Proposals for NSTX Run 2010

Wave-particle interactions group

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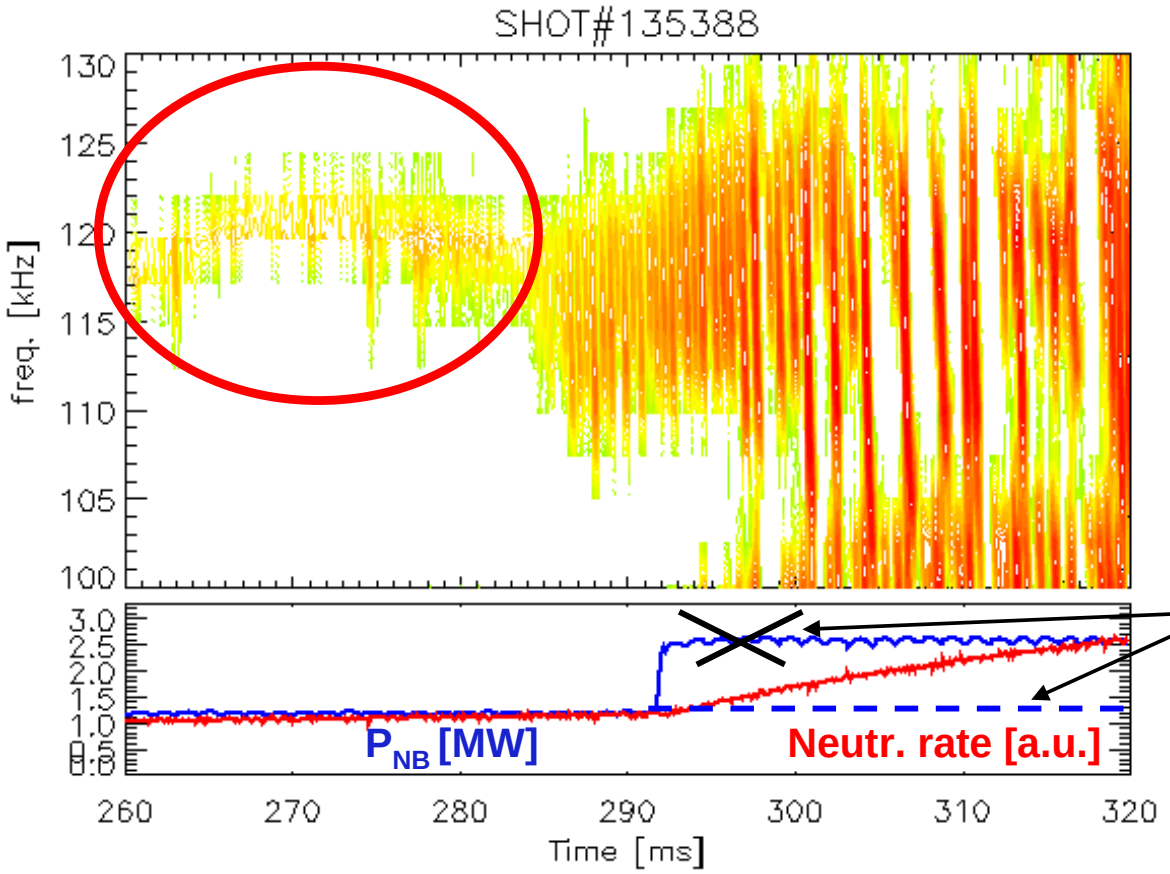
1. Characterize marginal stability conditions for TAE modes
   [ITPA EP-2 on fast ion transport by AEs]
   [Support theory/experiment comparison on TAEs in NSTX]
2. Characterize low-frequency Alfvenic modes
   [ITPA EP-2 on fast ion transport by AEs]

3. Effect of HHFW on plasma rotation
   [FY2010 milestone R10-2: RF heating and current drive]
4. HHFW absorption on fast ions
   [FY2010 milestone R10-2: RF heating and current drive]

1. Characterize marginal stability conditions for TAE modes

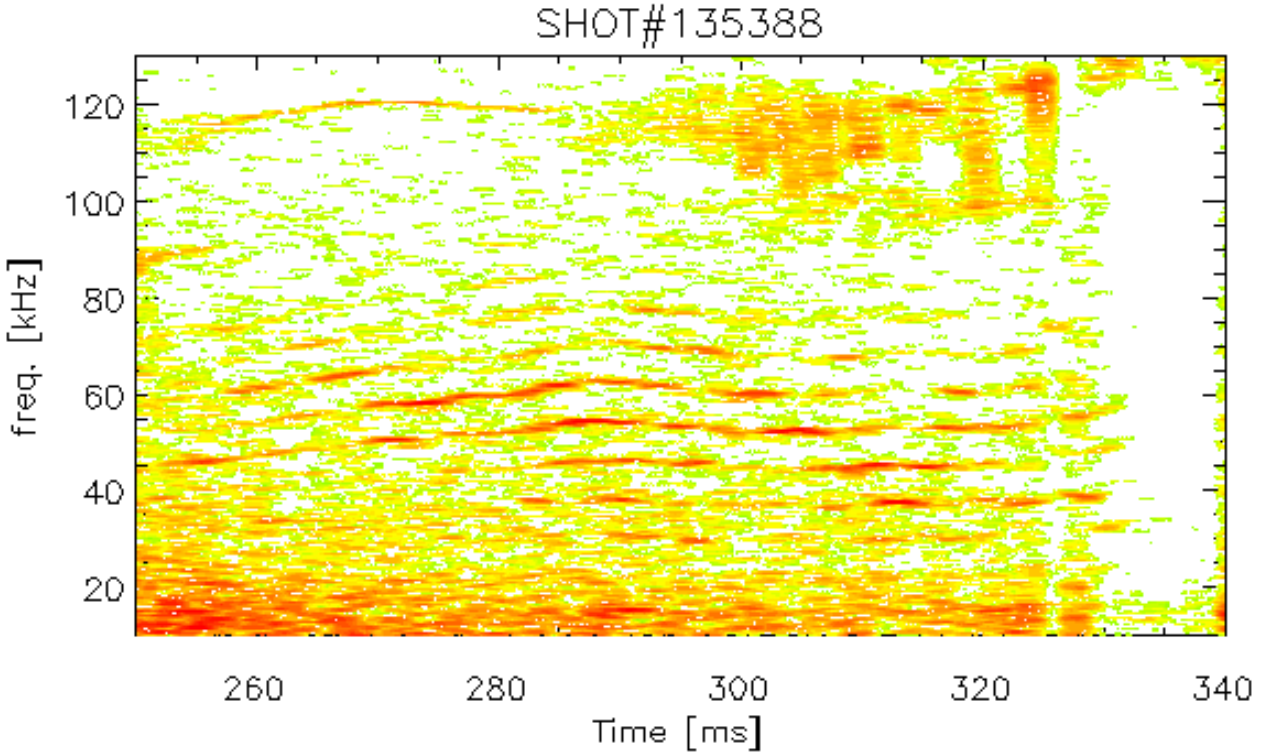


Estimated run time: ½ day

Remove NB power step, introduce modulation instead

- Goal: reproduce discharge from 2009 with little/no TAE activity from 200ms to 300ms (e.g. sh#135383), 1 steady NB source
- Switch to 1 modulated NB source (10 on/ 20 off)
- Look for “modulation” of TAE activity
  - Scan NB power (second source) to identify threshold
  - Scan density to vary damping terms

2. Characterize low-frequency AEs



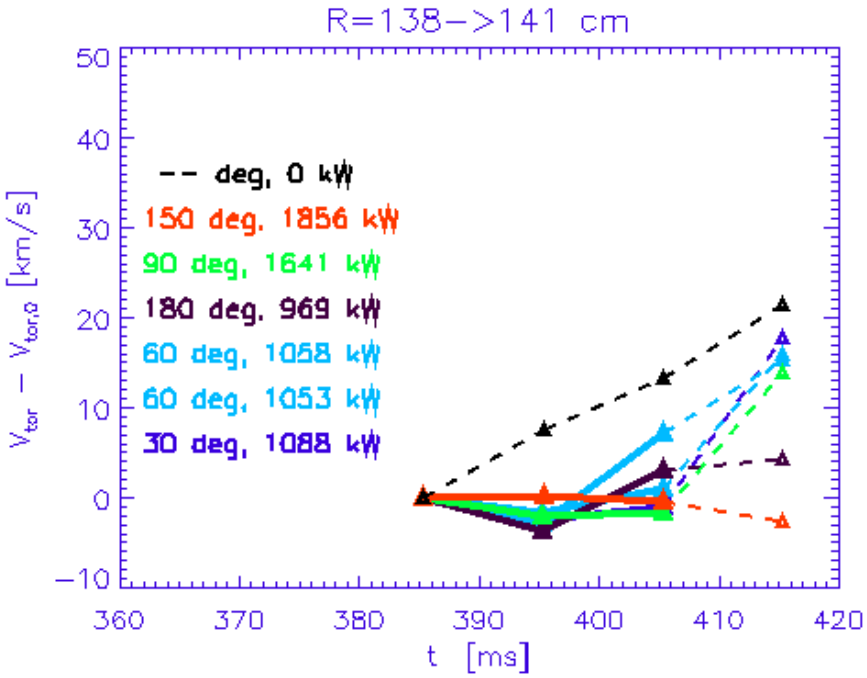
n=2…10 modes

Estimated run time: ½ day

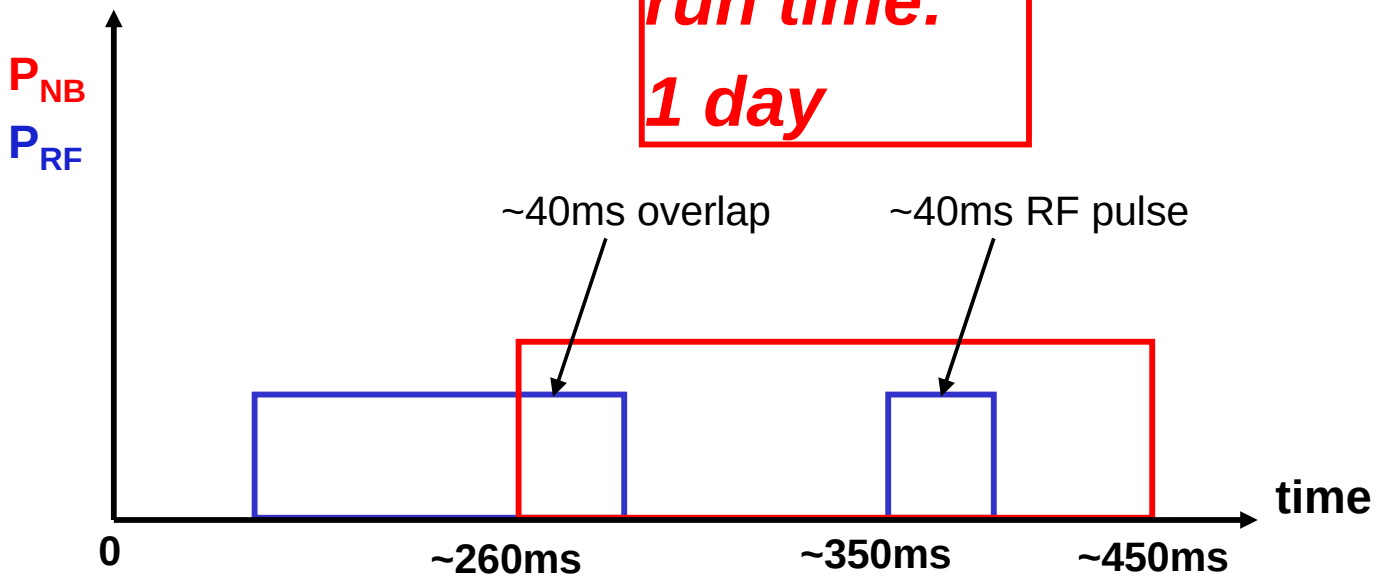
- Goal: characterize new (?!?) modes observed during 2009 TAE XP
  - Long-lasting, no frequency sweep (BAAEs), barely visible on magnetics (kink-like modes)
  - Extrapolated frequency (?) slightly <0 in *rotating plasma frame*
  - "Toroidal-flow induced" AEs have been predicted by theory…
- Use BES to reconstruct fine structure, use SPAs to affect rotation

3. Effect of HHFW on plasma rotation

- Toroidal rotation seems to “lock” at the edge during HHFW
  - See G. Taylor’s APS invited ’09
- Rotation “freed-up” when RF stops
- Phase/RF power dependence still unclear



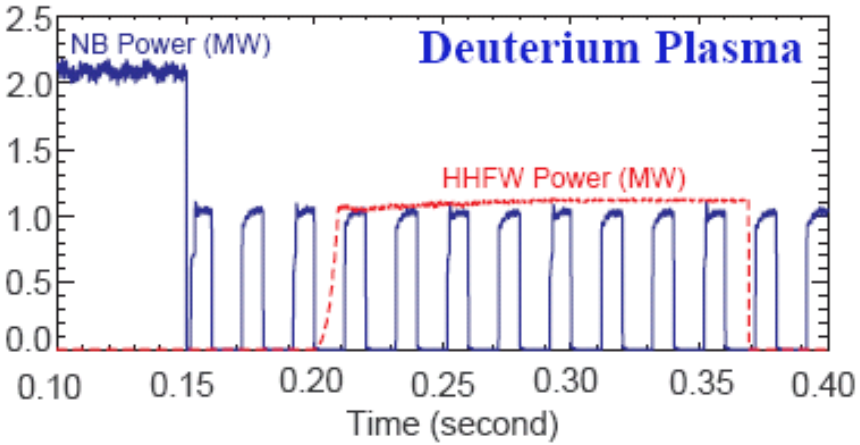
Estimated run time: 1 day



- Perform systematic scan of RF phase, RF power and NB power

4. HHFW absorption on fast ions

- RF absorption on fast ions may represent an issue for combined RF+NB heating/CD
- Little/no information available so far on *how much* RF power goes into fast ion channel compared to other loss channels
  - Dependence on RF phase, edge conditions, fast ion energy, …
- Plan: start from 2008 scenario (e.g. shot#128739)
  - Source A “blips” for q-profile
  - Low average NB power to avoid MHD
  - 10 ON/ 20 OFF modulation
  - Constant RF power, 200->400ms
- Scan RF phase, NB power
- Change edge conditions (outer gap?)
  - Edge losses *vs.* fast ion absorption



Estimated run time:

½ (maybe 1) day