(TG1) Multi-ion group report

Jan. 20, 2022 (H. Kasahara)

Date: Jan. 19, 2022, Time: 13:00~16:30, Shot#: 176677~176772(96 shots)
Prior wall conditioning: No, Divertor pump: On (except for 2-I)
Gas puff: H2, Pellet: D2, H2, IPD: C, B, SiB_6
LID: No

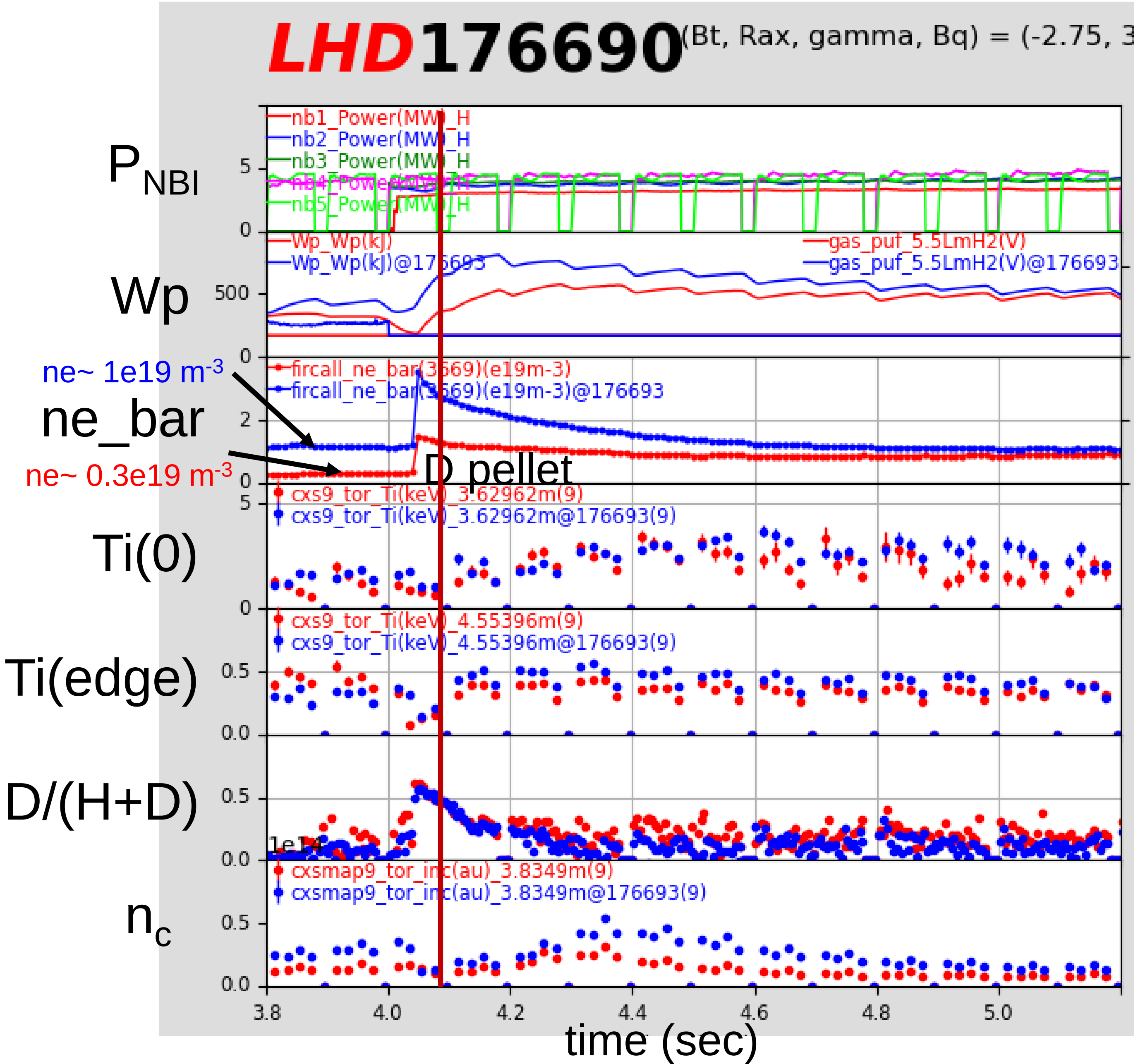
NBI#(1, 2, 3, 4, 5)=gas(H, H, H, H, H)=P(3.53, 4.39. 4.14, 5.24, 4.78)MW
ECH(77GHz)=ant(5.5-U, 2-OUR)=P(0.70, 0.79)MW,
ECH(154GHz)=ant(2-OLL, 2-OUL, 2O-LR)=P(0.98, 0.93, 0.99)MW
ICH(3.5U, 3.5L, 4.5U, 4.5L) = P(0, 0, 0, 0) MW
Neutron yield integrated over the experiment = 3.0×10^{12}

Topics

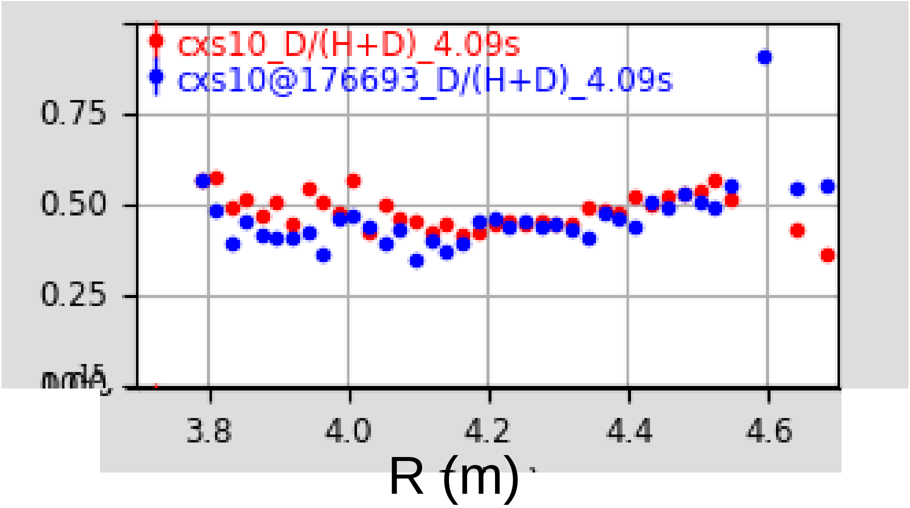
1. Hydrogen wall recycling after deuterium pellet (G. Motojima)
2. Impact of impurities at non-trace concentration on the background plasma (N. Tamura, J.M. Garcia Regaña)
3. Isotope effects in high-density ECH plasma after hydrogen isotope ice pellet injections (T. Tsujimura, postponed due to a false fire alarm)

False alarms happed in the fire alarm system, the cause was the equipment failure. Substituted with a down-graded alternative.
Failure of the nitrogen heater system in the closed divertor plate occurred.

Hydrogen wall recycling after deuterium pellet (G. Motojima)



Magnetic Configuration: (R_{ax}, Polarity, B_t, γ, B_q) = (3.60 m, CCW, 2.75 T, 1.2538, 100.0%)
Shots: 176678-176698 (22 shots)



- ✓ An increase in the deuterium fraction is observed immediately after the D pellet, reaching D/(H+D)=0.5-0.6. However, this deuterium fraction decreases within 100 ms; the D pellet does not affect the final deuterium fraction after pellet injection.
- ✓ At base density of ne~0.3e19 m-3, the density did not get back to its original value. On the other hand, at ne~1e19 m-3, the density is decayed to initial density. This suggests that wall recycling after the pellet varies with the base density.

Impact of impurities at non-trace concentration on the BKG plasma (J.M. García Regaña, N. Tamura et al.)

Magnetic Configuration: (R_{ax}, Polarity, B_t, γ, B_q) = (3.60 m, CW, 2.75 T, 1.2538, 100.0%)

Shots: #176702-#176722

Goal of this experiment

- Understanding the role of **non-trace** impurities on the transport of the main plasma
- Validating the gyrokinetic turbulent transport simulations, that predict reduction of main species heat fluxes (**stella** as main numerical tool) discerning the impact through modification of **ion density dilution and profile tailoring**

Main results of this experiment

- **We have injected C and B impurities into NBI-sustained plasmas** (C: C-IPD or C pellet, B: B-IPD or SiB_6-TESPEL)
  - ✓ **C-IPD**: 0.6V → 0.7V → 0.8V(collapsed)
  - ✓ **B-IPD**: 3V →...→ 8V (nearly collapsed)
- **Core Te, Ti seem to be improved with a larger amount of B powder** (see figures)
  - ✓ Edge Te decreased and ne increased
- Impact of impurities at non-trace concentration on the background plasma will be investigated by using the gyrokinetic turbulent simulations
  - ✓ Necessary parameters have been collected, such as ne/Te/Ti, Zeff