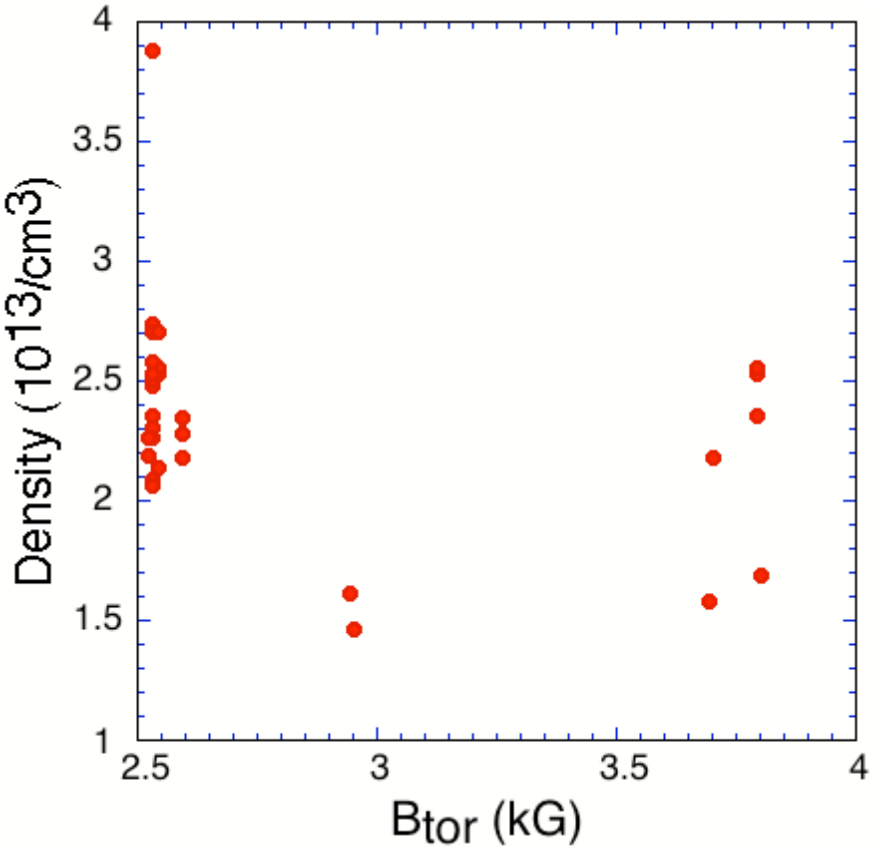
Parameter scaling of 'Angelfish' instability

- Best examples, most of data, is at low field (≈3kG) and early in discharge.
  - Low density?
  - Low current?
  - Weak drive (low fast ion beta)?
- Study mode with MSE, reflectometer, FLIP, NPA and Mirnov polarization array.
  - Develop scaling for frequency chirp rate, mode amplitude, burst frequency and secondary modes.

Most good data at low field, lowish density



- There are a few higher field points; needs more study.
- Angelfish seen with either source A or B, or with multiple sources
- Chirping faster with multiple sources?

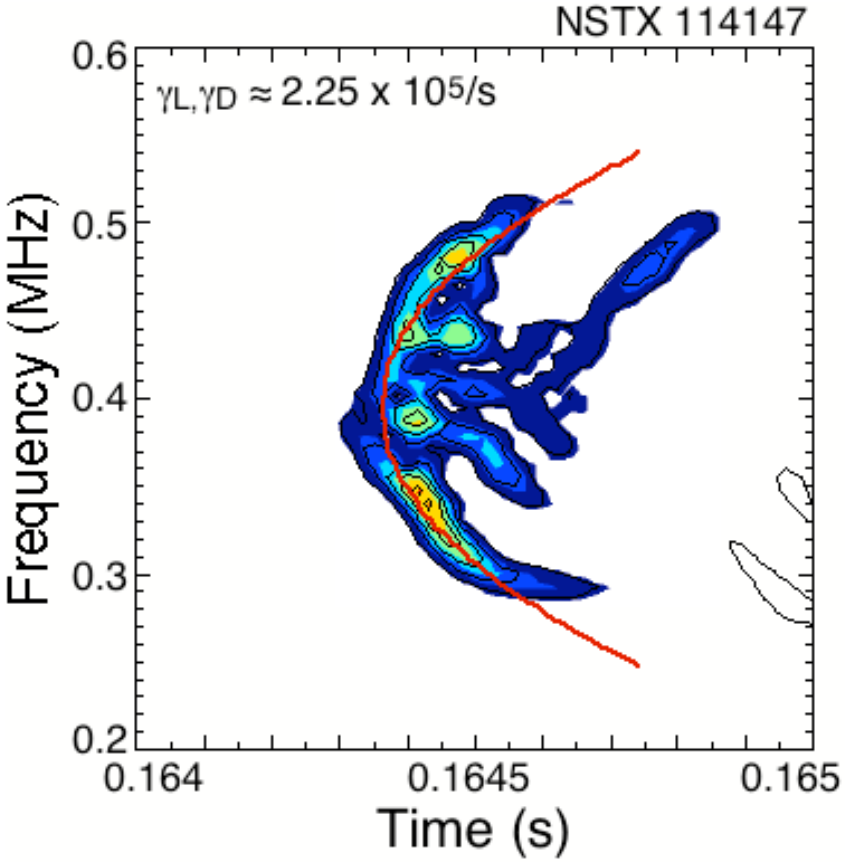
Considerable analysis can be done if available data is acquired

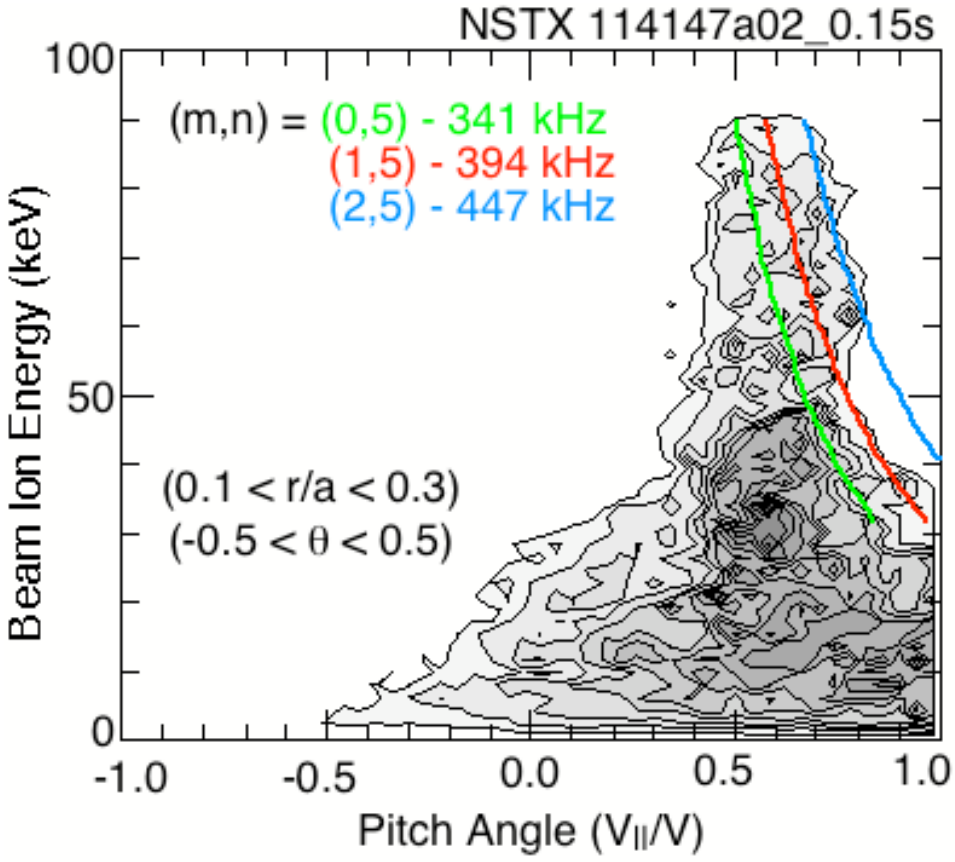
Dispersion relation:

$$\omega_{lab} = \omega_{GAE} - k_{||}V_{tor} = k_{||}V_{Alfvén} - k_{||}V_{tor}$$

Resonance condition:

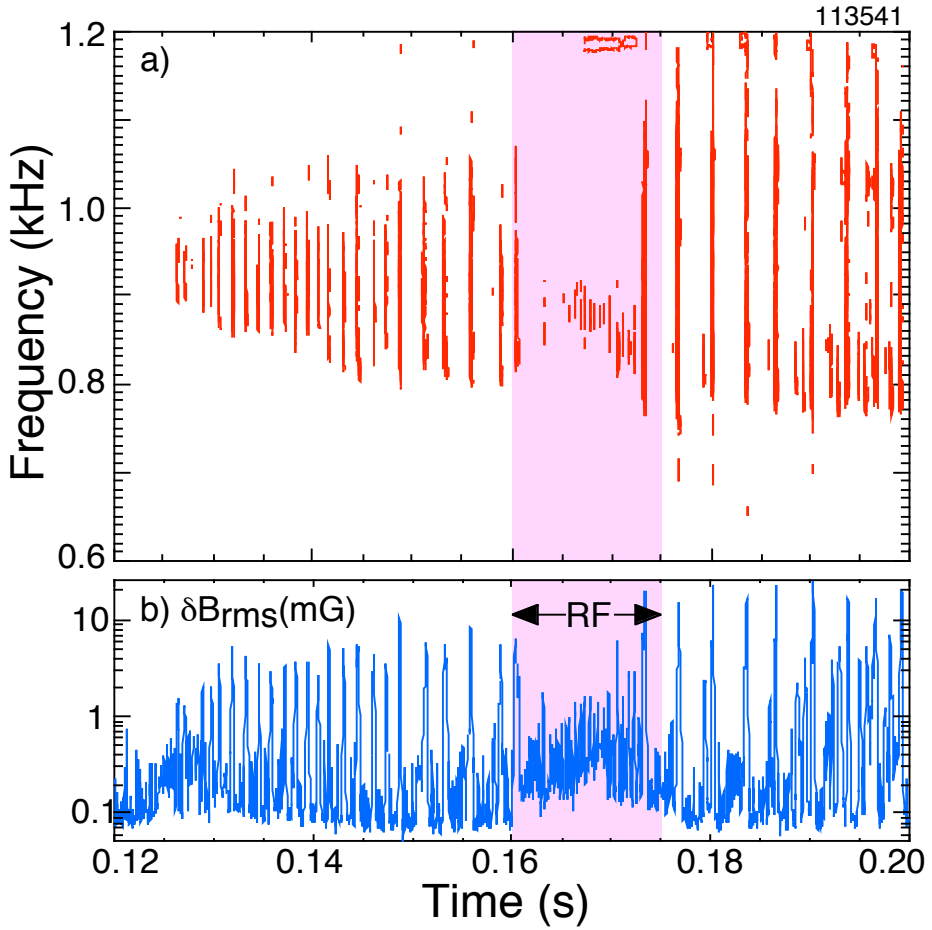
$$\omega_{ci} - k_{||}V_{b||} + k_{||}V_{tor} = \omega_{GAE}$$





Some evidence of Angel-suppression with HHFW

- However, there is a single burst towards end of RF pulse; incomplete suppression.
- Also, shots 113982-113985 are 'similar' shots, two with HHFW, two without, suggesting suppression.
- Hope for more data…



Experiment Outline:

1. Reproduce good Angelfish shot (113263 or 114147):
   - Acquire full diagnostic data set (MSE, reflectometer, polarization data).
2. Try to extend period of good Angelfish:
   - Flattop current earlier.
3. Try HHFW stabilization:
   1. High power first, then power scan?
   2. Change phasing?
4. Parameter scans (perhaps optimistic):
   1. TF - easiest
   2. Density?
   3. Beam parameters (most difficult)