MAX-PLANCK-INSTITUT
FÜR PLASMAPHYSIK

Significant sub-divertor pressures in W7X OP2.2

progress report

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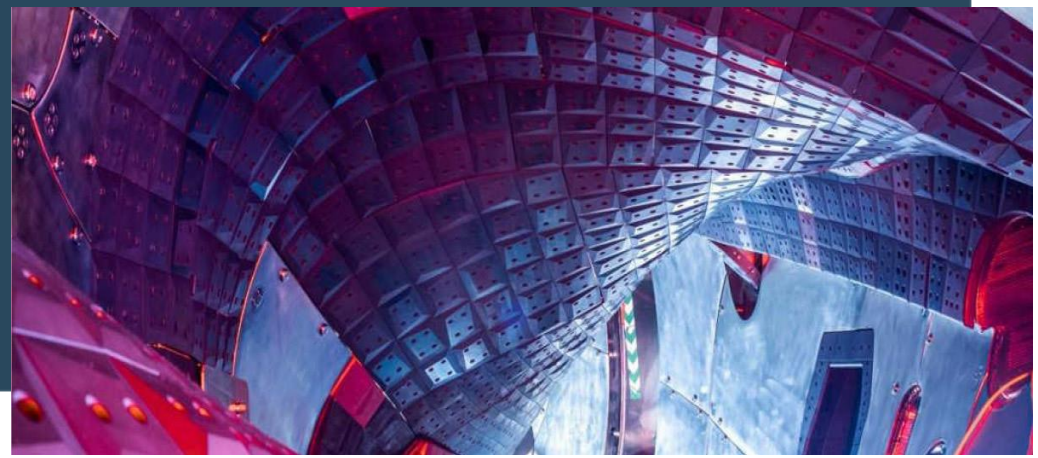
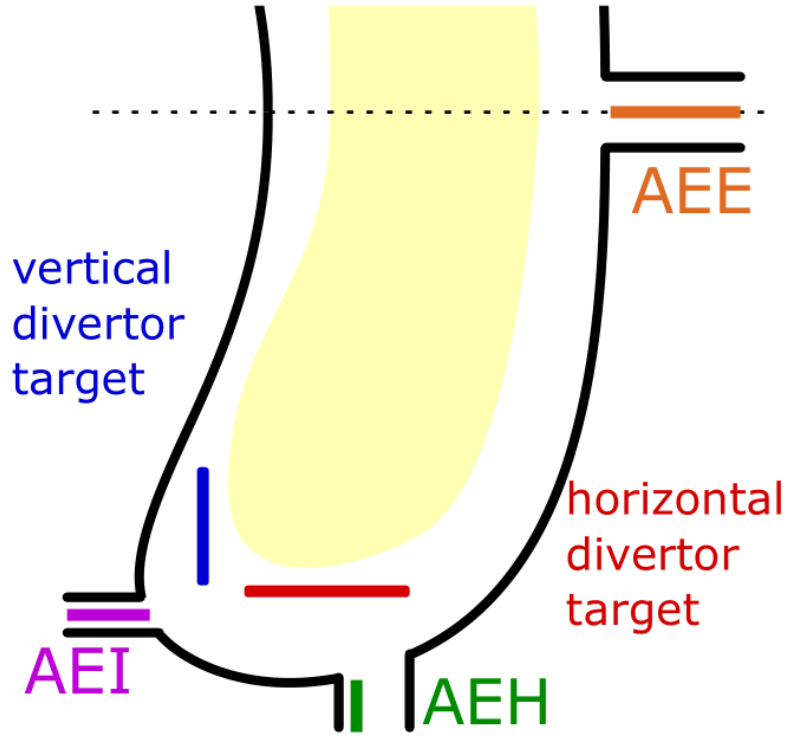


EUROfusion

This work has been carried out within the framework of the EUROfusion Consortium, funded by the European Union via the Euratom Research and Training Programme (Grant Agreement No 101052200 — EUROfusion). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Commission. Neither the European Union nor the European Commission can be held responsible for them.

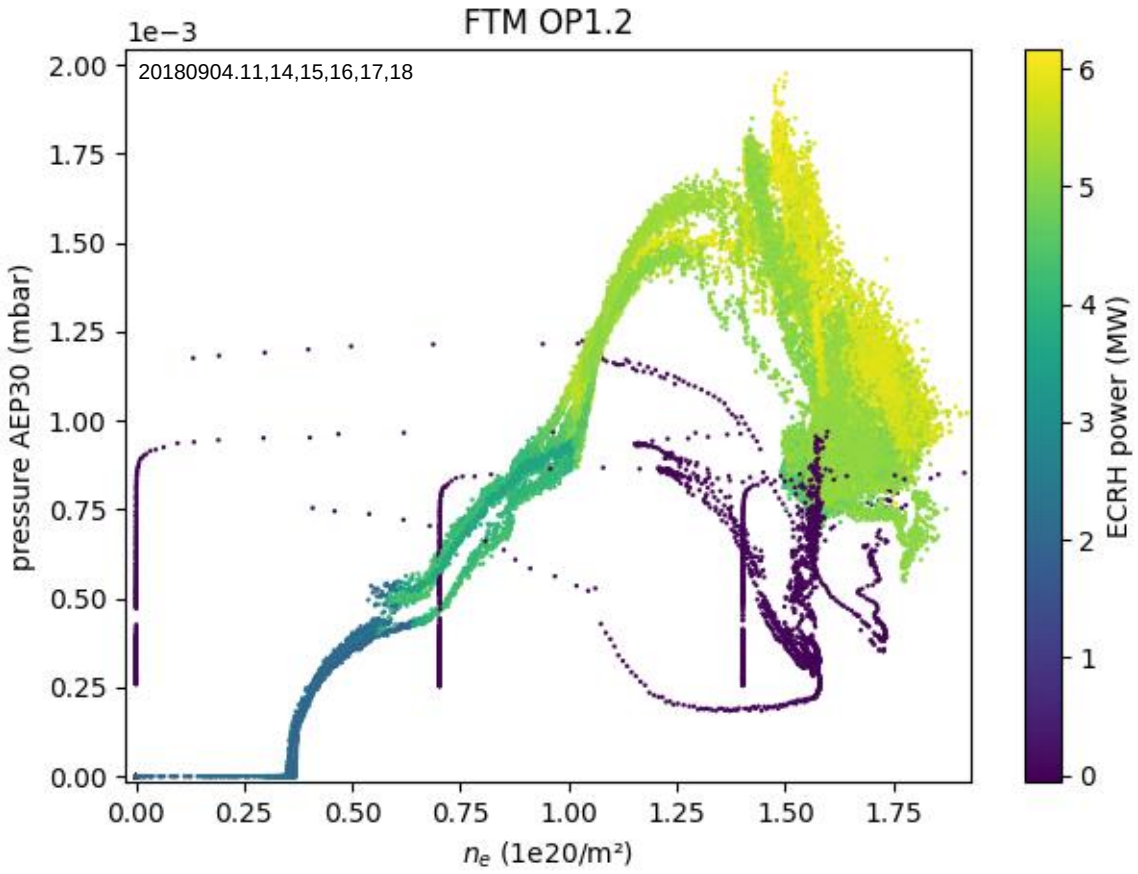
Measuring pressure – where and why

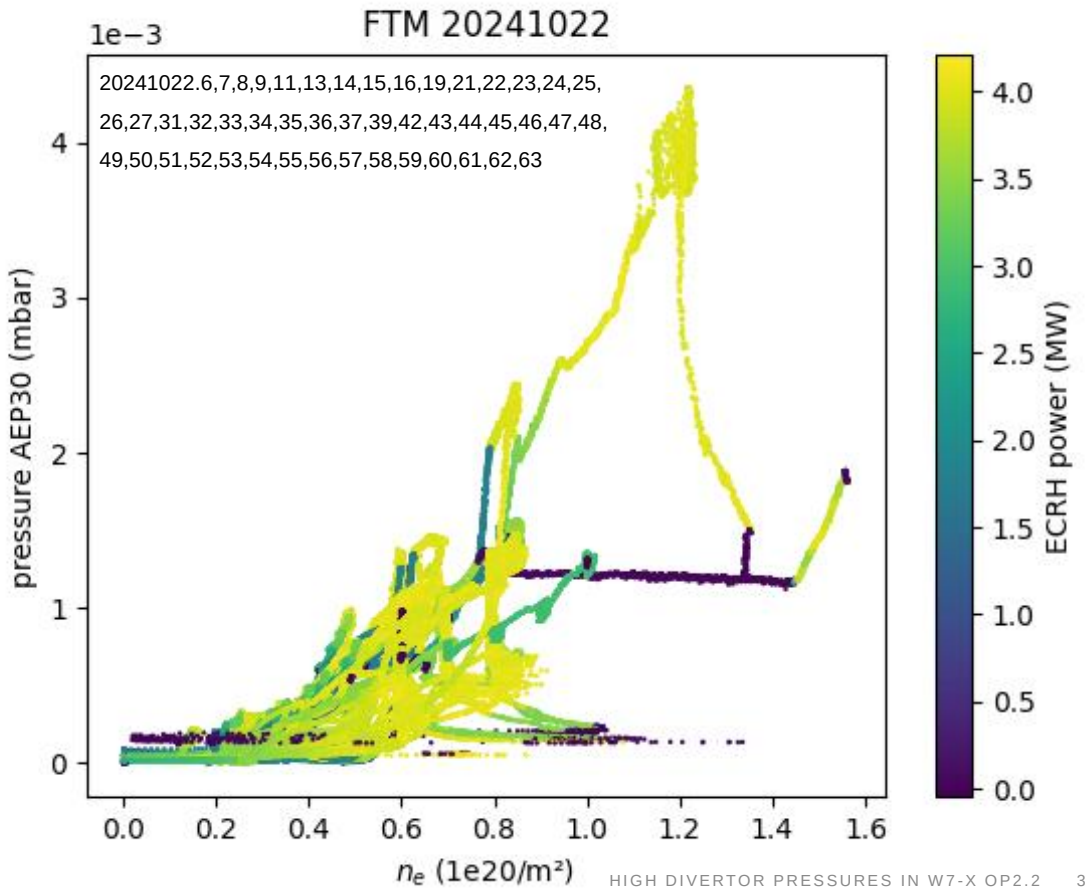
- 18 hot cathode ionization gauges installed in W7-X (currently: 15 working, 12 calibrated)
  - 5x outer midplane (AEE/A)
  - 1x inner midplane (AEL10)
  - 3x low iota pumping gap (AEI)
  - 4x(+2x) low iota pumping port (AEH)
  - 2x(+1x) high iota pumping port (AEP)
  - Not calibrated (so far): E41, H50, H51
  - No calibration so far for 1.8 T
- Relevant e.g. for exhaust quantification:
  - $Q = S \cdot p$ → increasing pressure is the only way to significantly increase exhaust at given pumping speed



Pressures in High Iota (FTM)

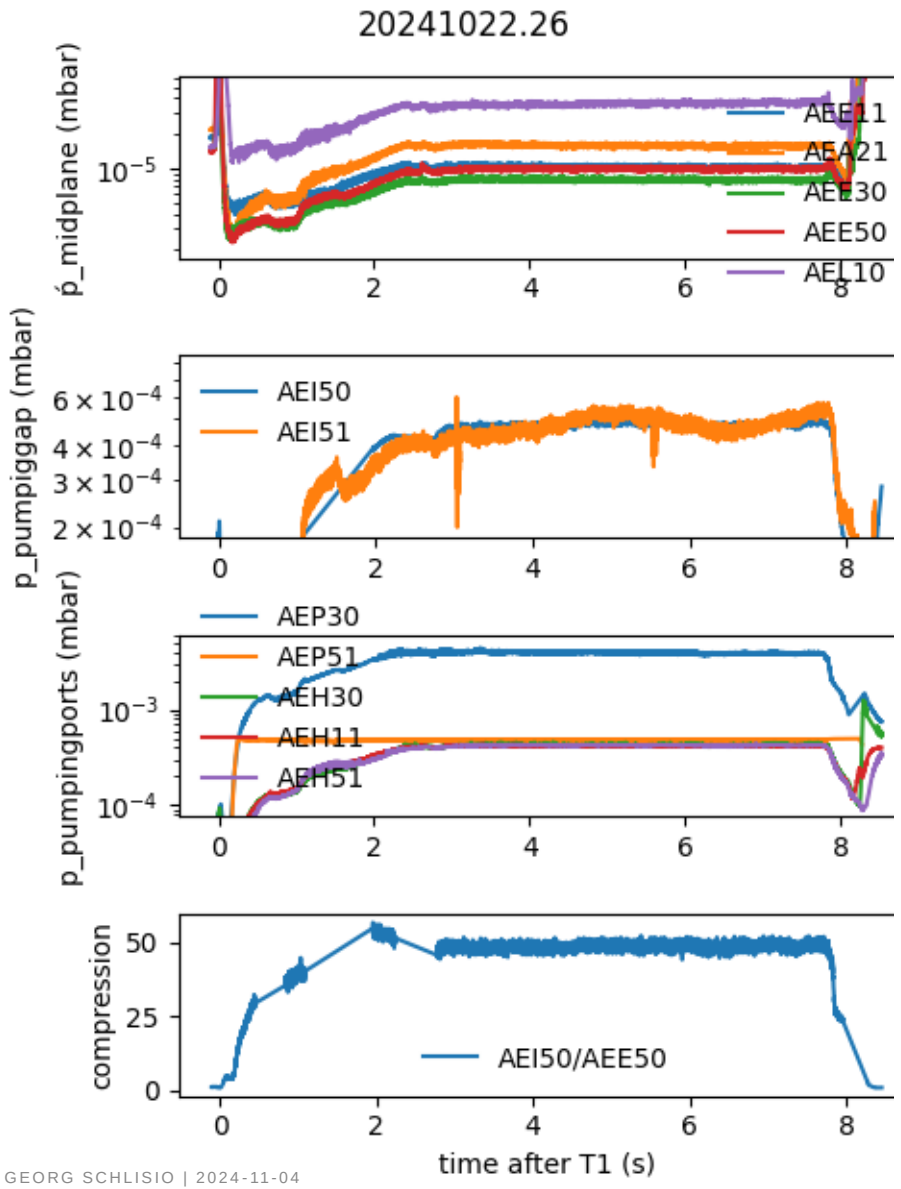
- FTM known for high pressures (Wenzel2022)
- Repeatedly obtained p>1e-3mbar in FTM in both OP1.2 and OP2.2 in AEP gauges
- Recipe: high power and density

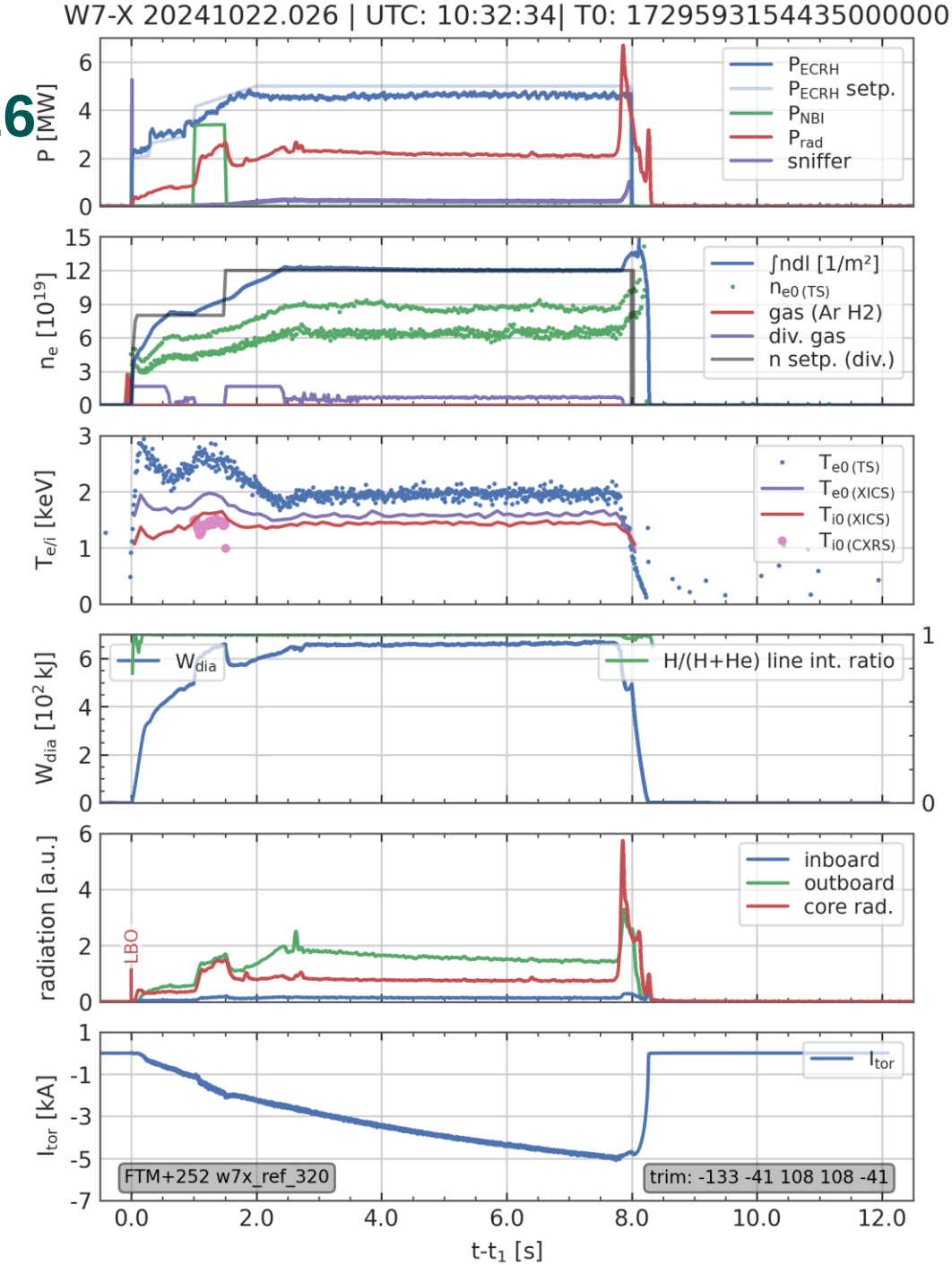




Record pressure OP2.2 so far: XP:20241022.26

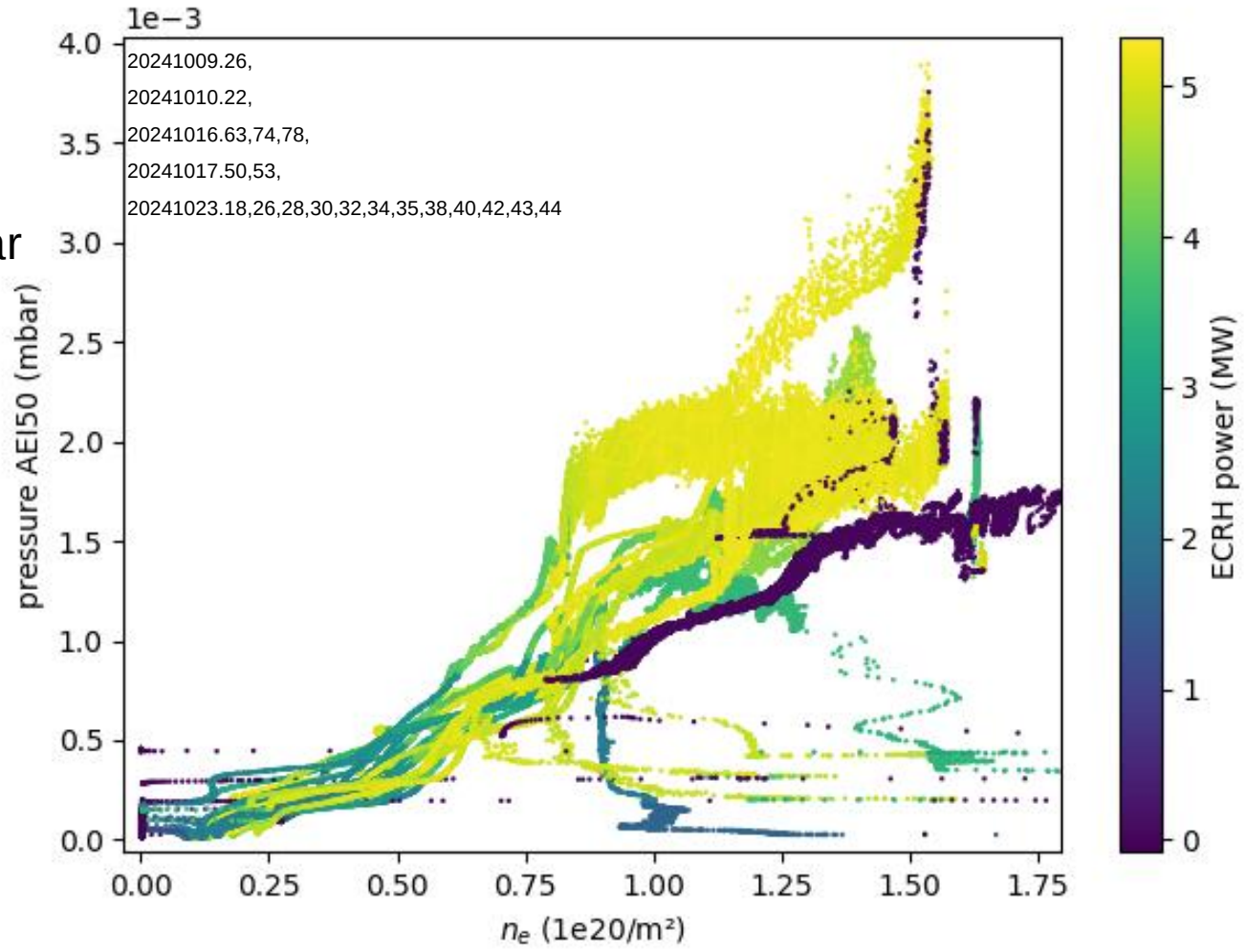
- Boronization characterization session by C. Brandt
- FTM, high density
- High pressures (stable 4e-4mbar = 0.4 Pa) in AEP30 (high iota pumpingport)
- Similar sessions (FTM high power/density) planned for CW46/47





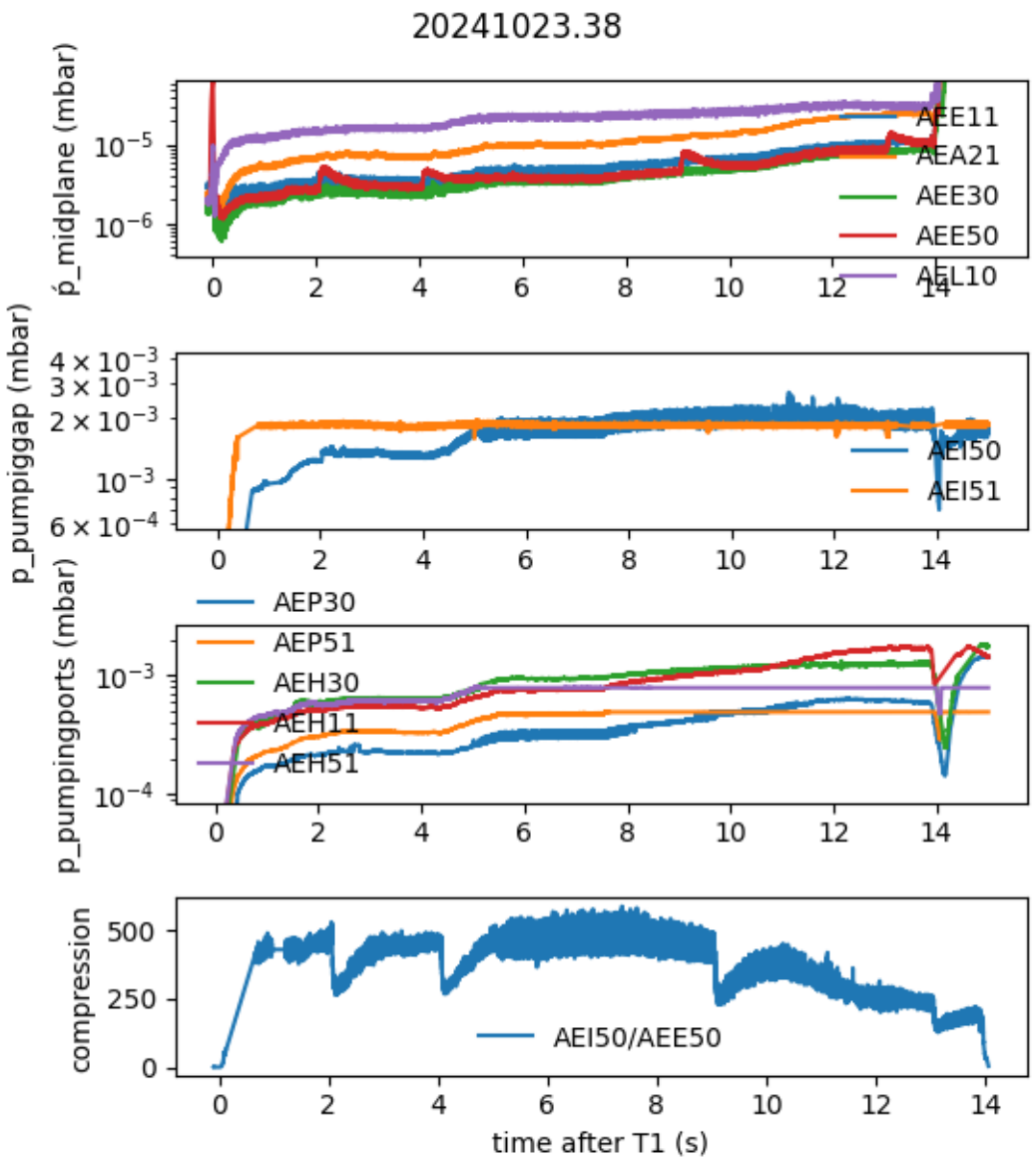
Pressures in non-FTM

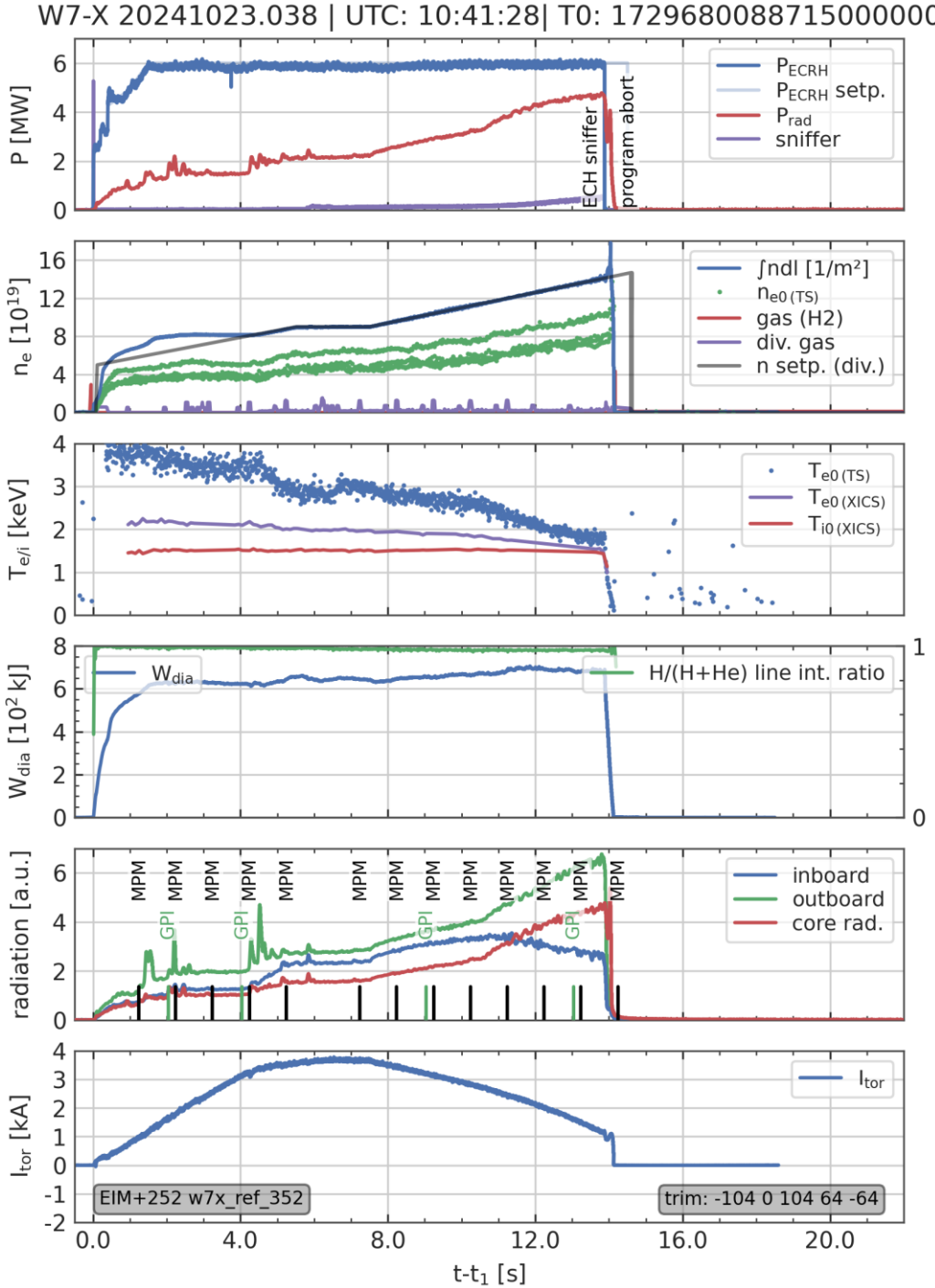
- Repeatedly obtained pressures >1e-3mbar in OP2.2 so far
- Typical pressures in OP1.2/OP2.2: ~4e-4mbar
- Recipe: high power and density (again)



Example: XP:20241023.38

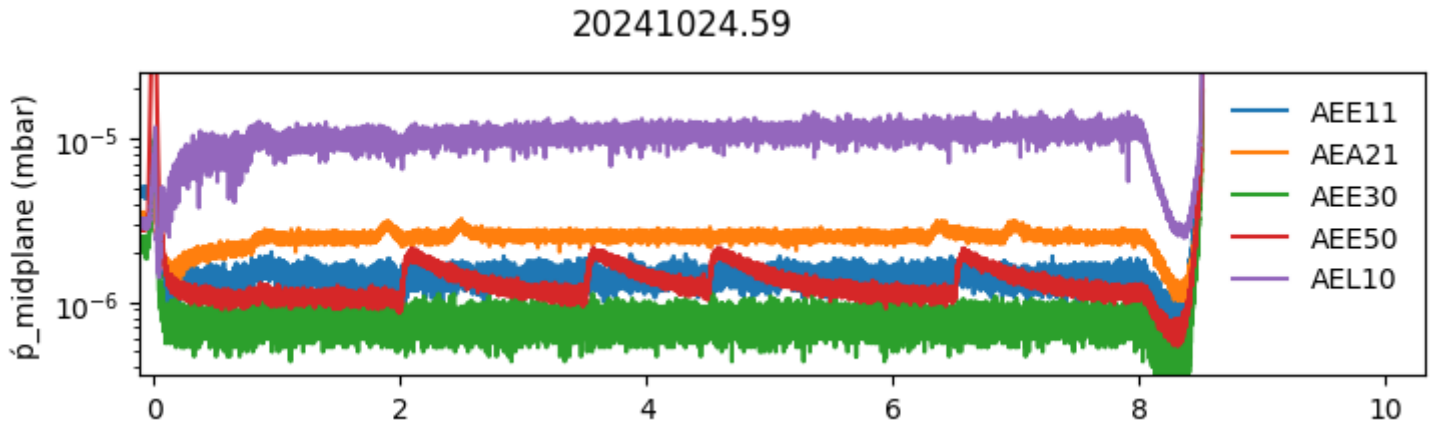
- EIM
- SOL transport session by Valeria
- (disregard saturated AEI51 measurement)





Further remarks

- First operation of inboard midplane gauge (AEL10): Pressure about 10x outboard midplane pressure



- Calibrated data of OP2.2 in ArchiveDB now (see Logbook page QRG#dataaccess)
- Pressure data will soon™ be available in the JUICE, thanks to Valeria and Sergey

  ➔ comprehensive analysis to be done in the next weeks

- Data still contains errors (saturation etc) ➔ Please talk to me **before** using data for publications

Conclusions

- We obtained up to 10x the typical pressures of pre-OP2.2
- This greatly improves particle exhaust
- Mainly obtained by higher density and heating power
- High performance also relevant for particle exhaust performance