Microscopic cluster model — Applications in light nuclei structure and astrophysics

M. Dufour[1] and P. Descouvemont[2]

[1] *IPHC, Strasbourg*
[2] *ULB, Brussel*

Microscopic cluster models are very important tools to investigate the structure of light nuclei and reactions of astrophysical interest. In this talk, we will first focuss on the theoretical framework of the Generator Cordinate Method and of the Microscopic R matrix method. We will show that the combination of these methods allows an unified description of bound and scattering states with an exact treatment of the asymptotic behaviour of the waves functions. We also will insist on the fact that in our models quantum numbers such as spin and parity are always exactly treated. Then, we will focus on some applications in the physics of light nuclei such as the ^{12}Be and the ^{16}B and on reactions of astrophysical interest such as $^{12}\mathrm{C}(\alpha,\gamma)^{16}\mathrm{O}$.