Improved the properties of laser-produced plasma ions using multichannel laser beams

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At present, there are number of works devoted to the study of laser-produced plasma as a source of ions for ICF together with heavy ion accelerators and the systems on the base of powerful impulse of electrical charge, i.e. Z-pinches. Laser ion source (LIS) has been recently designed to load the Heidelberg electron beam ion trap with a pulsed beam of charged ions from solid elements. Due to many characteristics of laser-produced plasmas, LIS takes advantages over e.g. a common metal vapor vacuum arc method as a source of ions. The system generates beams of large amount of highly charged atoms and nucleus of elements, including rare and radioactive isotopes to inject into the electrophysical equipments. Therefore, the investigation of interaction of laser radiation and plasma beams with different kinds of targets gives additional information to improve the characteristics of laser drivers for ICF. The main objective of the current work is to improve the charge state and intensity of ions using multichannel laser beams.

In these experiments, the initial laser beam creates a plasma on the surface of solid targets. The following laser beam(s) will interact with already created plasma, thus increasing the charge state and energy of the ions. It was found that the increase of the focusing condition (distance) from L=0 to L=1.0 mm leads to the increase of intencity of ions with Z>1 and to the disappearance of low energy part of the plasma ions spektra, while the maximal charge of ions is not changed.

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