Generation of X-ray emission by the single- and double-pulsed laser interaction with solid target placed in air

Diploma thesis by the six-year student
Zhvania Irina Alexandrovna

ABSTRACT

The experimental results on interaction of femtosecond superintense ($I \sim 10^{16}$ W/cm^2) laser radiation with solid target placed in ambient air for variety of pressures are presented.

It is shown, that hard X-ray yield (E>2.5 keV) from laser-induced plasma, generated on the surface of the target decreases 5 times and average rate of ablation decreases 3 times, if ambient gas pressure is varied from 10^{-2} to 760 Torr.

Double-pulse scheme of laser-target interaction is proposed and realized as the way to minimize the effect of laser self-action in air. The experimental setup, that includes synchronized nanosecond excimer XeCl laser and femtosecond Cr:forsterite laser is developed. It has been shown that hard X-ray yield from laser-induced plasma, generated on the surface of the solid target placed in ambient air, increases ~16 times in case of double-pulse laser impact with the optimal time delay in 10 μsec.

Scientific adviser,
professor,
doctor of physical and mathematical science //Gordienko V.M.