Abstract Submitted
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Injection of electrons into a laser wakefield accelerator driven in a capillary discharge waveguide using an embedded gas jet[1] ANTHONY GONSALVES, DMITRIY PANASENKO, KEI NAKAMURA, CHEN LIN, EAMONN MONAGHAN, CSABA TOTH, CAMERON GEDDES, CARL SCHROEDER, ERIC ESAREY, WIM LEEMANS, Lawrence Berkeley National Laboratory — A key issue in laser wakefield accelerators (LWFAs) is injection of electrons into the accelerating region of the wake. Typically electron beams have been self-injected into the wake, requiring a higher plasma density than that for an optimized accelerating structure. This in turn limits the electron beam energy and quality that can be achieved. In this talk it is shown that this coupling of injection and acceleration can be addressed for LWFA in a capillary discharge waveguide with the use of a gas jet embedded into the capillary. Previous experiments without a gas jet have shown self-trapping and acceleration of electrons with energy up to 1 GeV [Leemans et al., Nature Phys. Vol. 2, 696, 2006]. The addition of a gas jet in this work has shown that injection can be turned on or off by a local density perturbation. Hence high-energy electrons can be produced for densities in the capillary lower than otherwise possible without the jet. Results will also be presented on the improvement of electron beam properties, as well as laser spectral modulation and pump depletion.

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