Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Effects of laser polarization on electrostatic shock ion acceleration in near-critical plasmas[1] YOUNG-KUK KIM, TEYOUN KANG, MIN SUP HUR, Ulsan Natl Inst of Sci Tech — Collisionless electrostatic shock ion acceleration has become a major regime of laser-driven ion acceleration owing to generation of quasi-monoenergetic ion beams from moderate parametric conditions of lasers and plasmas in comparison with target-normal-sheath-acceleration or radiation pressure acceleration. In order to construct the shock, plasma heating is an essential condition for satisfying Mach number condition 1.5 <M <3.7, where M=v/c_s and c_s is the sound speed. Recently we showed that the shock ion acceleration could be achieved via electron heating by relativistic transparency of a circularly polarized (CP) laser pulse. This is different from the usual method of shock generation via the electron heating by oscillating ponderomotive force of a linearly polarized laser pulse. In this poster we show one-dimensional particle-in-cell simulation result to compare LP-shock with CP-shock ion acceleration for a broad range of parameters. As the main result, the CP-shock could be formed at lower density plasmas than the LP-shock due to the efficient density compression of CP pulses. This leads to higher shock velocity and ion energy. Comparison of other detailed characteristics such as transmittance, scale length dependence, and other results from the simulations is presented. In addition, two-dimensional simulation is also discussed in association with Weibel instability.

[1]This work was supported by the Basic Science Research Program (NRF-2013R1A1A2006353) and the Creative Allied Project (CAP-15-06-ETRI)

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Date submitted: 13 Sep 2016 Electronic form version 1.4