NSTX

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# XP-1019: Disruptivity Reduction with $\beta_N$-Control Status Report #2


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**S. Gerhardt, et al.**

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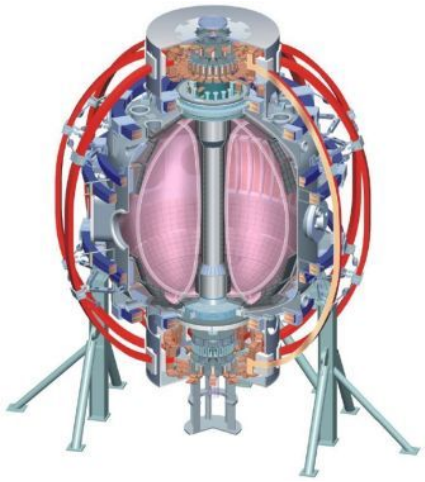
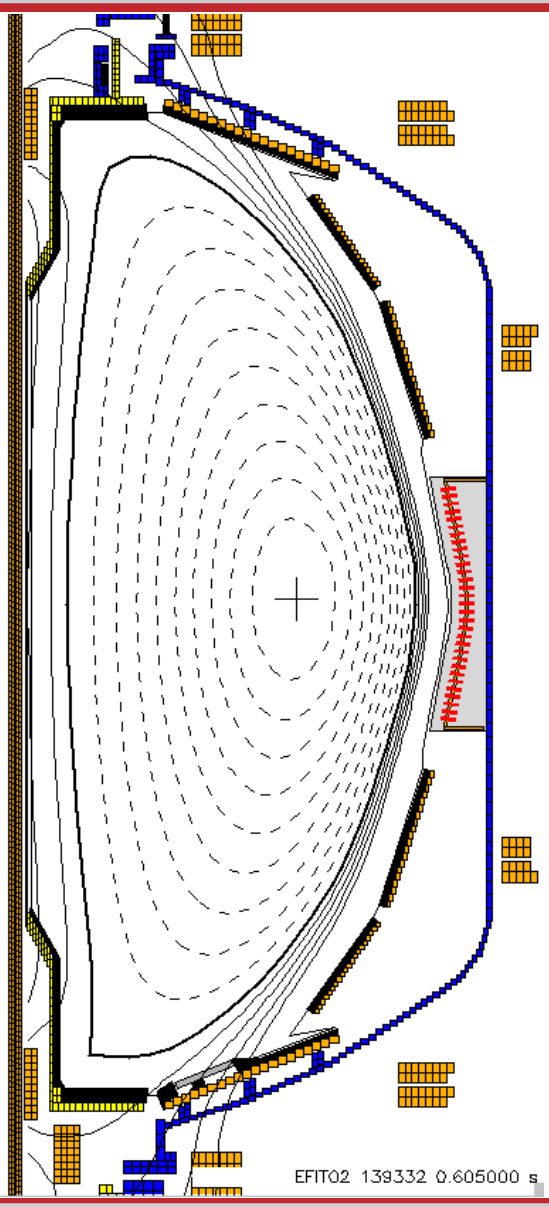
**Monday Physics Meeting**

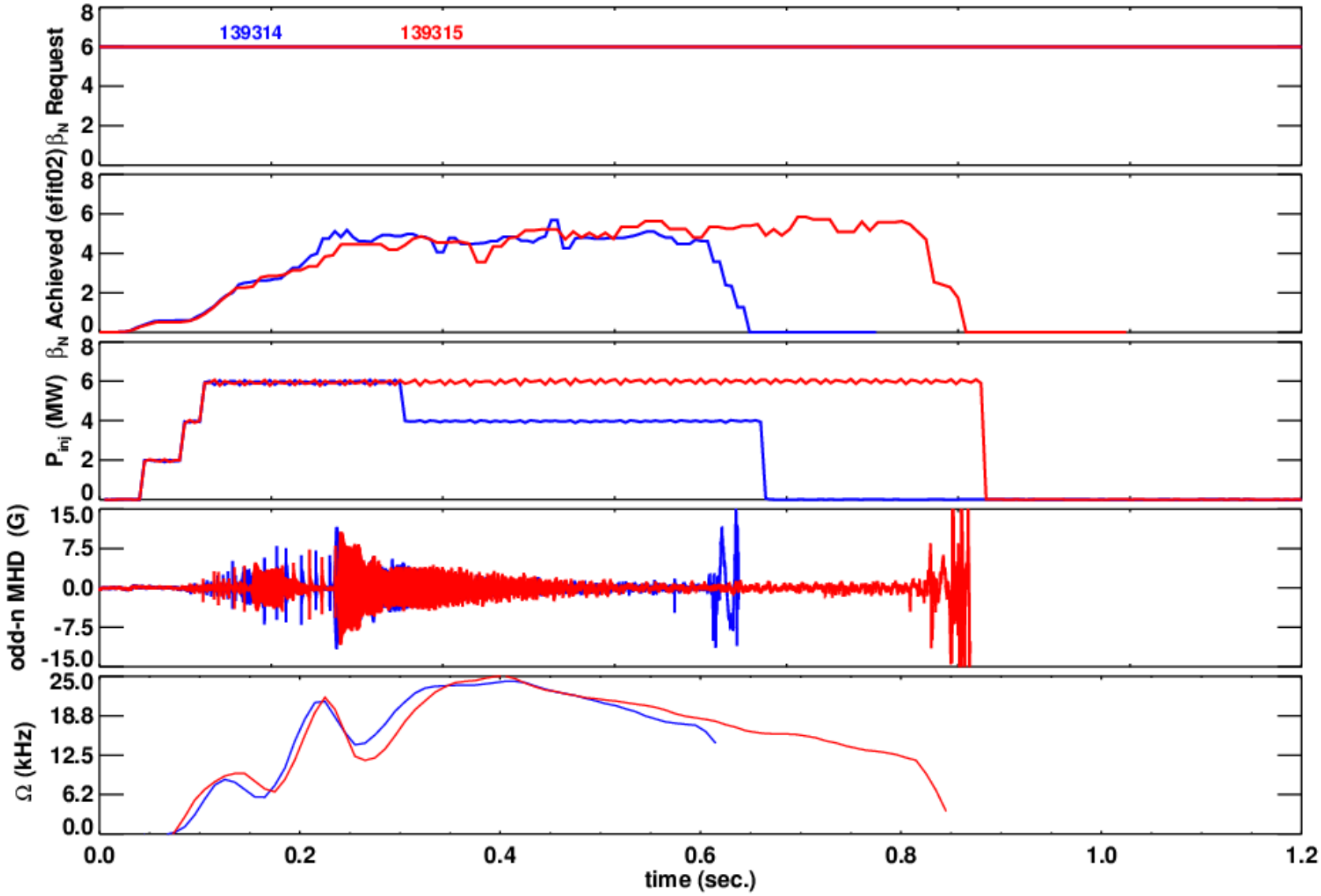


# Overview

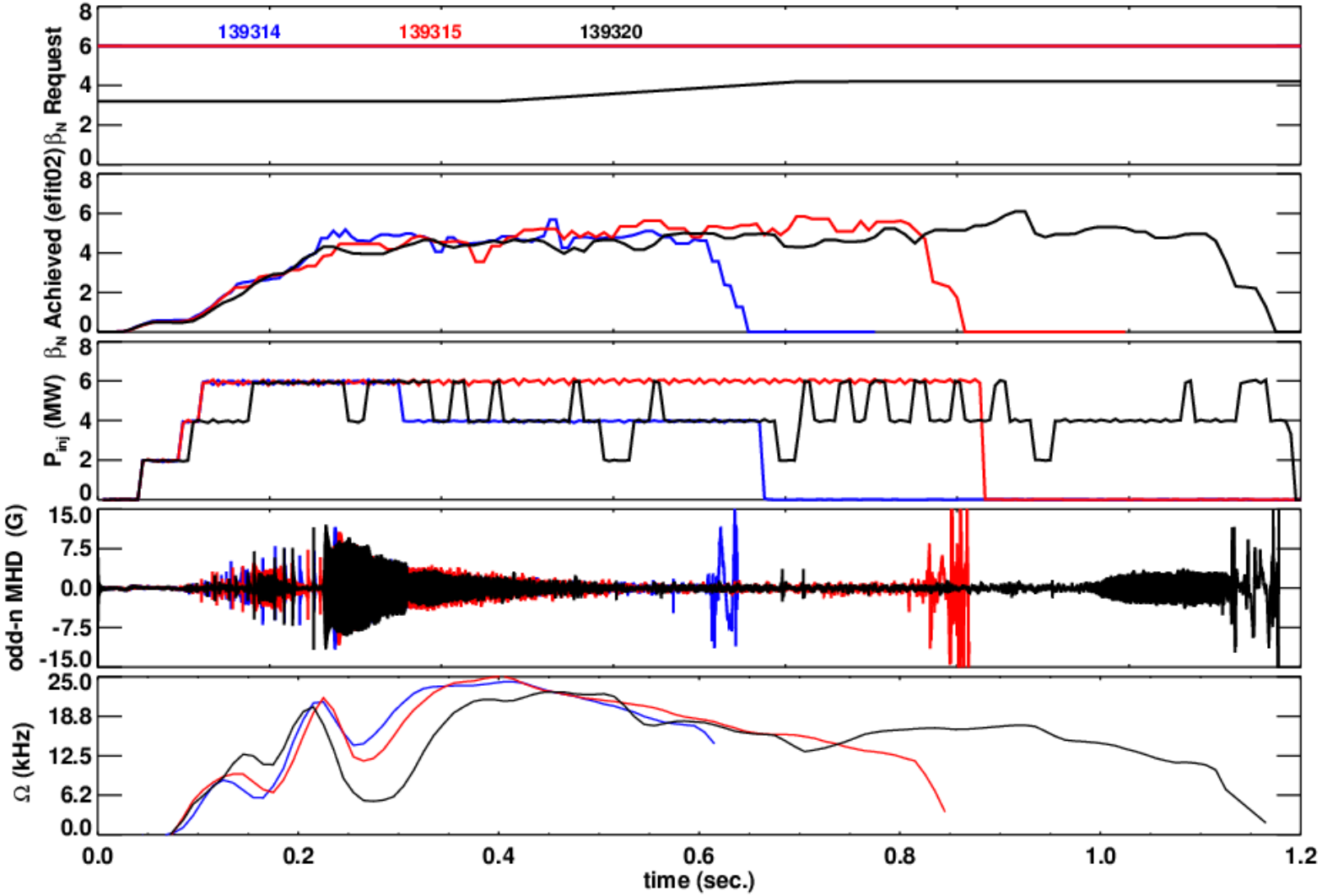
- So far this year
  - XMP to commission system.
  - ~3 hours of XP time.
    - Reliable target condition was achieved.
    - Progress limited by unreliable NB modulations on source B.
- Took another ~3 hours to finish XP.
  - Ran a very high $\kappa$ scenario.
  - Target was behavior was more complicated.
  - Pending ones outlook, $\beta_N$ control improved the discharge.
  - No additional run-time request for this year.



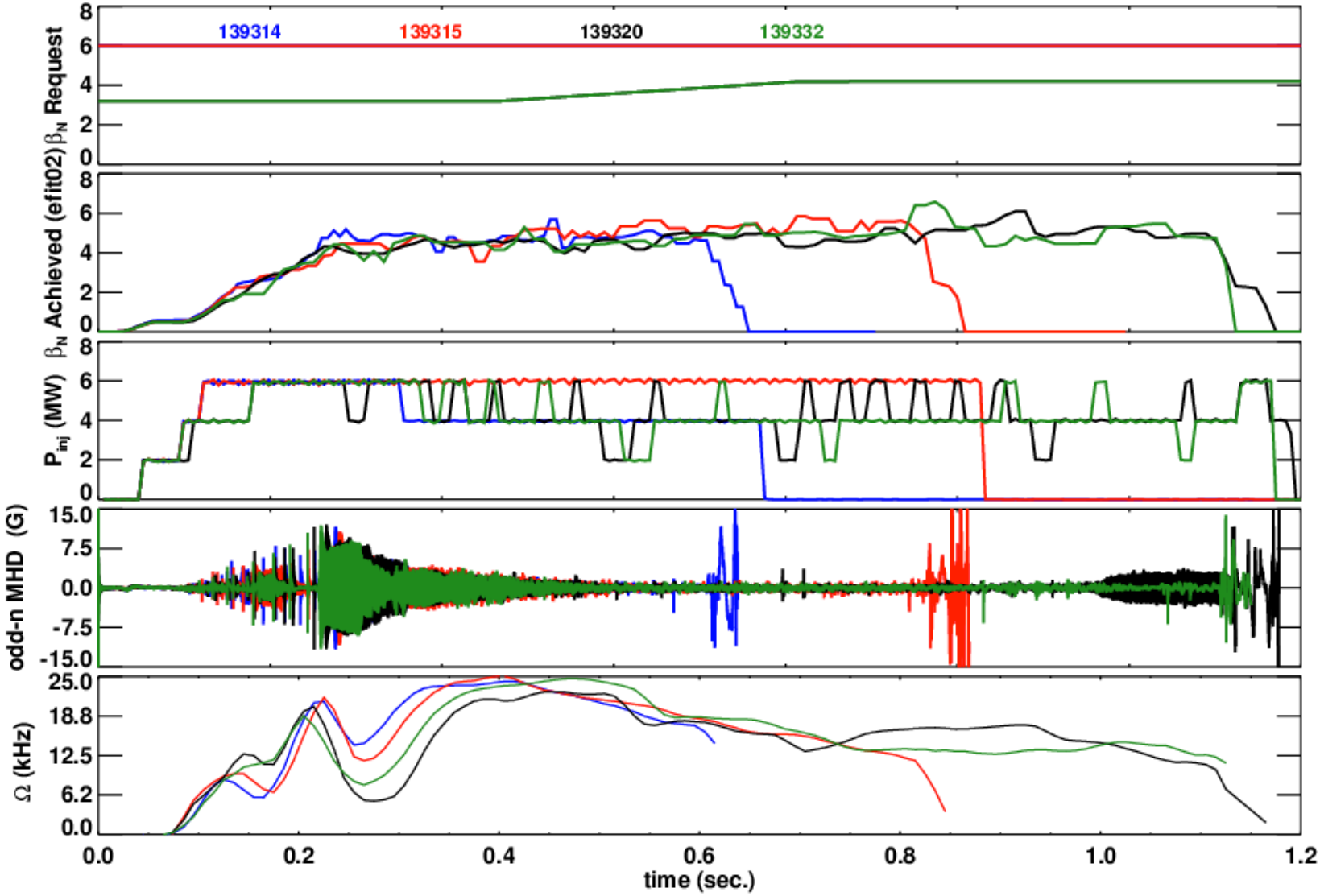
# target development…higher power shot lasts longer



# Add betaN control…longest shot of the day.



# Now slow the $\beta_N$ control (120 msec LP filter on $\beta_{N,rtEFIT}$)



# Conclusions

- XP is done.
- Found scenarios where the controller may improve performance.
- Need to do some ideal stability analysis.
- Comments
  - Modulation frequency is limited in NSTX (15 msec) to being a large fraction to $\tau_E$.
    - Especially problematic when a NB fails to turn on.
  - Controller may be of minimal benefit where $\beta_N$ is limited by temporally constant transport.
  - Controller may be quite useful when transport is changing dynamically.
    - EPH mode.