# QRPA WITH THE GOGNY FORCE: FROM LOW TO HIGH ENERGY GAMMA AND BETA STRENGTHS

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We propose to highlight successes obtained within the QRPA approach which complete our coherent set of theoretical approaches since lying on the same effective finite range Gogny interaction, being free of adjustable parameters, and in which the HFB solutions are the building blocks.
Static and/or dynamic degrees of freedom involved in the generation of low energy excited states can now be analyzed, and we will compare the first $2^+$ collective state obtained in QRPA and in 5DCH (a GCM-like method, including rotation) in Nickel and Tin N=16 isotones [1], and in the Nickel isotopic chain, from drip line to drip line. Slightly higher in excitation energy, light nuclei can exhibit low energy dipole resonances which will be discussed in the QRPA frame. The isoscalar or isovector nature of such Pygmy states will be examined [2]. As high energy results, we will present a study of giant resonances in doubly magic exotic nuclei [3], enlightening the role of the intrinsic deformation [4]. The first fully coherent microscopic description of the multipolar spectrum of the heavy deformed nucleus $^{238}$U [5] will be used to summarize our know-how. In the light of the previous results large-scale calculations of dipole responses, both electric and magnetic, for all nuclei for which data exist have been undertaken. Preliminary results [6] will be displayed. A strategy for an application to odd-A and odd-odd nuclei will be discussed on few examples.
Finally, we present the generalization of QRPA to the charge-exchange nuclear excitation (pnQRPA) [7] namely the Isobaric Analog and Gamow-Teller resonances which play a crucial role in several fields of physics (nuclear physics, astrophysics and particle physics). A comparison of the results with existing experimental data on Fermi and Gamow-Teller strength distributions is presented and the role of nuclear deformation analyzed. A special attention is paid to the reproduction of -decay half-lives as well as for the specific N = 82 isotonic chain relevant for the r-process nucleosynthesis [8]. For these charge exchange modes some extensions to odd systems will be presented too.

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