

(SG2, TC) Session Report



Apr. 11, 2024 (H. Nakano)

Date: April 11, 2024

Time: 12:40 – 14:07

Shot#: 189380 – 189409 (30shots)

Prior wall conditioning: None

Divertor pump: On

Gas puff: H₂, He

Pellet: TESPEL(Ti, Li₂TiO₃), Teflon

NBI#(1, 2, 3, 4, 5) = gas(H, H, H, H, H)=P(4.8, 4.3, 4.2, 3.7, 2.8) MW

ECH(77GHz) = ant(1.5-Uo, 5.5-U, 2-OUR)=P(-, 0.7, 0.4) MW

ECH(154GHz) = ant(2-OLL, 2-OUL, 2-OLR)=P(0.7, 0.9, 1.0) MW

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

Topics

1. Impurity effect on turbulent transport in magnetically-confined toroidal plasmas (Naoki Tamura)

Impurity effect on turbulent transport in magnetically-confined toroidal plasmas (N. Tamura, T. Tokuzawa, M. Goto, K.J. McCarthy, R. Bussiahn, Th. Wegner et al.)

Magnetic configuration: (R_{ax} , Polarity, B_t , γ , B_q) = (3.60 m, CW, 2.750 T, 1.2538, 100.0%)

Shots: #189380 - #189409

Goal of this experiment

- In this study, we systematically investigate how the spatio-temporal structure of electron density fluctuations in high-temperature toroidal plasmas changes with time when impurity ion profiles different from those of background ions and electrons are formed by impurity injection into the high-temperature toroidal plasma

Background & Motivation

- The improvement in confinement caused by introducing impurities is thought to be due to the reduction of turbulent transport triggered by the impurities.
- Still, the intrinsic role of impurities in reducing turbulent transport remains largely unexplained experimentally, although theoretical and simulation studies have pointed out their effects (e.g., impurity mode).

Approach & Methodology

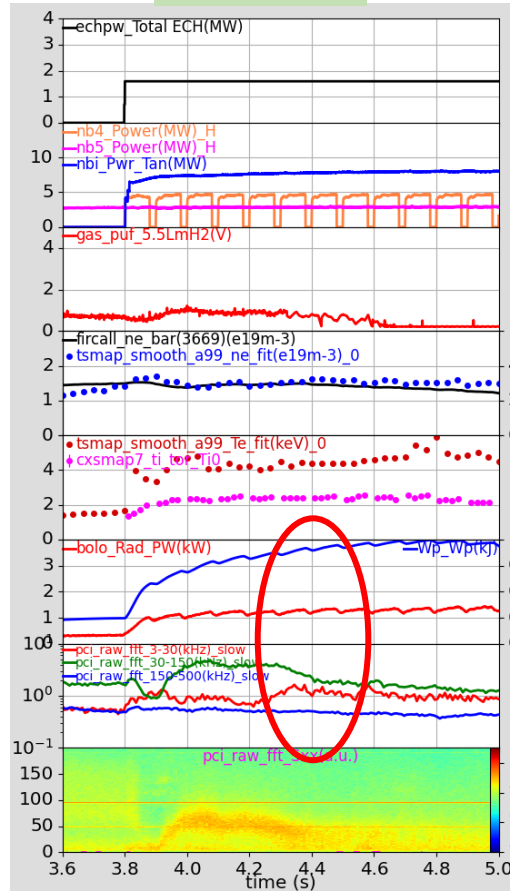
- Inject the various impurities into NBI-heated plasmas with the SSGP or TESPEL
 - ✓ He-SSGP: Hollow & narrow impurity (low-Z) profile
 - ✓ Ti-TEPEL: Hollow & narrow impurity (mid-Z) profile
 - ✓ Teflon pellet: Peaked (to be checked) & broad impurity (low-Z) profile
 - ✓ Li_2TiO_3 -TEPEL: Peaked (to be checked) & broad impurity (mid-Z) profile

Impurity effect on turbulent transport in magnetically-confined toroidal plasmas (N. Tamura, T. Tokuzawa, M. Goto, K.J. McCarthy, R. Bussiahn, Th. Wegner et al.)

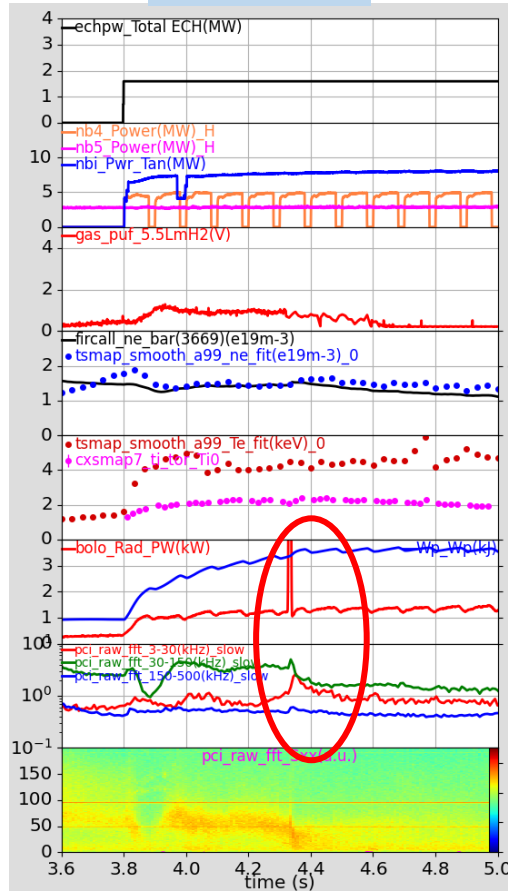
Results

- Various impurities have been injected to (CTR, Balanced) NBI-heated plasmas with the SSGP or TESPEL
- **Different behaviors of fluctuations** measured with PCI **according to the injection type have been measured** (Figures shown below have been obtained in CTR-NBI-heated plasmas)
- Other diagnostic data (e.g., DR, BS) will be also analyzed

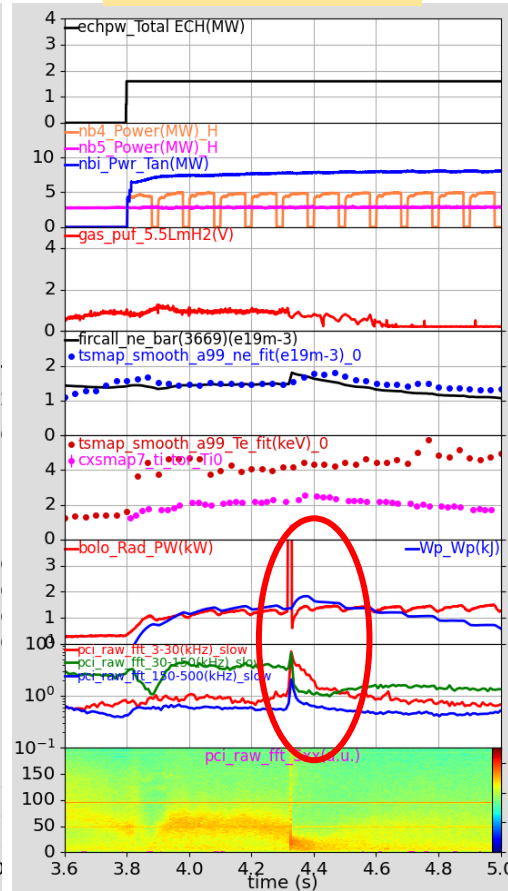
Reference



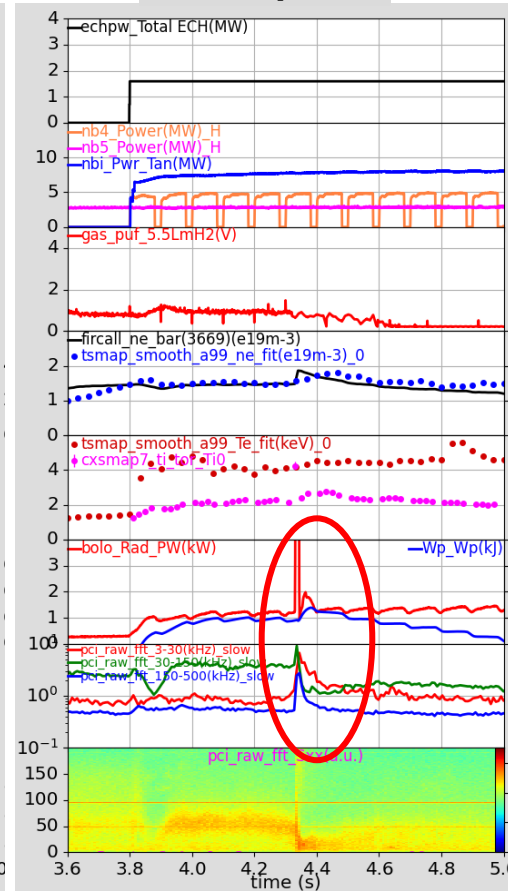
Ti-TESPEL



Li₂TiO₃-TESPEL



Teflon pellet



He-SSGP

