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STUDY OF PLASMA DIAMAGNETISM AT THE SMOLA DEVICE ^{*)}^{1,2}Kozhevnikov A.V., ¹Sudnikov A.V., ¹Inzhevatkina A.A., ¹Tolkachev M.S.,
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The physics the axial loss suppression of a rotating plasma by magnetic field with helical symmetry is being investigated at the BINP SB RAS on the basis of the open SMOLA trap. The helical field is a sequence of magnetic mirrors arranged along the axis of the system. In the reference frame of the rotating plasma, these mirrors move with constant velocity toward the confinement region [1]. The dynamic mirrors generate a force toward the confinement region, thereby significantly suppressing axial losses. [2, 3].

The efficiency of axial loss suppression affects the energy content of the plasma in the confinement region. To measure the energy content of the plasma in the SMOLA device, a diamagnetic loop was designed and incorporated into the measurement system, which makes it possible to determine the diamagnetism and the characteristic time of the diamagnetism decay in different modes of operation of the device.

Different modes of device operation provide different axial loss suppression efficiency, which implies that the energy content in these modes will also be different. The following modes of the guide magnetic field distribution were chosen for the experiments: without additional mirrors, additional mirror at the exit of the transport section, additional mirror at the entrance to the transport section. At the same time, the guide magnetic field itself is either straight or with helical symmetry.

It was obtained that diamagnetism and lifetime increase both when the mirror at the entrance of the transport section and the helical magnetic field are included, with the reduction in axial flux due to the mirror and the helical field being independent and having a multiplicative effect. It was also obtained that the diamagnetism and lifetime also increase with increasing the corrugation depth of the helical field.

The paper will present the dependences of diamagnetism and characteristic plasma lifetime on the magnetic configuration (including straight and helical field, without additional mirrors, with additional mirror at the exit of the transport section, with additional mirror at the entrance to the transport section), the flow of neutral gas into the plasma source.

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References

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^{*)} [abstracts of this report in Russian](#)