XP616 Summary: Moveable Glow Probe Evaluation

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All major target questions answered in XP 616 - Moveable Glow Probe Evaluation

- Does the moveable glow probe allow a reduction of the NSTX shot cycle? Yes
  - At least down to 12.5 min (6.5-7 min HeGDC) and maybe down to 10 min. (4-4.5 min. HeGDC)
  - Shorter glows require less fueling for long pulse
- Does a lower HeGDC pressure improve discharge performance? No
  - compared 2, 3, and 4 mTorr with 7 min. HeGDC
- Is the moveable glow probe more effective than the fixed wall probe for long pulses? No
  - Each allowed 1MA 1 sec pulses in double-null

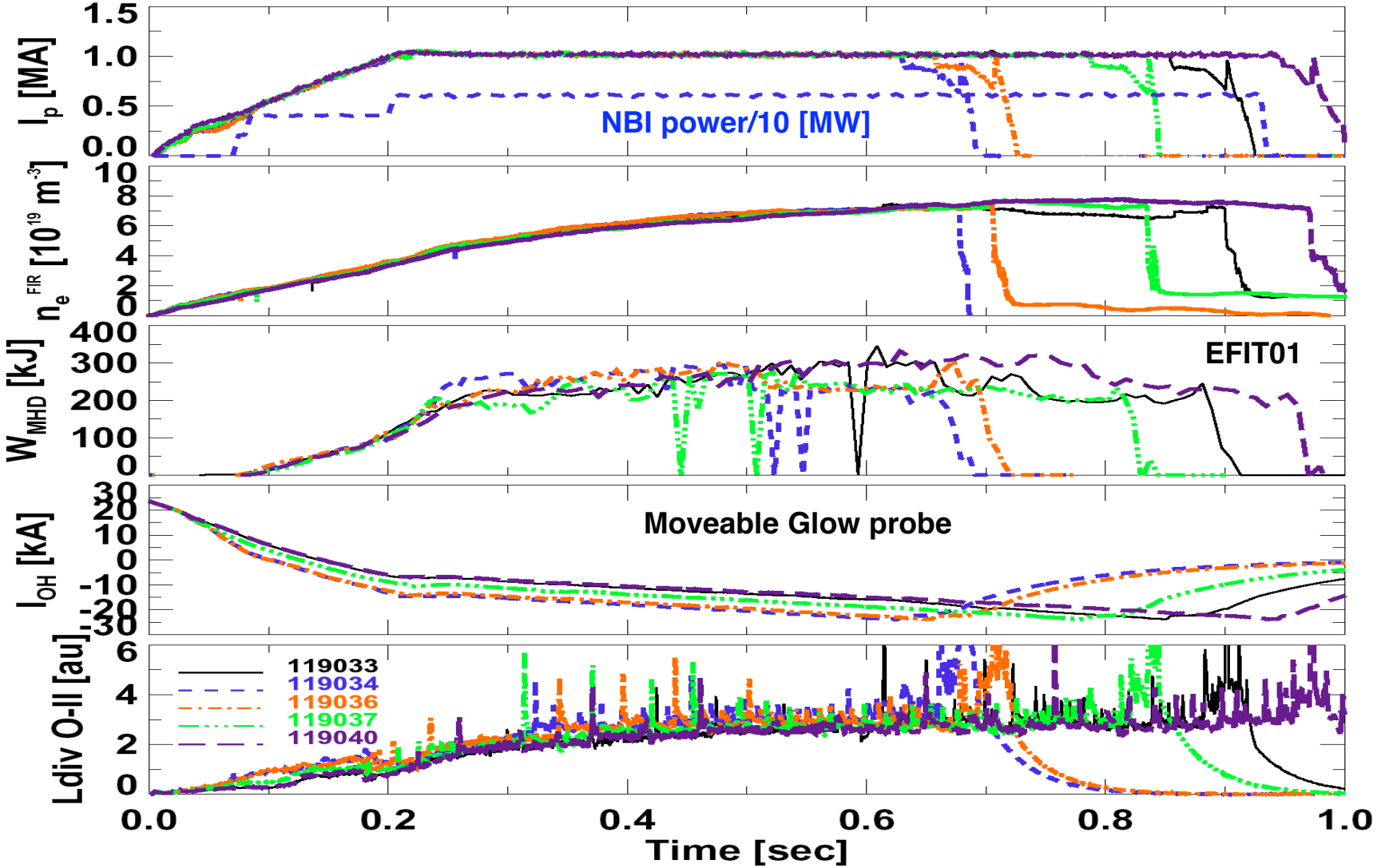
Several other conclusions from XP 616

- Plasma shape must be close to DN or biased slightly down to facilitate H-mode access (i.e. $\delta_r^{sep} \leq$ 3-5 mm)
  - ➢ Confirms conclusions from power threshold XP 505 which was at lower I_p, κ and δ
  - ➢ P_{LH} between 1 and 2 NBI srcs

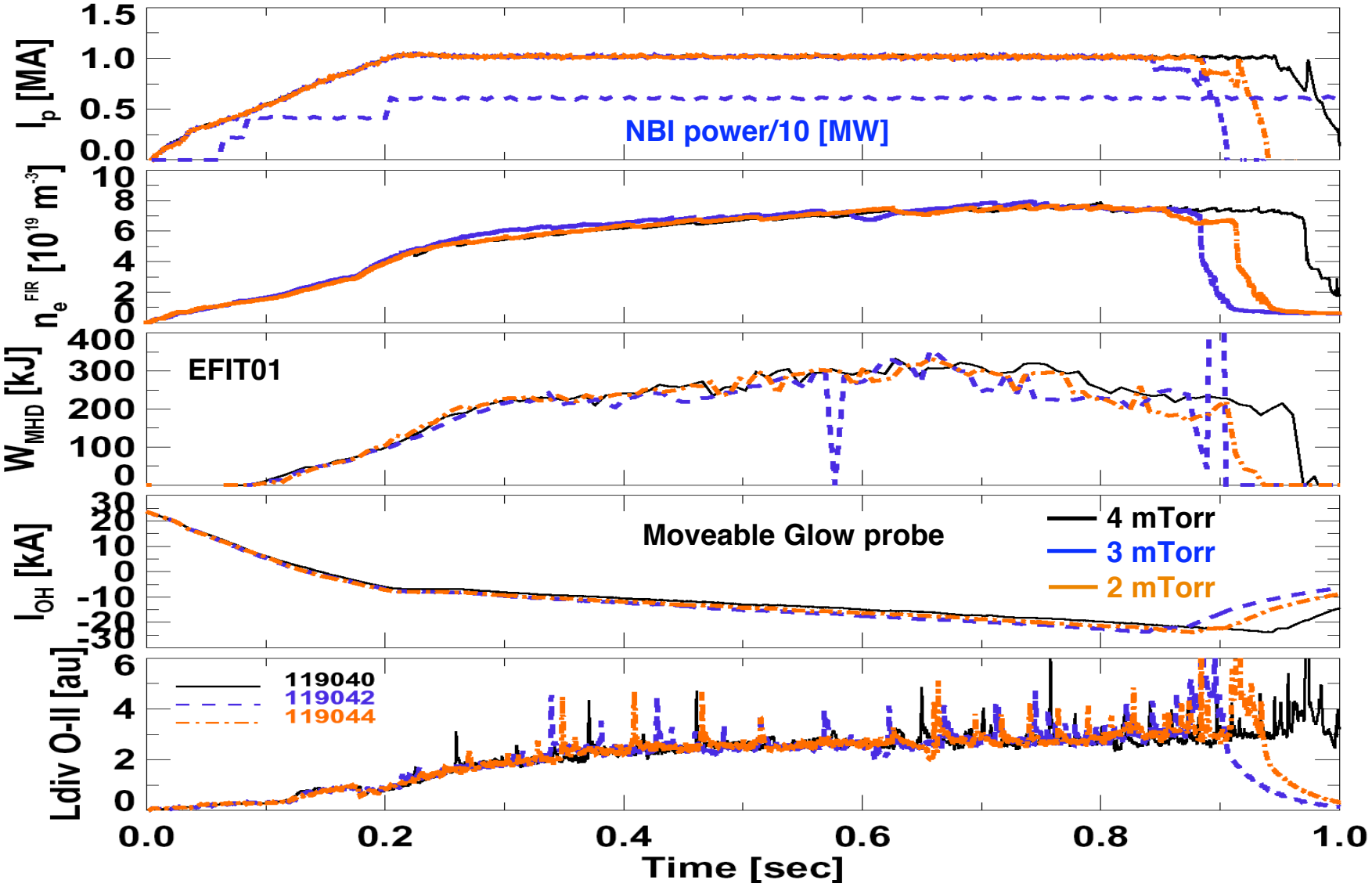
- Achieved 10 double-null discharges at 1 MA with I_p flattop past 0.8 sec and many in a row
  - ➢ Only 4 at the end of last year's run on different days
  - ✓ *Conclude that wall conditions are quite good now*

Reproducible long pulse discharges achieved with 6.5 min HeGDC between discharges

- Fueling reduced in steps from 119034-119040

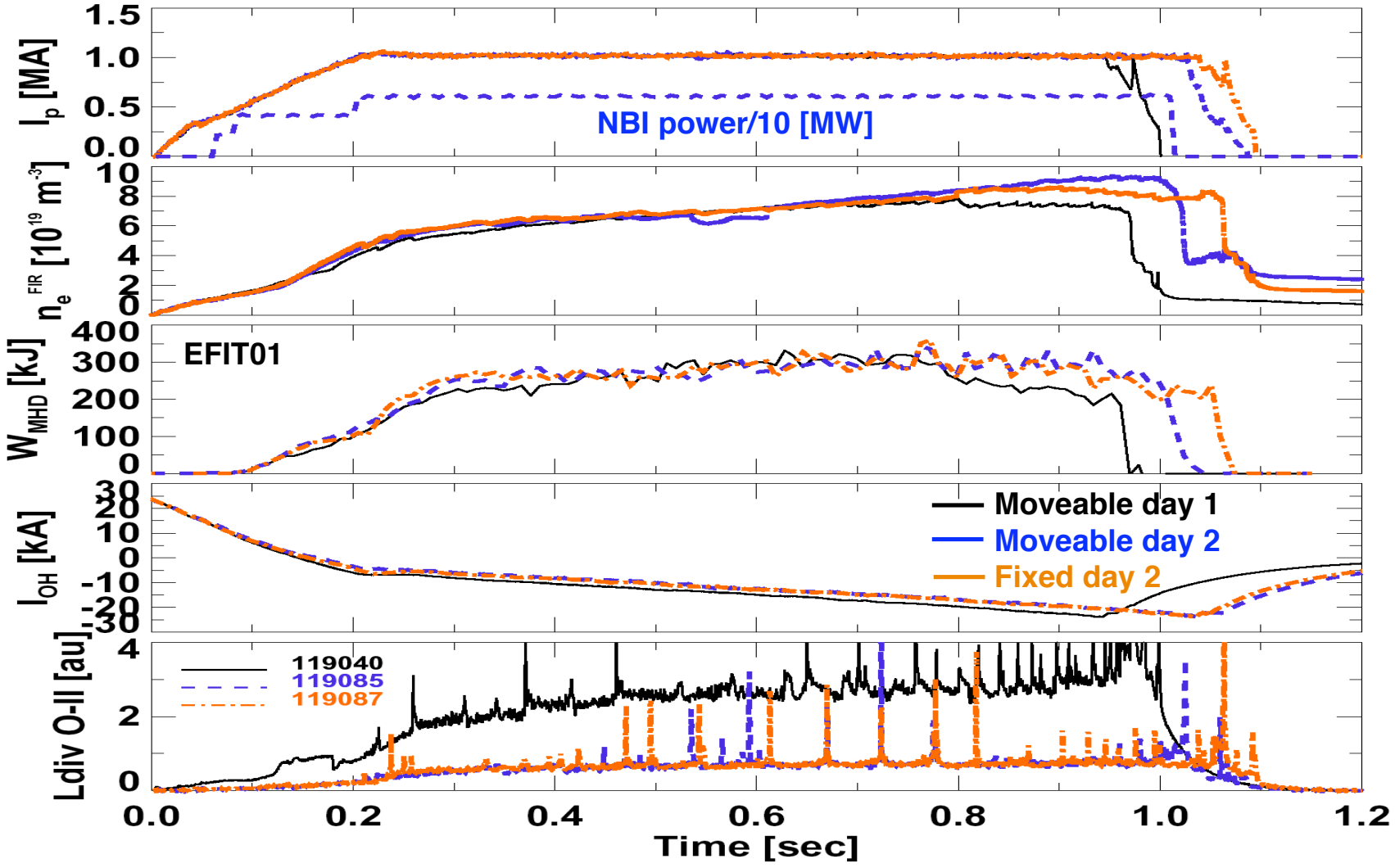


Discharge performance not strongly affected by HeGDC pressure

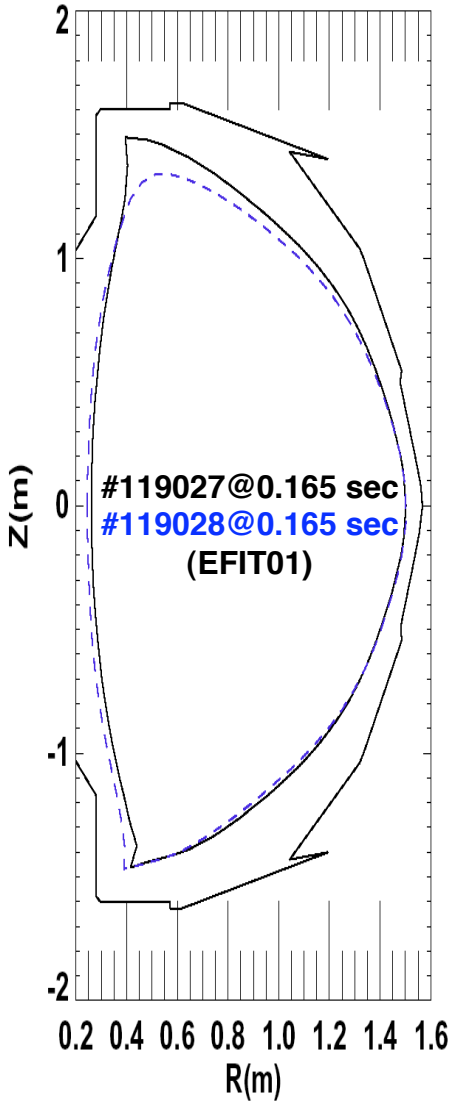


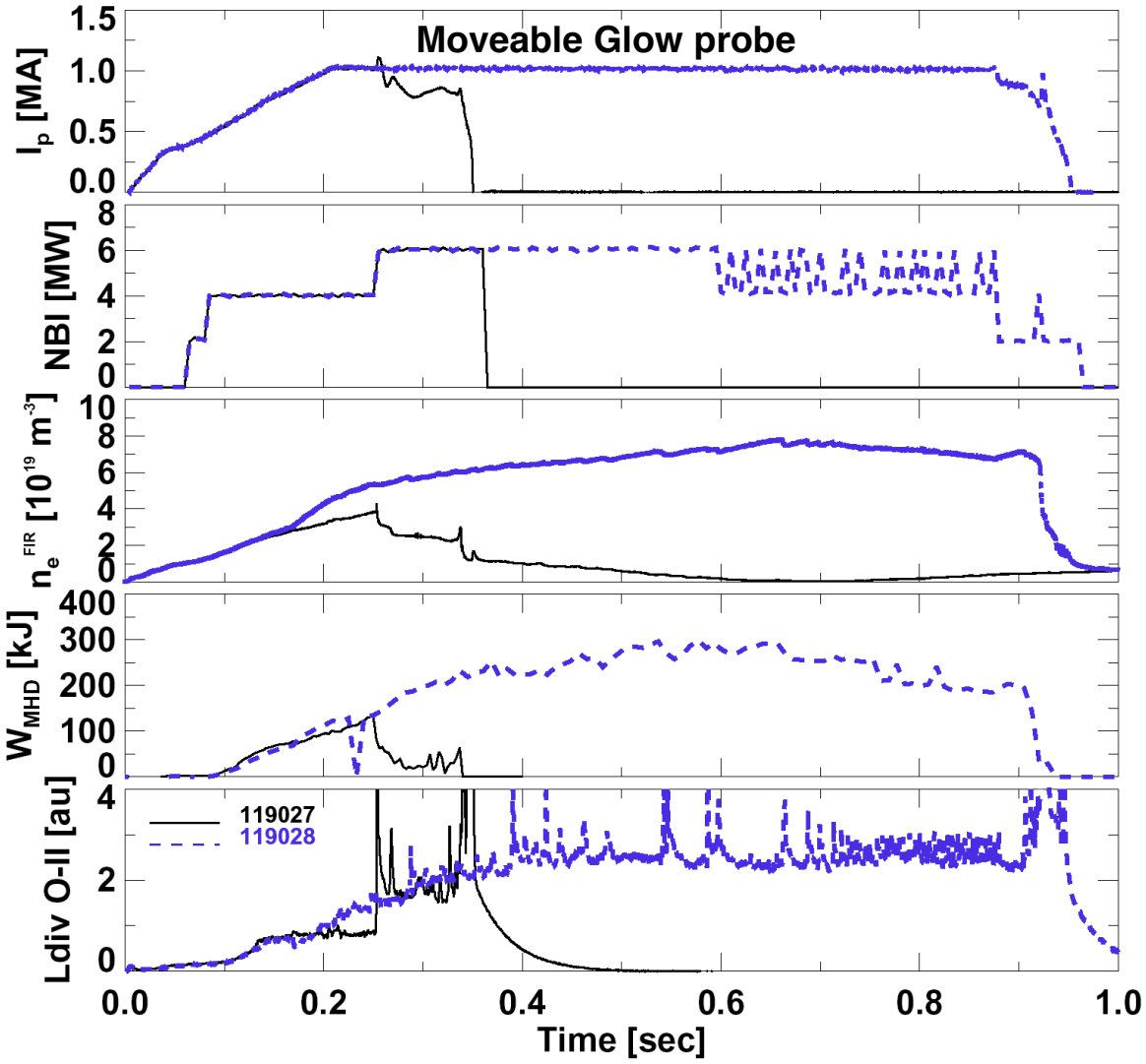
Similar long pulse discharges achieved with fixed and moveable HeGDC probes

- Did recycling go down considerably overnight? Or gain change?



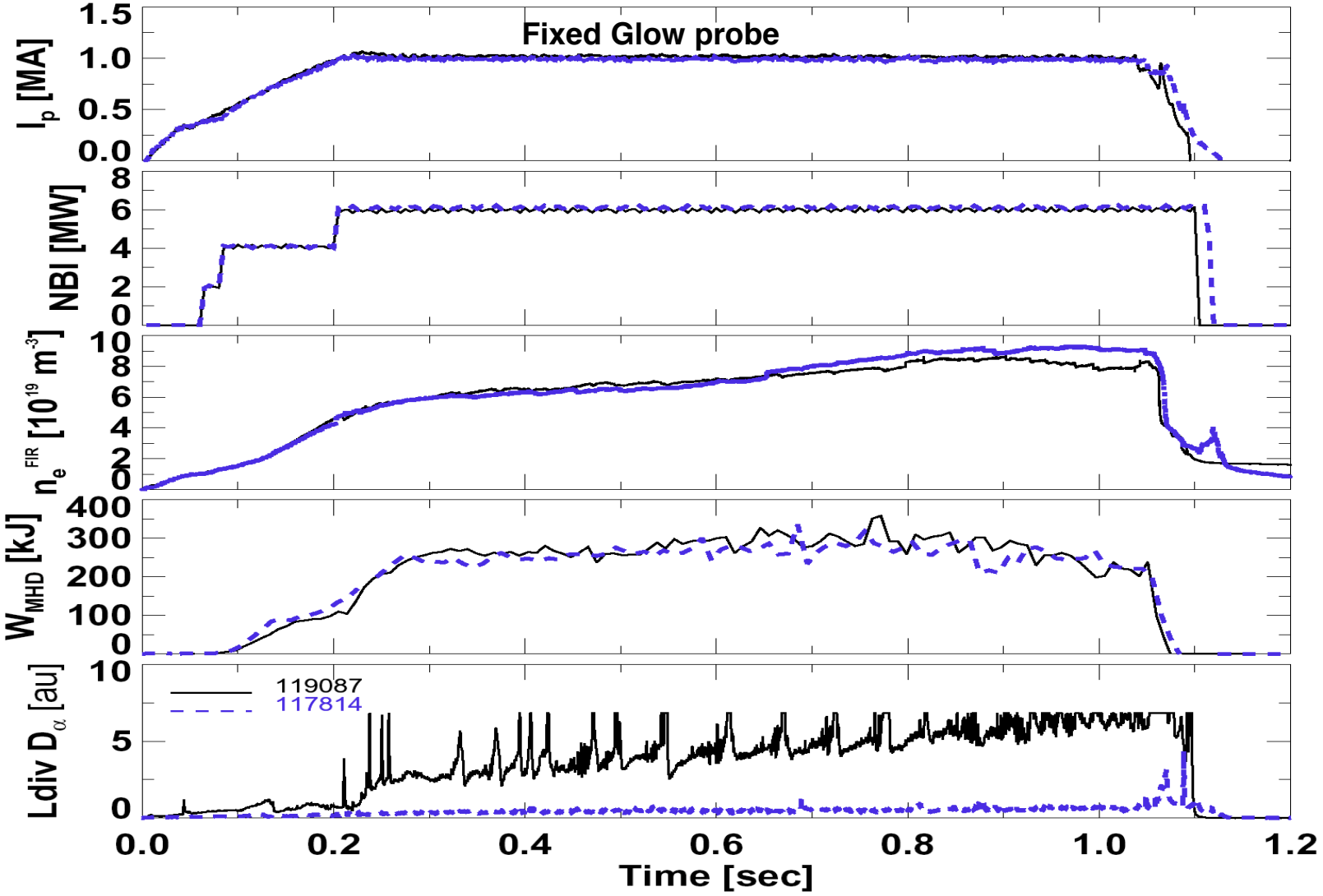
H-mode access easier as lower X-point becomes more dominant





Longest pulse 1 MA discharge from this year nearly identical to longest 1 MA discharge from last year

- Need to check if D_α gains were the same



Further questions from XP 616 results

- Can we achieve a 10 minute shot cycle with these high power, long pulse discharges
  - Maybe, but that requires more testing; #119048 was such a single discharge test case
- Assuming the good wall conditions are due to the second bake, would we make another improvement with a inter-run bake?
- What are the prospects to lengthen these long pulse discharges through early H-mode at 80-90 msec?
  - Reasonable: D_α showed possible signs of dropping into dithers; I_p flat spot and fueling to be optimized
- How does access to small ELMs depend on δ_r^{sep} and recycling?