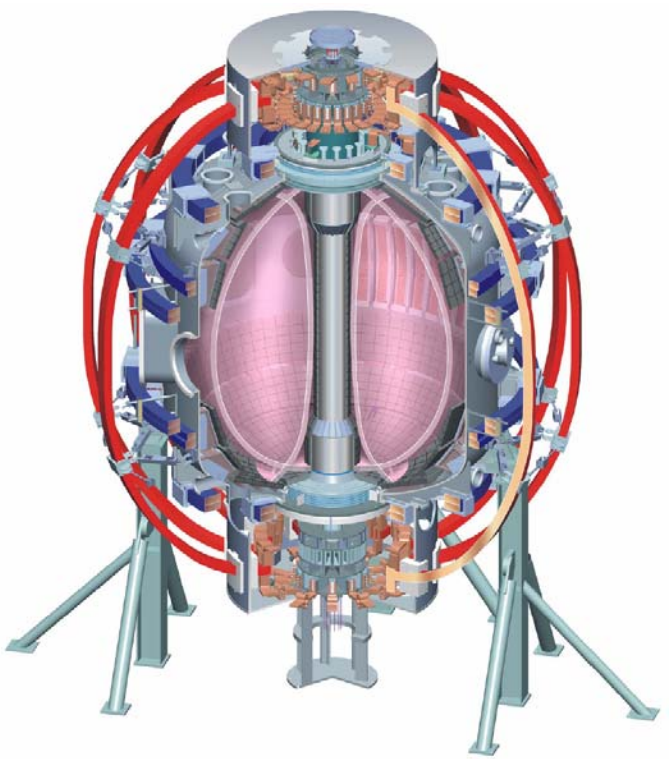
Supported by

XP513 on NSTX/MAST Identity Experiment on iITB Formation and Evolution



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T&T ET Discussion

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NSTX/MAST Identity Experiment on iITB – of interest to plasma science, ITPA, and ST

- Goals of experiment
  - Study and understand χ_ϕ and iITB formation and evolution
  - Document broad momentum scan in sustained H-mode
- Scientific motivation: interplay between turbulence suppression and microinstability drive
  - $\chi_i \sim \chi_{NC}$ over substantial zone (r/a ~ 0.7 – 0.9), sustained
  - Coupled to high toroidal flow shear
  - Zone starts deeper (r/a ~ 0.5) and moves out
- Broad interest
  - Science of ion energy and momentum transport
  - Identity verification with MAST, joint study for ITPA
  - Comparison study with DIII-D and AUG in 2006-2007

About 2/3 of XP435 Was Carried Out, Yielding Interesting and Desired Data

- Benefited greatly from rigorous review
- Thanks to excellent machine and NBI operation
- Allocated 5 hours, utilized 4 hours
- B_{T0} = 3 kG
- Executed 18 shots successfully
- 11 shots with good data
- Designed 3 shots for MSE commissioning
- Initial analysis helps define detail of XP513

NSTX: Shot list

Beam Energy-Power Matrix

- Shotlist [**Case**: sources/energy (kV), # shots]:

	~4.4 MW	~3.3 MW	~2.2 MW
	I: B, A/90, 2	**II**: 0.5B, A/90, 2	**III**: B→A/90, 2
MAST Matches	**IV**: B, 0.5A, C/80, 2	**V**: B, A/85, 2	**VIII**: C, B, 0.67A/85, 3
	VI: B, A, C/70, 2	**VII**: B, A, C/60, 3	**IX**: B, A/60, 3

- Redo complete scan at 4.5 kG
- High priority for MAST identity cases, requiring added NBI conditioning

NSTX	Power (MW)	MAST beam/energy(kV), power(MW)
VII: B, A, C/60, 3	3.3	SW/50, 1.5; SS/60, 1.8
VIII: C, B, 0.67A/85, 3	2.2	SS/70, 2.2
IX: B, A/60, 3	2.2	SW/35, 0.7; SS/60, 1.5

- Required successful shots: 21

What's Next?

- Analyze XP435 results to guide XP
- XP review (to be scheduled)
- Prepare for experiments on NSTX and MAST
- Complete XP513 at B_{T0} = 4.5 kG (May-June?)
- Carry out identity experiment on MAST (June-July?)
- Include appropriate existing shots from other XPs
- Include key physics elements in iITB evolution model – D. Newman et al
- Utilize TRANSP & EFIT with strong flow and MSE
- Write paper for review and journal