study of Runaway electrons on t-10 and t-15md tokamaks [[1]](#footnote-1)\*)

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1,2Shestakov E.A., 1,2Savrukhin P.V., 2Khramenkov A.V.

1Private Foundation SK RosAtom ITER Developing center, Moscow, Russia  
2National Research Centre “Kurchatov institute”, Moscow, Russia

Improving the reliability and economic efficiency of a tokamak reactor is one of the main tasks of thermonuclear energy. For the practical implementation of thermonuclear energy, construction of the ITER tokamak reactor is currently ongoing, aimed at testing the technologies of thermonuclear equipment and searching for optimal combustion regimes for high-temperature deuterium-tritium plasma [1].

Unfortunately, in modern experiments on tokamaks, maintaining stationary plasma regimes near the operational limits (high plasma density and pressure) is difficult due to the development of various plasma disturbances. This relates, first of all, to the development of plasma disruption instability [2], leading to the end of the discharge. The formation of runaway electron beams (E ~ 0.5–50 MeV) during the development of plasma disruption and their possible interaction with the surface of protective elements is one of the main problems in the successful implementation of the ITER project [3]. Studies of the processes of generation of runaway electron beams and the development of methods for their suppression are urgent tasks of modern research.

The report provides an overview of the diagnostic complex of nonthermal and hard X-ray radiation, developed and equipped on the T-10 tokamak, with increased time (up to 10–100 μs) and spatial (up to 2 cm) resolution, consisting of:

• multi-angle system for recording nonhermal X-ray radiation in a current mode based on CdTe detectors;

• systems of internal and external CdTe detectors with integrated spectrometric amplifiers;

• systems of multichannel scintillation LaBr3 detectors;

• systems of numerical spectrometric data analysis.

The description of the runaway electron diagnostics project for the T-15MD tokamak and the possibility of using various components of the T-10 tokamak diagnostic complex in this project are given. The plan of experimental studies of runaway electrons on the T-15MD tokamak is described.

The developed set of diagnostics of accelerated electrons for the T-15MD tokamak and the planned research program are aimed at clarifying the mechanisms of formation and suppression of accelerated electrons on the ITER tokamak to develop reliable and effective methods of their suppression.

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References

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