THE DEPENDENCE OF the ROTATION VELOCITY ON PLASMA PARAMETERS IN THE hELICAL mIRRoR oPEN TRAP smola [[1]](#footnote-1)\*)

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To suppress the plasma flux from open magnetic traps, the concept of confining rotating plasma in a helical magnetic field [1] was proposed, for the demonstration of which the SMOLA device was created at the BINP SB RAS [2]. The latest results [3] show the agreement between the theoretical assumption and the obtained experimental dependences.

In the concept of helical confinement one of the fundamental points is to find levers to control the plasma rotation velocity in the open magnetic trap with helical sections. Operating in the normal mode the optical diagnostics based on a spectrometer with a high spatial resolution [4] allows us to fix the plasma velocity with the system parameters change. At the moment, the plasma rotation velocity is recorded both in the input and output expanders of the SMOLA by spectrometers with high spatial resolution based on MDR-12 and MDR-23, respectively. Spectral instruments are installed on opposite sides relative to the plasma column. With such an arrangement, the obtained radial plasma velocity profiles prove the correct operation of such a spectrometric system, since the red and blue shift of the spectral line is observed by spectrometers.

Changing the design of the plasma gun and finding the operating mode of the device with the smallest fluctuations in the plasma current led to increase the plasma rotation velocity. Experiments were carried out to obtain the dependences of the plasma velocity on the voltage between the anode and cathode of the plasma gun, the magnetic configuration, also on the plasma density and electron temperature. At the input the rotation velocity is observed to be practically unchanged ~ 1.2·106 s-1. It is assumed that this velocity can be limited by the development of kinetic instabilities. At the output, clearer dependences of the rotation rate ~ 0.8·106 s-1 on the plasma parameters are observed.

In addition, the report will present a prototype of the Mach probe, adapted to the parameters of our system, which is installed in the helical section of the SMOLA device to record the longitudinal plasma velocity.

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References

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVIII/Mu/ru/AR-Inzhevatkina.docx) [↑](#footnote-ref-1)