MEASURING of intensity OF RADIATION LOSSES AND EFFECTIVE ion charge ZEFF ON THE GLOBUS-M2 TOKAMAK in conditions of THE INCREASED TOROIDAL MAGNETIC FIELD [[1]](#footnote-1)\*)

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Energy losses due to radiation lead to plasma cooling and a decrease in the confinement time of energy in the tokamak plasma. Radiation losses are mainly associated with the presence of impurities, since intense line radiation arises during the transition of an impurity atom from an excited state. The spatial distribution of the radiated power Prad and the effective ion charge Zeff provide important information on the influx and transport of impurities during the discharge.

This paper presents the measurement results of the radiation losses Prad and the effective ion charge Zeff under conditions of an increased magnetic field and plasma current, which were firstly obtained on the Globus-M2 tokamak.

At the Globus-M2 tokamak, radiation losses are measured using a system based on SPD photodiodes [1], which consists of a 16x16 photodiode array, a 1x24 array and the discrete photodiodes where radiation is collected from various spatial directions. According to the measurement results, 2D distribution of the radiation losses in the poloidal cross section is reconstructed using the tomography methods [2]. The effective plasma charge is determined on a Globus-M2 tokamak from the bremsstrahlung power in the spectral range of 1020–1041 nm and the Te (R) and ne (R) profiles [3, 4] that were measured using the Thomson scattering diagnostics. Bremsstrahlung is collected along the line-of-sight in the equatorial plane using a filter monochromator based on an avalanche photodiode (APD Hamamatsu S11519-30).

The toroidal field BT was increased up to 0.7 T and the plasma current Ip was increased up to 300 kA while the total radiated power Ptot was decreased by about 2.5 times compared with the values of Ptot ​​at the Globus-M installation (BT = 0.5 T, Ip = 200 kA [5]). In addition, the spatial distribution of the radiated power over the plasma volume was changed; the intensity of Prad near the separatrix in the region of low electron temperature was increased.

Also, the measurement results of the time evolution of the effective ion charge Zeff were obtained for a wide range of electron density from 1019 m-3 up to 1020 m-3 in ohmic discharges and discharges with additional heating. A fall of the effective ion charge Zeff with increasing electron density was observed.

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