GEC16-2016-000067

Abstract for an Invited Paper
for the GEC16 Meeting of
the American Physical Society

Effect of Coulomb collisions on low temperature plasma characteristics

GERJAN HAGELAAR, LAPLACE, CNRS and University of Toulouse

This presentation discusses the effects of electron-electron and electron-ion Coulomb collisions on the electron distribution function and transport coefficients obtained from the Boltzmann equation for simple gas discharge conditions. Such Boltzmann results are commonly used as inputs for fluids models or to interpret experimental data, but usually without taking into account Coulomb collisions. Proper inclusion of Coulomb collisions in the Boltzmann equation involves complex nonlinear collision terms acting on both the isotropic and anisotropic parts of the distribution function. In this presentation, different Coulomb collision effects are illustrated on the basis of local Boltzmann calculation results for argon gas. It is shown that the anisotropic part of the electron-electron collision term, generally neglected in the low-temperature plasma literature, can in certain cases have a large effect on the electron mobility and is essential when describing the transition towards the Coulomb collision dominated regime characterized by Spitzer transport coefficients. Finally, a brief overview is presented of the discharge conditions for which different Coulomb collision effects occur in different gases.