
Application of Linear Response Theory to detect instabilities in Skyrme functionals.

Alessandro Pastore*¹, Karim Bennaceur², Jacques Meyer³, Marco Martini⁴, and Dany Davesne⁵

¹Universite Lyon 1 – CNRS : IN2P3, CNRS – France

²Universite Lyon 1 – CNRS : IN2P3, CNRS – France

³Universite Lyon 1 – CNRS : IN2P3, CNRS – France

⁴Institut de physique nucléaire Orsay – CNRS UMR8608 – France

⁵Universite Lyon 1 – CNRS : IN2P3, CNRS – France

Résumé

In a recent paper Lesinski (T. Lesinski et al. PRC74 2006) has shown that two well-known Skyrme functionals, LNS and SKP, present an instability in the scalar-isovector channel. As a consequence when used in Hartree-Fock-Bogoliubov (HFB) calculation they can lead for some nuclei (i.e. Ni58) to unphysical results. To find out all the possible instabilities of a functional is an important task, but this is not possible using directly the HFB codes, since it would be too time consuming. The Lyon group has found an alternative and much faster way to solve this problem, mainly using the Linear Response Theory (LR) in infinite nuclear systems. The set of equations one has to solve are quite complicated because of the various tensor couplings, but once solved, the numerical calculations are almost immediate. This formalism then allows to perform in few minutes the calculations for all existing Skyrme functionals (with explicit tensor couplings and three body terms). In my presentation I will show the latest results on the instabilities, and how this tool can be used directly in the fitting procedure of the new functionals to improve the convergence procedure.

*Intervenant