

Elastic electron scattering by atomic particles and cross section representation in the Belgrade Electron-Atom/Molecule DataBase -BEAMDB

Bratislav P. Marinković

Laboratory for Atomic Collision Processes, Institute of Physics Belgrade, Serbia

Elastic electron scattering by an atomic particle (atom/molecule/ion) we define as a scattering process that conserves the kinetic energy of the colliding particles. Elastic cross sections are usually measured for unpolarised beams of electrons and atomic particles at specific energies and angles and they are defined as differential cross sections (DCS). DCS represents the ratio between number of scattered particles in unit time and unit solid angle and the incoming current density. In the crossed-beam scattering experiments DCSs are determined through a rather complex expression involving geometrical and instrumental functions, averaging over the angular and energy resolution [1]. In the Belgrade Laboratory for Atomic Collisional Processes, many data have been experimentally obtained on electron scattering cross section for metal atomic particles (see for e.g. [2,3]) or data for reference gases (such as Ar [4]). Such type of collisional data, among the other (excitation, ionization, etc. cross sections), are presented in the Belgrade Electron-Atom/Molecule DataBase (BEAMDB) [5]. Representing the atomic/molecular states as a single string data within the current database, we faced with certain challenges that need to be overcome by codifying a set of standards.

[1] R T Brinkmann and S Trajmar, “Effective path length corrections in beam-beam scattering experiments”, *J. Phys. E: Sci. Instrum.*, **14** (1981) 245-255.

[2] B. P. Marinković, V. Pejčev, D. M. Filipović, D. Šević, S. Milisavljević, B. Predojević, “Electron collisions by metal atom vapours”, *Rad. Phys. Chem.* **76** (2007) 455-460.

[3] B. P. Marinković, R. Panajotović, D. Šević, R. P. McEachran, G. García, F. Blanco, and M. J. Brunger, “Experimental and theoretical cross sections for elastic electron scattering from zinc”, *Phys. Rev. A* **99** (2019) 062702 [10pp].

[4] M. Lj. Ranković, J. B. Maljković, K. Tökési, and B. P. Marinković, “Elastic electron differential cross sections for argon atom in the intermediate energy range from 40 eV to 300 eV”, *Eur. Phys. J.D* **72** (2018) 30 [9pp].

[5] B. P. Marinković, V. A. Srećković, V. Vujčić, S. Ivanović, N. Uskoković, M. Nešić, Lj. M. Ignjatović, D. Jevremović, M. S. Dimitrijević, and N. J. Mason, “BEAMDB and MOLD – Databases at the Serbian Virtual Observatory for collisional and radiative processes”, *Atoms*, **7** (2019) 11 [14pp].