

Daily Report for 2025-12-16

R. Seki

Date: December 16, 2025

Time: 10:00 – 17:15

Shot: 199366 – 199503 (138 shots)

Prior wall conditioning: No

Divertor pump: ON (6l off)

Gas puff: H₂, Ne, Ar

Pellet: TESPEL, Impurity pellet

NBI: #1, #2, #3, #4, #5

ECH: 2-OUR (77GHz), 5.5-UO (77GHz), 2-OLL (154GHz), 2-OUL (154GHz)

ICH: No injection

Topics

1. Effect of low-Z powders on tungsten transport (A. Bortolon, F. Nespoli, S. Masuzaki)
2. Effect of boron impurity powder injection on tungsten impurity transport in the LHD core plasma (T. Oishi, S. Masuzaki)
3. Investigation of density limit and improved confinement regime in high density regime (K. Tanaka)
4. Detachment/reattachment cycles (R. Ishikawa)

Effect of B powder on W transport – $R_{ax} = 3.55$ m

Experimental conditions:

$(R_{ax}, \text{Polarity}, B_t, \gamma, B_q) = (3.55 \text{ m}, \text{CW}, 2.79 \text{ T}, 1.2538, 100.0\%)$

#199367 - #199395

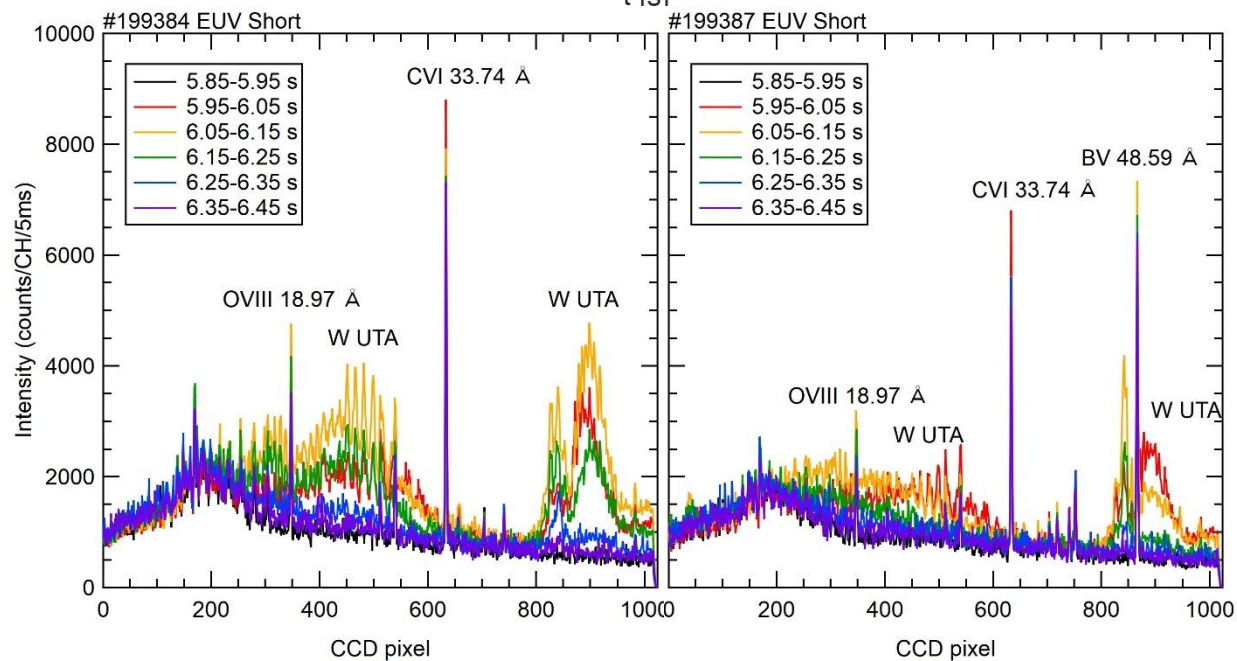
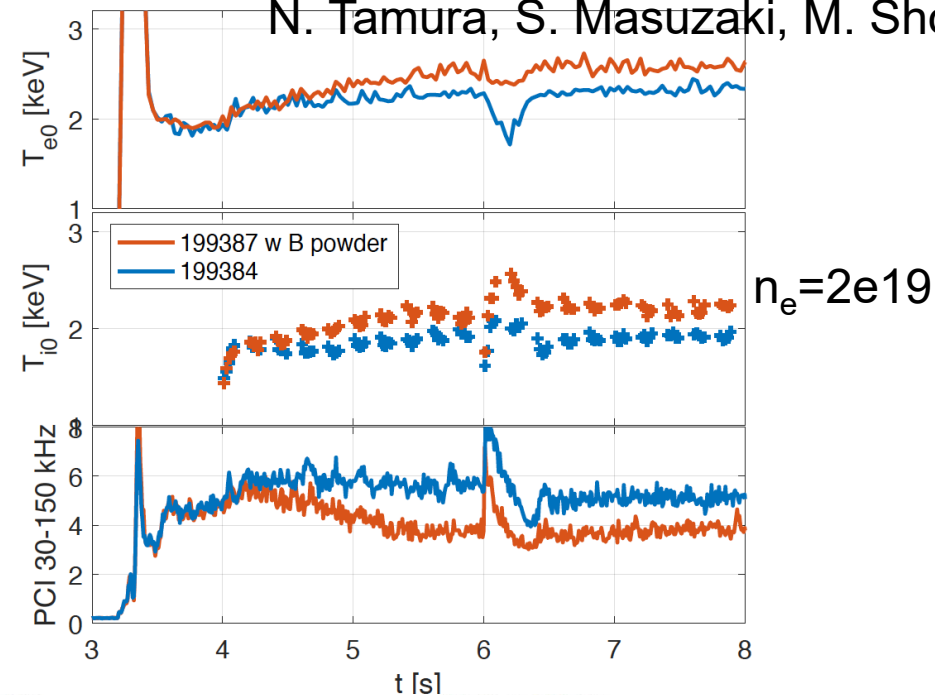
Motivation and method:

- Injection of low-Z powder observed to increase high-Z impurities transport
- Evaluate this effect for W at $R_{ax}=3.55\text{m}$, where turbulence should be more important and effect of B powder stronger
- W source: impurity pellet and TESPEL

Results:

- W impurity pellet injection did not work
- Only a few W TESPEL available
- Still, good data of W TESPEL with/without B powder for two different densities, to compare with experiment later the same day at $R_{ax}=3.6$ m (T. Oishi)
- Data collected for effect of different powders at $R_{ax}=3.55$ m

A. Bortolon, F. Nespoli, T. Oishi,
N. Tamura, S. Masuzaki, M. Shoji



Effect of B powder on W transport – $R_{ax} = 3.6$ m

T. Oishi, F. Nespoli, N. Tamura, S. Masuzaki,
M. Shoji, M. Goto, R. Ishikawa

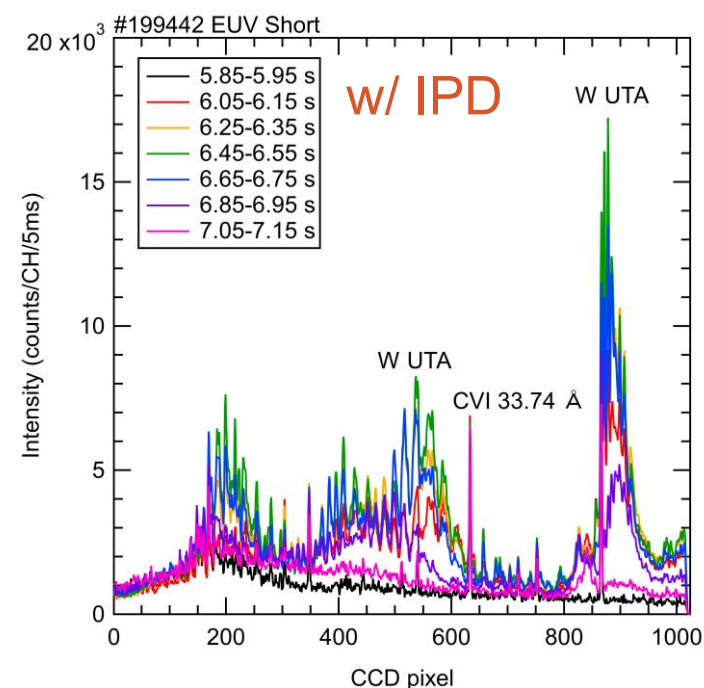
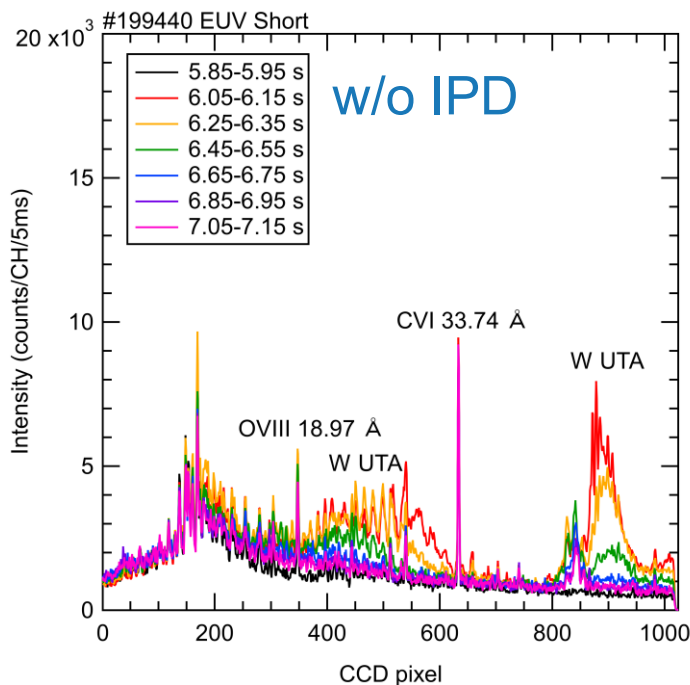
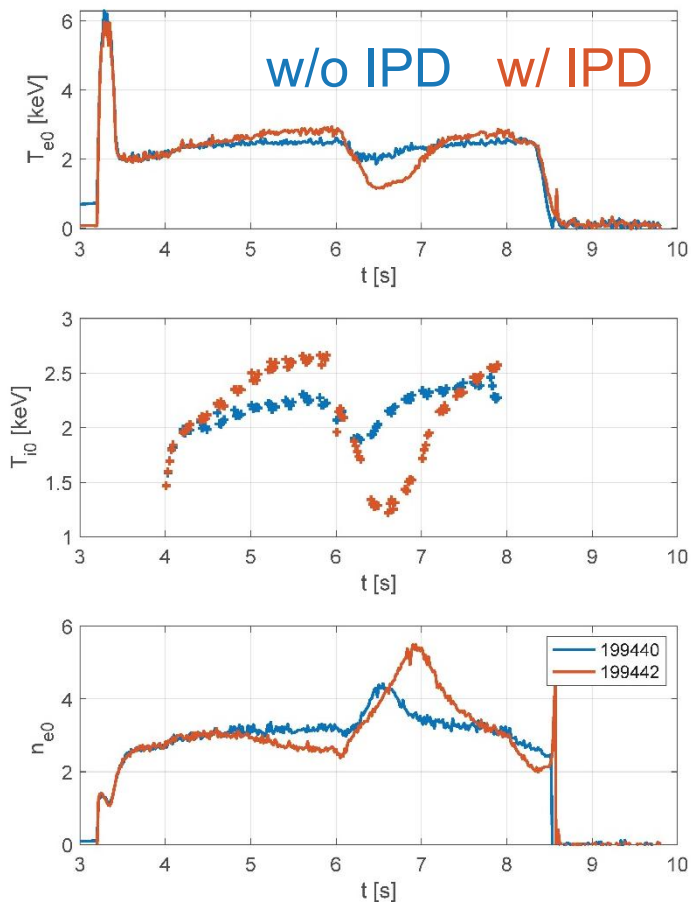
Experimental conditions: (R_{ax} , Polarity, B_t , γ , B_q) = (3.6 m, CCW, 2.75 T, 1.2538, 100.0%) #199431 - #199450

Motivation and method:

- Observation on enhancement of high-Z impurities transport by low-Z powder injection
- B-IPD (for 4-7 s), W-TESPEL (at 6 s)

Results:

- ($n_e = 1, 2, 3 \times 10^{13} \text{ cm}^{-3}$) \times (w/, w/o TESPEL) \times (w/, w/o IPD) data set were obtained.
- The perturbation on the plasma caused by TESPEL varied with the presence or absence of IPD. In discharges with IPD, the tungsten confinement time appeared to be longer.



Density limit and improved confinement in high density regime

K.Tanaka, H. Okuwada (Kyushu Univ.)

Experimental conditions:

$(R_{ax}, \text{Polarity}, B_t, \gamma, B_q) = (3.55 \text{ m, CCW, 2.78 T, 1.2538, 100.0\%)$

#199397- #199412

$(R_{ax}, \text{Polarity}, B_t, \gamma, B_q) = (3.6 \text{ m, CCW, 2.75 T, 1.2538, 100.0\%)$

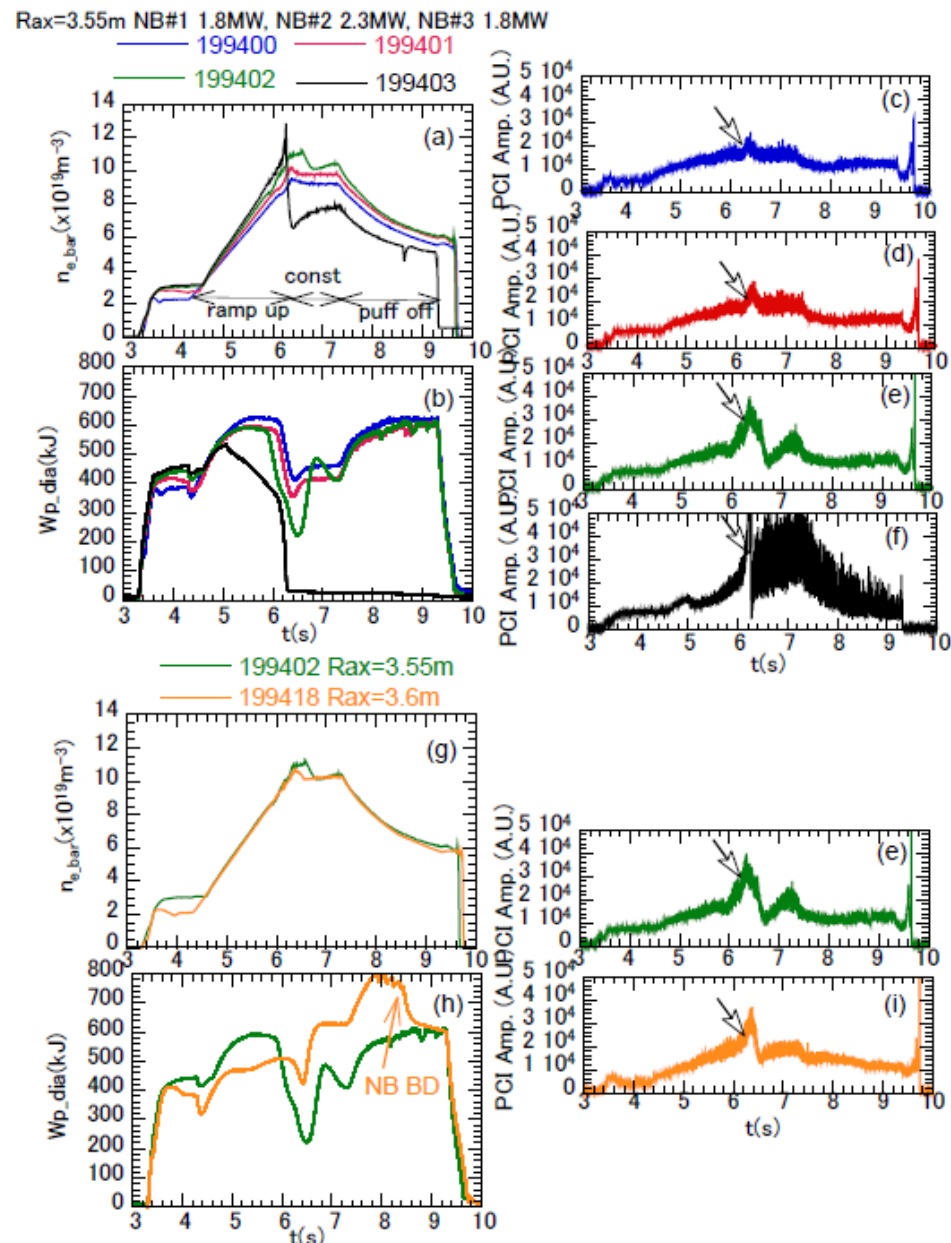
#199413 - #1999429

Motivation and method:

- The purpose is understanding of physical mechanism of density limit from the view point of turbulence.
- We observed the density ramping up, remaining constant and decaying after puff-off, in order to determine the density limit. Flat top constant density was scanned.

Results:

- There are some indication of increase of turbulence as a precursor of radiation collapse.
- Highest density is almost identical at $R_{ax}=3.55\text{m}$ and 3.6m , however, the recovery (reheat) is clearly higher at $R_{ax}=3.6\text{m}$



Detachment/reattachment cycles

R.T. Ishikawa, M. Kobayashi, M. I.N. Kobayashi, & K. Nagaoka

Experimental conditions:

$(R_{ax}, \text{Polarity}, B_t, \gamma, B_q) = (3.85 \text{ m}, \text{CCW}, 2.5714 \text{ T}, 1.2538, 100.0\%)$
#199451 - #199503

Motivation and method:

- Thermal Instability may play an important role in the detachment transition.
- We used LID current and gas puff (density ramp-up/ Ne / Ar) to realize the detachment transition.

Results:

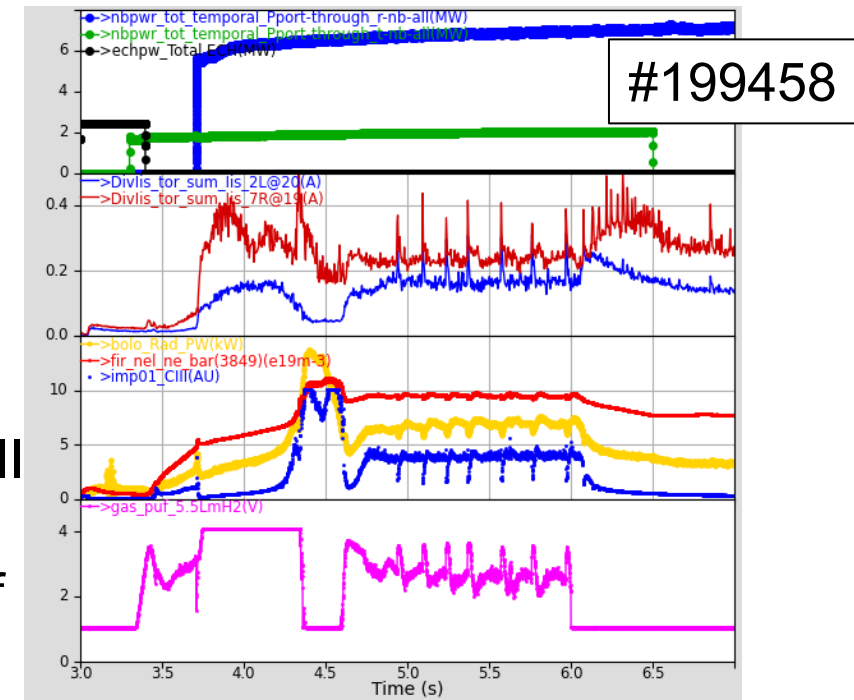
- Sudden increase of Ne and radiation and following bursty behavior were observed in #199458, but not in #199460.
- Detachment/Reattachment transitions with Ne /Ar impurity gas puff were also examined with different heating patterns. We will analyze them to understand the relation between the detachment/reattachment and thermal instability.

Heating

Div lis

Ne (fir)
Prad, CIII

Gas puff



Heating

Div lis

Ne (fir)
Prad, CIII

Gas puff

