

Enhancing laser ion acceleration by using advanced target designs

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The ion acceleration is considered one of the main applications of the high power laser systems that are being projected, built, and already operational around the world. The laser driven ion acceleration is not only attractive from the point of view of potential applications of high energy ion beams, but also from the point of view of investigations of fundamental aspects of laser-matter interaction and advanced concepts of particle acceleration. It is well understood that different mechanisms of the laser ion acceleration have its own limitations, connected with either some fundamental properties of the laser-matter interaction, developments of instabilities, or a finite parameter range, where they can operate. Some of these limitations can be compensated by pulse tailoring or advanced target design. In this paper we present several concepts of composite targets with the aim of enhancing the properties of Radiation Pressure Acceleration and Magnetic Vortex Acceleration mechanisms.