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Free-free experiments: dressed-atom effects during electron excitation¹ C.M. WEAVER, B.N. KIM, N.L.S. MARTIN, U. 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 free-free experiments. Recently the first experimental observation of dressed-atom effects has been reported.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 (seen in Xe) were extremely difficult to measure because they occur at very small scattering angles, necessitating extraordinary efforts to eliminate the unscattered electron beam. We are investigating a way round this difficulty: free-free processes during electron-impact excitation. We observe the absorption or emission of a photon by the inelastically-scattered electron which has lost the excited state energy during the collision; thus there is no spurious signal at small angles from the electron beam. Suitable targets are Ar and He; both have excited-state dipole polarizabilities 10 times those of the Xe ground state. Dressed atom effects are therefore expected to occur at larger scattering angles than those required for xenon.

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

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