

Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Sorting Category: 2.3.1 (T)

Direct ion acceleration with variable-frequency lasers

FABIO PEANO, JORGE VIEIRA, RICARDO FONSECA, LUIS SILVA, GoLP/CFP, Instituto Superior Tecnico, Lisboa, Portugal, GIANNI COPPA, ROBERTA MULAS, Politecnico di Torino, Italy — Laser-based ion acceleration commonly relies on indirect schemes, in which the ions are accelerated by the space-charge field in laser-irradiated solid targets, either via plasma-expansion processes [1], or resorting to electrostatic shock structures [2]. Here, we propose the production of monoenergetic ion beams via direct acceleration by the laser field (in vacuum or in tenuous plasmas) [3]. The method exploits two counterpropagating lasers with variable frequency to drive a beat-wave structure with variable phase velocity: the ions are trapped in the beat wave and accelerated to high energies. The physical mechanism is described with a 1D theory, providing the general conditions for trapping and scaling laws for the relevant ion-beam features. The validity and the robustness of the method are confirmed by 2D PIC simulations with OSIRIS [4].

[1] J. Fuchs *et al.*, Nature Phys. **2**, 48 (2006); L. Robson *et al.*, Nature Phys. **3**, 58 (2007); B.M. Hegelich *et al.*, Nature **439**, 441 (2006).

[2] L.O. Silva *et al.*, Phys. Rev. Lett. **92**, 015002 (2004).

[3] F. Peano *et al.*, submitted for publication (2007).

[4] R. A. Fonseca *et al.*, Lect. Notes Comp. Sci. **2331**, 342 (Springer-Verlag, Heidelberg, 2002).

Prefer Oral Session
 Prefer Poster Session

Luis Silva
luis.silva@ist.utl.pt
GoLP/CFP, Instituto Superior Tecnico, Lisboa, Portugal

Date submitted: 22 Jul 2007

Electronic form version 1.4