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Laser triggered injection using colliding pulses

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Laser driven acceleration in plasmas has succeeded in producing electron beams containing multi-nC's of charge, with some fraction of the electrons having energies in excess of 10's of MeV's but 100 % energy spread. One of the current challenges is to produce electron beams with much reduced energy spread. We report on experimental progress in the laser triggered injection of electrons in a laser wakefield accelerator using the colliding pulse method [1],[2]. The experiments use the OASIS multi-beam 10 Hz high power Ti:Al₂O₃ laser system [3]. In the present experiments, two counter propagating beams 30° angle are focused onto a high density gas jet. Preliminary results indicate that electron beam properties are affected by the second beam. Details of the experiments will be shown as well as comparisons with simulations. This work supported by DoE under contract No DE-AC-03-76SF0098. C. Geddes acknowledges support from the Hertz Foundation.

[1] E. Esarey et al., Phys. Rev. Lett. 79, 2682 (1997).

[2] C.B. Schroeder et al., Phys. Rev. E 59, 6037 (1999).

[3] W.P. Leemans et al., Phys. Rev. Lett. 89, 174802 (2002).