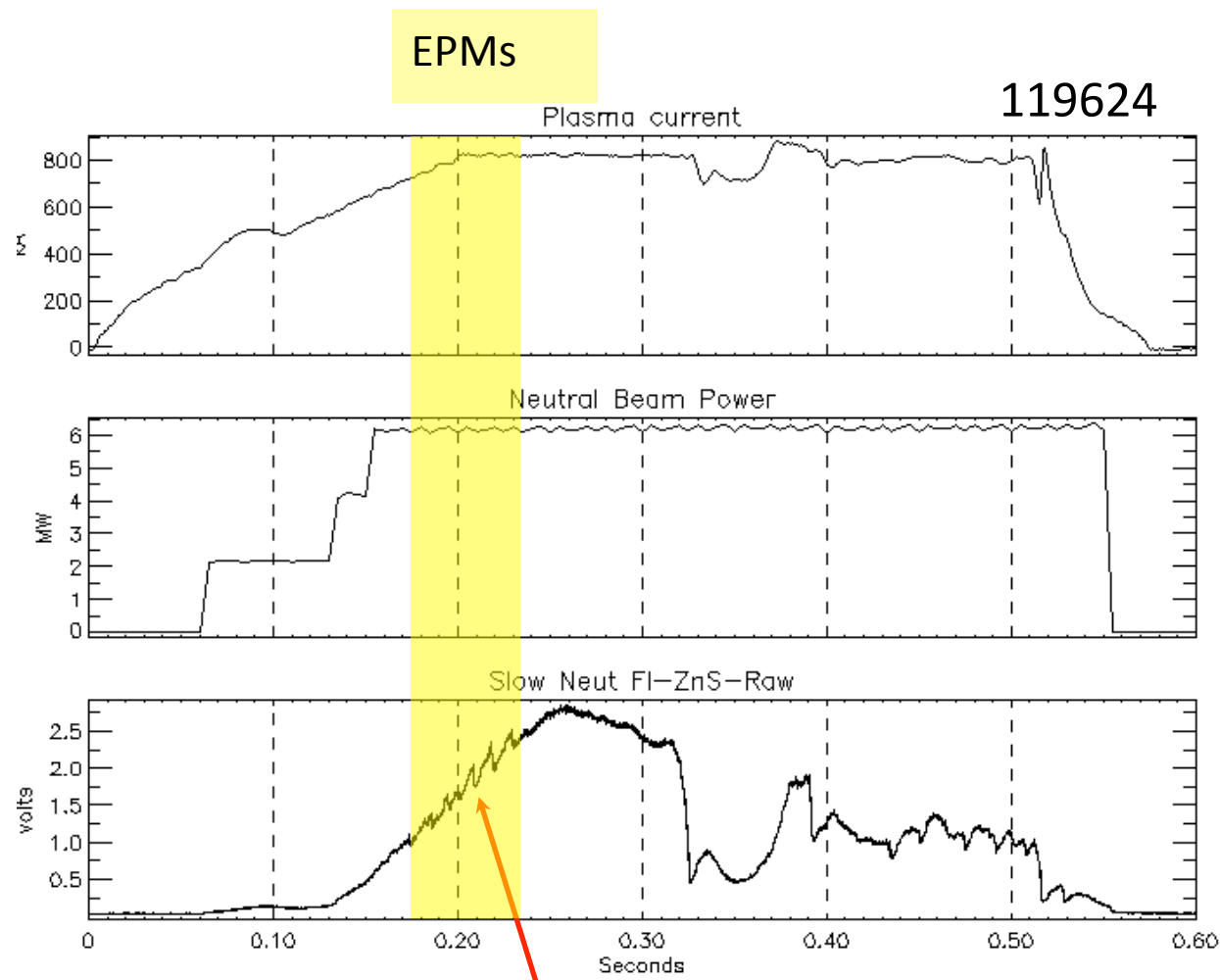


**XP 905: Current Profile
Modifications and Fast Ion Loss
from BAAEs/EPMs**

D. Darrow, et al.

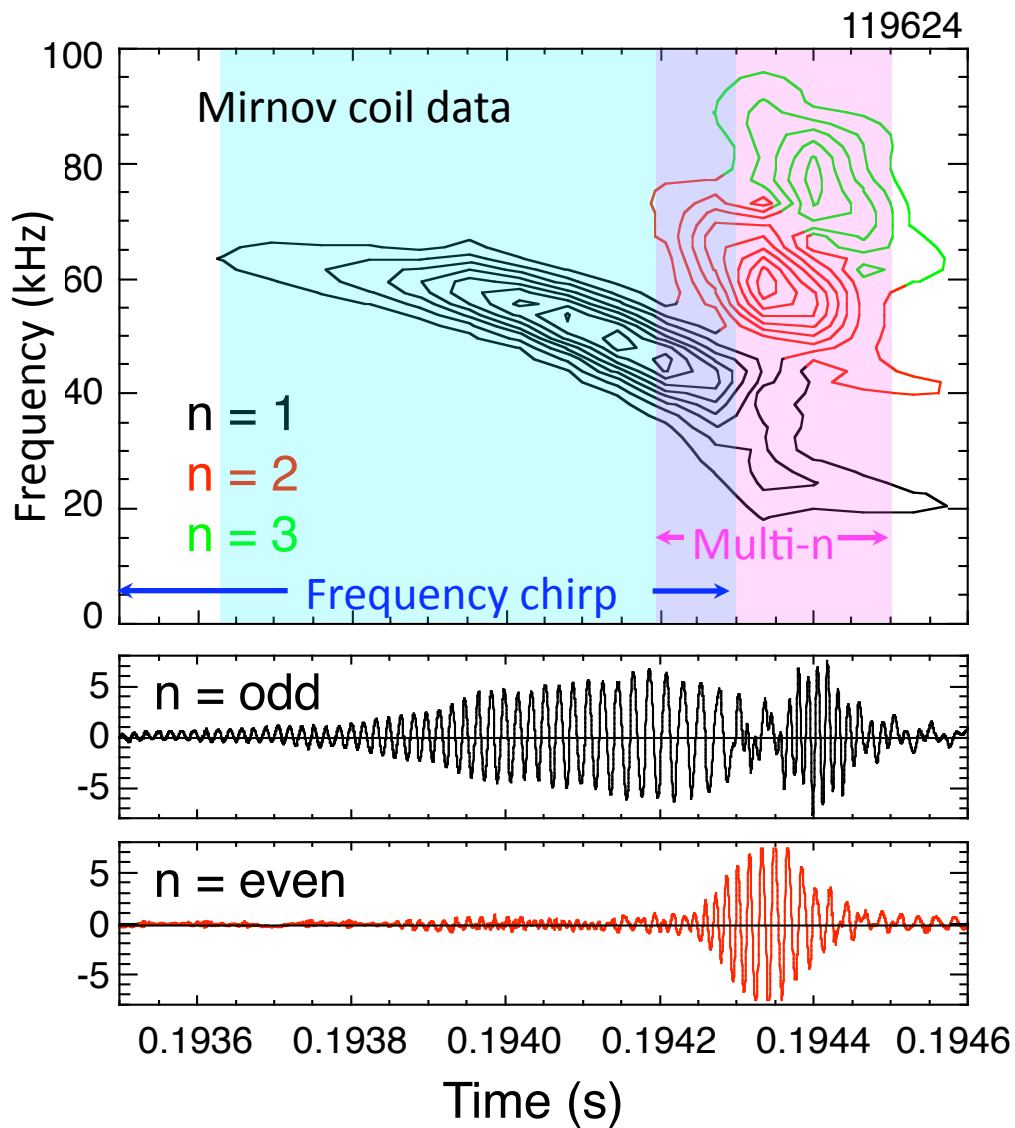
April 8, 2009

BAAE/EPM bursts expel NB ions & may redistribute current



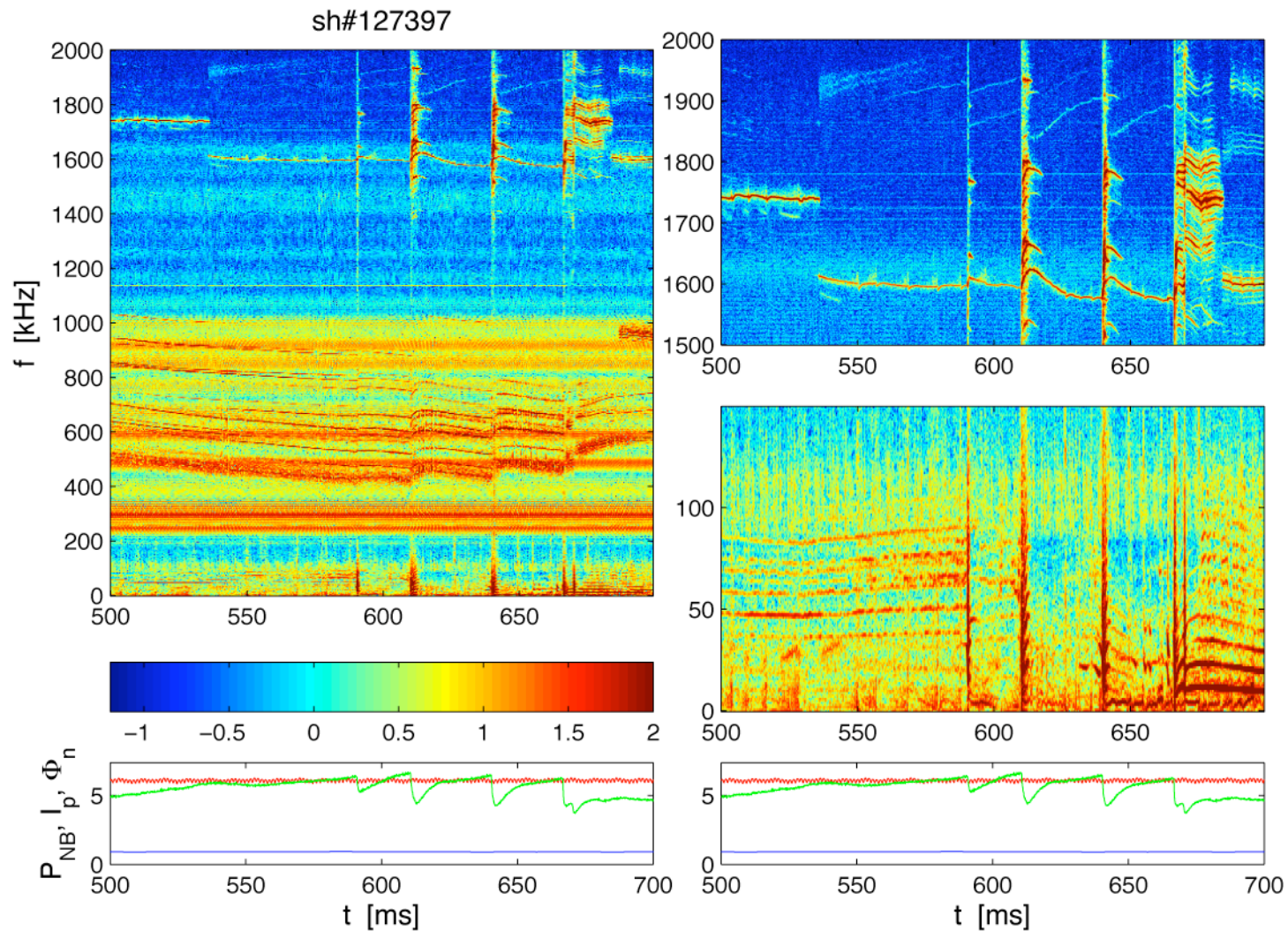
- Bursts are often seen during I_p ramp up, causing neutron drops and possibly contributing to rapid $j(r)$ redistribution
- Important for NHTX, VNS, & ITER to quantify $j(r)$ transport due to modes

Mode chirps & has multiple n



- Neutron drops & fast ion loss concurrent with multi-n overlap

Bursts also seen during I_p flattop— simplest situation to study



Experimental plan-1

- Reload 2008 shot with bursts during flattop: 127393 (alternates: 127383, or 127397)
- 900 kA, 0.44 T, 3 beams at 90 kV
- Check for presence of bursts

Experimental plan-2

- If no bursts:
- Reduce I_p by steps of 100 kA until bursts recur
- With bursts present, increase gas puff to increase n_e in steps of $\leq 1 \times 10^{19} \text{ m}^{-3}$ to reduce mode fast ion drive & increase interval between bursts. Goal: 50 ms between bursts. [2 hour limit on this step]
- If 50 ms spacing not attained:
- Increase I_p in steps of ≤ 100 kA until 50 ms spacing attained [2 hour limit on search]

Experimental plan-3

- Work with 50 ms separated bursts, if attained, otherwise measure effect of series of bursts
- Document effects of bursts on $j(r)$, fast ion loss

Experimental plan-4

- Document mode numbers, profiles & amplitudes
- Reserve 2 hours for: Repeat shots with $n=3$ braking to get data on mode structure near $\omega_{\text{rot}}=0$

Key diagnostics

- MSE: $j(r, t)$
- Mirnov coils: mode n , freq, & amplitude
- FIDA: $f_{NB}(E, r, t)$
- NPA: $f_{NB}(E, r, t)$
- CHERS: $\omega_{rot}(R, t)$ (for fast ion loss torque)
- Neutron detectors: $S_n(t)$
- sFLIP: $\Gamma_{loss}(E, \chi, t)$
- SXR array: mode structure
- FReTIP: mode structure
- Reflectometer: mode structure? (H-mode)
- High- k scattering: mode structure info

Analysis emphases

- MSE: Focus on effect of single burst or cumulative effect of multiple bursts, depending upon what is obtained; identify amount of current transported to or from each flux surface
- Mode profile diagnostics: fit best mode radial profiles and compare with NOVA predictions for BAAE under those conditions; compare also at lowest attainable toroidal rotation: how well do modes match BAAE theory?