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Relativistic MeV Photoelectrons from the Single Atom Response of Xenon to a 10^{19} W/cm^2 Laser Field NAGITHA EKANAYAKE, Department of Physics and Astronomy, University of Delaware, Newark, Delaware 19716, USA., ANTHONY DICHIARA, ISSAC GHEBREGZIABHER, LAURA BARCLAY, JANE WAESCHE, BARRY WALKER — We present experimental photoelectron measurements from the single atom photoionization of Xe exposed to field intensities up to 1.2x10^{19} W/cm^2. An ultra-strong laser field was used to ionize Xe and the resulting high energy electrons as a function of intensity, energy and angle were measured with a dynamic range of four orders of magnitude. The measurements are compared to a 3D, relativistic, semi-classical, single electron model of ionization [1]. The essential photoelectron spectrum features above 0.5 MeV, including the high energy cutoff, are in reasonable agreement with a semi-classical, relativistic 3D model of ionization. The observed energy spectrum and angular distributions at 60 keV is lower than the calculated result by an order of magnitude indicating existence of multi-electron processes which are not included in the model. This work is supported by the National Science Foundation (Grant #: 0757953).

[1] I. Ghebregziabher and B.C. Walker, PRA 76, 023415 (2007).

Barry Walker
Department of Physics and Astronomy,
University of Delaware, Newark, Delaware 19716, USA

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