

Frontiers in Gamma Ray Spectroscopy

FIG18

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Studies of extremely deformed nuclei near ^{40}Ca

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Content :

The medium light nuclei situated in the nuclear chart between the double magic nuclei ^{40}Ca and ^{58}Ni exhibit many features characteristic for well deformed heavier nuclei. Although in this regions close to the stability line the ground states are predominantly spherical or oblate, at higher values of spin well developed rotational bands are present. This happens in particular when the intruder $f_{7/2}$ or $g_{9/2}$ proton- and neutron- shells are partially filled. Such SD-like bands, resulted from the multiple particle-hole excitations across the magic $N, Z=20$ shells, were observed so far in several isotopes of Ar, Ca and Ti, but this knowledge is limited to rather moderate spins $I \leq 16$.

The effective interactions derived for the *sdfp* active orbitals allowed for reasonable description of the collectivity developed in these nuclei, from low lying band heads up to the maximum aligned spin, within the spherical shell model. On the other hand, recent calculations performed in the framework of the EDF theory [1] foresee extremely deformed, high spin cluster states, that become yrast beyond the SD termination.

I will discuss plans to investigate very deformed rotational bands in these nuclei. Application of complementary methods: Coulomb excitation and gamma spectroscopy in the continuum will provide opportunity to track the shape evolution in the full range of the available angular momentum.

[1] D.Ray and V.Afanasjev, *PhysReV C*94, 014310(2016)

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