Spectral composition dynamics of terahertz radiation flux during REB relaxation in the plasma column under different boundary conditions at the beam exit from the plasma [[1]](#footnote-1)\*)

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Experimental studies on the mechanisms of submillimeter waves (0.1–0.8 THz) generation during collective relaxation of a relativistic electron beam (REB) with parameters 0.6 MeV / 20 kA / 6 μs, are carried out on a specialized facility GOL-PET [1]. The experiments are carried out at a plasma density of ~ 1 1015 cm-3 in a magnetic field of 4.7 T, when a plasma column 250 cm long has a diameter of 6 cm, and a beam with a current density of (2-4) kA / cm2 is limited in diameter of 4 cm.

The report presents the results of experiments on studying the characteristics of the generated radiation flux in the frequency range (0.15-0.6) THz, emerging along the axis of the beam-plasma system. The flux is recorded after it leaves the vacuum to the atmosphere through a fluoroplastic window.The experiments are carried out under conditions when the plasma density distribution along the axis of the plasma column varies in the region of the decreasing magnetic field in the vicinity of the graphite collector that absorbs the beam passed through the plasma. Experiments have shown that if the plasma has a high density in this area, then the power in the radiation flux ejected through the central hole in this collector with a diameter of 18 cm is 4 MW [2]. When, before the beam injection, a low-density plasma is created in this section, the power in the radiation flux rises to the level of tens of megawatts [3]. The text describes the results of recording the spectral composition dynamics of the radiation flux ejected into the atmosphere for these two variants of the density distribution. A discussion of the patterns established in this series of experiments is also provided.

References

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVIII/Pt/ru/GM-Arzhannikov.docx) [↑](#footnote-ref-1)