

# X-ray and particle images of region laser–plasma interaction high intensity laser pulse with a solid target

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The pinhole camera is a simple but at the same time very informative diagnostic tool for the exploration of high intense laser–matter interaction. In this work, we present the results of experiments where spatial properties of the interaction region on solid targets irradiated by picosecond laser pulses at relativistic intensity were measured by the use of a pinhole camera. Laser plasma was imaged onto photoluminescent image plate detectors and plastic track detectors CR 39 through pinhole camera.

Experiments were carried out with tungsten targets with thicknesses of 0.5 and 2 mm at the laser pulse energies from 16.2 to 40.4 J. Images of up to 10 MeV proton source on the irradiated surface of a laser target were obtained. It has been established that x-rays and charged particles are emitted from spatially separated sources, it can be due to the influence of powerful magnetic fields in laser plasma, in particular, the so-called fountain effect. The intensity of the magnetic field, which causes this effect, has been estimated at 500 MG. Estimates of the conversion efficiency of the laser pulse energy into proton beam energy and proton beam fluence are presented.