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## Calibration of Polarimetric Thomson scattering by depolarization measurements of Raman scattering on Nitrogen

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The absolute calibration in Thomson Scattering (TS) systems is done usually by measuring the scattered light by a gas like Nitrogen or Hydrogen at a given pressure[1,2]. The Raman lines of Nitrogen or Hydrogen are used to avoid the stray light at the laser wavelength. Since the measured signal can be accurately calculated knowing the cross section from this signal the spatial emission profile of the laser is deduced. The same concept is used in the Polarimetric Thomson Scattering where the depolarization of scattered light is measured to deduce the temperature of plasma. In this case the depolarization of Raman light can be measured and since this is precisely known the calibration can be deduced. This paper describes the project of the calibration of the Polarimetric Thomson Scattering system on FTU. Preliminary Raman depolarization measurements are done in laboratory to determine the level of the signal available, using a prototype polarimeter. These measurements can be helpful also in characterising the polarimeter to be used in the Raman calibrations measurements of on the TS system on FTU[3]. The results of Raman depolarisation measurements and the deduced figures of the polarimeter are reported. Therefore the project of the Raman depolarization measurements on FTU TS is described: the lay-out of the calibration system (which includes the polarimeter characterised in laboratory) is detailed and the evaluation of the signal to be detected. Finally the evaluation in high temperature scenarios of FTU of the depolarisation in the Thomson scattering is discussed and the signal to be detected is calculated.

1. Penney C M, St Peters R L and Lapp M 1974 Absolute rotational Raman cross section for N<sub>2</sub>, O<sub>2</sub> and CO<sub>2</sub> J. Opt. Soc. Am. 64 712 ;
2. Röhr H 1981 Rotational Raman scattering of hydrogen and deuterium for calibrating Thomson scattering devices Phys. Lett. A 81 451-3
3. F Orsitto, A Brusadin, E Giovannozzi, D Santi, R Bartiromo, P Pizzolati, Thomson scattering system on FTU tokamak: Calibration, operation, results, Review Scientific Instruments 66(1995)1167; Thomson-scattering diagnostic on the Frascati tokamak upgrade, Applied Optics 34(1995)2712

### Summary

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