Modeling GeV-class single-stage laser-plasma electron acceleration in the blowout regime

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Using this computationally effective strategy, we elucidate the physics of electron self-injection and assess the risk factors associated with the nonlinear evolution of the self-guided driver. It is shown that phase self-modulation and self-steepening transform an initially smooth driver into a relativistic piston, which causes rapid expansion of the bubble followed by continuous injection and generation of polychromatic tails in electron spectra [2]. The work is partly supported by the U.S. DoE.