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Energetic ion production using a 5 TW Ti:sapphire Laser interacting with an underdense plasma NUNO LEMOS, GoLP/Instituto de Plasmas e Fusão Nuclear, Instituto Superior Técnico, Lisbon, Portugal, KENNETH MARSH, ARTHUR PAK, Department of Electrical Engineering, UCLA, Los Angeles, California 90095, USA, JOANA MARTINS, GoLP/Instituto de Plasmas e Fusão Nuclear, Instituto Superior Técnico, Lisbon, Portugal, CHAN JOSHI, Department of Electrical Engineering, UCLA, Los Angeles, California 90095, USA — From laser-plasma interactions it is now possible to generate energetic particles such as MeV ions and GeV energy electrons using the short-pulse high-intensity lasers available. In this work we present an experimental study where energetic ions were produced in an underdense $\sim$1x10^{19} cm^{-3} plasma created by a 50 fs Ti:Sapphire laser with 5 TW's of power. The acceleration mechanism is mainly based on the generation of a longitudinal electric field at the plasma-vacuum boundary created by the charge separation and the current produced by accelerated electrons. We are exploring if the higher energy electrons produced by laser induced wakes can in turn produce higher energy ions than the usual scaling found using solid targets. The physics of the interaction is studied with 2D and 3D particle-in-cell simulations. Work supported by DOE grants DE-FG02-92ER40727, NSF grants PHY-0936266 and FCT grant SFRH/BD/37838/2007.

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