

Abstract Submitted
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Ultra-relativistic electron and positron bunches in plasmas in the linear and blow-out/suck-in regime LIGIA AMORIM, JORGE VIEIRA, GoLP/Instituto de Plasmas e Fusão Nuclear, Instituto Superior Técnico, Lisbon, Portugal, PATRIC MUGGLI, Max Planck Institute for Physics, Munich, Germany, RICARDO FONSECA, GoLP/Instituto de Plasmas e Fusão Nuclear, Instituto Superior Técnico, Lisbon, Portugal, WARREN MORI, University of California, Los Angeles, USA, LUIS SILVA, GoLP/Instituto de Plasmas e Fusão Nuclear, Instituto Superior Técnico, Lisbon, Portugal — Proton bunches currently available at CERN are promising candidates as drivers for plasma based accelerators since their energy (100 kJ) is much larger than that of currently available drivers. A proton-driven plasma wakefield acceleration [1] experiment (AWAKE) is currently being designed at CERN which will operate in self-modulated regimes. Key physics of the experiment can also be explored using current technology and electron and positron bunches at SLAC-FACET. Understanding how does wake excitation occur for positively and negatively charged particle bunches using both long and compressed (capable of driving higher amplitude wakefields) bunches is critical for future experiments. We will examine analytically and numerically (using OSIRIS) the differences between positively [2] and negatively driven wakefields (e.g. evolution of average and peak acceleration gradients, wake phase velocity, etc) in the suck-in, blowout and self-modulated regimes for hadrons and leptons.

[1] A. Caldwell et al. Nat. Physics 5 363 (2009)

[2] B. E. Blue et al., PRL 90 214801 (2003)

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