Monopole oscillations in light nuclei with a molecular dynamics approach

Karim Hasnaoui*[1], Takuya Furuta[2], Francesca Gulminelli[3], Christian Leclercq[4], and Akira Ono[5]

[1]Florida State University (FSU) – États-Unis
[2]RIKEN – Japon
[3]Laboratoire de Physique Corpusculaire (LPC) – CNRS/IN2P3 UMR6533 – France
[4]Laboratoire de Physique Corpusculaire (LPC) – CNRS/IN2P3 UMR6533 – France
[5]Tohoku University – Japon

Résumé

The monopole vibrations are collective motions of the nuclei which are characterized by their compression and their dilatation. The monopole vibrations are strongly related to the equation of state of the nuclear matter, and they are usually studied with mean field models at small amplitudes such as the RPA/TDHF models. We have recently developed a Fermonic Molecular Dynamics (FMD) model and an Antisymmetrized Molecular Dynamics (AMD) model based on Skyrme functionals, and we are interested in testing the capability of such kind of models to investigate the monopole vibrations for a wide range of amplitudes. In that framework, the giant monopole resonance energy in Caˆ{40} is sensitive to the incompressibility of the effective interaction, in good agreement with complete RPA/TDHF calculations. The collective response of Cˆ{12}, Oˆ{16}, and Mgˆ{24} is also studied. For these lighter nuclei that have an important contribution of an alpha-clustered component, different frequencies are observed, corresponding to two different types of vibrations associated with breathing and moving of the underlying clusters

*Intervenant