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Theory and particle-in-cell modeling of laser acceleration of monoenergetic ion beams from layered targets[1] B.J. ALBRIGHT, L. YIN, B.M. HEGELICH, K.J. BOWERS[2], T.J.T. KWAN, J.C. FERNÁNDEZ, Los Alamos National Laboratory — One possibility for achieving fast ignition inertial confinement fusion (ICF) involves the use of ion beams to ignite a compressed plasma to burning conditions, a scenario which is more effective for ion beams with small energy spread [Temporal, Honrubia, and Atzeni, Phys. Plasmas **9**, 3098 (2002)]. Recent experiments at the LANL Trident facility [Hegelich et al., submitted to Nature (2005)] have demonstrated that quasi-mono-energetic light ion beams with energies of several MeV/nucleon may be produced when a thin layer of light ions is accelerated from a heavy ion substrate in ultra-intense laser-matter experiments. In this presentation, the acceleration mechanism is examined within an analytical model and predictions are validated against particle-in-cell simulations and Trident data. Key dimensionless parameters controlling the beam dynamics are obtained, and implications and requirements for the feasibility of ion-driven fast ignition ICF will be discussed.

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