

# Intracavity laser probing in Thomson scattering diagnostics of plasma

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Thomson scattering diagnostics is a main and most reliable tool for electron temperature measurements in fusion plasma experiments. The diagnostics has to employ a high power laser for probing plasmas because of a very low cross section of the Thomson scattering. This restricts the diagnostic capabilities – the sensitivity and/or repetition rate of the electron temperature measurements.

A new approach to laser probing for Thomson scattering developed in Ioffe Institute removes substantially these restrictions. The approach is based on two principles:

1. laser beam scans the plasma volume many times (multipass probing)
2. the plasma volume is placed in the laser resonator cavity (intracavity probing).

The approach multiplies significantly the laser probing energy and allows multipulse laser operation at a high repetition frequency.

The report concerns with the basic principles of the approach and its application to Thomson scattering in the FT-1 and FT-2 tokamaks of Ioffe Institute. A similar system has been designed recently for the TV Thomson scattering of TEXTOR tokamak. Essential features of the TEXTOR laser system and its test results are also discussed in the report.