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## From shape isomers to superdeformation at high spins

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Extreme shape coexistence, of which shape isomers observed in actinide nuclei at spin zero are peculiar examples, is also at the origin of the phenomenon of superdeformation in rapidly rotating nuclei. Nevertheless, the studies of superdeformation have developed virtually in a completely independent manner from other shape-coexistence investigations, mainly because they were carried out almost always in the high-spin regime, while the others were related to low-spin phenomena [1,2].

In this talk, we will focus on Ni isotopes, where example of shape-isomer-like  $0^+$  excitations have been found in  $^{66}\text{Ni}$  and  $^{64}\text{Ni}$  [3,4], and we will discuss new results on  $^{62}\text{Ni}$ , in which superdeformed rotational bands at high spin, decaying out at around spin 8, are known [5]. Following a neutron capture experiment with the FIPPS spectrometer at ILL, ten  $0^+$  excited states below 6.5 MeV have been observed in  $^{62}\text{Ni}$ , with a fragmented gamma decay, in close agreement with predictions from state-of-the-art Monte Carlo Shell Model calculations. This allowed to identify, among them, the band-head of the superdeformed rotational band at high spins, which turns out to be fragmented over mainly two highly deformed and triaxial  $0^+$  configurations.

The work allows to make a connection between shape coexistence at spin 0 and superdeformation at high spins, and to trace, microscopically, the origin of the fragmented decay pattern of the superdeformed band.

[1] S. Leoni, B. Fornal, A. Bracco, Y. Tsunoda, T. Otsuka, *Prog. Part. Nuc. Phys.* 139 (2024) 104119.

[2] S. Leoni, B. Fornal, N. Marginean, and J. N. Wilson, *Eur. Phys. J. Spec. Top.* 233 (2024)1061.

[3] S. Leoni, et al., *Phys. Rev. Lett.* 118 (2017) 162502.

[4] N. Marginean, et al., *Phys. Rev. Lett.* 125 (2020) 102502.

[5] M. Albers et al., *Phys. Rev. C* 94 (2016) 034301.

### Type of contribution

Invited Speaker

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