

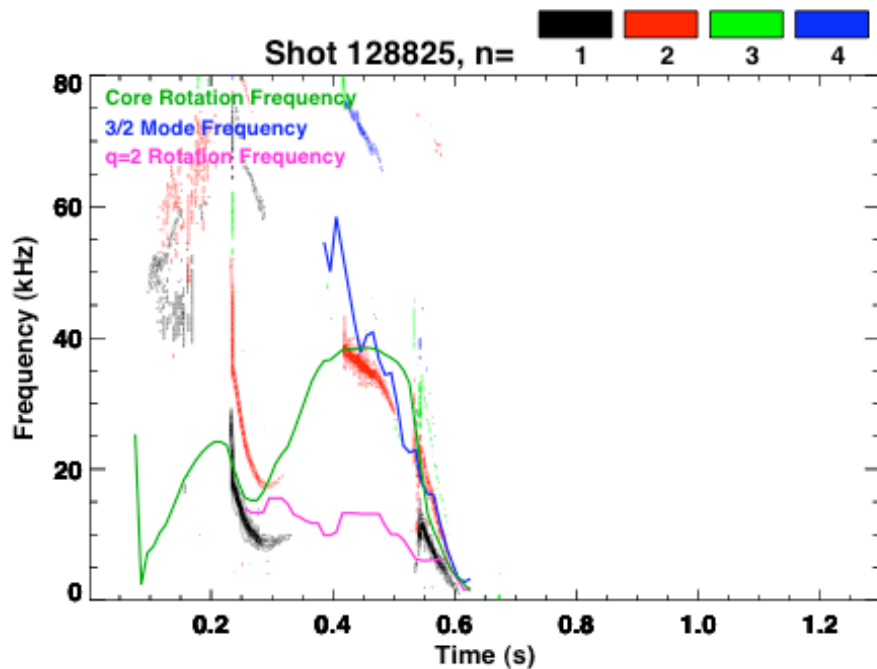
# XP 834: 3/2 NTMs

## Goal:

- Use a “beam step” technique to trigger mode.
- Use NBI rampdown to restabilize the mode.
- Study island width and restabilization as a function of rotation.

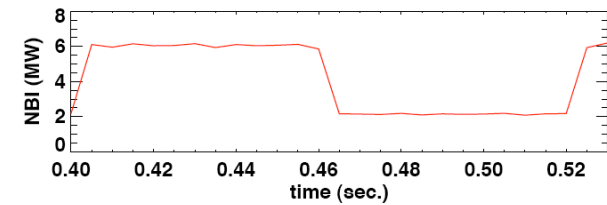
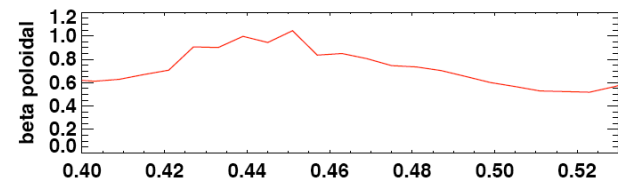
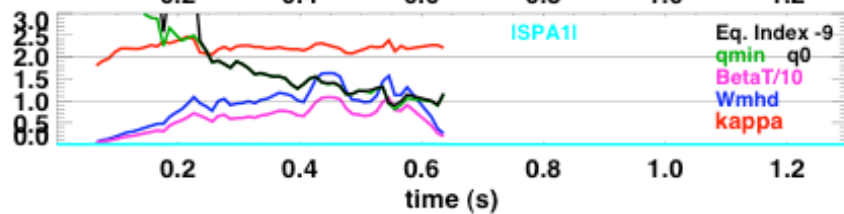
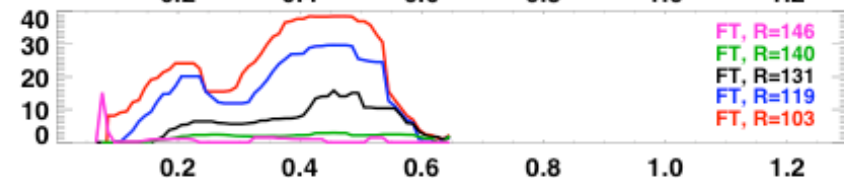
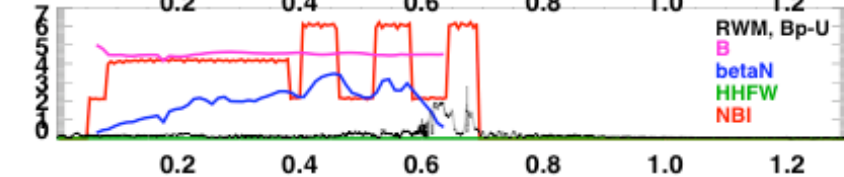
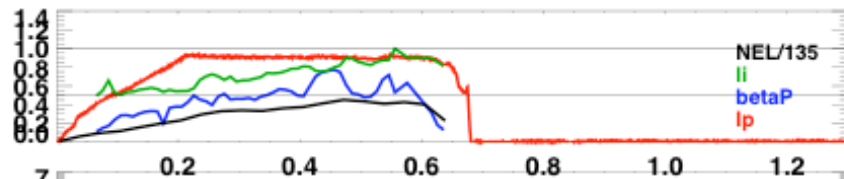
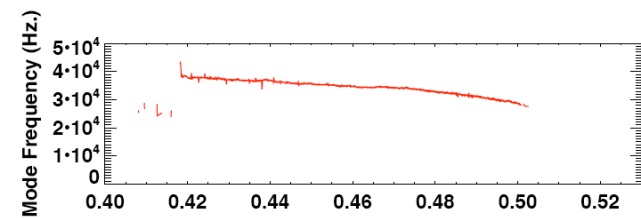
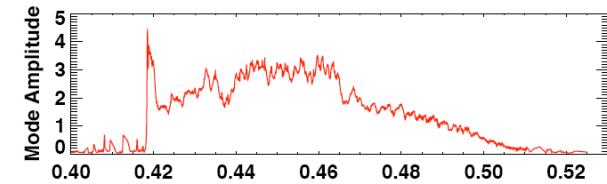
## Result:

- The method didn't work reliably.
- Scanned  $I_p$  to 900kA, 750kA, 1100kA, generated 3/2 modes in some, but not all cases.
- Reduced pre-heating, found a recipe to generate 3/2 modes later in the discharge. Got a few of these.
- Then, on XP828, beautiful 3/2 modes were generated...additional data toward these studies.

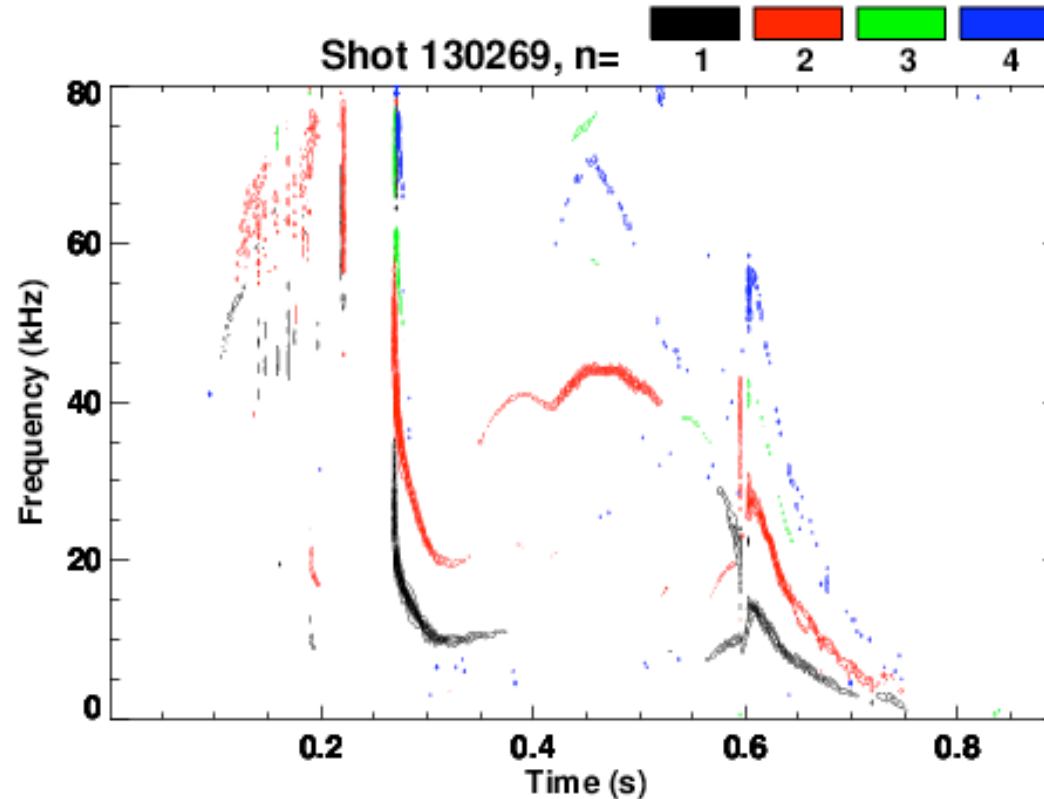


## Example of the “recipe”

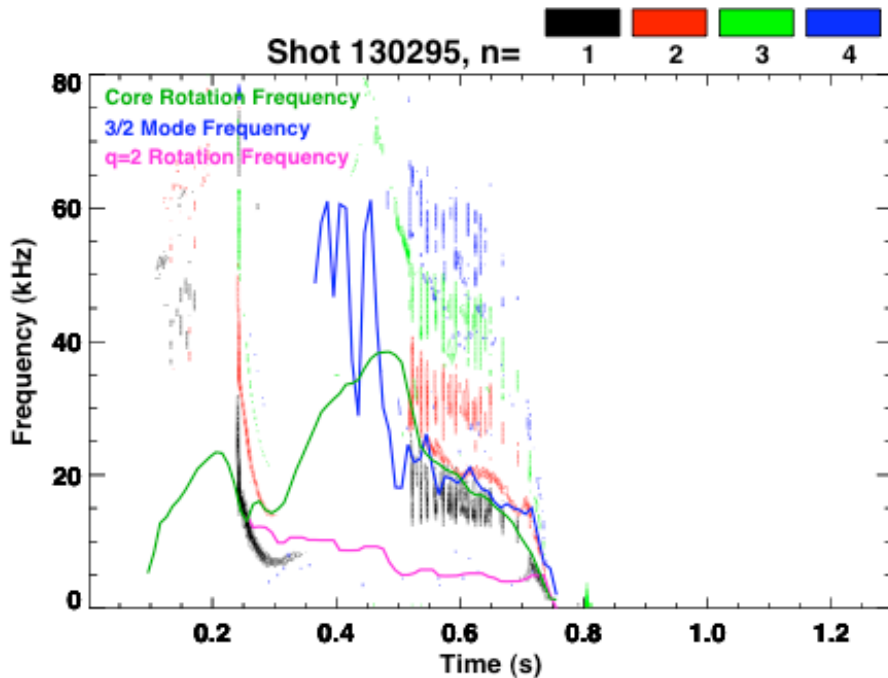
Mode Amplitude Decreases  
as  $\beta_p$  is Reduced



# Example Where Recipe Worked

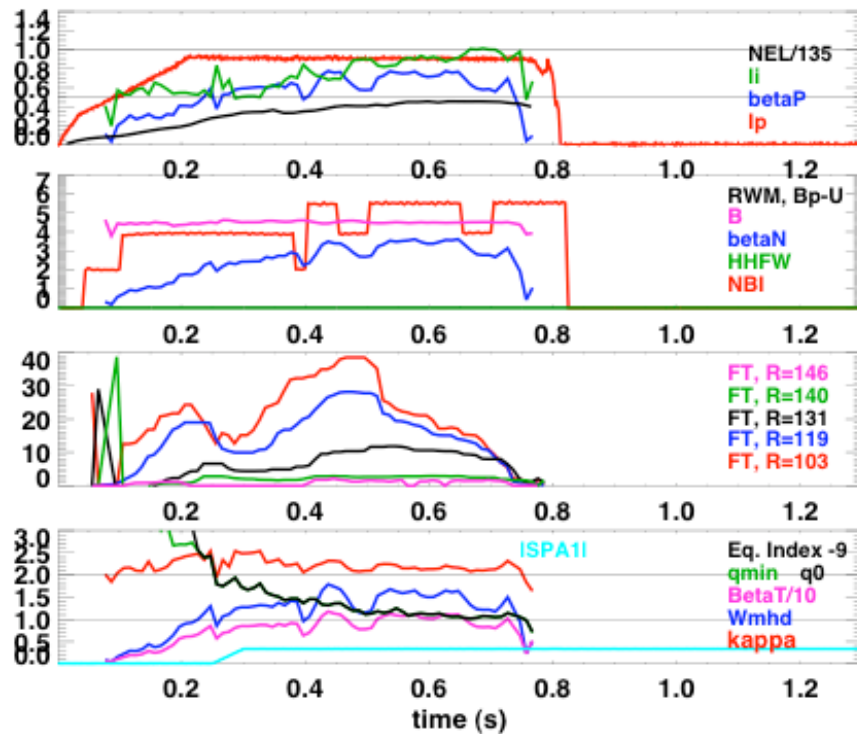


- Not able to strike reliably...but did have 3 or 4 cases.
- Mode “spontaneously” restabilizes without NBI power reduction ( $L_q$ ,  $L_p$ ,  $\beta_P$ ,  $GGJ$ ,  $w_{pol}$ ?).
- A few cases where 4/3 replaces 3/2.



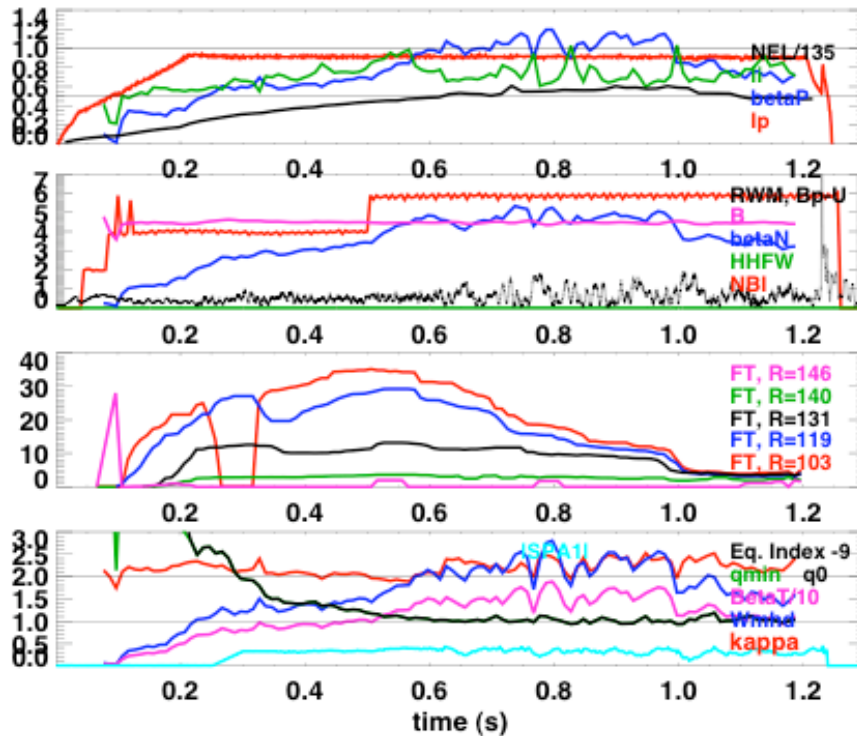
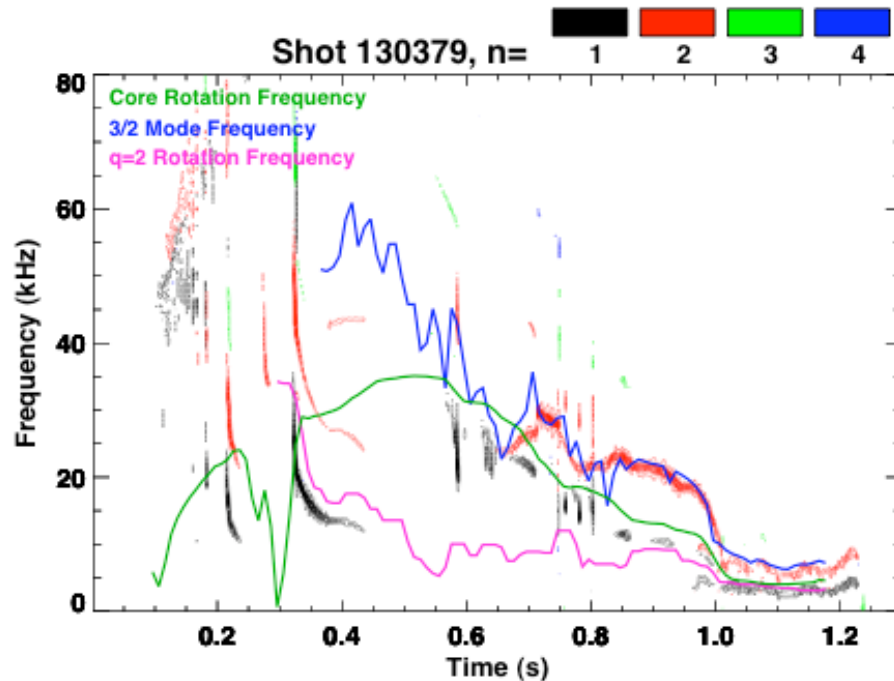
## Developed a Scenario with a Later 3/2 Mode

- Delayed source 2nd source
- NBI Step does NOT trigger a mode.
- Chirping modes (trigger?) + 3/2 mode.
- Late NBI “notch” to look for  $\beta_P$  dependence of island width.



*...frustratingly...*

## Beautiful 3/2 Modes on Li Powder Day



- Shots 130379, 130384, 130386, 130387.

- Match between mode frequency and  $2xf_{q=3/2}$ .

- Strong in the USXR, with inversion radii across  $q=3/2$ .

- Rotation damping effect similar to  $n=1$  mode, but not so strong.

- Interspersed with “similar” shots with no 3/2 mode...useful to check for differences in triggers, profiles...

# Summary

- We have a wide variety of shots with 3/2 modes.
  - but they are difficult study systematically.
- Should be possible to do analysis and modeling (more than I have time for) on these.
- Need a way to get the mode more reliably.
  - S.T. trigger studies, starting from 129898?