

Commissioning and first results of the 174 GHz collective Thomson scattering diagnostic at Wendelstein 7-X

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Collective Thomson Scattering (CTS) diagnostics measure the scattering spectrum of monochromatic incident radiation off collective fluctuations in the plasma. In this contribution, we present the first results from the upgraded CTS diagnostic at Wendelstein 7-X (W7-X) operating in the frequency range between 172 and 176 GHz. This frequency range allows minimizing noise originating from the electron cyclotron emission in the plasma. Consequently, the good signal-to-noise ratio allows for fast ion measurements or bulk plasma parameters measurements with higher temporal resolution compared with the previously used 140 GHz system.

In this contribution, we present the first results from the CTS measurements in the W7-X plasma, as well as a characterization of the 174 GHz CTS receiver.

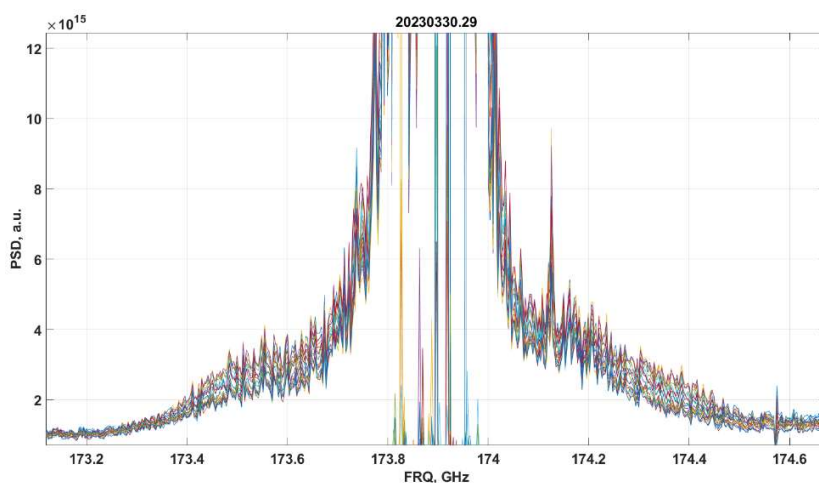


Figure 1. Example of thermal CTS spectra from W7-X discharge 20230330.29 with 3ms exposure time. Here a total of 22 thermal CTS spectra are presented, covering the plasma discharge phases with and without ICRF heating.

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