Abstract Submitted
for the MAS14 Meeting of
The American Physical Society

Experimental Resolution of 100 keV to MeV Photoionization from Ultrahigh Intensity Ionization of Atoms BARRY WALKER, PATRICK GRUGAN, SIYU LUO, SUI LUO, University of Delaware — Recent work on the ionization of atoms by ultrahigh intensities ($2 \times 10^{19} W/cm^2$) has shown that photoelectrons are strongly forward scattered and atomic shell structure plays a significant role in the energy resolved photoelectron spectrum and angular distribution [1]. The energy and angular resolutions for these previous experiments were 30% and 4°, respectively. The experiments were unable to determine the yield of photoelectrons beyond 2 MeV or observe potential dynamics due to excitation from photoelectron rescattering with the parent ion in the ultrastrong field. We will discuss the recent results and a new magnetic spectrometer, currently under construction, that will allow for better angular and energy resolution of the 100 keV to MeV photoelectrons. Additional benefits of the new system include the ability to resolve photoelectrons above 4 MeV, an order of magnitude improvement in the signal to noise, and an increased sample density at the laser focus creating the ultrahigh intensity.

[1] N. Ekanayake, et al PRL 110, 203003 (2013)

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Date submitted: 03 Sep 2014 Electronic form version 1.4