^{61}Ni(^{3}He,2nγ) 2010Al28

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Alan L. Nichols, Balraj Singh, Jagdish K. Tuli	NDS 113, 973 (2012)	15-Apr-2012

2010Al28: E=14 MeV, measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$, level lifetimes by DSAM using HORUS spectrometer consisting of twelve HPGe detectors at the Cologne Tandem accelerator facility. Comparison with shell model and IBM calculations. Identification of multi-phonon excitations and one-phonon mixed-symmetry 2^+ state.
Additional information 1.

^{62}Zn Levels

E(level)†	J$^\pi$	$T_{1/2}$‡	Comments
0.0	0^+		
953.84 *9*	2^+		
1804.69 *11*	2^+		
2186.07 *13*	4^+		
2342.1 *4*	0^+		J$^\pi$: from $\gamma\gamma(\theta)$ (2010Al28).
2384.51 *16*	3^+		
2743.62 *16*	4^+		
2803.08 *19*	2^+	0.146 ps *21*	E(level): identified as one component of one-phonon mixed-symmetry 2^+ state.
2884.0 *3*	2^+	0.132 ps *21*	E(level): identified as second component of one-phonon mixed-symmetry 2^+ state.
3209.88 *22*	4^+	0.250 ps *35*	E(level): 2010Al28 identify the 3209, 4^+ state as a good candidate for a two-phonon mixed symmetry state. However, non-observation of expected transition to the one-phonon mixed symmetry 2^+ state at 2803 keV does not allow confirmed identification of such an excitation. J$^\pi$: from $\gamma\gamma(\theta)$ (2010Al28). $J^\pi=3^-$ is ruled out – would give a large quadrupole (M2) admixture for 1023.7γ which is inconsistent with RUL.
3223.5 *4*	3		
3586.58 *24*	5^+		
3707.5 *3*	6^+	0.250 ps *35*	
4008.4 *7*			
4043.26 *24*	5^-	0.270 ps *42*	
4217.6 *8*			
4347.86 *25*	(6^+)	0.48 ps *13*	
4535.4 *9*			
4904.9 *3*			
5123.9 *6*			
5131.1 *6*			
5143.4 *5*			
5481.3 *7*			

† From least-squares fit to Eγ data.
‡ Effective half-lives from DSAM measurements (2010Al28), not corrected for side feedings; should be considered as upper limits.

γ(^{62}Zn)

B(M1), B(E2)(W.u.) and B(E1)(W.u.) values are deduced by 2010Al28 from effective half-lives, thus should be considered as lower limits.

E_i(level)	J_i^π	Eγ	Iγ	E_f	J_f^π	Mult.	δ‡	Comments
953.84	2^+	953.8 *1*	100	0.0	0^+			
1804.69	2^+	850.8 *1*	100 *5*	953.84	2^+	M1+E2	−3.6 +*7*−*10*	
		1804.8 *2*	89 *9*	0.0	0^+	(E2)		Mult.: δ(M3/E2)=−0.05 *11*.
2186.07	4^+	1232.2 *1*	100	953.84	2^+			

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^{61}Ni(^{3}He,2nγ) 2010Al28 (continued)

γ(^{62}Zn) (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	δ‡	Comments
2342.1	0^+	1388.2 *4*	100	953.84	2^+			
2384.51	3^+	579.8 *2*	64 *7*	1804.69	2^+	M1+E2	−1.9 *+3−5*	
		1430.7 *2*	100 *6*	953.84	2^+	M1+E2	+3.4 *+9−6*	E_γ: as per e-mail of 6 Nov 2010 from M. Albers. Eγ=1431.7 in Table 1 of 2010Al28 is a misprint.
2743.62	4^+	359.2 *4*	5 *2*	2384.51	3^+	(M1+E2)	−0.32 *22*	
		557.5 *2*	100 *4*	2186.07	4^+	(M1+E2)	−0.38 *7*	
		938.9 *2*	79 *10*	1804.69	2^+	(E2)		Mult.: δ(M3/E2)=+0.14 *13*.
		1789.7 *9*	2 *1*	953.84	2^+			
2803.08	2^+	998.4 *4*	9 *2*	1804.69	2^+	(M1+E2)		B(M1)↓<0.029 *6*; B(E2)(W.u.)<21 *6*
		1849.2 *2*	100 *7*	953.84	2^+	(M1(+E2))	+0.03 *16*	B(M1)=0.039 *6*.
		(2803.0 *5*)	8 *5*	0.0	0^+	[E2]		BE2W=0.11 7. B(E2)(W.u.): deduced by the evaluators. B(E2)(eff)(W.u.)=0.011 *3* listed in 2010Al28 is a misprint. I_γ: γ not observed in 2010Al28, intensity taken from Iγ(2803)/Iγ(1849)=6 *4*/72 *6* (2008Fi07).
2884.0	2^+	1079.4 *4*	5 *2*	1804.69	2^+	[M1+E2]		B(M1)<0.018 *5* $ B(E2)(W.u.)<9 *3*.
		1930.1 *4*	100 *7*	953.84	2^+	(M1(+E2))	−0.32 *+30−36*	B(M1)=0.035 *8* $ B(E2)(W.u.)=0.96 *21*.
		2884.0# *5*	<2	0.0	0^+	[E2]		E_γ,I_γ: this γ not seen in 2010Al28, but included in the analysis of transition probabilities using an upper limit of intensity deduced from detection sensitivity. Evaluators assign Iγ<2 based on quoted B(E2)(W.u.) value in 2010Al28. B(E2)(W.u.)<0.015 *10*.
3209.88	4^+	325.7†#	<2	2884.0	2^+	[E2]		B(E2)(W.u.)<293.
		406.7†#	<2	2803.08	2^+	[E2]		B(E2)(W.u.)<97.
		1023.7 *2*	100 *5*	2186.07	4^+	(M1(+E2))	+0.01 *18*	B(M1)=0.10 *2* $ B(E2)(W.u.)=0.10 *1*.
		2256.5 *8*	40 *8*	953.84	2^+	[E2]		B(E2)(W.u.)=0.74 *17*.
3223.5	3	2269.6 *4*	100	953.84	2^+	D(+Q)	−0.10 *19*	δ: −0.07 *12* quoted in text is a misprint (as per email of 6 Nov 2010 from M. Albers, first author of 2010Al28).
3586.58	5^+	843.0 *3*	97 *8*	2743.62	4^+	(M1+E2)		δ(E2/M1)=−2.5 *+10−33* or −0.38 *22*.
		1202.1 *3*	100 *5*	2384.51	3^+	E2		Mult.: δ(M3/E2)=−0.06 *11*.
3707.5	6^+	1521.5 *3*	100	2186.07	4^+	(E2)		B(E2)(W.u.)=19 *3*. B(E2)(eff)(W.u.): deduced by the evaluators. δ(M3/E2)=+0.01 *6*.
4008.4		2203.7 *7*	100	1804.69	2^+			
4043.26	5^-	833.2 *3*	10 *2*	3209.88	4^+	[E1]		B(E1)(W.u.)=1.9×10^{-4} *5*. B(E1)(W.u.)(eff): deduced by the evaluators.
		1299.4 *4*	35 *4*	2743.62	4^+	(E1)		B(E1)(W.u.)=1.8×10^{-4} *4*. B(E1)(W.u.): deduced by the evaluators. δ(M2/E1)=−0.07 *17*.
		1857.5 *4*	100 *7*	2186.07	4^+	(E1)		B(E1)(W.u.)=1.7×10^{-4} *3*. B(E1)(W.u.): deduced by the evaluators. δ(M2/E1)=0.00 *6*.
4217.6		2031.5 *7*	100	2186.07	4^+			
4347.86	(6^+)	640.4 *3*	18 *2*	3707.5	6^+			
		761.7 *6*	<5	3586.58	5^+			
		1604.2 *3*	100 *6*	2743.62	4^+	E2		Mult.: δ(M3/E2)=(−0.19 *22*).

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^{61}Ni(^{3}He,2nγ) 2010Al28 (continued)

γ(^{62}Zn) (continued)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	δ‡
4535.4		2349.3 *8*	100	2186.07	4^+		
4904.9		557.4 *5*	54 *10*	4347.86	(6^+)		
		861.5 *3*	14 *2*	4043.26	5^-		
		1197.2 *5*	100 *8*	3707.5	6^+	D(+Q)	−0.01 *13*
5123.9		1080.6 *5*	100	4043.26	5^-		
5131.1		1087.8 *5*	100	4043.26	5^-	D(+Q)	0.00 *20*
5143.4		795.6 *6*	23 *3*	4347.86	(6^+)		
		1556.7 *5*	100 *6*	3586.58	5^+		
5481.3		1773.7 *6*	100	3707.5	6^+		

† This γ not seen in 2010Al28; upper limit of intensity from detection sensitivity used to estimate E2 transition probability. Evaluators assign Iγ<2 based on quoted B(E2)(W.u.)(eff) value in 2010Al28.

‡ From $\gamma\gamma(\theta)$ data in 2010Al28 and RUL.

\# Placement of transition in the level scheme is uncertain.

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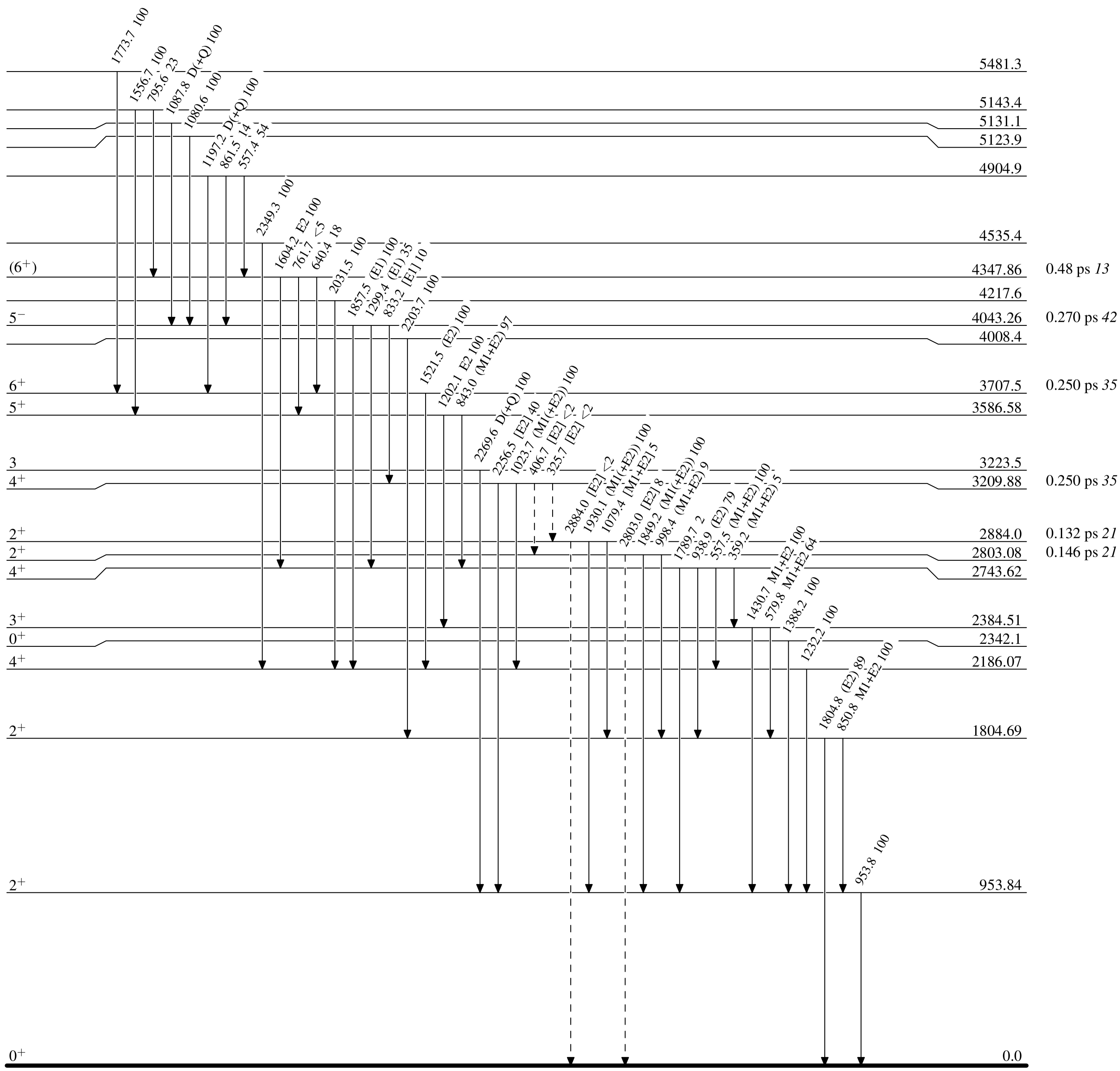
Level Scheme

Intensities: Relative photon branching from each level

Legend

γ Decay (Uncertain)



$^{62}_{30}Zn_{32}$