Numerical modelling of the time-dependent ionisation structure and emission due to non-thermal plasmas in the supernova-driven ISM

Miguel De Avillez[*1,2]

[1]University of Évora [Portugal] – Universidade de Évora — Largo dos Colegiais 2, 7000 Évora, Portugal
[2]Technische Universität Berlin (TUB) – Straße des 17. Juni 135 10623 Berlin, Germany

Abstract

The time-dependent joint thermal and dynamical evolutions of the supernova-driven interstellar medium requires the knowledge on the fly of the ionisation structure of the plasma and its continuum and line emissions. In general the ionisation structure and emission of plasmas are calculated assuming that the particles involved in the processes have a Maxwell-Boltzmann distribution. However, this may not be the case in the regions where particle acceleration occurs. Therefore, the determination of the ionization structure and the emission of the plasma requires the calculation of all the rates associated to ionization, recombination, charge exchange, and excitation/deexcitation processes using non-thermal distributions and the cross sections of the different processes. The excitation/deexcitation by proton and electron impact requires the use of the collision strengths available in the literature (a small number) or newly calculated (using R-Matrix methods) for the purpose. A summary of this work and some results related to the ionisation structure of plasmas in regions of particle acceleration are presented.

[*]Speaker