

Abstract Submitted  
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**Convergence of the Ponderomotive Guiding Center approximation in the LWFA**<sup>1</sup> THALES SILVA, JORGE VIEIRA, ANTON HELM, RICARDO FONSECA, LUIS SILVA, Instituto Superior Tecnico — Plasma accelerators arose as potential candidates for future accelerator technology in the last few decades because of its predicted compactness and low cost. One of the proposed designs for plasma accelerators is based on Laser Wakefield Acceleration (LWFA). However, simulations performed for such systems have to solve the laser wavelength which is orders of magnitude lower than the plasma wavelength. In this context, the Ponderomotive Guiding Center (PGC) algorithm for particle-in-cell (PIC) simulations is a potent tool. The laser is approximated by its envelope which leads to a speed-up of around 100 times because the laser wavelength is not solved. The plasma response is well understood, and comparison with the full PIC code show an excellent agreement. However, for LWFA, the convergence of the self-injected beam parameters, such as energy and charge, was not studied before and has vital importance for the use of the algorithm in predicting the beam parameters. Our goal is to do a thorough investigation of the stability and convergence of the algorithm in situations of experimental relevance for LWFA. To this end, we perform simulations using the PGC algorithm implemented in the PIC code OSIRIS. To verify the PGC predictions, we compare the results with full PIC simulations.

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Jorge Vieira  
Instituto Superior Tecnico

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