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Inelastic electron-argon scattering in a laser field[1]

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Laser-assisted electron scattering (LAES) experiments examine the effects of an electro-magnetic field on the collision of charged particles with atoms and molecules. Most LAES experiments involving elastic scattering have been well described by a simple theory (the Kroll-Watson Approximation[2]) that assumes that laser-target interactions can be ignored. In 2015, Morimoto, Kanya, and Yamanouchi reported on LAES experiments in xenon[3] that, for the first time, showed the unambiguous breakdown of the KWA. Those experiments were extremely challenging due to (among other things) the fact that the laser-field dressing of the target xenon atoms was slight, and only apparent at scattering angles less than 0.5°. Here we will present an overview of LAES experiments and describe our recent work to observe laser-target interactions during *inelastic* electron-argon scattering. The polarizability of the excited argon is relatively large, making dressing effects easier to observe.

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[2]N. M. Kroll and K. M. Watson Phys. Rev. A 8, 804 (1973).

[3]Y. Morimoto, R. Kanya and K. Yamanouchi Phys. Rev. Lett. 115, 123201 (2015)