TSVV3 16/10/2024

First analysis of the long-leg high and low density, L-mode plasmas with baffles

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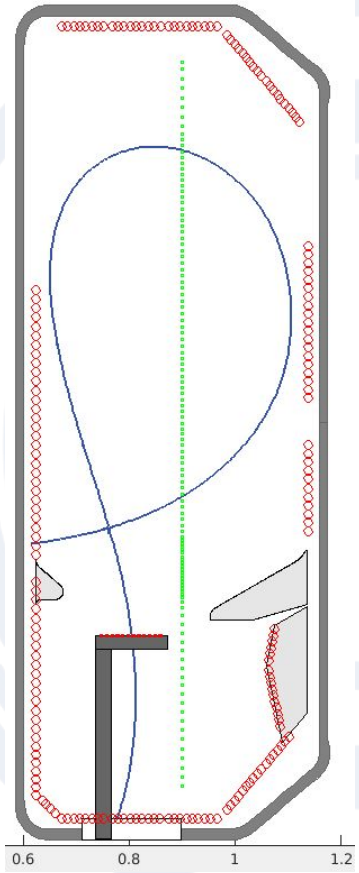
Two weeks to repeat shots with baffles

Goal : repeat 4 scenarios (low-high dens, FF-RF toroidal field) with baffles and X-point GPI

Shots summary:

1. Week 38: 2 ~good shots to check GPI setup
2. Week 39: 5 good shots for the 4 scenarios

# Shot	sign(B_t)	Density
[83406]	RF	Low
[83405, 83408]	RF	High
[83124, 83130, 83407]	FF	Low
[83394]	FF	High

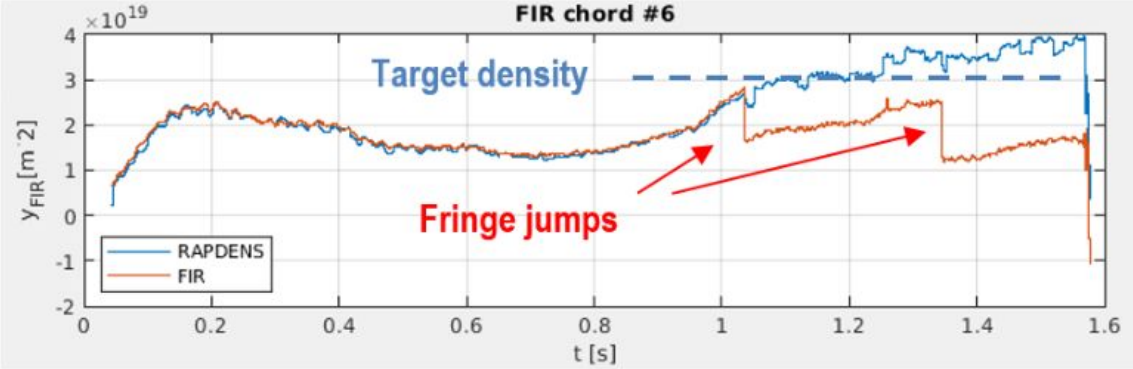


Experimental setup adapted to ensure good GPI data

Problems with the baffled shots and GPI:

- Closer to density limit + increase due to GPI

  → control density with real-time density model (RAPDENS)



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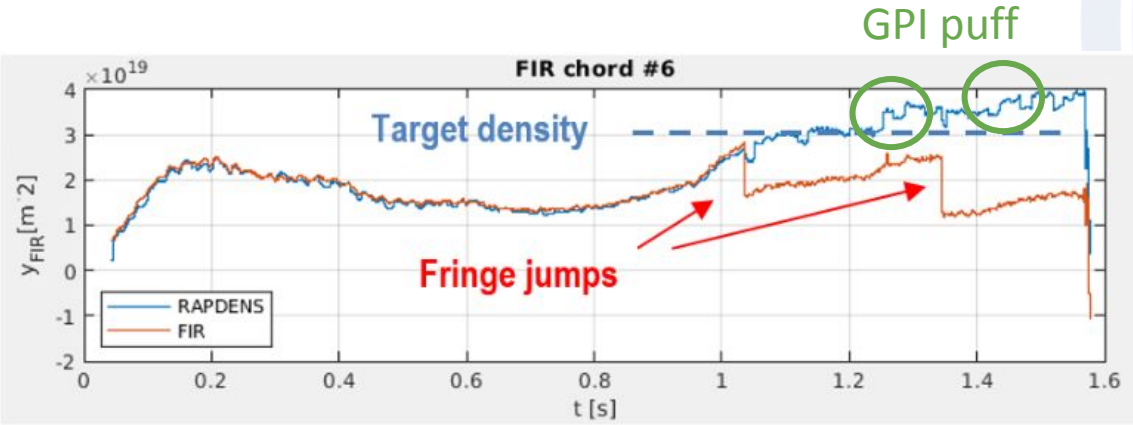


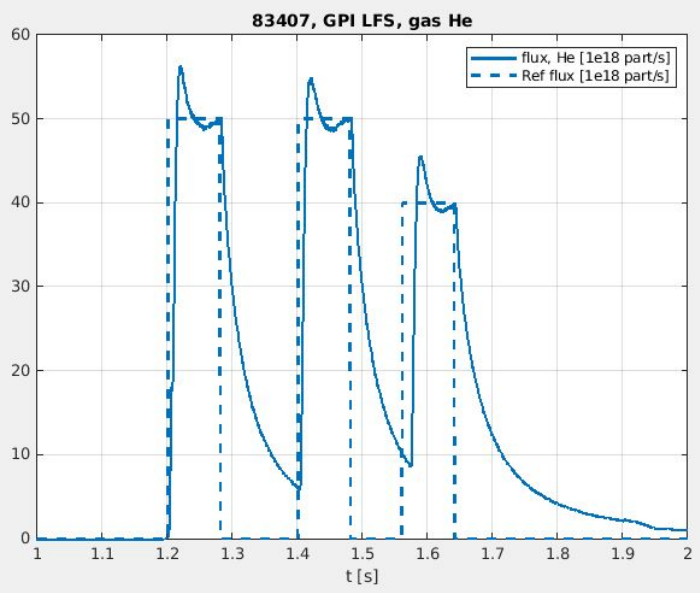
Experimental setup adapted to ensure good GPI data

Problems with the baffled shots and GPI:

- Difficult balance between good SNR with GPI and perturbing density

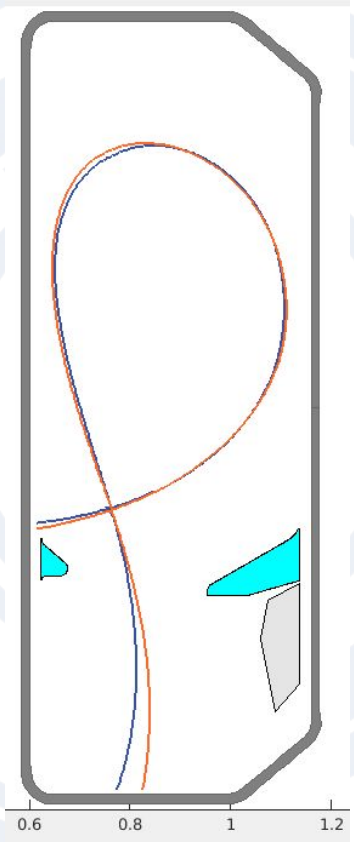
  →Adjust gas puff amplitude

  → Move leg closer after first phase of the shot



0.8s < t < 1.35s

t > 1.4s



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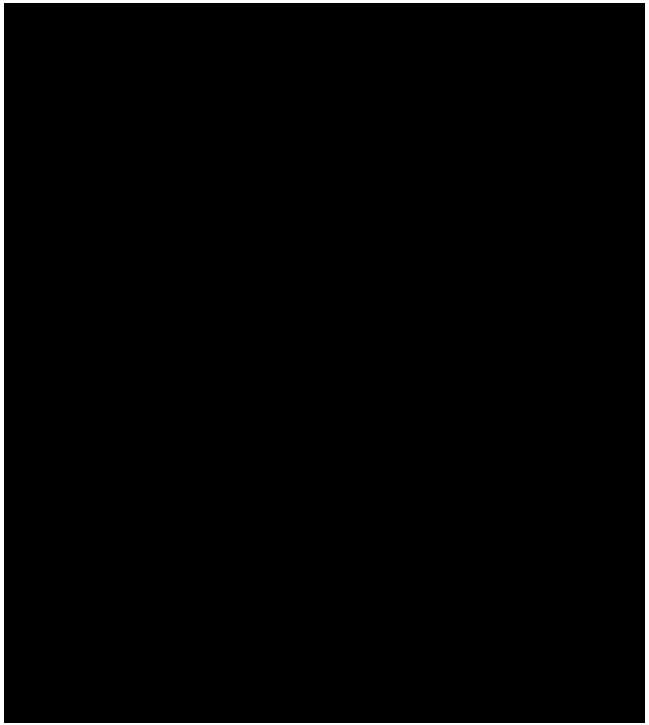
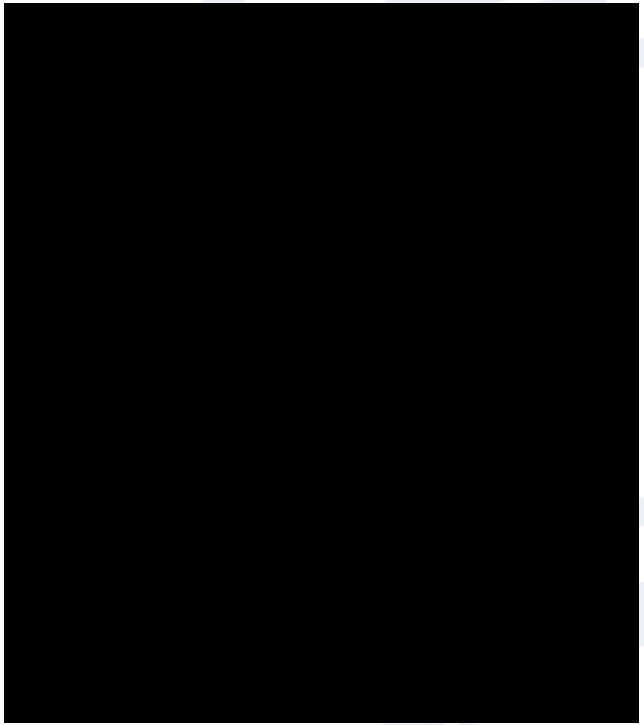
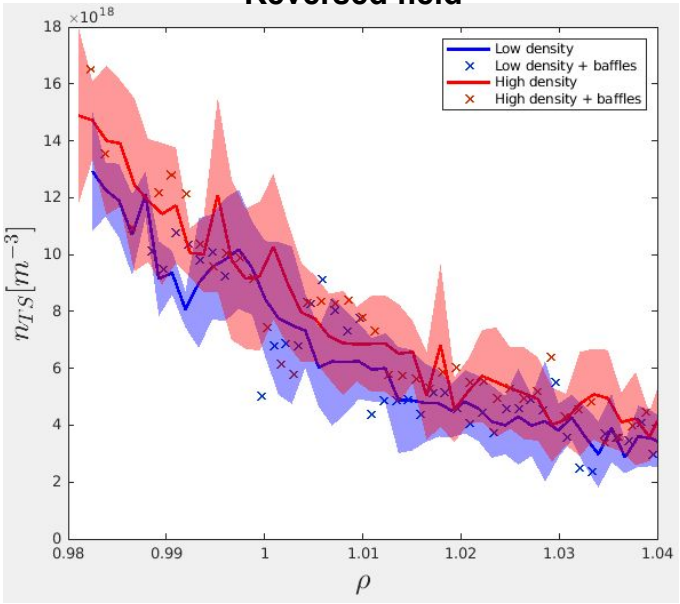




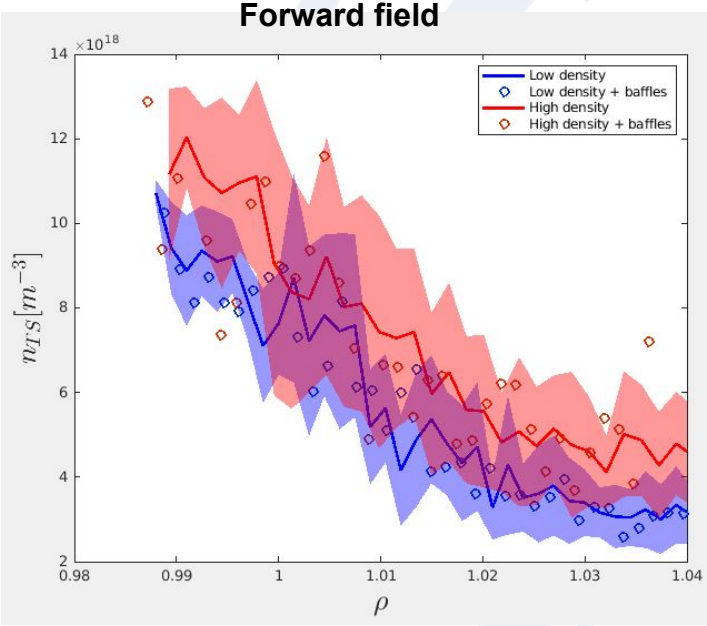
TS density profiles match unbaffled shots up to error bars

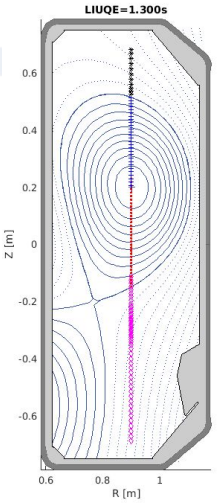
- Upstream density compatible between baffled and unbaffled shots

Reversed field



Forward field

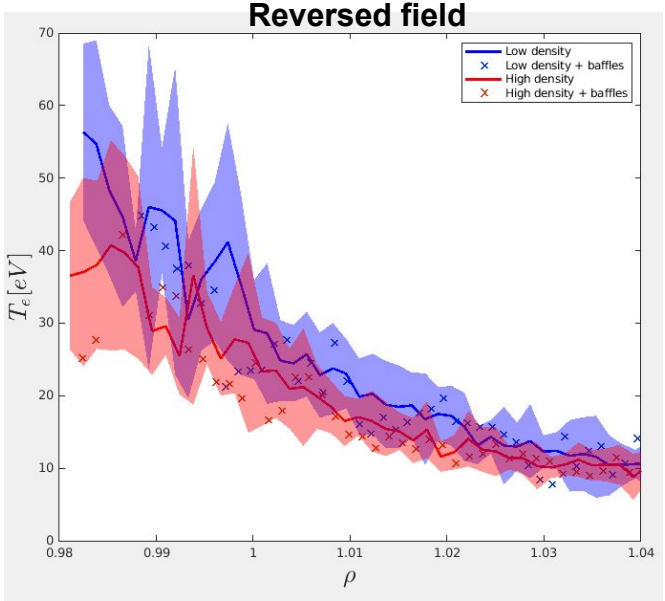




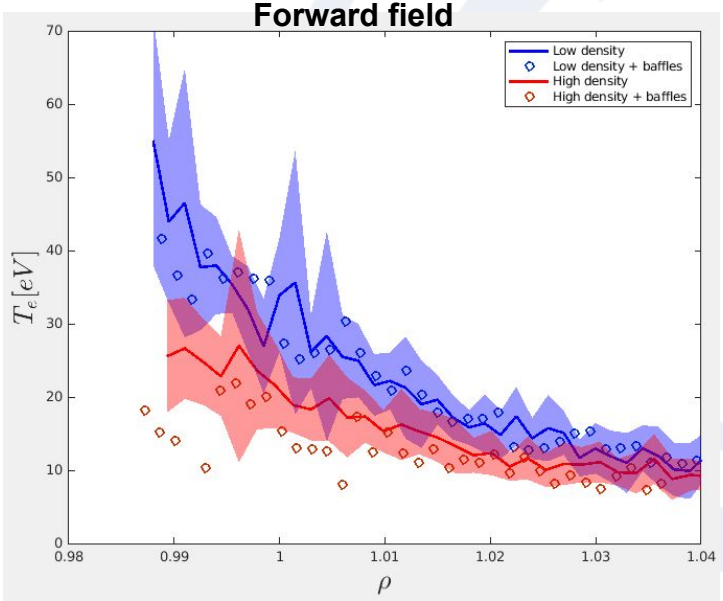
TS temperature profiles match unbaffled shots up to error bars

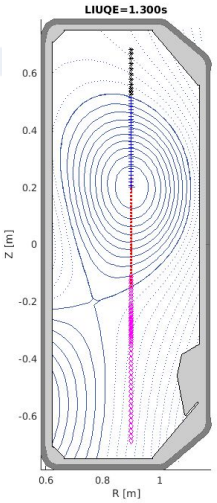
- Upstream temperature compatible between baffled and unbaffled shots
- Lower T_e for FF high density

Reversed field



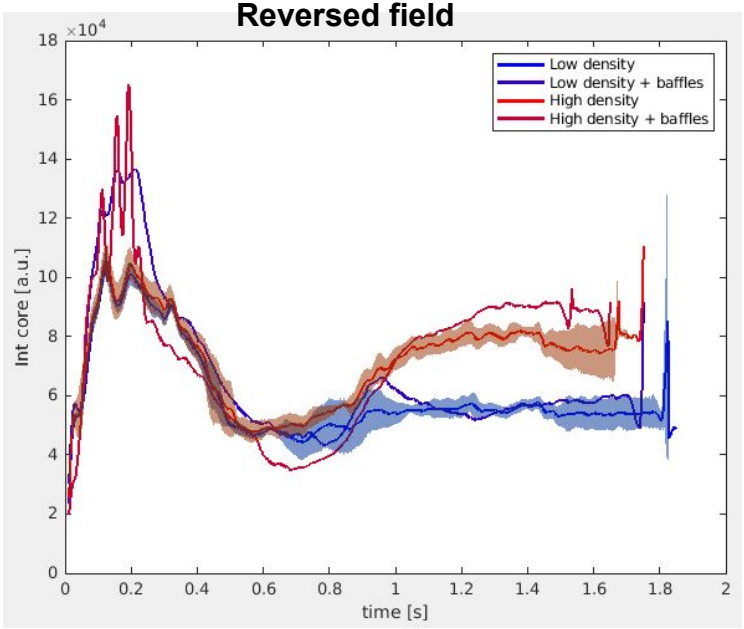
Forward field

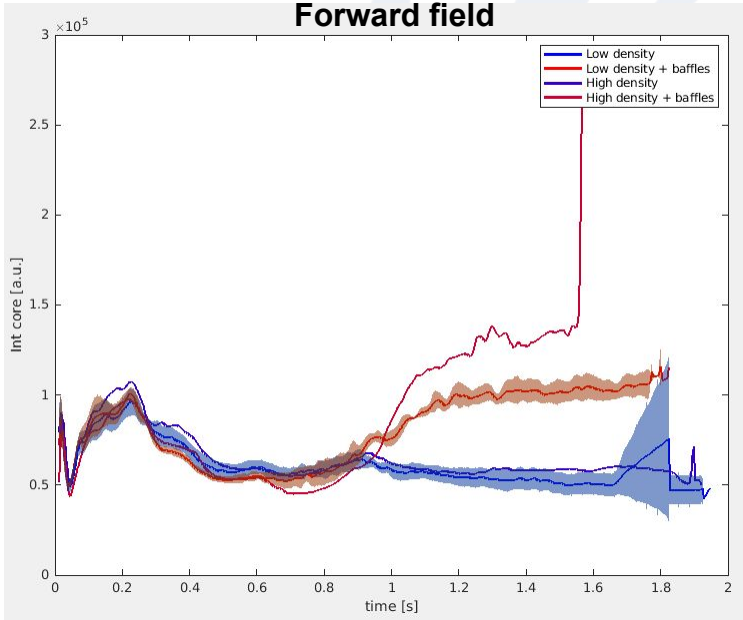


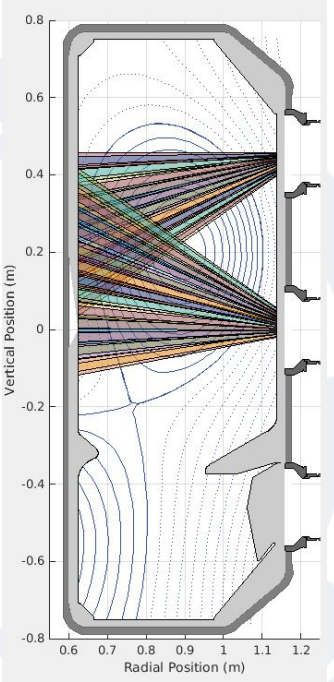


Bolometry measurements in the core shows more losses with baffles in high density

- Low density shots compatible
- In high density high radiation due to He → observed also with DSS
- In FF high density 20% more radiation → investigate with tomography



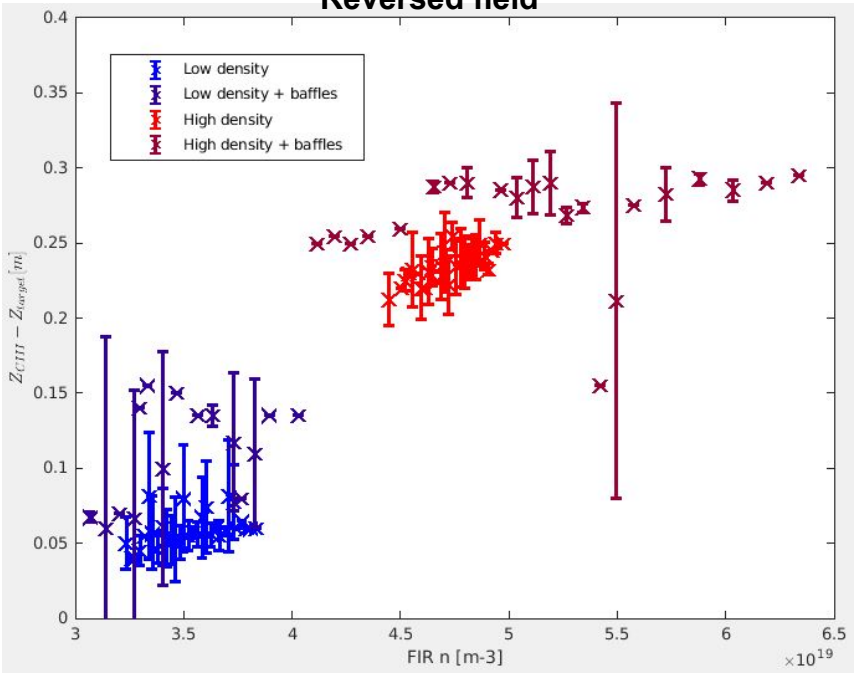




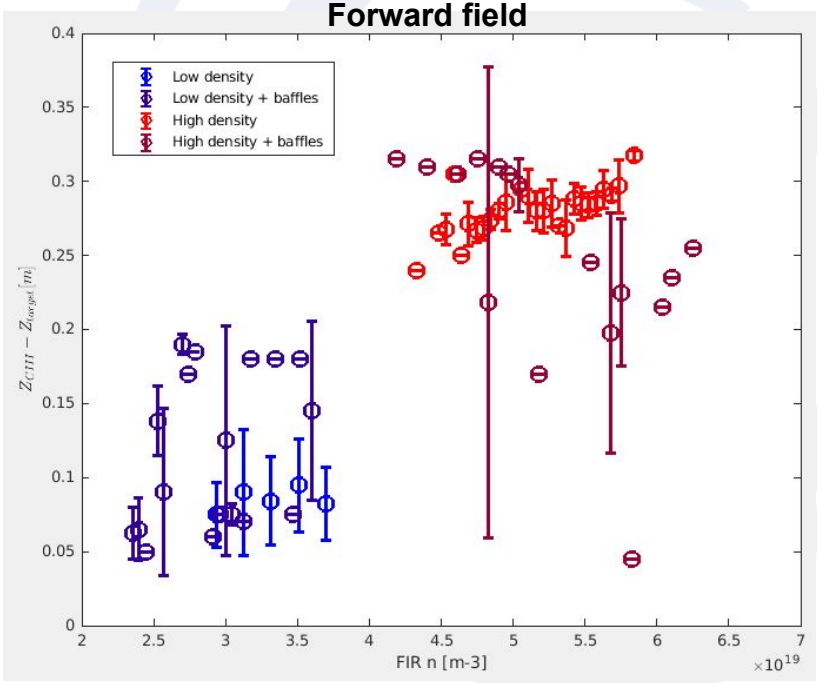
DSS shows CIII front movement compatible with unbaffled shots

- CIII front higher in low density with baffles → lower temperature close to target
- Clear movement of CIII front from low to high density also with baffles

Reversed field

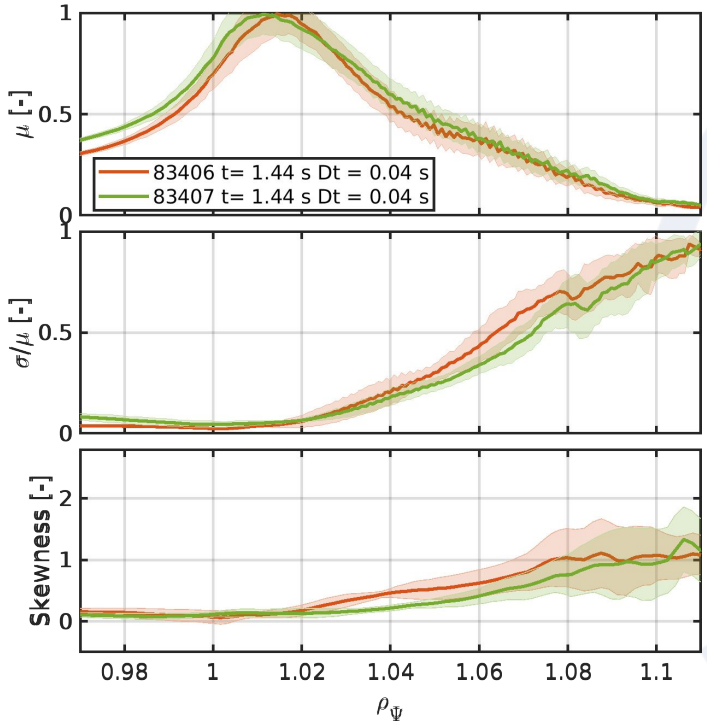


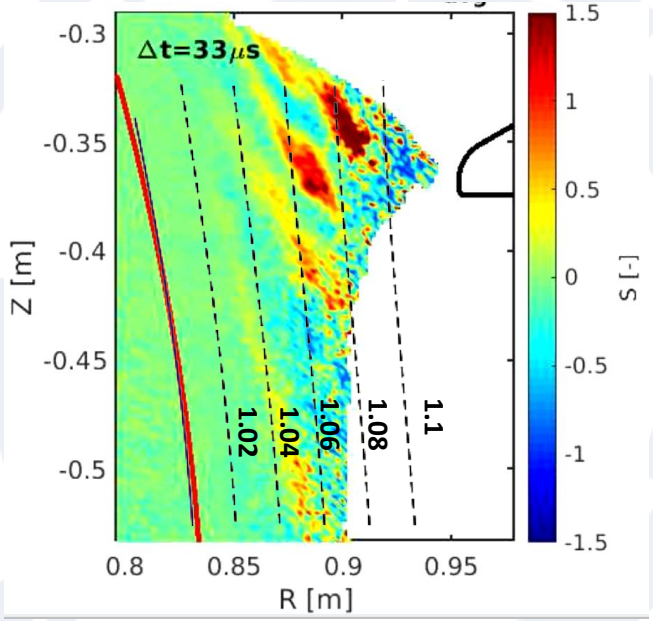
Forward field



First GPI analysis

Profiles easy to get from direct emission:





Sensible to diagnostic artifacts → velocity profiles more difficult to get but more reliable (paper of Y. Wang on synthetic GPI in preparation)

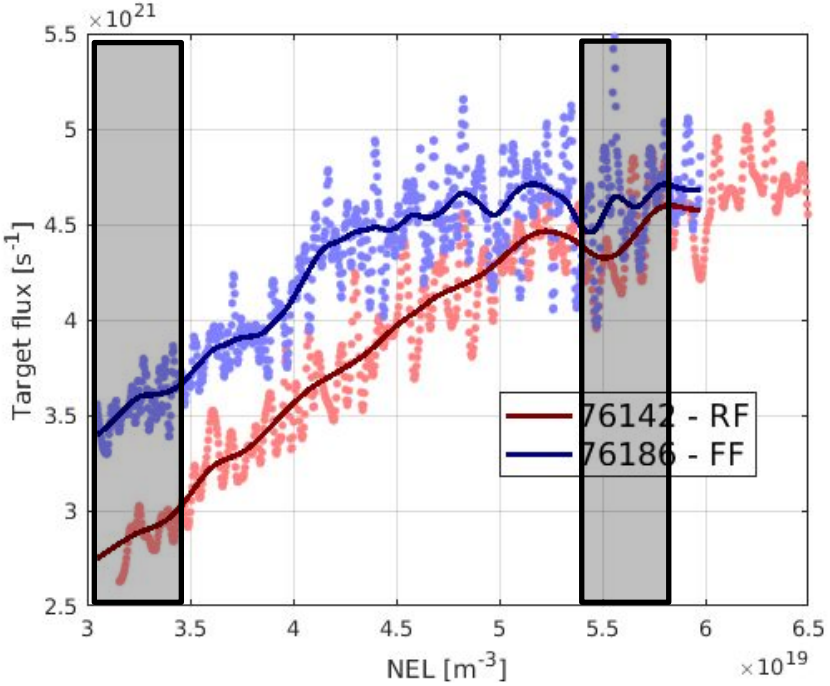
Conclusions

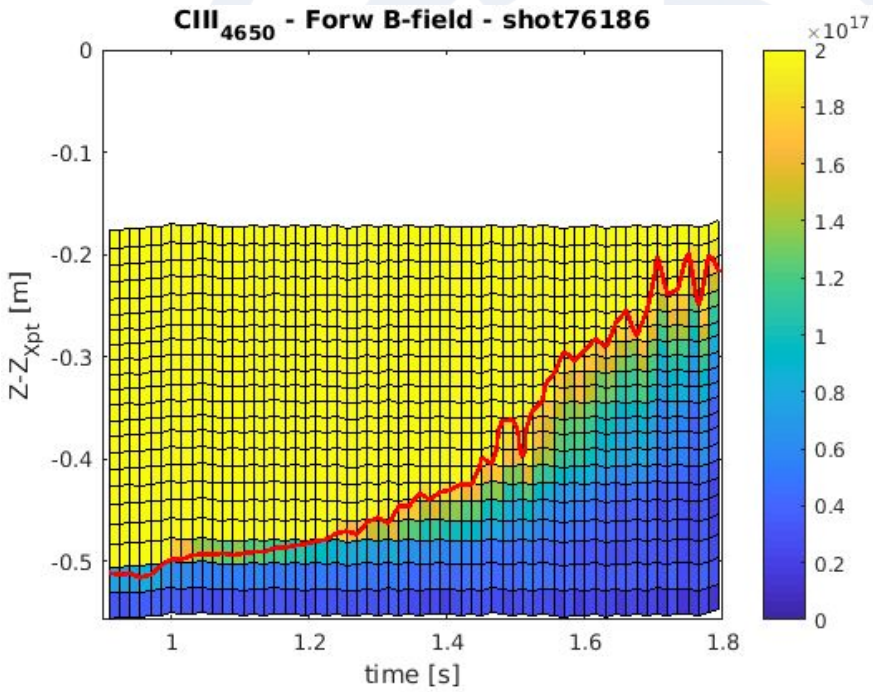
Full database soon to be completed:

- Database for unbaffled shots almost complete → same routines for new shots
- Baffled shots are compatible with un-baffled shots: same trends from low to high density
- LPs and RDPA analysis under going
- High density FF case higher radiated power and lower separatrix temperature
- DSS measurements to be analyzed : check relevance of He due to GPI
- GPI measurements to be analyzed (input is welcome):
  - Preliminary profiles: check for leg position + compare with synthetic
  - Blobs detection : velocity profiles + shape analysis

From density ramps (2023) to flat-tops for high quality dataset

- Density ramps up to saturation of ion flux, with CIII front movement from target
- Two density windows chosen for simulations and reference for flat-top shots (2024)

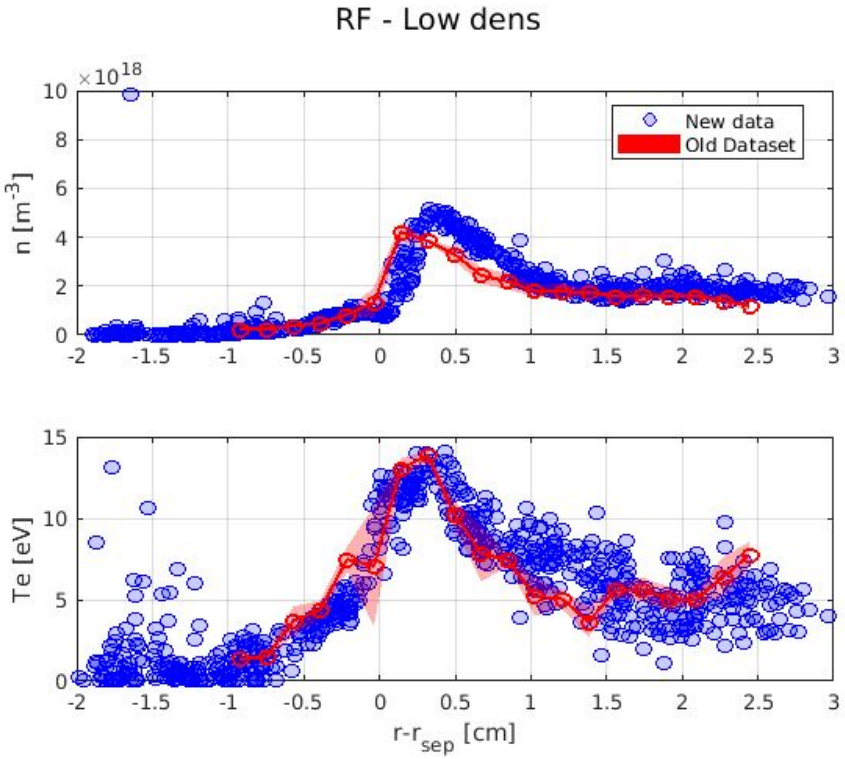


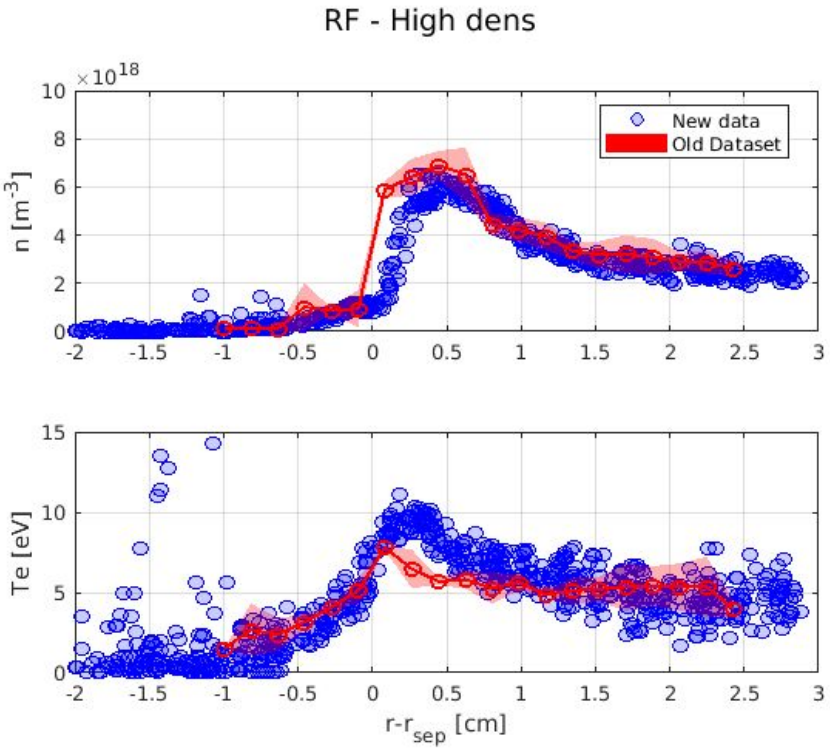


LPs targets profiles improved quality

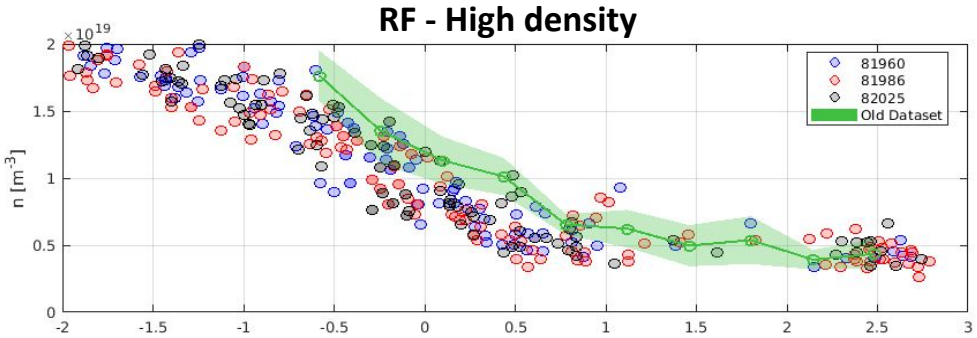
Better data:

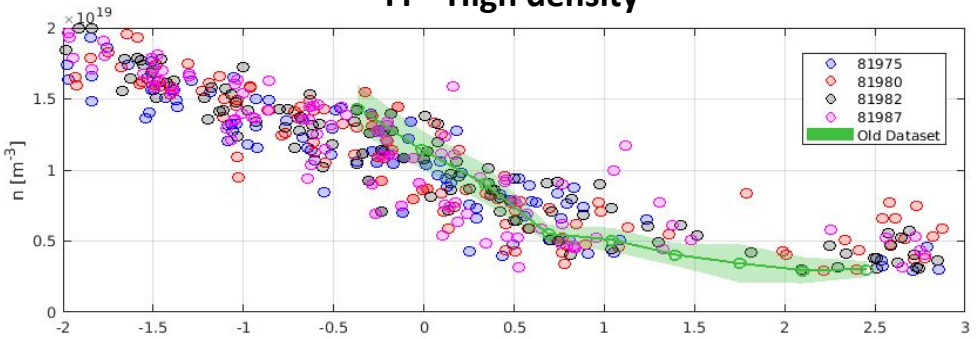
- Longer time intervals
- Strike points position sweeping

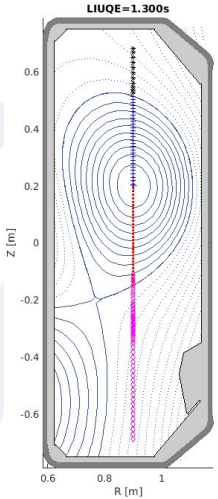




LP profiles match with unbaffled shots up to error bars







sign(B_t)	$n_{e,sep}$ [10^{19} m^{-3}]	$T_{e,sep}$[eV]
RF	0.84 (0.91 ± 0.12)	31.2 (40.2 ± 8.7)
RF	1.00 (1.20 ± 0.20)	23.0 (26.1 ± 7.5)
FF	0.78 (0.98 ± 0.13)	27.0 (35.5 ± 6.5)
FF	1.02 (1.13 ± 0.14)	20.4 (24.0 ± 4.5)

(old density ramp)