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Laser assisted free-free experiments: the search for dressed-atom effects[1] C.M. WEAVER, B.N. KIM, N.L.S. MARTIN, University of Kentucky, B.A. DEHARAK, Illinois Wesleyan University — The absorption or emission of radiation during the collision of charged particles with atoms and molecules is investigated in the so-called free-free experiments. Up to now almost all such experiments have been in agreement with a simple theory which assumes that the interaction of the radiation with the atom itself has no effect on the scattering process. Very recently the first experiments to observe the unambiguous breakdown of this assumption have been carried out in xenon by Morimoto, Kanya, and Yamanouchi.[2] An estimate of the dressing of the target by the radiation's electric field may be made in terms of the electric dipole polarizability of the target. The effects in Xe were extremely difficult to measure because they occur at very small scattering angles. We have begun to carry out laser-assisted elastic scattering experiments in potassium, and laser-assisted inelastic scattering experiments in argon. In both cases we expect that dressing effects should be observed at scattering angles easily accessible to experiments, and without the need for complicated corrections.

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

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