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NSTX

XP525 – ELM Mitigation by Application of Resonant Magnetic Perturbations

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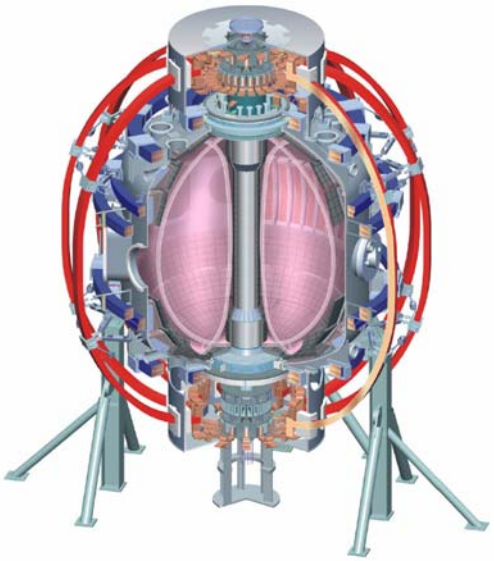

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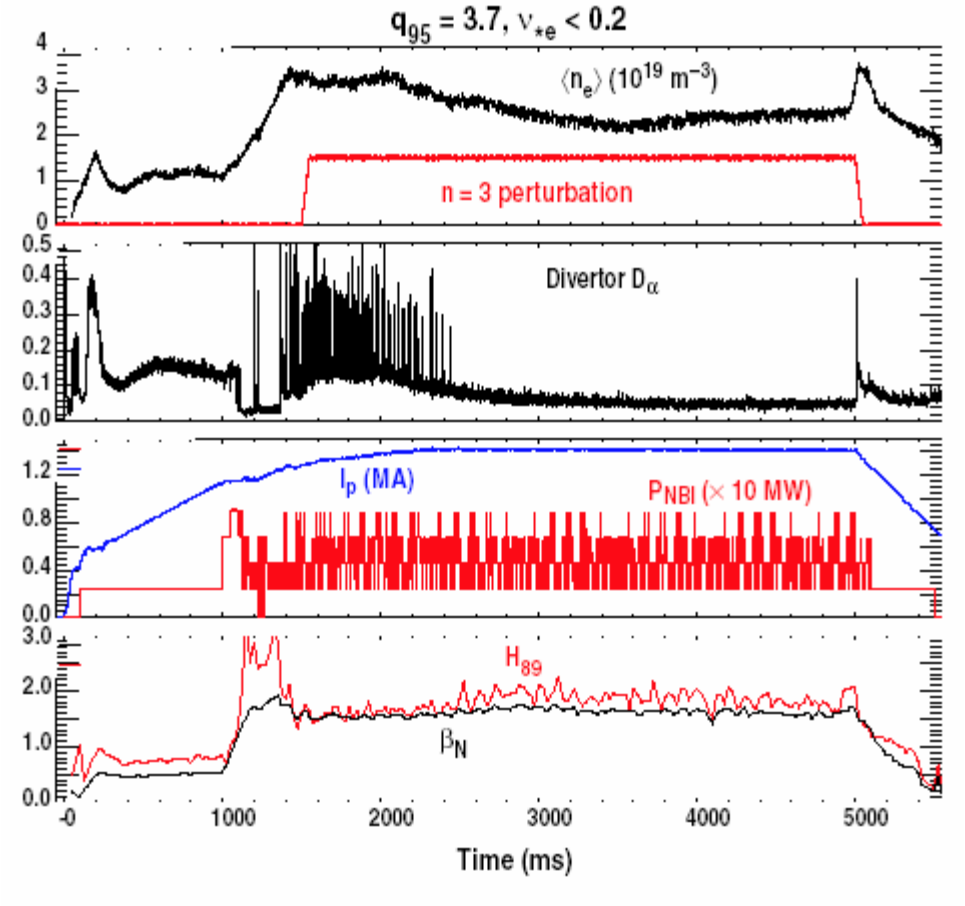
Experiments on DIII-D Using I-Coil to Produce RMP Successful in Suppressing ELMs While Maintaining Good Performance

DIII-D (Evans)



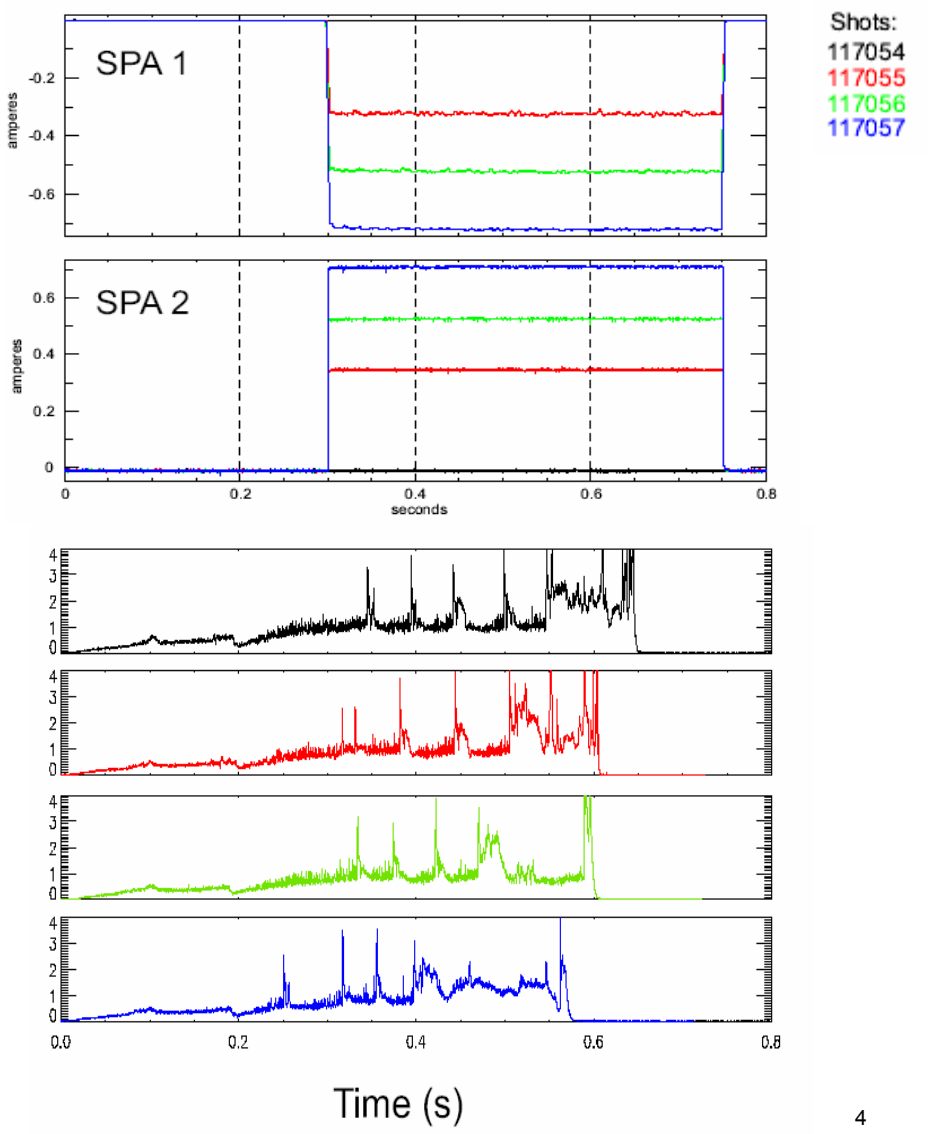
- Try to reproduce effect on NSTX using EF/RWM coil
  - Similar to C-coil on DIII-D

- Experiments explored effects due to different
  - Polarity of applied perturbed fields
  - Strength of applied perturbed fields
  - Resonant conditions (change edge q by changing I_p)

- Two experimental run days
  - First several hours of each day devoted to establishing reproducible conditions
  - Explored scenarios with large (Type I) and smaller, higher frequency ELMs

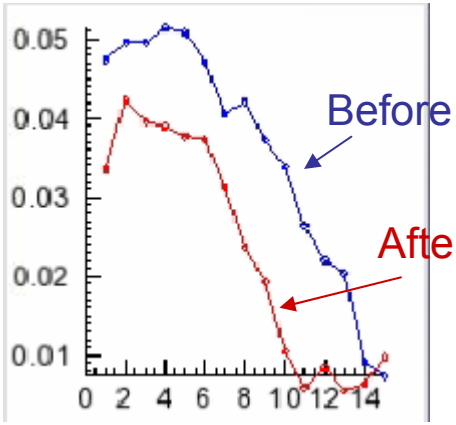
- *No definitive (reproducible) positive effect on ELM suppression*

Initial Scans Used Type I ELM Discharges as Baseline (900 kA, 6 MW)

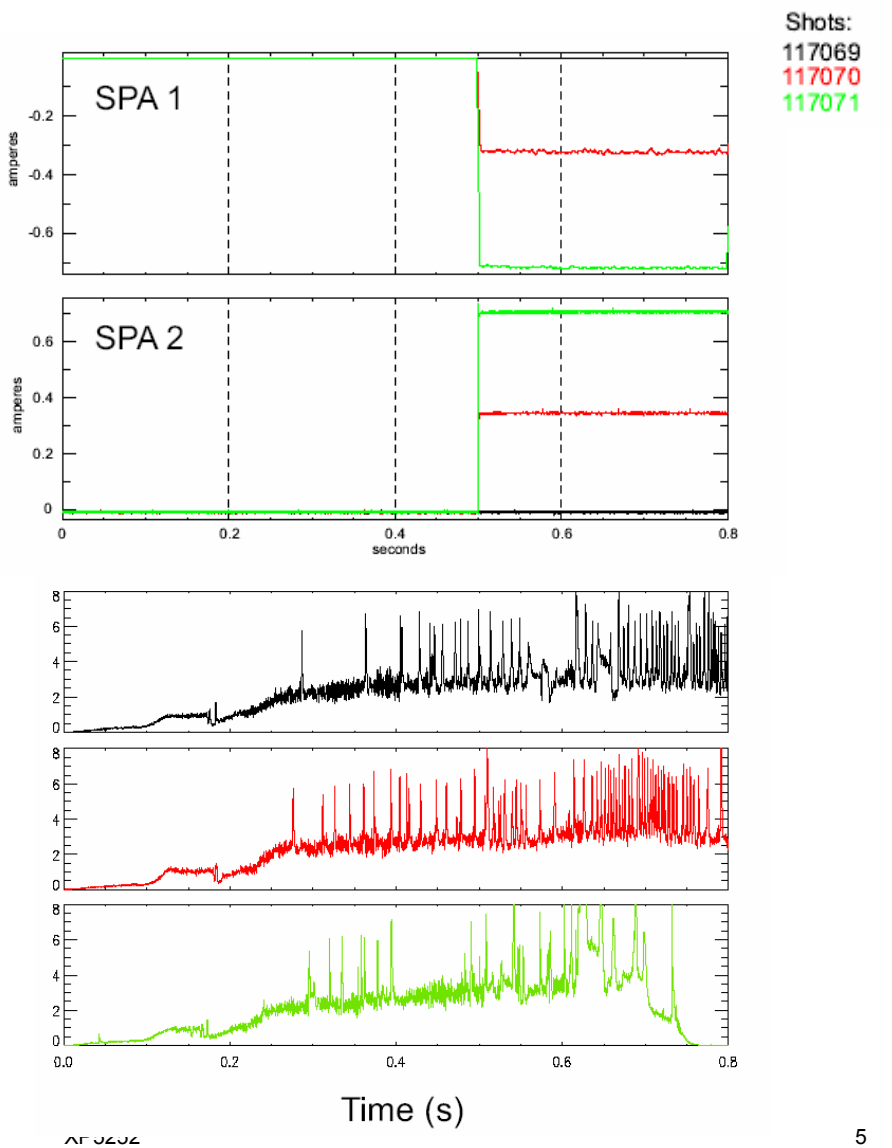


- Discharges get progressively shorter with increasing SPA current (n=3 perturbation)
- No significant or reproducible suppression of ELMs
  - ELM events extend into core
  - MPs only near edge; not effective in suppressing extended events

SXR – Be100

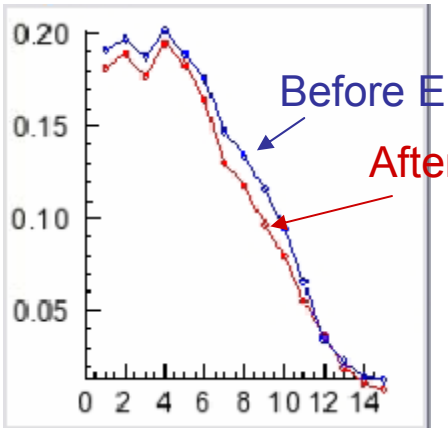


Scan #2

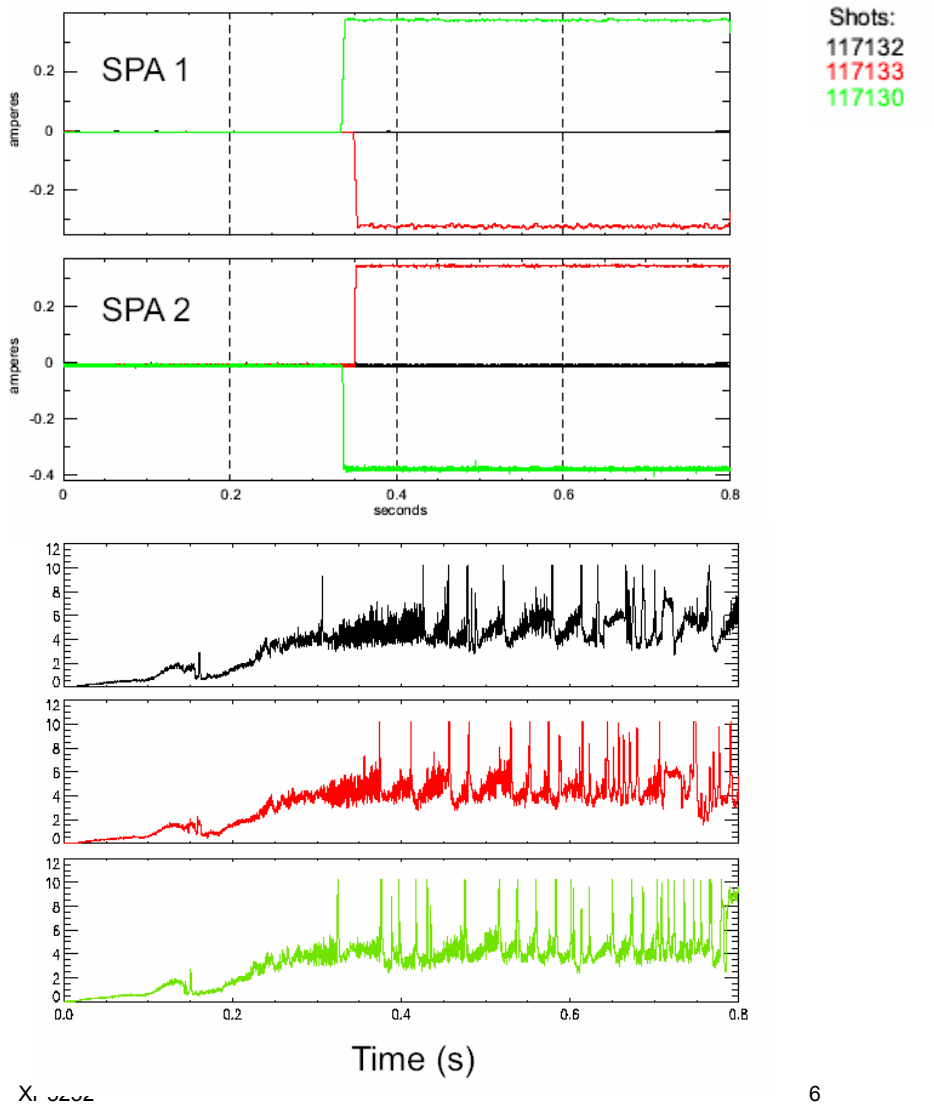


- Baseline discharge has smaller, but more frequent ELMs (more edge localized)
- Even with this baseline scenario, no significant or reproducible suppression
  - Perhaps at highest SPA current?

SXR – Be100

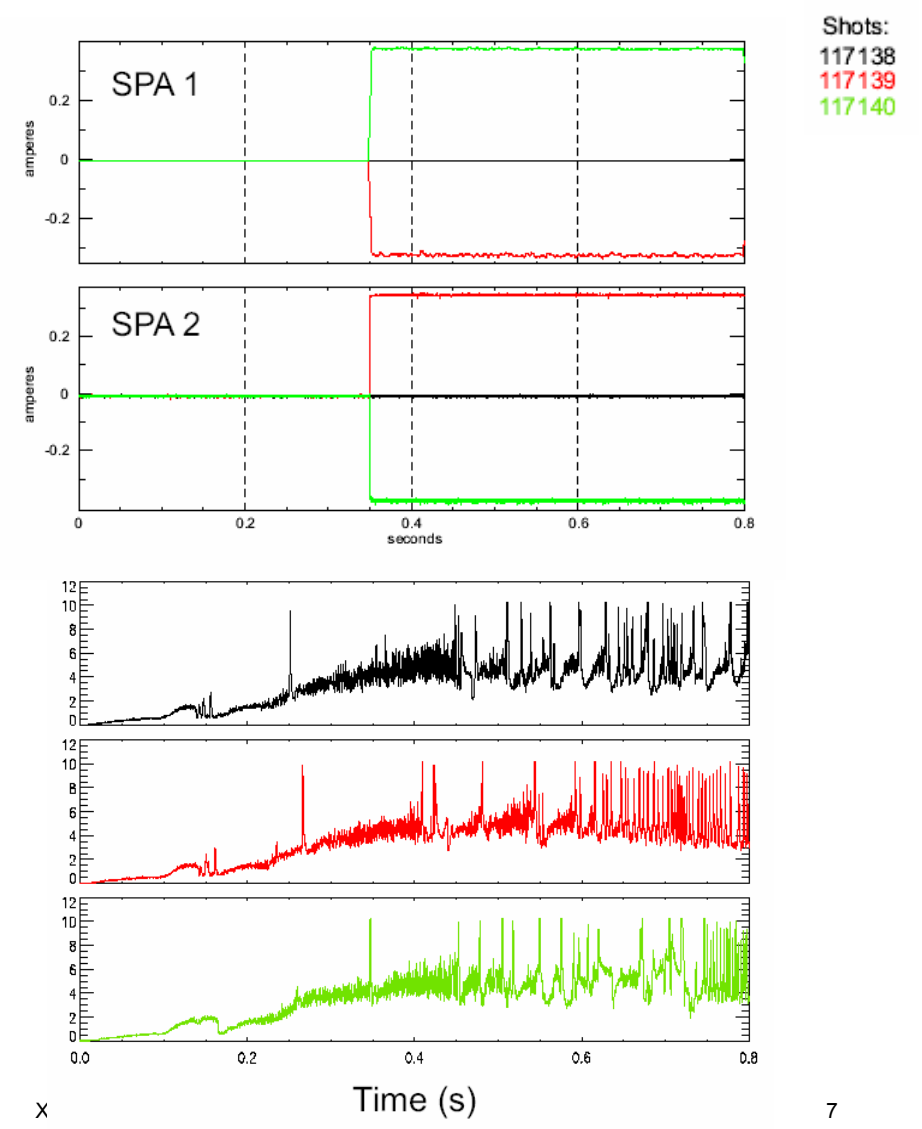


Shift n=3 Phase by 60°



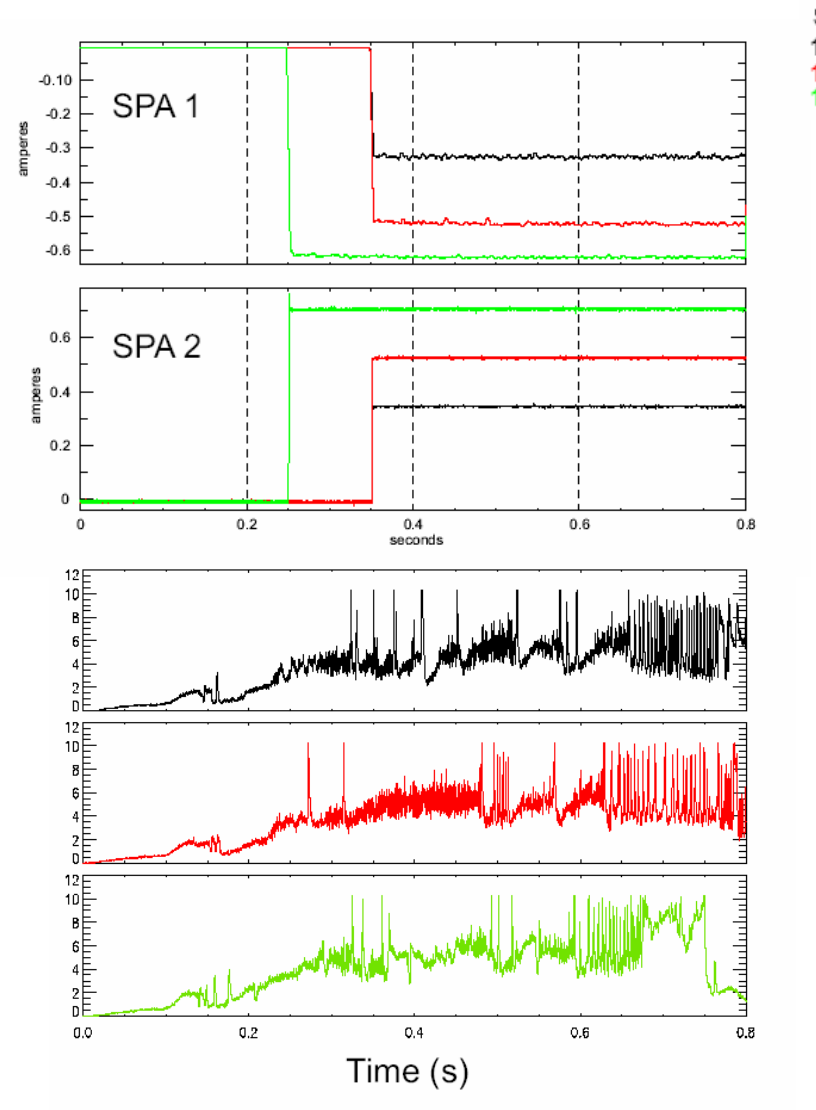
- Reverse currents on SPAs
- No observable effect at this SPA current (400 A)

Change Edge q



- Reduce I_p to 800 kA
- Apply SPA currents in both phasings
- No effect seen at this or higher (1 MA) current levels

Final Scan



- Redo SPA current level scan (400 to 700 A)
  - Same toroidal phase as shown previously
- Some suppression at highest SPA current level?
- Jumping off point for future experiments