

(TG4) Plasma instability group report



Nov. 5, 2021 (S. Kamio)

Date: Nov. 4, 2021

Time: 9:50 - 12:45

Shot#: 171708 – 171759 (52 shots)

Prior wall conditioning: None

Divertor pump: On

Gas puff: H₂, Pellet: No

NBI#(1, 2, 3)=gas(H, H, H)=P(4.2, 4.2, 3.6)MW

Neutron yield integrated over experiment = 1.0×10^9

Topics

1. Trial of NBI start-up and detachment sustainment with 0.5T (M. Kobayashi)

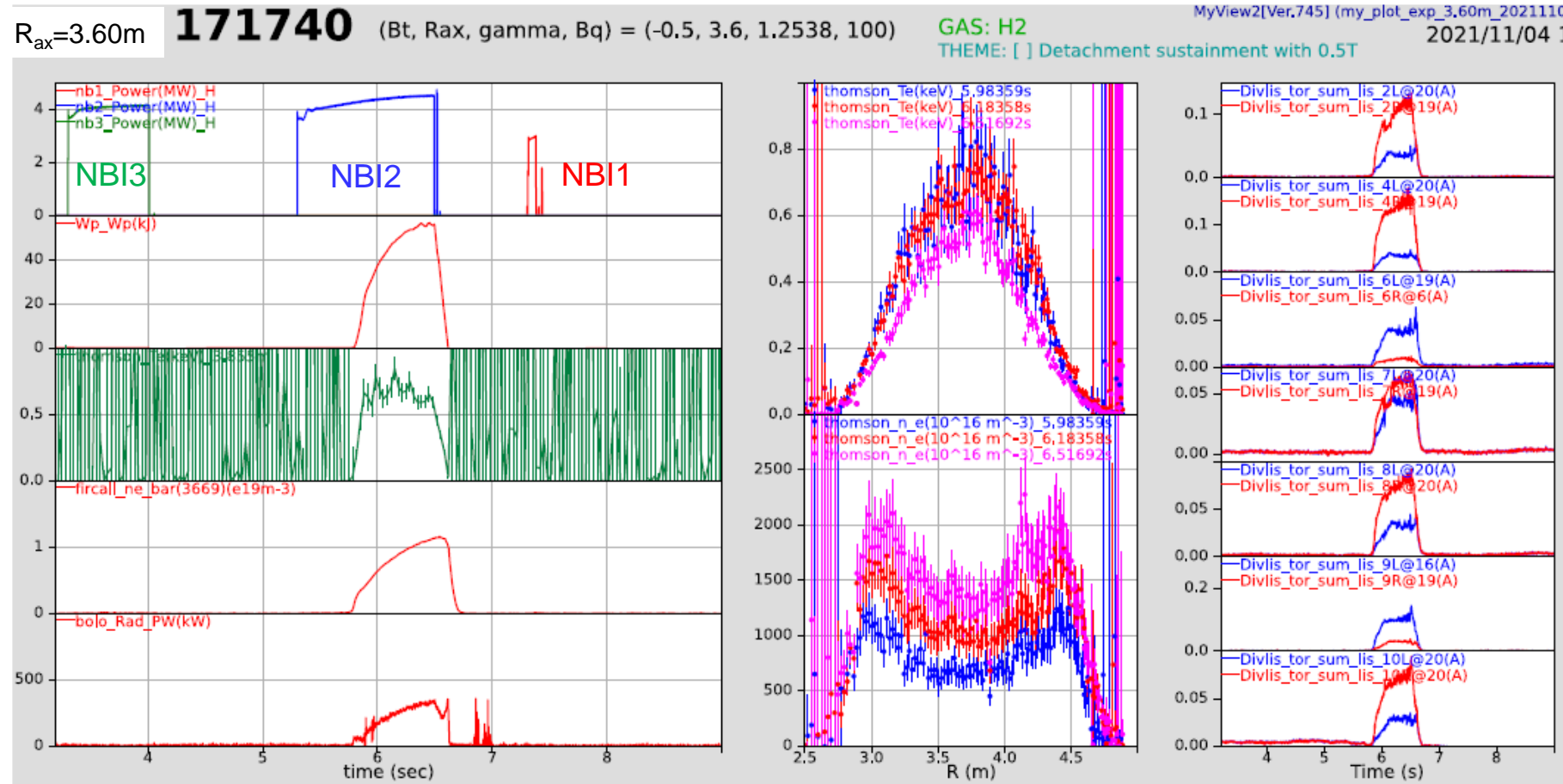
Trial of NBI start-up and detachment sustainment with 0.5T

Objectives:

In the normal conducting LHD, the magnetic field strength will be 0.5T and only one NBI will be available. In order to investigate whether the detachment experiment is possible or not in such condition, experiment was conducted by mimicking the condition.

Results:

- $R_{ax}=3.60m$, 0.5T, CCW, $\gamma=1.254$, Bq=100%, $R_{ax}=3.90m$, 0.5T, CCW, $\gamma=1.254$, Bq=100%, H plasmas.
- The plasma could be started up with one NBI in both $R_{ax}=3.60$ and 3.90m.
- As shown in table, NBI#2 seems most effective to initiate the plasma.
- The plasma start-up was not always possible even with same gas puff pattern. It seems that wall condition affects the start-up significantly, especially for 3.60m.
- It was easier to initiate plasma in $R_{ax}=3.90m$ than in 3.60m. But decay of W_p after NBI break down is very fast in 3.90m. $\rightarrow \tau_E$ is very small?
- RMP was applied for $R_{ax}=3.90m$ and Ne puff \rightarrow detachment was obtained.
- These results may suggest that detachment experiment would be possible in the normal conducting LHD.

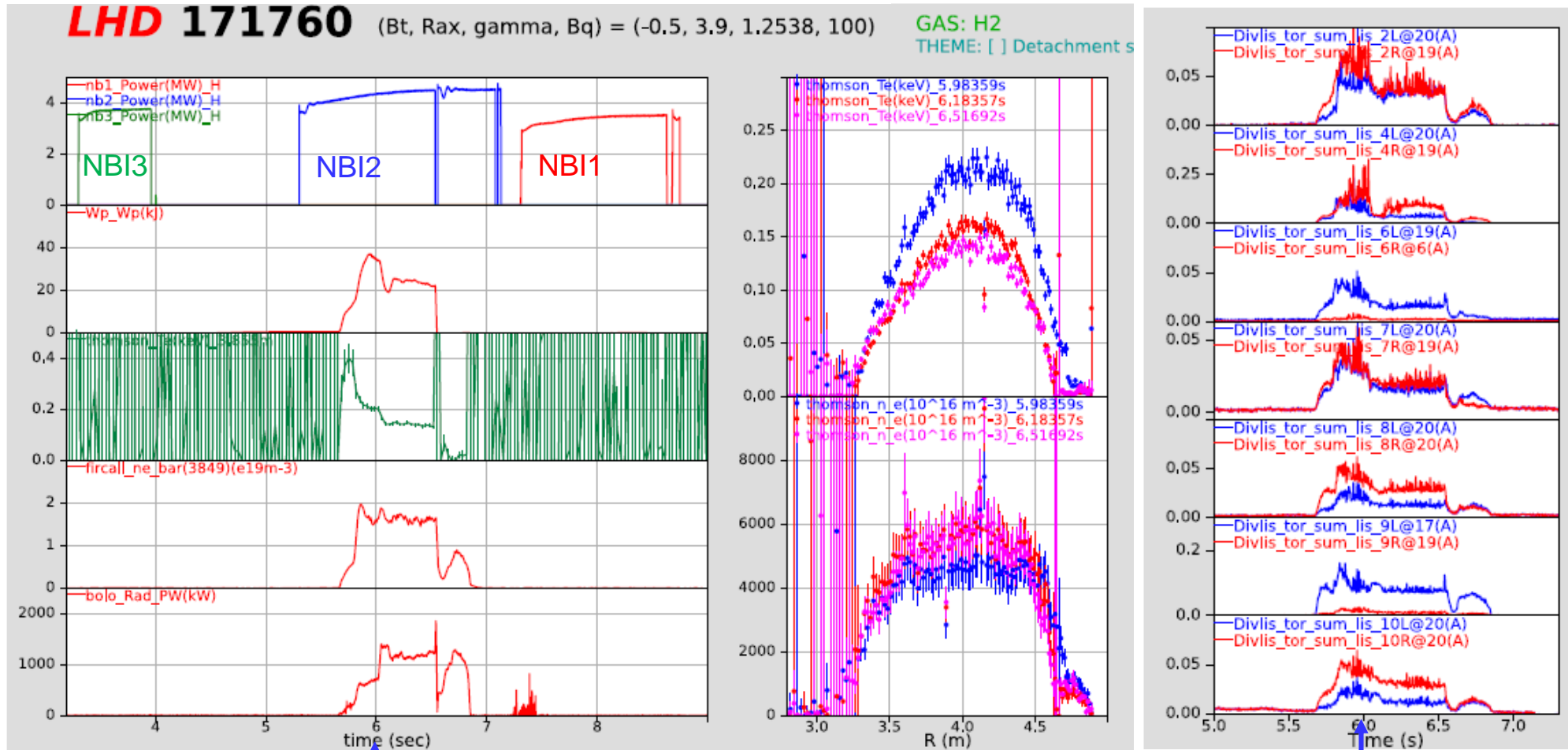


	$R_{ax}=3.60m$
Density ($e19 m^{-3}$)	171726(3), 171729(2), 171739(2), 171740(2)
< 1	

Numbers in () means NBI#.

Trial of NBI start-up and detachment sustainment with 0.5T

$R_{ax}=3.90m$ with RMP (590A) & Ne puff (5.5L, @t=6.0 s, 4 ms pulse)



Ne ↑ $R_{ax}=3.90m$

Density ($e19 m^{-3}$)	171742(1), 171744(2), 171745(2), 171746R(1)
	< 1
	171743(2), 171747R(2), 171754(2), 171758(2)Ne2ms, 171759(2)Ne4ms, 171760(2)R Ne4ms

Numbers in () means NBI#. "R" means with RMP.