

Abstract Submitted
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Generation of multiple, mono-energetic electron bunches via ionization injection in a laser wakefield accelerator C.J. ZHANG, Tsinghua University, C.-K. HUANG, National Central University, J.F. HUA, Tsinghua University, C.-H. CHEN, S.-Y. CHEN, National Central University, C. JOSHI, W.B. MORI, University of California Los Angeles, J. WANG, National Central University, W. LU, Tsinghua University — Electron bunches with multiple energy peaks are generated via ionization injection in a laser wakefield accelerator using a 40 fs, 10 TW laser. These electron bunches are highly asymmetric with an aspect ratio that varies from 2 to 5 and have a central energy about 80 MeV with multiple narrow-energy-spread peaks. Key features of the electron bunches seen in this experiment are observed in 3D PIC simulations using OSIRIS. In the simulations, ionization and injection of the inner-shell electrons is caused by the increase of laser intensity due to self-focusing ($p/p_c \approx 1.1$) and is subsequently terminated after a propagation distance of less than Z_R as a result of laser evolution. Acceleration of these electrons then leads to mono-energetic bunches. The interaction between the back of the laser pulse and the accelerated bunch stretches the latter leading to a highly asymmetric spot.

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