The project of a beam-plasma generator of THz radiation on the kiloampere BEAM of a linear induction accelerator [[1]](#footnote-1)\*)

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Electromagnetic radiation in the frequency range 0.15 - 2.0 THz has a very wide area of applications. First, the fluxes of such radiation make it possible to solve a number of engineering and technical problems, including: analysis and structure modification of materials and objects, visualization of objects hidden under shelters, suppressing the operation state of electronic devices in order to ensure safety, etc. On the other hand, THz radiation fluxes open up new opportunities in fundamental research in physics, chemistry, biology and medicine.

The studies on the generation mechanisms of the radiation in the interval of 0.15 – 0.8 THz at the collective relaxation of a relativistic electron beam with parameters 0.6 MeV / 15 kA / 5 μs in a plasma with a density of 3-5 1014 cm-3, are carried out at the GOL-PET facility in a multimirror magnetic trap 4.8/3.6 T. These studies have demonstrated that at a beam current density of 1 – 2 kA/cm2 an energy content of about 10 J is achievable in a generated radiation flux [1]. To expand the radiation range up to 1 THz and higher using generation mechanisms in a beam-plasma system, it is necessary to increase the beam current density by several times while maintaining its angular divergence at a low level. A beam with such parameters can be obtained by magnetic compressing the cross section of the beam generated in a linear induction accelerator (LIA) [2]. The possibility to overcome the obstacles, produced by short (~100 ns) beam pulse duration, is confirmed by the results of experimental studies carried out at the INAR facility [3, 4].

In the report, we will analyze the prospects of using an electron beam obtained at the LIA output with an energy of 1 MeV, a current of 2 kA to generate THz radiation in a magnetized plasma. This analysis will be based on the results of experimental studies mentioned above and on theoretical ideas about the mechanisms of transforming the plasma oscillations into electromagnetic waves.

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