the VELOCITY MAP of plasma flow IN THE CONFINEMENT AND ACCELERATION regime on THE OPEN helical mirror trap smola [[1]](#footnote-1)\*)

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The open mirror trap SMOLA was created at the Budker Institute of Nuclear Physics (BINP SB RAS) for studying the physics of suppression of plasma longitudinal losses from the system in which rotating plasma is confined in a magnetic field with helicoidal symmetry. The plasma rotates due to the E × B drift. In the rotating plasma frame, the longitudinal velocity of the magnetic mirrors is comparable to the longitudinal velocity of the plasma flow. The direction of moving velocity depends on the directions of the electric and magnetic fields. In the improved confinement regime the plasma flow velocity is directed along the plasma density gradient, in the acceleration regime is against.

The measurement of the radial distribution of the plasma rotation velocity along the device full length is carried out by determining the Doppler shift of the plasma radiation using spectrometers with high spatial resolution based on MDR-12 and MDR-23 monochromators [1].

A plane Mach probe was constructed to determine the longitudinal plasma velocity in the transport section. This diagnostic allows us to measure the ion saturation current in the plasma density range from 0,8∙102 cm-3 to 5∙1012 cm-3 at an electron temperature of ~ 30 eV. The plane shape of the probe makes it possible to simultaneously measure the ions moving flow in the plasma density gradient direction and the ions moving flow in the opposite direction.

Previous results have already demonstrated improved confinement in a helical open mirror trap [2]. An important effect is an increase in the density of the ions moving flow in the transport section in the direction opposite to the direction of the plasma flow. This effect is consistent with the radial transfer model of particles in a helical magnetic field [3].

The report will present the experimentally obtained dependences of the azimuthal and longitudinal velocities on the density, plasma temperature and he magnetic field magnitude in the plasma confinement and acceleration regimes.

References

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