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Photoelectron Angular Distributions from an Ultrastrong Field Atom Interaction ANTHONY DICHIARA, ISAAC GHEBREGZIABHER, ROBERT SAUER, BARRY WALKER, Department of Physics and Astronomy, University of Delaware, Newark DE 19716 — Ultrastrong field laser physics has introduced a new regime for light-matter interactions. Photoelectrons in the continuum acquire relativistic kinetic energy from the laser electric field and the laser magnetic field can no longer be ignored. Therefore, the full Lorentz force is necessary to understand photoelectron continuum dynamics. As a result photoelectrons are pushed toward the direction of laser propagation. This effect impacts processes such as rescattering and high harmonic generation by preventing photoelectrons from revisiting the atomic core. In addition, the large photoelectron velocity could prove useful for laser based accelerator schemes. We report the photoelectron angular distributions measured for Argon atoms at an intensity of $5x10^{18}$ W/cm^2. The experimental apparatus consists of a 780 nm, 45 fs Ti:Sapphire chirped pulse amplifier operating at the terawatt level. The laser is focused in a UHV chamber to a spot of 2 μm in diameter. We find that the isotropy increases with intensity and lower kinetic energy photoelectrons are more isotropic.

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