Daily Report for 2025-12-17

M. Goto

Date: December 17, 2025
Time: 10:00 – 17:15
Shot: 199506 – 199644 (138 shots)
Prior wall conditioning: No
Divertor pump: On
Gas puff: H2, Ne
Pellet: No

NBI: #1, #2, #3, #4, #5
ECH: 2-OUR (77GHz), 2-OUL (154GHz), 2-OLL (154GHz)
ICH: No

Topics

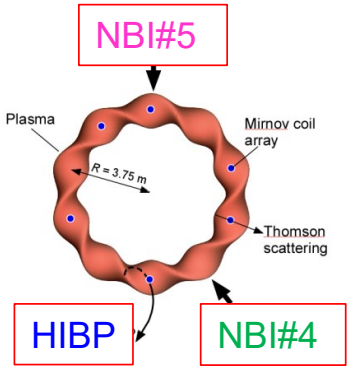
1. Influence of energetic particles on the formation of the electric potential profiles and impurity transport (T. Ido, M. Nishiura)
2. Studies of intermittent ion temperature increases observed in reversed magnetic shear plasmas with counter neutral beam injection on LHD (K. Toi, K. Tanaka)
3. Joint Experiment on Effect of Impurities on StellaratorPerformance (F. Nespoli, S. Masuzaki)
4. Effect of low-Z powder injection on density limit (F. Nespoli, S. Masuzaki)
5. (piggy-back) Effects of boronizatoin on plasma facing surface (S. Masuzaki)

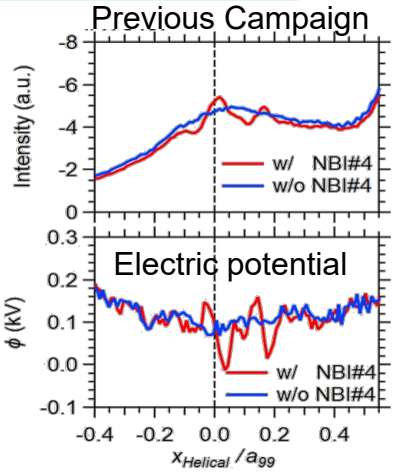
Influence of energetic particles on the formation of the electric field and impurity transport (T. Ido, M. Nishiura)

Shot #: 199504 - 199544

Experimental conditions: (R_{ax}, Polarity, B_t, γ, B_q) = **(3.75m, +1.375 T, 1.254, 100%), n_e ~ 0.5 x 10^{19} (m^{-3})**

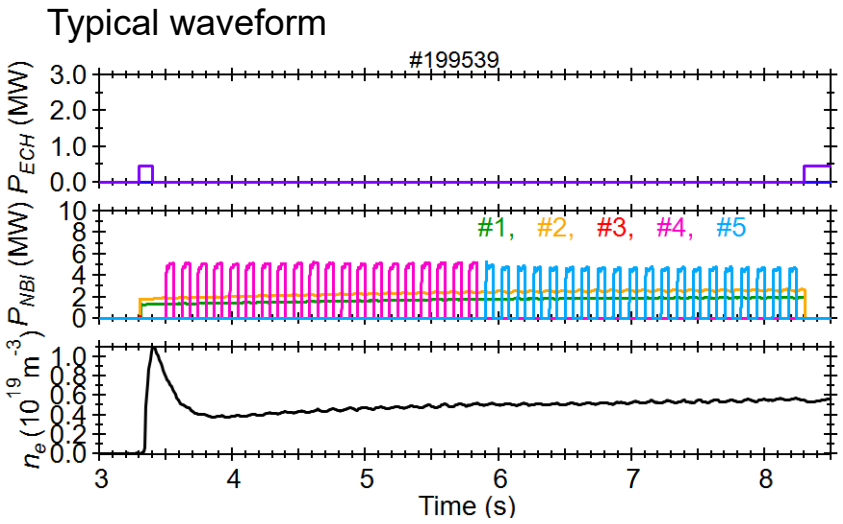
Balanced tangential NBI + modulated perpendicular NBI





Background and motivation:

- In the previous campaign, peculiar spatial structures of the electric potential (ϕ) and density profiles were observed in the central region during the perpendicular NBI #4, but not during the perpendicular NBI #5.
- The purpose of this experiment is to investigate the 2D special structures and the influence of the structures on turbulence and the particle transport.



Results:

The electric potential profiles were measured in the central region.

However, the peculiar structure that had been observed during NBI injection was not observed in this experiment.

Studies of intermittent ion temperature increases observed in reversed magnetic shear plasmas with counter neutral beam injection on LHD

K. Toi and K. Tanaka

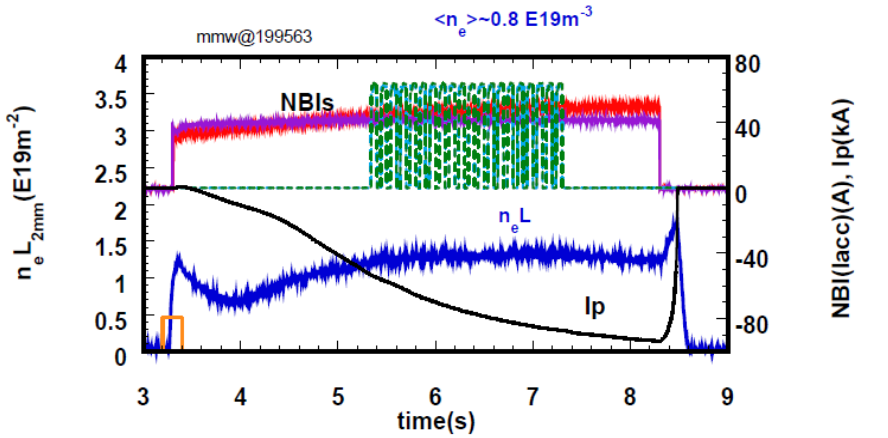
Experimental conditions:
(R_{ax}, Polarity, B_t, γ, B_q) = (3.75 m, CW, 1.3 T, 1.2538, 100.0%)
#199545 - #199568

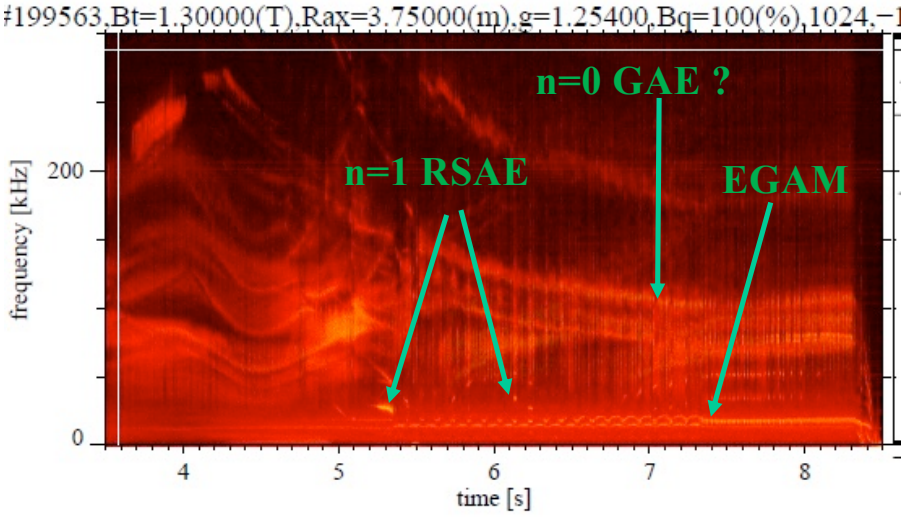
Motivation and method:

- To clarify the relation between the intermittent increases in ion temperature T_i and the time evolution of the off-axis minimum of the rotational transform ι_{min} determined by Alfven spectroscopy.

Results:

- Net plasma current Ip reached to ~100 kA, despite the density increase due to #4 and #5 NBIs. The reversed magnetic shear (RS) configuration seems to be formed, but it relaxes rather fast.
- EGAM, n=1 RSAEs and n=0 GAE are excited, having similar temporal behaviors with the previous RS plasmas.
- Data concerning the T_i, v_θ, v_φ and n_{Neon} profiles are expected to be obtained by the CXS.
- Detailed analysis is needed to confirm the occurrence of the similar T_i-increases observed in the previous experiments.





Effect of powder on confinement – comparison to W7-X

F. Nespoli, S. Masuzaki,
K. Tanaka, M. Shoji

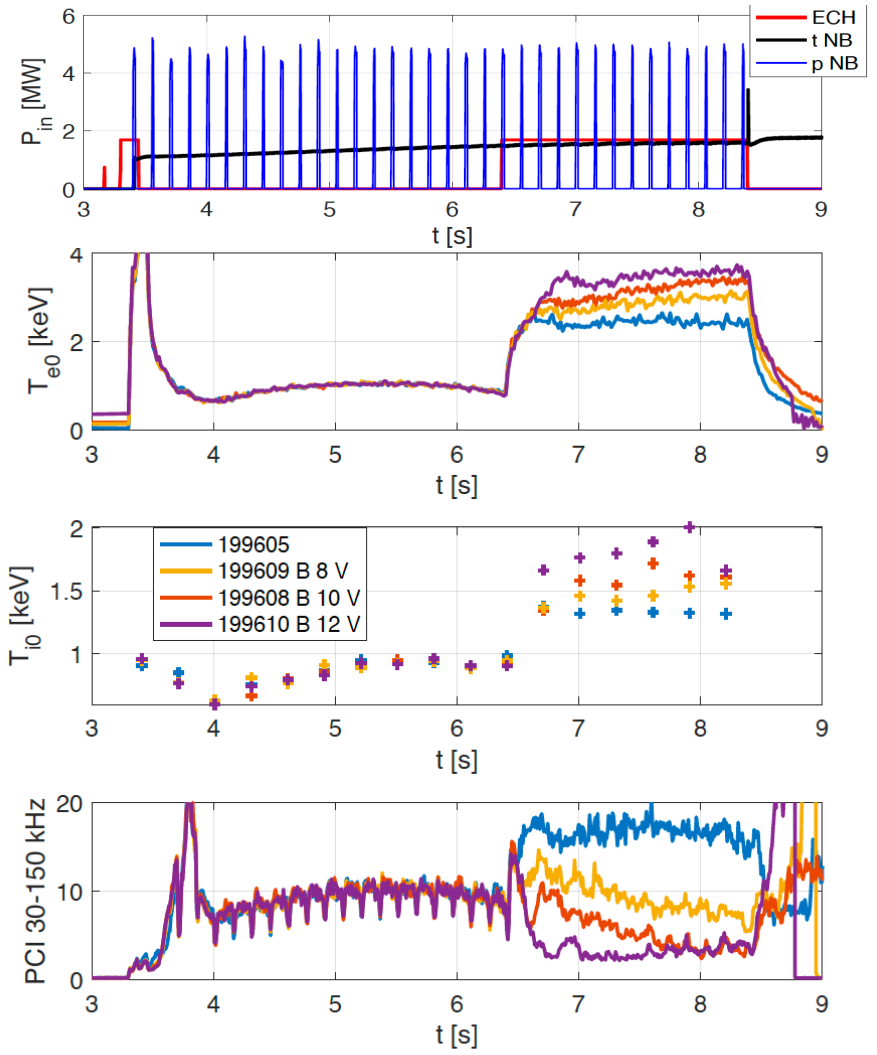
Experimental conditions:
(R_{ax}, Polarity, B_t, γ, B_q) = (3.6 m, CW, 2.75 T, 1.2538, 100.0%)
#199604 - #199627

Motivation and method:

- Injection of boron powder observed to increase confinement, reduce turbulence
- Experiment performed in March in W7-X with pulsed boron carbide powder injection show strong increase of confinement for specific plasma scenario, we reproduce it in LHD

Results:

- n_e=3e19, PNB=2MW+ PECH=2MW
- Strong increase in Te and Ti, reduction in turbulence
- Improvement correlates with amount of powder
- Different scenarios comparing tNB and pNB have been explored for better comparison with W7-X



Effect of powder on density limit

F. Nespoli, S. Masuzaki,
K. Tanaka, M. Shoji

Experimental conditions:
(R_{ax}, Polarity, B_t, γ, B_q) = (3.6 m, CW, 2.75 T, 1.2538, 100.0%)
#199569 - #199603, #199628-199643

Motivation and method:

- Injection of low-Z powder observed to decrease intrinsic impurity and radiation, turbulence
- Previous experiments in last campaign show improvement of density by B powder injection in one scenario

Results:

- Different scenarios explored 3NB, 2NB, 2NB+ECH
- Different powders compared small B, big B, Li
- Only limited improvement with powder injection
- Reference discharge already better than Sudo…
- More analysis needed