the method of thomson scattering diagnostics signal aqcuisition and processing [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2020.47.1.212

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Thomson scattering diagnostics is one of the crucial techniques of high temperature plasma measurement, which provides local electron temperature and concentration. Information about spatial distribution dynamics of plasma kinetic parameters is essential for plasma heating and confinement research and theoretical modelling.

Thomson scattering provides passive well-localized diagnostics of plasma electron component. Doppler broadening alters spectrum of laser radiation, scattered by moving electrons. Scattered spectrum width contains electron temperature, while overall intensity carries information about their concentration. Robust physical meaning of resulting data is balanced by complicated technical solutions: the cross-section of Thomson scattering process requires weak optical signal registration under intense plasma backlight. Common practice is employing high peak pulse power lasers (~GW) and sensitive photodetectors with dynamic range enough to resolve low signal with strong background level.

The Globus-M2 spherical tokamak is equipped with equatorial Thomson scattering diagnostics, based on band-pass filter polychromators with a few spectral channels optimized for a certain plasma temperature range. Each spectral channel is equipped with ultra-low noise high-speed detection system and 1024-cell analog memory array. Such a device captures and digitalizes the high-frequency part of the signal with 1, 2 or 5 GS/s rate. Oscilloscope recording retains detailed information about the shape of the scattered radiation signal, enabling any processing algorithms.

Estimation of inaccuracy in the resulting electron temperature and concentration is an important calculations part. This poster provides noise composition and distinguishing analysis. Also, this poster contains the developed algorithm and demonstrates the results of calculations for ohmic mode and neutral beam injection in tokamak discharges.

The work was funded by Ioffe institute under contracts 0034-2019-0001 and 0040-2019-0023. The experiments were carried out using the Unique Scientific Facility “Spherical tokamak Globus-M”, which is incorporated in the Federal Center of Collective Use “Material science and diagnostics in advanced technology” (unique project identifier RFMEFI62119X0021)

1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVII/E/ru/JK-Zhiltsov.docx) [↑](#footnote-ref-1)