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Out-of-plane $(e, 2e)$ experiments on helium autoionizating states.[1]
B.A. DEHARAK, N.L.S. MARTIN, University of Kentucky — Recent COLTRIMS experiments on charged particle ionization have found substantial disagreement with theoretical predictions. In particular the angular distribution of electrons ejected into a plane perpendicular to the scattering plane disagreed with expectations by a factor of between three and five. A mechanism has been proposed to explain these results that invokes a second collision of the projectile in which it undergoes elastic scattering with the residual ion. We are investigating such phenomena when autoionization is present: the finite lifetime of the intermediate state will profoundly affect any such second collision and will influence the ejected electron angular distributions. Our experiments are being carried out on an existing $(e, 2e)$ apparatus modified to allow the electron gun to move on the surface of a (mathematical) cone. This permits the measurement of out-of-plane $(e, 2e)$ angular distributions, for a full 360°, using a special geometry that allows out-of-plane conditions to be combined with the binary peak in a single measurement. Details of the apparatus, and the results of preliminary experiments on He $2s2p\ ^1P$, will be presented.

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