

Early HHFW heating in NSTX

Status and future goals of XP-025

J. Menard

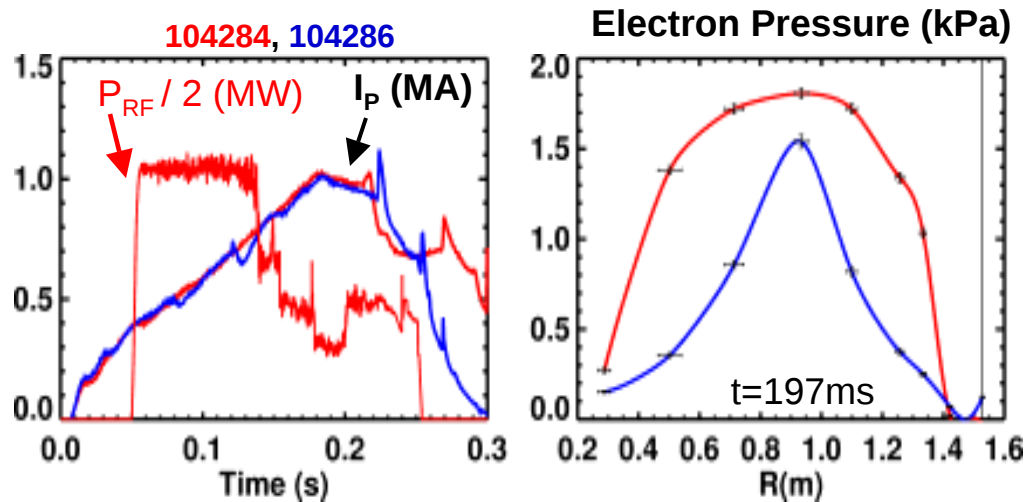
NSTX Research Forum

Integrated Scenario Development Experimental Task Group

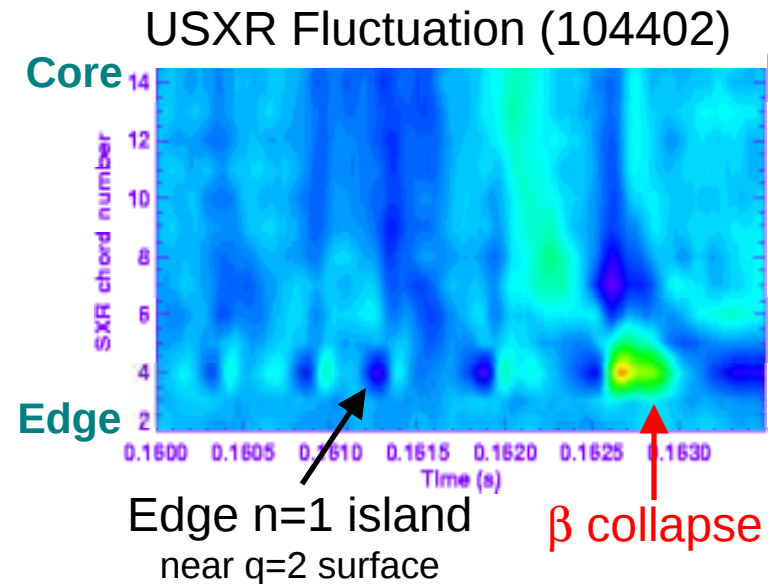
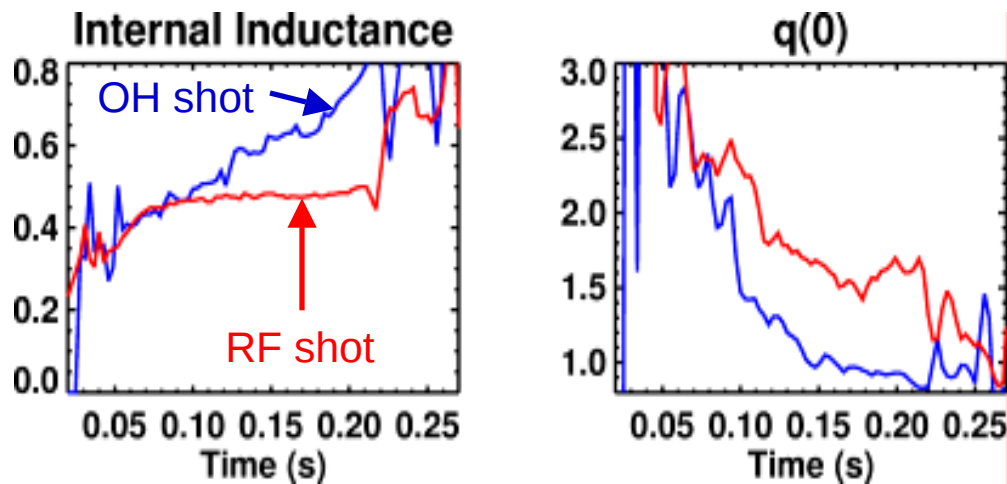
November 29, 2001



RF heating during I_p ramp can lower $p(0)/\langle p \rangle$, raise $q(0)$



- Achieved $\beta=15\%$ at low- $l_i \sim 0.5-0.6$ using early RF+NBI
- β -collapse caused by **edge** MHD
- Possibly useful for “AT” regimes



XP025,016 - J. Menard
XP017 - S. Sabbagh

Early FW heating often slows rotation, triggers locking

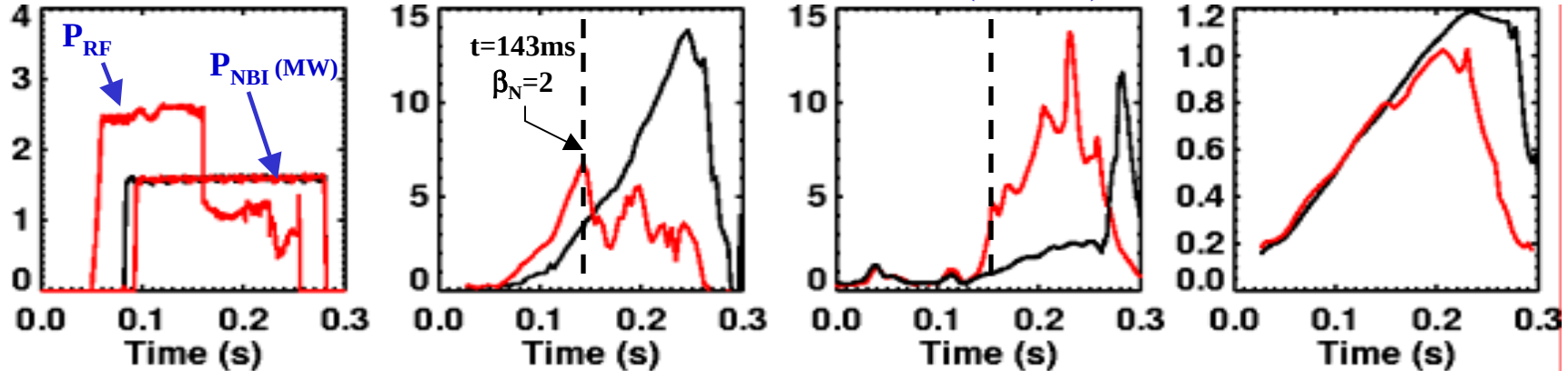


Red = HHFW+NBI
Black = NBI only

$\beta_{t0}(\%)$

Locked-mode
n=1 (Gauss)

I_p (MA)

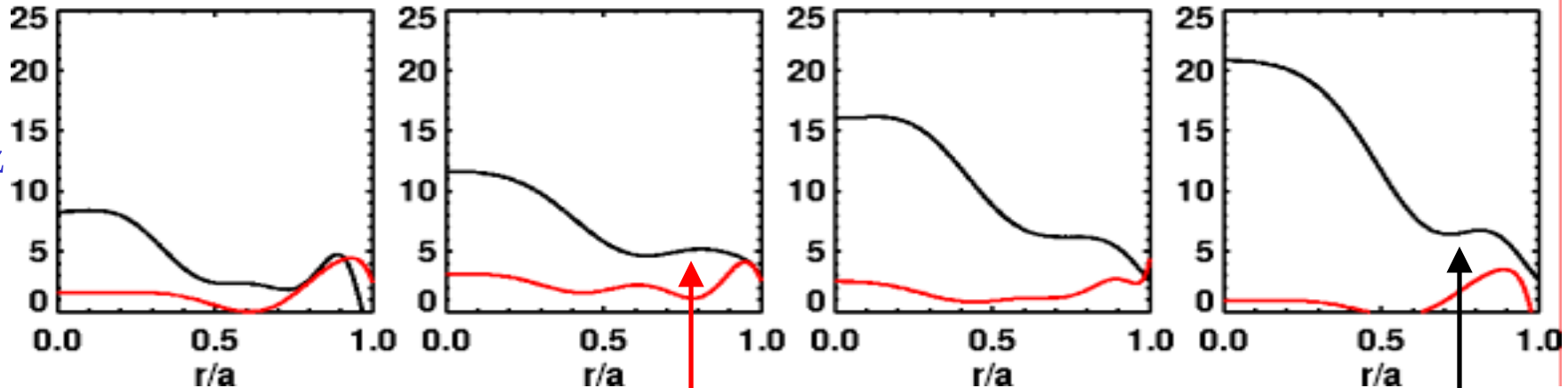


f_{Rot} at $t=130ms$

f_{Rot} at $t=150ms$

f_{Rot} at $t=170ms$

f_{Rot} at $t=190ms$



- Many shots suggest $f_{ROT} \geq 2-3kHz$ needed to avoid locked tearing
- Edge rotation often has plateau w/ $f_{ROT} \leq 6kHz$ - **error field drag?**

Future Goals for Early HHFW Heating



- Get more rotation and locked-mode sensor data
 - Crucial data obtained only at end of last run
 - Data $\Rightarrow$ early suppression of NBI rotation by HHFW
 - Low rotation $\Rightarrow$ tearing/kink modes lock to error field
 - Need to understand effect of HHFW on NBI rotation
 - Study role of density, NBI/HHFW timing, ion-damping, etc.
 - Results could be quite different with reduced error field
- Study effect of ramp-rate and discharge history
 - Successful early heating $\Rightarrow$ unstable J-profile?
 - Modify I_p ramp-rate to study stability of heated plasma
 - Use long-pulse high $q(0)$ HHFW shot as NBI target, then ramp I_p