

Abstract Submitted
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Impact of Distributed Injection on Plasma Wakefield Acceleration at FACET¹ NAVID VAFAEI-NAJAFABADI², Stony Brook University — Impact of Distributed Injection on Plasma Wakefield Acceleration at FACET An electron-beam-driven plasma wakefield accelerator (PWFA) will sustain accelerating gradients of tens of GeV/m in a meter-scale plasma. If the transverse radius of the electron beam is not matched to the plasma, the envelope of this drive beam will execute betatron oscillations in the focusing force of the ion column. At its lowest radius in this oscillation cycle, the electric field of the beam can surpass the ionization threshold of elements, leading to ionization injection of these electrons in to the wake. Electrons from each cycle of this betatron oscillation then accumulate at the back of the wake and decrease the accelerating field. The experiments were carried out at FACET, where the drive electron beam had 3 nC of charge and an energy of 20.35 GeV. Two different plasma sources were used: a ~30 cm self-ionized Rubidium (Rb) vapor confined by argon (Ar) gas at room-temperature and a partially pre-ionized hydrogen gas. The experimental and simulation evidence for the distributed injection of electrons and their impact on the PWFA at FACET will be presented in this talk.

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