"Positron Impact Cross Section of Atoms Relevant to Pair Plasma Study"

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Electron-positron plasma has perfect mass symmetry and perfect charge anti-symmetry which projects them as an excellent alternative to the ion-electron plasma. Moreover, these plasma systems would need positron sources, which however is limited. NEPOMUC (NEutron-induced POsitron source MUniCh) [1] is a well-known intense positron beam source. The positrons from the source are fed in the PAX and APEX experiments to achieve the desired goal. Further, these sources consist of Pt foils that both generate positrons, by pair production and moderate them. In addition, Cd cap is used to shield the inner experimental setup containing the Pt foils. Thus, the interaction of these relevant atoms with the produced positrons would be relevant to model the positron source. Monte Carlo simulations are used to determine the optimum working conditions for these structures in the source. However, these simulation codes need a complete set of cross sections, which in case of positron impact is on the weaker side. Hence, the present work aims at providing a comprehensive set of positron impact cross section for cadmium and platinum atoms.

Modified spherical complex optical potential (SCOP) [2] and complex scattering potential-ionisation contribution (CSP-ic) [3] formalisms are incorporated to compute the cross sections. SCOP formalism is utilised to calculate the elastic, inelastic and total cross sections. The inelastic cross section thus determined is used to compute the direct ionisation, positronium formation and total ionisation cross sections employing the CSP-ic method. The present work reports the calculated cross sections for an exhaustive energy range from 1eV to 5keV whereas the inelastic cross sections are reported from their respective thresholds to 5 keV. To the best of our knowledge, no previous data is available for platinum atom. Hence, we present the first set of cross sections for e^+-Pt system. Further, for Cd few comparisons are available for elastic and total cross sections. The present results are found to be consistent with them. However, all inelastic cross sections for this atom are computed for the first time.

[1] C. Hugenschmidt, C. Piochacz, M. Reiner and K. Schreckenbach. *New Journal of Physics* 14, 055027 (2012)

[2] S. Singh, S. Dutta, R. Naghma, and B. Antony. *J. Phys. Chem. A* 120, 5685 (2016)

[3] S. Singh and B. Antony. *Journal of Applied Physics* 121, 244903 (2017).