§11. Thomson Scattering for JIPP T-IIU

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Continued efforts were paid to improve the performance of the Thomson scattering system installed on the JIPPT-IIU tokamak. Controlling the surrounding temperature of the YAG laser resulted in a stable operation of the system yielding almost routinely the electron temperatures at 28 points along the vertical line every 10 ms. Nevertheless, we have some unsettled problems, one of which is systematic errors in the deduced electron temperatures T_e and density n_e. We examined possible sources of the errors such as (1) the variation of responsivity of Si- avalanche photo diode (APD) due to the surrounding temperature variation; (2) the non-linear response of the detectors in the presence of high level of background plasma light; (3) differences in the responsivity for fast signal (scattered signals of 30 ns width) and for slow signal(calibration signals of 30 ms width) ; (4) slight difference in optical alignment at the calibration and at the scattering measurement. Although some improvement was achieved by (1) controlling the surrounding temperature of the APD and by (2) refinement of the laser beam alignment, no drastic change was observed. We often observed that the stray light signals drop at current disruptions when plasma light intensity increases greatly. This indicates that the responsivity decreases as the background light increases due to the drop of the bias voltage. Several ways are now under consideration to keep the bias voltage constant and monitor the responsivity of the APDs during plasma discharge.

As an example, Fig.1 shows the temporal evolutions of Te and ne of an ohmically heated plasma which was He-gas-puffed strongly.

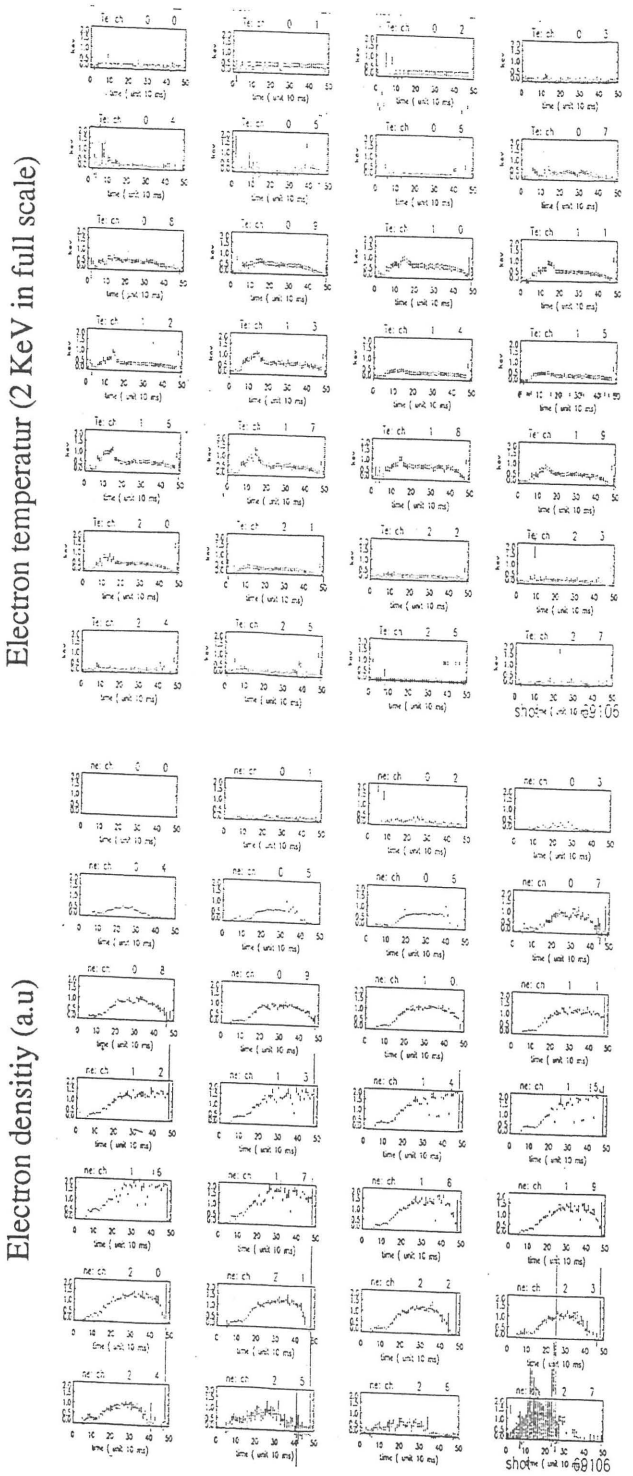

Fig.1. Temporal evolutions of T_e and n_e of an ohmically heated plasma which was He-gas puffed strongly. The ch1-ch28 see scattering volumes along a vertical line with 15 mm interval. The ch15 is situated at the center.