

Prompt Particle Decays From Deformed High-Spin States

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During the past decade, numerous experiments have revealed a plethora of states in superdeformed or second minima of the nuclear potential. Their γ decay-out is strongly hindered, and a lot of effort has been made to establish single-step γ -connections between the superdeformed and normally deformed states. At latest, superdeformation was established in the mass $A \sim 60$ regime, and very recently we observed for the first time a prompt decay of a *well-deformed* excited rotational band in the $N=Z$ nucleus ^{58}Cu via the emission of monoenergetic protons into a *spherical* excited state in ^{57}Ni . The figure shows the corresponding decay scheme. In the following, a second case was established in the decay-out of a rotational band in the doubly magic nucleus ^{56}Ni . Moreover, a weak ($\sim 4\%$) decay-out branch from the second minimum in ^{58}Ni constitutes the first observation of a prompt monoenergetic α decay into a spherical state in the daughter nucleus ^{54}Fe . The latter two particle links are in direct competition with in-band and single-step linking γ transitions. In 1998 new experiments were performed at EUROBALL and GAMMASPHERE to study these particle decays in more detail. Latest results of the ongoing experimental work on the combined in-beam high-spin γ -ray and particle-spectroscopy will be presented.

