

APR05-2005-020018

Abstract for an Invited Paper
for the APR05 Meeting of
the American Physical Society

High Quality Electron Beams from Laser Accelerators

WIM LEEMANS, L'OASIS Group, LBNL

Twenty five years ago, laser driven accelerators were proposed as an alternative to conventional accelerator systems.[1] The appeal was and is the large accelerating gradients (up to hundreds of GV/m) that can allow the development of compact devices capable of producing multi-GeV electron beams. Until recently, all experiments produced large gradients but beams with 100 % energy spread and only a small amount of electrons at high energy. This has recently changed. At the multi-beam L'OASIS facility at LBNL we have produced beams with narrow energy spread using a channel guided laser accelerator.[2] At Rutherford Appleton Laboratories (UK)[3] and at the Ecole Polytechnique (France),[4] beams with narrow energy spread were produced by using laser beams with relatively large focal spots. These results demonstrate that laser-plasma based accelerator can produce high quality electron beams. A review of the L'OASIS experiments will be presented as well as our plans and activities for producing a GeV-class electron beam.

[1] T. Tajima and J.M. Dawson, Phys. Rev. Lett. **43**, 267-270 (1979).

[2] C.G.R. Geddes et al., Nature **431**, 538- 541(2004).

[3] S.P.D. Mangles et al., Nature **431**, 535 –538 (2004).

[4] J. Faure et al., Nature **431**, 541-544 (2004).