Horia Hulubei National Institute for R&D
in Physics and Nuclear Engineering

IFIN-HH

# Seminar general

## Tensor-force effects on shape deformation of atomic nuclei


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The exploration of the shell structure of exotic nuclei led us to novel consequences compared to the traditional "shell model" presented by Mayer and Jensen in 1949.

The shell structure varies as N or Z changes, sometimes resulting in emerging new magic numbers or in vanishing/weakening old magic numbers. This phenomenon occurs as a manifestation of certain aspects of nuclear forces: in particular the interplay between tensor force and central force. I will overview this phenomenon called the shell evolution. This interplay not only evolves the shell structure but also gives strong impacts on the shape deformation.

A good and exciting example has been found in the chain of Ni isotopes, where the strongly deformed excited rotational band appears with varying excitation energies as the neutron number, N. This variation exhibits a novel pattern: while the variation is parabolic as a function of N in the traditional picture of shape coexistence, it is linear as experimentally verified also in Bucharest.

A similar interplay further changes the fundamental view of nuclear shapes, by superseding the prolate-dominant one by Aage Bohr with prevailing triaxiality of rotational bands of heavy nuclei, a possible paradigm change. It is of interest that these new trends in nuclear structures are actually built on a common basis.


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