

§30. The Multipulse and Multipoint YAG Thomson Scattering Measurement on CHS

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Thomson scattering is a popular method for the measurement of electron density and temperature profiles of plasmas. We have constructed new YAG Thomson scattering system on CHS. One of the merits of this system is multipoint measurement with high repetition rate [1].

YAG Thomson system on CHS has five Nd:YAG lasers. Each of lasers can be fired with repetition rate of 50 Hz (20msec). Figure 1 shows beam merging system of lasers. Each laser beam is reflected by elliptic mirror, which is formed on an AR-coated glass at the position in front of the laser exit. The mirror for each laser has the different position on the glass. The other lasers go through the glass. Therefore five lasers are combined. When we use all lasers successively at even intervals, the repetition rate is 250 Hz, and the time resolution is 4 ms. When we use all lasers in rapid succession, the maximum repetition rate is about 50 kHz, and the time resolution is 20 μ sec, which is determined by the read-out time of an ADC. Since we use 24 ch. Polychromator, we can measure 24 spatial points simultaneously. Because we detect the back scattered light, a spatial resolution is about 4 cm in the inner region of the torus and about 1.5 cm in the outer region

Figure 2 shows a typical example of the temporal evolution of the electron temperature (T_e) and the electron density (n_e) profiles of CHS plasmas. Because of using five lasers, the time resolution was 4 msec. The plasma was produced by ECH (0.4MW) between 8-38 ms and heated by NBI between 25-145 msec. The vacuum magnetic axis is at the 92.1 cm. In this case, the electron temperature was rapidly increased in ECH phase. And in NBI phase, the temperature was decreased

slowly as the electron density increased. The electron temperature profile is nearly parabolic, while that of the density is hollow.

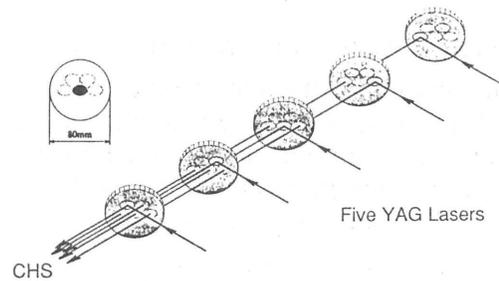


Fig. 1. The schematic diagram of the beam packing mirrors for five lasers.

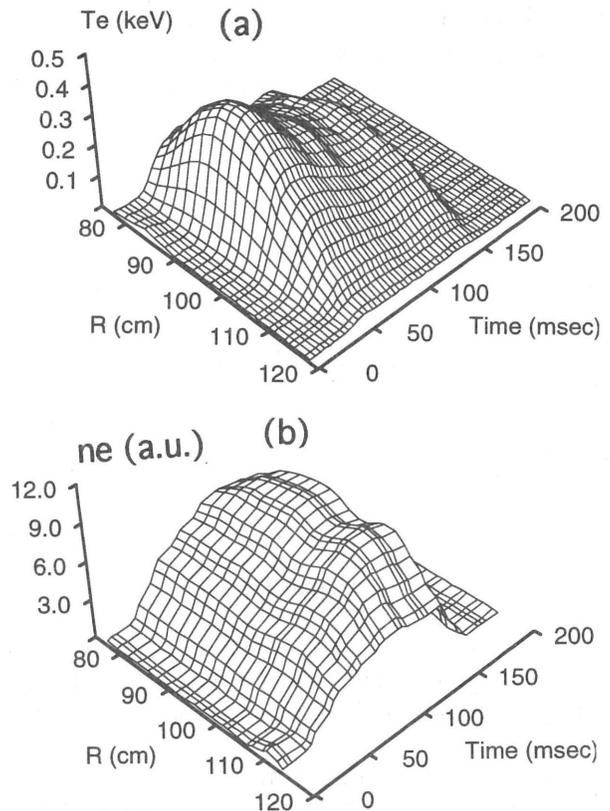


Fig. 2. The typical example of T_e and n_e measured with the YAG Thomson scattering system.

References

- 1) Narihara, K., et al., Rev.Sci.Instrum., to be published (1995)