Target plasma optimization in Cat [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2023.50.2023.1.1.080

1Murakhtin S.V., 1Korobeynikova O.A., 1Bagrynsky P.A., 1Yakovlev D.V., 2Kolesniko K.S., 2Ivanov R.S.

1Budker Institute of Nuclear Physics, Novosibirsk, Russia, inp@inp.nsk.su
2Novosibirsk State University, Novosibirsk, Russia, phys.nsu@mail.ru

A new experimental device Compact Axisymmetric Toroid (CAT) has been created at the INP SB RAS. The research program includes the study of methods for stabilizing hot plasma with high beta in an axisymmetric trap with powerful atomic injection, demonstration of diamagnetic retention and magnetic field reversal [1].

The research program includes:

1. Capture optimization of neutral beam by target plasma.
2. Creation and stabilization of a plasmoid with high β.

An action is currently being performed to optimize the plasma gun [2]. The results of numerical simulation [3] show that the density of the target plasma >1-5\*1013 cm-3, and its temperature should be 30-40 eV.

The first experiments were carried out to measure radial electron density and temperature profiles of the target plasma, and a method for measuring its diamagnetism was created. We register the energy spectrum of ions that are lost from the central cell along the magnetic field lines. Differential plasma rotation is the cause of the Kelvin-Helmholtz instability. This effect increases the average ion energy in the plasma. In the experiment, a starting plasma with a density of 1013 cm‑3, an electron temperature of 30 eV and an average ion energy of 200 eV was obtained.

References

1. A.G. Shalashov et al., Plasma Phys. Control. Fusion, 2020, 62, 065010.
2. [A.A.Ivanov and V.V.Prikhodko, Plasma Phys. Control. Fusion, 2013, 55, 063001](http://www.fpl.gpi.ru/Zvenigorod/XLV/Zven_XLV.html).
3. A.G. Shalashov et al., Journal of Instrumentation, 2021, 16, 07007.
4. A. G. Shalashov et al., Phys. Plasmas, 2022, 29, 080702.
1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/L/Mu/ru/CN-Murakhtin.docx) [↑](#footnote-ref-1)