Differential Cross Sections for Charge Transfer in Collisions between Protons and the Ions He$^+$, Li^{2+}, Be^{3+}, B^{4+}, and C^{5+} THOMAS WINTER, Pennsylvania State University — Coupled-state differential cross sections are being determined for electron transfer in collisions between keV-energy protons and the hydrogenic ions He$^+$, Li^{2+}, Be^{3+}, B^{4+}, and C^{5+}. Integrated cross sections for these five collisional systems using a two-center, coupled-Sturmian-pseudostate approach have been recently reported.[1] Differential cross sections were previously considered for He$^+$ targets only; those calculations used smaller two-center Sturmian bases, as well as triple-center, atomic-state bases.[2] In the eikonal approach taken in that and earlier papers,[3] the differential cross sections were obtained by integrating the transition amplitude from the scattering calculation over impact parameter after multiplying by a suitable energy phase and a Bessel function. A simpler approach, also taken, was just to multiply the square of the transition amplitude at the classical scattering angle corresponding to the impact parameter by the Rutherford scattering cross section, an approach probably valid at large scattering angles and small impact parameters.

[1]T. G. Winter, Phys. Rev. A **87**, 032704 (2013).
[2]T. G. Winter, Phys. Rev. A **49**, 1767 (1994).
[3]L. Wilets and S. J. Wallace, Phys. Rev. **169**, 84 (1968).

Thomas Winter
Pennsylvania State University

Date submitted: 26 Jan 2014   Electronic form version 1.4