Development and first experimental results of electrostatic analyzers on GDT and CAT facilities [[1]](#footnote-1)\*)

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The study of plasma magnetic confinement being undertaken in Budker Institute of Nuclear Physics, it is split into several independent directions: in addition to noticeable success in achievement of high plasma parameters on Gas Dynamic Trap (GDT) facility [1], the realization of magnetic field reversed configuration (FRC) is studied on the new facility called Compact Axisymmetric Toroid (CAT) [2].

GDT is a linear magnetic mirror device with a large mirror ratio. Plasma ions can be divided into cold component with temperature ~100 eV and hot (~20 keV) anisotropic component, generated by 8 neutral injectors (625 kW, 5 ms), directed at the angle of 45° to the facility axis.

CAT is an axisymmetric magnetic mirror trap, aimed at reaching FRC by accumulation of azimuthal current of hot ions (~15 keV): two focused neutral injectors (2 MeV, 5 ms) are directed perpendicularly to the main axis with the impact parameter of 10 cm [3].

This work presents developed diagnostic tools based on the analysis of charge-exchanged neutrals for determining parameters of the hot component on previously mentioned facilities: 45-degree electrostatic analyzer with angular resolution for determining radial distribution of plasma density on GDT and 45-degree electrostatic analyzer with energetic resolution on CAT magnetic trap. First results, obtained during the experiment on Gas Dynamic Trap, are also presented.

References

1. Bagryansky P.A., Gospodchikov E.D., Lizunov A.A., Maximov V.V., Prikhodko V.V., Shalashov A.G., & Yakovlev D.V. (2014). Achievement of a record electron temperature for a magnetic mirror device. arXiv preprint arXiv:1411.6288.
2. Bagryansky P.A., Akhmetov T.D., Chernoshtanov I.S., Deichuli P.P., Ivanov A.A., Lizunov A.A., & Oreshonok V.V. (2016, October). Status of the experiment on magnetic field reversal at BINP. In AIP Conference Proceedings (Vol. 1771, No. 1, p. 030015). AIP Publishing LLC.
3. Davydenko V.I., Deichuli P.P., Ivanov A.A., & Murakhtin S.V. (2019). Neutral beam injection system for the CAT experiment. Plasma and Fusion Research, 14, 2402024-2402024.
1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLIX/Mu/ru/BF-Gorenkov.docx) [↑](#footnote-ref-1)