Adopted Levels, Gammas

History

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

Q(β^-)=5322 *19*; S(n)=6598 *19*; S(p)=9792 *19*; Q(α)=−8021 *19* 2012Wa38
Note: Current evaluation has used the following Q record 5315 20 *6605* 20 *9800* 20-8029 20 2011AuZZ.
S(2n)=15924 *20*, S(2p)=23041 *20* (2011AuZZ).
Values in 2003Au03: Q(β^-)=5315 *20*, S(n)=6604 *20*, S(p)=9799 *28*, Q(α)=−7950 *40*, S(2n)=15925 *20*, S(2p)=22830 *90*.
^{62}Co produced and identified by 1949Pa01 in ^{64}Ni(d,α) and ^{62}Ni(n,p) reactions followed by chemical separation. Later studies: 1957Ga15, 1968Ki08, 1969Wa16, 1969Mo04, 1969Es03, 1970Jo12.
Other reactions:
1995Wi09: ^{62}Ni(n,p) E=198 MeV; measured summed Gamow-Teller strength functions up to 30 MeV excitation energy.
1987Ah01: ^{63,65}Cu(n,X) E=9,11 MeV; measured cross sections and level-density parameter.
1987Gl05: ^{64}Ni(^{7}Li,^{7}Be) E=78 MeV; measured σ, deduced particle-hole gross structure.
1984Br03: ^{62}Ni(n,p) E=60 MeV; measured $\sigma(\theta)$, deduced analog isovector resonance excitation mechanism.
1984Ul01: ^{62}Ni(n,p) E=59.6 MeV; measured $\sigma(\theta)$, deduced GDR analog, sum rule and blocking.
1979Gr16: ^{66}Zn(α,^{8}B) E=109 MeV; measured $\sigma(\theta)$; possible observation of ^{62}Co g.s. population.
Additional information 1.
1999Ca29: shell model calculations, levels.

^{62}Co Levels

Cross Reference (XREF) Flags

A	^{62}Fe β^- decay (68 s)
B	^{48}Ca(^{18}O,p3nγ)
C	^{62}Ni(t,^{3}He)
D	^{64}Ni(d,α),(pol d,α)

E(level)[†]	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0	(2)$^+$	1.54 min *10*	A CD	%β^-=100 J$^\pi$: log *ft*=5.71 and 5.57 to 2$^+$ states; L(d,α)=(2,0+2); shell model predictions (1999Ca29). Lack of β feedings to 0$^+$ and 4$^+$ states is consistent with J=2. T$_{1/2}$: weighted average of 1.4 min *2* (1970Jo12, from decay curve of 1129γ followed for more than five half-lives, also 1971JoZN thesis − half-life plots given for several gamma rays); 1.50 min *4* (1969Wa16, from $\gamma\gamma$ coin and high energy β(E>3 MeV) − only lists half-life, no decay curves shown − uncertainty increased to 0.2 by the evaluators); 1.5 min *1* (1962Va23, from β-decay curve followed over about four half-lives − no discussion of contaminants − uncertainty increased to 0.2 by the evaluators); 1.9 min *3* (1960Pr05, from β decay curve − only lists half-life, no decay curves shown); 1.6 min *2* (1949Pa01, from β decay curves followed over six half-lives).
22 *5*	(5)$^+$	13.86 min *9*	BCD	%β^->99; %IT<1 (1970Jo12) E(level): may be a doublet according to (t,^{3}He) results with second component being 2$^+$. J$^\pi$: log *ft*=5.4 to 4$^+$; L(d,α)=4; $\sigma(\theta)$ and A$_y(\theta)$ patterns consistent with J^π=5$^+$. Shell model predictions (1999Ca29) suggest a 5$^+$ level at ≈250 keV. T$_{1/2}$: from weighted average of 13.5 min *3* (1970Jo12, from decay curves of 1163γ and 1173γ followed for more than two half-lives, also 1971JoZN thesis − half-life plots shown); 13.8 min *5* (1969Mo04, from decay curves of 1163, 1172, 1717, 2003, and 2103 γ rays followed over about six half-lives − half-life plots shown); 14.00 min *24* (1969Wa16, from β(E>1.5 MeV) and γ(E>1.4 MeV decay curves − only lists half-life, no decay curves shown); 13.9 min *2* (1962Va23, from β-decay curve shown and followed over about two half-lives − no discussion of contaminants); 13.8 min *2* (1960Pr05, from β decay curve − only lists half-life, no decay curves shown);

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Adopted Levels, Gammas (continued)

^{62}Co Levels (continued)

E(level)[†]	J^{π}	$T_{1/2}$	XREF	Comments
				13.91 min *5* (1957Ga15, from γ decay measured in a well-type scintillation detector, minor ^{64}Cu and ^{65}Ni impurities detected – only lists half-life, no decay curves shown; uncertainty inflated to 0.2 by the evaluators); 13.9 min *2* (1949Pa01, from β decay curves followed over six half-lives). Searches for a 22-keV isomeric transition as photons or Co x rays following possible heavily-converted IT decay have proved negative (1969Es03,1970Jo12). Implies almost 100% β^- decay of the isomer.
230[@] *5*			Cd	J^{π}: (3$^+$) proposed in (t,^{3}He). See also comment for 244 level.
244[@] *5*			Cd	E(level): 246 *10* doublet in (d,α) probably corresponds to 230+244 seen in (t,^{3}He). J^{π}: (3$^+$,4$^+$) proposed in (t,^{3}He). L(d,α)=(2) for a 246-keV doublet suggests (1$^+$,2$^+$,3$^+$) for one of the components.
506.1 *1*	1$^+$		A CD	J^{π}: L(d,α)=0+2; also allowed β transition from 0$^+$ parent with log *ft* ≈ 4.1.
532[&] *8*	1$^+$		CD	J^{π}: L(d,α)=0+2.
609.71[#] *14*	(5)$^+$		BCD	J^{π}: L(d,α)=4; $\sigma(\theta)$ pattern in (pol d,α) consistent with J=5, also analogy with $\sigma(\theta)$ pattern for 5$^+$ g.s. in ^{60}Co. (5$^+$,6$^+$) suggested in (t,^{3}He).
696 *10*			cD	E(level): unresolved from 706 group in (d,α).
706[a] *10*	3$^+$,4$^+$,5$^+$		cD	J^{π}: L(d,α)=4. J^{π}=(2$^+$) suggested for a 701 *5* group in (t,^{3}He).
863 *10*			D	
901[a] *10*			cD	E(level): doublet at 912 *5* in ^{62}Ni(t,^{3}He).
920[a] *10*			cD	
1172[a] *10*			CD	XREF: C(?).
1216.30[#] *15*	(6)		BCD	J^{π}: ΔJ=1, dipole γ to (5)$^+$. J^{π}=(5$^+$,6$^+$) proposed in (t,^{3}He).
1248 *10*			D	
1271 *5*			C	J^{π}: (3$^+$,4$^+$) proposed in (t,^{3}He) for a doublet.
1359[&] *5*	1$^+$,2$^+$,3$^+$		CD	J^{π}: L(d,α)=2; comparison of $\sigma(\theta)$ pattern with known cases in neighboring nuclei favors L=2, J=3 in preference to J=2. (2$^+$) proposed in (t,^{3}He).
1469[&] *8*			CD	J^{π}: (1$^+$,2$^+$,3$^+$) suggested in ^{62}Ni(t,^{3}He).
1500 *10*			D	
1543.22[#] *19*	(7)	1.32 ps *28*	BCD	J^{π}: ΔJ=1, dipole γ to (6). (5$^+$,6$^+$) proposed in ^{62}Ni(t,^{3}He). $T_{1/2}$: from DSAM in ^{48}Ca(^{18}O,p3nγ).
1667[&] *10*			CD	
1692[&] *10*			CD	
1805[&] *10*	(1$^+$,2$^+$,3$^+$)		CD	J^{π}: L(d,α)=(2).
1820 *10*			C	
1873 *15*			C	E(level): doublet.
1979[&] *10*			CD	
2079 *10*			D	
2120 *15*			C	
2135[@] *15*			Cd	E(level): doublet in (t,^{3}He). E=2149 *10* in (d,α) probably corresponds 2135+2165 groups in (t,^{3}He).
2165 *20*			Cd	E(level): see comment for 2135 level.
2281 *10*			D	
2309.7[#] *9*	(8)	<0.28 ps	B	J^{π}: ΔJ=1, dipole γ to (7). $T_{1/2}$: from DSAM in ^{48}Ca(^{18}O,p3nγ).
2344 *10*	(7$^+$)[‡]		D	
2420 *10*			D	
2521 *10*	(1$^+$,2$^+$,3$^+$)		D	J^{π}: L(d,α)=(2); comparison of $\sigma(\theta)$ pattern with known cases in neighboring nuclei favors L=2, J=3 in preference to J=2.
2647 *10*			D	

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Adopted Levels, Gammas (continued)

^{62}Co Levels (continued)

E(level)†	Jπ	XREF	E(level)†	Jπ	XREF	E(level)†	Jπ	XREF
2754 *10*		D	3.79×10^3		D	4.45×10^3 *3*	(7$^+$)‡	D
2.88×10^3 *2*	(7$^+$)‡	D	4.10×10^3		D	4.60×10^3 *3*	(7$^+$)‡	D
2.92×10^3		D	4.18×10^3 *3*	(7$^+$)‡	D			
3.46×10^3		D	4.38×10^3 *3*	(7$^+$)‡	D			

† From γ-ray studies when possible. Energies of levels populated only in particle-transfer reactions taken from ^{62}Ni(t,^{3}He) and ^{64}Ni(d,α) for levels below 2.8 MeV, and from ^{64}Ni(pol d,α) for higher energies.

‡ From comparison of experimental $\sigma(\theta)$ and $A_y(\theta)$ distributions in (pol d,α) with empirical patterns for L=6 and J=7 (1988Na01).

Based on fixed value of 22-keV level, without including the specified uncertainty of 5 keV.

@ From (t,^{3}He).

& Weighted average from (t,^{3}He) and (d,α).

^{a} From (d,α).

γ(^{62}Co)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.†	Comments
506.1	1$^+$	506.1 *1*	100	0.0	(2)$^+$		E_γ: from ^{62}Fe β^- decay.
609.71	(5)$^+$	587.71 *14*	100	22	(5)$^+$	D	
1216.30	(6)	606.44 *15*	33 *5*	609.71	(5)$^+$	D	
		1194.45 *18*	100 *5*	22	(5)$^+$	D	
1543.22	(7)	326.92 *12*	100	1216.30	(6)	D	
2309.7	(8)	766.5 *9*	100	1543.22	(7)	D	

† From $\gamma(\theta)$ in ^{48}Ca(^{18}O,p3nγ).

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level