

Abstract Submitted
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Dephasingless laser wakefield acceleration J.P. PALASTRO, J.L. SHAW, D. RAMSEY, T.T. SIMPSON, P. FRANKE, S. IVANCIC, K. DAUB, D.H. FROULA, University of Rochester, Laboratory for Laser Energetics — The energy gain in conventional laser wakefield acceleration (LWFA) is ultimately limited by dephasing, occurring when trapped electrons outrun the accelerating phase of the wakefield. Here we apply spatiotemporal pulse shaping to overcome this limitation. The ponderomotive force of spatiotemporally shaped pulses can drive a wakefield with a phase velocity equal to the speed of light in vacuum, preventing trapped electrons from outrunning the wake. Analytic scalings in the linear and bubble regimes illustrate the distinct parameter regimes required to optimize traditional and dephasingless LWFAs.

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