Abstract Submitted
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Efficient energy transfer from laser to proton beam in an intense short pulse laser foil interaction[1] K. TAKAHASHI, S. KAWATA, Y.Y. MA, Utsunomiya University, Q. KONG, P.X. WANG, Fudan University, D. SATOH, D. BARADA, Utsunomiya University — A remarkable improvement is demonstrated in the energy conversion efficiency from laser to protons by particle simulations in a laser-foil interaction. The total laser-proton energy conversion efficiency becomes 16.7% in an optimized multi-hole target and in this case the laser substrate-Al-ion energy transfer is 38.7%. When an intense short-pulse laser illuminates the thin foil target, the foil electrons are accelerated around the target by the intense laser. The hot electrons generate a strong electric field, which accelerates the foil protons, and the proton beam is generated. In our previous study, we found that multi-hole thin-foil target was efficient for the energy conversion from laser to protons [Phys. Rev. E 78, 046401 (2008)], and the energy conversion efficiency from laser to protons was 9.3%. In this paper 2.5-dimensional particle-in-cell simulations clarify the role of the target hole thickness and depth in the laser-proton energy conversion. The optimized multi-hole foil target provides a remarkable increase in the laser-proton energy conversion efficiency.

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