

The LXcat Project

L.L. Alves, on behalf of the LXcat team¹

*Instituto de Plasmas e Fusão Nuclear, Instituto Superior Técnico, Universidade de Lisboa,
Av. Rovisco Pais, 1049-001 Lisboa, Portugal*

The LXcat project (www.lxcat.net) [1] is an open-access website for collecting, displaying, and downloading electron and ion scattering cross sections (also differential), swarm parameters (transport parameters and rate coefficients), interaction potentials, oscillator strengths and other data essential for modeling low temperature plasmas. On-line tools enable importing, exporting, plotting and comparing different sets of data. The available databases have been contributed by members of the community around the world and are indicated by the contributor's chosen title. Anyone willing to contribute to this project should contact lxcat.info@gmail.com for instructions on how to take part.

This presentation will focus on the status of the data available for electrons on LXcat. At present, LXcat offers 16 databases containing sets of cross sections for electron scattering from ground state neutral atoms and molecules, covering a range of energies from thermal up to 100's of eV and higher. Some of the databases present *complete* and *consistent* sets of cross sections [2-4], with interest for modelling or the interpretation of experiments, corresponding to much more than a simple compilation of data. *Complete* cross section sets stand for arrangements able to describe the main electron momentum-loss, energy-loss and number-changing processes (excitations, ionization, attachment, recombination), either individually or grouped together. *Consistent* sets are those able to reproduce measured values of swarm parameters when used as input data to evaluate the electron energy distribution function from a Boltzmann solver or Monte Carlo/Particle-in-Cell codes. The conversion of cross section data to swarm parameters in pure gases or in gas mixtures can be accomplished with online or downloadable tools, including the Boltzmann equation solver BOLSIG+ [5], and comparisons of calculated and measured swarm parameters can also be done online.

The LXcat team has been making systematic inter-comparisons of cross section data and comparisons of calculated and measured swarm parameters. These were published for noble gases [2-4] and reported in a series of posters at the Gaseous Electronics Conference for common molecular gases (H₂, N₂ and O₂). Work is in progress on the validation of data for more complex molecules (H₂O, CO₂, CO, CH₄ and CF₄).

[1] S. Pancheshnyi et. al., *Chem. Phys.* **398**, 148 (2012)

[2] L.C. Pitchford et. al., *J. Phys. D: Appl. Phys.* **46** 334001 (2013)

[3] L.L. Alves et. al., *J. Phys. D: Appl. Phys.* **46** 334002 (2013)

[4] M.C. Bordage et. al., *J. Phys. D: Appl. Phys.* **46** 334003 (2013)

[5] Bolsig 2005, www.bolsig.laplace.univ-tlse.fr/

¹S. Pancheshnyi (Switzerland); M.C. Bordage, B. Chaudhury, S. Chowdhury, G.J.M. Hagelaar, L.C. Pitchford and V. Puech (France); K. Bartschat, W.L. Morgan, L. Viehland and O. Zatsarinny (USA); J. d'Urquijo, A.A. Castrejón-Pita, J.L. Hernández-Ávila and E. Basurto (Mexico); I. Bray and D.V. Fursa (Australia); S.F. Biagi and Quantemol (UK); L.L. Alves, V. Guerra and C.M. Ferreira (Portugal); I. Kochetov and A. Napartovich (Russia); Y. Itikawa (Japan); A. Stauffer and C. Brion (Canada); J van Dijk (The Netherlands)