



Contribution ID: 148

Type: Oral

Evidence of seniority conservation via lifetimes measurements in the $N=50$ isotones towards 100Sn

Friday, June 17, 2022 10:10 AM (20 minutes)

The experimental evidence of the seniority conservation is a direct evidence of the validity of the short-range pairing interaction, with far-reaching implications for nuclear structure in the validity of the BCS theory and therefore of the quasiparticle representation of the atomic nucleus [1]. In theory, this symmetry is preserved up to $j \leq 7/2$ and, contradictory experimental results exist for orbitals with larger angular momenta. In order to shed light on the open question of the seniority conservation in the proton $g_{9/2}$ orbital in the $N = 50$ isotones, reduced transition probabilities in ^{90}Zr , ^{92}Mo and ^{94}Ru nuclei, have been determined experimentally for the first time via lifetime measurements at the GANIL laboratory. The unconventional use of multi-nucleon transfer reaction [2] with a differential plunger device [3] allowed to measure lifetimes of the yrast low-spin states despite the presence of isomers in the proton-rich isotones. The required sensitivity to the lifetimes could only be achieved with the AGATA+VAMOS++ detection system [4,5].

The reduced transition probabilities for the $4^+ \rightarrow 2^+$ and $2^+ \rightarrow 0^+$ yrast transitions in ^{92}Mo and ^{94}Ru and for the $4^+ \rightarrow 2^+$ and $6^+ \rightarrow 4^+$ yrast transitions in ^{90}Zr determined in this experiment will be discussed in this contribution and, the results, will be interpreted on the basis of realistic shell-model calculations in the $f_{5/2}$, $p_{3/2}$, $p_{1/2}$, $g_{9/2}$ proton valence space, where it emerges that seniority is conserved in the first $\pi g_{9/2}$ orbital [6]. The results are relevant as well in the understanding of the evolution of the nuclear effective interaction in the $Z = 28$ isotopes towards ^{78}Ni , located much further away from the stability line than the $N = 50$ isotones.

[1] S. Cohen et al., Phys. Lett. 10, 195 (1964)

[2] R. Broda et al., Phys. Lett. B 251, 245 (1990)

[3] A. Dewald et al., Prog. Part. Nucl. Phys. 67, 786 (2012)

[4] S. Akkoyun, et al., Nucl. Instr. Meth. Phys. Res. A 668, 26 (2012)

[5] M. Rejmund, et al., Nucl. Instr. Meth. Phys. Res. A 646, 184 (2011)

[6] R.M. Pérez-Vidal, et al. Submitted to Phys. Rev. Lett.

Primary authors: PÉREZ VIDAL, Rosa María; GADEA, Andres (CSIC IFIC); DOMINGO PARDO, César (IFIC-CSIC); GARGANO, Angela (INFN Complesso Universitario di Monte S. Angelo); AND THE AGATA,VAMOS++ AND IKP PLUNGER COLLABORATIONS

Presenter: PÉREZ VIDAL, Rosa María

Session Classification: NS2022 Plenary

Track Classification: Oral Presentations