Cross machine comparisons of H-modes on NSTX, MAST, and DIII-D

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Review and Motivation

- NSTX (R/a=1.26), MAST (R/a=1.33) DIII-D are similar in core size but different in aspect ratio
- NSTX and MAST similar in size, similar behavior
  - — See “ears” on n_e profile during H-mode
  - (MAST has resolution to show the “ear” shape at edge; NSTX has spline fit to Thomson data)
- Power: NSTX both RF and NBI H-modes -- No OH H-mode
  - — MAST NBI and OH H-modes -- No RF H-modes
- Reliable H-modes obtained in LSND at 0.9 MA in NSTX DND used in MAST;
- Tried gassed up wall ala MAST -- did not help get H-mode
- NSTX added inboard gas fueling for coming run (response to H-mode success on MAST)

Planned Experiments & Studies

NSTX vs. MAST

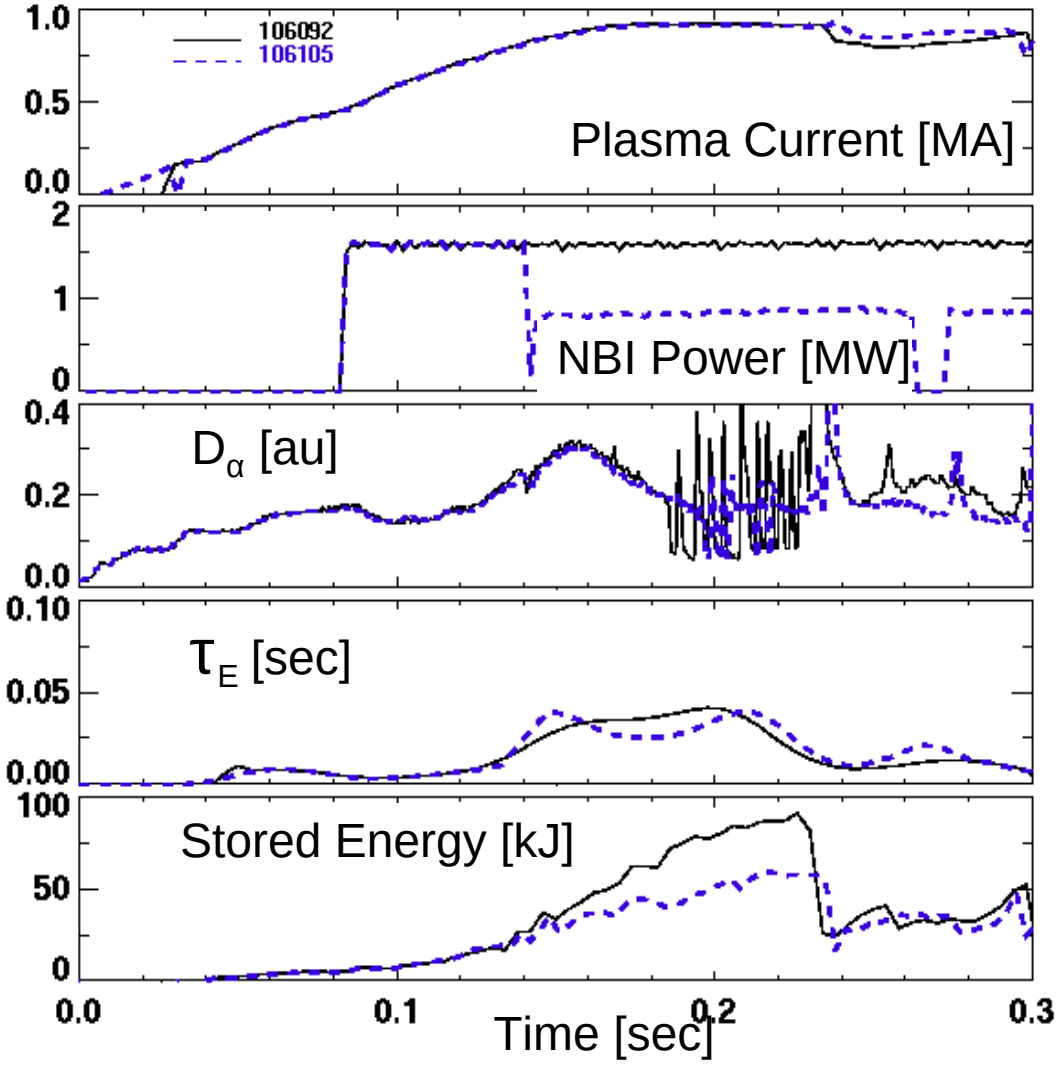
- Must get DND and USND H-modes on NSTX
  - — Require dedicated run time to obtain DND
  - — Will be able to compare with MAST and DIII-D
- Carefully match geometry -- R/a, elongation, B_t, I_p, DND Fueling (inboard?), x-point height, divertor strike points
  - — Main difference will be walls; NSTX outer walls close MAST outer walls at ∞
- Compare inboard outboard fueling results
- Compare ELM behavior
- Compare P_{th} scalings
- Combined NSTX and MAST H-mode database

Planned Experiments & Studies

NSTX vs. DIII-D

- Compare power threshold results for NSTX and DIII-D
  - — Difference in USND and LSND on DIII-D
  - — P_{th}(LSND) = 2.7 MW, P_{th}(USND) = 6.8 MW
- Dimensionless Parameter Comparison with DIII-D (Similarity experiments)
  - — What is good dimensionless parameter set? (ρ^*, ν^*, and β ?, also compare R/a effects on these)
  - — Compare the edge and pedestal widths
- Combined NSTX and MAST H-mode database
- Compare ELM behavior

ELMy H-mode Can Appear when NBI Power Far Exceeds L-H Threshold Power



- Same plasma current
- NBI power near $P_{L\text{-}H}$
- Dithers show up in D_α
- τ_E stays high at higher P_{NBI}
- Stored energy increases