Abstract Submitted
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Optimization of laser-heated capillary discharge waveguides for laser wakefield acceleration[1] C. V. PIERONEK, Lawrence Berkeley National Laboratory, University of California-Berkeley, A. J. GONSALVES, C. BENEDETTI, S. S. BULANOV, J. VAN TILBORG, J. H. BIN, K. K. SWANSON, J. DANIELS, W. P. LEEMANS[2], Lawrence Berkeley National Laboratory, G. BAGDASAROV, N. BOBROVA, V. GASILOV, Keldysh Institute of Applied Mathematics RAS, G. KORN, Institute of Physics ASCR, P. SASOROV, Keldysh Institute of Applied Mathematics RAS, C. G. R. GEDDES, C. B. SCHROEDER, E. ESAREY, Lawrence Berkeley National Laboratory — Laser-heated discharge capillary waveguides provide low plasma density guiding structures to guide laser pulses over many diffraction lengths and have been recently employed in laser-plasma acceleration experiments to achieve 7.8 GeV. Optimizing accelerator performance requires control of waveguide plasma density and matched spot size, which experiments show can be tuned via initial discharge and laser parameters. Characterization of the matched spot size and plasma density in laser-heated capillary discharges is presented. Measurements are compared to modeling using the MHD code MARPLE. Trends in waveguide properties with respect to initial plasma density and temperature, as well as heating laser parameters, have been identified. Strategies for optimizing accelerator performance are described.

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