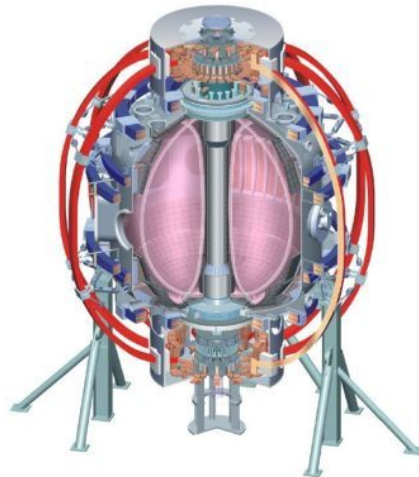


# Summaries of XP 1064 (EPH Mode Development) and XP 1025 (ELM Pacing with Combined RMP and Vertical Jogs)

College W&M  
 Colorado Sch Mines  
 Columbia U  
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 General Atomics  
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 UC Irvine  
 UCLA  
 UCSD  
 U Colorado  
 U Illinois  
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 U Rochester  
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 U Wisconsin

**J.M. Canik, ORNL**

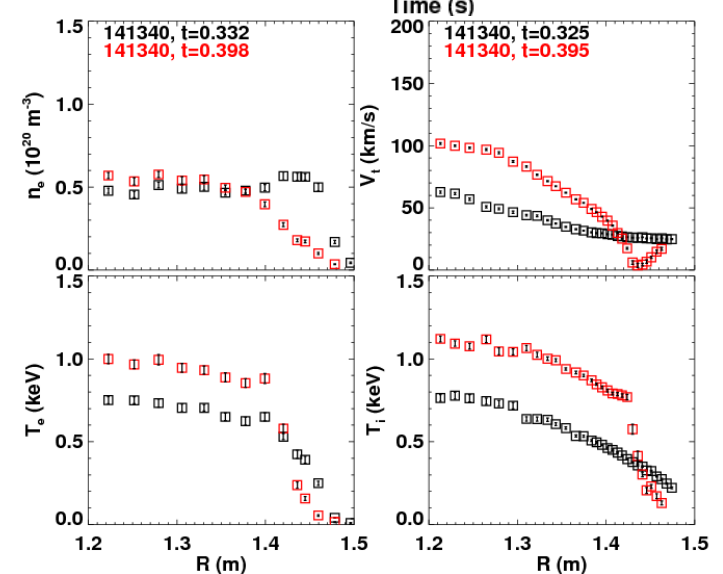
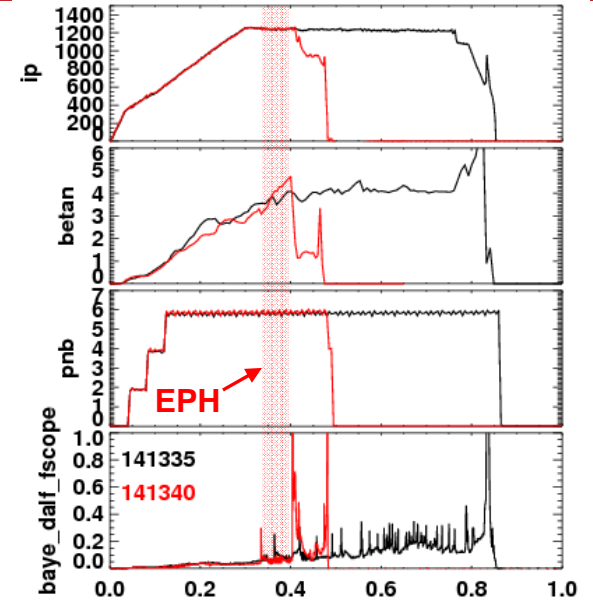
**NSTX FY10 Results Review**  
**Princeton, NJG**  
**Nov 30, 2010**



Culham Sci Ctr  
 U St. Andrews  
 York U  
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 Fukui U  
 Hiroshima U  
 Hyogo U  
 Kyoto U  
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 KAIST  
 POSTECH  
 ASIPP  
 ENEA, Frascati  
 CEA, Cadarache  
 IPP, Jülich  
 IPP, Garching  
 ASCR, Czech Rep  
 U Quebec

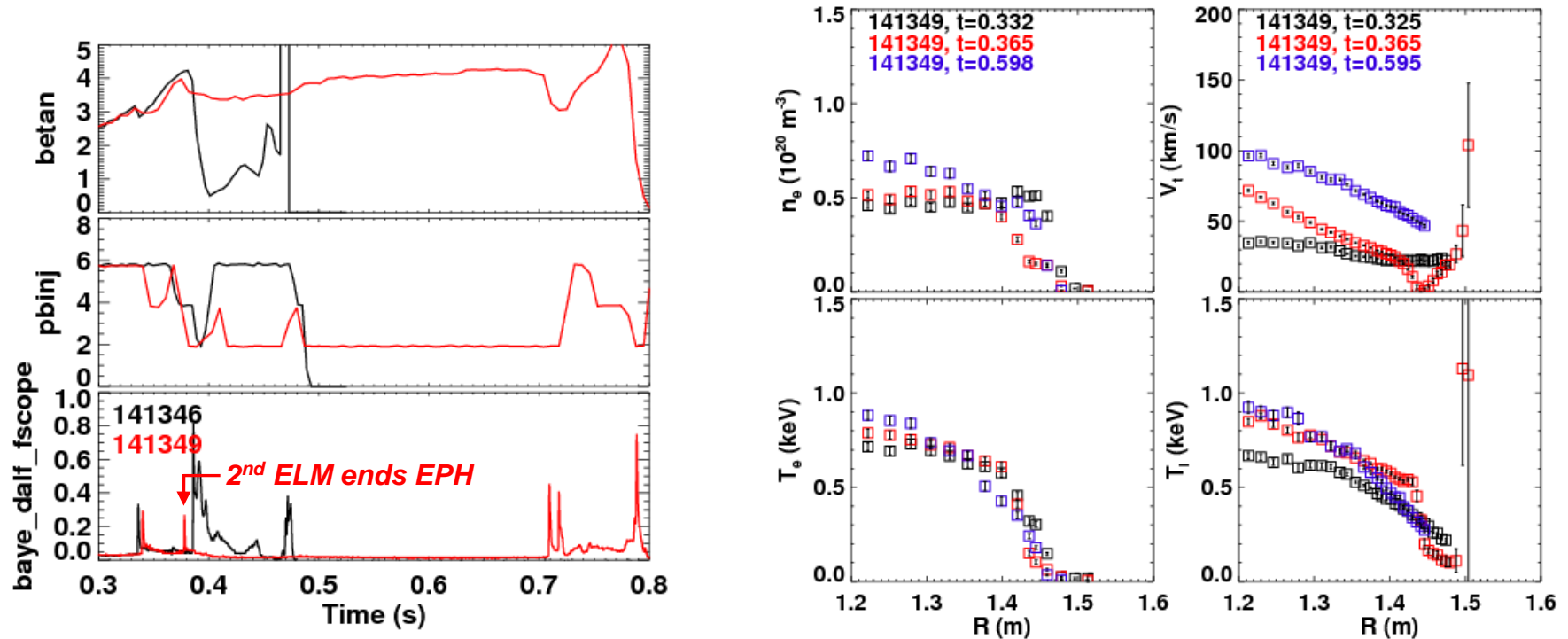
# Summary of EPH Mode Development (XP-1064, second day)

- Original XP Goals: trigger EPH, extend with advanced control techniques
  - Lithium, SGI to facilitate
  - Triggered ELMs (w/ n=3 field) to initiate
  - $\beta$ , RWM feedback to extend
- 2<sup>nd</sup> day: look for natural EPH phases commonly attained at reduced  $q_{95}$ 
  - No SGI or n=3 triggers used
  - Occurred (early) in flat-top
- EPH phase successfully reached in 15 of 20 discharges
  - Fast ramp of  $\beta_N$ , typically to disruption
  - Pedestal profile shows EPH structure: high  $T_e$ ,  $T_i$ , local minimum of  $\sim 0$  in  $v_{tor}$



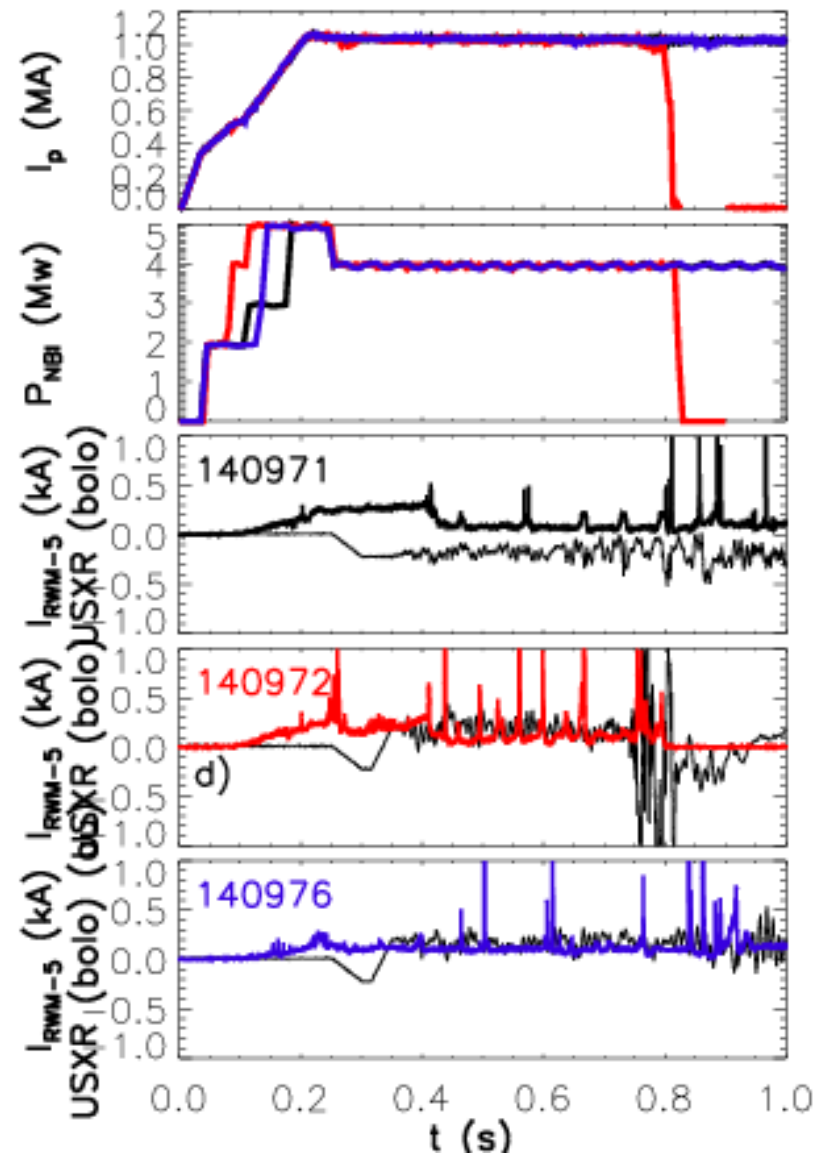
# Summary of EPH Mode Development (XP-1064, second day)

- $\beta$ -feedback control attempted to extend EPH
  - Aggressive feedback parameters (gain and target beta) successful in rapidly dropping power following transition
  - Early disruption avoided, but second ELM ended EPH
    - Suggests more Li needed to avoid unwanted ELMs



# Summary of Initial Results using combined vertical jogs + RMP for ELM Pacing (XP-1025)

- XP Goal: test if combining vertical jogs and  $n=3$  field can trigger ELMs at reduced jog size, field amplitude
  - Either  $n=3$  or VJ alone trigger ELMs
  - JET shows synergism of the two
- First run provided positive results, indicate combined RMP and VJ more effective for triggering ELMs
  - Jogs alone: no/few ELMs
  - **Jogs +  $n=3$ : several ELMs**
  - $n=3$  alone: fewer ELMs



# Summary of Initial Results using combined vertical jogs + RMP for ELM Pacing (XP-1025)

- Second run largely reproduced results from first day
  - Small jogs (below ELM triggering threshold) alone didn't trigger ELMs
  - Same jogs combined with low-level n=3 field produced a few ELMs
- Had trouble with L-H transition timing
  - Reproducibility was very poor
  - Didn't get to n=3 only case, or any further in shot list

