

Abstract Submitted  
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**Positron acceleration in doughnut wakefields in the blowout regime**<sup>1</sup> JORGE VIEIRA, JOSE MENDONCA, RICARDO FONSECA<sup>2</sup>, LUIS SILVA, GoLP/Instituto de Plasmas e Fusão Nuclear, Instituto Superior Técnico, Universidade de Lisboa, Lisbon, Portugal — Most important plasma acceleration results were reached in the so called bubble or blowout regime. Although ideally suited for electron acceleration, it has been recognized that non-linear regimes are not adequate to accelerate positrons. New configurations enabling positron acceleration in non-linear regimes would therefore open new research paths for future plasma based collider configurations. In this work, we explore, analytically and through 3D OSIRIS simulations, a novel configuration for positron acceleration in strongly non-linear laser wakefield excitation regimes using Laguerre-Gaussian laser drivers to drive doughnut shaped wakefields with positron focusing and accelerating fields [J. Vieira and J.T. Mendonca, PRL 112 215001 (2014)]. We demonstrate that positron focusing-fields can be up to an order of magnitude larger than electron focusing in the spherical blowout regime. The amplitude of the accelerating fields is similar to the spherical blowout. Simulations demonstrate laser self-guiding and stable positron acceleration until the laser energy has been exhausted to the plasma. Other realisations of the scheme, using two Gaussian laser pulses, will also be explored.

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