

Abstract Submitted
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High-Quality Positron Beams in Beam-Driven Plasma Wakefield Accelerators using a Plasma Column¹ SEVERIN DIEDERICHS, Lawrence Berkeley National Laboratory, DESY, University of Hamburg, CARLO BENEDETTI, ERIC ESAREY, Lawrence Berkeley National Laboratory, JENS OSTERHOFF, DESY, CARL B. SCHROEDER, Lawrence Berkeley National Laboratory — Acceleration of positron beams in a plasma-based accelerator is a highly-challenging task. However, in order to realize a plasma-based linear collider, accelerating a positron bunch with high charge and efficiency, while maintaining a low emittance and a sub-percent-level energy spread, is required. Recently, a plasma-based positron acceleration scheme was proposed in which a wake suitable for the acceleration and transport of positrons is produced in a plasma column by means of an electron drive beam [Diederichs et al., PRAB 22, 081301 (2019)]. In this talk, we present a study of beamloading for a positron beam in this type of wake. We demonstrate via particle-in-cell simulations that acceleration of high-quality positron beams is possible, and we discuss a possible path to achieve collider-relevant parameters.

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