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The LXCat project

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Our long-term objective is the establishment of a set of web based tools and open access databases relevant to modeling low temperature plasmas and plasma chemistry. To this end, we have focused over the past year on developing web-based tools for access, display, and processing of data concerning the electrons in typical low temperature plasma conditions - this is the LXCat (or ELECtron SCATtering) project. From the web site in its present version [1], users can access compilations of complete sets of electron-neutral scattering data for various gases developed by different contributors (presently 34 different gases and 6 contributors). New contributors are welcome. Anyone wishing to up-load their cross section sets and/or swarm parameters to this site should contact lxcat.info@gmail.com to obtain an account and to receive instructions for how to use the on-line tools to upload data and plot/compare data. The available cross section compilations on the site at this time are "complete" in the sense that the major momentum and energy loss processes are included for each gas.

In many low-temperature plasma conditions, the electron energy distribution function (edf) is non-Maxwellian and a good parameter is the reduced electric field, E/N, the ratio of the electric field strength to the neutral density. The electron transport and rate coefficients are functions of E/N are obtained appropriate averages over the edf, which is itself determined by solving the electron-Boltzmann equation. Input to the Boltzmann equation solver consists of the complete set of cross sections for each gas and can be taken from the LXCat databases. We have developed an on-line version of BOLSIG+, a solver for the electron-Boltzmann equation in the two-term approximation [2] which is also available on the LXCat site. Thus electron transport and rate coefficients in pure gases and gas mixtures can be calculated on-line. Results are displayed in graphical form or in a text file that can be downloaded from the LXCat site.

References

[1] http://www.lxcat.laplace.univ-tlse.fr

[2] G.J.M. Hagelaar and L.C. Pitchford, Solving the Boltzmann equation to obtain electron transport coefficients and rate coefficients for fluid models, Plasma Sources Sci. Technol. **14**, 722 (2005)