Abstract Submitted
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Acceleration of energetic ions using 40 femtosecond laser pulses and ultrathin targets F.N. BEG, C. MCGUFFEY, University of California San Diego, A. RAYMOND, T. BATSON, University of Michigan, J. KIM, R. HUA, C. KRAULAND, University of California San Diego, A. MAKSIMCHUK, University of Michigan, G. PETROV, Naval Research Laboratory, V. YANOVSKY, A. THOMAS, K. KRUSHELNICK, University of Michigan — We report on experiments conducted using the 40 fs HERCULES laser at intensity $3x10^{20}$ W/cm^2 with sub-micron Si_3N_4 and pure metal foils. The target thickness scan shows that the ion species distribution transitions from low ionization states of protons and carbon to high ionization states of carbon and substrate ions such as Si^{12+} when the thickness is reduced incrementally from 1300 nm to 50 nm. The change in thickness also results in dramatic increase in maximum energy and particle number. The ion beam generation characteristics were improved for thicknesses 50-150 nm. Targets with thicknesses 35 nm and below yielded similar high charge state ions and high maximum energy yet reduced particle number. The results are consistent with 2D PIC modeling where realistic laser and target parameters were used [1]. This work was performed with the support of the Air Force Office of Scientific Research under grant FA9550-14-1-0282.

[1] G. Petrov, "Proton acceleration from short pulse lasers interacting with ultrathin foils," this meeting.

Farhat Beg
University of California San Diego

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