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**DIAGNOSTICS OF THE SUPRATHERMAL X-RAY RADIATION IN THE T-15MD TOKAMAK <sup>\*)</sup>**<sup>1,2</sup>Lisovoy P.D., <sup>1,2</sup>Savrukhin P.V., <sup>1</sup>Shestakov E.A., <sup>1,2</sup>Tepikin V.I., <sup>1</sup>Khramenkov A.V.<sup>1</sup>NRC «Kurchatov institute», Moscow, Russia, [Lisovoy\\_PD@nrcki.ru](mailto:Lisovoy_PD@nrcki.ru)<sup>2</sup>National Research University «MPEI», Moscow, Russia

Evolution of electron beams with suprathermal energies (20 - 300 keV) is a typical feature of experiments in tokamaks in regimes with magnetohydrodynamic (MHD) instabilities during disruption and in regimes with non-inductive current drive by Electron Cyclotron (ECCD) and Low Hybrid (LHCD) waves. Study of spatial and temporal evolution of the electron beams makes it possible to analyze physical mechanisms of MHD perturbations, including magnetic field lines reconnection, and also to estimate current drive efficiency by ECCD and LHCD. Analysis of the fast electrons evolution can be provided using multichannel tomographic systems for measurements of the x-ray radiation with suprathermal energies.

This report discusses the possibility of equipping a multi-channel diagnostic system for nonthermal X-ray radiation registration (20 - 300 keV) on the T-15MD tokamak based on CdTe Eurorad and BSI detectors. The layout of diagnostic equipment in one toroidal section in the upper (+90°), inclined (+55°, -55°) and equatorial (0°) ports for tomographic reconstruction of x-ray intensity distribution is analyzed (Fig.1a). Assemblies consisting of tube collimators made of lead with CdTe detectors, which are connected to a signal pre-amplification system (operational amplifiers with an inverting amplifier). Collimators with that design and location has a spatial resolution of up to 4-10 cm and a temporal resolution of 1  $\mu$ s. To measure x-ray intensity distribution in the toroidal direction, it is possible to rotate the collimator located in the equatorial port (Fig. 1b). To study the x-ray energy distribution, a set of spectrometric CdTe detectors from Eurorad and scintillation detection units based on LaBr3(Ce) lanthanum bromide crystals are used.

The results of testing CdTe detectors on a laboratory stand and during preliminary experiments on the T-15MD tokamak, using a diagnostic prototype, are also presented.

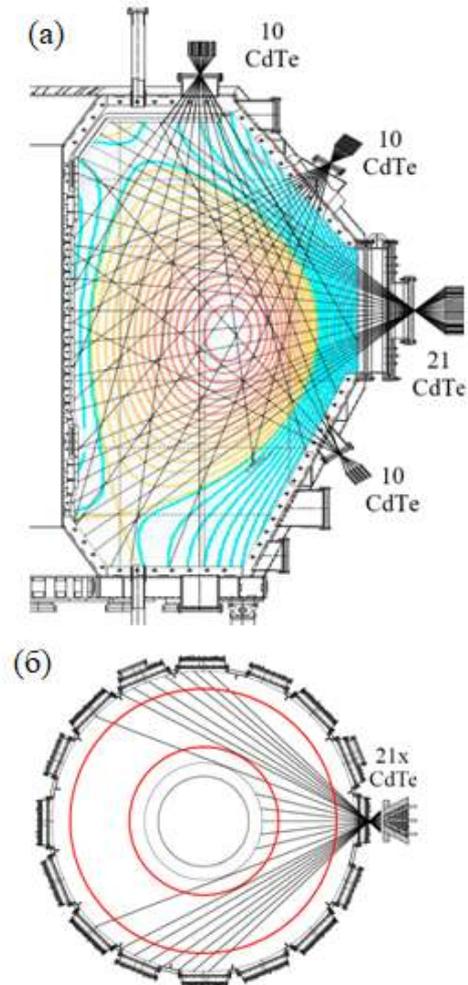


Fig.1 Schematic view of the T-15MD suprathermal x-ray diagnostic

<sup>\*)</sup> [abstracts of this report in Russian](#)