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Kilo-Tesla Axial Magnetic Fields from Linearly Polarized Orbital Angular Momentum Beams (PhD Oral-24)[1] ANDREW LONGMAN, JASON MYATT, ROBERT FEDOSEJEVS, University of Alberta — Linearly polarized orbital angular momentum (OAM) modes have recently been demonstrated with intensities exceeding 3E19Wcm-2 at focus using off-axis spiral phase mirrors [1]. With the ability now to generate such modes, we have explored the possibility of generating kilo-Tesla level axial magnetic fields numerically with OAM modes that can be obtained in high-power laser facilities. 3D PIC simulations run using the EPOCH code confirm the analytic model of the inverse Faraday effect [2], and show kilo-Tesla fields generated over lengths greater than 100 microns, and with decay times on the order of picoseconds using laser pulses of length 100 femtoseconds. We discuss the coupling of linearly polarized OAM modes to plasma through nonlinear mechanisms, scaling laws of the inverse Faraday effect, magnetic field persistence, and length scales. [1]. A. Longman et al, Opt. Lett. 48(8), 2187-2190, 2020 [2]. S. Ali et al. Phys. Rev. Lett. 105(035001), 2010

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