Contribution ID : **118** Type : **not specified**

12.43 154 GHz Collective Thomson Scattering (CTS) diagnostic for H and D plasmas in LHD

Wednesday, 18 April 2018 20:31 (120)

CTS diagnostic is a strong tool to measure the ion temperature, fast ion distribution function, and fueling ratio. We have already developed the 77 GHz CTS system, and reported that the obtained CTS spectra responded reasonably according to the ion temperature. The CTS spectrum originated from fast ion is also compared with the simulation result. The result explained the anisotropy of CTS spectrum caused by fast ions. However, the probe beam with the frequency of 77 GHz begins to deflect and cut off by the electron density below 10^{20} m^{-3}. Therefore, new 154 GHz CTS system has been developed with the probe and receive beam with the frequency of 154 GHz. The CTS receiver is a type of heterodyne detection. The RF side containing a notch filter and a mixer, and a local oscillator of the 77 GHz CTS system are replaced with the components for 154 GHz system, and the components of the intermediate frequency side remains. Although the signal level for 154 GHz scattered radiation is much lower than that for 77 GHz one from the theoretical calculations, we could obtain the CTS spectra for 154 GHz successfully. In the rich D or rich H plasma, the experimental CTS spectrum for D ions is broader than that for H ions with the ion temperature of 1keV. zThe result is attractive for a react

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Session Classification : Session #12, Wednesday Night Poster Session