Daily Report for 2025-12-05

Masaki Nishiura

Date: December 5, 2025
Time: 10:00-17:15
Shot:198663-198775(113 shots)
Prior wall conditioning: No
Divertor pump: Off
Gas puff: H_2, CH_4

NBI:#1, #2, #3, #4, #5
ECH:2-OUR (77GHz), 5.5-UO (77GHz), 2-OUL (154GHz), 2-OLL (154GHz)
ICH: 3.5UL, 4.5UL

Topics

1. Impact of density gradient on turbulence anisotropy (Katsumi Ida)
2. Assessment of geometrical effect on transport through quadrupole field scan (Naoki Tamura)

Impact of density gradient on turbulence anisotropy

K.Ida, T.Tokuzawa, M.Yoshinuma

Experimental conditions:

(R_{ax}, Polarity, B_t, γ, B_q) = (3.6 m, CCW, 2.75 T, 1.2538, 100.0%)
#198663 - # 193696

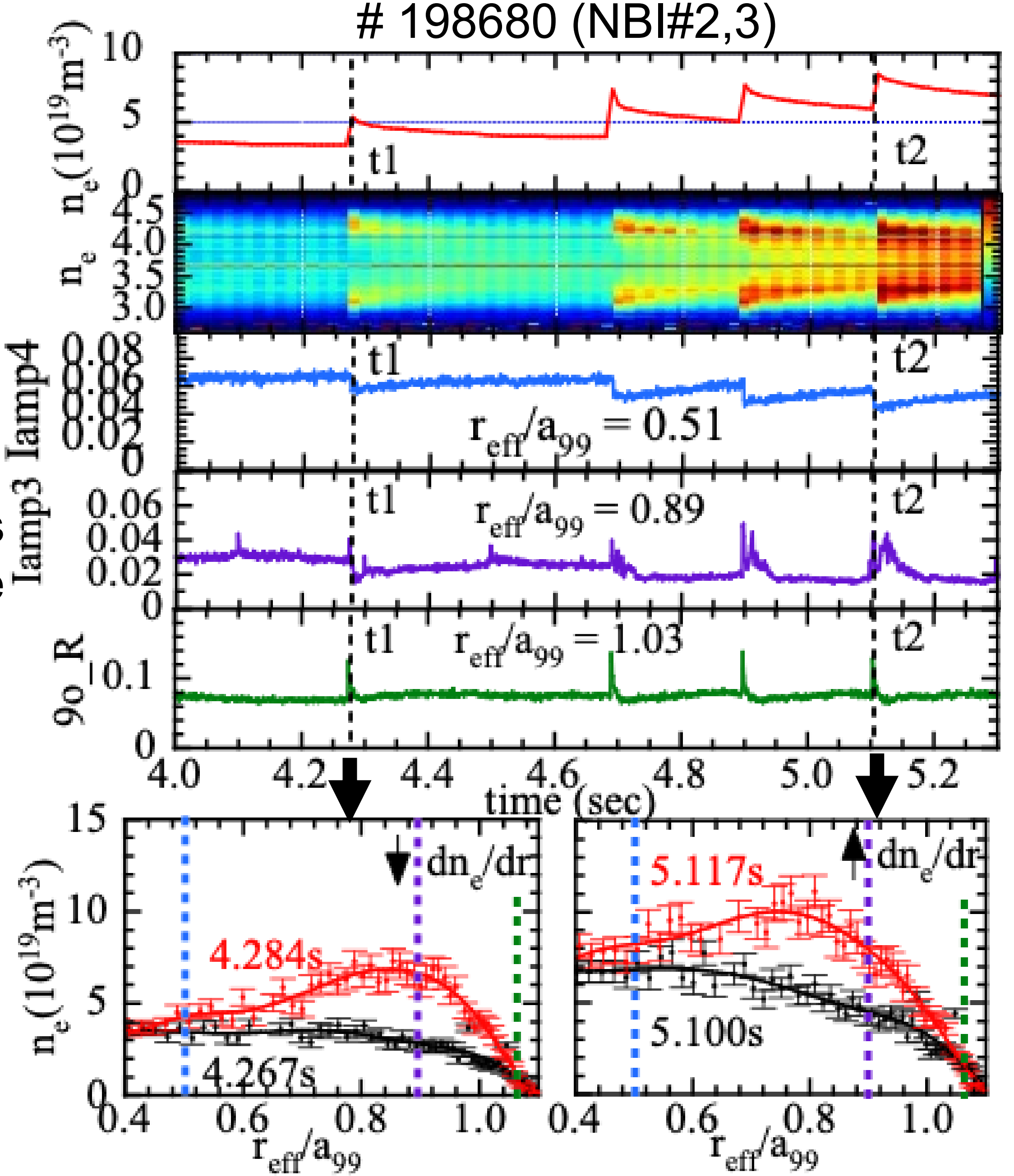
Motivation and method:

- Investigate the impact of density gradient (dn_e/dr) on turbulence using backscattering system (lamp3,lamp4)
- The density gradient is controlled by the pellet injection

Results:

- The sign and magnitude of density gradient was changed in the density ramp-up discharge with multiple pellets and position of lamp3 was scanned.
- The turbulence in the core (r_{eff}/a_{99}=0.51) always drops by pellets.
- The turbulence near the edge(r_{eff}/a_{99}=1.03) always increase by pellets.
- The turbulence near the peak (r_{eff}/a_{99}=0.89) was reduced at t=t1 (4.284sec) associated with the decrease of dn_e/dr.
- In contrast, the turbulence was enhanced at t=t2 (5.117sec) associated with the increase of dn_e/dr.

198680 (NBI#2,3)



Assessment of geometrical effect on transport through quadrupole field scan

(N. Tamura[1], H. Yamada[2], K. Tanaka[2], T. Tokuzawa[2], K.Y. Watanabe[2], K. Nagaoka[2]: [1]IPP, [2]NIFS)

Magnetic configurations & Shots

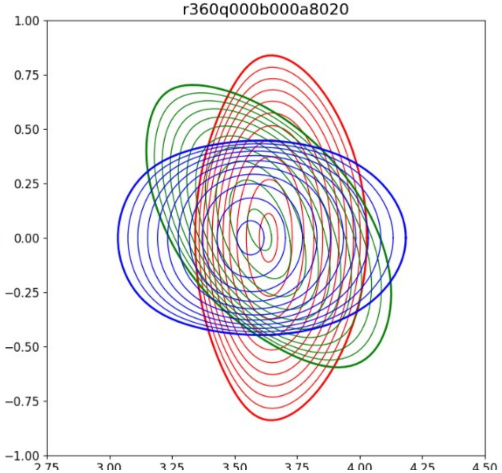
(R_{ax}, Polarity, B_t, γ, B_q) = (3.6 m, CCW, 1.375 T, **1.1739**, 100.0%) #198697 - #198735 (39 shots)

(R_{ax}, Polarity, B_t, γ, B_q) = (3.6 m, CCW, 1.375 T, 1.2538, **0.0%**) #198736 - #198775 (40 shots)

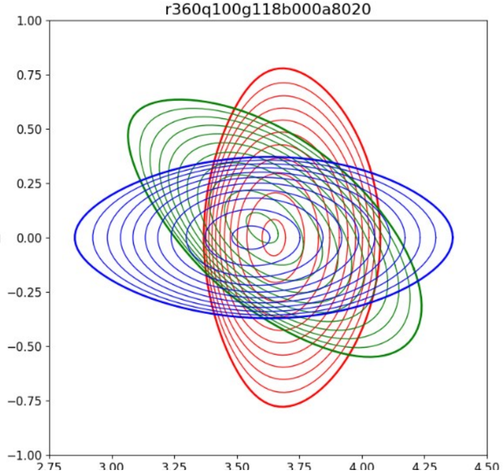
Background & Motivation

- The study on the assessment of geometric effects due to elongation on transport was conducted during the previous LHD experimental campaign, utilizing significantly more sophisticated diagnostics and tools than those employed in the 2003-2004 preliminary studies.
- This time, the experiments were conducted with the objective of acquiring data under strong heating conditions, which had not been obtained previously
- Elongation κ can be controlled from 0.8 to 1.4 by changing Bq = 200% - 0%

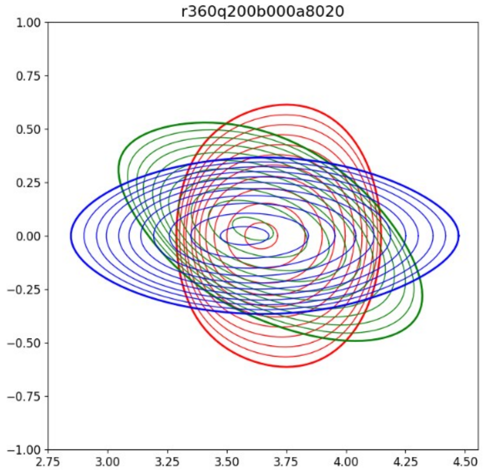
B_q=0%
κ = 1.4
γ = 1.25



B_q = 100%
κ = 1.4
γ = 1.17



B_q = 200%
κ = 0.8
γ = 1.25



Target on this day: Re-run at Bq = 100% (standard, but low g) and 0% (prolate)

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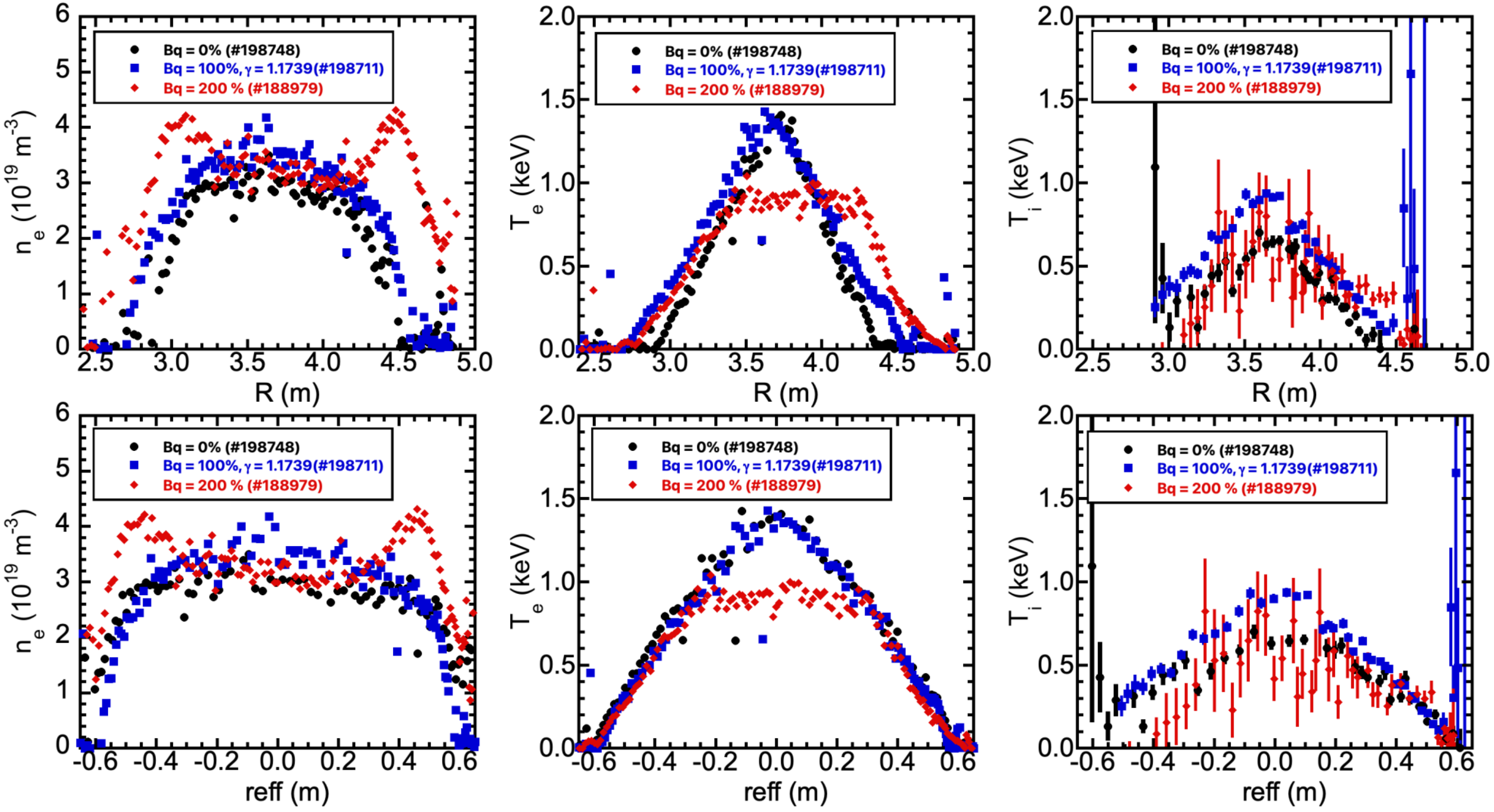
Results:

- Dataset missed in the previous experimental campaign (**3 x NBI-heated case**) was successfully obtained in each config.
  - ✓ e.g.: Comparison in the ne_bar of ~ 2.5 x $10^{19}m^{-3}$ case is shown below (new data: **black** and **blue**)



Density fluctuation data with a refined setting were also reobtained

→ The acquired data will accelerate documentation of geometric effects in confinement and transport