QRPA WITH THE GOGNY FORCE WITH OR WITHOUT CHARGE EXCHANGE APPLIED TO SPHERICAL AND DEFORMED NUCLEI.

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We propose a review of several works using the finite range Gogny interaction in QRPA approaches used to simultaneously describe high and low energy spectroscopy as well as collective and individual excitations.

First, comparison of the low energy spectrum obtained within QRPA and 5DCH (a GCM-like method, including rotational degrees of freedom) is performed for 2^+ states in N=16 isotones, Nickel and Tin isotopes [1]. For the first time the different static and dynamic factors involved in the generation of the 2^+ states in the Nickel isotopic chain, from drip line to drip line, can be analyzed in only one set of coherent approaches, free of adjustable parameters, using the same interaction and the resulting HFB mean field. After the description of giant resonances in doubly magic exotic nuclei [2], the role of the intrinsic deformation in giant resonances is presented [3]. The appearance of low energy dipole resonances in light nuclei is also discussed. In particular, the isoscalar or isovector nature of Pygmy states is debated [4]. Then, the first fully coherent microscopic description of the multipole spectrum of heavy deformed nucleus ^{238}U is presented [5] as well as preliminary results of large-scale calculations undertaken to reproduce dipole responses, both electric and magnetic, for all nuclei for which data exist.

Finally, we present the generalization of QRPA to the charge-exchange nuclear excitations (pnQRPA) [6] 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 calculation of -decay half-lives for which experimental data exist as well as for the specific N = 82 isotonic chain relevant for the r-process nucleosynthesis [7].

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