

HIGH-QUALITY GEV-LEVEL ELECTRON BEAMS FROM LASER PLASMA ACCELERATORS

E. Esarey, LBNL, Berkeley, California

Abstract

In 2004, three separate groups reported for the first time the production of high quality electron bunches from laser plasma accelerators in the 100 MeV range with narrow divergence and narrow energy spread [S. P.D. Mangles et al., C. G.R. Geddes et al., and J. Faure et al., Nature 30 Sep 2004]. These results were obtained using multi-ten TW lasers interacting with few-mm diameter gas jet targets. High quality electron bunches were generated by exciting plasma wakefields to sufficient amplitudes so as to self-trap electrons from the background plasma and accelerate these electrons over distances on the order of the dephasing length. Recently, the plasma was extended from a length of a few mm to a few cm by using a capillary discharge in experiments at LBNL in collaboration with Oxford University. Capillary discharges also enabled lower plasma densities, thus extending the dephasing length. This has resulted in the production of high quality electron bunches in the GeV-range. These results and the associated physics will be discussed.

**PAPER NOT
RECEIVED**