

Abstract Submitted
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Laser Ion Acceleration Control¹ SHIGEO KAWATA, T. NAGASHIMA, T. IZUMIYAMA, D. SATO, M. TAKANO, D. BARADA, Y.Y. MA, Utsunomiya University, Y.J. GU, Q. KONG, P.X. WANG, Fudan University, W.M. WANG, Inst. of Physics, CAS — An intense femtosecond pulsed laser is employed to accelerate ions. The issues in the laser ion accelerator include the energy efficiency from the laser to the ions, the ion beam collimation, the ion energy spectrum control, the ion beam bunching, the ion particle energy control, etc. In the study particle computer simulations were performed to solve the issues, and each component was designed to control the ion beam quality. When an intense laser illuminates a target, electrons in the target are accelerated and leave from the target; temporarily a strong electric field is formed between the high-energy electrons and the target ions, and the target ions are accelerated. The energy efficiency from the laser to ions was improved by using a solid target with a fine sub-wavelength structure or by a near critical density gas plasma. The ion beam collimation was realized by holes behind the solid target. The control of the ion energy spectrum and the ion particle energy, and the ion beam bunching were successfully realized by a multi-stage laser-target interaction. The present study proposed a novel concept for a future compact laser ion accelerator, based on each component study required to control the ion beam quality and parameters.

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