Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 178, 41 (2021).	12-Nov-2021

Q(β^-)=7307 *20*; S(n)=6012 *27*; S(p)=11446 *20*; Q(α)=−9249 *20* 2021Wa16
S(2n)=14511 *27*, S(2p)=25846 *21* (2021Wa16).
Mass measurements: 2010Fe01, 2008Bl05 (also 2011Kw02, could be for an isomer at 107 keV *20* as described by 2010Fe01).
Additional information 1.
Theory references for structure and other topics: seven primary references in the NSR database at www.nndc.bnl.gov/nsr/.

^{64}Co Levels

Cross Reference (XREF) Flags

A	^{64}Fe β^- decay (2.0 s)	D	^{198}Pt(^{76}Ge,Xγ)
B	^{64}Ni(d,^{2}He)	E	^{238}U(^{70}Zn,Xγ)
C	^{64}Ni(t,^{3}He)		

E(level)[†]	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0	1$^+$	0.30 s *3*	ABCDE	%β^-=100 T$_{1/2}$: from 1974Ra31. Other: 0.40 s *5* (1969Wa15). J$^\pi$: log *ft*=4.3 to 0$^+$ (see ^{64}Co β^- decay); L(d,^{2}He)=0 from 0$^+$.
107? *20*		>280 ms		%β^-=?; %IT=? E(level): from mass excess of −59792 keV *20* for ^{64}Co g.s. in 2021Wa16 and measured mass excess of −59685.7 keV *41* using LEBIT at NSCL-MSU, 2010Fe01, tentatively, propose an isomer at 107 keV *20*. J$^\pi$: (5$^+$) assigned by 2010Fe01 in analogy with low-lying (5$^+$) isomers in ^{62}Co and ^{66}Co, but note that J^π=(3$^+$), instead of (5$^+$) is assigned for the 175-keV isomer in ^{66}Co by 2012Li02. T$_{1/2}$: estimated by 2010Fe01 from the time interval spent by the ions in the mass measurement apparatus. 2021Ko07 give 300 ms from systematics.
176? *30*			C	
310.9 *5*	(1$^+$,2$^+$,3$^+$)		ABC E	XREF: B(296)C(296). J$^\pi$: L(d,^{2}He)=0+2.
441.0 *5*	(2$^+$,3$^+$)[#]		DE	
458[‡] *15*	(1$^+$)		BC	J$^\pi$: L(d,^{2}He)=0.
672.6 *4*	(3$^+$)[#]		DE	
691[‡] *15*	(1$^+$)		BC	J$^\pi$: L(d,^{2}He)=0.
769.3 *5*	(4$^+$)[#]		DE	
804 *15*			bC	J$^\pi$: L(d,^{2}He)=0+2 suggests (1$^+$,2$^+$,3$^+$) for 804 and/or 867 levels.
833.2 *6*	(5$^+$)[#]	6.4 ns *3*	D	T$_{1/2}$: from (projectile-like-fragment)γ(t) in (^{76}Ge,Xγ) (2000As05).
867 *15*			bC	J$^\pi$: L(d,^{2}He)=0+2 suggests (1$^+$,2$^+$,3$^+$) for 804 and/or 867 levels.
953 *15*			C	
1067? *15*			C	
1132[‡] *15*	(1$^+$,2$^+$,3$^+$)		BC	J$^\pi$: L(d,^{2}He)=0+2.
1300 *15*			C	
1410[‡] *15*	(1$^+$)		BC	J$^\pi$: L(d,^{2}He)=0.
1541[‡] *15*	(0$^+$,1$^-$,2$^-$)[@]		BC	
1561			A	
1669[‡] *15*	(0$^+$,1$^-$,2$^-$)[@]		BC	
1773 *15*	(0$^+$,1$^-$,2$^-$)[@]		BC	XREF: C(?). E(level): from (d,^{2}He).
1906 *15*			C	

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Adopted Levels, Gammas (continued)

^{64}Co Levels (continued)

E(level)[†]	J$^\pi$	XREF	E(level)[†]	J$^\pi$	XREF	E(level)[†]	J$^\pi$	XREF
1974 *26*	(0$^+$,1$^-$,2$^-$)[@]	B	2681 *20*	(0$^+$,1$^-$,2$^-$)[@]	B	3486 *20*	(0$^+$,1$^-$,2$^-$)[@]	B
2058[‡] *15*	(0$^+$,1$^-$,2$^-$)[@]	BC	2817 *23*	(0$^+$,1$^-$,2$^-$)[@]	B	3644 *27*	(0$^+$,1$^-$,2$^-$)[@]	B
2413 *23*	(0$^+$,1$^-$,2$^-$)[@]	B	3074 *30*	(0$^+$,1$^-$,2$^-$)[@]	B	4870 *40*		B
2494 *20*	(0$^+$,1$^-$,2$^-$)[@]	B	3188 *30*	(0$^+$,1$^-$,2$^-$)[@]	B			

[†] From a least-squares fit to Eγ data for levels populated in γ-ray studies.
[‡] Unweighted average of values from (d,^{2}He) and (t,^{3}He).
[#] As proposed by 2000As05 based on γ-ray multipolarity assignments and model considerations.
[@] L(d,^{2}He)=0+1 for each of the unresolved structures: (1543+1650+1773; 1974+2065; 2413+2494; 2681+2817; 3074+3188; 3486+3644) in (d,^{2}He) reaction suggest J^π=0$^+$,1$^-$,2$^-$.

γ(^{64}Co)

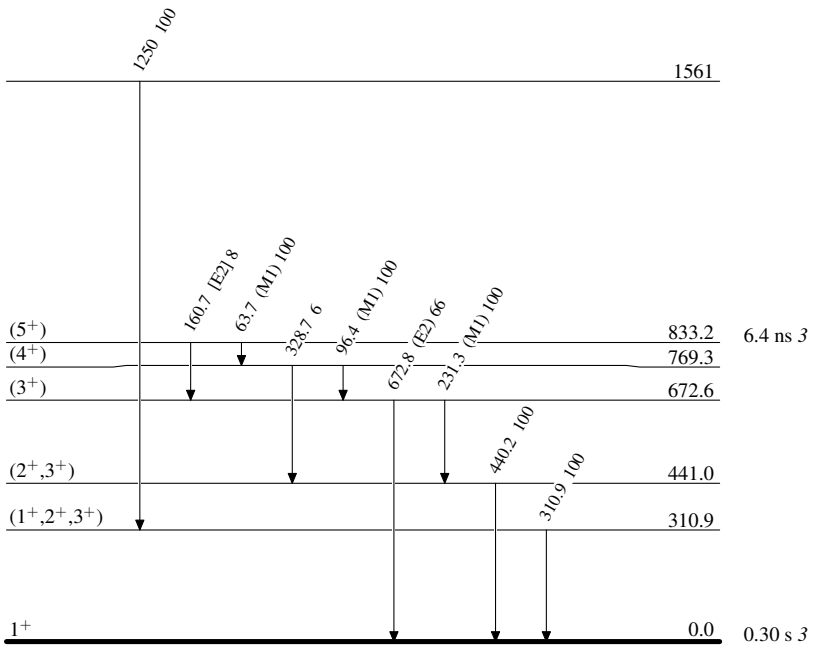
E$_i$(level)	J$_i^\pi$	E$_\gamma$[†]	I$_\gamma$	E$_f$	J$_f^\pi$	Mult.[‡]	α[#]	Comments
310.9	(1$^+$,2$^+$,3$^+$)	310.9 *5*	100	0.0	1$^+$			E$_\gamma$: from (^{70}Zn,Xγ).
441.0	(2$^+$,3$^+$)	440.2 *9*	100	0.0	1$^+$			E$_\gamma$: unweighted average of 441.0 *3* (^{76}Ge,Xγ) and 439.3 *3* in (^{70}Zn,Xγ).
672.6	(3$^+$)	231.3 *3*	100 *5*	441.0	(2$^+$,3$^+$)	(M1)		E$_\gamma$: weighted average of 231.8 *3* (^{76}Ge,Xγ) and 231.1 *2* in (^{70}Zn,Xγ).
		672.8 *4*	66 *6*	0.0	1$^+$	(E2)		E$_\gamma$: weighted average of 673.0 *3* (^{76}Ge,Xγ) and 672.3 *4* in (^{70}Zn,Xγ). I$_\gamma$: weighted average of 63 *14* (^{76}Ge,Xγ) and 67 *6* in (^{70}Zn,Xγ).
769.3	(4$^+$)	96.4 *3*	100 *6*	672.6	(3$^+$)	(M1)	0.0441 *9*	E$_\gamma$: weighted average of 97.0 *5* (^{76}Ge,Xγ) and 96.3 *2* in (^{70}Zn,Xγ).
		328.7 *4*	6 *1*	441.0	(2$^+$,3$^+$)			E$_\gamma$: γ from (^{76}Ge,Xγ) only.
833.2	(5$^+$)	63.7 *5*	100 *8*	769.3	(4$^+$)	(M1)	0.138 *4*	B(M1)(W.u.)=0.108 *11* γ from (^{76}Ge,Xγ).
		160.7 *5*	8 *3*	672.6	(3$^+$)	[E2]	0.0866 *16*	B(E2)(W.u.)=3.7 *14* γ from (^{76}Ge,Xγ).
1561		1250	100	310.9	(1$^+$,2$^+$,3$^+$)			

[†] From (^{70}Zn,Xγ) unless otherwise stated.
[‡] From angular asymmetry ratio of γ intensities in the reaction plane and out of the reaction plane in ^{198}Pt(^{76}Ge,X). Electric or magnetic nature of the multipolarity is not determined by this ratio, but stretched quadrupole transitions are most likely E2 from RUL, and stretched dipole (ΔJ=1) transitions are considered as M1 by 2000As05.
[#] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{64}_{27}Co_{37}$