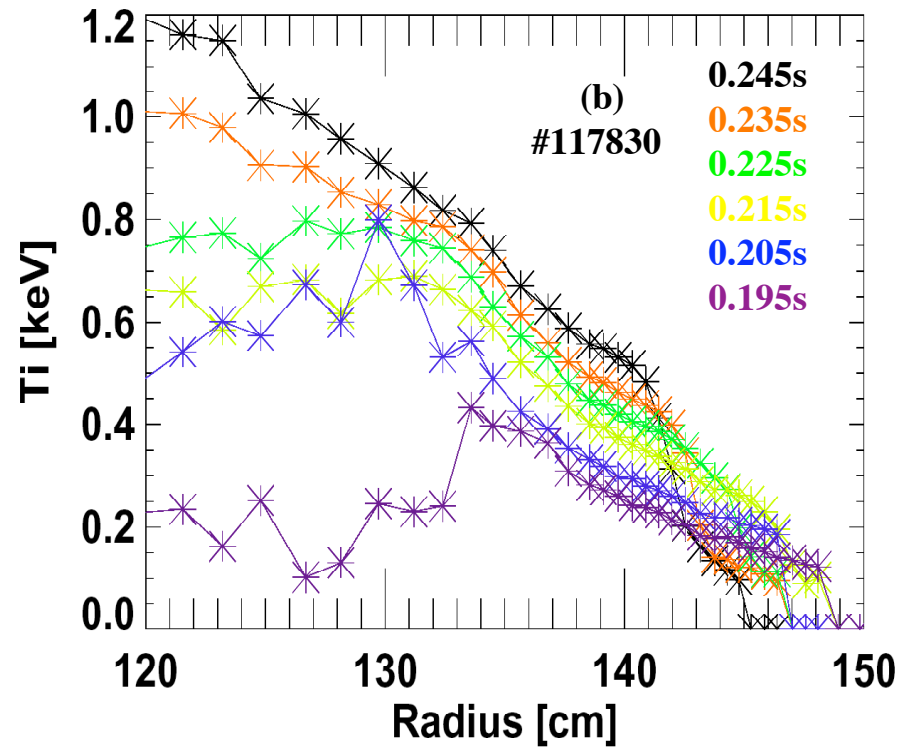
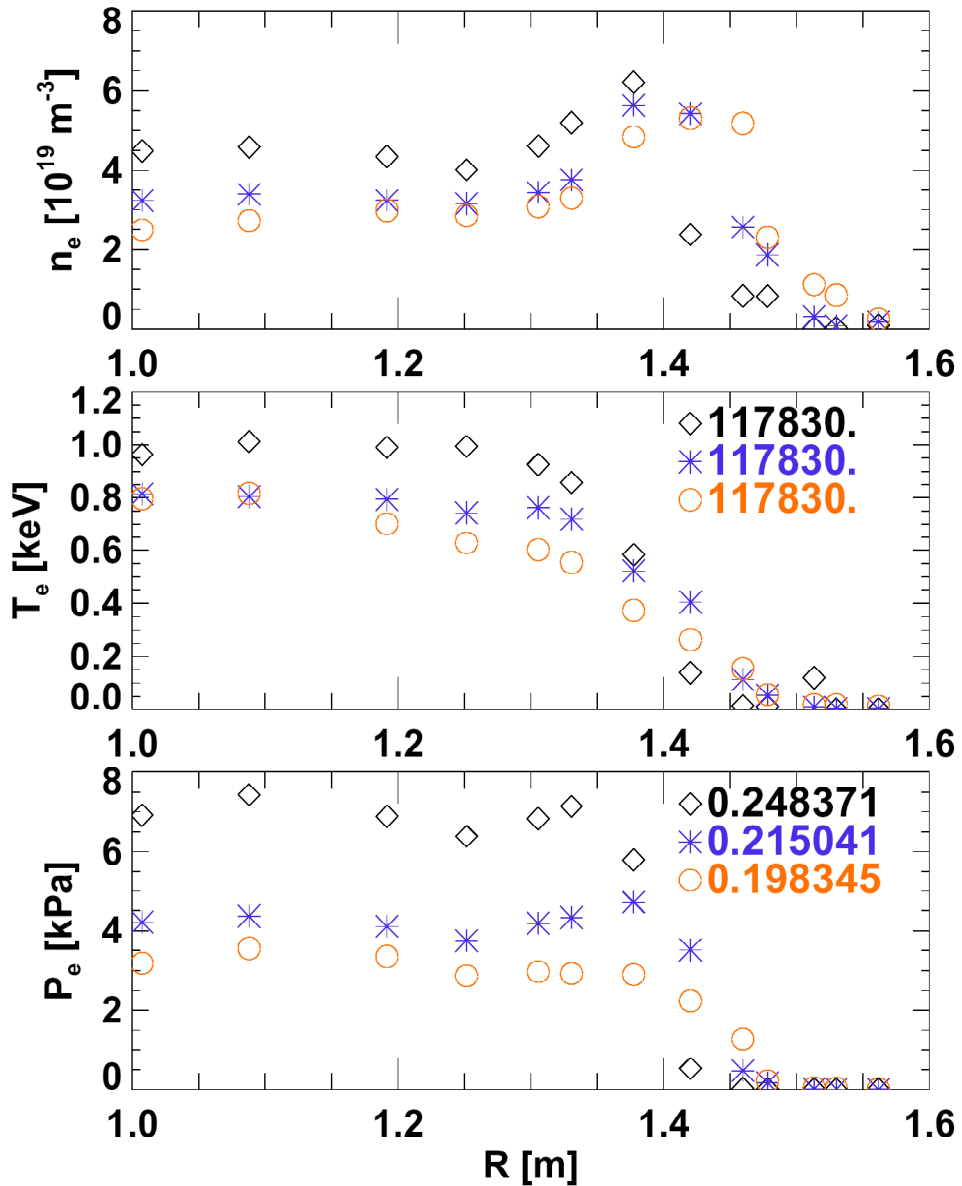
Transition to Enhanced Confinement follows MHD



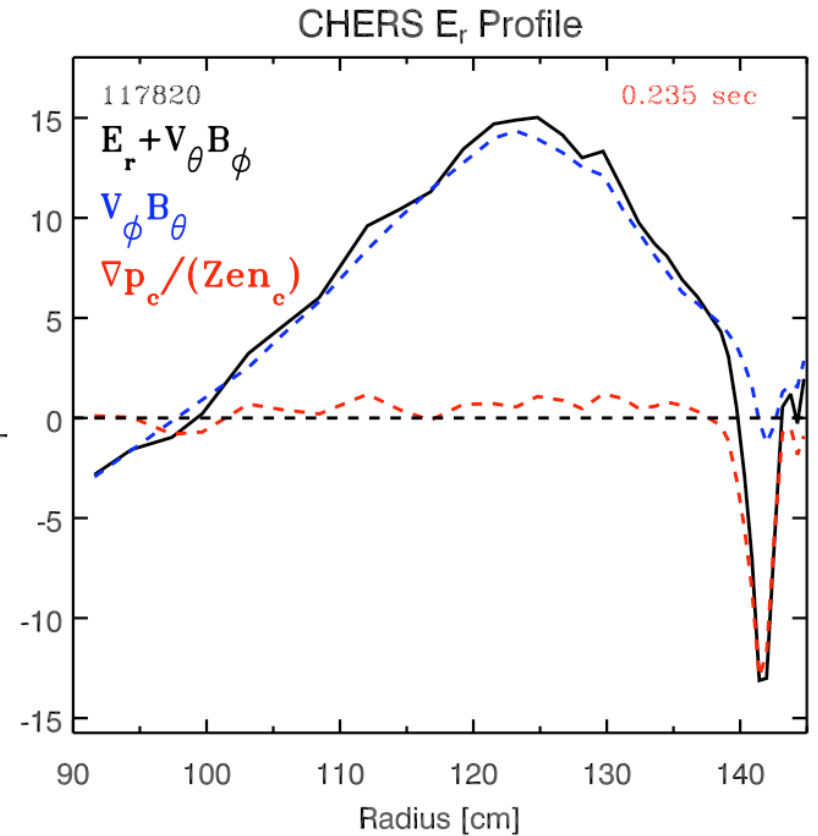
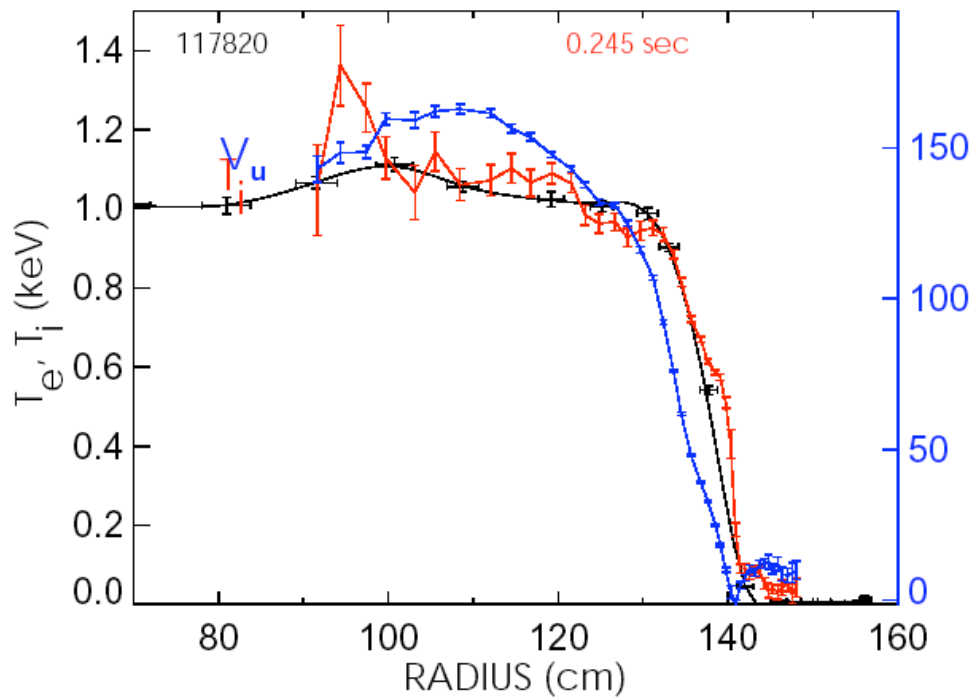
Dramatic Increase in Edge T_i , T_e and core n_e



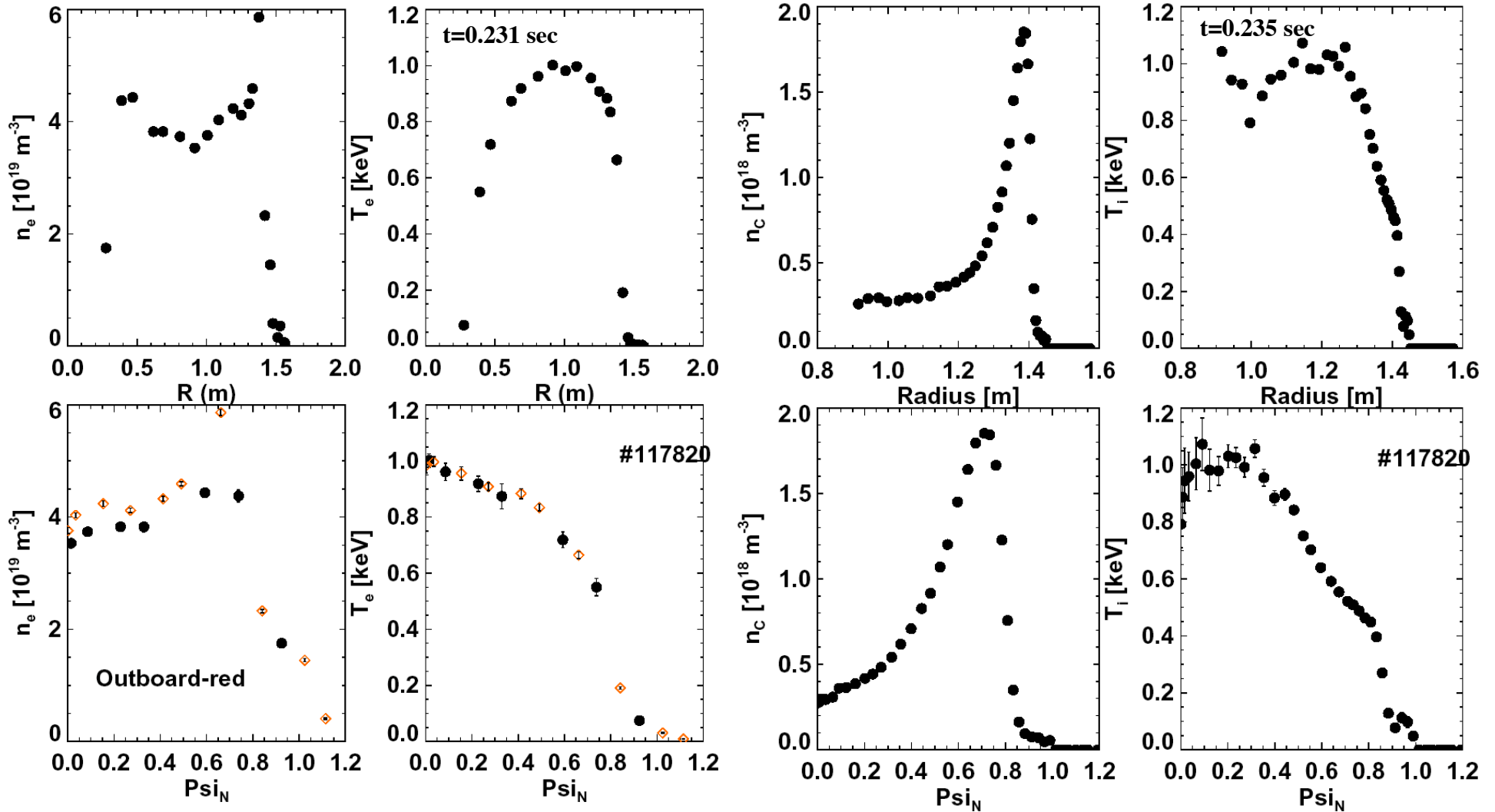
Dramatic Increase in Edge T_i , T_e and core n_e



Large E_r near T_i inflection point, dominated by ∇P
No Evidence of large island in V_ϕ Near T_i inflection

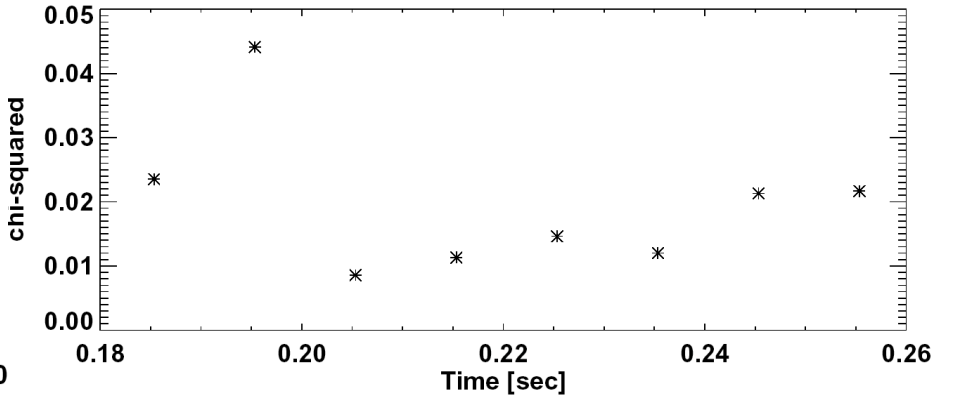
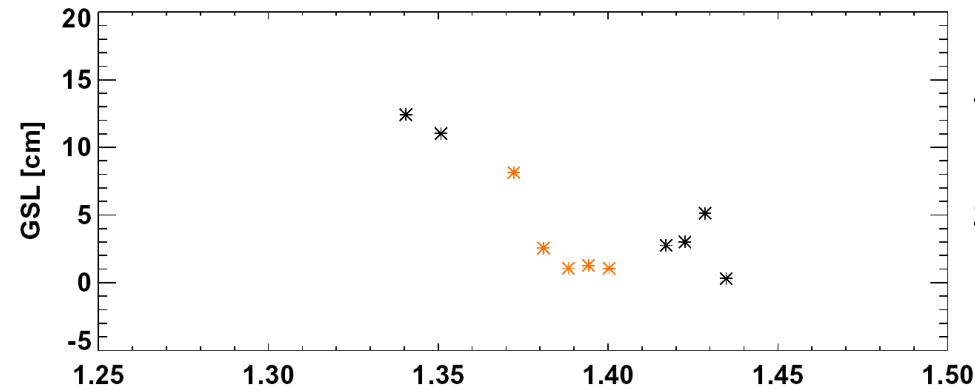
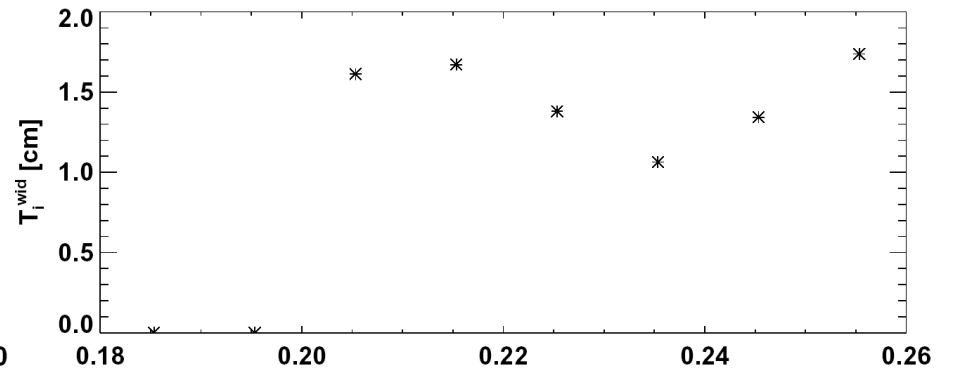
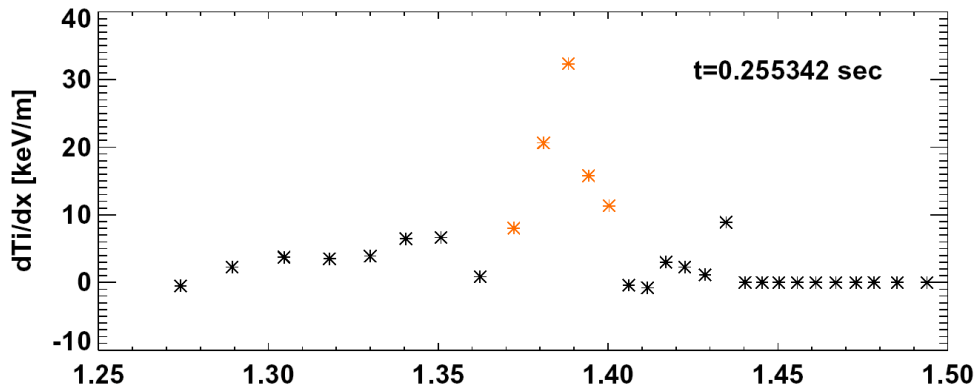
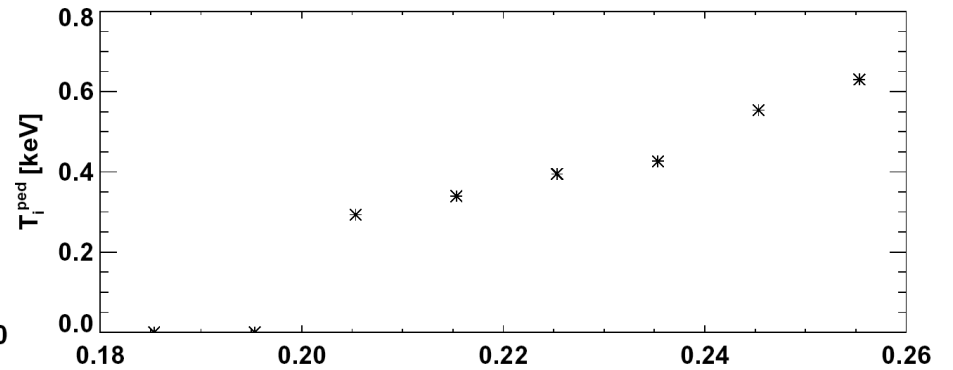
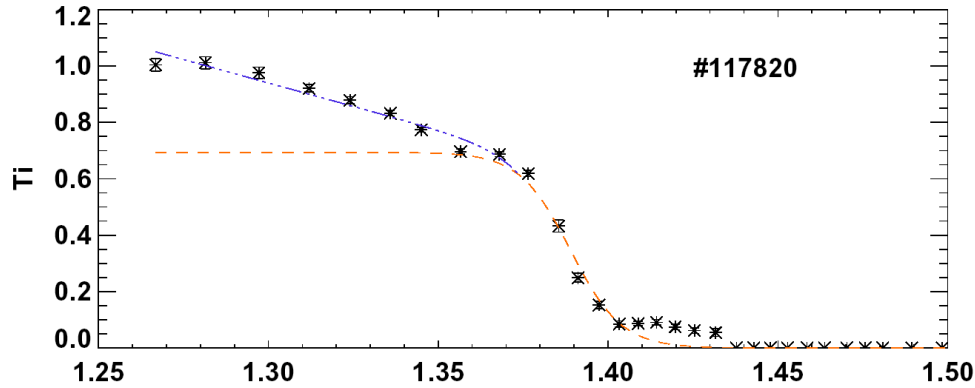


T_i steep gradient region extends from $\psi_N \sim 0.8-0.9$



LRDFIT04 with isothermal constraint

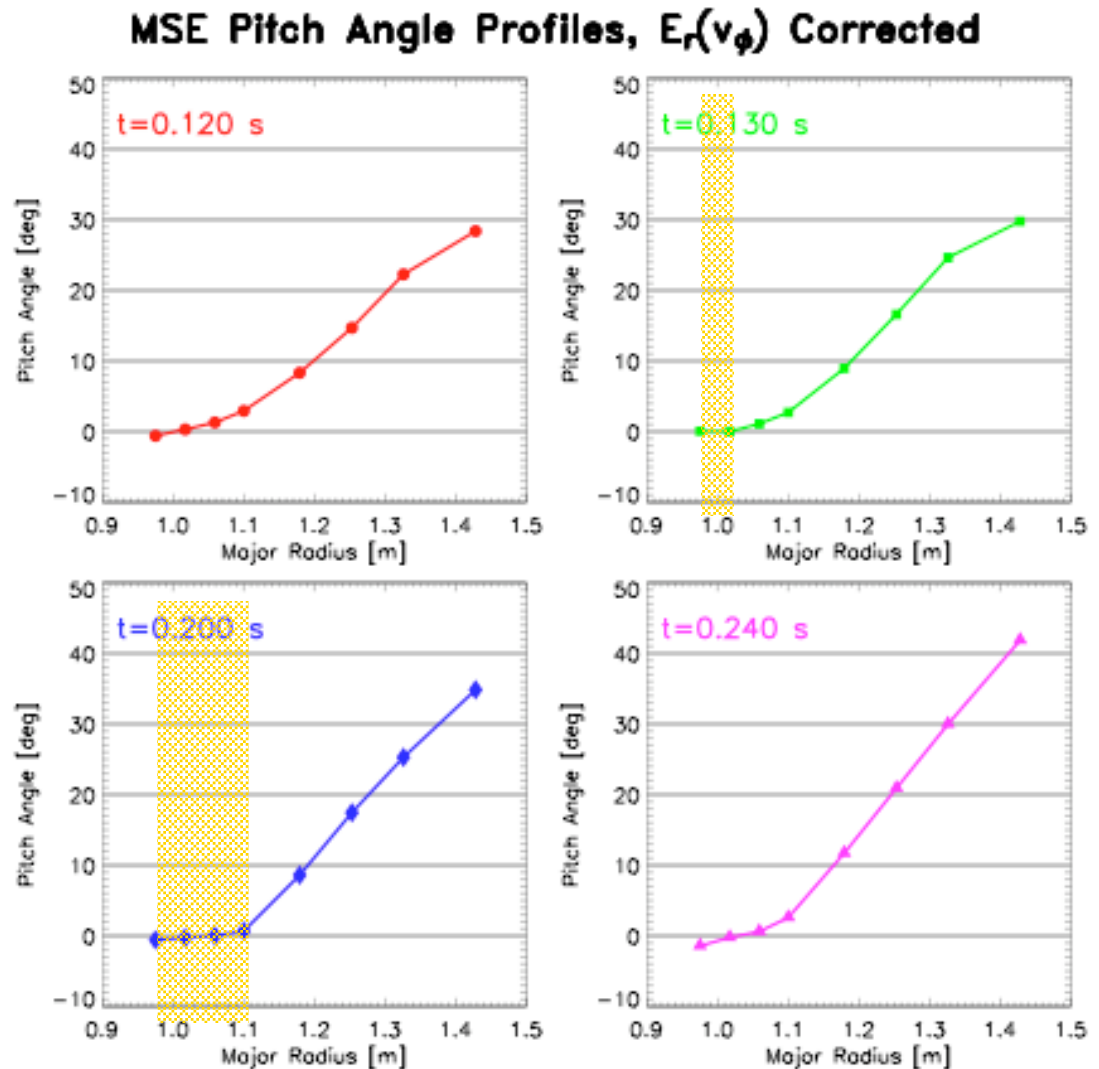
“Standard” Modified tanh fits show pedestal T_i increasing with time



MSE Shows Evidence for Formation of “Current Hole”



- At 0.12 s current profile is hollow but central current density is finite
- Small region of almost zero current density forms at 0.13 s
- Expands to about 15 cm diameter by 0.20s
- Central current density becomes positive again by 0.24 s



XP526 - Enhanced H-mode Analysis Plans



- Pedestal analysis using new Thomson edge channels
- TRANSP analysis with LRDFIT or EFIT using isothermal constraint on T_e
- Identify characteristics of terminating MHD
- Global stability analysis including good fit to MSE channels