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**Positron self-driven hollow channel in non-linear plasma wakefields**[1] LIGIA DIANA AMORIM, JORGE VIEIRA, RICARDO A. FONSECA, LUIS O. SILVA, GoLP/Instituto de Plasmas e Fusão Nuclear, Instituto Superior Técnico, Lisbon, GOLP/INSTITUTO DE PLASMAS E FUSÃO NUCLEAR TEAM — Plasma based accelerators are capable of sustaining very high acceleration gradients when compared to conventional accelerators. In particular plasma based accelerators operating in non-linear regimes reached the 100GV/m. One of the challenges for a future plasma based collider is to accelerate positrons in non-linear regimes. Although novel techniques have been investigated to this end [1], it is still important to propose and explore other new configurations for positron acceleration in non-linear regimes. In this context we suggest a novel process for positron acceleration in non-linear plasma wakefields, where a tightly focused positron drive beam expels the plasma ions forming a hollow channel with large accelerating and focusing wakefields suitable for positron acceleration. We introduce the setup of the proposed scheme and illustrate it with analytical and numerical results of a 3D numerical simulations performed with the PIC code OSIRS [2]. Moreover, we discuss the optimal conditions for the positron drive beam stability.

[1] J. Vieira, J.T. Mendonça, PRL 112, 215001 (2014);
[2] R. A. Fonseca et al., Lect. Notes Comput. Sci. 2331, 342 (2002).

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