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Dressing effects in laser assisted inelastic electron-atom scattering[1]

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How does a laser field influence the scattering of an electron by an atom or molecule? That is the question investigated by laser-assisted electron scattering (LAES) experiments. The first, and most commonly performed LAES experiments involved elastic scattering. Most of those experiments were well described by the Kroll-Watson Approximation[2] which ignores laser-target interactions. However, if the cross sections predicted using the KWA are small, then laser-target interactions are not necessarily negligible. Morimoto, et al reported the first observation of laser-target interactions in an LAES experiment in 2015[3]. Their experiments were extremely challenging largerly due to the fact that the polarization of the target xenon atoms by the laser-field dressing was small, 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-dressing effects during *inelastic* electron-argon, and electron-helium scattering. The polarizability of excited argon, and helium 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)