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**Free-free experiments: the search for dressed-atom effects<sup>1</sup>**

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The absorption or emission of radiation during the collision of charged particles with atoms and molecules is investigated in 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.<sup>2</sup> An estimate of the dressing of the target by the radiation's electric field may be made in terms of the electric dipole polarizability  $\alpha$  of the target. The effects in Xe ( $\alpha = 28$  au) were extremely difficult to measure because they occur at very small scattering angles. We have begun to carry out electron-collision experiments for atomic processes which involve polarizabilities an order of magnitude larger than elastic scattering from Xe. Two such processes are elastic scattering from Potassium, and inelastic scattering into the first excited states of argon; both involve polarizabilities  $\alpha \sim 300$  au. I will give a progress report on our experiments.

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