

Abstract Submitted  
for the DPP19 Meeting of  
The American Physical Society

**Positron transport and acceleration in beam-driven plasma wakefield accelerators using finite radius plasmas**<sup>1</sup> SEVERIN DIEDERICHS, DESY, TIMON JOHANNES MEHRLING, CARLO BENEDETTI, CARL B. SCHROEDER, Lawrence Berkeley National Laboratory, ALEXANDER KNETSCH, DESY, ERIC ESAREY, Lawrence Berkeley National Laboratory, JENS OSTERHOFF, DESY — The transport and acceleration of positron beams is a crucial challenge on the path towards plasma-based particle colliders. In this work, a finite radius plasma is proposed to generate wakefields that can focus and accelerate positron beams in a plasma wakefield accelerator. The finite radius plasma reduces the restoring force acting on the plasma electrons forming the plasma wakefield, resulting in an elongation of the on-axis return point of the electrons and, hence, creating a long, high-density electron filament. This results in a region with accelerating and focusing fields for positrons, allowing for the acceleration and quality-preserving transport of high-charge positron beams.

<sup>1</sup>We acknowledge the support of the Director, Office of Science, Office of High Energy Physics, of the U.S. Department of Energy, and its Science User Facility National Energy Research Scientific Computing Center (NERSC) under Contract No. DE-AC02-05CH11231.

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Date submitted: 01 Jul 2019

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