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USING AN EXTENDED PLASMA CORD AT THE LIA-PET FACILITY TO GENERATE A DIRECTED FLUX OF THZ RADIATION *)

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Electromagnetic radiation in the terahertz frequency range is actively applied in a large number of scientific and practical problems. Examples of its use are the following: plasma heating, spectroscopy of fast processes, and exposure on materials in the corresponding spectral region. Currently, the frequency range of 0.3–1 THz remains the least developed, comparing to others. Research aimed at solving the problem powerful sources of THz radiation creation is carried out at the Budker Institute of Nuclear Physics, where a generation method based on beam-plasma interaction is applied [1]. Currently, research is being carried out at a specialized GOL-PET facility, where generation of radiation in the frequency range 0.1–0.3 THz is realized by the injection of REB with an energy of 0.5 MeV, a current density of 1–2 kA/cm^2 and a total current of 20 kA into a plasma with a density of $5\cdot10^{14}$ cm^{-3} [2].

The understanding of the radiation generation mechanisms obtained to date and the results achived in the experiments at GOL-PET facility allowed us to formulate a project of a LIA-PET facility designed to generate radiation in the range of 0.3–0.9 THz [3]. To shift to the frequency range 0.3–0.9 THz in case of radiation generation in the beam-plasma system, it is necessary to ensure the level of plasma density ~$5\cdot10^{15}$ cm^{-3} and the beam current density on a scale of 10 kA/cm^2 in maintaining its angular divergence at a low level. Within the framework of the project, use of a linear induction accelerator (LIA) [4] was proposed, allowing one to obtain ат electron beam with an energy of 1 MeV, a current of 2 kA and the possibility of beam compress to provide a current density of 10–15 kA/cm^2. On the other hand, it is necessary to ensure the creation of a plasma cord with a diameter of 16 mm, a length of 300 mm and a density value of ~$5\cdot10^{15}$ cm^{-3}.

Given report will be devoted to the issue of the design of a plasma creation system with the required parameters. The report will outline the basic requirements for a plasma creation system. Approaches that will ensure the formation of plasma with the necessary parameters will be considered. A design of a plasma creation system based on a pulsed high-voltage discharge will be presented.

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