Measuring the parameters of relativistic electron beams accelerated from thin solid targets by femtosecond laser pulses of 100 TW power

Flegentov V.A.[1,@], **Safronov K.V.**[1], **Gorokhov S.A.**[1], **Kovaleva S.F.**[1], **Fedorov N.A.**[1], **Zamuraev D.O.**[1], **Shamraev A.L.**[1], **Tischenko A.S.**[1] **and Potapov A.V.**[1]

[1] Federal State Unitary Enterprise "Russian Federal Nuclear Center – All-Russia Research Institute of Technical Physics named after Academician E.I. Zababakhin", Vasilieva str 13, Snezhinsk, 456770, Russia

[@] vflegentov@gmail.com

A series of experiments on the generation of relativistic electron beams from thin solid targets was carried out using a femtosecond high-intensity laser system. Metal (W, Ta, Al) foils with a thickness of 15÷500 μm, as well as Mylar of 175 μm thickness were used as targets in experiments. Spectra, angular distributions and total charges of the relativistic electron bunches accelerated in the laser field and transmitted to the back side of the target were characterized.

All measured relativistic electrons spectra follow the relativistic Maxwell distribution $dN_e/dE=A\times E^2\times\exp(-E/T)$, where A is a constant, T is the characteristic temperature of the distribution which in experiments was in the range from 1 to 3 MeV. The maximum electron energy in experiments was about ∼40 MeV. The divergence angle (FWHM) of electron beams was about 20°÷45° and the total beam charges of tens of nC/pulse were obtained.