Investigation of the Globus-M tokamak plasma with SPD XUV photodiodes

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Radiation losses play important role in understanding of the energy balance and confinement of tokamak plasma. Plasma radiated power and its distribution give information about impurity transport in plasma. Besides, radiation losses could also be used for plasma instability investigation, such as Internal Reconnection Events, Edge Localized Modes, MHD instabilities etc.

Radiated power studies on the Globus-M tokamak plasma are acquired with aid of SPD photodiodes, which detect electromagnetic radiation from near infrared to X-ray energy range [1].

To calculate total radiation losses of Globus-M plasma data from collimated SPD with field of view across major radius were extrapolated to the whole plasma volume. For neutral beam heated plasmas total radiated power dependence on plasma density was investigated.

Furthermore investigations of radiation losses were made in hydrogen and deuterium plasmas. Total radiated power dependence on input power was studied.

Such plasma instabilities as sawtooth oscillations and internal reconnection events were observed using SPD filtered with beryllium foil for SXR measurements.

Pinhole camera based on 16x16 SPD photodiodes was installed on the Globus-M tokamak. Matrix array was viewing tangentially to the plasma; field of view is poloidal cross section of the plasma. The diagnostic system is characterized by high temporal resolution (~1µs) [2], which allow to investigate fast processes in plasma. First experimental data from the diagnostic were achieved and processed.

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References

1. Zabrodsky V.V., Aruev P.N., Sukhanov V.L., Zabrodskaya N.V., Ber B.J., Kazantsev D. Ju., Alekseyev A.G. Silicon precision detectors for near IR, visible, UV, XUV and soft X-ray spectral range. // Proceeding of the 9th International Symposium on Measurement Technology and Intelligent Instruments. – 2009. Saint-Petersburg, Russia.
2. Alekseev A.G., Belov A.M., Zabrodskii V.V., Instruments and Experimental Techniques, 2010, Vol.53, No.2, pp. 209-212.