DEVELOPMENT OF an OPTICAL DIAGNOSTIC COMPLEX FOR inverstigation of PLASMAs of the GLOBUS-M2 tokamak [[1]](#footnote-1)\*)

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On the upgraded Globus-M2 tokamak, a toroidal magnetic field BT is up to 1 T and a plasma current Ip is up to 0.5 MA. Transport processes in spherical tokamaks under such conditions have not been studied previously. A unified diagnostic complex, which will include modernized diagnostics of radiation losses Prad, effective ion charge Zeff, new diagnostics of electron temperature Te, and spectroscopic diagnostics, is being created to compile a picture of impurity transport at the Globus‑M2 tokamak.

Zeff on the tokamak is determined using the intensity of bremsstrahlung which is collected along one observation chord [1]. The modernization of the diagnostics involves increasing the number of chords and spectral intervals for detecting bremsstrahlung. The existing diagnostics of Prad [2] has some disadvantages that notably limit the study of instabilities and needs to be improved. A complex for measuring two-dimensional distributions of Te and Prad based on two arrays of 3x24 SPD photodiodes [3] has been developed. The difference of the new measurement system of Prad from the old one is that all the observation chords will lie in one poloidal section, which will reduce the number of channels in a data acquisition system and let us apply a more accurate and simple method of reconstruction. Te will be determined from ratio of the power of radiation in a spectral region of the soft X‑ray passing through beryllium filters of different thicknesses. The spectroscopic diagnostics, consisting of a wide spectrum spectrometer and the discrete monochromators, recording individual spectral lines of the main impurity elements in plasmas of the Globus-M2 tokamak (carbon, oxygen, helium, nitrogen, boron, copper, iron), has already been partially launched at the facility. The wide spectrum spectrometer Avantes Avaspec-2048 registers radiation in a wavelength range of 200-1100 nm every 20 ms and allows to determine the impurity plasma composition at different stages of discharge. A data collection complex with 176 channels will be used for all the described diagnostics. A 16-bit ADC will allow signal digitization with a frequency of up to 500 kHz throughout the time of entire discharge on the Globus‑M2 facility.

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVIII/Mu/ru/BA-Tyukhmeneva.docx) [↑](#footnote-ref-1)