

Abstract Submitted
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Direct Laser Acceleration of Electrons in a Plasma Wakefield with Ionization Injection¹ J.L. SHAW, F.S. TSUNG, N. LEMOS, K.A. MARSH, N. VAFAEI-NAJAFABADI, W.B. MORI, C. JOSHI, University of California Los Angeles — We show through experiments and supporting simulations the role of direct laser acceleration (DLA) of electrons in a plasma accelerator when ionization injection of electrons is employed to inject charge into the laser-produced wake. If the laser pulse is intense enough to expel most of the plasma electrons but is nevertheless long enough to overlap the electrons trapped in the first accelerating potential well (bucket) of the wakefield, then the betatron oscillations of the electrons in the plane of the laser polarization in the presence of an ion column can lead to an energy transfer from the laser pulse to the electrons. DLA can be a major contributor to the maximum electron energy, and the energy gain due to DLA can exceed that due to laser wakefield acceleration for certain laser and plasma parameters.

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