STRUCTURE OF LOW-LYING OCTUPOLE STATES IN THE MASS 160 REGION

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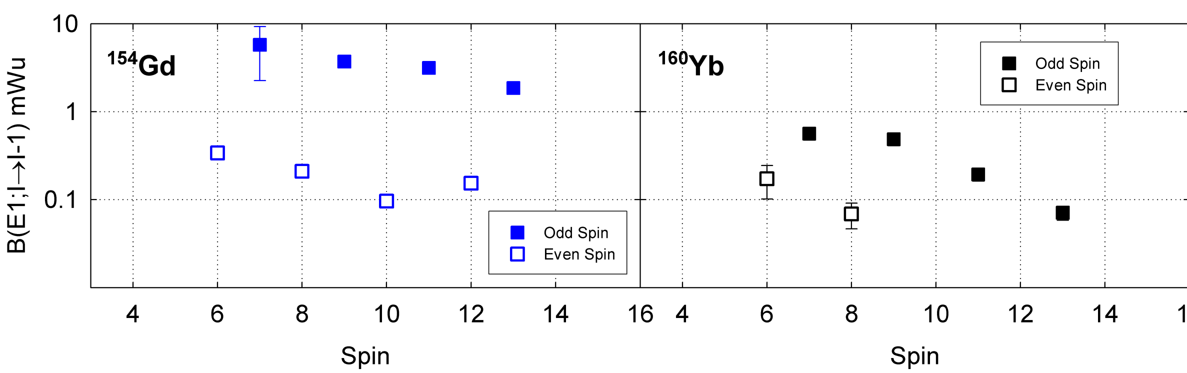
Recent theoretical work [1] suggested that nuclei in the rare earth region around $Z \sim$ 64-70 and $N \sim$ 90-94 may exhibit excited states that are tetrahedrally deformed. A consequence of a purely tetrahedrally deformed band is the absence of a quadrupole deformation, and the corresponding suppression of in-band E2 transitions. *Odd-spin*, negative parity bands (npb) with small ratios of in-band B(E2) to out-of-band B(E1) ratios, in the vicinity of nuclei such as ${}^{156}_{64}Gd_{92}$ [1] were early candidates for tetrahedral rotation. However, these bands are always accompanied by *even-spin* npb's with large B(E2)/B(E1) ratios.

The tetrahedral hypothesis has since been ruled out by recent experimental values of quadrupole moments, implying that the odd and even spin bands have the same deformation [2]. As a result, absolute B(E1) values can be inferred in a number of cases, as shown below. The large differences between out-of-band B(E1) values remained a mystery.

At the iThemba LABS cyclotron, using the AFRODITE array, a growing list of nuclei have been studied in this region, including ^{158,160}Yb, ^{156,158,160}Er, ^{158}Dy, and ^{152,154}Gd allowing a comprehensive set of systematics to be obtained.

In all cases low-lying odd and even spin npb's were observed, with the even-spin bands having larger B(E2)/B(E1) values. We find a more reasonable description of these bands as octupole vibrations of the nucleus, and explain the B(E1) anomalies within the framework of the Random Phase Approximation.



References

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