(TG3) Spectroscopy group report

Jan. 25, 2022 (T. Kawate)

Date: Jan. 25, 2022
Time: 13:32 – 16:55
Shot#: 177129 – 177193 (65 shots)
Prior wall conditioning: H_2
Divertor pump: ON
Gas puff: H_2, N_2, Ar, Ne
Pellet: TESPEL(SiB_6, AlN, $CaAl_2O_4$, V, Mn, Ni, Fe, Cu)

NBI#(1, 2, 3, 4, 5)=gas(H, H, H, H, H)=P(3.7, 4.5, 4.2, 4.2, 4.2)MW
ECH(77GHz)=ant(5.5-U, 2-OUR)=P(0.703, 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, 0, 0, 0)MW
Neutron yield integrated over the experiment = 2.3×10^{12}

Topics

1. Light impurity transport studies in D/H plasmas at LHD using VUV spectroscopy (T. Fornal, N. Tamura)
2. Impurity transport study in LHD D/H plasmas using VUV spectroscopy in experiment with TESPEL injection (M. Kubkowska, N. Tamura)

Light impurity transport studies in H plasmas at LHD using VUV/VIS spec. (T. Fornal, 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: #177129 - #177163 (#177161 - #177163: NBI calib.)

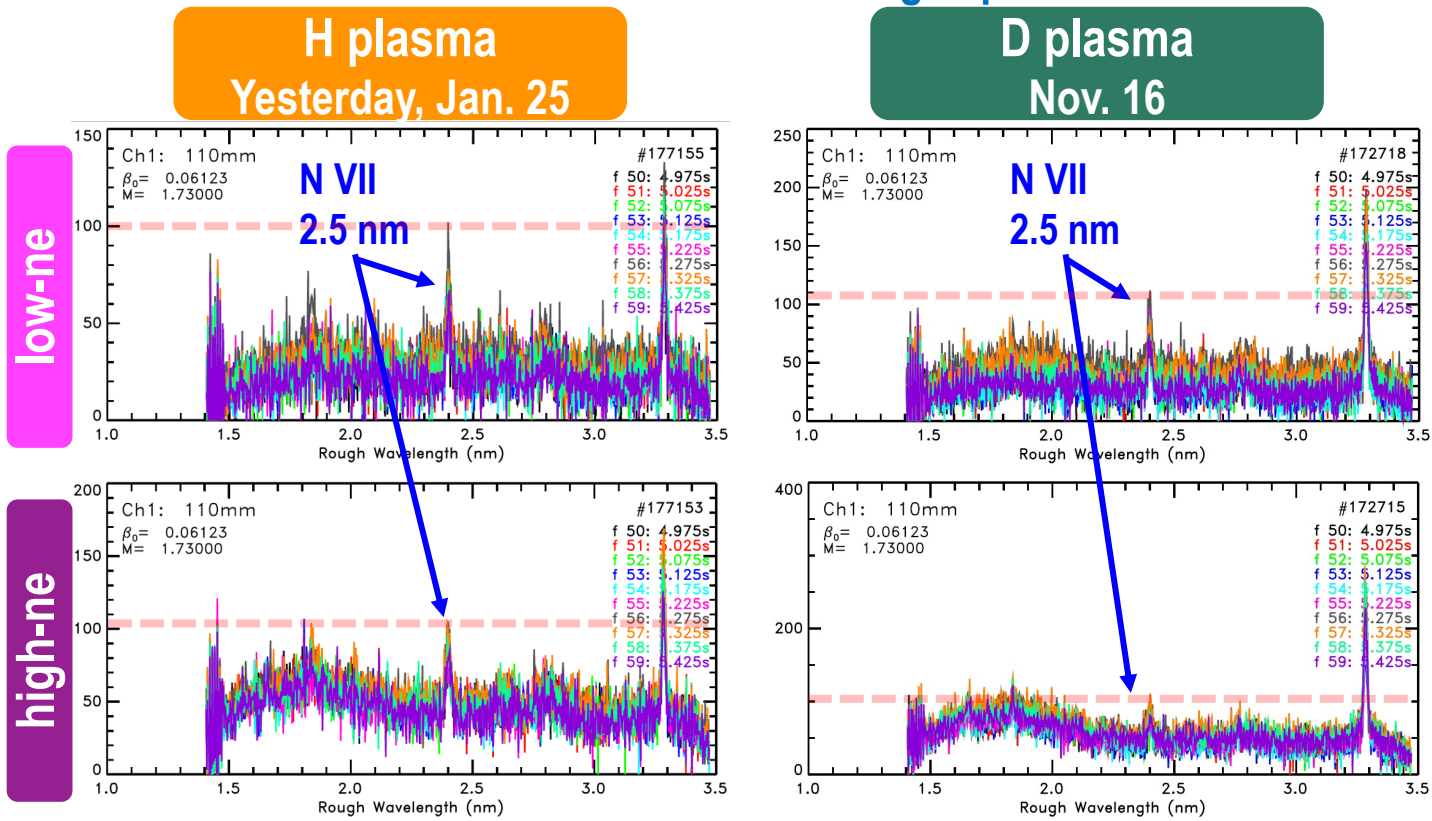
Goal of this experiment:

- To investigate the behavior of light impurities (B, C, N, O) in the hydrogen plasma of LHD and its comparison to the deuterium case, and its comparisons with the results in W7-X

Results:

- **TESPELs**(SiB_6, AlN, $CaAl_2O_4$) (t = 3.73 s)and **N_2 gas puff** (t = 4.7s - 4.8s) are injected into the EC-heated **H** LHD plasmas with a various density from 1E19 m^{-3} to 4E19 m^{-3}
- N VII intensity (one of target lines with "CO-monitor" to be installed at W7-X) in the high-n_e case is lower than that in the low-n_e case
  → same as in **D** LHD plasma case
  → It might be due to "Impurity screening"
- Difference between H and D plasmas will be investigated

Spectra measured with SOXMOS after N2 gas-puff



Study of impurity transport in ECH LHD plasmas with TESPEL injection (M. Kubkowska, 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: #177164 - #177193
Goal of this experiment

- To obtain the data by using **TESPELs containing quadruple tracers (V/Mn/Ni + Fe or Cu)** for comparisons with the future results in W7-X

Results

- **(V/Mn/Ni + Fe or Cu)-TESPELs are successfully injected** into the ECR-heated LHD H plasmas with n_e up to 4E19 m^{-3}
  - ✓ Same heating power as in the D plasma exp. on Nov. 16 has been achieved

V/Mn/Ni + Fe

	1e19	2e19	3e19	4e19
3 x 154 GHz (2.35 MW)	✓	✓	Not conducted	✓
2 x 154 GHz (1.52 MW)	✓	✓	Not conducted	Collapsed by TESPEL

V/Mn/Ni + Cu

	1e19	2e19	3e19	4e19
3 x 154 GHz (2.35 MW)	✓	✓	✓	Collapsed by TESPEL
2 x 154 GHz (1.52 MW)	✓	✓	Collapsed by TESPEL	Collapsed by TESPEL

- Emission lines from V, Mn, Ni + Fe or Cu have been clearly observed
  - ✓ To be identified & to be analyzed later

@n_e~2e19 m^{-3}