ELECTRON BEAM INJECTION IN THE GDL, experimental results [[1]](#footnote-1)\*)

DOI: 10.34854/ICPAF.2022.49.1.026

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An experiment to study the interaction of an electron beam with a plasma in an open magnetic system was carried out at the Gas Dynamic Trap (GDT) facility in 2020-2021. An electron source with following parameters was specially developed for the experiments: electron energy 20-30 keV, current 5-10 A, duration up to 15 ms. The gun was installed in one of the GDT expanders and made it possible to inject an electron beam along the magnetic field. A specially developed X-ray diagnostics based on a CsI(Tl) scintillator was used in the experiments; also a stilbene-based neutron and gamma-ray spectrometer was used. We used the standard GDT diagnostics: a Thomson scattering system for measuring the electron temperature and plasma concentration, a dispersion interferometer, diamagnetic loops and Langmuir probes.

The report will present experimental results of the production of a target plasma with parameters sufficient to capture neutral beams. Thus, another method of creating a target plasma (as well as a plasma gun and electron cyclotron plasma startup) has been worked out at the GDT.

In experiments with the injection of an electron beam in a plasma, a population of “hot” electrons with an energy that is an order of magnitude higher than the energy of the electrons of the initial beam can arise. An experimental and theoretical study of the mechanism of generation of superheated electrons in the GDT plasma in such experiments was carried out. The region in which the generation of “hot” electrons occurs was localized and a mechanism for the generation of such electrons was proposed. These data will be presented in the report.

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