



Iranian Journal of Physics Research, Vol. 17, No. 3, 2017

Two-center close-coupling method in charge transfer

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(Received 6 December 2015 ; in final form 6 August 2016)

Abstract

In the present work, the transition matrix elements as well as differential and total scattering cross-sections for positronium formation in positron-hydrogen atom collision and hydrogen formation in positronium-hydrogen ion collision, through the charge transfer channel by Two-Centre Close-Coupling method up to a first order approximation have been calculated. The charge transfer collision is assumed to be a three-body reaction, while the projectile is assumed to be a plane wave. Additionally, the hydrogen and positronium atoms are assumed, initially, to be in their ground states. For the case of charge transfer in the scattering of positron by hydrogen atoms, the differential cross-sections are plotted for the energy range of 50 eV to 10 keV, where the Thomas peak is clearly observable. Finally, the total scattering cross-section for the charge transfer in the collision of positron-hydrogen and positronium-hydrogen ions are plotted as a function of projectile energies and compared with other methods of charge transfer in the literature.

Keywords: two-center close-coupling, electron capture, Thomas peaks, transition matrix, scattering cross-sections

For full article, refer to the Persian section