Abstract Submitted
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Computing Wake Functions in Plasma Accelerators Using Particle-in-Cell Simulations[1] STEPHEN WEBB, DAVID BRUHWILER, NATHAN COOK, RadiaSoft LLC, ALEXEY BUROV, VALERI LEBEDEV, Fermi National Accelerator Laboratory, REMI LEHE, Lawrence Berkeley National Laboratory — Plasma accelerators in the blowout regime are a possible candidate for a future TeV lepton collider due to their high gradients. These high gradients come from the small scale of the accelerating plasma wave, typically hundreds of microns, compared to conventional rf-based structures, with scales in the range of tens of centimeters. This small scale can lead to very strong dipole wakes, which could drive a beam break-up instability and spoil the bunch for any collider applications. Understanding the beam break-up instability in plasma accelerators requires computing the wake functions in a plasma accelerator to characterize the linear response of the plasma wave to a perturbing charge. We present an approach to computing these wake functions from simulations in the FBPIC electromagnetic particle-in-cell code. We apply this approach to a beam-driven plasma wakefield accelerator using a drive and witness bunch with parameters similar to what is expected at the proposed FACET-II facility.

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