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High-gradient positron acceleration in thin, warm hollow plasma channels THALES SILVA, Instituto Superior Tecnico, LIGIA DIANA AMORIM, Lawrence Berkeley National Laboratory, MICHAEL DOWNER, The University of Texas at Austin, MARK HOGAN, VITALY YAKIMENKO, SLAC National Accelerator Laboratory, RAFAL ZGADZAJ, The University of Texas at Austin, JORGE VIEIRA, Instituto Superior Tecnico — Plasma-based accelerators are promising candidates for particle acceleration in the next generation of light sources and lepton colliders due to their high-accelerating gradients. Plasmas accelerators are asymmetric for the accelerated bunch charge's sign as the background electrons and ions react at different timescales due to the disparity of their mass. Thus, progress for positron acceleration has been much slower than for electrons. A possible solution is the use of hollow plasma channels, but there beam breakup instabilities dominate the bunch dynamics. Using theory and three-dimensional particle-in-cell simulations, we show that the long-term plasma dynamics (ionic timescales) in the blowout's regime aftermath can generate thin and warm plasma channels. These channels are ready for high-gradient and high-quality positron acceleration, free from beam breakup instabilities. We explore regimes suitable for proof-of-principle experimental verification with today's technology.

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