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Investigating two-phonon γ -vibrational states in ^{162}Dy through Coulomb excitation

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The existence of two- γ -phonon excited states in rare-earth nuclei remains a contentious issue in nuclear structure. While examples of single-phonon γ -vibrational states are prevalent in even-even deformed nuclei, identifying two-phonon excitations is challenging due to strength fragmentation and competing non-collective states. Although two-phonon states are predicted by the collective model [1], only six cases have been reported in rare-earth nuclei [2–5]. While these states are largely in agreement with predictions from collective models, their rarity has challenged the validity of a collective model in well-deformed nuclei [6].

Coulomb excitation populates excited states in both beam and target nuclei, while allowing other scattering process to be neglected. The well-established formalism of electromagnetic interactions then allows extraction of reduced matrix elements and branching ratios from experimental γ -ray yields numerically [7].

In this presentation, the results of Coulomb-excitation γ -ray spectroscopy on the rare-earth, even-even nucleus ^{162}Dy with an ^{16}O beam will be presented. Precise measurements of the transition strengths between low-lying (< 2 MeV) excited states of ^{162}Dy were made, building towards a more complete picture of the level scheme and identifying collective features.

References

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