Study of positron scattering from the acetylene molecule

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Recently, the study of positron scattering from different molecules is getting a lot of attention due to its numerous applications, e.g. in the plasma and astronomical environments to understand the different physical and chemical process occurring there. Acetylene is one of the most important molecules used in plasma polymerization and deposition processes. Also it has been found in several astronomical environments. Thus, positron scattering from such molecule will provide information about their collision dynamics.

In order to study positron scattering from acetylene molecule, we have introduced a method where the charge density and static potential of the target molecule is obtained in an analytical form [1]. The molecular orbitals of the target are represented through Gaussian wave function which is taken as a linear combination of atomic orbitals. In addition, to the static potential, we have also added to it, the polarization potential and these have been used in the Schrödinger equation, which is solved with partial wave analysis technique to obtain the scattering phase shifts and amplitude with which we obtained the elastic differential and integral cross sections. Further, to take account the inelastic part of the scattering, we have added the absorption potential to the static and polarization potentials and obtained inelastic integral cross sections. As an illustration, the elastic differential cross sections at 50 and 100 eV incident positron energies are shown in figure 1(a) and 1(b). These are compared with the differential cross section measurements of Kauppila et al. [2] and we notice good agreement. Detailed results will be presented in the workshop.

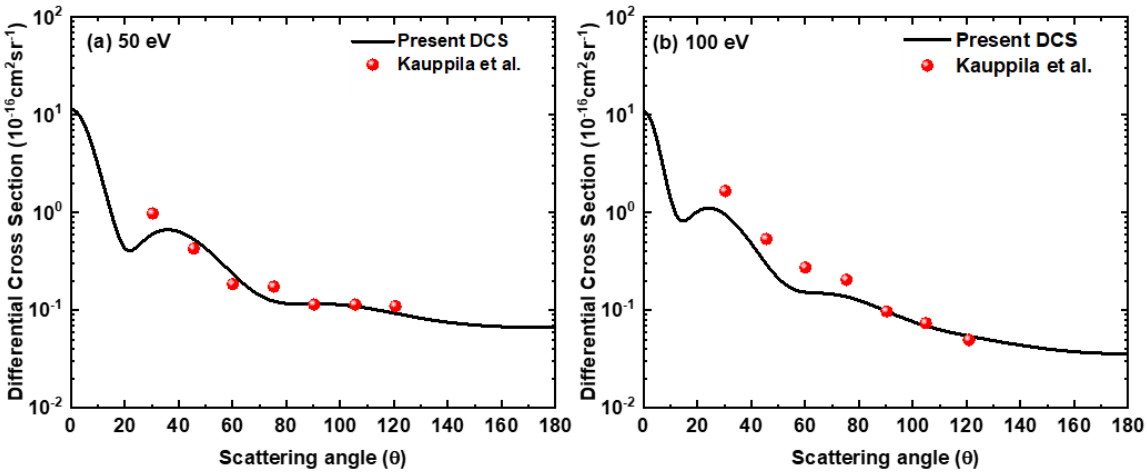

Fig.1. Positron impact differential cross section at (a) 50 and (b) 100 eV incident positron energies.

[1] D. Mahato, L. Sharma and R. Srivastava, *J. Phys. B At. Mol. Opt. Phys.* **53**, 225204 (2020)
[2] W.E. Kauppila *et al.*, *Nucl. Inst. Meth. Phys. Res. Sect. B.* **192**, 162 (2002).