

Abstract Submitted
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Plasma undulator based on laser excitation of wakefields in a plasma channel¹ CARL SCHROEDER, Lawrence Berkeley National Laboratory, SERGEY RYKOVANOV, Helmholtz-Institut Jena, ERIC ESAREY, CAMERON GEDDES, WIM LEEMANS, Lawrence Berkeley National Laboratory — A novel plasma undulator based on the wakefields excited by a laser pulse in a plasma channel is described. Generation of the undulator fields is achieved by inducing centroid oscillations of the laser pulse in the channel. The period of such a plasma undulator is proportional to the Rayleigh length of the laser pulse and can be sub-millimeter, with an effective undulator strength parameter of order unity. The undulator period can further be controlled and reduced by beating laser modes or using multiple colors. Analytic expressions for the electron trajectories in the plasma undulator and the synchrotron radiation are compared to numerical modeling. Examples of short-period laser-driven plasma undulators are presented based on available laser and plasma channel parameters.

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