

Session Planning

SOII - 58 : Helium NBI + boron injection

O. P. Ford,

TF-I Session Planning 22.11.2024



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SOII - 58 : ~~Helium NBI + boron injection~~ Helium, NBI and boron injection

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Proposals



Priority 1:

- roblu_003 High performance with boron injection + H pellets
- oliford_012 Core helium transport with helium NBI

Priority 2:

- sul_055 NBI helium injection
- pepo_004 FIHeA (like FIDA) measurements
- oliford_011 Helium NBI beam-stopping coefficient measurements
- sban_003 Long NBI pulses into stable ECRH plasmas

Proposals



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roblu_003 High performance with boron injection
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oliford_012 Core helium transport with helium NBI

Priority 2:

sul_055 NBI helium injection

pepo_004 FIHeA (like FIDA) measurements

oliford_011 Helium NBI beam-stopping coefficient measurements

sban_003 Long NBI pulses into stable ECRH plasmas

SO discretion:

oliford_006 O2 reintroduction + boron injection.

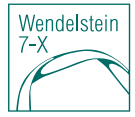
sul_037, 062, Max power. NBI on to ECRH.

dinklage_020

alca_003 NBI current drive

oliford_008 H pellets into He plasmas. Particle transport study

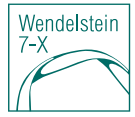
Boundary conditions



Preparation:

- SOII-58 is the afternoon session. Morning session will prepare boron dropper but probably not NBI.
- Probably need to switch to 4 NBI sources. Does SOII-57 need all gyrotrons??
- Necessary ECRH and NBI pulse length extension should be complete.
- SOII-48 should have found an optimum O₂-reintroduction.

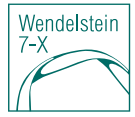
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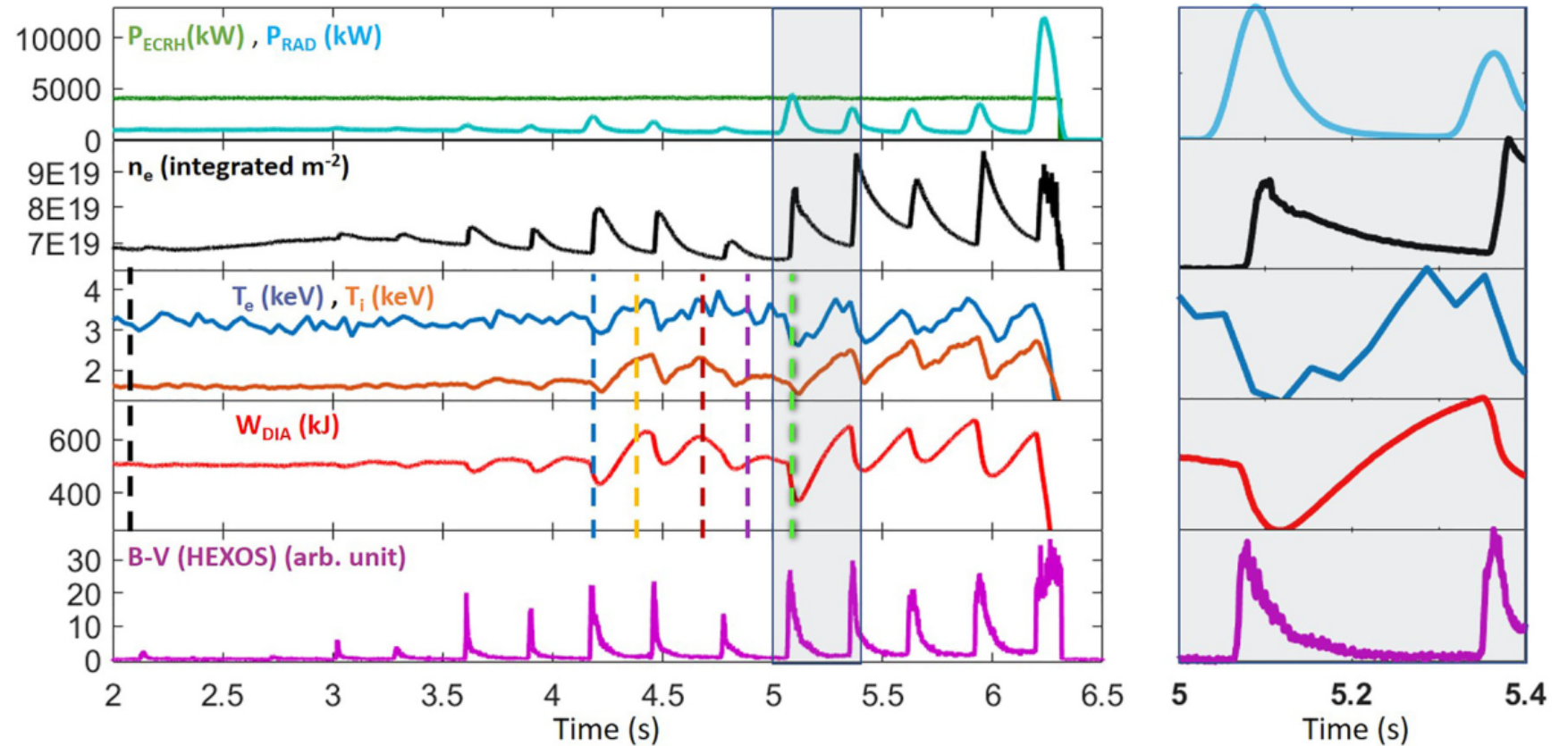
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roblu_003: Boron dropper reduced turbulence

Boron dropper induced T_i increase:

- Repeat #20180927.047.
- Large well spaced out boron injections.
- 4-5 shots adjusting boron amount / frequency.
- Repeat best one with:
 - NBI blips for T_i .
 - H pellets for HP combination?

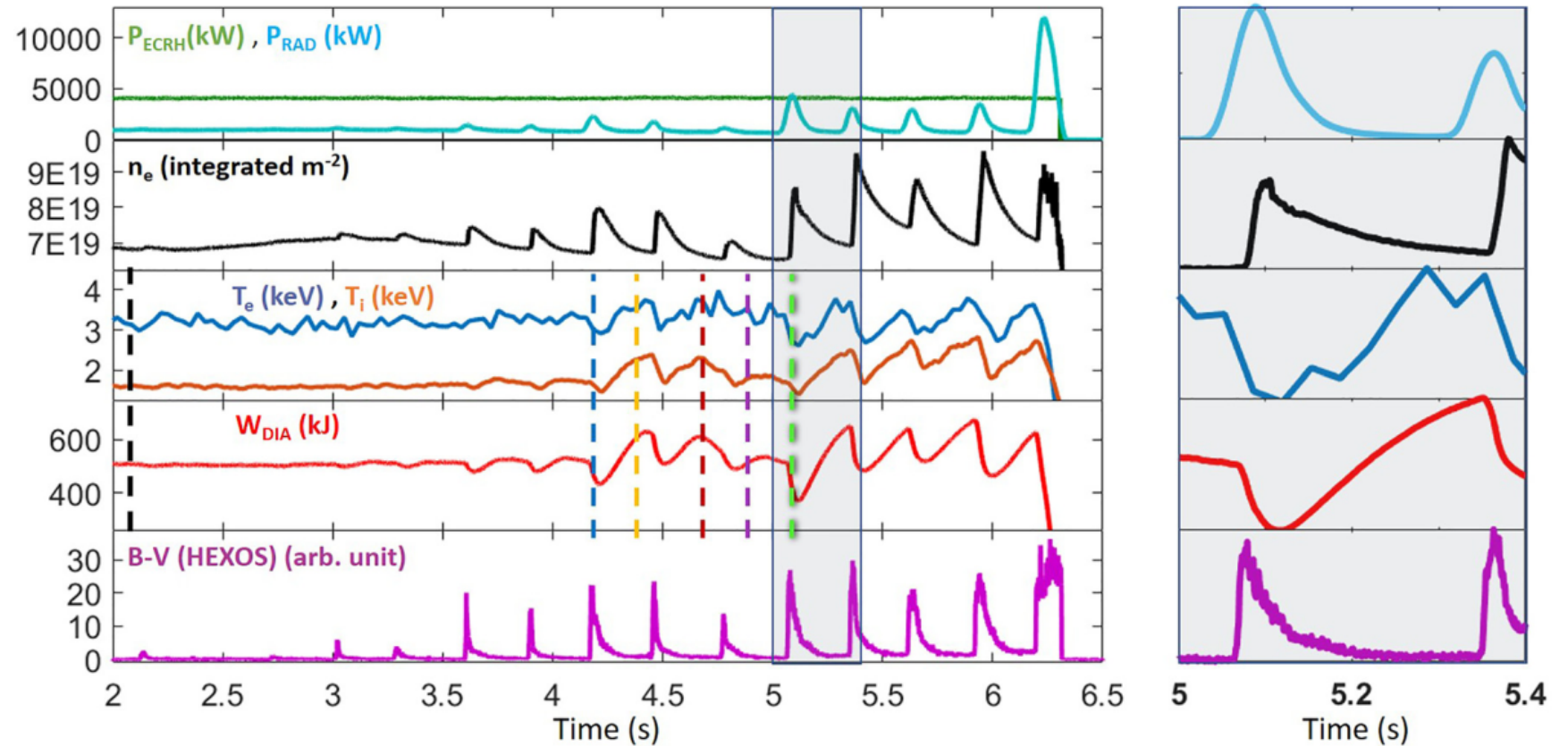


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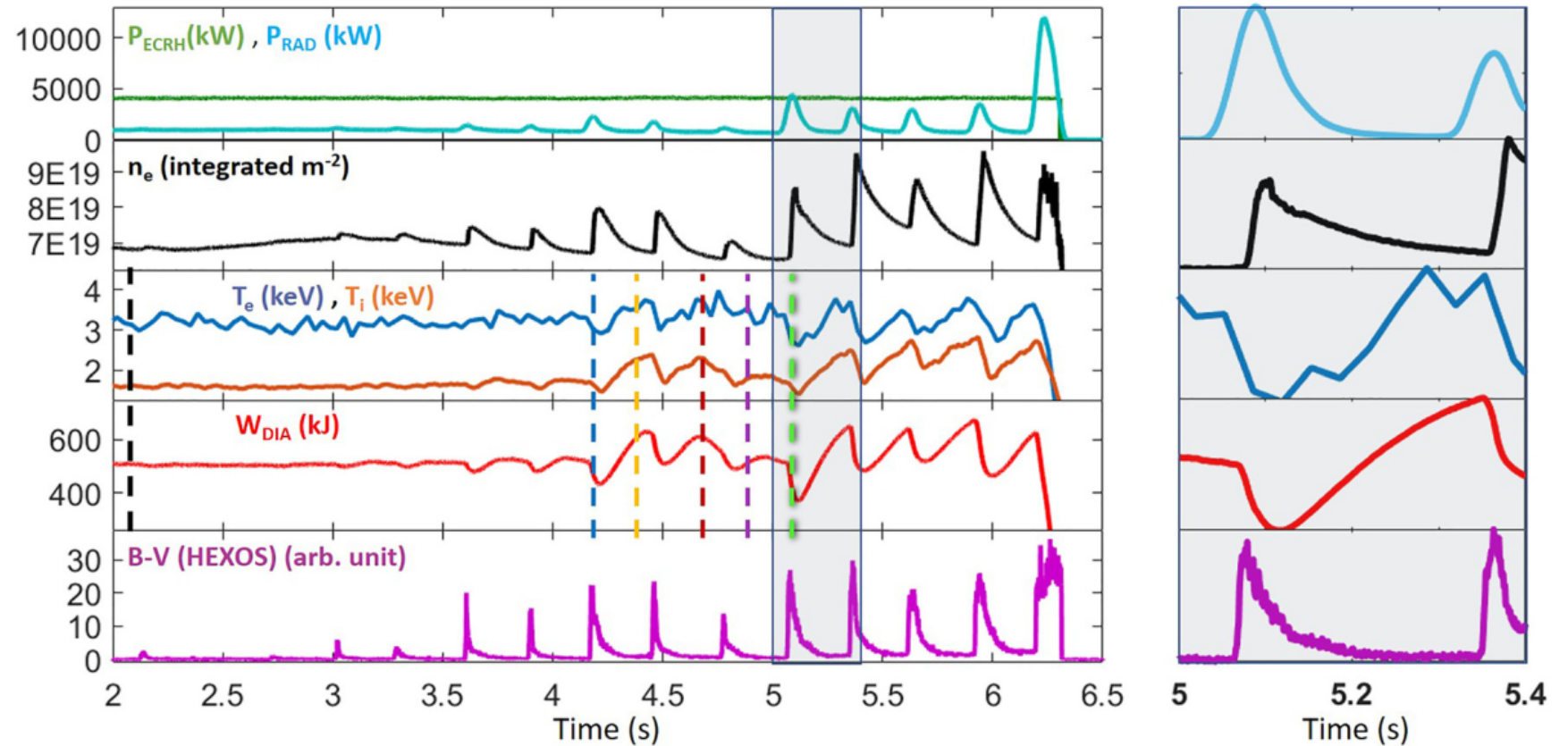


roblu_003: Boron dropper reduced turbulence



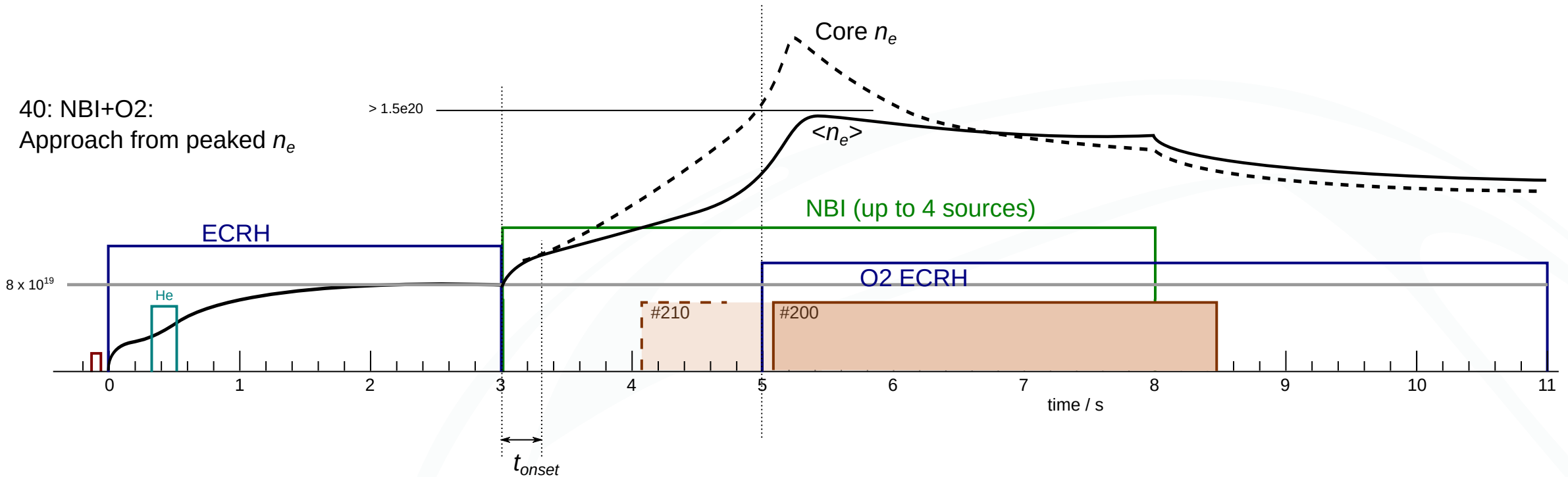
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oliford_006: NBI+O2 reintro + Boron dropper

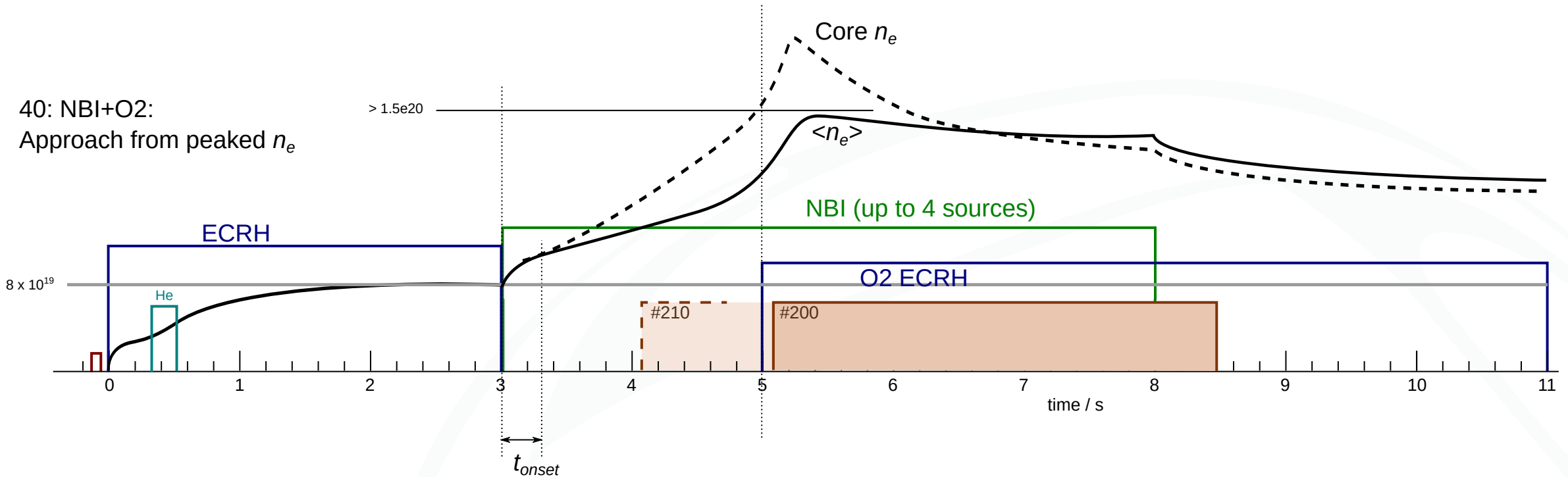
Add boron injection as roblu_003 to best NBI+O2 reintroduction of SOII-48.



#200: B injection during O2 phase.
#210: B injection before O2 phase.

oliford_006: NBI+O2 reintro + Boron dropper

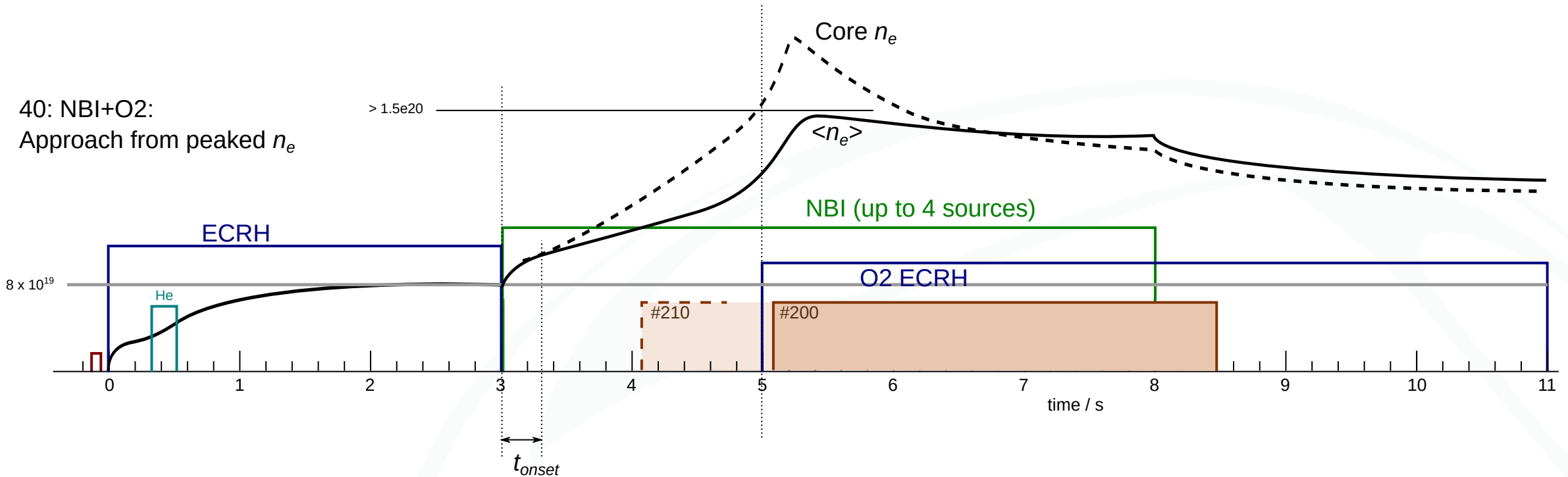
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#200: B injection during O2 phase.
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oliford_006: NBI+O2 reintro + Boron dropper

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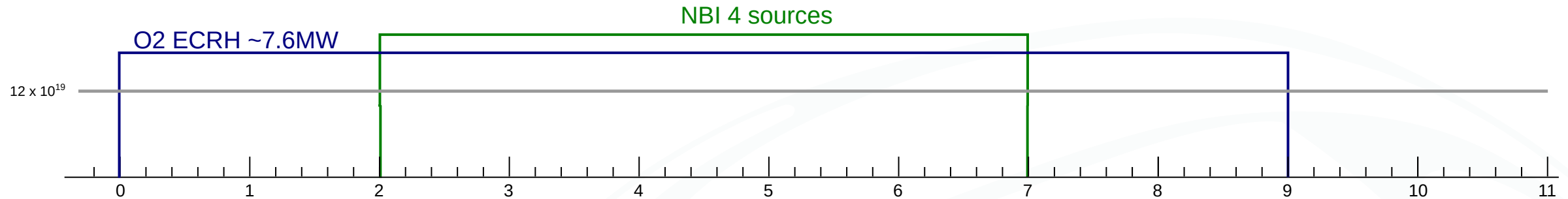


#200: B injection during O2 phase.
#210: B injection before O2 phase.

sul_037, 062, dinklage_020: Maximum power



Attempt maximum power stationary discharge not conducted in SOII-14 (Requested by TFL)
#300: Repeat incomplete pulse length extension 4xNBI + 6MW #20241017.053



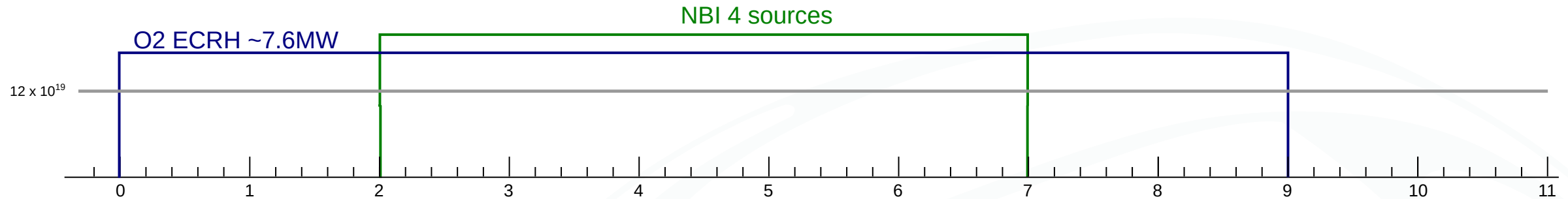
#310: Increase to max power 4xNBI + ~7.6MW ECRH

All in O2 at 1.2×10^{20}

sul_037, 062, dinklage_020: Maximum power



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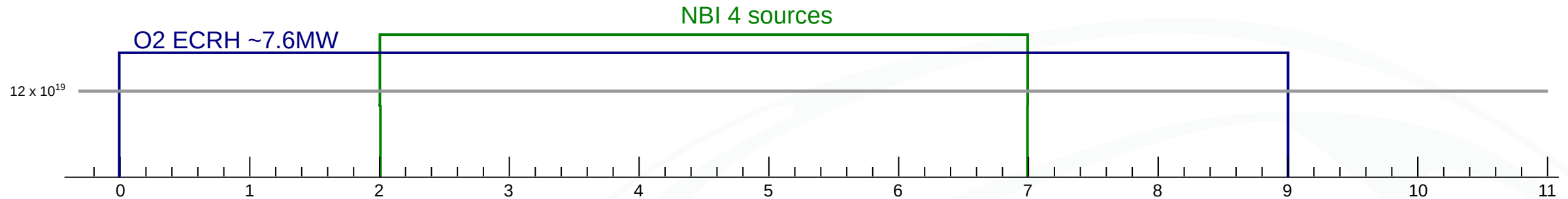
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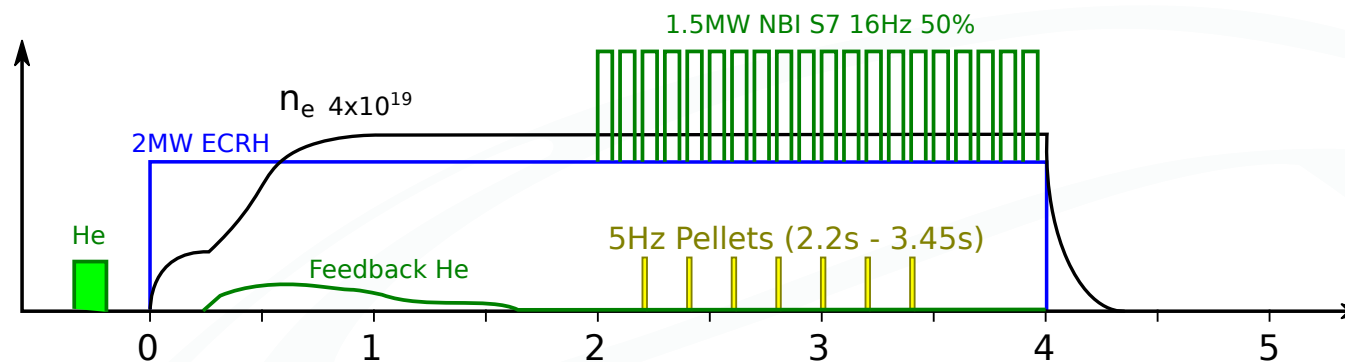
H / He relative transport

Instead of helium NBI injection, two helium/hydrogen mixture experiments:

oliford_008 (for M.Yoshinuma): H pellets into H/He mix plasma.

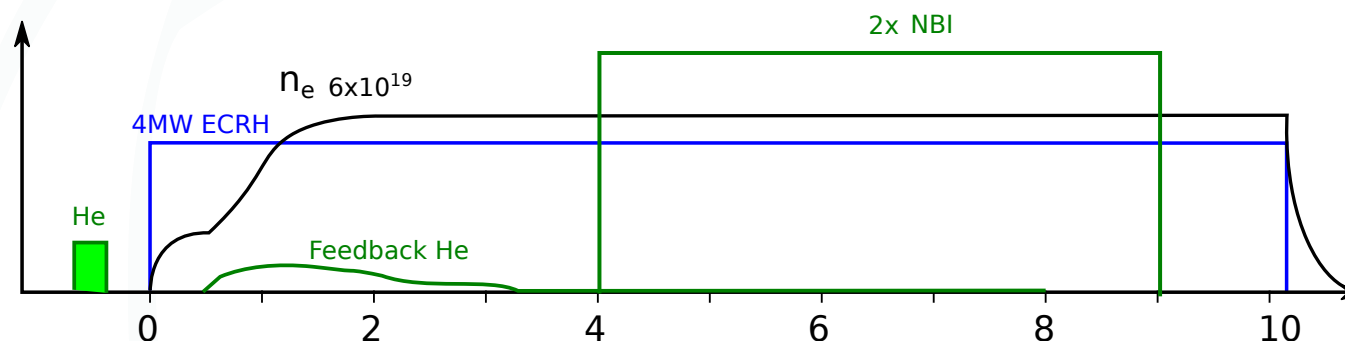
#400

*(clarify details with
proponent!)*



(replace oliford_012): Hydrogen NBI into helium plasma.

#450



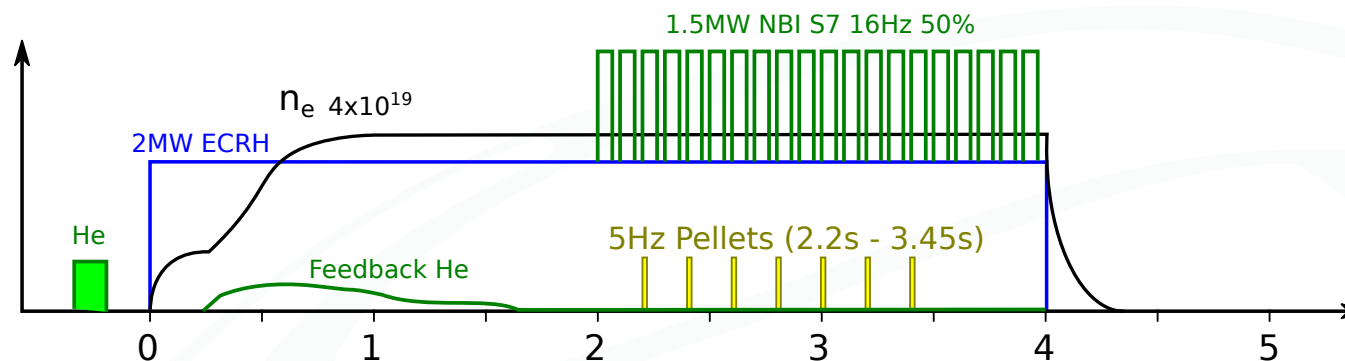
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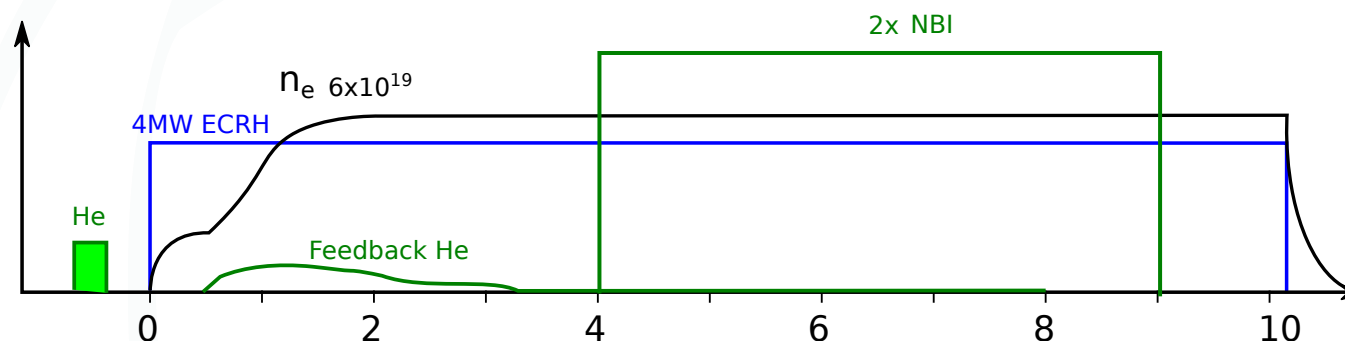
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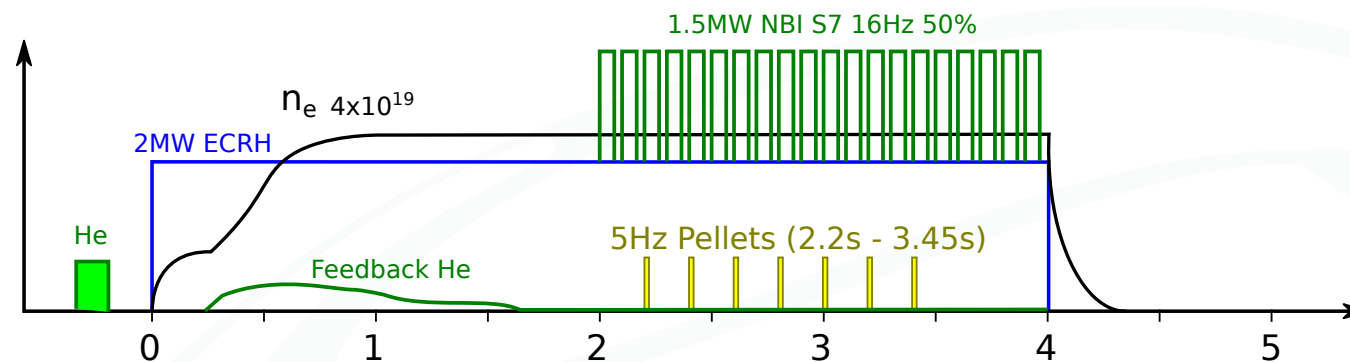
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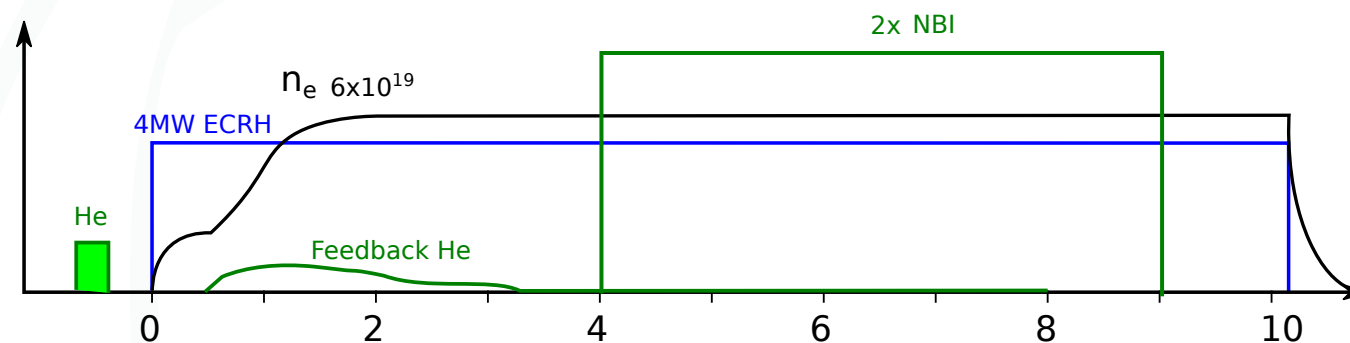
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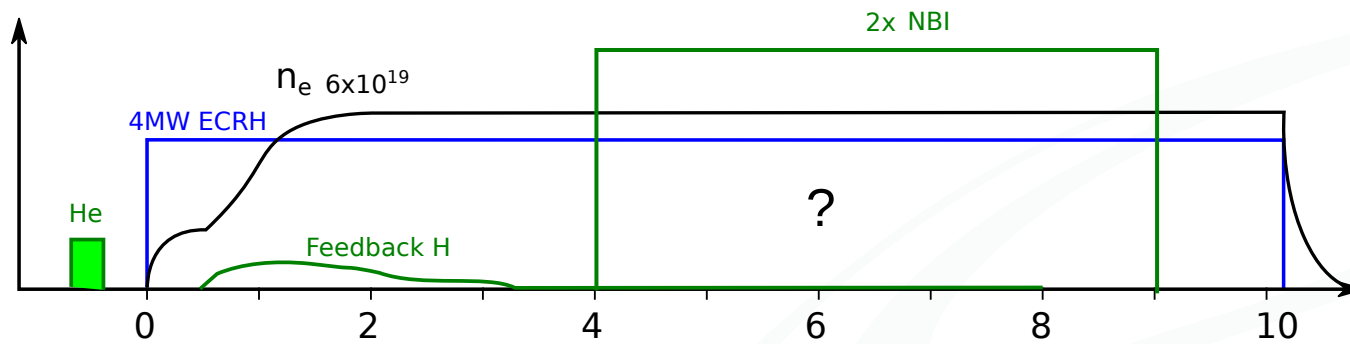
#450



alca_003: NBCD



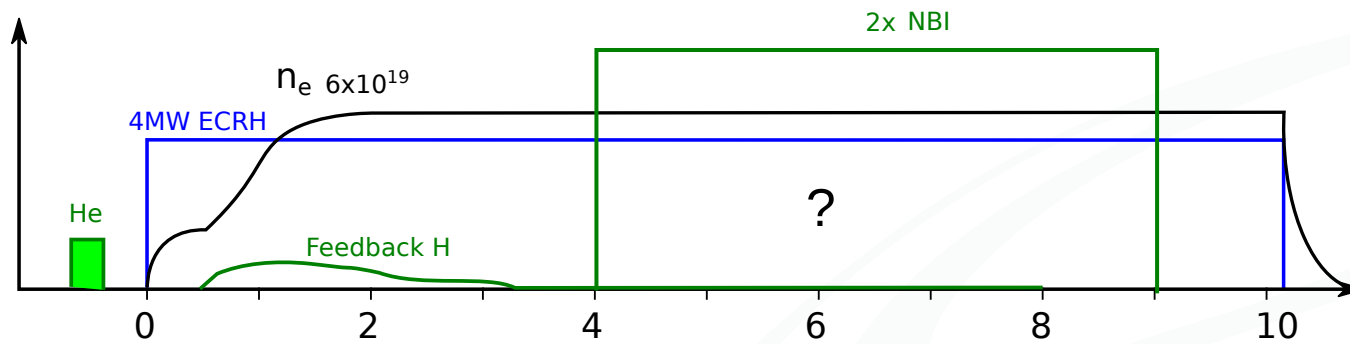
#500: Prio2 probably not conducted in SOII-42.
(Looks the same as #450, but with hydrogen)



alca_003: NBCD



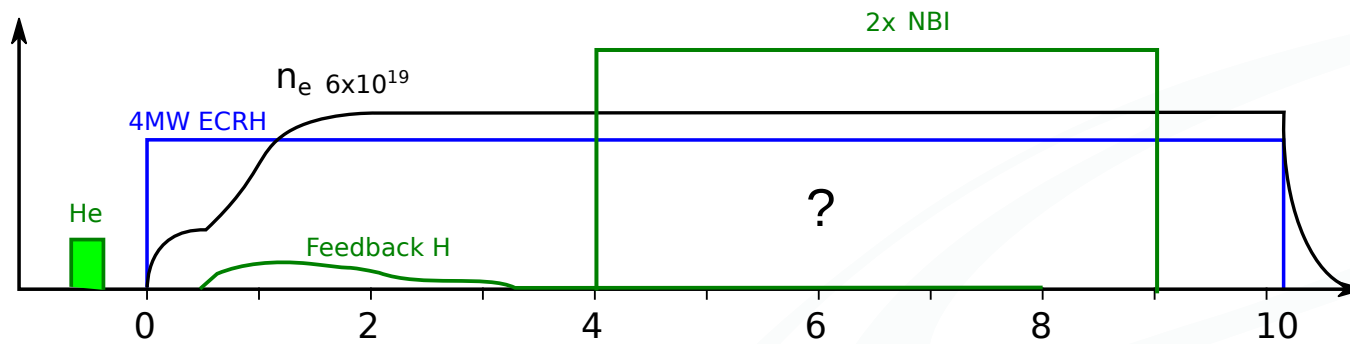
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(Looks the same as #450, but with hydrogen)



alca_003: NBCD



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(Looks the same as #450, but with hydrogen)



Shot list



Rough shot plan:

ID	Description	ne	NBI	ECRH	Proposal	Ref
100	Large boron injection	7	-	4	roblu_003	20180927.047
110	Large boron injection	7	-	4	roblu_003	#100
120	Large boron injection	7	-	4	roblu_003	#100
130	Large boron injection	7	-	4	roblu_003	#100
140	Repeat best of 100-130 with NBI blips for Ti	7	S7/S8 blips	4	roblu_003	#100-130
150	Repeat best of 100-130 with H pellets	7	-	4	roblu_003	#100-130
200	Repeat best from SOII-48 with boron injection in O2 phase	8	as SOII-48	as SOII-48	oliford_006	SOII-48 - ??
210	Repeat best from SOII-48 with boron injection before O2 phase	8	as SOII-48	as SOII-48	oliford_006	SOII-48 - ??
300	Max power ECRH + NBI. Complete PLE #20241017.053	8	All	6	sul+dinklage	20241017.053
310	Max power ECRH + NBI	8	All	7.6	sul+dinklage	20241017.053
400	H pellets into He plasmas. Particle transport study	6	S7/S8 blips	3	oliford_008	
410	Adjust pellet parameters	6	S7/S8 blips	3	oliford_008	#400
450	H NBI into He plasma	6	S7/8	3	???	
500	NBCD	6	(S7+S8) or (S3+S4)	4	alca_003	#450
510	NBCD	6	(S7+S8) or (S3+S4)	2	alca_003	
520	NBCD	6	(S7+S8) or (S3+S4)	6	alca_003	

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