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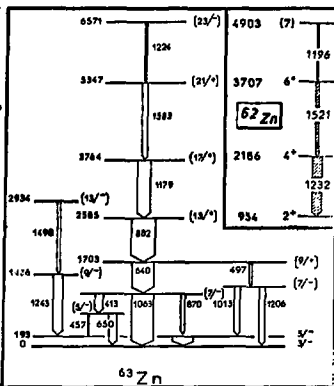
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PRE-PLUS-PARTICLE COUPLING DESCRIPTION OF THE ^{63}Zn HIGH-SPIN LEVELS

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Experimental evidences for a $\nu g_{9/2} \otimes ^{62}\text{Zn}$ core weak coupling description of the yrast states in ^{63}Zn are presented. (Level energy spacing and lifetime measurements).

The high-spin level studies made on a large scale among the whole chart of isotopes reveals to some extent a likeable uniformity in the nuclear structure problems. Thus there are more and more experimental results which point out that the medium weight nuclei at the end of the f-p shell exhibit nuclear structure phenomena similar to those observed in heavy nuclei ($A > 150$): shape coexistence in the Ge and Se region ^{1,2}, like-backbending effect in the ^{66}Zn nucleus ³, decoupled-band" model description of the odd Zn isotopes ⁴ are some examples. The reason is that the $g_{9/2}$ orbital plays an important ^{3,4} and somewhat similar role to the $i_{13/2}$, $h_{9/2}$ or $i_{13/2}$ orbitals. The aim of the present work is to provide an additional evidence in favour of the $\nu g_{9/2} \otimes$ core weak coupling scheme previously proposed ⁴ for the description of some high-spin levels in the odd Zn isotopes. The ^{63}Zn levels scheme has been investigated using the $^{61}\text{Ni}(\alpha, 2n\gamma)$ reaction at $E_{\alpha} \sim 30$ MeV; the same measurements (γ - γ coincidences, γ angular distribution, yield function) as in the ^{62}Zn nucleus study ⁵ have been performed. The figure shows most of the observed decaying scheme: there is no disagreement with the few previously known results ^{6,7,8}. The



^{62}Zn nucleus			^{63}Zn nucleus		
E_x (keV)	J^{π}	τ (ps)	E_x (keV)	J^{π}	τ (ps)
954	0^+	13.4 hours	1703	$9/2^+$	$5.0^{+2.0}_{-2}$
	2^+	2.5^{+1}_{-2}	2585	$13/2^+$	$2.5^{+2.5}_{-1.5}$
2186	4^+	1.5^{+1}_{-1}	3764	$(17/2^+)$	2.0^{+2}_{-1}
3707	6^+	$0.25^{+0.2}_{-0.1}$	5347	$(21/2^+)$	$0.2^{+0.2}_{-0.1}$
4903	(7^-)	$1.0^{+1}_{-0.5}$	6571	$(23/2^-)$	$1.5^{+4.5}_{-0.5}$

The $J = 6$ state in ^{62}Zn is unambiguously assigned a positive parity. The preliminary analysis gives the results reported in the table: the good concordance of the ^{62}Zn and ^{63}Zn lifetimes values strongly suggest core-transitions between the yrast states of the ^{63}Zn nucleus.

References

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table shows the correspondence of ^{63}Zn high-spin states to ^{62}Zn ones, the $\nu g_{9/2}$ single particle energy being equal to 1703 keV. To improve the credibility of the $|^{63}\text{Zn} \rangle = \nu g_{9/2} \otimes |^{62}\text{Zn} \rangle$ description of the high-spin states in ^{63}Zn , DSAM lifetimes measurements in ^{62}Zn and ^{63}Zn were performed using ^{60}Ni and ^{61}Ni self-supporting target and the $(\alpha, 2n\gamma)$ reaction at $E_{\alpha} = 30$ MeV. A