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Direct Acceleration of Electrons in a Corrugated Plasma Waveguide JOHN PALASTRO, ANDREW YORK, THOMAS ANTONSEN, HOWARD MILCHBERG, University of Maryland — Direct laser acceleration of electrons provides a low power tabletop alternative to laser wakefield accelerators. Until recently, however, direct acceleration has been limited by diffraction, phase matching, and material damage thresholds. The development of the corrugated plasma channel has simultaneously removed all of these limiting factors and promises to allow direct acceleration of electrons over many centimeters at high gradients using femtosecond lasers. We present a simple analytic model of laser propagation in a corrugated plasma channel and examine the laser-electron beam interaction. Simulations show accelerating gradients of several hundred MeV/cm for laser powers much lower than required by standard laser wakefield schemes.

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