Topic 24: overview of results, missing bits, and next steps

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Main plasma shapes explored so far in T24

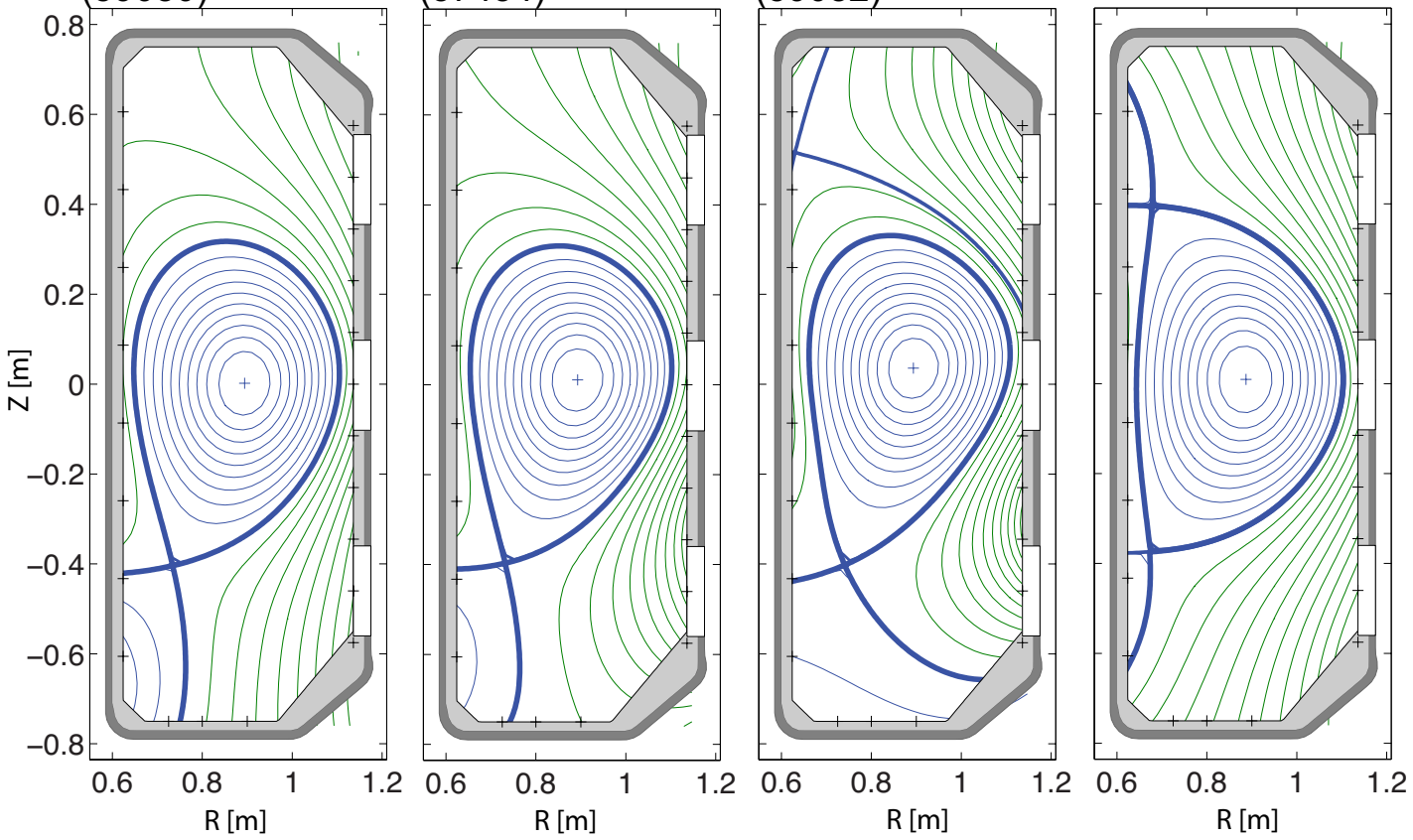
fx≈3.5; R_t≈0.75m (59080)

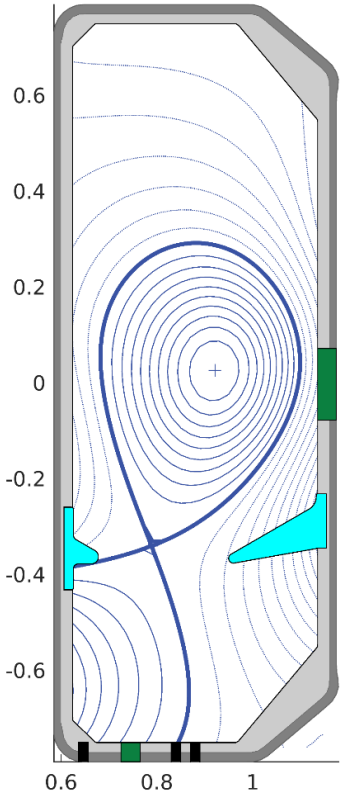
fx≈9; R_t≈0.74m (57434)

fx≈3; R_t≈1.045m (59082)

(57504)

2018, (near) baffle-compatible shape (fx≈6, 60888)

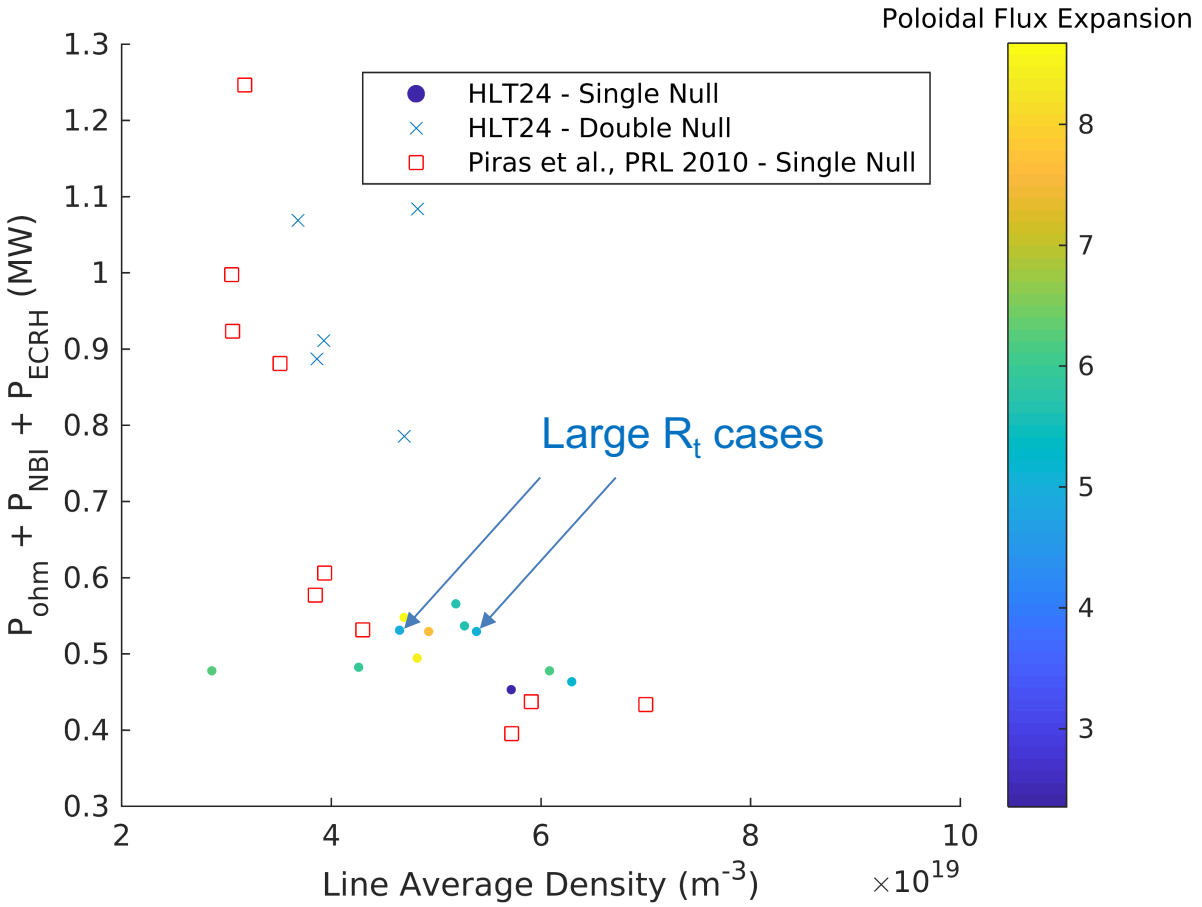




- H-mode achieved in all these plasmas

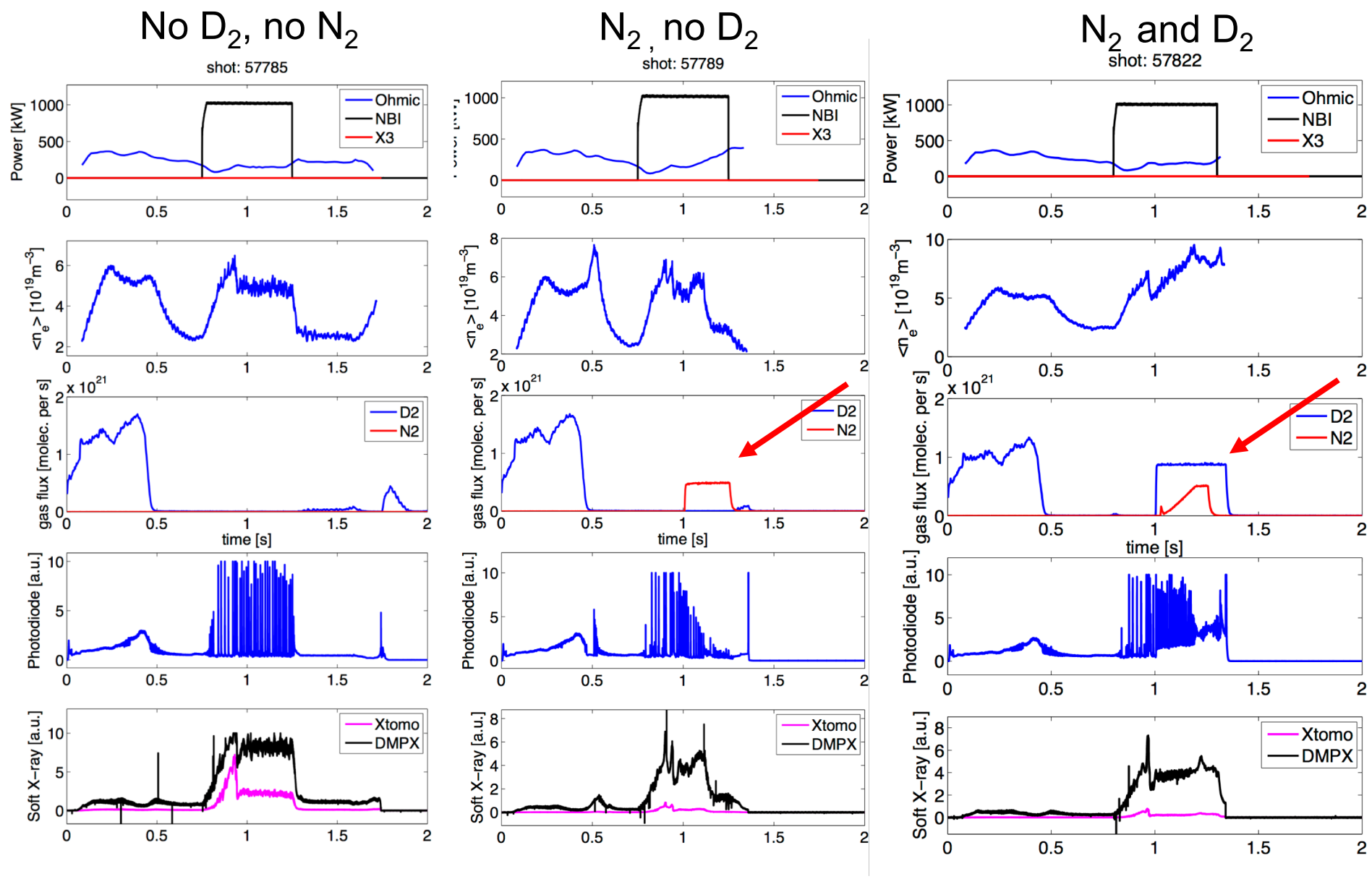
Estimating P_{L-H}

- Outer divertor f_{exp} doesn't seem to strongly influence $P_{L-H,}$ nor does R_T

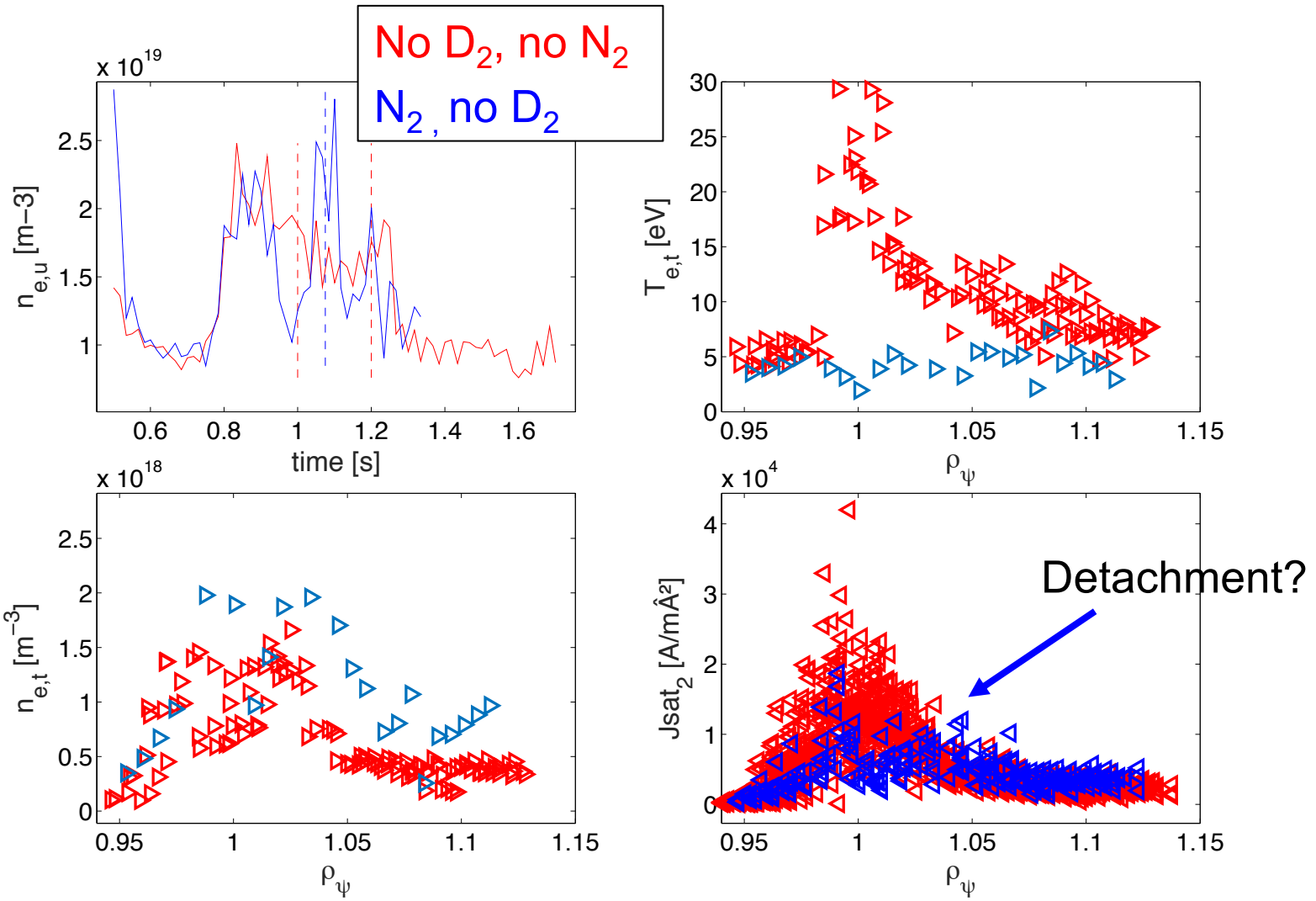


❑ Missing/desired: Threshold for f_x=6.5 over a larger density range

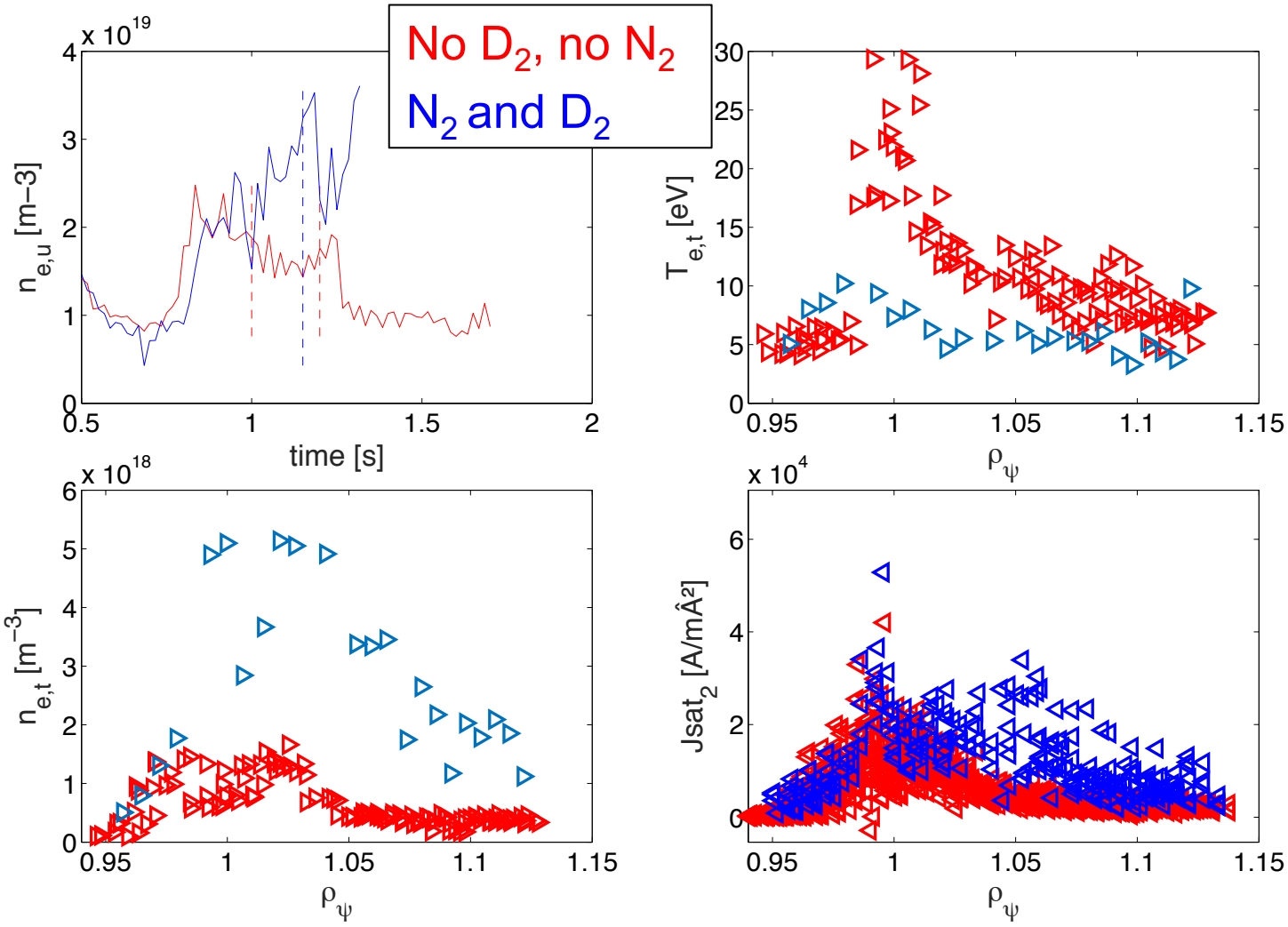
2017 shape at 210 kA -> ELMy



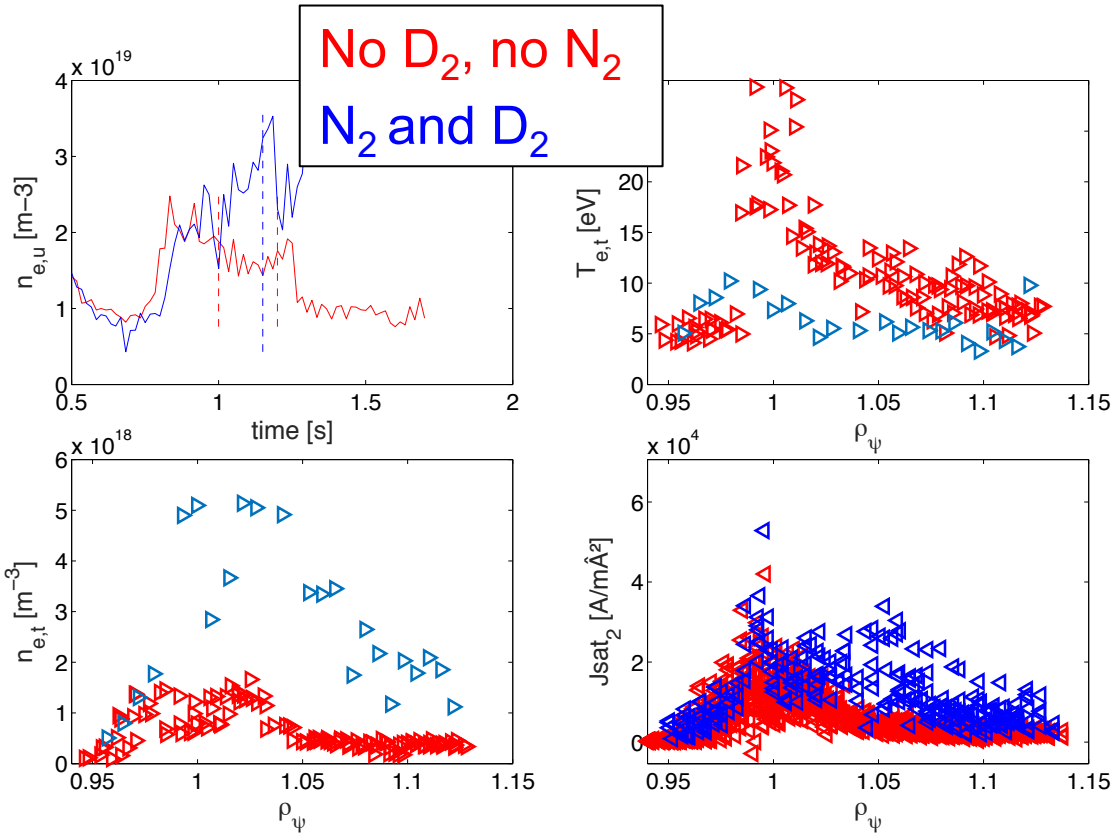
Injection of N2 results in significant cooling at target



Significant target cooling also for N_2 and D_2 injection

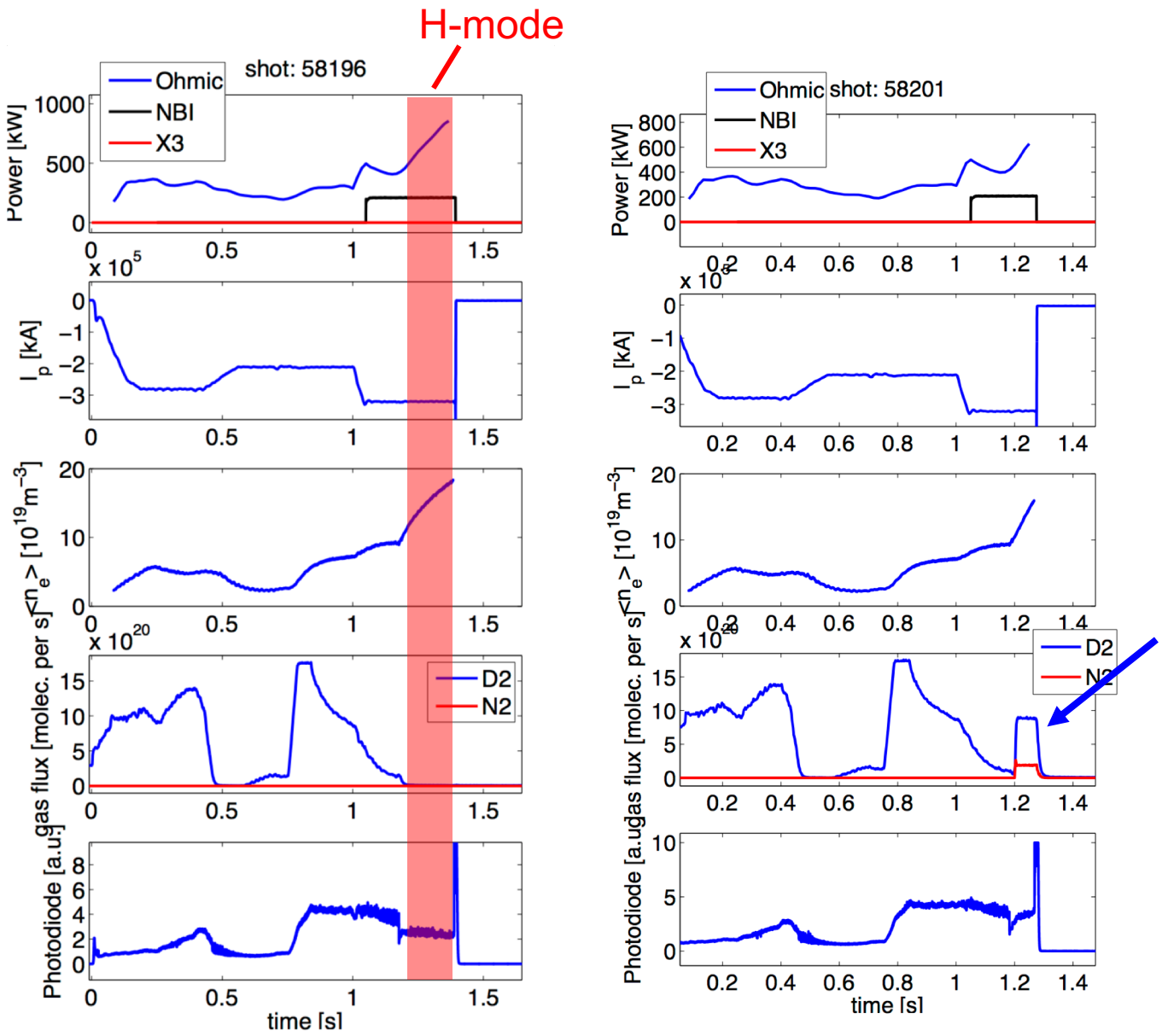


Significant target cooling also for N_2 and D_2 injection



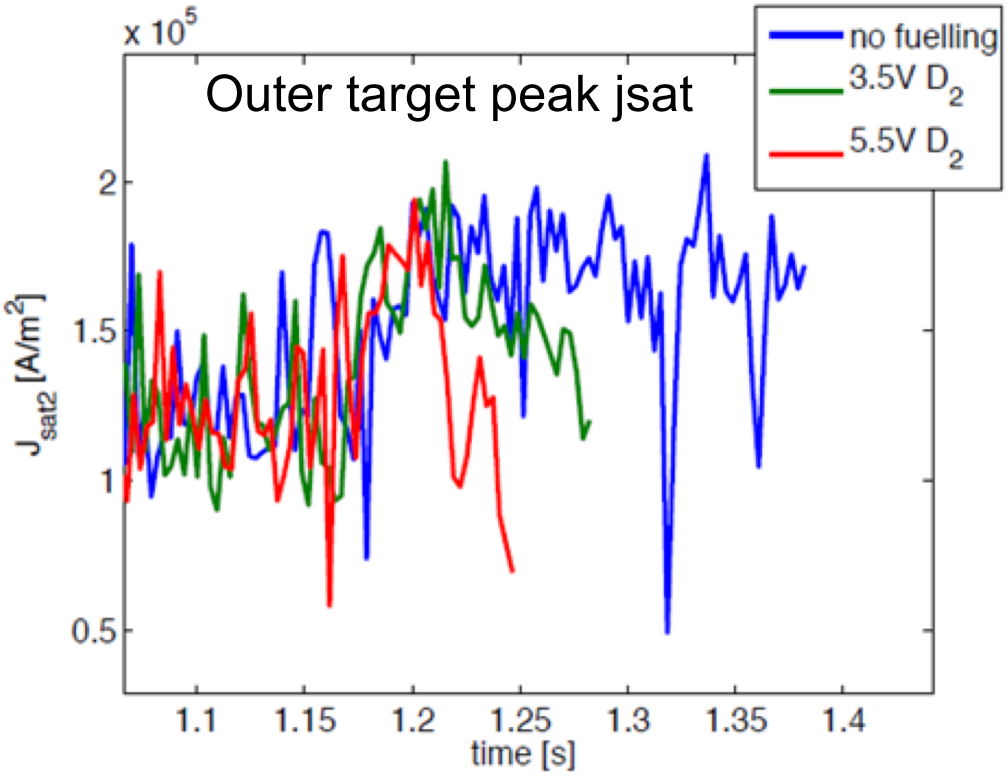
- Extend these experiments to scans in f_x, R_t, and to SF- configurations?

2017 shape at 320 kA, higher n_e, lower beam -> ELMfree



Injection of N_2 and/or D_2 into ELMfree phase

Signs of detachment with D_2 injection



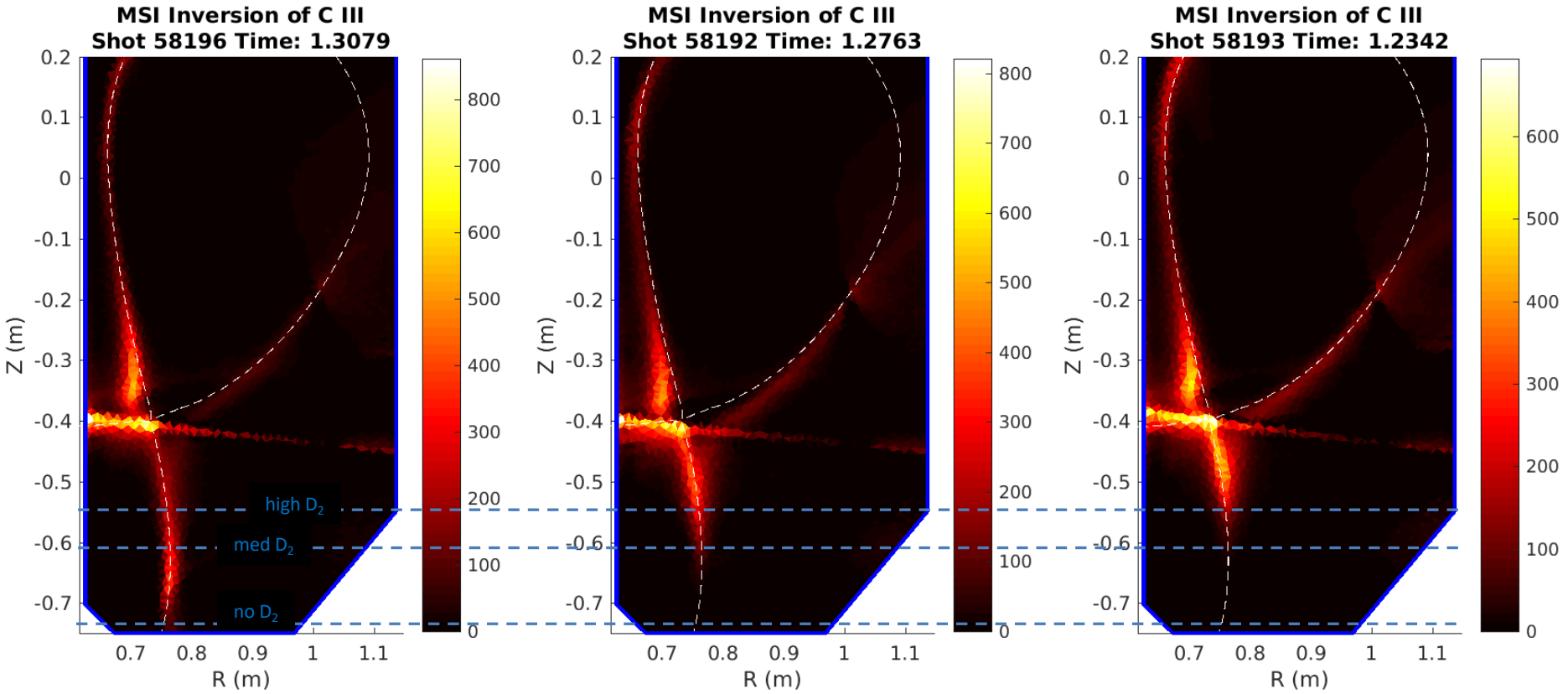
58196 – no fuelling

58192 – 3.5V divertor D_2

58193 – 5.5V divertor D_2

CIII front movement observed

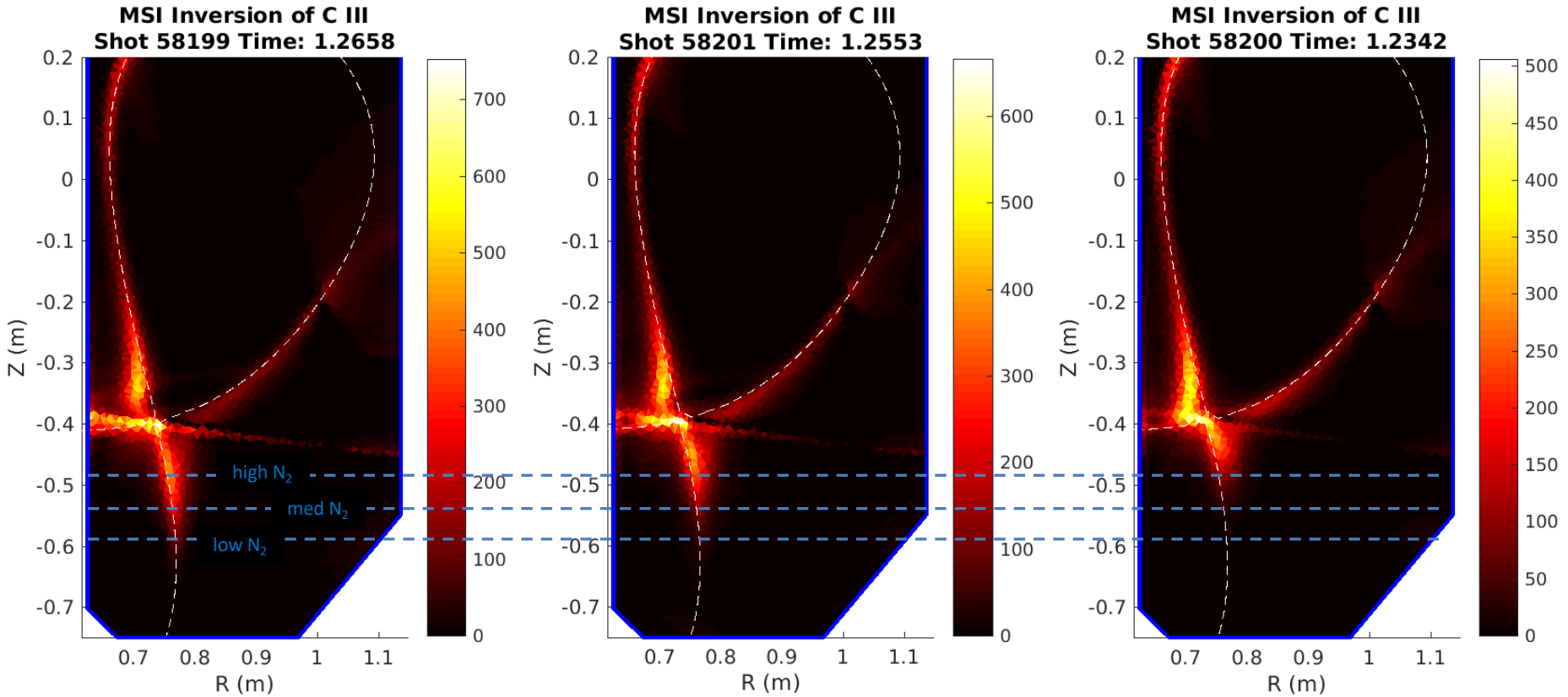
CIII emission just before disruption suggests stronger cooling of the outer leg with divertor D_2 puffing



No divertor D_2 **Mid divertor D_2** **High divertor D_2**

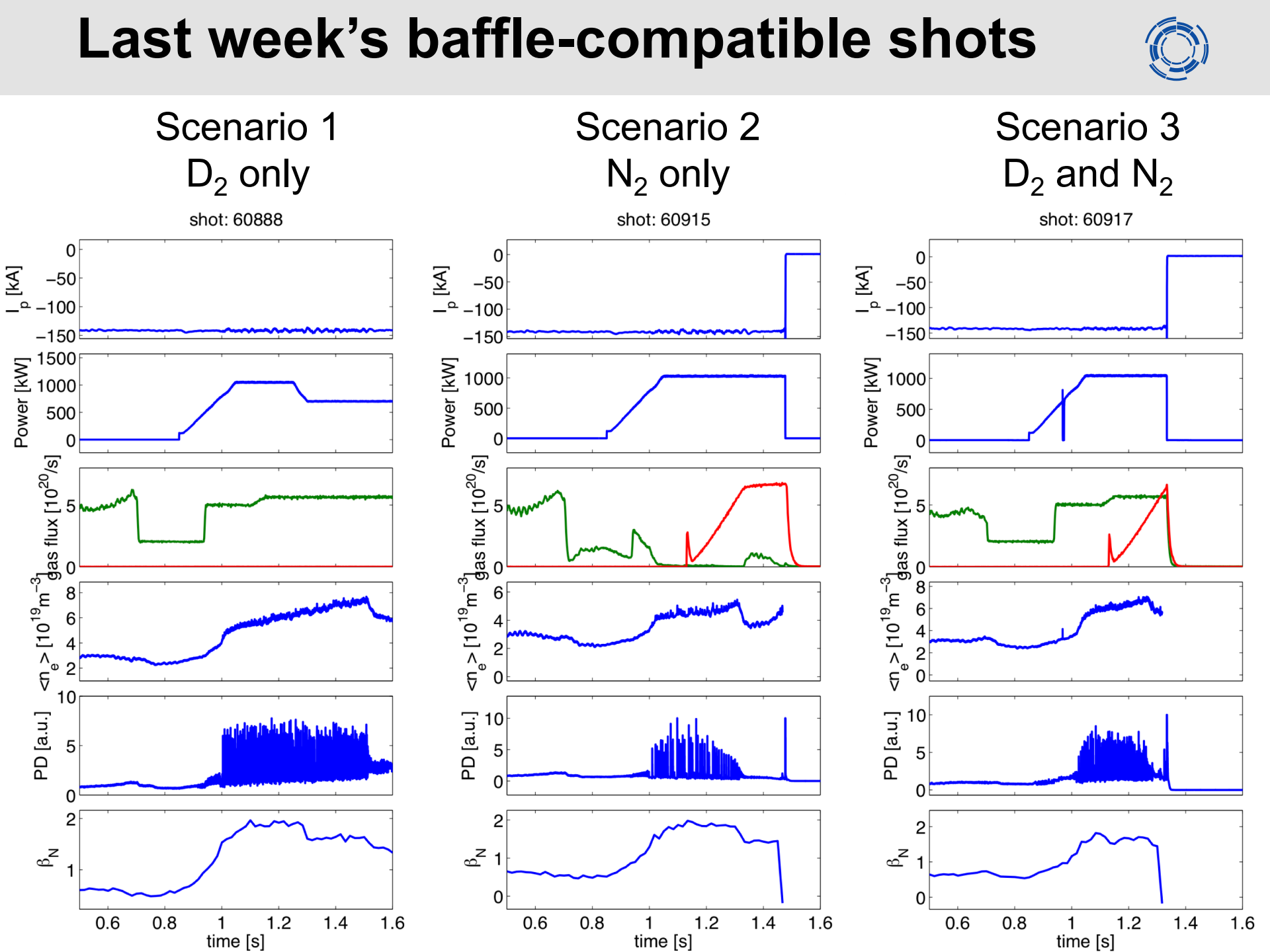
Front movement enhanced with N_2

CIII emission just before disruption suggests stronger cooling of the outer leg with increasing N_2 seeding

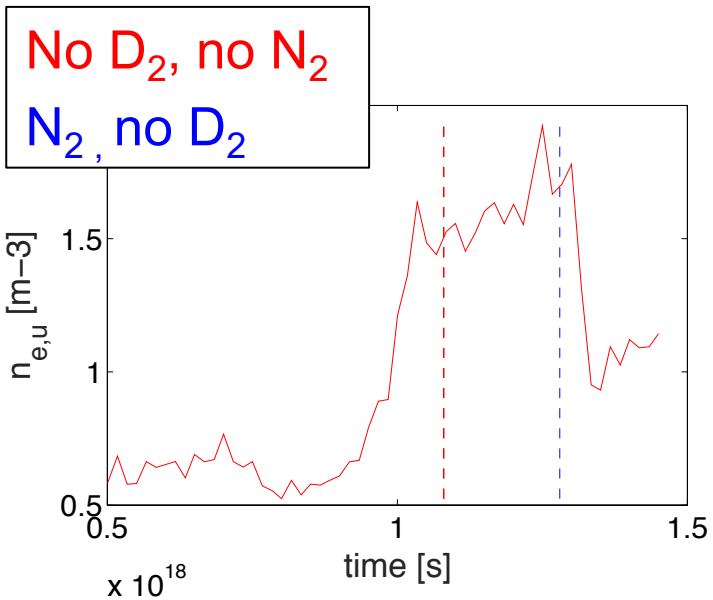


Low divertor N_2 | **Med divertor N_2** | **High divertor N_2**

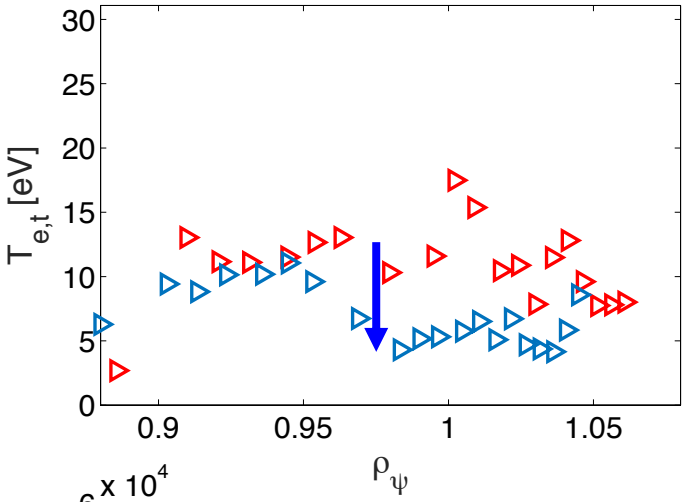
Last week's baffle-compatible shots

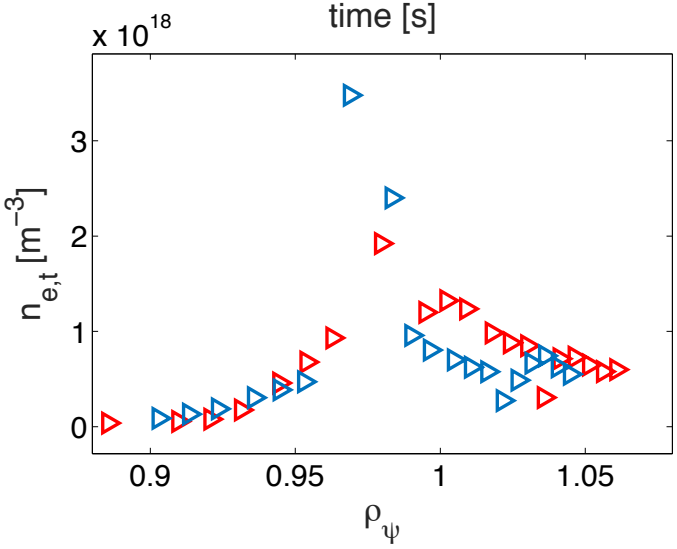


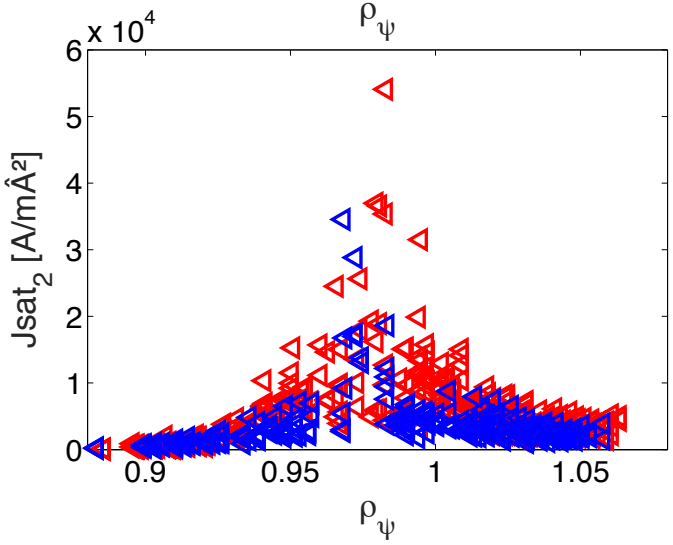
Some cooling due to N2 injection



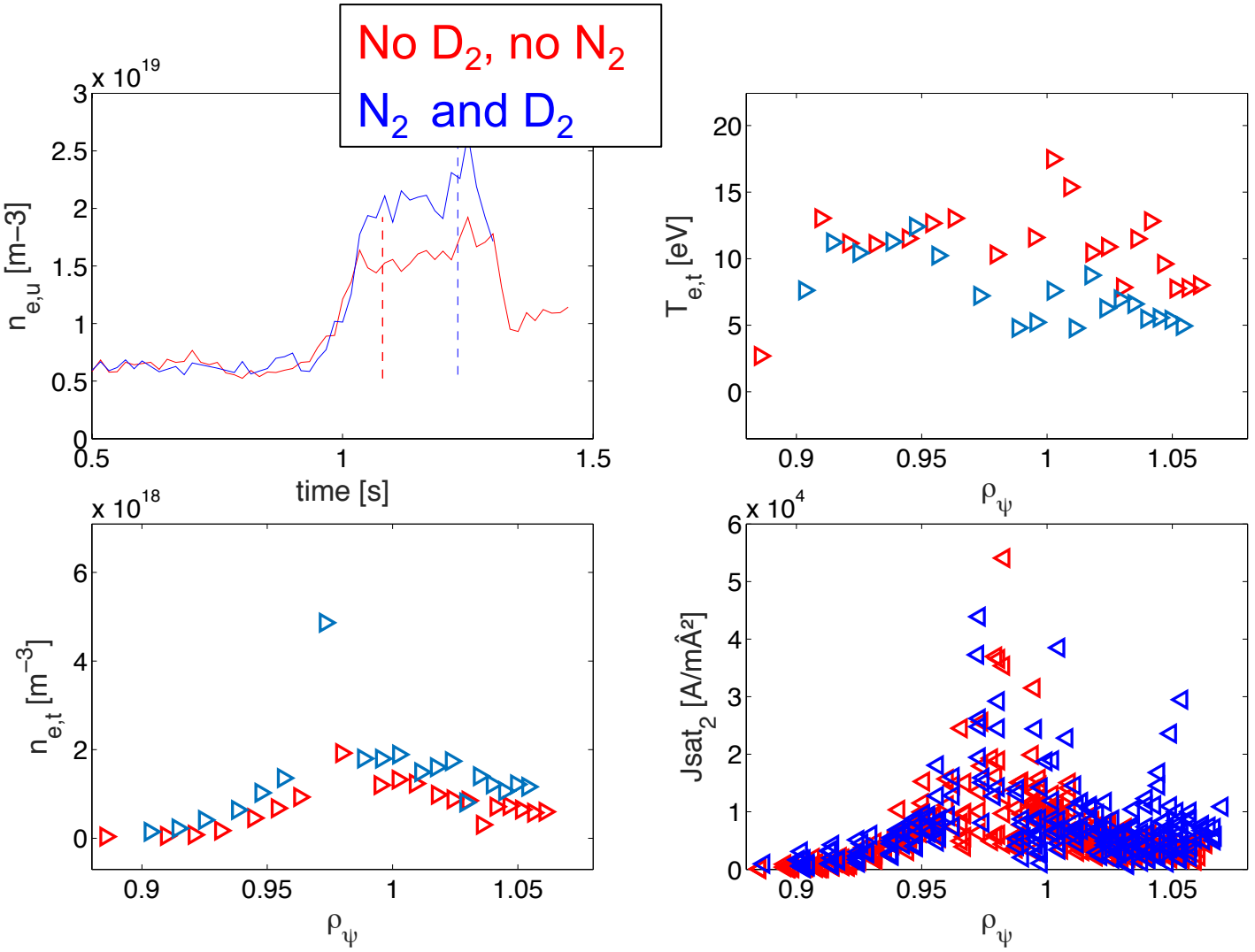
Already fairly cold before N_2



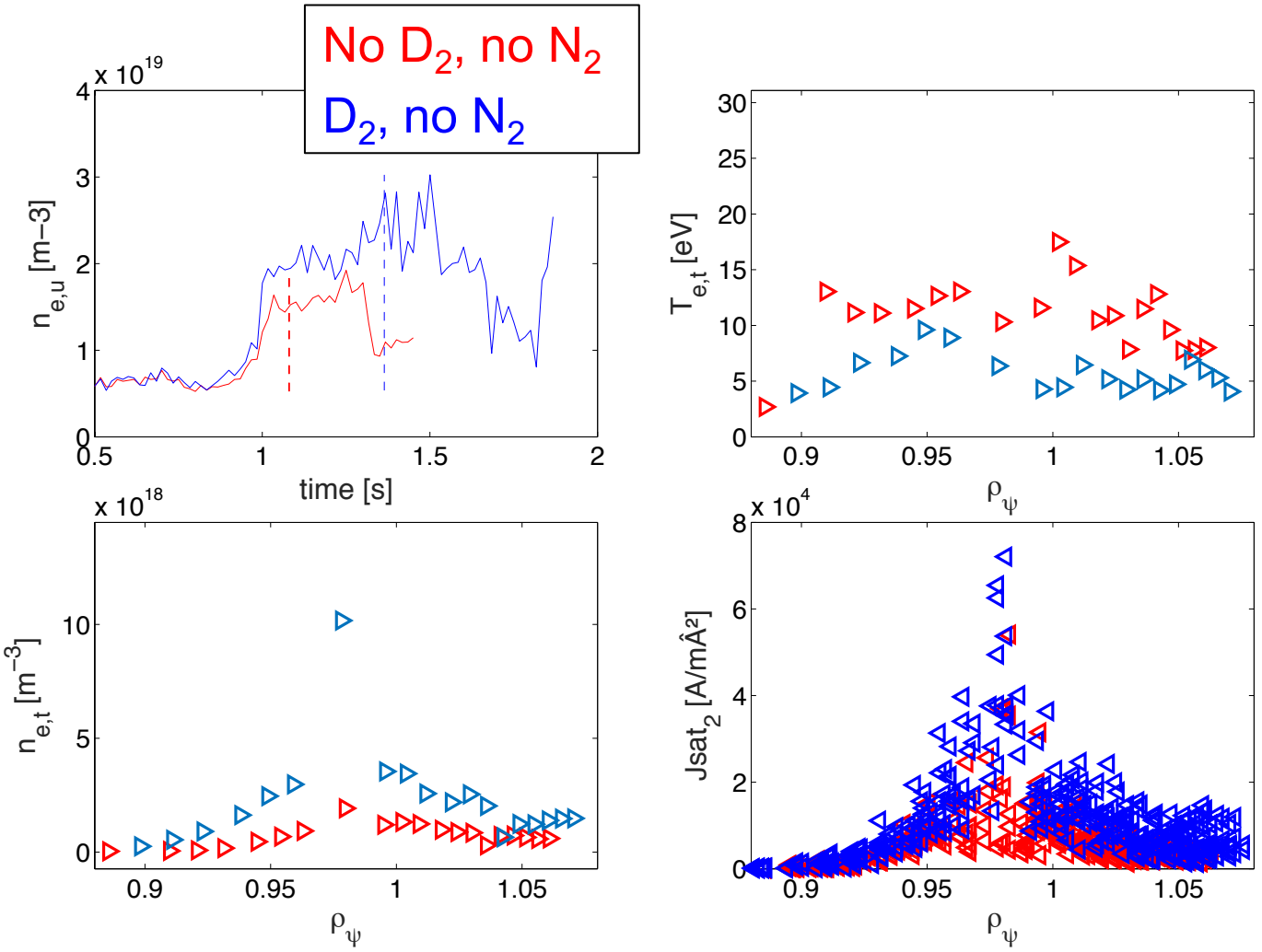




Similar observations for N_2 and D_2 injection



D_2-only results in lower T_e^t, higher n_e^t

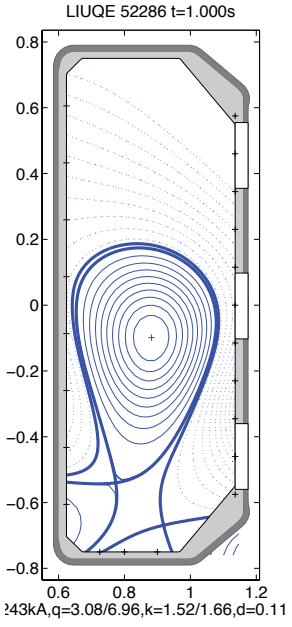


Some thoughts

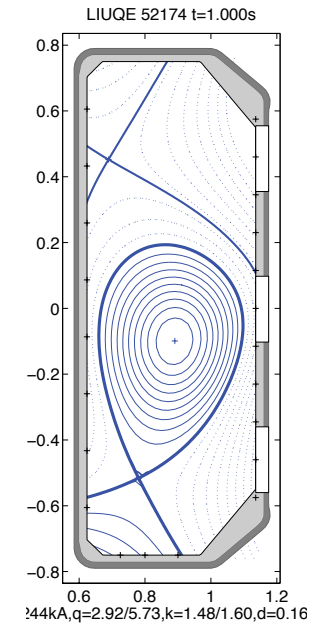
- Move on to SF-? Which shape, which scenario (current, power, etc..?)

- Explore CD_4 seeding/fueling to avoid MSI issues with N_2 lines?
- Extend to scenarios with higher more heating? (X3 tripping less of an issue now)

SF minus



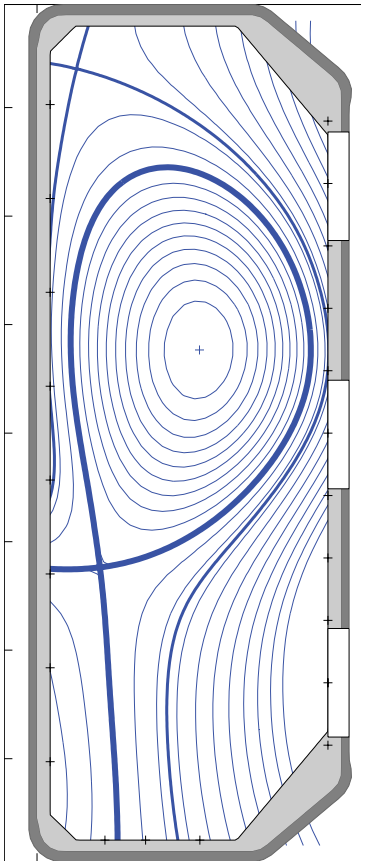
SN reference

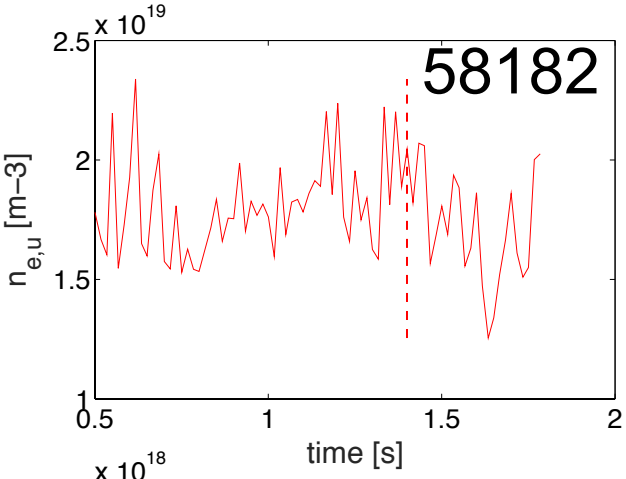


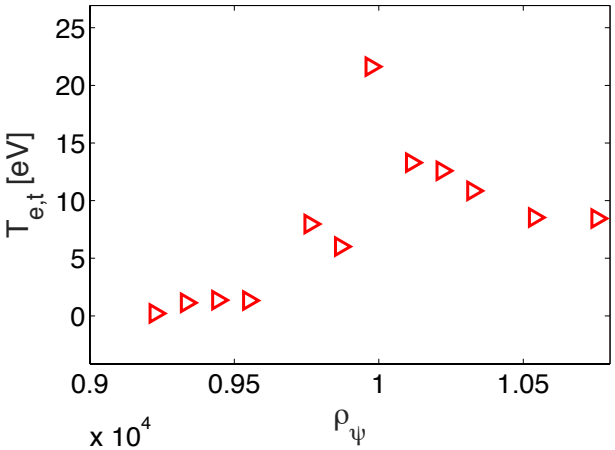
Other promising scenarios

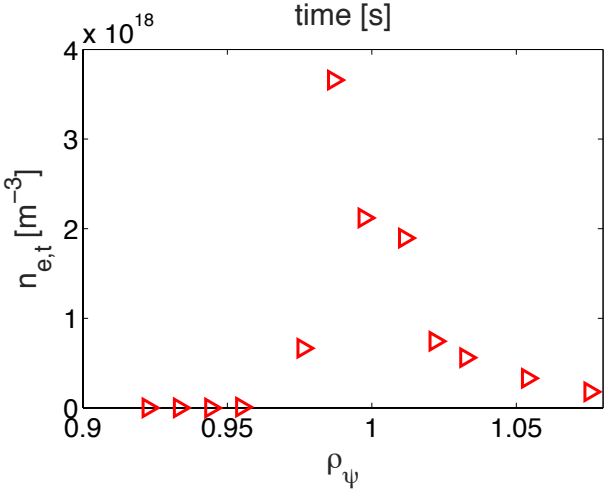
- High I_p, low NBI scenario (see next slides)
- 170kA scenario from T02? (similar to our 210kA scenario…)

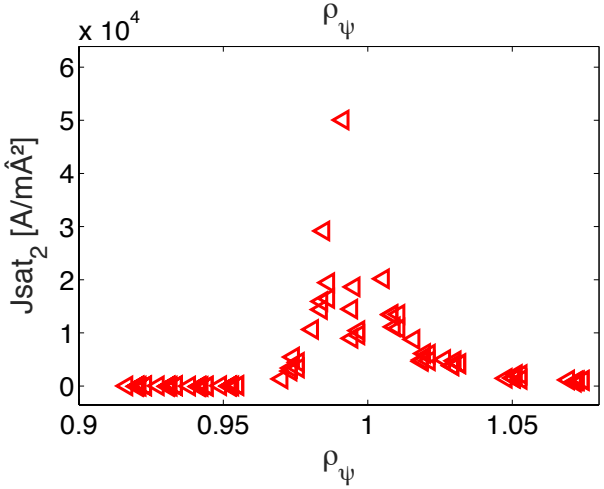
High I_p, low NBI scenario (T18 and T24)







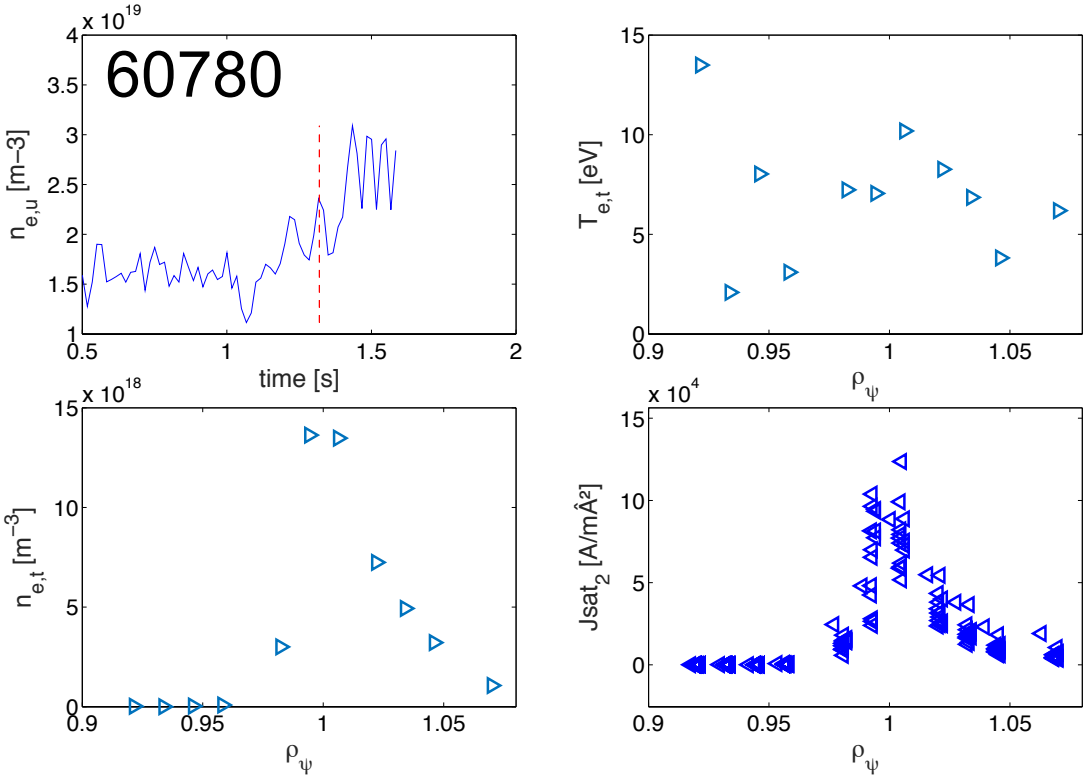




High I_p, low NBI scenario (T18 and T24)

TCV internal campaign extended scenario to full NBI power + injection of X3.

Surprisingly, T_e^t drops!



- Interesting scenario, planned to explore further in T18