Recent Progress in Electron-Atom Scattering[1]

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The application of multi-parameter data collection techniques to electron-atom collision-experiments allows statistically significant results to be obtained for weak physical effects [1]. In addition to improved count rates, if the spin projection of the primary electron is determined, the roles of electron exchange and relativity in the scattering process can be highlighted. Examples of recent measurements from our laboratories will be discussed in the context of work from other groups. These will include benchmark measurements on the electronic excitation of helium employing the time-of-flight technique [2]. The technique allows inelastic cross sections to be accurately placed on an absolute scale by normalization to well-established elastic cross sections. Measurements on the (e,2e) ionization/excitation of helium through the application of energy-dispersive toroidal-analyzers will also be discussed [3]. The results provide a stringent test to theory and indicate the strengths and limitations of state-of-the art calculations in describing the Coulomb 4-body problem. Finally I will describe results from (e,2e) measurements on argon [4] and xenon [5] targets performed with spin polarized electrons which probe the many-body nature of electron exchange-scattering.

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