Changes of the electrons distribution function of a kiloampere REB in pumping oscillations in a magnetized plasma [[1]](#footnote-1)\*)

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Experimental studies of the mechanisms to generate submillimeter waves (0.1–0.8 THz) with multi-megawatt power in case of the relativistic electron beam (0.6 MeV / 20 kA / 6 μs) collective relaxation are carried out at the specialized GOL-PET facility in BINP SB RAS [1]. To date, as a result of this research a theoretical description of the generation mechanisms has been proposed [2] and the possibility to obtain radiation flux with an energy content more than 4 MW in a pulse has been demonstrated [3]. In these experiments, a beam of relativistic electrons is injected into a plasma column with diameter 6 cm and length 250 cm and with a density (0.8-1.5) 1015 cm-3, which is confined in a magnetic field of 4.8 T. At the entrance to the plasma, the beam has a diameter of 4 cm and a current density of 2 - 4 kA/cm2. An important task of this research is to establish regularities in the changes of the submm radiation spectrum and the direction of its fluxes from the plasma column, in depend on the injected beam parameters. To reveal these dependences, it is necessary to measure the angular divergence and energy distribution of the electrons in the beam after the beam passes through the plasma column in case of intense plasma oscillations pumping. In aim to measure the energy distribution of the electrons of the beam passed through the plasma column a multi-foil analyzer was designed [4], registration in which is carried out by 10 successive aluminum foils. This sensor is located in a uniform magnetic field with an induction of 0.07 T, which ensures a decrease in the beam current density in the foils to a level of 50 - 100 A / cm2. The optimization of foils thickness in the sequence of their location as the beam advances during absorption has been carried out taking into account the existing experience of the analyzer usage and the results of computer simulation of the electrons absorption in foils. The carried out optimization provides the possibility to restore the electron energy distribution function with an accuracy not worse than 20%. The report describes the results of experiments and presents an interpretation of the observed patterns. Taking into account the existing experience of using the analyzer and the results of computer simulation of the absorption of electrons in foils.

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