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Influence of superelastic collisions on discharge properties: A self-consistent approach GIANPIERO COLONNA, PLASMI Lab CNR NANOTEC Bari — A fundamental aspect in modeling a gas discharge is to determine the rate coefficients of electron-induced processes. An accurate approach is to solve the Boltzmann equation in the two-term approximation to calculate the electron energy distribution function (eedf), that, together with the cross sections, allows the calculation of the rates. To simplify the calculation, under the assumption that eedf relaxes much faster than the gas composition, the rate coefficients can be related only to the local electric field. This approach cannot consider the contribution of the superelastic collisions in affecting the eedf. In participating to the Round Robin activity for the verification of different plasma kinetic codes, strong effects of superelastic collisions on the plasma properties have been observed, when a self–consistent coupling of free electron and level kinetics has been considered, even in the simple argon discharge, including ionization/recombination and excitation/de-excitation of the metastable state. Effects of superelastic collisions are very important not only in the post-discharge conditions, but also in the presence of high electric field, considering both power density or E/N as input.

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