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**Ionization Injection and Acceleration of Electrons in Meter Scale Plasma at FACET**[1] NAVID VAFAEI-NAJAFABADI, C.E. CLAYTON, K.A. MARSH, W. AN, UCLA, W. LU, Tsinghua University, UCLA, W.B. MORI, C. JOSHI, UCLA, E. ADLI, University of Oslo, SLAC National Accelerator Laboratory, J. ALLEN, C.I. CLARKE, S. CORDE, J. FREDERICO, S. GESSNER, S.Z. GREEN, M. LITOS, SLAC National Accelerator Laboratory, D. WALZ, Retired, M.J. HOGAN, V. YAKIMENKO, SLAC National Accelerator Laboratory, P. MUGGLI, MPI — Generation and acceleration of a bright beam in a plasma wakefiled accelerator using ionization injection is explored in experiment and supporting simulation. The plasma is generated via field ionization of a column of lithium vapor by the 3nC, 20.35 GeV electron beam at FACET. The electron beam then drives a wakefield in the singly ionized lithium plasma, which rapidly evolves to the blowout regime. The column of lithium vapor is bounded by cold helium gas, which result in density ramps on either side of the lithium vapor. Electrons belonging to helium, on the lithium density ramp, can therefore be ionized by the combined fields of the wakefield and the electron beam as it undergoes betatron oscillations. The resulting injected beam can gain over 25 GeV of energy, with energy spread on the order of 10%, and emittance that is much smaller than that of the drive beam. Solutions for reducing energy spread of this beam based on OSIRIS simulations will be presented.

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