

Collectivity in neutron-rich Co and Mn isotopes going towards $N = 40$

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In the last decade, a large experimental and theoretical effort has been devoted to the study of the sub-shell closure $N = 40$ and the evolution of the magic number $N = 50$ for the Ni isotopic chain. Meanwhile the $N = 50$ ^{78}Ni excited states represent still nowadays an experimental challenge, the evolution of the sub-shell closure at $N = 40$, when taking away protons from the Ni core, has been thoroughly studied. In fact, it has been measured that, by removing protons from the $f7/2$ shell below ^{68}Ni , the $N = 40$ subshell gap vanishes and a new region with large quadrupole deformation appears, as is the case of ^{66}Fe and ^{64}Cr [1,2]. A large theoretical effort within the shell-model framework has been done to describe this development of deformation and it has been shown that only by the inclusion of the $d5/2$ neutron orbital beyond $N = 50$ the deformation can be reproduced in this so called new island of inversion [3,4]. In this work we employed the AGATA demonstrator coupled to the PRISMA spectrometer to study the low-lying excited states in the neutron-rich Co. With one proton hole respect to Ni, Co isotopes present both collective and single-particle states [5,6]. We have also studied the excited states in neutron-rich Mn isotopes (three proton holes respect to Ni). The lifetimes of the excited states in $^{63,65}\text{Co}$ as well as $^{59,61}\text{Mn}$ have been measured employing the Recoil-Distance-Doppler-Shift method. The experimental $B(E2)$ values have been compared with LSSM calculations, which lead us to draw some conclusions on the role of the $d5/2$ and $g9/2$ neutron orbitals in driving collectivity below ^{68}Ni .

[1] W. Rother et al. Phys. Rev. Lett. 106, 22502 (2011)

[2] A. Gade et al. Phys. Rev. C81, 051304 (2010)

[3] E. Caurier et al. Eur. Phys. Jour. A. 15, 145 (2002)

[4] S. Lenzi et al. Phys. Rev. C82, 54301 (2010)

[5] A. Dijon et al. Phys. Rev. C83, 64321 (2011)

[6] D. Pauwels et al. Phys. Rev. C79, 44309 (2009)

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