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## EFFECTS OF SCATTERED FIELDS OF THE TOKAMAK AND NEIGHBORING SOLENOIDS OF THE T-15 M D GYROTRON COMPLEX ON THE DEPOSITION OF THE ELECTRON BEAM ON THE GYROTRON COLLECTOR <sup>\*)</sup>

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The gyrotron complex of the T-15MD tokamak in the future should include eight gyrotrons. At the moment, one gyrotron with a frequency of 82.6 GHz and output power about 1 MW, has been put into operation [1]. By the end of 2025, it is planned to install four more gyrotrons. Figure 1 shows the location of the gyrotron stands on the T-15MD installation. Each gyrotron is installed in a cryomagnet that creates a magnetic field of 3.27 T or 3.98 T in the center of the solenoid, depending on the operating gyrotron frequency (82.6 GHz and 105 GHz, respectively).

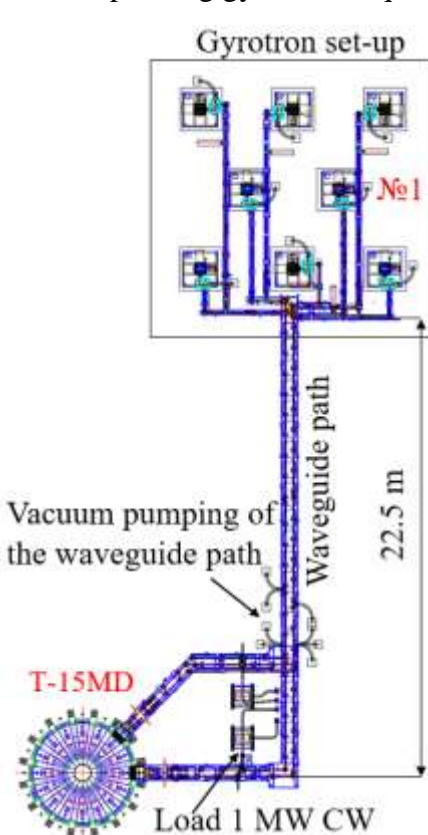


Figure 1. Gyrotron set-up of the T-15MD tokamak.

The gyrotron collector is experiencing a high thermal load [2]. With an efficiency of  $\sim 50\%$  of the device, the power of the electron beam is  $\sim 1$  MW. The system of collector coils, consisting of static and dynamic sections, ensures uniform distribution of energy release along the cooled surface. At the same time, to ensure the normal operation of the gyrotron, the radial component of the magnetic field near the collector walls should not exceed 2-5 Gs. In this regard, there is a need to simulate the magnetic environment that is created in this configuration of the microwave complex. Ultimately, the task boils down to determining the effect of the magnetic field of neighboring solenoids and tokamak on the collector of each gyrotron.

At this stage, the problem of the influence of one of the neighboring cryomagnets on the distribution of the magnetic field in the collector area of gyrotron No. 1 is being solved, which can lead to the deposition of part of the beam on uncooled areas.

The parameters of the collector coils are determined by the manufacturer of gyrotrons, the company "GYCOM Ltd". In order to verify the correctness of the configuration of the magnetic field created by the smearing coils, a program was developed that allows determining the excursion of the electron beam along the collector surface. Thus, the influence of scattered fields can be observed visually.

The results of the assessment of the additional influence of the magnetic fields of neighboring cryomagnets may be included in the report. The work was carried out within the state assignment of NRC "Kurchatov institute".

### References

- [1]. G.G. Denisov, V.I. Malygin, A.I. Tsvetkov, etc., *Izvestiya vuzov. Radiophysics*, volume LXIII, No.5-6, p. 369
- [2]. V.N. Manuilov, M.V. Morozkin, O.I. Luksha, M.Y. Glavin *Gyrotron collector: types and Possibilities. Infrared Physics and Technology*, Volume 91, June 2018, pages 46-54.

<sup>\*)</sup> [abstracts of this report in Russian](#)