Projection of cranked HFB states using Skyrme functionals

Benoît Avez*[1], Benjamin Bally , Michael Bender , and Paul-Henri Heenen

[1]Centre d'Etudes Nucléaires de Bordeaux Gradignan (CENBG) – CNRS : UMR5797, IN2P3, Université Sciences et Technologies - Bordeaux I – Chemin du Solarium - BP 120 - 33175 Gradignan Cedex, France

Résumé

Nuclear Energy Density Functional (EDF) methods, also known as self-consistent mean-field and beyond mean-field approaches, are one of the tools of choice to study low-energy nuclear structure. They are able to describe bulk properties of nuclei (masses, radii, deformation) as well as spectroscopy (excitation energies, B(E2), spectroscopic moments, ...) of characteristic nuclear states throughout the nuclear chart using the same set of parameters. Up to now, applications of the complete EDF framework, i.e. configuration mixing of particle-number and angular momentum projected Hartree-Fock-Bogoliubov (HFB) states, have been applied to study nuclear spectroscopy of even-even nuclei, including, in state of the art implementations, triaxial degrees of freedom. However, a drawback of these applications is their limitation to systems conserving time-reversal invariance, preventing symmetry restoration and configuration mixing of angular-momentum optimized states (i.e. "cranked states"), and quasiparticle excitations (odd nuclei, K-isomers, excited band heads). Our aim, raising this limitation, is to achieve a better description of even and odd nuclei, and quasi-particle excitations, within the same framework. This contribution aims to present some of the first results of these ongoing developpments, and will focus on particle number and angular momentum projection of cranked Hartree-Fock-Bogoliubov states, which is one of the first steps towards completion of this project.

*Intervenant