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Colliding pulse injection experiments in non-collinear geometry for controlled laser plasma wakefield acceleration of electrons CSABA TOTH, K. NAKAMURA, C. GEDDES, P. MICHEL, C. SCHROEDER, E. ESAREY, W. LEEMANS — A method for controlled injection of electrons into a plasma wakefield relying on colliding laser pulses [1] has been proposed a decade ago to produce high quality relativistic electron beams with energy spread below 1% and normalized emittances $<$ 1 micron from a laser wakefield accelerator (LWFA). The original idea uses three pulses in which one pulse excites the plasma wake and a trailing laser pulse collides with a counterpropagating one to form a beat pattern that boosts background electrons to catch the plasma wave. Another, two-beam off-axis injection method [2] with crossing angles varying from 180 to 90 degrees avoids having optical elements on the path of the electron beam and has been studied at the LOASIS facility of LBNL as a viable method for laser triggered injection. It allows low dark current operation with controllable final beam energy and low energy spread. Here, we report on progress of electron optical injection via the two-beam non-collinear colliding pulse scheme using multi-terawatt Ti:Sapphire laser beams (45 fs, 100s of mJ) focused onto a Hydrogen gas plume. Experimental results indicate that electron beam properties are affected by the second beam. *This work is supported by DoE under contract DE-AC02-05CH11231.
[1] E. Esarey, et al, Phys. Rev. Lett 79, 2682 (1997) [2] G. Fubiani, Phys. Rev. E 70, 016402 (2004)

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