

Abstract Submitted
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Numerical simulations towards reaching high transformer ratio in the nonlinear regime of the PWFA¹ YUN FANG, WARREN MORI, CHENGKUN HUANG, WEIMING AN, PATRIC MUGGLI, UNIVERSITY OF SOUTHERN CALIFORNIA COLLABORATION, UNIVERSITY OF CALIFORNIA, LOS ANGELES COLLABORATION — We have previously shown initial simulation results from the Quickpic particle in cell (PIC) code that uses the quasi-static approximation indicating that a transformer ratio larger than two can be achieved with a train of one to three electron bunches driving the PWFA interaction into the weakly non-linear regime. Such transformer ratio can be maintained over four betatron wavelengths (or $\sim 2\text{cm}$). The parameters for the electron bunches are chosen based on the current experiment running in the Brookhaven National Laboratory Accelerator Test Facility where the effects could be demonstrated. Reaching the weakly nonlinear is crucial to insure that the accelerating structure and the transformer ratio are maintained even in the presence of the transverse evolution of the bunch along the plasma caused by the transverse fields. In this presentation, we will investigate the wakefield evolution over very long plasma length (meter scale) and the parameters of a witness bunch following the drive train.

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