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Role of direct laser acceleration of electrons in a laser wakefield accelerator with ionization injection[1] JESSICA SHAW, UCLA, LLE, NUNO LEMOS, UCLA, LLNL, LIGIA DIANA AMORIM, UCLA, IST, NAVID VAFAEI-NAJAFABADI, UCLA, Stony Brook University, KEN MARSH, FRANK TSUNG, UCLA, DUSTIN FROULA, LLE, WARREN MORI, CHAN JOSH, UCLA — We show through experiments and supporting simulations the role of direct laser acceleration (DLA) of electrons in a laser wakefield accelerator when ionization injection of electrons is employed. The laser pulse is intense enough to create a nonlinear wakefield and long enough to overlap the electrons trapped in the first accelerating potential well (bucket) of the wakefield. The betatron oscillations of the trapped electrons in the plane of the laser polarization in the presence of an ion column lead to an energy transfer from the laser pulse to the electrons through DLA. We show that the produced electron beams exhibit characteristic features that are indicative of DLA as an additional acceleration mechanism when the laser pulse overlaps the trapped electrons.

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