

(TG1) Multi-ion Plasma group report



Date: Oct. 26, 2022

Oct. 27, 2022 (H. Kasahara)

Time: 13:25~17:15

Shot# 181568~181605, 181651~181694

Prior wall conditioning: GD-H2, Div cryo: Yes

Gas puff: H₂, D₂, He, Ar, IPD: (Li, B, C)

Pellet: H, D, TESPEL:Yes

NBI(1, 2, 3, 4, 5) = gas(H, H, H, D, D) = P(3.34, 4.28, 4.06, 7.98, 8.16) MW

ECH(56GHz,15U) = P(-) MW

ECH(77GHz, 55Uo, 2Our) = P(0.70,0.79) MW

EH(154GHz, 2Oll, 2Oul, 2Olr) = P(0.72,0.80,0.83) MW

ICH(38.47MHz, 3.5U, 3.5L, 4.5U, 4.5L) = P(-, -, -, -) MW

Neutron yield integrated over the experiment = 8.3×10^{15}

Topic

1. Transport study in ECRH superposed ion ITB plasma (181568~181605) (H. Nakano)
2. Mixture induced phase transition in multi-ion transport (181651~181694) (A. Dinklage, N. Tamura)

Transport study in ECRH superposed ion ITB plasma (H. Nakano, H. Takahashi)

Background and Objective

- ❖ The ECRH superposition in peripheral region to the high T_i discharge improved T_i as well as the thermal confinement.
- ❖ Influence of the H/D ratio on the the high T_i discharge with the off-axis ECRH is studied

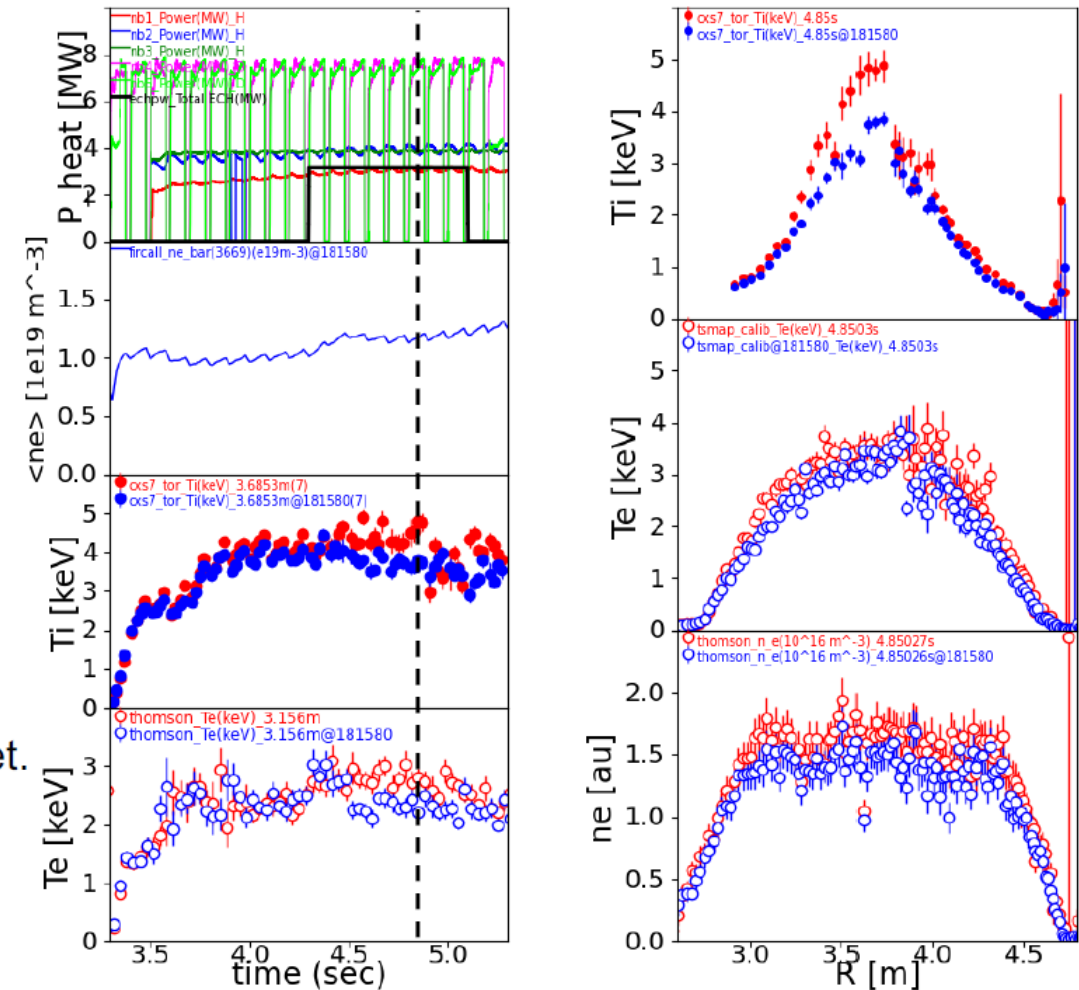
Experimental Condition (Third day for H/D ratio scan exp.)

- ❖ Shot: 181568 – 181605
- ❖ (Rax, Polarity, Bt, γ , Bq) = (3.58 m, CCW, 2.765 T, 1.2538, 100 %)
- ❖ NB1-3: H beam, NB4-5: D beam, Ice pellet

Results

- ❖ Higher central T_i was observed by off-axis ECRH.
- ❖ D/(H+D) ratio between 0.4 and 0.6 was observed by deuterium ice pellet.
- ❖ Due to the data acquisition trouble, many kinds of data were not automatically stored and calculated during experiment.
- ❖ Transport and fluctuation analyses will be done.

LHD181583 (t, Rax, gamma, Bq) = (2.765, 3.58, 1.2538, 100) MyView2[Ver 795] (20201222 HighTi_R_ra.txt) G2.9654, 3.58, 1.2538, 100, 13 THEME: [(1) Multi-Ion] Transport



Red: w/ ECRH at r=0.8
Blue: w/o ECRH

Mixture-induced phase transition in multi-ion transport (A. Dinklage, N. Tamura et al.)

Magnetic Configuration, Shots

(R_{ax} , Polarity, B_t , γ , B_q) = (3.55 m, CCW, 2.64 T, 1.2538, 100.0%), #181651 – #181678 (#181678: NBI calib.)

(R_{ax} , Polarity, B_t , γ , B_q) = (3.9 m, CCW, 2.75 T, 1.2538, 100.0%), #181679 – #181694 (#181679: NBI calib.)

Goal of this experiment: To study the change of the impurity accumulation window in H/D/He-mixed plasmas

Results: We tried to change the He contents in the plasma by using different gas puff settings around n_{e_bar} of $4e19\text{ m}^{-3}$ under the **H, D-mixed condition: D/(H+D) ~ 0.5**

$R_{ax} = 3.55\text{ m}$

$R_{ax} = 3.90\text{ m}$

w/o He puff

w/ He puff (feedbacked)

w/o He puff

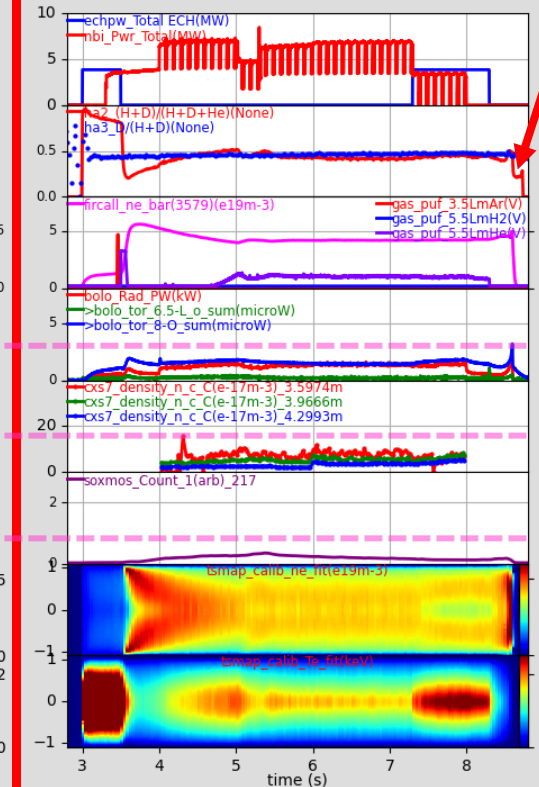
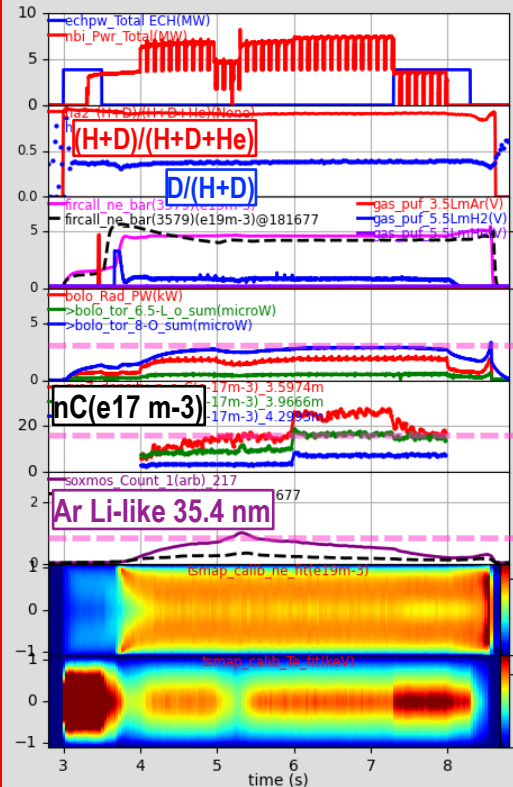
w/ He puff (feedbacked)

LHD 181654

LHD 181677

LHD 181686

LHD 181694



When He contents increased, as a general trends,

- Bolometer signal level decreased
- C-density level decreased
- Ar Li-like intensity level decreased

However, such decreases at $R_{ax} = 3.55\text{ m}$ are smaller than those at $R_{ax} = 3.9\text{ m}$

