(SG2) Tronsport and Confinement Report

May. 15, 2024 (A. Shimizu)

Date: May. 14, 2024
Time: 10:30 - 16:45
Shot#: #191050 – #191165 (116 shots)

Prior wall conditioning: YES
Divertor pump: YES
Gas puff: H2
IPD: OFF
NBI#(1, 2, 3, 4, 5)=gas(H, H, H, H, H)=P(4.5, 4.1, 4.2, 4.0, 4.6)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, 889, 982)kW
ECH(56GHz)=ant(1.5U)=P(-)kW
ICH(3.5U, 3.5L, 4.5U, 4.5L)=P(0.0, 0.0, 0.0, 0.0)MW

Topics

1. Magnetic configuration effects in anomalous transport (K. Tanaka)
2. Heating power dependence of heat transport (R. Ishikawa)

Configuration effect in anomalous transport K. Tanaka (NIFS), H. Sakai (Kyushu Univ.)

Motivation

Understanding of configuration effects in anomalous transport is the most important issue for the design of next generation helical devices. We investigate configuration effects in anomalous transport experimentally.

Metrology

Density scan and heating power scan were performed at Rax=3.53, 3.6 and 3.75m.

#191050-191082 Rax=3.53m, Bt=2.8T
#191106-191126 Rax=3.6m, Bt=2.75T
#191146-191165 Rax=3.75m, Bt=2.64T

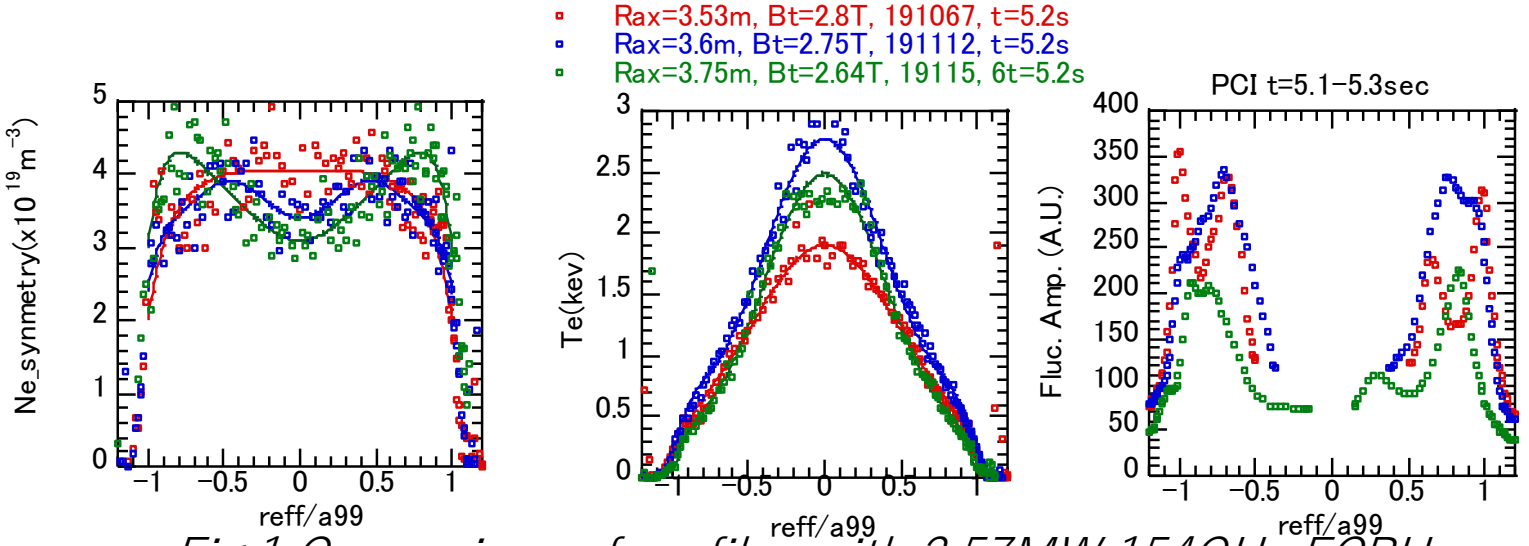
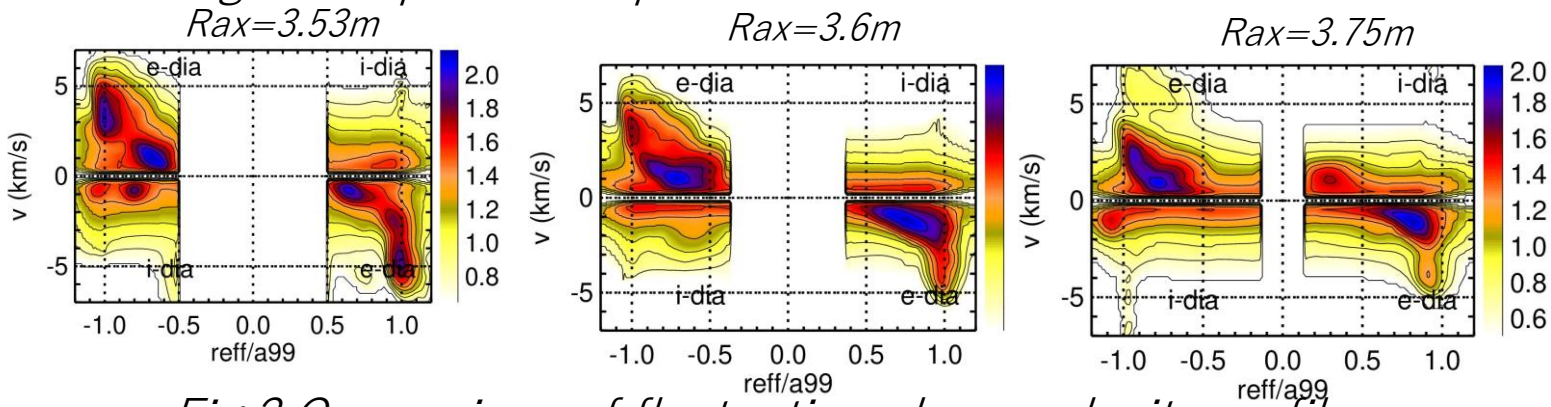


Fig.1 Comparison of profiles with 2.57MW 154GHz ECRH



Fig,2 Comparison of fluctuation phase velocity profile

Results

Figure 1 and 2 shows comparison of profiles at three configurations. Neoclassical transport is likely to be lowest at Rax=3.53m, however, achieved Te is lowest at Rax=3.53m. Density profiles is hollower at more outwardly shifted configuration. Electron diamagnetic propagation direction of turbulence suggest that dominant instability is resistive interchange turbulence (Kinoshita PRL2024). Edge turbulence (reff/a99>0.9) is the highest at Rax=3,53m, but core turbulence (reff/a99=0.5~0.7)is the highest at Rax=3.6m.

Heating power dependence of heat transport

R.T. Ishikawa & K. Nagaoka (NIFS)

Background and objective

- In previous experiments, parameters that dominate the ion-heat transport by multi-regression analysis (Nishimoto et al. 2024).
  They found that the geodesic curvature is the most important parameter.
  The second one is Te/Ti which is not a controllable parameter.
- Our purpose is to use the heat-power ratio Qe/Qi instead of Te/Ti.

Experimental Condition

- #191084-191102 (19 shots): Rax=3.60 m, *B*=2.75 T
- #191127-191144 (18 shots): Rax=3.75 m, *B*=2.64 T

Results

- We performed density scans and heating power scans around the ITER regime (low collision frequency and electron heating dominant) as well as more collisional regimes.
- The temperature ratio decreases as the collision frequency increases, while the opposite trend appears in the less collisional regime.
- We will investigate the effect of the different heating power ratio.