POSITRON IMPACT IONIZATION OF CO, CO_2 AND CH_4

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Positron impact phenomena are theoretically simpler than the electron impact phenomena because of the lack of electron exchange and are considered a good testing ground for different theoretical models. Lately there has been a lot of research dealing with positron ionization phenomena. Until very recently all this work related to total (integrated) cross sections.

The theoretical calculations of these cross sections concentrated on the use of distorted wave models. Our group produced a number of theoretical papers [1,2] which showed that these models can, with various degrees of accuracy, reproduce the experimental measurements.

More recently our work concentrated on positron impact ionization of molecules. We found that for homonuclear molecular targets such as H_2, N_2, O_2 our distorted wave model CPE produces cross sections which agree well with the experimental results [3-5]. CPE is a relatively simple model in the sense that it does not require elaborate descriptions of the various scattering channels. Our calculations used a two-center approach with a Gaussian representation of the molecules.

In this work we applied the same approach to the positron impact ionization of CO, CO_2 and CH_4 for which experimental data is available [6]. Fig.1 shows that our theory is in excellent agreement with the experimental CO data. For CO_2 and CH_4 our theory produces cross sections significantly higher than the experiment results and we examine methods to improve this agreement.

Our work demonstrates that our relatively simple distorted-wave model can produce good results for heterogeneous molecular targets too.

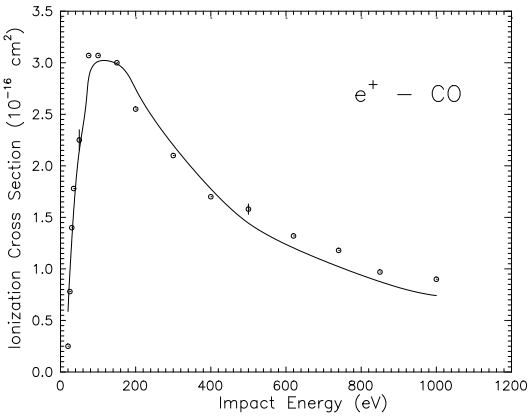

Figure 1. Positron impact ionization of CO: open circles correspond to the experiment of ref.[6], while the continuous curve corresponds to our CPE model.

References

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