

Abstract Submitted  
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**Dynamics of high-energy proton beam acceleration and focusing from advanced hemisphere-cone target by high-intensity lasers**<sup>1</sup> B. QIAO, UC San Diego, M.E. FOORD, LLNL, R.B. STEPHENS, M.S. WEI, GA, P. PATEL, H. MCLEAN, M. KEY, LLNL, F.N. BEG, UC San Diego — The ability to focus intense proton beam to higher intensities and smaller focal diameters makes it very attractive for the applications ranging from isochoric heating of plasma [1], imaging implosion dynamics [2], to proton fast ignition (FI) [3], opening a new avenue of research for high energy density physics (HEDP). The roles of the laser-heated electrons in determining conversion efficiency and focus have not been previously considered [4]. In this talk, we shall present the recent theoretical and numerical calculations that self-consistently describe the evolution of the proton beam starting with the laser-generation of electrons and continuing through to ballistic proton motion, 15ps later. An analytical model is given for the electrostatic field in the plasma during acceleration, which determines the focusing characteristics of the beam.

[1] P. K. Patel et al., PRL 91, 125004 (2003).

[2] M. Borghesi, et al., PPCF 43, A267 (2001).

[3] M. Roth et al., PRL 86, 436 (2001).

[4] T. Bartal et al., Nat. Phys. 8, 139 (2012).

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B. Qiao  
UC San Diego

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