Thermal energy confinement At the Globus-M/M2 spherical tokamaks [[1]](#footnote-1)\*)

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The presentation is devoted to the thermal energy confinement study at the compact spherical tokamaks Globus-M and Globus-M2. Experiments were performed under auxiliary heating using neutral beam injection (NBI) in plasma with lower null magnetic configuration (major radius *R* = 0.35 m, minor radius *a* = 0.21-0.22, elongation *κ*~1.9, triangularity *δ*~0.35) for the ranges of plasma current and toroidal magnetic field: *Ip*=0.12-0.25 MA, *BT*=0.25-0.5 T. It have been shown that energy confinement time (*τE*) dependence on BT is very strong, while the *τE* dependence on plasma current *Ip* is significantly weaker than IPB98(y,2) scaling predicts: *τE*~$I\_{p}^{0.48\pm 0.21}B\_{T}^{1.28\pm 0.12}$. The improvement of *τE* was mostly by electron heat diffusivity decrease with toroidal field rise, while the ion heat diffusivity was in line with neoclassical theory predictions.

The first NBI experiments were carried out at the Globus-M2 for the increased range of plasma current and toroidal magnetic field: *Ip* =0.25-0.3 MA and *BT* = 0.7 T. During NBI heating (D-beam, 28 keV, 0.8 MW) the plasma total stored energy measured by the diamagnetic coil increased more than twice (in comparison with the Globus-M results). Diamagnetic measurements were confirmed by the kinetic (electron and ion temperature profiles) measurements. Thermal energy confinement time was estimated by 1.5D ASTRA transport modeling while the beam absorbed power was derived using two codes: NUBEAM code and 3D fast ion tracking algorithm. The obtained τE values are higher than those predicted by IPB98(y,2) and are in good agreement with the Globus-M scaling.

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVII/R/ru/LH-Kurskiev.docx) [↑](#footnote-ref-1)