Development of the GDMT project at the BINP [[1]](#footnote-1)\*)

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The report is an overview of the key problems of a plasma confinement with thermonuclear parameters in open-type magnetic traps with a linear axisymmetric configuration. These problems are addressed to the research program at the Gas-Dynamic Multi-Mirror Trap (GDMT) facility [1,2], the project of which is currently being developed at Budker Institute of Nuclear Physics (BINP) in cooperation with a number of Russian and foreign organizations. The GDMT is based on achievements of GDT [3] and GOL-3 [4] facilities together with specially constructed devices SMOLA [5], GOL-NB [6] and CAT [7]. The project should provide a physics basis for fusion systems: the GDT-based neutron source and a future fusion reactor. The GDMT will consist of the central section, the multi-mirror sections and the plasma flow expanders and will be constructed in two stages. The first stage includes the central section with strong mirror plugs and the expanders. The multiple-mirror sections will replace the single plugs at the second stage of GDMT construction. The main part of the report addressed to the research program at the first stage GDMT facility: suppression of kinetic instabilities related with anisotropy of hot ions; axial confinement and the role of gas conditions in the expander; suppression of MHD-instabilities in linear devices with axisymmetric configuration; the problem of limiting the plasma radius and thermal loads on the limiter. In the final part of the report, brief information is presented about experiments on the GDT, GOL-NB, SMOLA and CAT devices. In addition, the possibility of realizing and studying diamagnetic confinement is discussed.

References

1. A. Beklemishev *et al.* Novosibirsk Project of Gas-Dynamic Multiple-Mirror Trap. *Fusion Science and Technology* **63**, 46-51 (2013).
2. P. A. Bagryansky, A. D. Beklemishev & V. V. Postupaev. Encouraging Results and New Ideas for Fusion in Linear Traps. *Journal of Fusion Energy* **38**, 162-81 (2019).
3. A A Ivanov, V V Prikhodko. Gas-dynamic trap: an overview of the concept and experimental results. *Plasma Physics and Controlled Fusion* **55**, № 6, p. 063001 (2013).
4. A.Burdakov, A.Azhannikov, V.Astrelin *et al.* Plasma heating and confinement in GOL-3 Multi Mirror Trap. *Fusion Science and Technology* **51**, № 2T, 106-111 (2007).
5. Sudnikov, A. V., Beklemishev, A. D., Inzhevatkina *et al*. Preliminary experimental scaling of the helical mirror confinement effectiveness. *J. Plasma Phys.* **86** (5), 905860515 (2020).
6. V.V. Postupaev, V.I. Batkin, A.D. Beklemishev *et al.* The GOL-NB program: further step in multiple-mirror confinement research. *Nuclear Fusion* **57**, № 3, 036012 (2017).
7. Yu.A. Tsidulko, I.S. Chernoshtanov. *AIP Conference Proceedings*, *1771*, 040005, (2016).

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