



Contribution ID: 74

Type: **Oral**

Oral_10: Advances in ITER Thomson scattering diagnostic systems

Tuesday, 7 September 2021 15:00 (30 minutes)

Thomson scattering (TS) is a proven diagnostic technique that will be implemented in ITER in three independent systems. The Edge TS will measure electron temperature T_e and electron density n_e profiles at high resolution in the region with $r/a > 0.8$ (with “a” the minor radius). The Core TS will cover the region $r/a < 0.85$ and shall be able to measure electron temperatures up to 40 keV. The Divertor TS will observe a segment of the divertor plasma more than 700 mm long and is designed to detect T_e as low as 0.3 eV.

The three systems are at different design stages and subject to different constraints, however they can share a number of innovative technical solutions. Results of R&D conducted for one system are often useful for another one.

The outcomes of several recent developments are presented, namely design and testing of laser sources, laser beam dump, shutters, plasma facing mirrors with mirror cleaning systems and spectrometers, optimization of injection optics, collection optics and calibration techniques. Ongoing R&D activities including neutron and gamma irradiation tests on optical components, together with the challenges still remaining, are summarized.

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