Bachelor’s diploma abstract

«**Electron bunch formation under action of relativistic laser pulse onto long-scale undercritical plasma**»

Author: Gorlova D.A.

Scientific Supervisor: Ph.D., Dr.Sc., professor Savel'ev A.B.

Characteristics of electrons generated in the interaction of a laser pulse of relativistic intensity and solid targets from W and a film were experimentally investigated. We also used additional nanosecond laser pulse with controlled parameters to create undecritical plasma of various scales. It has been demonstrated experimentally that electrons can be generated in the form of a beam with a divergence of ~ 0.1 rad for small delay times (~ 5 ns), or multiple beams with a divergence of ~0.04 rad at a large delay (~ 30 ns) between nanosecond and femtosecond pulses.

A technique for direct measurement of the energy spectrum of electron beams using a magnetic dispersion system has been developed and tested. Using it we can now obtain spectra in each individual shot. It is shown that for experiments with a lower particle flux for direct detection of electronic spectra, the Medipix detector can be used effectively. Electron temperatures in all the investigated cases are in the range T = 1.1 ÷ 1.8 MeV.

An automated system has been developed that allows changing the angle of incidence of radiation to the target, as well as the angle at which the detector is located. It is shown that for the W target with a change in the angle of incidence of radiation on the target, the electron beam shifts to the normal. For film targets, electrons are always generated at an angle close to 90^0 from the direction of the original beam.