Contribution ID: **220** Type: **Semi-plenary talk (30 min + 5 min questions)**

THE MODEL FOR DESCRIBING THE WIDTH OF DOUBLE GAMMA DECAY OF THE QUADRUPOLE STATE OF SPHERICAL NUCLEI

Thursday, 14 July 2022 13:30 (30 minutes)

To describe the γγ-decay, a formalism relates the electromagnetic interaction up to second order in the electromagnetic operators and two-quantum processes in atomic nuclei. In Ref.[1], the γγ-decay of a nuclear transition in competition with an allowed γ-decay has been discovered. This is the observation of the γγ-decay of the first excited J=$11/2^-$ state of ^{137}Ba directly competing with an allowed γ-decay to the J=$3/2^+$ ground state. The branching ratio of the competitive γγ-decay of the $11/2^-$ isomer of the odd-even nucleus 137Ba to the ground state relative to its single γ-decay was determined to be $(2.05{\pm}0.37){\times}10^{-6}$. This discovery has very recently been confirmed and the data were made more precise, in particular with respect to the contributing multipolarities [2].
This paper reports on the situation, in which the γγ-decay of the low-energy quadrupole state of the even-even nucleus occurs in a nuclear transition which could proceed by a single γ-decay in competition. The coupling between one-, two- and three- phonon terms in the wave functions of excited nuclear states is taken into account within the microscopic model based on the Skyrme energy density functional.
It is shown that the γγ-decay width is sensitive to the interaction between one- and two-phonon configurations in the giant dipole resonance region [3]. The maximal branching ratio of the competitive γγ-decay relative to its single γ-decay is predicted for ^{48}Ca as $3{\times}10^{-8}$. This prediction can be tested experimentally.

1. C.Walz et al., Nature. 526, 406 (2015).
2. P.-A. Söderström et al., Nature Commun. 11, 3242 (2020).
3. A.P. Severyukhin, N.N. Arsenyev, N. Pietralla, Phys. Rev. C. 104, 024310 (2021).

The speaker is a student or young scientist

No

Section

1. Nuclear structure: theory and experiment

Primary author: SEVERYUKHIN, Alexey (BLTP, JINR)

Presenter: SEVERYUKHIN, Alexey (BLTP, JINR)

Session Classification: Plenary session