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Octupole excitation in super heavy nuclei and J=4 isomeric states in N=100 isotones described by a same QRPA approach

Known to be well adapted for the description of giant resonances, the QRPA formalism can also, with the same accuracy, describe low energy vibrational states whether with a highly collective or with a single-particle character. The QRPA approach based on the Gogny interaction developed in Bruyères-le-Châtel [1] can be applied to spherical as well as to axially deformed nuclei, from light (i.e. oxygen) to superheavy elements [2]. At the end of the calculation the transition probabilities for the decay of the QRPA excited states toward the ground state are obtained, regardless of the transition multipolarity. In addition, recent developments allow us to study odd nuclei.

In this talk I will present recent successes obtained by the QRPA approach in the reproduction of two experimental findings : octupole excitations around 249Cf [3], and K=4 isomeric states in N=100 isotones [4].

In superheavy odd nuclei our approach is able to produce low energy octupole excitations in agreement with recent experimental data on 251Fm [3]. After specifying some points of the odd system treatment, the octupole electric B(E3) and quadrupole magnetic B(M2) transition probabilities will be discussed with respect to data along the N=150 chain.

Our axially-symmetric-deformed QRPA approach has also been applied to the N=100 isotones in order to describe the J=4 isomeric states. Since calculated half-lives for pure K=4 states are too large by several orders of magnitude, Coriolis coupling between QRPA states has been introduced (4). The formalism related to the induced K-mixing will be explained, and results about the mixing amplitudes in isomeric states will be used to interpret the variation of the lifetime along the isotonic chain (4).

(1) S. Péru and H. Goutte, Phys.Rev. C 77, 044313 (2008)
(2) S. Péru et al, Phys.Rev. C 83, 014314 (2011)
(3) K. Rezynkina, A. Lopez-Martens, K. Hauschild, et al, under revision for PRC
(4) L. Gaudefroy, S. Péru et al, submitted to PRC.

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