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

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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 $j <= 7/2$ 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 $f_{5/2}$, $_{p3/2}$, $_{p1/2}$, $g_{9/2}$ 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.

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