Master’s thesis abstract

«Modeling of experimental results on electron acceleration in dense laser plasma»

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In this work, we studied several problems of importance for experiments on the acceleration of electrons in a dense laser plasma. The result of this consideration is specific results and recommendations for the design of the experiment.

The problem of the relation between the spectrum of accelerated electrons and the spectrum detected in real geometry is considered. In the process of solving this problem, a number of universal techniques have been developed, embodied in a software package. The result of the review is both the directly calculated value of the temperature of the spectrum of accelerated electrons, and the well-developed, automated method for obtaining results for a whole class of similar problems.

The possibility of optimizing the scheme for generating positrons is investigated. The optimal configuration was clarified, the possibility of phased generation of positrons was studied. The result is that such a scenario is found to be inoperative, and inferior to generation from a single-stage target at a moving angle of incidence.

The problem of calculating the coefficients for determining the charge of an electron beam by neutron counting is considered. The actual geometry of the experiment was transferred to a virtual environment, and simulations were performed for various materials of the gamma-neutron converter, for several slopes of the spectrum. As a result, coefficients were obtained. Measurement of the beam charge by this method is practically applicable for beryllium as a gamma-neutron converter.