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Observation of Monoenergetic Electrons from Two-Pulse Ionization Injection in Quasilinear Laser Wakefields

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The generation of low emittance electron beams from laser-driven wakefields is crucial for the development of compact x-ray sources. Here, we show new results for the injection and acceleration of quasimonoenergetic electron beams in low amplitude wakefields experimentally and using simulations. This is achieved by using two laser pulses decoupling the wakefield generation from the electron trapping via ionization injection. The injection duration, which affects the beam charge and energy spread, is found to be tunable by adjusting the relative pulse delay. By changing the polarization of the injector pulse, reducing the ionization volume, the electron spectra of the accelerated electron bunches are improved.

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