

**XXth International School on
Low Temperature Plasma Physics: Basics and Applications**

Modeling Workshop

Hands on a Boltzmann solver

(by L.L. Alves, IPFN/IST, Lisbon, Portugal)

Electrons are the prime species to convey energy into a gas, producing plasma. The study of low-temperature plasmas entails a description of the electron transport and interactions with neutral/charged species, for which either electron–neutral scattering cross sections or electron parameters or both are required typical data. Electron parameters can be obtained by averaging different quantities involving the electron-impact cross sections over the electron energy distribution function (EEDF), whose determination is therefore of paramount importance.

The goal of this modeling workshop is to familiarize students with a very popular solver (BOLSIG+) of the electron Boltzmann equation (EBE), when written in the classical two-term approximation often used in low-temperature plasma studies. The workshop will depart from the concepts presented in the lecture “Electron kinetics in atomic and molecular plasmas”

- To present the methodology adopted in the numerical solution of the EBE
- To Identify the input data and parameters required for its solution
- To use BOLSIG+ (<http://www.bolsig.laplace.univ-tlse.fr/>), after downloading electron scattering cross sections from the open-access website LXCat (<http://www.lxcat.net/>).

Attendees will be given the opportunity to perform a series of exercises, analyzing the evolution of the EEDF in different gases, with variations in the applied electric field, the excitation frequency and the ionization degree. A comparison between calculated and measured swarm parameters will also be proposed. The workshop is very interactive, with plenty of questions / discussions taking place and in some cases using quantities measured during the experimental workshop.

The workshop is limited to 10 students, preferable in the first year of a PhD thesis, to be divided into 5 groups of two, each group needing a PC laptop for the exercises.