Interpretation of Experimental Results with QRPA

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The Quasiparticle Random Approximation (QRPA), built on top of Hartree-Fock-Bogoluybov solutions obtained with the Gogny Force, is a coherent and parameter-free approach. It allows to describe a wide range of nuclear phenomena from low collective vibrational states to giant resonances, resulting from any (dipole, quadripole, octupole, etc) electromagnetic excitation. Based on a mean-field approach it can be applied to nearly all the nuclides of the chart, including odd nuclei thanks to recent developments [1]. In this talk, I will present the pictures obtained in QRPA of recent experimental results, such as low lying isomers in very heavy nuclei produced at Jyvaskyla [2], or high energy excited state in neutron-rich mid-mass nuclei populated at Alto [3]. The phonon excitations of the QRPA are built on a coherent summation of 2-quasiparticle excitations. The analysis of the main 2-qq contributions to a phonon excitation allows to get a deep understanding of the phenomenon. In the M1 spin-flip excitations observed in the ^{90}Zr nucleus, which presents a spin-saturated j-shell closure in proton, it reveals a proton contribution allowed by pairing correlations [4].

References

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