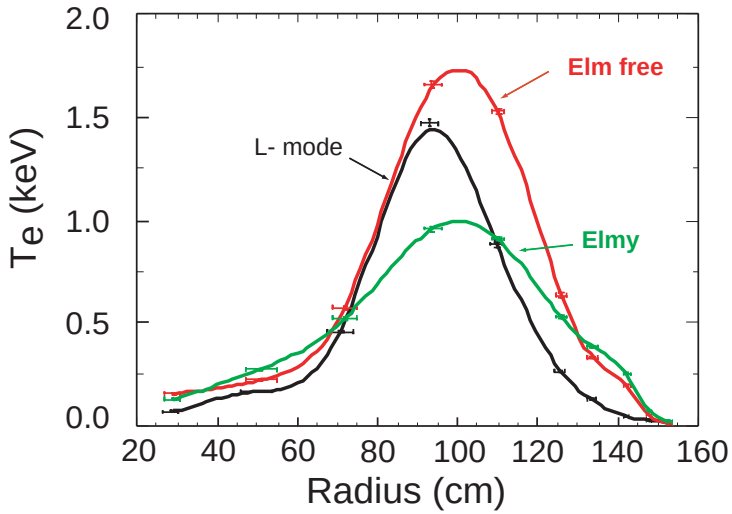
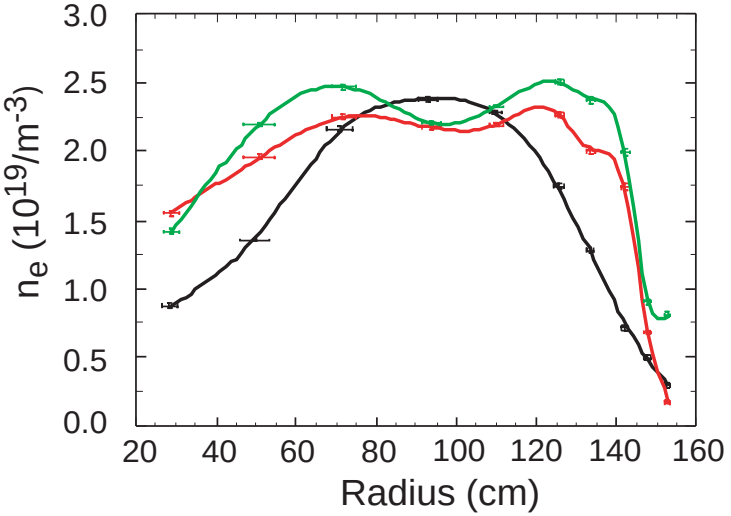
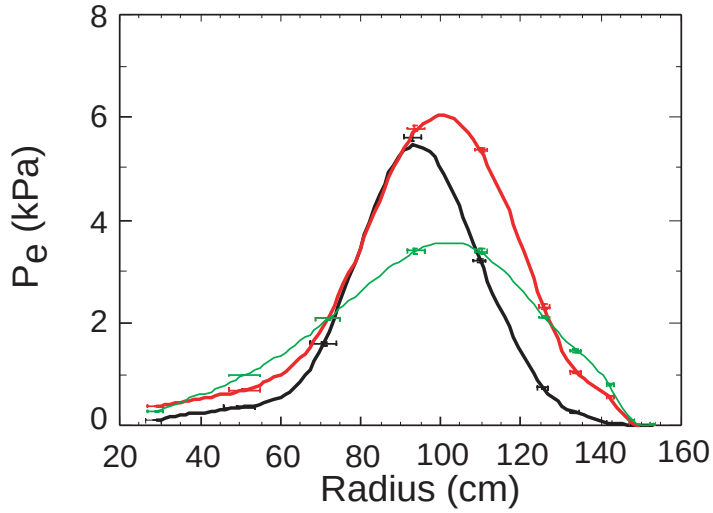
Long Pulse Extension utilizing HHFW H-modes

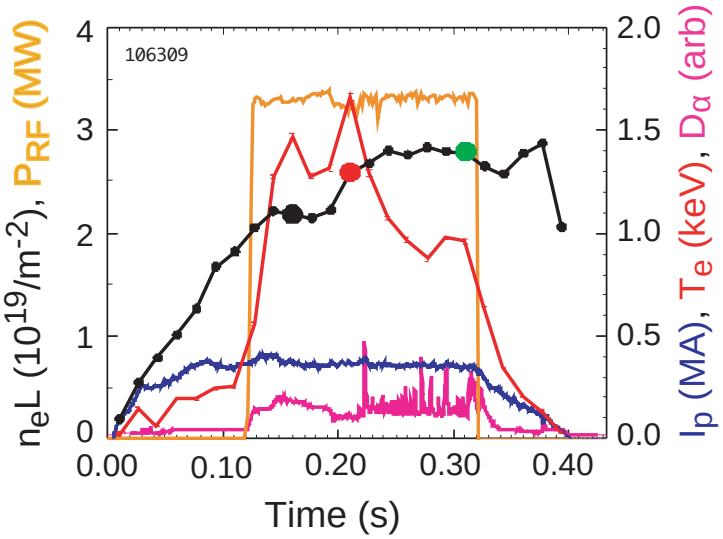
- A principle goal of NSTX research is to demonstrate that ST's can have steady state capability
- ST's can have large bootstrap current fraction but probably not 100%
- The HHFW H-mode discharges obtained during the last run provide a direction to move in to demonstrate CW potential

H-mode develops with broad T_e and especially n_e profile





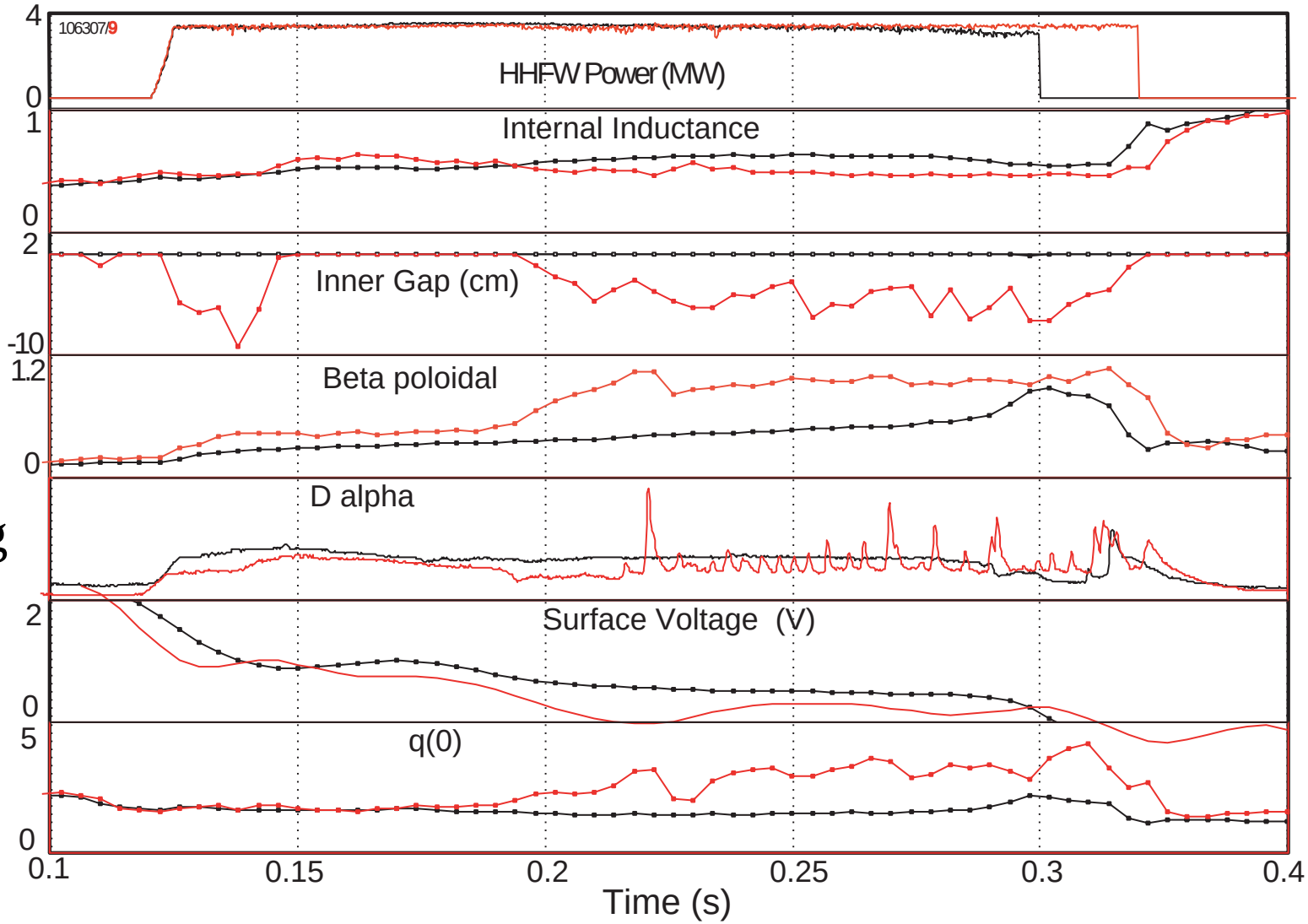




H-mode makes excellent target for long pulse sustainment

TRANSP analysis indicates $f_{BS} = 0.4$

Pulse ends due to programming



Directions to move research in

- Lengthen pulse
  - Increased TF time will help
  - Come closer to steady state
- Raise current
  - May improve confinement but will lower bootstrap fraction without proportional increase in stored energy
- Raise density
  - Increase stored energy/ bootstrap fraction
- Use current drive phasing on RF
  - May actually drive current
- Increase RF power
  - Maintain H-mode at higher density/current
  - Increase stored energy