Investigation of the radiative losses on the Globus-M tokamak using SPD XUV silicon photodiodes

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The radiative losses are of the great importance in the plasma power balance and should be known for the purposes of confinement efficiency improving. Intensity of radiation accounts for the level of impurities in the plasma and measured spatial and temporal distributions of radiated power provide the significant contribution to the transport modeling. On the spherical tokamak Globus-M the silicon SPD XUV photodiodes [1] are implemented to study the radiation losses. These photodiodes are precision p-n photodiodes which are sensitive to photons in 1.13 eV – 60 keV energy range [2, 3].

For radiation losses measurements Globus-M was equipped with different diagnostic systems based on SPD XUV photodiodes: individual SPD photodiodes, SPD 16x16 hybrid matrix array [4] and SPD 1x16 linear array for SXR measurements.

The behavior features of the radiative losses were studied for the wide range of plasma density and input power both for ohmic discharges and regimes with auxiliary heating. Owing to high temporal resolution of SPD XUV detectors, various fast processes in tokamak plasma have been made possible to be looked into. First experimental results achieved with 16x16 SPD matrix array on the Globus-M tokamak are presented. The plasma instabilities like IRE, sawtooth and MHD oscillations were investigated by use of SPDs for the variety of plasma regimes.

References