Contribution ID: **204**   Type: **not specified**

Positron Acceleration in a Narrow Plasma Column: Concept and Initial Results of Electron Beam Guidance

The acceleration of positron beams in plasma wakefield accelerators (PWFA) has gained significant interest in recent years due to its potential applications in colliders. One promising scheme for achieving positron acceleration in PWFA is to create an electron-driven blowout wake within a finite-radius, pre-ionized plasma column (narrow plasma column). This approach allows for the formation of an elongated region of sheath electrons at the closing of the first wake period, which can accelerate positrons while simultaneously providing a transverse focusing force. We describe the acceleration technique and present initial results from the E333 experiment at the Facility for Advanced Accelerator Experimental Tests II (FACET-II), which in its first phase investigates the behavior of PWFA in a narrow plasma column with a single electron driver. Our simulations show that the transverse focusing force of the wake is asymmetric when the driving electron beam offsets from the center of the narrow plasma column. This asymmetric transverse force guides the electron beam along the plasma column trajectory. We report preliminary experimental evidence of the guided electron beam in a narrow column PWFA and a reduction in energy loss with respect to PWFA in a wide plasma column.

Working group

WG3 : Beam-driven plasma acceleration

Primary authors: LEE, Valentina (University of Colorado Boulder); ARINIELLO, Robert (SLAC National Accelerator Laboratory); STOREY, Doug (SLAC National Accelerator Laboratory); DIEDERICHS, Severin (CERN); EMMA, Claudio (SLAC National Laboraotry); ESAREY, Eric (LBNL); GESSNER, Spencer (SLAC); HOGAN, Mark; KNETSCH, Alexander (SLAC National Accelerator Laboratory); MAJERNIK, Nathan (UCLA); O'SHEA, Brendan (SLAC National Accelerator Laboratory); OSTERHOFF, Jens (LBNL); SCHROEDER, Carl (Lawrence Berkeley National Laboratory); THÉVENET, Maxence (DESY); BENEDETTI, carlo (LBNL); LITOS, Michael (University of Colorado Boulder)

Presenter: LEE, Valentina (University of Colorado Boulder)

Session Classification: WG3