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# Towards a microscopic understanding the shape isomerism in medium mass nuclei

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The phenomenon of nuclear shape isomerism is an example of extreme shape coexistence in atomic nuclei. It arises from the existence of a secondary minimum in the nuclear potential energy surface (PES), at substantial deformation, separated from the primary energy minimum (the ground state) by a high potential energy barrier that hinders the transition between the minima. Shape isomers have clearly been observed, so far, in actinide nuclei at spin zero [1], and in superdeformed nuclei at the decay-out spin [2]. Only recently, being inspired by various mean-field theoretical approaches [3-5] and by the state-of-the-art Monte Carlo Shell Model (MCSM) calculations [6], shape-isomer-like structures, of prolate deformed nature, have been observed at spin zero in the lighter nuclei of 64,66Ni, by using gamma-ray spectroscopy and employing different types of reaction mechanisms (i.e., proton and neutron transfer, neutron capture and Coulomb excitation) [7,8].
From the theory point of view, the phenomenon of shape isomerism in the Ni isotopes reflects the action of the monopole tensor force which stabilizes isolated, deformed local minima in the PES. An analogous situation is expected to occur in the 112-116Sn isotopes and in 83,84Se nuclei.
In this talk, we will discuss the extended research program carried out at ILL (Grenoble) with the FIPPS array, IFIN-HH (Magurele) with ROSPHERE, and at Argonne (USA) and Legnaro National Laboratory (Italy), with the tracking array GRETINA and AGATA, respectively. The aim is to provide complementary information on the properties of shape-isomer-like states in different mass regions, which will help shedding light on the microscopic origin of extreme shape coexistence in atomic nuclei.

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