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ELECTROSTATIC NPA IN THE EXPERIMENT AT THE CAT FACILITY *)

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One of the main areas of research at BINP SB RAS is the studying of plasma with high relative pressure. For this purpose the Compact Axisymmetric Toroid (CAT) has been constructed and put into operation. The facility is a magnetic mirror trap with axial symmetry, where plasma heating is carried out using powerful atomic injection beams captured by the target plasma. Heating with high current density beams allows for high values of the relative pressure β1 of the formed plasmoid to be expected [1]. The CAT [2] research program is focused on studying methods for stabilizing hot plasma with high relative pressure β ~ 1 (diamagnetic confinement). The results obtained from the facility will serve as an experimental basis for designing the linear magnetic confinement system of GDMT [3].

The most informative data on the accumulation and retention of the fast ion population in the plasmoid formation process can be obtained by studying the spectrum of recharging neutrals. The spectrum allows to judge the energy distribution of the plasma-trapped beam's atoms. To study this spectrum, an electrostatic 45-degree analyzer (NPA) was developed and assembled, allowing the detection of neutrals with energies from 3 to 20 keV.

Calibration of NPA registration channels using ion source is now complete. The analyzer is installed in the injection plane and is part of the diagnostic system for CAT installation. The numerical simulation has obtained an optimal linear density of the target gas $nl \sim 10^{15} cm^{-2}$. Relaxation of the function of distribution of fast particles, related to their braking on electrons in the plasma, recharging processes on residual gas and atomic beam. The average energy of accumulated fast particles is shown to be greater than 7 keV.

References

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1 $\beta=8\pi P_\perp/B^2$ - ratio plasma pressure to the magnetic field pressure.