

Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

High quality electron bunch generation using a longitudinal density-tailored plasma-based accelerator WARREN MORI, XINLU XU, Univ of California - Los Angeles, FEI LI, WEI LU, Tsinghua University, CHAN JOSHI, Univ of California - Los Angeles — The feasibility of generating high quality electron bunches (high brightness, low energy spread and short duration) from a plasma-based accelerator that utilizes an appropriately tailored plasma density profile is demonstrated with three-dimensional particle-in-cell simulations. The underlying physical mechanism that leads to generation of high quality electrons is uncovered by tracking the particle trajectories of the electrons as they cross the sheath and are trapped by the wake. The intensity of the driver and the steepness of density profile select the electrons to be injected and determines the quality of the injected beam. In the given example, a peak brightness of 10^{19} A/m²/rad² and a slice energy spread of ~ 0.5 MeV can be achieved by exciting a wake as the laser pulse traverses a plasma density downramp with a nominal density of 10^{19} cm⁻³. Work supported by NSF and DOE.

Xinlu Xu
Univ of California - Los Angeles

Date submitted: 24 Jul 2015

Electronic form version 1.4