

# LHD トムソン散乱計測における前方散乱による電子温度空間分布計測 Measurement of Electron Temperature Spatial Profiles from Forward Scattering Configuration in the LHD Thomson Scattering System

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In order to measure the higher electron temperature up to more than 50 keV, the new forward scattering configuration was installed for the Thomson scattering diagnostic system on the Large Helical Device (LHD) [1].

The original Thomson scattering system on LHD has the backward scattering configuration with the scattering angle of  $167^\circ$  [2, 3]. The Thomson scattered light is spectroscopically analyzed by the interference filters and detected by the avalanche photo diode (APD) detectors in the polychromators. Each polychromator has the 5 wavelength channels. The Thomson scattering signals from the polychromators are presently detected by the charge-integration type analog-to-digital convertor (ADC) (FAST-BUS LeCroy 1881M), which can detect the signals with the minimum temporal interval of 2 ms.

In the new forward scattering configuration system, the laser light is reflected in the optical delay path after the backward scattering measurement and injected again to the plasma. The scattering angle in the forward scattering configuration is  $13^\circ$  ( $= 180^\circ - 167^\circ$ ). In the first experiment of the forward scattering measurement, the both of the backward and forward scattering signals were observed by high speed oscilloscopes. Since the length of the optical delay path is 30 m, the interval of the two signals of the backward and forward Thomson scattering is about 100 ns.

As the minimum detection interval of the present detector (FAST-BUS) is longer than the delay time of the forward scattering signal from the backward scattering signal, it is impossible to detect the both backward and forward scattering signals separately by the FAST-BUS. Therefore, a new detector system which will mainly detect the forward scattering signals is prepared. The new detector system also consists of the charge-integration type AD convertor (CAEN V792), which has 32 charge-to-digital conversion channels in 1 module. They are controlled by the VME controller (CAEN V2718). Since 1 module of this type detector is prepared now, the maximum number of spatial points where the forward scattering measurement will be operated is 6 at present. Although this number may be small for the profile measurement of the electron temperature and density, the number of the spatial position will be increased when more detection modules are installed.

## References

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