DOI: 10.34854/ICPAF.52.2025.1.1.091

LAUNCH OF THE INJECTION COMPLEX OF THE EXPERIMENTAL DEVICE CAT *)

[1]Gamov V.V., [2]Afanasyev N.A., [1]Voskoboynikov R.V., [2]Zhimulev K.F., [1]Zubarev P.V., [1]Kolesnichenko K.S., [1]Moiseev D.V., [1]Murakhtin S.V., [1]Stupishin N.V., [1]Khilchenko A.D.

[1]*Budker Institute of Nuclear Physics, Novosibirsk, Russia*
[2]*Novosibirsk State University, Novosibirsk, Russia*

A program for the study of plasma with high relative pressure is being implemented at BINP. For this purpose, the CAT facility, a compact axisymmetric toroid, was designed and put into operation [1]. One of the critical steps for the successful implementation of the program is the injection of powerful atomic beams with equivalent current density up to 3 A/cm^2.

The neutral beam injection system of the CAT facility [2] is based on two injection modules with geometric beam focusing [3] developed for the C-2W open-field reversed-field trap heating complex (TAE Technologies). The main characteristics of the injector are as follows: the energy of injected particles is 15 keV, ion current is up to 140 A, injection duration is 5 ms, and the fraction of particles with full energy is ~85%. Due to the use of powerful injection of neutrals into a small volume plasma, the experiments are expected to obtain relative plasma pressure $\beta\sim1$[1].

One of the two heated injectors was launched in the summer of 2024. The injected neutrals power was 1.5 MW. The beam parameters were measured using a diagnostic suite consisting of an array of secondary emission sensors and two wire calorimeters mounted upstream of the plasma cord and on the flange of the beam receiver. The angular divergence of the elliptical beam along the two axes was 10x35 mrad.

The second injector with electric power supply system is fully assembled, component-by-component debugging of the systems has been performed, and commissioning works are in progress.

In order to radically accelerate the introduction of the injectors to operating parameters, a special procedure was used to precondition the high-voltage electrodes of the ion-optical system in a glow discharge with high-voltage breakdowns of limited energy (a few joules).

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*) abstracts of this report in Russian

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