Decay spectroscopy of neutron-rich Dy isotopes around double midshell

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The shape is one of the fundamental features inherent to self-confined nuclear matter consisting of a finite number of protons and neutrons. It is well known that the spherical equilibrium shape is energetically favored for closed-shell configurations, while the sphericity tends to be unstable with the addition (or removal) of valence nucleons. When moving further away from shell closures, the nucleus is driven towards a non-spherical equilibrium shape due to the strong coupling between the motion of the individual valence nucleons and the surface oscillations of the closed-shell core. Such a phenomenon of spontaneous symmetry breaking is analogous to the so-called "Jahn–Teller effect" in polyatomic molecules.

This presentation will report on the recent results of decay spectroscopy of neutron-rich Dy (Z = 66) isotopes from the EURICA (EUROBALL-RIKEN Cluster Array) project at RIBF. The focus is particularly on the systematic behavior not only of the ground-state rotational band, but also of the non-yrast collective structure such as gamma and octupole vibration, in even-even deformed nuclei around the doubly mid-shell ^{170}Dy (N = 104). New results obtained also include isomeric states in ^{168,170,172}Dy and their decay properties. The experimental results will be discussed in comparison with the deformed Quasiparticle Random-Phase Approximation based on a Skyrme energy-density-functional.