

P4.2013 Divergence and direction control of laser-driven energetic proton beam using a disk-solenoid target

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See the full abstract here:

<http://ocs.ciemat.es/EPS2019ABS/pdf/P4.2013.pdf>

A scheme for controlling the divergence and direction of energetic proton beam driven by intense laser pulse is proposed. Simulations show that a precisely directed and collimated proton bunch can be produced by a sub-picosecond laser pulse interacting with a target consisting of a thin solid-density disk foil with a solenoid coil attached to its back at the desired angle. It is found that two partially overlapping sheath fields are induced. As a result, the accelerated protons are directed parallel to the axis of the solenoid, and their spread angle is also reduced by the overlapping sheath fields. The proton properties can thus be controlled by manipulating the solenoid parameters. Such highly directional and collimated energetic protons are useful in the high-energy density as well as medical sciences.

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