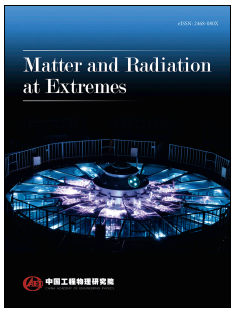
Accepted Manuscript



On intense proton beam generation and transport in hollow cones

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PII: S2468-080X(16)30082-6

DOI: 10.1016/j.mre.2016.11.001

Reference: MRE 33

To appear in: *Matter and Radiation at Extremes*

Received Date: 14 October 2016

Revised Date: 3 November 2016

Accepted Date: 8 November 2016

Please cite this article as: J.J. Honrubia, A. Morace, M. Murakami, On intense proton beam generation and transport in hollow cones, *Matter and Radiation at Extremes* (2017), doi: 10.1016/j.mre.2016.11.001.

On intense proton beam generation and transport in hollow cones

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Abstract

Proton generation, transport and interaction with hollow cone targets are investigated by means of two-dimensional PIC simulations. A scaled-down hollow cone with gold walls, a carbon tip and a curved hydrogen foil inside the cone has been considered. Proton acceleration is driven by a 10^{20} Wcm^{-2} and 1 ps laser pulse focused on the hydrogen foil. Simulations show an important surface current at the cone walls which generates a magnetic field. This magnetic field is dragged by the quasi-neutral plasma formed by fast protons and co-moving electrons when propagating towards the cone tip. As a result, a tens of kTesla B_z field is set up at the cone tip, which is strong enough to deflect the protons and increase the beam divergence substantially. We propose using heavy materials at the cone tip and increasing the laser intensity in order to mitigate magnetic field generation and proton beam divergence.

Keywords: `Inertial Fusion Energy, Ion Fast Ignition, Laser driven ion acceleration`

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