
Using parallel computing to gain insight into different astrophysical problems

Miguel A. de Avillez^{1,2}

¹*Computational Astrophysics Group, Department of Mathematics, University of Évora, Portugal*

²*Zentrum für Astronomie und Astrophysik, Technische Universität Berlin, Germany*

In this talk I shall briefly review the ongoing work by the Computational Astrophysics Group that makes use of heterogeneous parallel systems composed of GPUs and coprocessors. This includes, among others, (i) the development of a plasma emission software to handle the ionization structure and emission of a plasma with thermal and non-thermal distributions of electrons, (ii) the study of the energy deposition by secondary electrons, (iii) the study of the joint thermal (including the ionization structure of the plasma) and dynamical evolutions of the interstellar medium in star-forming galaxies, (iv) the evolution of superbubbles, including the Local Bubble and Loop I, as a result of correlated supernovae, (v) the formation and evolution of the Fermi Bubbles including the star captures by the central Galactic black hole, and (vi) atomic physics calculations to determine electron impact excitation and ionization cross sections of different ions.