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Theoretical Calculations for Transfer-Excitation and Transfer-Ionization A.L. HARRIS, J.L. PEACHER, M. SCHULZ, D.H. MADISON, University of Missouri-Rolla — Theoretical fully differential cross sections (FDCS) will be compared with experimental results for transfer-excitation and transfer-ionization occurring in proton-helium collisions. In the experiments, the incident proton captures one electron from a helium atom, and the remaining electron is left either in an excited bound state of the helium ion, or is ejected into the continuum as a free particle. The transfer-excitation experiments have been performed in Rolla, MO and the transfer-ionization experiments have been performed in Frankfurt, Germany. The theoretical approach we use is a full four-body approach, taking each particle into account. This results in a nine dimensional integral to evaluate the T-matrix. For transfer-excitation, the incident projectile and the outgoing hydrogen atom are treated as Hartree-Fock distorted waves, and a Hylleraas wavefunction is used for the initial state helium atom. In the final state, bound hydrogenic wavefunctions are used for the hydrogen atom and the residual ion. In the case of transfer-ionization, the ejected electron is treated as a Hartree-Fock distorted wave instead of a bound hydrogenic.

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