

(TC) Transport and Confinement Report



June 4, 2024 (M. Nishiura)

Date: May 31, 2024

Time: 14:15 - 15:30

Shot#: 192454 – 192476 (23 shots)

Prior wall conditioning: No

Divertor pump: ON

Gas puff: H₂

Pellet: No

NBI#(1, 2, 3, 4, 5)=gas(H, H, H, H, H)=P(-, -, -, -, -)MW

ECH(77GHz)=ant(5.5-Uout (or 1.5U), 2-OUR)=P(698, 380)kW

ECH(154GHz)=ant(2-OLL, 2-OUL, 2-OLR)=P(705, 806, 982)kW

ECH(56GHz)=ant(1.5U)=P(-)kW

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

Topics

1. Diagnostics of relativistic electrons by Thomson scattering in high electron temperature plasmas (H. Funaba)

Diagnostics of relativistic electrons by Thomson scattering in high electron temperature plasmas (H. Funaba)

Experimental conditions:

1. $(R_{ax}^{VAC}, \text{Polarity}, B_t, \gamma, B_q) = (3.55 \text{ m}, \text{CCW}, 2.7887 \text{ T}, 1.254, 100.0\%)$
(# 192454- #192476)
ECH power: 3.57 MW, typical $n_e < 3 \times 10^{18} \text{ m}^{-3}$

Background and Purposes:

- (1) Measurement of non-Maxwellian distribution of electron velocity by polychromators with more channels and anisotropy by the forward scattering
- (2) In the previous experiment in 24th cycle, the forward scattering configuration was not available. 100 signals in 5 ms by the 20 kHz laser were averaged for improvement of S/N ratio. T_e was more than 15 keV in $R_{ax} = 3.60 \text{ m}$, $B = 2.85 \text{ T}$.
- (3) In this cycle, Laser #4 (new 30Hz, 1.6J) was used simultaneously with Laser #2 (30 Hz) to increase signal intensity. Forward scattering was tried. Polychromators with 9 ch. and 12 ch. were used. On the other hand, the 20 kHz laser was not available.

Results:

Low electron density plasmas of $n_e < 3 \times 10^{18} \text{ m}^{-3}$ were produced by ECH. Fig. 1 shows an example of T_e profiles (#192472). The charge-integrated signals are averaged in time (4.5 – 4.9s, 13 signals). The central T_e seems to be higher than 20 keV. The backward scattering configuration is not suitable for $T_e > 20 \text{ keV}$. The signals in the forward scattering configuration were also quite small and averaging is needed .

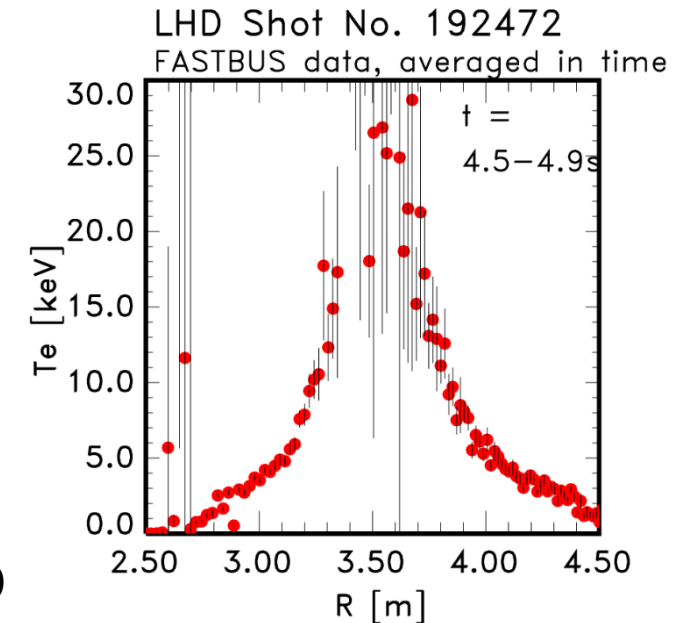


Fig. 1. Electron temperature profile of an ECH plasma. The charge-integrated signals are averaged in time (4.5 – 4.9s, 13 signals). Laser #2 and Laser #4 were operated simultaneously.