MAX-PLANCK-INSTITUT
FÜR PLASMAPHYSIK

S42: NBI+ECRH in high-mirror - Session Report

Presented by Oliver Ford on behalf of the W7-X Team

Physics Meeting. 27th February 2023

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Proposals

Prio-I:

oliford_002	Threshold of P_ECRH into pure NBI for heat transport change	Scenario-development
stato_022	ECRH into pure NBI with no X2 absoption	
dacar_006	Turbulence in suppressed turb. scenarios (DR, PCI, CECE, SXR)	Measurement specifics
thir_002	Threshold P_ECRH for impurity transport change	
alkn_004	Beta effects on edge topology	Measurements at high-beta
cbra_011	XMCTS Shafranov shift at different betas	
kbr_10	Alfvén Eigenmodes in high beta	
mspolaor_002	Edge EM turbulence in high beta (MPM probe)	
tya_023	MHD stability in high performance	

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Prio-2:

astechow_011	Turbulence "matching" between pure ECRH and NBI	Modification request

Additional:

cswee_001, twegner_007	Impurity transport in NBI+ECRH	Cover in passing

Scenario Development

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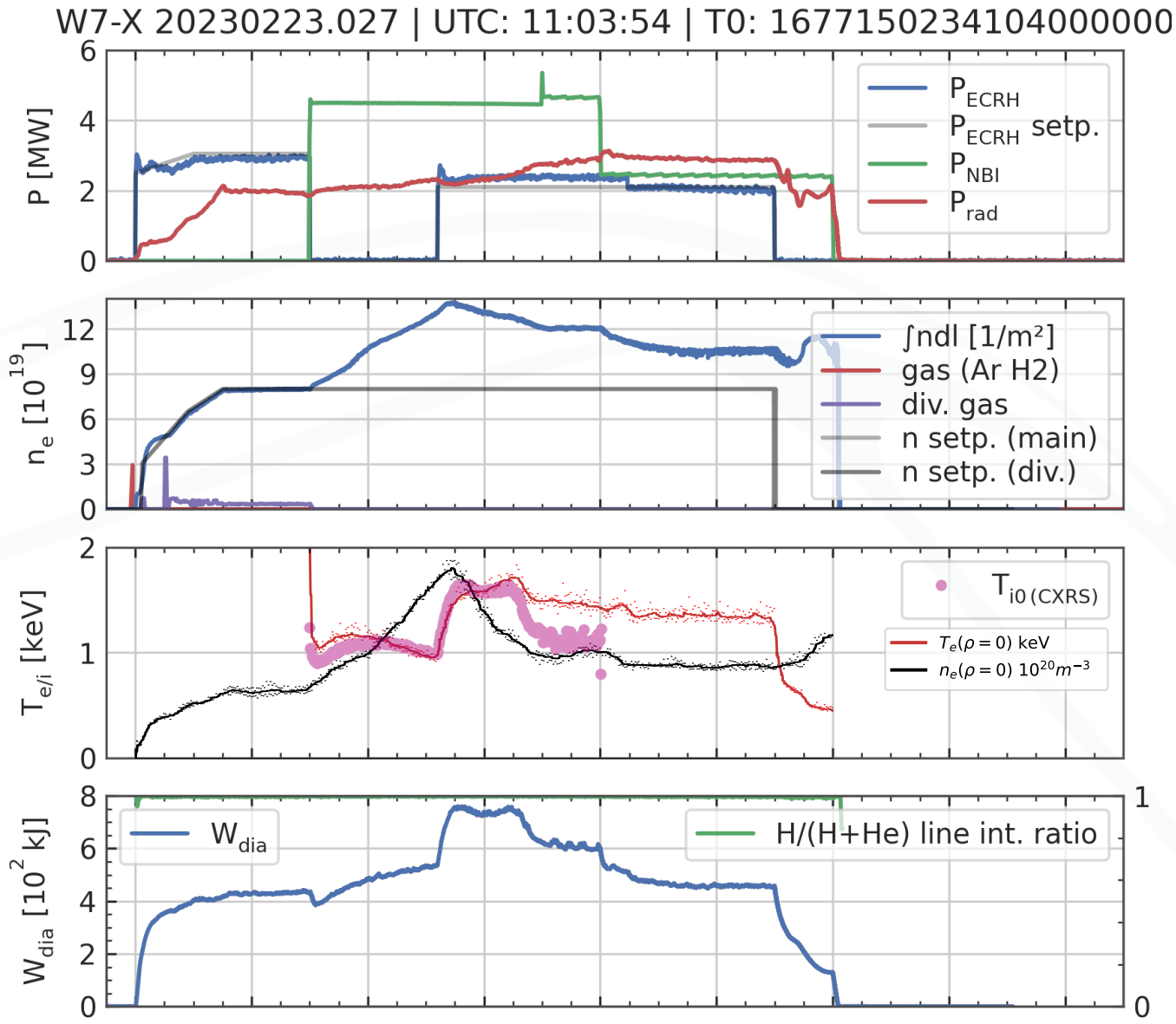
stato_022

Mostly successful (in KKM)



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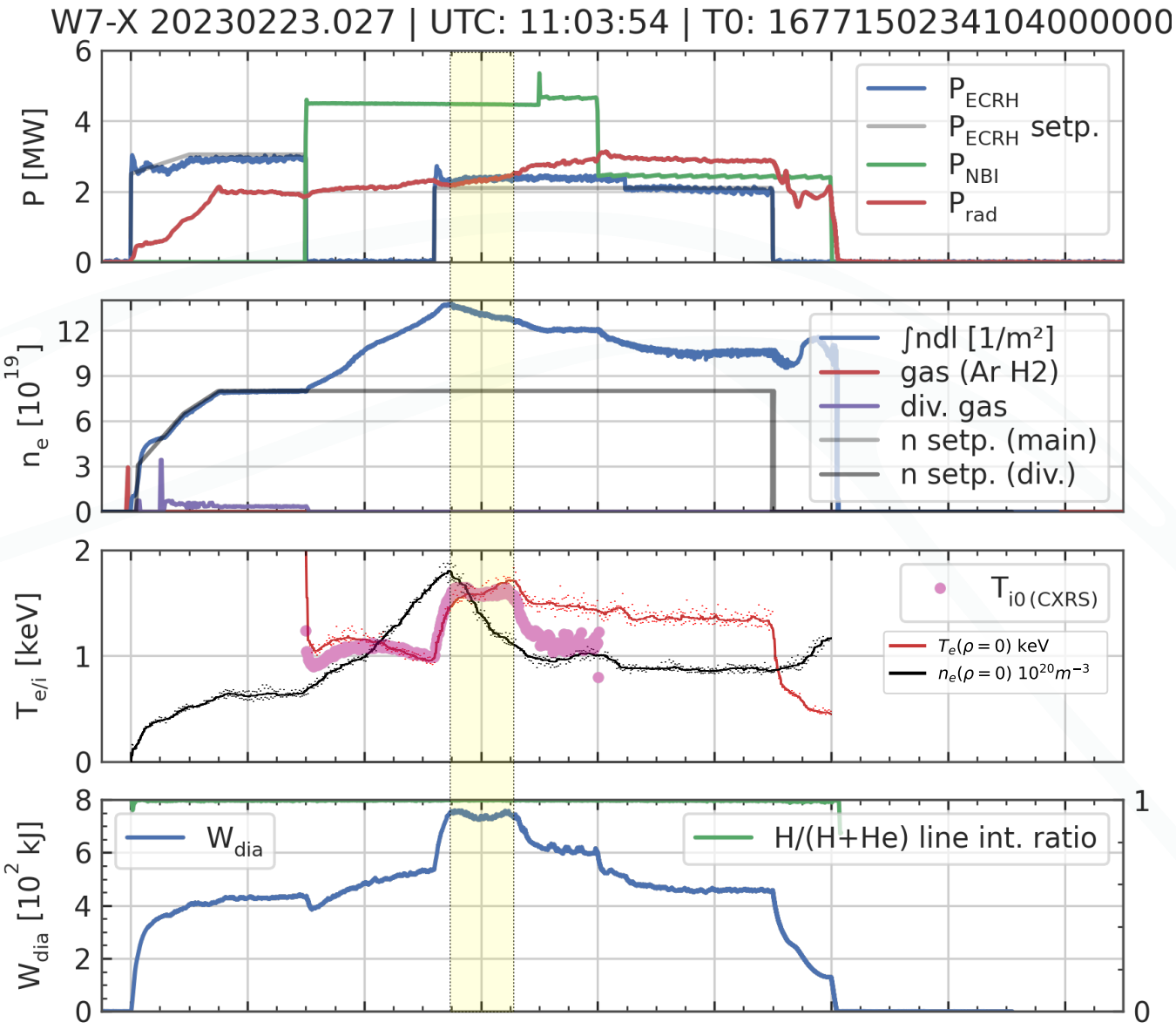
~500ms stable reduced turb. transport
(higher T_i gradient, impurity accumulation)
at <= 2MW O2 ECRH.



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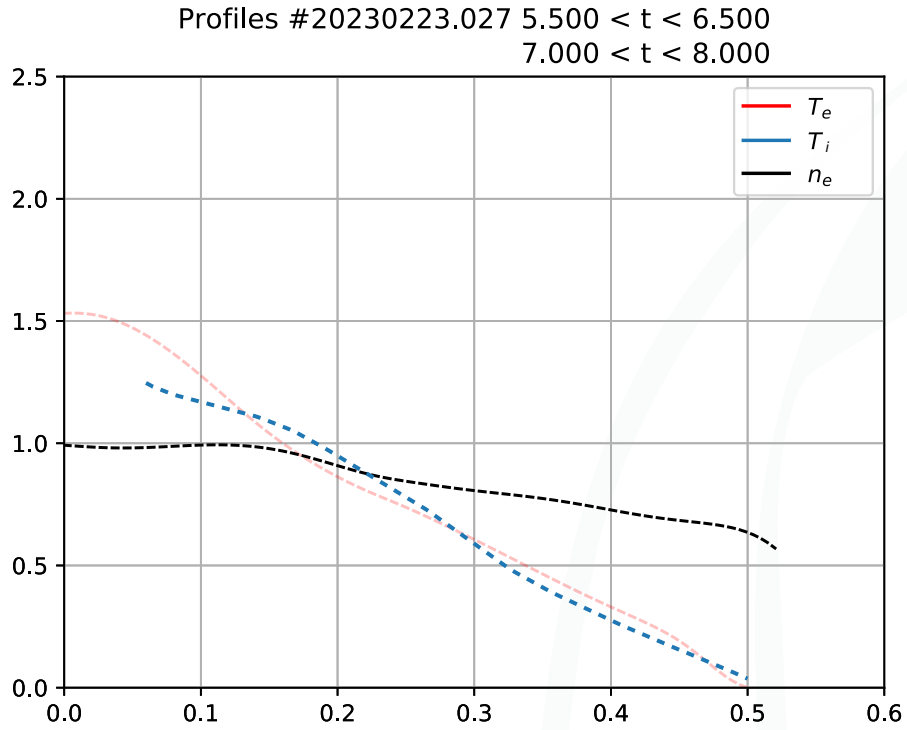

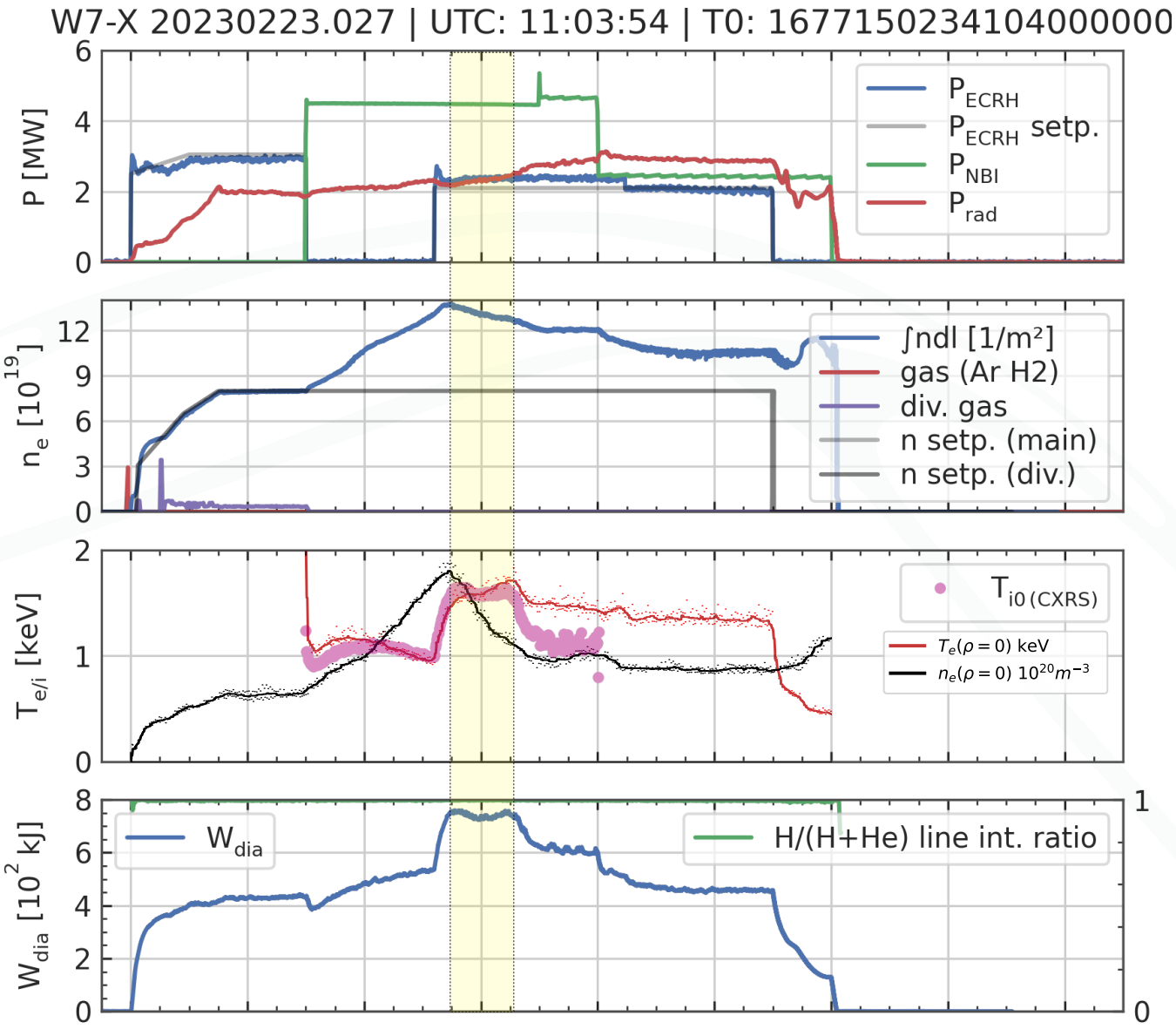

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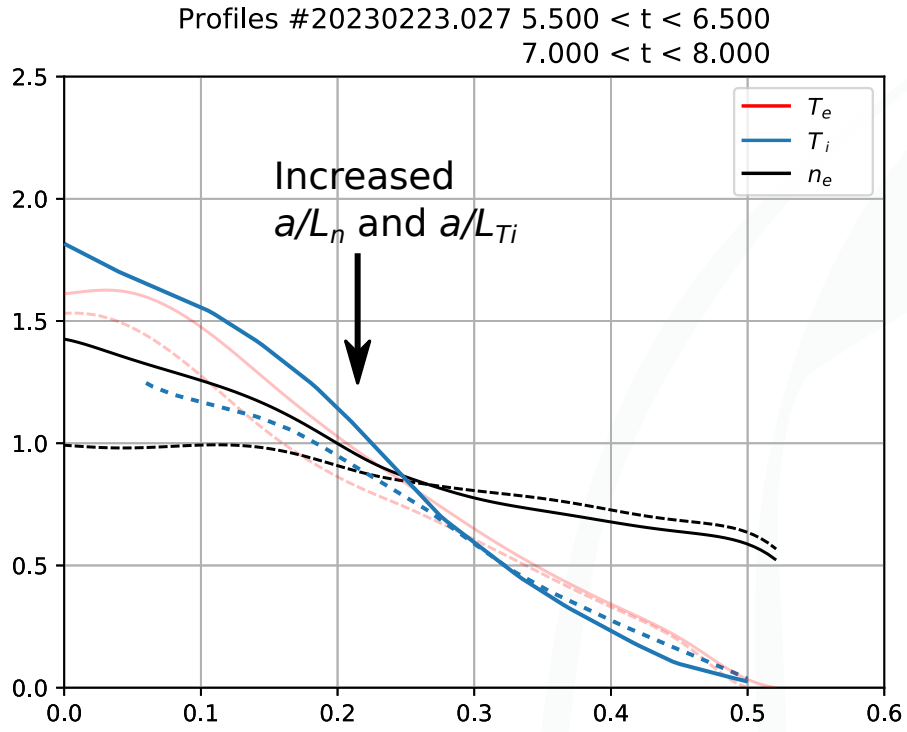

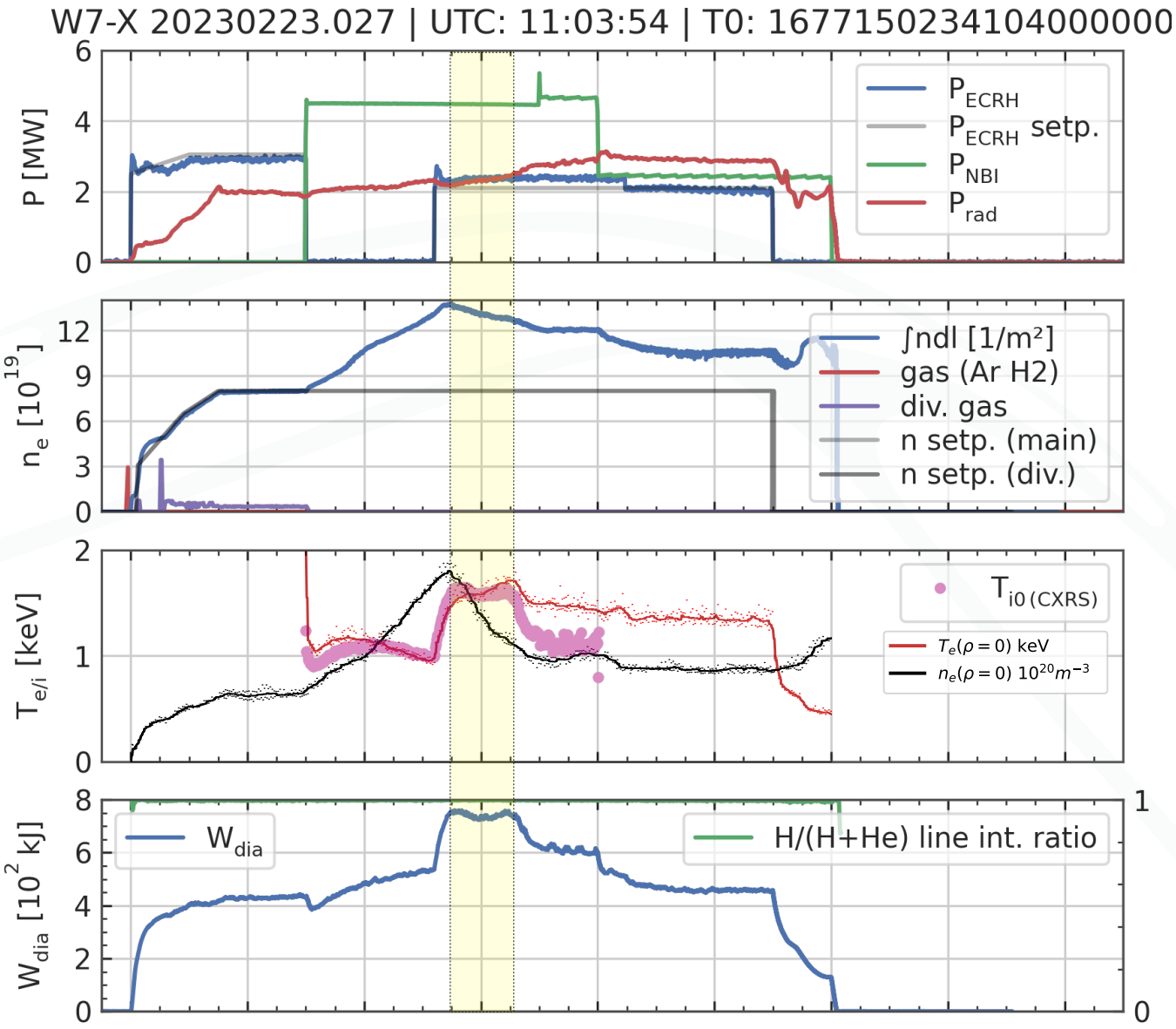

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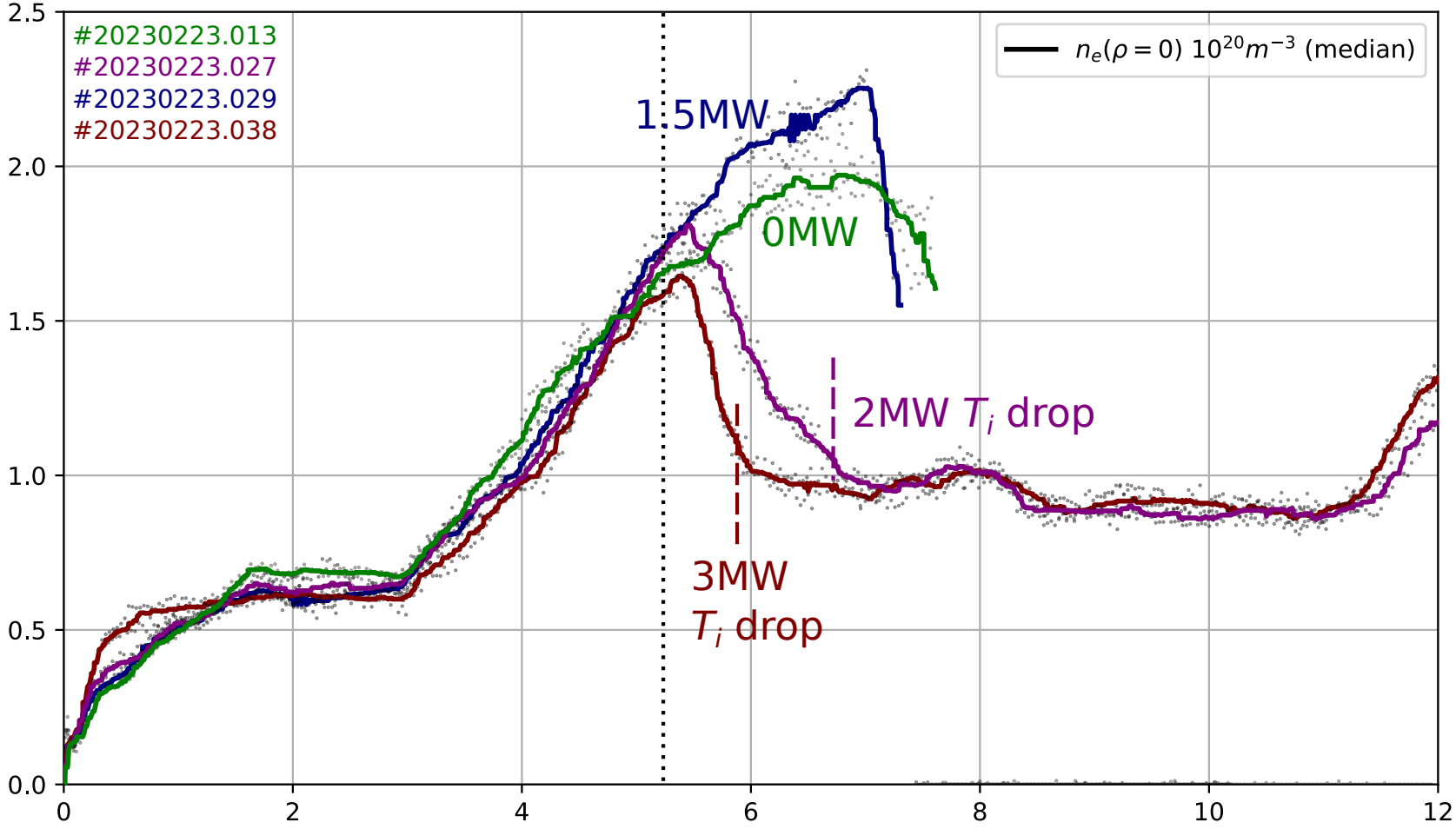

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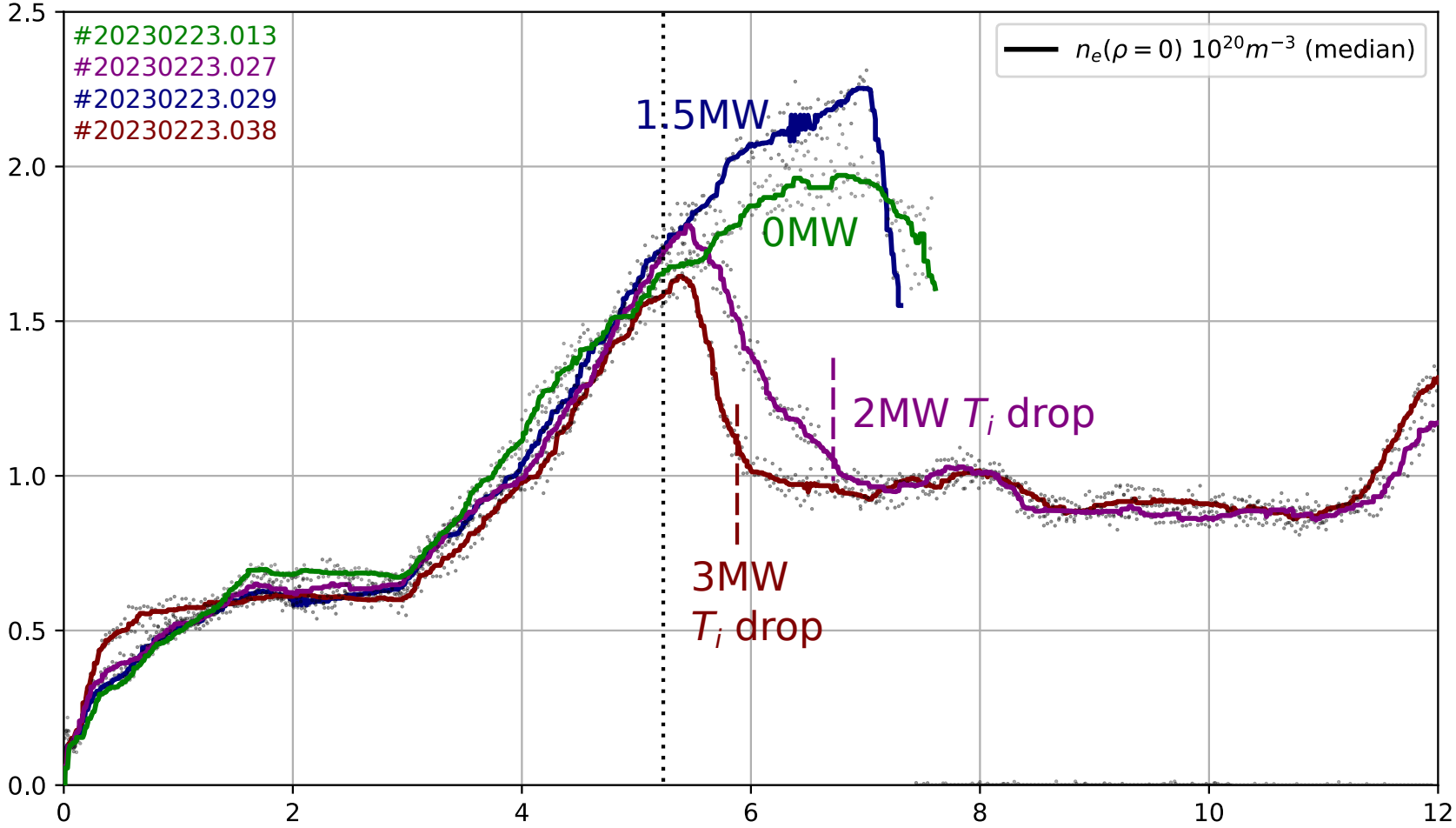
Effect on a/L_{Ti} is strong, but...
$\rho_{eff} \sim 0.4$ in high-mirror.

Seems to vary with config.
Maybe much more effect in high-iota (S49+50 next wed) or standard (S55, S45 ... KW12?).



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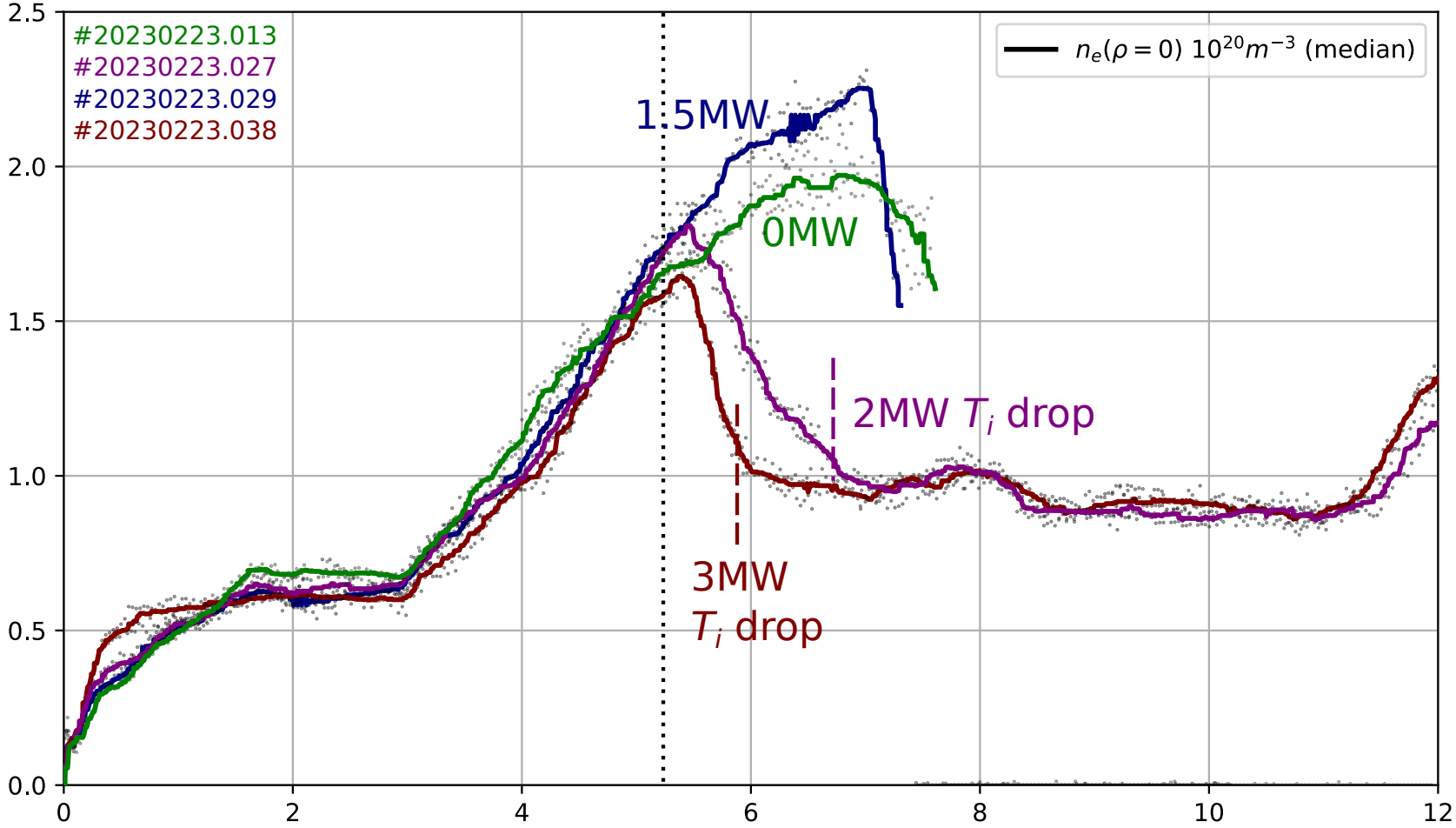
stato_022:
- Threshold different with no X2 absorption?
- Improves with spread out O2?
  No obvious difference.
  Detailed assessment on going.



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alkn_004	Beta effects on edge topology	Measurements at high-beta: 3x repeats of 'high-beta' phase, but: - Moderate axis beta ($\beta_0 \sim 3\%$) - Only on axis good - $W_{dia} \sim 800$kJ - Non-stationary n_e profile.
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cswee_001, twegner_007	Impurity transport in NBI+ECRH	Provided one iron LBO into NBI+ECRH ... but not in high a/LTi phase.

Mostly sucessful = Good data provided, not necessarily 'complete'!

Report - ECRH Program

ECRH program was all addition (no priority)

ksena_001	ECCD exploration	2 shots OK, but no crashes seen. Requires too low P/n.
mbeur_007/9	ECRH into pure NBI with no X2 absoption	6 shots due to repeat failures. Successful?
stato_???	Remote steering launcher comissioning	Not conducted - RSL not ready?
uhn_013	Bootstrap, on/off-axis ECRH	Density too high.
tya_022	ECRH modulation for MHD stability	Not conducted - out of time.

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