Testing the Weak Shear / Rational q Model to Make ELM Suppression on NSTX

An idea by
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Presented to the
NSTX Research Forum, March 2011

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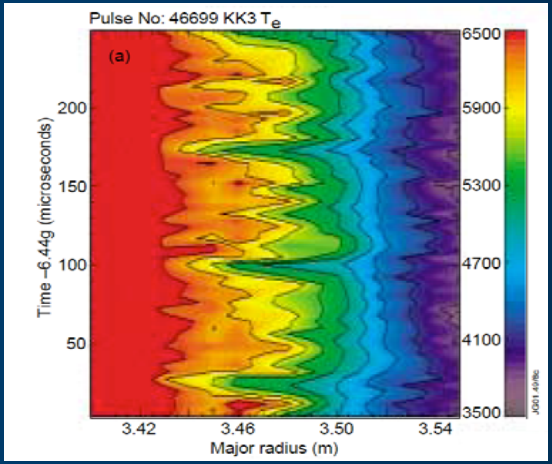

Work funded by the US DOE.

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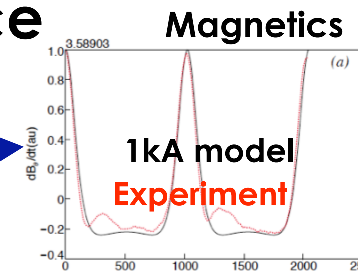
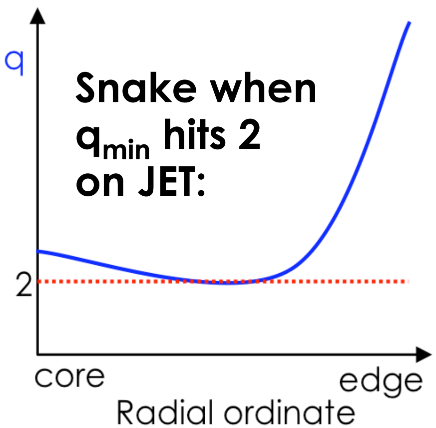
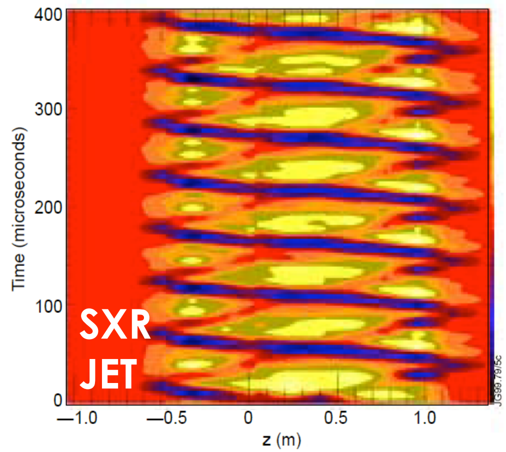
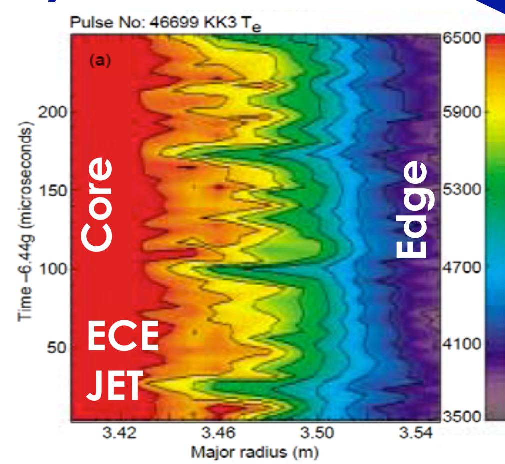
Can RMP-ELM effect be a Resonance with Weak Shear Rational q in Pedestal?

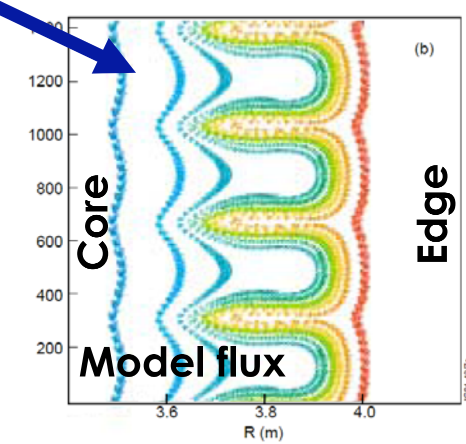
- **Ideal & vacuum 3D response predicted <u>broad</u> q resonance**
- **Observe <u>narrow</u> q resonance – reminiscent of JET snake:**
  - – Filament at q_{min}=2 matches B & Te observations
  - – Weak shear readily modified by **tiny current**, ~1kA



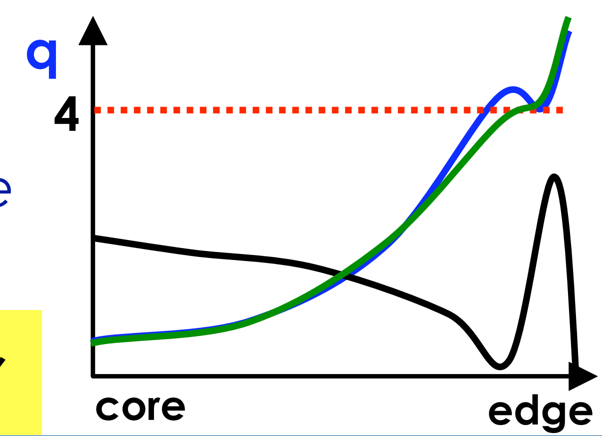








- **Can this arise with the ELM?**
  - – *High bootstrap leads to **zero** or **weak** shear ➔*
  - – *Flux readily perturbed when this has rational q value*
  - ✓ Narrow q_{95} window, low ν^*, β dependence



ELM effect may not be snake – point is topology is readily altered, could be ideal-like distortion, or just changed turbulence

[Hender et al. 2004]

How to test this on NSTX

- **Key issue is to have edge bootstrap to reach weak/zero shear**
  - High lithium, high shape, double (???) null, lowest possible density, fiddle with X point location (advice from Rajesh)
    - Can you still make large ELMs then?
    - (Harder to reverse shear in ST – but weaken it…?)
  - Configure RMP coils for optimal edge resonance
    - N=3 fields I guess!
  - q_{95} ramp as usual
    - Distortion requires least free energy at integer q (then get 3 separate 12/3 filaments, but only 1 needs to grow)
- **Look for:**
  - Complete ELM suppression
  - Narrow q resonances in any effect
    - eg ELM frequency, density pump, turbulence measurements
  - Finger like structures (what diagnostic?)
    - Ladders on magnetic spectrogram or SXR
    - Add a bit of Argon or Neon to light up filaments/fingers on SXR?