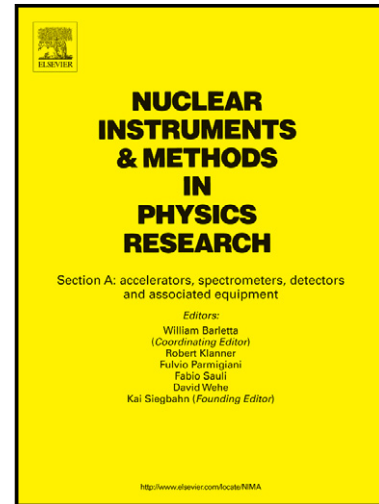


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and emerging mechanisms

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Laser-driven ion acceleration: state of the art and emerging mechanisms

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Abstract

Ion acceleration driven by high intensity laser pulses is attracting an impressive and steadily increasing research effort. Experiments over the past 10-15 years have demonstrated, over a wide range of laser and target parameters, the generation of multi-MeV proton and ion beams with unique properties, which have stimulated interest in a number of innovative applications. While most of this work has been based on sheath acceleration processes, where space-charge fields are established by relativistic electrons at surfaces of the irradiated target, a number of novel mechanisms has been the focus of recent theoretical and experimental activities. This paper will provide a brief review of the state of the art in the field of laser-driven ion acceleration, with particular attention to recent developments. © 2013 Elsevier Science. All rights reserved

Keywords: Type your keywords here, separated by semicolons ; Laser acceleration of ions, Sheath Acceleration, Radiation pressure, laser-matter interaction

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1. Introduction

The first experiments reporting laser acceleration of protons with beam-like properties and multi-MeV energies in laser experiments were reported in 2000 [1-3]. Experiments over the following 13 years have demonstrated, over a wide range of laser and target parameters, the generation of multi-MeV proton and ion beams with unique properties such as ultrashort burst emission, high brilliance, and low emittance, which have in turn stimulated ideas for a range of innovative applications. While most of this work has been based on sheath acceleration processes [3-5], a number of novel mechanisms have been at the centre of recent theoretical and experimental activities. This paper will provide a brief review of the state of the art and recent developments in the field. A more extensive survey is provided in [6-8].

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