(TG4) Plasma instability group report

Feb. 3, 2022 (Y. Takemura)

Date: Feb. 2, 2022
Time: 16:20 - 18:45
Shot#: 178025 – 178072 (48 shots)

Prior wall conditioning: None
Divertor pump: Off
Gas puff: H_2, Pellet: No
NBI#(1, 2, 3, 4, 5)=gas(H, H, H, H, H)=P(3.3, 0.0, 3.9, 0.0, 4.5)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
Neutron yield integrated over experiment = (1.2×10^{11})

Topics

1. p-B11 reaction induced alpha particle detection (S. Ohadachi, TAE)

p-B11 reaction induced alpha particle detection S.Ohdachi/NIFS/TAE

Shot #: 178025-178072

Experimental conditions:

(R_{ax}, Polarity, B_t, γ, B_q) = (3.6 m, CCW, 0.6 T, 2.75T, 100 %)

Background and motivation:

- Proton-Boron11 fusion reaction ($^{11}B(p,\alpha)2\alpha$) is quite difficult to realize due to the extremely small reaction cross-section. The cross-section of the reaction has a large peak at around 130-150 keV and using LHD boron droppers and a negative ion source NBI, this resonant peak can be used.

We try to detect alpha particle from p-B^{11} reaction using silicon detector on the movable insertion system together with TAE technologies.

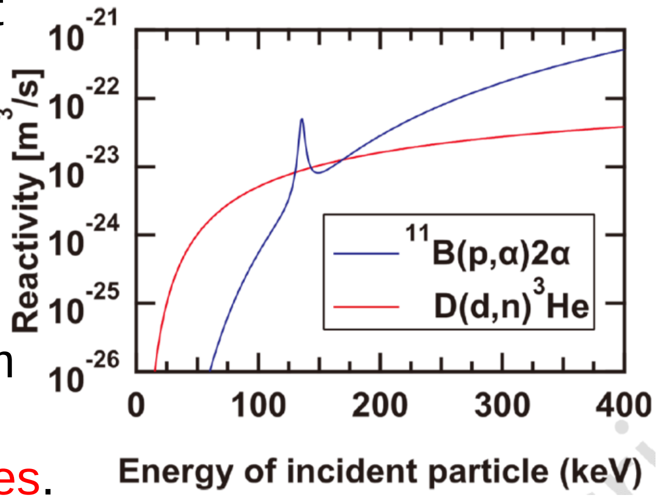

Fig. 1. Cross-section of the p-B^{11} reaction

Results:

- Low freq. noise is observed when the detector is located close to the plasma.
- This noise is reduced in the low-density discharge regime.
- The output of the silicon detector signal becomes more spiky when the boron powder is injected. (Fig. 2)
- These spikes becomes smaller with reduced NBI voltage (130keV).

#178060(Wo/Boron)/62(W/Boron)

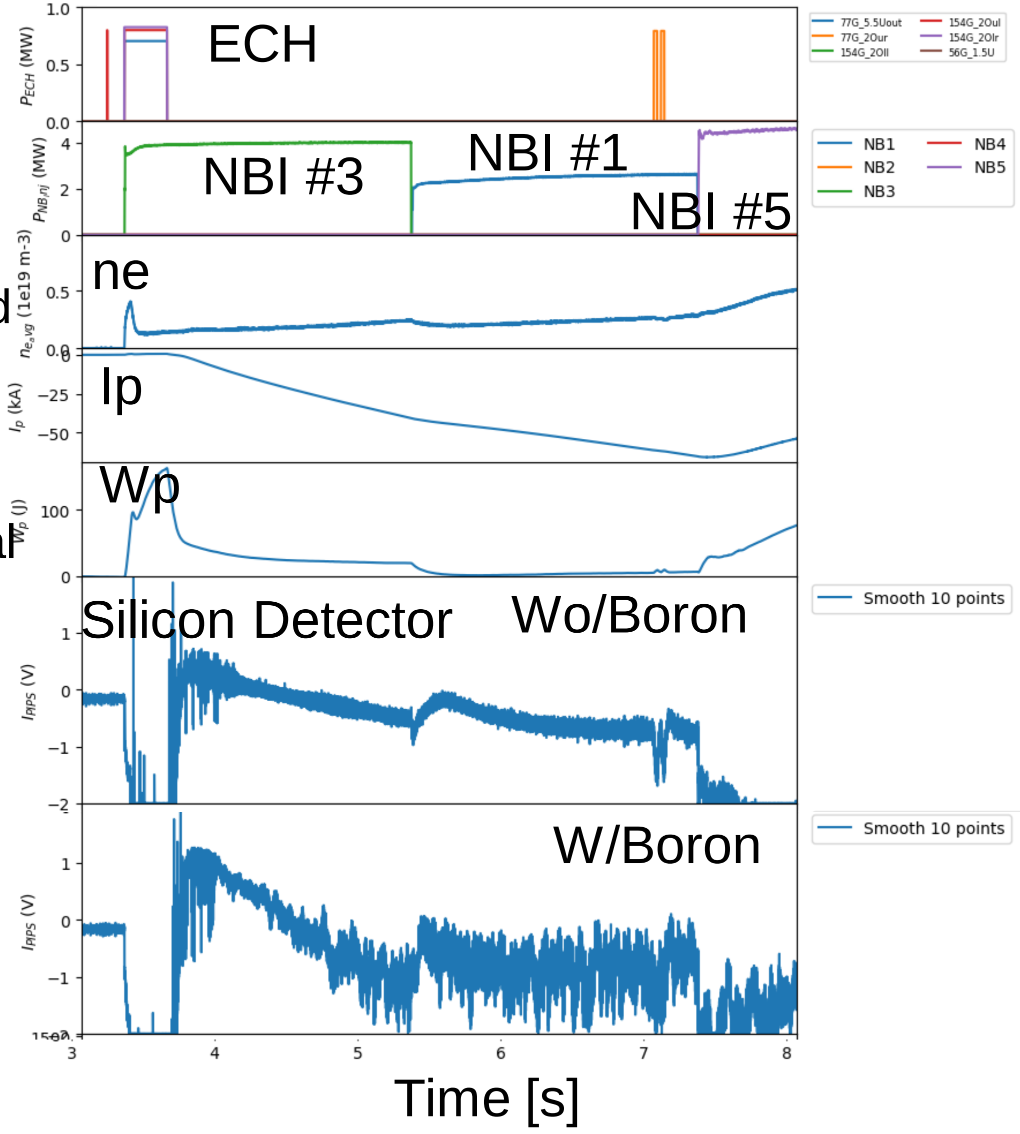

Fig. 2 Time evolution of the silicon detector output