

Abstract Submitted  
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**High energy low divergence electron beams generated with gas mixtures in sub-millimeter length gas cells**<sup>1</sup> JESSICA SHAW, NAVID VAFAEI-NAJAFABADI, KEN MARSH, CHAN JOSHI, UCLA — Laser wakefield acceleration in underdense plasma has been an area of intense study as a source of high energy monoenergetic electron beams. In this work, we report on the acceleration of electrons with energies on the order of 100 MeV using sub millimeter gas cells with comparable lengths to the source's dephasing length. The gas cell design, used mainly to overcome the density inhomogeneity associated with gas jets, yielded low density homogeneous sub-millimeter length plasmas. A 50 fs,  $\sim 10$  TW Ti:Sapphire laser was focused with an OAP onto gas cells 300  $\mu\text{m}$  long. Helium was used as the target gas with  $\text{N}_2$  impurities added in order to induce ionization trapping of plasma electrons as previously reported [1]. The observed electron beams had divergences as low as 1.9 mrad and an unnormalized emittance as low as  $3.7 \times 10^{-3}$  mm mrad. These results are to be presented and techniques to reduce energy spread to be explored.

[1] Pak, A., et. al. PRL, 104, 025003.

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