

Abstract Submitted
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Wake excitation and beam dynamics in self-ionized plasma wakefield acceleration for afterburner parameters MIAOMIAO ZHOU, CHENGKUN HUANG, WEI LU, FRANK TSUNG, VIKTOR DECYK, CHAN JOSHI, WARREN MORI, UCLA, E-167 COLLABORATION — For the parameters envisaged in possible afterburner stages of a plasma wakefield accelerator (PWFA), the self-fields of the particle beam can be intense enough to tunnel ionize some neutral gases. Wake excitation (including the optimal gas density) in self-ionized regimes are investigated by comparing with the pre-ionized wakes through simulation. Critical issues such as the hosing instability and the beam head erosion are also investigated with QuickPIC, a highly efficient 3-D quasi-static particle in cell (PIC) code which makes it possible to model these long term beam dynamics with hundreds of betatron oscillations. QuickPIC has been validated by benchmarking it against full PIC code OSIRIS and previous afterburner experiments. Comparisons with ongoing experiments at SLAC will also be shown. Work supported by DOE under DE-FGO3-92ER40727, DE-FC02-01ER41179, and DE-FG02-03ER54721.

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