Contribution ID: **87** Type: **Posters**

The calibration features of Thomson scattering diagnostics for ITER divertor

The Thomson scattering (TS) diagnostics for ITER divertor will operate using a number of optical elements placed inside the vacuum chamber. The survival of front-end optical components has been discussed since the ITER project started. Nevertheless, no solution guaranteeing operational stability of all in-vessel optical components in ITER has been found up to now.
Because of possible degradation of in-vessel optic spectral transmission resulting in the TS spectra distortion and following inaccuracy in ne and Te measurements, the repeated recalibrations are required during operational lifetime. Relative calibration of spectral channels sensitivity is usually performed with a blackbody radiation source illuminating all or more frequently only part of the collection optics. Two calibration methods are being proposed for the ITER divertor TS system: a) a diffuser or retroreflector array with internal light source or back illumination scheme [1] and b) the Raman scattering on the gas target. The latter is discussed in this report.
Raman scattering on different gases is a technique routinely used for calibration in a number TS system in the world [2-5]. This technique gives possibility to measure collection optics transmittance for all working spectral range. The main problem for implementation this technique in ITER is that the application of usually used nitrogen will be probably restricted since any off-nominal gases in ITER may be taboo. The comparable assessment of the calibration technique for the use of nitrogen, hydrogen and deuterium is fulfilled with a view of implementation for divertor TS calibration.

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