The Role of Nonaxial Shapes in Neutron-Rich Exotic Nuclei

A. J. Mitchell[1, *]

[1]*Department of Nuclear Physics, Research School of Physics and Engineering, The Australian National University, Canberra, ACT 2601, Australia*

Transitions from shell-model-like behaviour to collective motion have always been interesting, yet controversial, topics in nuclear structure. The dramatic emergence of deformed ground-state structures between $N = 88$ and $N = 90$ in stable $A \approx 150$ nuclei is often discussed in terms of phase transitions [1]. One way to clarify the discussion is to expand the scope of investigation to heavier and lighter members of the sequence. However, the lighter isotones are quite neutron rich and cannot be accessed by conventional fusion-evaporation reactions. Similar phenomena are known to occur in neutron-rich $A \approx 100$ nuclei, where some of the most-deformed ground states have been observed. However, these deformed configurations are delicate, and are polarized by adding or removing a few nucleons. In molybdenum, triaxiality has been reported, though the data are sparse and mostly obtained from prompt fission-fragment spectroscopy.

The CARIBU radioactive ion-beam facility [2] grants access to these experimentally challenging regions of the nuclear landscape. Spontaneous fission fragments of ^{252}Cf are extracted from a $\sim$1-Ci source, thermalised in a gas catcher, purified and delivered to the experimental area. A dedicated β-decay spectroscopy station has been commissioned to exploit the unique capabilities offered with low-energy CARIBU beams [3]. This presentation will focus on detailed $\beta - \gamma$ spectroscopy measurements of the low-spin structures in the $N = 90$ nucleus, ^{146}Ba [4] and $A \approx 100$ nuclei, ^{104,106}Mo. Experimental observations are compared to predictions from the interacting boson model, which suggest that the role of the γ degree of freedom has previously been underestimated.

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