Abstract Submitted
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Injection, focusing, and acceleration of electrons in the nonlinear 3D laser wakefield.[1] SERGUEI KALMYKOV, The Department of Physics and Institute for Fusion Studies, The University of Texas at Austin, LEONID GOBUNOV, P. N. Lebedev Physics Institute, Russian Academy of Sciences, Moscow, Russian Federation, PATRICK MORA, Centre de Physique Theorique (UMR 7644 du CNRS), Ecole Polytechnique, Palaiseau, France, GENNADY SHVETS, The Department of Physics and Institute for Fusion Studies, The University of Texas at Austin — Accelerating and focusing phases of the nonlinear three-dimensional axisymmetric laser wakefield can almost entirely overlap at some distance back from the laser pulse in homogeneous plasma. Field structure of this kind results from the curvature of phase fronts due to the radially inhomogeneous relativistic plasma frequency shift. Consequently, the number of trapped low-energy electrons can be much greater than that predicted by the linear wake theory. This effect is favorable for trapping and monoenergetic acceleration of considerable charge (several hundreds of pC) to about 1 GeV per electron in the plasma wakefield driven by the ultrashort (of order 30 fs) loosely focused (focal spot radius about 100 microns) petawatt laser pulse.

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