Sol width determination on globus-M2 tokamak with Ir-Camera [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2021.48.1.039

Tokarev V.A., Gusev V.K., Khromov N.A., Voronin A.V., Petrov Yu.V., Sakharov N.V., Novokhatsky A.N., Minaev V.B., Varfolomeev V.I., Balachenkov I.M., Telnova A.Yu., Shchegolev P.B., Bakharev N.N., Kurskiev G.S., Kiselev E.O., Patrov M.I., Tuhmeneva E.A., Tolstyakov S.Yu.

Ioffe Institute, Saint-Petersburg, Russian Federation, Valentin.Tokarev@mail.ioffe.ru

In a tokamak, the plasma core, where the fusion reactions occur, eventually establishes contact with the walls of the containment device via a region called the scrape-off layer (SOL). Understanding of the SOL has profound implications for future fusion devices since their performance is limited by the heat and particle loads on the plasma-facing components, and because the tokamak plasma edge is key to core performance.

Infra-red (IR) thermography diagnostics that are now standard on many tokamaks to determine divertor target heat flux [2]. This type of diagnostic allows to measure temporal evolution of target temperature and then using these data calculate heat flux density from which is possible to deterimene scrape-off layer (SOL) power witdth — *λq*.

Globus-M2 is a spherical tokamak [3] with the minor radius *a=*0.24 m, the major radius *R=*0.36 m, a toroidal magnetic field *B*T≤1.0 T, the plasma current *I*p≤0.5 MA and a divertor plasma configuration.

IR camera with a 640x512 pixel detector, a spectral range of 2-5 microns, and a frame rate of up to 220 Hz in full-frame mode was used to monitor the lower divertor thermal emission. The IR camera was located on the upper dome of the vacuum chamber at a distance of 1.3 m from the lower divertor plates; a sapphire window was used to ensure the passage of radiation in the required range.

The paper presents the results of temperature measurements and estimates of the heat flux at strike point of the outer separatirx, as well as the width of the scrap layer with different plasma currents.

The experiments were carried out on Globus-M2 Spherical Tokamak, which is a part of the Material Science and Diagnostics in Advanced Technologies Federal Center for Collective Use (unique project identifier RFMEFI62119X0021).

References

1. Stangby P.C. The Plasma Boundary of Magnetic Fusion Devices. – Bristol: Publishing Ltd, 2000. – 703 p. (Plasma Physics Series).
2. Lee H.H. et al Nuc. Mat. and E. 12 (2017) 541-547
3. V.B. Minaev et al J. Phys.: Conf. Ser. 1094 012001
1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVIII/Mu/ru/AY-Tokarev.docx) [↑](#footnote-ref-1)