Keep-in-Touch meeting
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The LisbOn Kinetics Monte Carlo solver

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The modelling of low-temperature plasmas (LTP) is essential to understand the fundamental processes ruling the system and to find a configuration that maximizes the efficiency for a determined application. However, models should describe accurately the reality, which is not always the case.

Typically, the electron kinetics in a LTP is solved under the low-anisotropy assumption, where only the first two terms in a Legendre expansion over the electron velocity space are kept. However, the intense values of reduced electric field (*E*/*N*), characteristic of fast-pulsed discharges, may break down the two-term approximation and a different approach should be pursued.

Here, we present the LisbOn Kinetics Monte Carlo (LoKI-MC) open-source solver for the simulation of the electron kinetics. Using Monte Carlo techniques, the program easily addresses any complex gas mixture, describing electron collisions with any target state (electronic, vibrational and rotational). Since the two-term approximation is not needed, the formulation is valid at high *E*/*N*.

We start by verifying and benchmarking LoKI-MC in various gases against analytical solutions and other available codes, under constant electric field. Then, we move on to physical configurations that most of the codes available for the LTP community cannot describe: (i) coexistence of a constant magnetic field; (ii) anisotropic scattering in electron collisions; (iii) time-dependent electric field pulses; (iv) unified MC description, where the heavy-species chemistry evolves at the same time as the electron kinetics.