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Enhanced Laser-to-Electron Energy Conversion Efficiency using Micro-Plasma Waveguide (MPW) Targets[1] DEREK NASIR, Ohio State Univ - Columbus, JOSEPH SNYDER, Department of Mathematical and Physical Sciences, Miami University Hamilton, LIANG JI, Shanghai Institute of Optics and Fine Mechanics, KEVIN GEORGE, CHRISTOPHER WILLIS, GINEVRA COCHRAN, ANTHONY ZINGALE, REBECCA DASKALOVA, DOUG SCHUMACHER, LINN VAN WOERKOM, Ohio State Univ - Columbus — We present experiments from the Scarlet laser facility and 3D Particle in Cell (PIC) simulations detailing the improved hot electron spectrum of MPW targets over flat targets. We observe an increase in the electron cutoff energy by a factor of 3 and a 10x enhancement of the total signal of electrons above 5MeV. From PIC simulations, we see strong transverse electric fields extract electron bunches from the MPW walls with the laser period, which are then accelerated by the usual **v**x**B** force. In addition, quasi-static longitudinal electric fields arise and are observed to increase the acceleration length of electrons along the tube walls. In this way, the micro-engineered structures provide a geometry more conducive to efficient direct laser acceleration and offer a new dimension in target design. We present evidence that by varying the structure's geometry we can alter the laser plasma interactions with applications in high field science, laser based proton therapy and relativistic nonlinear optics. In particular, the relationship between the MPW tube and laser-electron dephasing length is examined.

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