GEC13-2013-000049

Positron collisions from simple atoms and positronium-hydrogen collisions[1]

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I plan to present calculations of three-body, effective three-body and four-body collisions at low energies that involve a positron. We applied the hyperspherical hidden crossing method with a correction term to Ps formation in low energy e^+-H [1,2], e^+-Li [2,3,4] and e^+-Na collisions [2]. We considered the alkali atoms Li and Na as effective one-electron atoms, so that e^+-Li collisions and e^+-Na collisions can be considered as effective three-body collisions. The calculations provide an explanation of the extremely small S-wave Ps formation cross section for e^+-H, e^+-Li and e^+-Na collisions in terms of destructive interference. The S-wave cross section for Ps formation in e^+-Li and in e^+-Na collisions increases with decreasing momentum of the incoming Ps, which is consistent with the Wigner threshold law [5]. We have also studied at low-energies a fundamental four-body Coulomb process, that of elastic Ps-H scattering [6]. Using the Kohn variational method (and variants of this method) we have computed accurate ^{1,3}S- and ^{1,3}P-wave phase shifts. We also have some preliminary ^{1,3}D-wave phase shifts.

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