XP 739: Marginal island width of NTMs in NSTX

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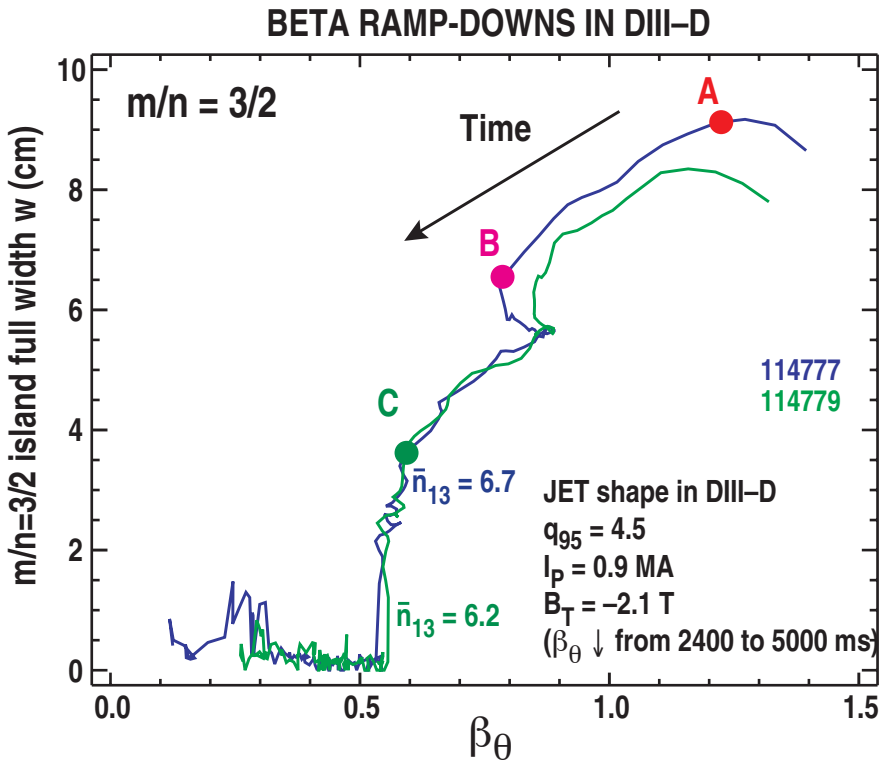
GENERAL ATOMICS

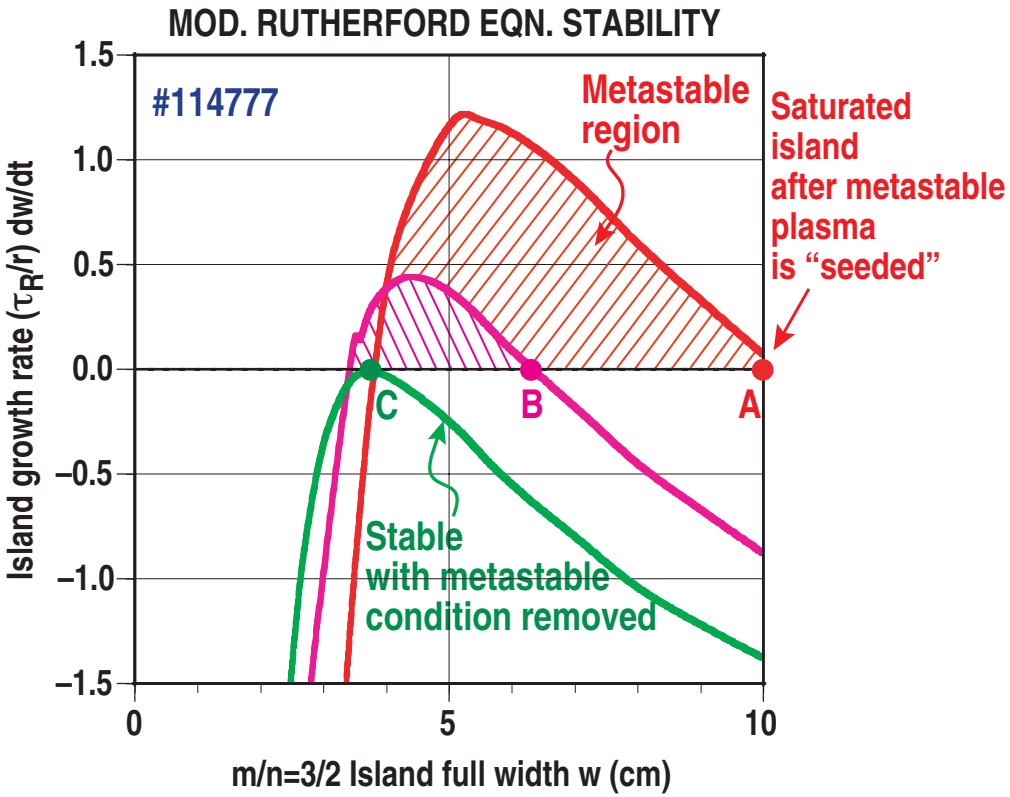
XP 739: Marginal island width of NTMs in NSTX

- **Marginal island width (dw/dt maximum) provides a test of the small-island physics that determine the NTM threshold**
- **Experiments in DIII-D, JET, and ASDEX-Upgrade suggest that $w_{marg} \sim 2\varepsilon^{1/2}\rho_{\theta i}$**
  - Twice the ion banana width
- **NSTX experiment can test the $\varepsilon^{1/2}$ term**
- **<u>Approach</u>: generate a 3/2 NTM; then ramp down β until w reaches the marginal value for self-stabilization.**

NTMS Can Be Removed (or Avoided) by Removing the Metastable Condition I

- Reducing beta without ECCD removes the island ... when the "marginal island" is reached





La Haye, APS 2003; Buttery, IAEA 2004

Summary of experiment and results

- **NBI power was ramped down late in the discharge to look at NTM "turn-off"**
  - In magnetic braking experiment
  - Some dedicated shots for this XP
- **Some m/n=3/2 candidates identified**
  - Preliminary analysis consistent with $w_{marg} \sim 2\varepsilon^{1/2}\rho_{\theta i}$
- **Detailed analysis requires**
  - Equilibrium analysis and Ti profile
  - Mode identification and island width (SXR?)
- **Goal: comparison with results in R/a=3 tokamaks**