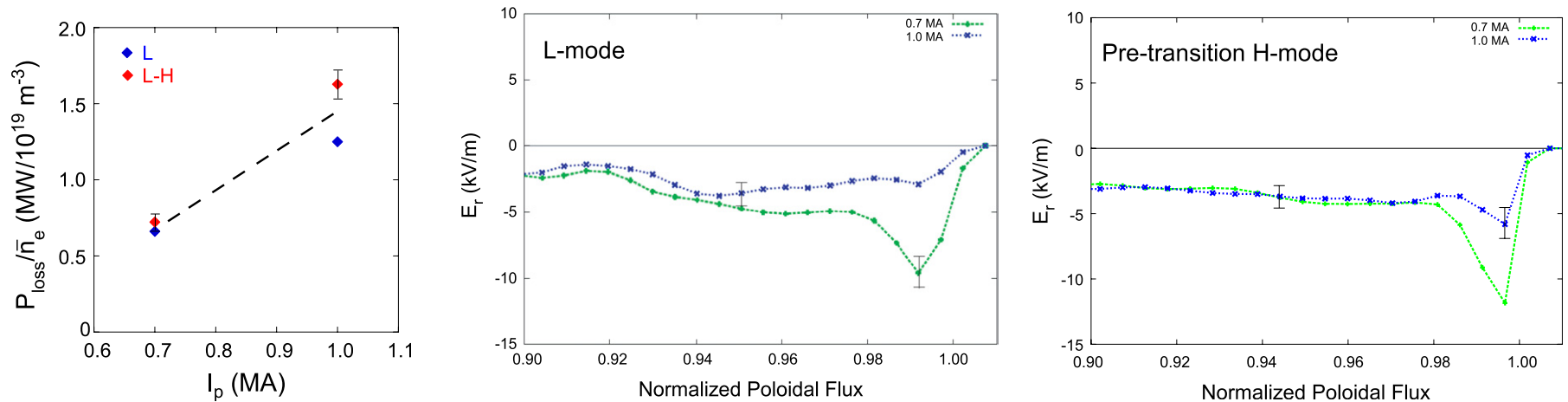


# XP on L-H Power Threshold Scan

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# Motivation

- Conventional aspect ratio indicates  $P_{\text{LH}} \sim n_e B_T S$  (not exactly but pretty close)
- NSTX exhibited a strong dependence of  $P_{\text{LH}}$  on plasma current
  - Correlated with depth of  $E_r$  well as determined by XGC



- No dedicated  $B_T$  scans performed in NSTX
- $P_{\text{LH}}$  did show an anecdotal density dependence both in NBI and RF
- Will help establish transition conditions for Smith/Churchill XP

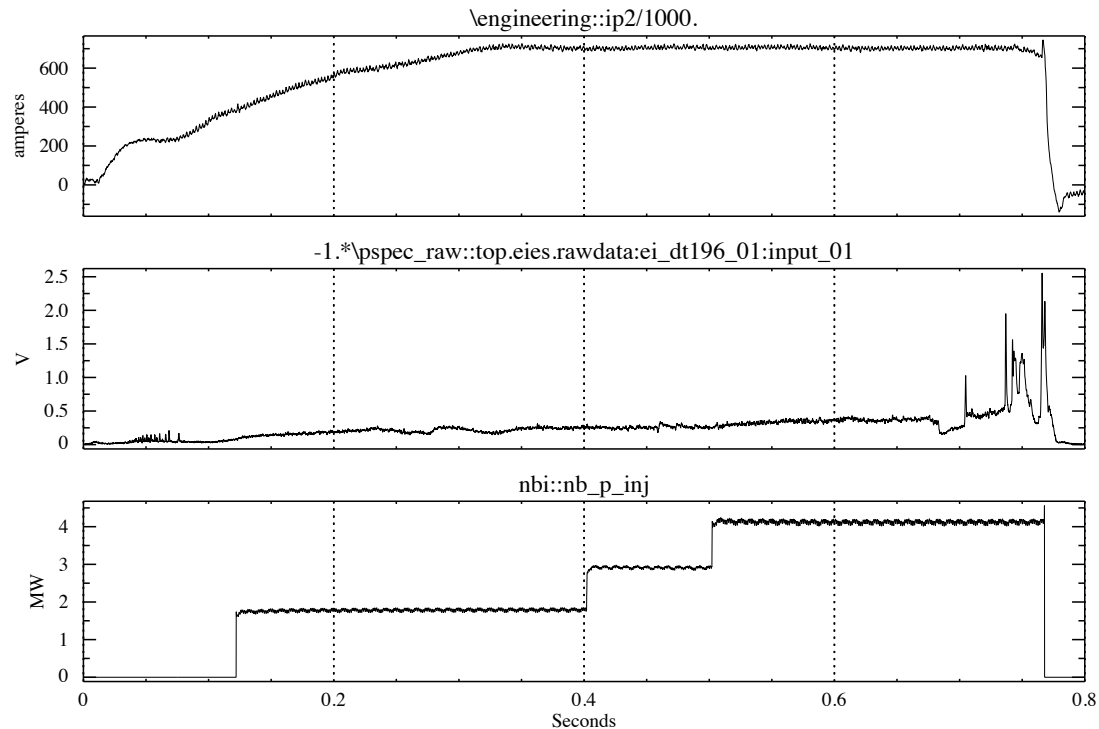
# Plan

- Perform current and field scans to determine  $P_{LH}$ 
  - $I_p = 600, 800, 1000$  kA
  - $B_T = 0.4, 0.52, 0.65$  T
- Use 1B as primary source, with 2C and 2A as needed
  - Vary voltage using “binary search” (as in NSTX) to determine threshold
- Most likely an XP that could be performed very soon, with present machine conditions
  - Low field startup has been achieved, but discharge needs to be lengthened
  - Some issues with higher current L-mode shots on last run day (4/8)
- Require MHD-free periods at time of transition
  - Don't care about after!
- Require transitions after current flattops

# Baseline discharges

- 204202: 700 kA L-mode shot used for BEAST/NUBEAM validation (4/8)
  - Used three sources, L-H transition at 0.67 s
  - Move beam on times earlier towards start of flattop

Shots:  
204202



# Baseline discharges

- Vary current and field

Condition	$I_p$ (MA)	$B_T$ (T)
1	1.0	0.65
2	0.8	0.65
3	0.6	0.65
4	0.6	0.52
5	0.6	0.40

- 1 day XP (20-24 shots):  $3.08e15$  neutrons

# Misc

- **Diagnostics – interested in global behavior**
  - Required:  $D_a$ , IR cameras, magnetics and Mirnovs, neutrons, TV, MPTS, estimate of  $Z_{\text{eff}}$
  - Desired: CHERS, BES, FIDA, high-f Mirnovs
- **Analysis:**
  - Equilibrium reconstruction, TRANSP, XGC
- **Publication**
  - IAEA, NF letter or equivalent (PPCF?)