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Title: **Fast nuclear rotation and octupole deformation**

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Enhanced octupole interactions, which may cause octupole deformation, are expected in nuclei, in which *opposite-parity* orbitals, satisfying Δj=Δl=3 relation, are placed close to the Fermi level. One member of the Δj=Δl=3 pair is the high-j *intruder orbital.* Such orbital plays an important role in generating spin of a fast rotating nucleus and is a source of a characteristic *backbending* phenomenon. An octupole interaction provides an extra force binding the intruder orbital to the so called *normal-parity* orbitals, changing thus its response to fast nuclear rotation. Observation of spin alignment as a function of rotational frequency in nuclei with strong octupole interactions provides, therefore, a convenient tool to study octupole correlations in nuclei[1].

Standard example of such behaviour is that reported for the ^{222}Th nucleus [2], where instead of a sharp backbanding, expected for the proton $i_{13/2}$ intruder orbital, a gradual increase of alignment is observed. Calculations assuming the presence of octupole deformation in ^{222}Th are in excellent agreement with the experiment [3] up to the highest observed spin, I=22. The same calculations predict that at still higher rotational frequency, the neutron $j_{15/2}$ intruder orbital will allign, displaying a sharp backbending, since the alignment of *two* intruder orbitals should be enough to restore reflection symmetry in a nucleus.

Rotational frequencies observed in ^{222}Th are too low to observe the predicted transition from octupole to reflection-symmetric shape. Higher rotational frequencies are observed in another region of strong octupole correlations, in the neutron-rich Lanthanides [4]. The ^{150}Sm nucleus [5] displays a behaviour similar to that observed for ^{222}Th, yet here seen to higher rotational frequencies. Studies of the neighbouring odd-A nuclei provide a unique identification of the observed alignment process in ^{150}Sm, where after the second, sharp backbanding a reflection-symmetric shape is restored.

References

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Invited talk.