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High brightness electron beam generation through plasma density variation induced injection in beam or laser driven 3D nonlinear wakes WEI LU, FEI LI, XINLU XU, Tsinghua University of Beijing, China, WARREN MORI, CHAN JOSHI, University of California, Los Angeles — High brightness electron beam generation is critical for the development of plasma wakefield accelerators. The generation of high current and low emittance electron beam through plasma density variation induced injection in charged beam or laser driven 3D nonlinear wakes is explored using full 3-dimensional particle-in-cell simulations. It is found out that the radial selection in the injection process and the transverse dynamics when the injected electrons move in the electron sheath of the wake determine the final beam quality, e.g., emittance, current and energy spread. Simulations show that brightness as high as $5 \times 10^{20}\mathrm{Am}^{-2}\mathrm{rad}^{-2}$ could be generated under proper condition.

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