Electron Transport in Molecular Gases: a Modelling Procedure to Evaluate Cross Section Data Sets

G. Garcia[1, 2]
[1]Instituto de Física Fundamental, Consejo Superior de Investigaciones Científicas (CSIC), Serrano 113bis, 28006 Madrid, Spain
[2]Centre for Medical Radiation Physics, University of Wollongong, NSW Australia
g.garcia@csic.es

Modelling electron transport is a powerful tool for important applications of radiation [1] to medicine and industry. Even in the case of not using electrons as primary radiation source but photons, protons, positrons or heavy ions, electrons appear as secondary particles which can be generated even at very low energies [2]. For this reason, electron transport needs to be incorporated into accurate radiation models and this requires a complete set of electron scattering cross-section data over a broad energy range [3]. In this lecture we propose a method to evaluate the reliability of these cross-sectional data by comparing the observed energy and angular distributions of electrons transmitted through a magnetically confined beam-gas apparatus [4] with those predicted by a Monte Carlo simulation using our LEPS code [1]. Input data for this simulation are critically derived from a compilation of experimental and theoretical cross-section values obtained through a wide international collaboration [5].

References

[1] *Radiation Damage in Biomolecular Systems*, G. García and M. Fuss (eds) (Springer, London 2012).
[2] L. Sanche, (2008)in: Shukla M.K., Leszczynski J. (eds) *Radiation Induced Molecular Phenomena in Nucleic Acids* (Springer, Dordrecht 2008).
[3] M. C. Fuss, A. G. Sanz, A. Muñoz, F. Blanco, M. J. Brunger, S. J. Buckman, P. Limão-Vieira and G. García , *Appl. Radiat. Isot*. 83B, (2014), 159.
[4] A. I. Lozano, J. C. Oller, K. Krupa, F. Ferreira da Silva, P. Limão-Vieira, F. Blanco, A. Muñoz, R. Colmenares, and G. García, *Rev. Sci. Instrum*. **89**, (2018), 063105.
[5] A. I. Lozano, J. C. Oller, D. B. Jones,R. F. da Costa, M. T. do N. Varella, M. H. F. Bettega, F. Ferreira da Silva, P. Limão-Vieira, M. A. P. Lima, R. D. White, M. J. Brunger,F. Blanco, A. Muñoz and and G. García, *Phys. Chem.Chem. Phys* **20**, (2018), 22368.