

Abstract Submitted
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Optimization of electron beam properties from intense laser pulses interacting with structured gas jets KELLY SWANSON, HAI-EN TSAI, SAM BARBER, REMI LEHE, HANN-SHIN MAO, SVEN STEINKE, JEROEN VAN TILBORG, KEI NAKAMURA, CAMERON GEDDES, CARL SCHROEDER, ERIC ESAREY, WIM LEEMANS, Lawrence Berkeley Natl Lab — Through precision tailoring of the plasma density profile, control of laser-plasma-accelerated electron beams injected along a shock-induced density downramp was demonstrated. The relationships between the electron beam spatial profile and steering, and the downramp slope, shock angle and the acceleration length were experimentally investigated using a 1.8 J, 45 fs laser interacting with a mm-scale gas jet. We demonstrate that injection is highly sensitive to these parameters, and by adjusting the density profile high-quality electron beams over a tunable range of energies were produced. Simple models were developed to explain these relationships and are in good agreement with the experimental results, advancing the understanding of downramp injection.

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