

(TG4) Plasma instability group report

Oct. 26, 2022 (Y. Takemura)

Date: Oct. 25, 2022

Time: 9:31 - 18:45

Shot#: 181377-181541 (165 shots)

Prior wall conditioning: H₂, Divertor pump: Off

Gas puff: H₂, Pellet: None

NBI#(1, 2, 3, 4, 5)=gas(H, H, H, H, H)=P(3.3, 3.6, 3.6, 3.6, 3.6)MW

ECH(56GHz)=ant(1.5-U)=P(-)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(0.72, 0.80, 0.83)MW

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

Neutron yield integrated over experiment = (1.6E+13)

Topics

1. Fluctuation pattern change with the L/H transition (S. Ohdachi)
2. Measurements of p-11B alpha particles (R. Magee, H. Gota, K. Ogawa, S. Ohdachi et al.)

Fluctuation pattern change with the L/H transition S.Ohdachi

Shot #: 181376-181424

Experimental conditions:

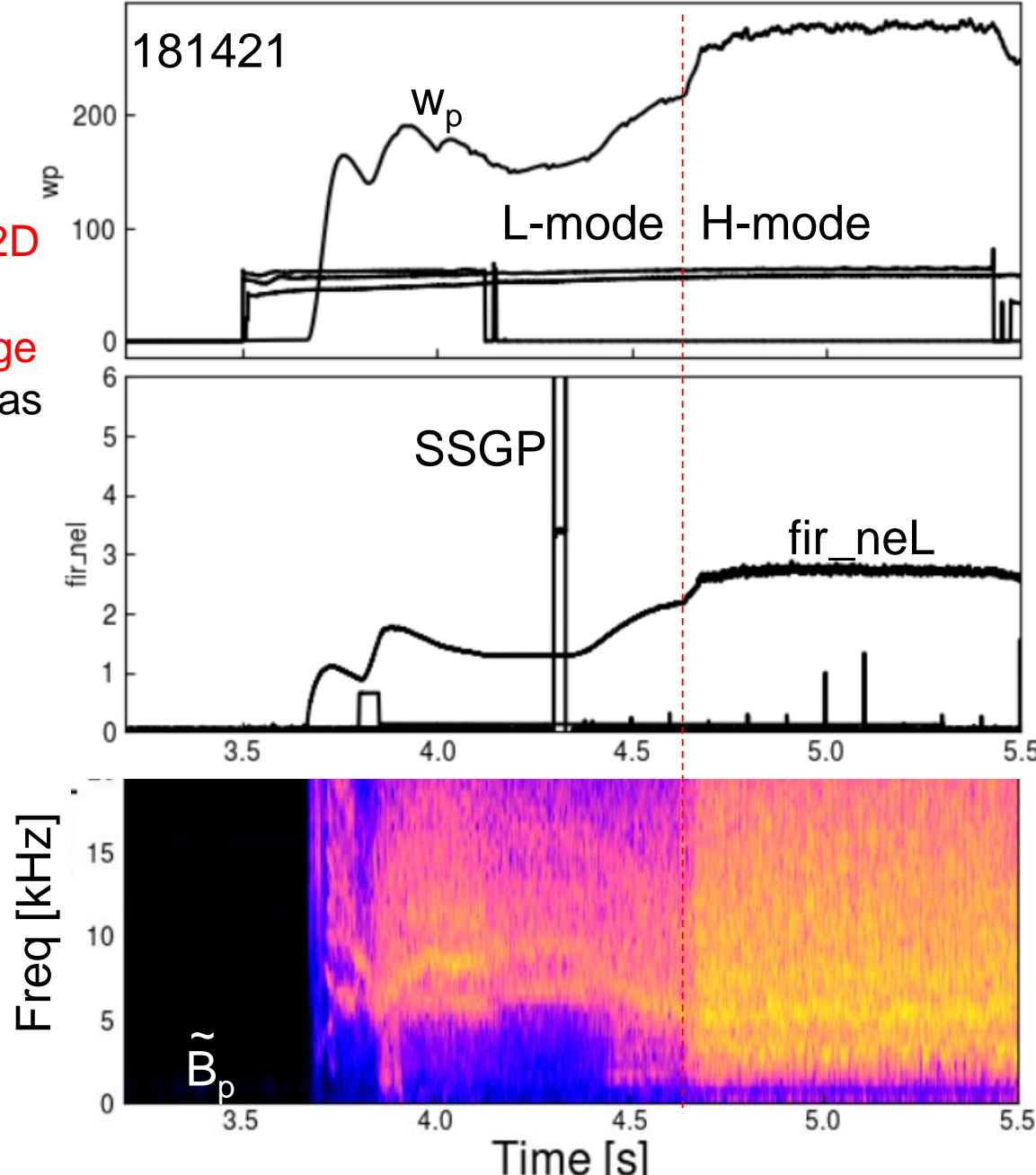
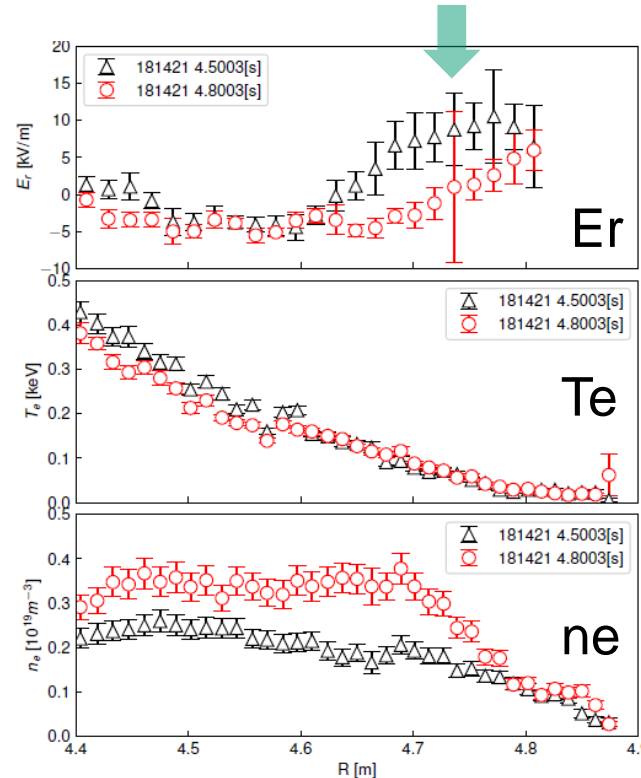
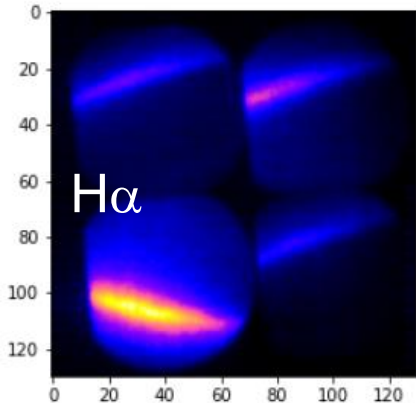
$(R_{ax}, \text{Polarity}, B_t, \gamma, B_q) = (3.6 \text{ m}, \text{CCW}, 1.0 \text{ T}, 100 \%)$

Background and motivation:

- Relation of the fluctuations and transport is important issue. **2D density fluctuation** pattern changes with L/H transition was observed. In order to obtain supporting data (**Er, He GPI image with upgraded GPI system**), H-mode discharge with SSGP was performed.

Results:

- Er, GPI with helium gas is successfully obtained.
- Analysis of the rotation of the fluctuations, pattern changes will be performed.



Measurements of p-¹¹B alpha particles (R. Magee, H. Gota, K. Ogawa, S. Ohdachi et al.,)

Shot #:181429-181541 (113 shots)

Experimental conditions: (R_{ax} , Polarity, B_t , γ , B_q) = (3.60 m, CCW, 2.75 T, 1.254, 100%)

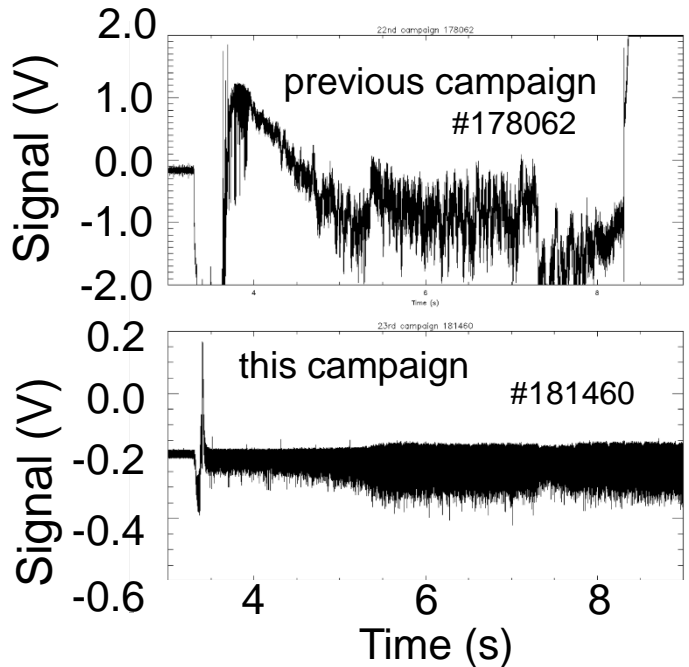
Background and motivation:

- We perform the p-¹¹B experiment in LHD for the contribution for aneutronic p-¹¹B fusion research.
- In the previous campaign, we were successfully commission the Alpha Particle Detector (APD), but we suffered from noise issue in APD.

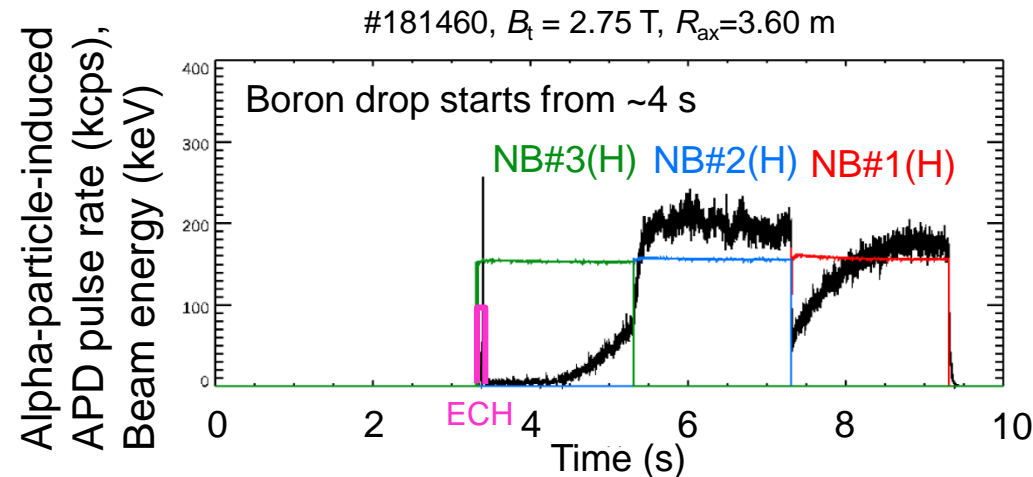
Results:

- Noise level of APD is much reduced by introducing vacuum-tight co-axial cable and change electronics connections.
- We obtained detailed alpha particle emission rate dependence on beam energy. -> We will compare with p-¹¹B cross section.
- We also obtained dependence on boron amount and APD position.

Typical APD raw signal



Typical time evolution



Alpha-particle-induced APD pulse rate normalized by beam current

Beam energy scan (shot by shot)

