

Abstract Submitted
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Studies of a hybrid Trojan Horse wakefield accelerator with high transformer ratio¹ NATHAN COOK, DAVID BRUHWILER, RadiaSoft LLC, BERNHARD HIDDING, Scottish Centre for the Application of Plasma-based Accelerators, University of Strathclyde, JEAN-LUC VAY, Lawrence Berkeley National Laboratory, STEPHEN WEBB, RadiaSoft LLC — Plasma wakefield acceleration uses relativistic high-charge electron bunches to generate a plasma blowout supporting intense electric fields for trapping and acceleration. Dramatic improvements in emittance, peak current and brightness are achievable through laser-controlled ionization in the plasma blowout, which is the premise of the Trojan Horse approach. The hybrid Trojan Horse concept extends this approach to use the output beam from a laser plasma accelerator to drive a Trojan Horse, resulting in a compact system that can produce higher brightness bunches with order-of-magnitude lower energy spread. We are exploring the use of multiple, shaped laser pulses to resonantly inject a shaped electron drive bunch. The resulting output bunch could generate wakes in PWFA or beam-driven dielectric structures with transformer ratios of 5 to 10 or larger. Hence, a hybrid Trojan Horse accelerator with bunch shaping may provide a compact source of nC bunches that can drive a variety of systems for studying high-gradient wakefields and lepton acceleration. Initial work will use previously simulated electron bunches from a laser plasma accelerator to drive the plasma wakefield stage. We present preliminary results from simulations using the parallel, particle-in-cell framework Warp.

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