(TG3) Spectroscopy group report

Oct. 7, 2022 (T. Oishi)

Date: Oct. 6, 2022
Time: 9:50 – 18:44
Shot#: 179861 – 180009 (149 shots)
Prior wall conditioning: NO
Divertor pump: OFF
Gas puff: H_2, He, Ne, Ar
Pellet: NO

NBI#(1, 2, 3, 4, 5)=gas(H, H, H, H, H)=P(2.8, 4.1, -, 4.9, 3.8)MW
ECH(77GHz)=ant(5.5-U, 2-OUR)=P(0.448, 0.792)MW
ECH(154GHz)=ant(2-OLL, 2-OUL, 2-OLR)=P(0.723, 0.799, 0.825)MW
ICH(3.5U, 3.5L, 4.5U, 4.5L)=P(0.73, 0.67, 0.82, 0.30)MW
Neutron yield integrated over the experiment = 2.0×10^{13}

Topics

1. (TG1, commissioning) ICRF heating system commissioning for He(H) plasmas (H. Kasahara)
2. Study of edge impurity transport by utilizing multiple spectroscopic diagnostics (T. Nishizawa [Kyushu Univ.], T. Kobayashi)

ICRF heating system commissioning for He(H) plasmas

H. Kasahara, T. Seki, K. Saito, M. Kanda

Shot #: 179860 - 179900

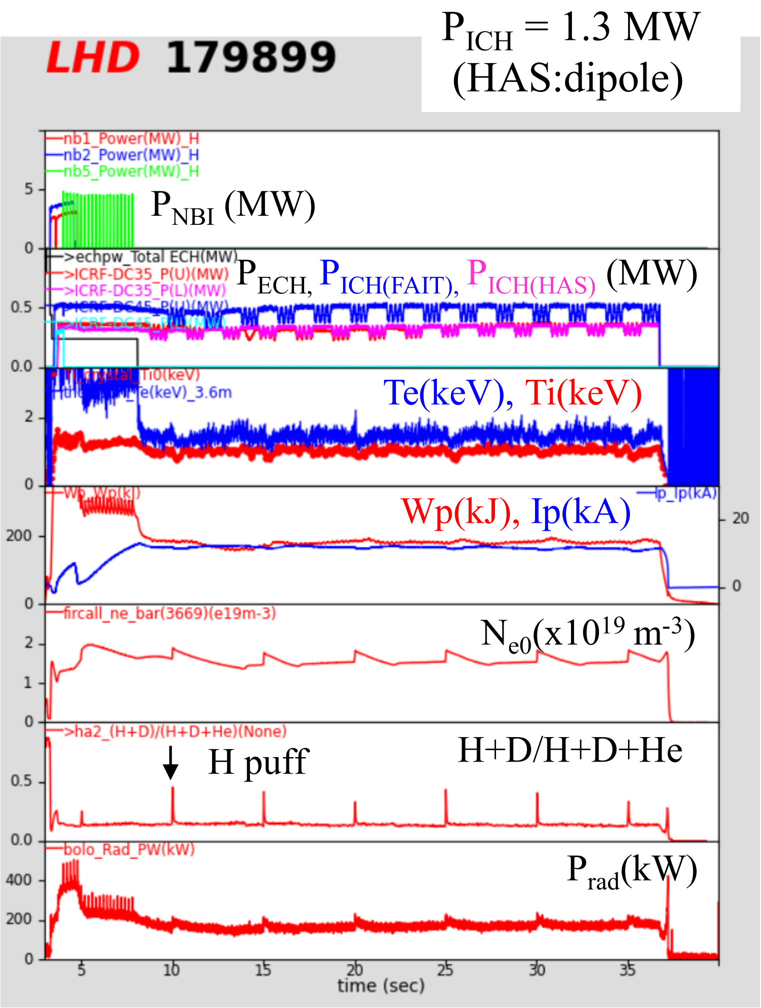
Experimental conditions: (R_{ax}, Polarity, B_t, γ, B_q) = (3.60 m, CW, 2.75 T, 1.2538, 100.0%)

Purpose:

- Confirming the plasma heating efficiency in various antenna phases for the HAS antenna.
- Confirming the real-time stub control with pump assist on long-pulse plasma with ICH

Experimental result:

- The plasma with a line averaged electron density of 1.5×10^{19} m^{-3} can be sustained by only ICH with an injection power of 0.76 MW and the antenna-plasma distance Δ of 10 cm.
- ICH power modulation was performed with four different antenna phase differences (0, 90, 180, and 270°). When the phase difference was 90° , the interaction between the antenna and the plasma was more vital, and the power reflectivity change during the discharge was more significant than at 0° or 180° , often resulting in injection shutdowns due to reflected power overload.

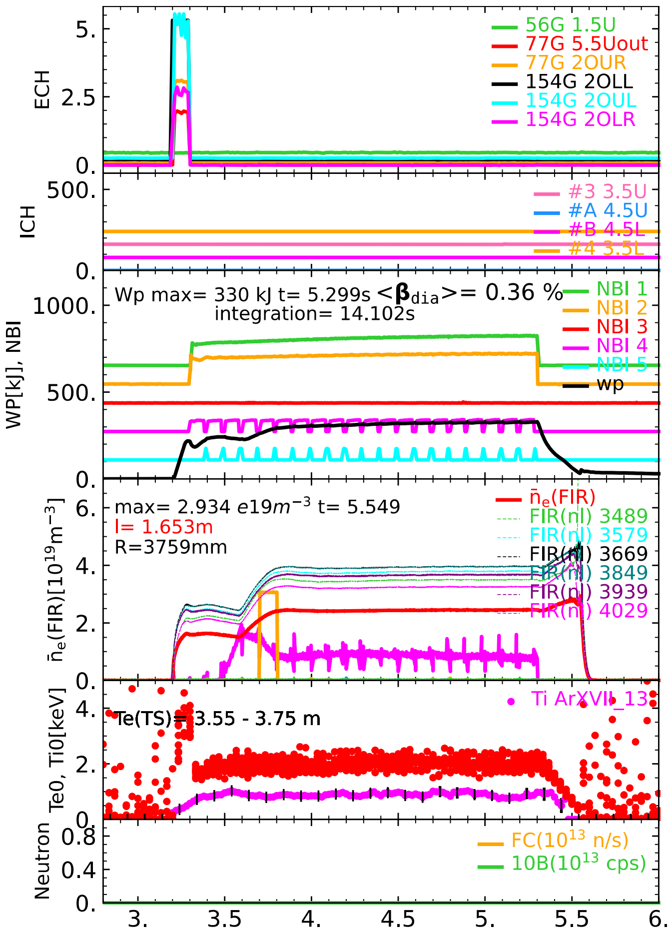


Study of edge impurity transport by utilizing multiple spectroscopic diagnostics

(T. Nishizawa, T. Kobayashi, T. Oishi, Y. Yoshinuma, I. Murakami, D. Kato, and K. Ida)

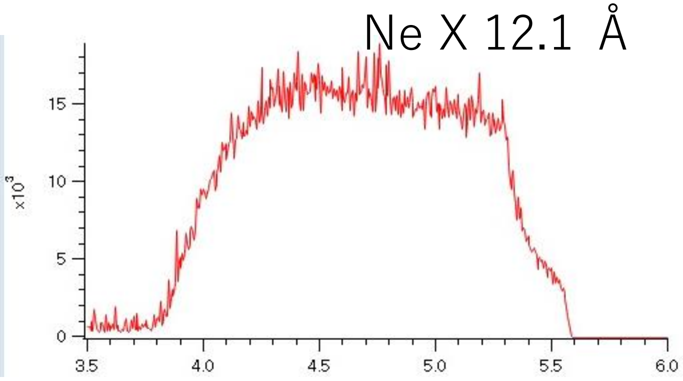
Shot #: 179905 – 18009

objective: To measure impurity transport coefficients (D and v) just inside the LCFS



method: Puff Ne for 200 ms and observe Ne emission when the Ne profile is quasi-stationary by using CXR and EUV.
By simultaneously observing multiple charge states of the same impurity species, D and v can be separated without perturbing the impurity profile.

Done: R_ax scan:3.6, 3.75, and 3.9 (m) and density scan are performed.
Control room analysis showed that the time evolution of Ne X 12.1Å instensity varies depending on the density and R_ax.



To do: Model atomic processes to obtain impurity profiles, and extract D and v.
The same measurements will be performed for deuterium plasmas on Nov. 23.