

(TG2) Turbulence Topical Group Report



Nov. 4, 2021 (T. Tsujimura)

Date: Nov. 2, 2021

Time: 13:16 – 14:42, 17:14 – 18:42

Shot#: 171606 – 171633, 171679 - 171707 (57 shots)

Prior wall conditioning: D₂

Divertor pump: On except for 2-I

Gas puff: D₂, He, Ar

Pellet: None

NBI#(1, 2, 3, 4, 5)=gas(H, H, H, D, D)=P(4.2, 4.0, 3.8, 7.7, 10.0)MW

ECH(77GHz)=ant(5.5-Uout (or 1.5U), 2-OUR)=P(703, 792)kW

ECH(154GHz)=ant(2-OLL, 2-OUL, 2-OLR)=P(723, 715, 727)kW

ECH(56GHz)=ant(1.5U)=P(-)kW

ICH(3.5U, 3.5L, 4.5U, 4.5L)=P(-, -, -, -)MW

Neutron yield integrated over the experiment = 1.5×10^{16}

Topics

1. Isotope effects on plasma confinement properties and nonlinear interaction of multi-scale turbulence in LHD (Y. Xu, J. Cheng (Southwest Jiaotong U.), M. Kobayashi, A. Shimizu *et al.*)
2. Plasma behaviors at the boundary of the transition to the High Ion Temperature discharge (M. Yoshinuma)

Isotope effects on plasma confinement properties and nonlinear interaction of multi-scale turbulence in LHD

Y. Xu, J. Cheng, M. Kobayashi, A. Shimizu et. al.

Objectives:

Investigate the impact of the isotope mass on characteristics of edge turbulence, turbulent transport, edge radial electric field etc. as well as the nonlinear interaction of multi-scale turbulence in different isotope H/D rich plasmas using GPI, reflectometer and PCI diagnostics, etc.

Results:

$R_{ax}=3.60m$, $B=2.75T$, CCW, $\gamma=1.254$, $Bq=100\%$, D plasma.

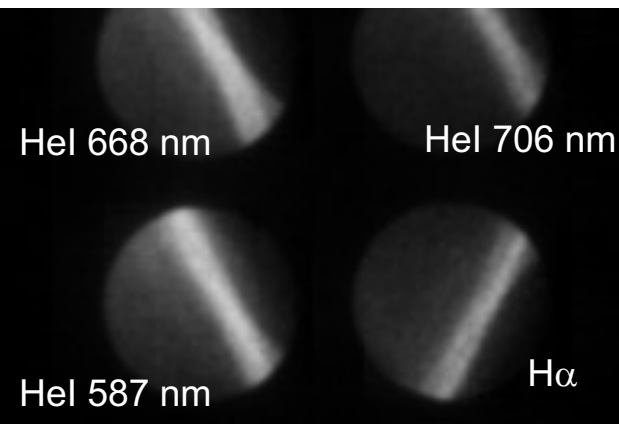
NBI heated and ECRH plasmas were produced with NBI power and density being scanned, as shown in the figure.

Obtained shot list is summarized in a table ("G" means with gas puff imaging data.).

He concentration was scanned in several shots.

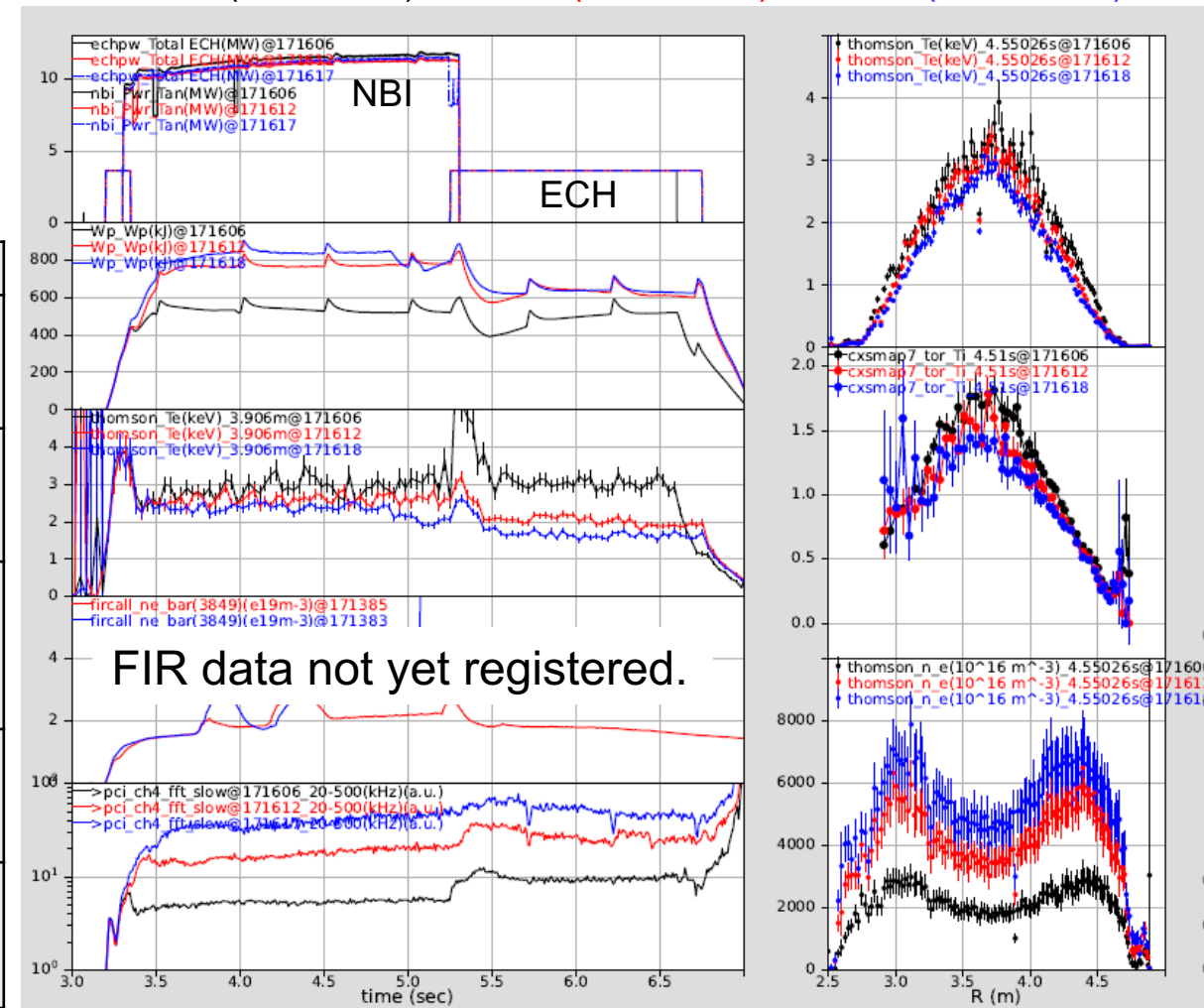
Detailed analysis will be conducted later.

GPI data (#171618)



	NBI# 2,3	NBI# 1,2,3
Density (e19 m^-3) 1.5	171621G, 171622, 171623G	171606G, 171607
2.5	171608G, 171609G, 171610	171619G
3.5	171611, 171624G, 171630G(He40%), 171631G(He50%), 171632G(He50%), 171633G(He60%)	171611, 171612G
4.5	161626G	171617G, 171618G
Ramp-up	171628G, 171629G(He30%)	

#171606 ($1.5e19m^{-3}$), 171612 ($3.5e19 m^{-3}$), 171618 ($4.5e19 m^{-3}$)



Plasma behaviors at the boundary of the transition to the High Ion Temperature discharge

Experimental conditions:

(R_{ax} , Polarity, B_t , γ , B_q) = (3.55m, CCW, 2.78 T, 1.2538, 100.0%)

Motivation and Objective:

Understanding the ion temperature discharge by studying the plasma behaviors at the boundary of the transition to the high ion temperature discharge.

Experiments:

The behavior of the ion temperature was observed by varying the combination of tangential NBI as additional heating with a vertical beam leading discharge in CCW configuration.

Results and future plan:

Discharges with different archived ion temperature were obtained depending on the combination of tangential beams. Co injection (BL1+BL3) archives higher ion temperature than balanced injection (BL2+BL3).

T_i near the center increased after 0.2 sec after the additional heating injection. Ion temperature drop and recover is observed for the delay time.

Relation on the T_e/T_i and difference in the fluctuations will be investigated.

Ion temperatures in the case with full injection(171701), co injection(171699) and balance injection(171700).

