Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 202,59 (2025)	25-Feb-2025

Q(β^-)=2137.9 *7*; S(n)=6098.08 *14*; S(p)=12622 *20*; Q(α)=−8630.2 *27* 2021Wa16
S(2n)=15755.54 *25*, S(2p)=24068 *4* (2021Wa16).
Mass measurements: 2007Gu09, 2004He32.
Hyperfine structure measurements:
2024Mu06: measured hyperfine structure parameters, nuclear dipole and quadrupole moments using collinear laser spectroscopy at ISOLDE/CERN.
2022Ma04: measured isotope shift using collinear laser spectroscopy at ISOLDE-CERN.
2006Ge16,2005Ge09: measured $T_{1/2}$, g-factor of the $9/2^+$ isomer using TDPAD method at Orsay.
1976Kr09: measured magnetic dipole moment of g.s. using $\gamma(\theta)$ anisotropy at Los Alamos.
Cross-section measurements:
^{65}Cu(d,X): 2006Ta21.
^{65}Cu(n,p): 2007Zh34, 2004Sh14, 2001ShZZ, 1992Uw01.
^{68}Zn(n,α): 2006Ab61, 2005Co27, 1999NeZY.
Cu(^{7}Li,X): 2004De41.
Cu(p,X), (α,X), (^{12}C,X), (^{20}Ne,X), (^{40}Ar,X): 2003Ya20.
^{58}Ni(^{124}Sn,X): 1998Ji04.
Theoretical calculations:
2004Ho08, 1990Ra01, 1983Ra22: calculated levels, nuclear moments, transition strengths.
1988Lo12, 1974Sc13: calculated quadrupole moment, B(E2).
1998Pa39, 1977Ko02, 1973Hs03,1 973Wu02: calculated levels, J, π, spectroscopic factors.
2002Mo15, 2002Ho08, 1997Si01, 1966La12, 1967Co22, 1967Ga09: calculated levels, J, π.

^{65}Ni Levels

Cross Reference (XREF) Flags

A	^{65}Co β^- decay (1.16 s)	E	^{64}Ni(d,pγ)	I	^{64}Ni(^{18}O,^{17}Oγ)
B	^{64}Ni(n,γ):resonances	F	^{64}Ni(pol t,d)	J	^{208}Pb(^{64}Ni,Xγ)
C	^{64}Ni(n,γ),(pol n,γ) E=th	G	^{64}Ni(α,^{3}He)		
D	^{64}Ni(d,p),(pol d,p)	H	^{64}Ni(^{18}O,^{17}O)		

E(level)†‡	J$^\pi$#	$T_{1/2}$	XREF	Comments
0.0	5/2$^-$	2.5175 h *5*	A CDEFGhIJ	%β^-=100 μ=0.7575 *7* (2024Mu06) Q=9.7 *9* (2024Mu06) J$^\pi$: L(pol d,p)=3 from 0$^+$ and L-1/2 transfer from analyzing power; also from analyzing power in (pol t,d). $T_{1/2}$: weighted average of 2.520 h *1* (1980RuZY,1971Me14), 2.521 h *5* (1968Re04), 2.522 h *7* (1977Ba64), 2.5172 h *3* (1987Ju05). Others: 2.553 h *8* (1963Cl06), 2.67 h *17* (1937Oe01), 2.5 h (1940Di01), 2.6 h (1942Ne02, assigned for ^{63}Ni and re-assigned to ^{65}Ni by 1946Sw01), 2.25 h *2* (1960Pr05), 2.50 h *3* (1960Ri06), 2.58 h (1964Fr04). μ,Q: from collinear laser spectroscopy in 2024Mu06. Others: 0.69 *6* from $\gamma(\theta)$ anisotropy (1976Kr09), also in 2019StZV compilation. $\delta<r^2>(^{60}Ni,^{65}Ni)$=0.385 fm^2 *18*. Total charge radius R_c=3.856 fm *3* (2022Ma04). Isotope shift $\delta\nu(^{60}Ni,^{65}Ni)$=1317.5 MHz *26*(stat) *94*(syst) (2022Ma04). Additional information 1.
63.40 *4*	1/2$^-$	68.6 μs *35*	A CDEFGhIJ	%IT=100 $T_{1/2}$: from γ(t) in (d,pγ). Other: >2.1 μs from $\gamma\gamma$(t) in (n,γ) E=th.

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Adopted Levels, Gammas (continued)

^{65}Ni Levels (continued)

E(level)[†‡]	Jπ[#]	$T_{1/2}$	XREF	Comments
310.37 *5*	$3/2^-$		A CDEF hIJ	Jπ: L(pol d,p)=1 from 0^+ and L+1/2 transfer from analyzing power; also from analyzing power in (pol t,d) and γ(circ pol) in (pol n,γ) E=th.
692.30 *5*	$3/2^-$		A CDEFGhIJ	Jπ: L(pol d,p)=1 from 0^+ and L+1/2 transfer from analyzing power; also from analyzing power in (pol t,d) and γ(circ pol) in (pol n,γ) E=th. Other: L(α,^{3}He)=2 from 0^+ giving $3/2^+$,$5/2^+$ is in disagreement.
1017.17 *8*	$9/2^+$	25.6 ns *11*	CDEFGhIJ	μ=−1.332 *14* (2005Ge09,2020StZV) Jπ: L(pol d,p)=4 from 0^+ and L+1/2 transfer from analyzing power; also from analyzing power in (pol t,d). $T_{1/2}$: weighted average of 22 ns *2* from (d,pγ), 26.7 ns *10* from (^{18}O,^{17}Oγ), 25 ns *5* (1994Pa20), and 24 ns *3* (1997Is13) from (^{64}Ni,xγ). μ: from TDPAD in 2005Ge09,2006Ge16, also in 2020StZV compilation.
1141.10 *10*	$(5/2^-,7/2^-)$		A CDE hI	XREF: D(1143?) Jπ: possible allowed β^- feeding from $(7/2)^-$ parent; 1652γ from $5/2^+$.
1273.75 *12*	$(5/2^-)$		A CD F hI	Jπ: possible allowed β^- feeding from $(7/2)^-$ parent; 1210.5γ to $1/2^-$. But L(d,p)=1 from 0^+ giving $1/2^-$,$3/2^-$, and $1/2^-$ from (pol t,d) are in disagreement, which may indicate a different level around this energy.
1417.67 *7*	$1/2^-$		CD FG I	Jπ: L(pol d,p)=1 from 0^+ and L-1/2 transfer from analyzing power; also from analyzing power in (pol t,d) and γ(circ pol) in (pol n,γ) E=th.
1500	$7/2^+$,$9/2^+$		FG	XREF: F(1556?)G(1500) E(level): from (α,^{3}He). Jπ: L(α,^{3}He)=4 from 0^+.
1609.4 *10*	$7/2^-$		DEFG	XREF: E(1609) E(level): from (d,p). Jπ: from analyzing power in (pol t,d).
1772	$(3/2)^-$		D F	XREF: D(1779?) E(level): from (pol t,d). Jπ: from analyzing power in (pol t,d).
1920.44 *7*	$5/2^+$		CDEFGHIJ	XREF: H(1960) Jπ: L(pol d,p)=2 from 0^+ and L+1/2 transfer from analyzing power; also from analyzing power in (pol t,d).
2096? *10*			D	XREF: D(2096?)
2146.81 *13*	$3/2^-$		CD G	XREF: G(2130) Jπ: L(pol d,p)=1 from 0^+ and L+1/2 transfer from analyzing power.
2168.78 *17*			CD	XREF: D(2163?)
2185.90 *20*	$(11/2^+)$[@]		J	
2.30×10^3 *6*	$(9/2^+)$		DE G	XREF: E(2320) Jπ: L(pol d,p)=(4) from 0^+ and L+1/2 transfer from analyzing power.
2302 *10*			D	
2324.16 *6*	$3/2^{(-)}$		CD	Jπ: primary 3773.7γ D+Q, ΔJ=1 from $1/2^+$ in (n,γ) E=th, most likely E1 (2020Po12). But L(d,p)=(3) from 0^+ giving $(5/2^-,7/2^-)$ is in a disagreement.
2510	$7/2^+$,$9/2^+$		G	Jπ: L(α,^{3}He)=4 from 0^+.
2519.50 *20*	$(13/2^+)$[@]		E J	XREF: E(2480)
2520 *10*	$3/2^+$,$5/2^+$		D	Jπ: L(d,p)=2 from 0^+.
2574? *10*			D	XREF: D(?)
2698? *10*			D	XREF: D(?)
2711.19 *7*	$(3/2^+)$		CDE	XREF: D(2714?)E(2790) Jπ: L(d,p)=2 from 0^+ for a possible level at 2714 *10*; 1293.6γ to $1/2^-$.
2792.97 *10*	$5/2^+$		CD	Jπ: L(pol d,p)=2 from 0^+ and L+1/2 transfer from analyzing power.
2829 *10*	$1/2^+$		D G	Jπ: L(d,p)=0 from 0^+.

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Adopted Levels, Gammas (continued)

^{65}Ni Levels (continued)

E(level)[†‡]	Jπ[#]	XREF	Comments
2901.77 *10*	(3/2)$^+$	CD G	XREF: G(2940) Jπ: L(d,p)=L(α,^{3}He)=2 from 0$^+$; 2838.3γ to 1/2$^-$.
2906.52 *24*	(13/2$^+$)[@]	J	
3014.40 *14*	3/2$^+$	CD	Jπ: L(pol d,p)=2 from 0$^+$ and L-1/2 transfer from analyzing power.
3044.20 *20*	(5/2$^+$)	CD	Jπ: L(pol d,p)=(2) from 0$^+$ and L+1/2 transfer from analyzing power.
3105.76 *22*	(1/2$^-$,3/2$^-$)	CD G	Jπ: L(d,p)=(1) from 0$^+$. But L(α,^{3}He)=(3,4) from 0$^+$ giving (5/2$^-$,7/2,9/2$^+$) for a level at E=3100 is in disagreement.
3197 *10*		D g	XREF: g(3230)
3261 *10*		D g	XREF: g(3230)
3279.37 *10*	(3/2)$^+$	CDe	XREF: e(3340) Jπ: L(d,p)=2 from 0$^+$; 1861.6γ to 1/2$^-$.
3354 *10*	5/2$^+$	De	XREF: e(3340) Jπ: L(pol d,p)=2 from 0$^+$ and L+1/2 transfer from analyzing power.
3401 *10*	1/2$^+$	D	Jπ: L(d,p)=0 from 0$^+$.
3410.59 *16*	(3/2$^+$)	CD	XREF: D(3411?) Jπ: L(d,p)=(2) from 0$^+$; 1992.8γ to 1/2$^-$.
3451.66 *16*	(3/2$^+$)	CD	Jπ: L(pol d,p)=(2) from 0$^+$; 2033.7γ to 1/2$^-$.
3463? *10*		D	XREF: D(?)
3483? *10*		D	XREF: D(?)
3509.19 *14*	(3/2$^+$)	CD	Jπ: L(d,p)=(2) from 0$^+$; primary 2589γ D+Q from 1/2$^+$ in (n,γ) E=th.
3523.00 *29*	(15/2$^+$)[@]	J	
3.53×10^3 *21*	5/2$^+$	DE	XREF: E(3530) Jπ: L(pol d,p)=2 from 0$^+$ and L+1/2 transfer from analyzing power.
3569? *10*		D	XREF: D(3569?)
3743 *10*	3/2$^+$,5/2$^+$	D G	XREF: G(3700) Jπ: L(d,p)=L(α,^{3}He)=2 from 0$^+$.
3907 *10*	3/2$^+$,5/2$^+$	D	Jπ: L(d,p)=2 from 0$^+$.
3937 *10*		D	
3962.64 *19*	(3/2$^+$)	CD	Jπ: L(d,p)=(2) from 0$^+$; 2545.3γ to 1/2$^-$.
3984? *10*		D	XREF: D(?)
4001.44 *17*	(1/2$^-$,3/2)	C E	XREF: E(4100) Jπ: primary 2096.6γ D(+Q) from 1/2$^+$ in (n,γ) E=th; 4000.8γ to 5/2$^-$.
4011.3 *4*	(17/2$^+$)[@]	J	
4012 *10*	3/2$^+$,5/2$^+$	D	Jπ: L(d,p)=2 from 0$^+$.
4061? *10*		D	XREF: D(?)
4084 *10*	3/2$^+$,5/2$^+$	D	Jπ: L(d,p)=2 from 0$^+$.
4108 *10*	3/2$^+$,5/2$^+$	D	Jπ: L(d,p)=2 from 0$^+$.
4134 *10*	3/2$^+$,5/2$^+$	D	Jπ: L(d,p)=2 from 0$^+$.
4165 *10*		D	
4199 *10*	1/2$^+$	D	Jπ: L(d,p)=0 from 0$^+$.
4252 *10*	1/2$^+$	D	Jπ: L(d,p)=0 from 0$^+$.
4299? *10*		D	XREF: D(?)
4344.61 *14*	1/2$^+$	CD	Jπ: L(d,p)=0 from 0$^+$.
4373? *10*		D	XREF: D(?)
4391.78 *17*	(3/2)$^+$	CD	Jπ: L(d,p)=2 from 0$^+$; 2974.5γ to 1/2$^-$.
4408? *10*		D	XREF: D(?)
4443 *10*	3/2$^+$,5/2$^+$	D	Jπ: L(d,p)=2 from 0$^+$.
4482 *10*		D	
4508.0 *4*	(1/2,3/2,5/2$^+$)	CD	Jπ: primary 1589.9γ from 1/2$^+$ in (n,γ) E=th.
4536 *10*		D	
4544.46 *21*	(1/2$^-$,3/2)	C E	XREF: E(4520) Jπ: 3126.7γ to 1/2$^-$, 4544.3γ to 5/2$^-$; primary 1553.6γ from 1/2$^+$ in (n,γ) E=th.
4568 *10*	3/2$^+$,5/2$^+$	D	Jπ: L(d,p)=2 from 0$^+$.
4590 *10*		D	
4632 *10*		D	

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Adopted Levels, Gammas (continued)

^{65}Ni Levels (continued)

E(level)[†‡]	Jπ[#]	XREF	Comments
4655.32 *22*	(3/2)$^+$	CD	XREF: D(4650) Jπ: L(d,p)=2 from 0$^+$; 3237.1γ to 1/2$^-$.
4677 *10*		D	
4712 *10*		D	
4750 *10*		D	
4781 *10*		DE	XREF: E(4770) E(level): from (d,p).
4808 *10*		D	
4834 *10*	3/2$^+$,5/2$^+$	D	Jπ: L(d,p)=2 from 0$^+$.
4860? *10*		D	XREF: D(?)
4879 *10*	1/2$^+$	D	Jπ: L(d,p)=0 from 0$^+$.
4902? *10*		D	XREF: D(?)
4916? *10*		D	XREF: D(?)
4934 *10*		D	
4949? *10*		D	XREF: D(?)
4972 *10*	3/2$^+$,5/2$^+$	D	Jπ: L(d,p)=2 from 0$^+$.
5009? *10*		D	XREF: D(5009?)
5029? *10*		DE	XREF: E(5020) Additional information 2. E(level): from (d,p).
5066 *10*	3/2$^+$,5/2$^+$	D	Jπ: L(d,p)=2 from 0$^+$.
5090? *10*		D	XREF: D(?)
5123 *10*	3/2$^+$,5/2$^+$	D	Jπ: L(d,p)=2 from 0$^+$.
5133? *10*		D	XREF: D(?)
5193 *10*	3/2$^+$,5/2$^+$	D	Jπ: L(d,p)=2 from 0$^+$.
5212? *10*		DE	XREF: D(?)E(5270) E(level): from (d,p).
5340 *15*	3/2$^+$,5/2$^+$	D	Jπ: L(d,p)=2 from 0$^+$.
5530 *15*		DE	XREF: E(5510) E(level): from (d,p).
5600 *15*		D	
5650 *15*		D	
5710 *15*		DE	XREF: E(5760) E(level): from (d,p).
5810		D	
5860		D	
5900 *15*		D	
6000		D	
(6098.26 *8*)	1/2$^+$	BCD	XREF: D(6090) S(n)=6098.08 *14* (2021Wa16). Jπ: s-wave capture in 0$^+$ g.s. of ^{64}Ni.
6107.50 *17*	(3/2)	B	
6112.16 *24*	1/2	B	
6112.65 *17*	(1/2)	B	
6120 *15*		D	
6129.39 *17*	(3/2)	B	
6131.36 *15*	1/2	B	
6159.9 *4*	(3/2)	B	
6180 *15*		D	
6203.04 *16*		B	
6225.39 *14*	1/2	B	
6237.38 *17*		B	
6244.57 *17*	1/2	B	
6250 *15*	3/2$^+$,5/2$^+$	D	Jπ: L(d,p)=2 from 0$^+$.
6250.67 *17*	1/2	B	
6258.75 *17*	1/2	B	

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Adopted Levels, Gammas (continued)

^{65}Ni Levels (continued)

E(level)[†‡]	J$^{\pi}$[#]	XREF	Comments
6273.02 *17*	1/2	B	
6286.11 *24*		B	
6300.19 *24*	1/2	B	
6309.45 *33*		B	
6314.47 *17*	1/2	B	
6321.46 *33*	1/2	B	
6326.43 *15*	1/2	B	
6330 *15*		D	
6332.28 *17*		B	
6349.81 *33*		B	
6363.59 *17*	1/2	B	
6377.2 *4*		B	
6380? *15*		D	XREF: D(?)
6389.5 *25*	1/2	B	
6401.8 *25*	1/2	B	
6420.0 *25*		B	
6425.9 *25*	1/2	B	
6433.0	1/2	B	
6457	3/2	B	
6463.8	3/2	B	
6468		B	
6470 *15*	(3/2$^+$,5/2$^+$)	D	J$^{\pi}$: L(d,p)=(2) from 0$^+$.
6475	3/2	B	
6481	1/2	B	
6484.5		B	
6487.4		B	
6499	3/2	B	
6506		B	
6510? *15*	(3/2$^+$,5/2$^+$)	D	XREF: D(?) J$^{\pi}$: L(d,p)=(2) from 0$^+$.
6512.3	1/2	B	
6546.5	1/2	B	
6550.4	3/2	B	
6557.3	1/2	B	
6561		B	
6570	1/2	B	
6574	1/2	B	
6578.1		B	
6589.8		B	
6593		B	
6609		B	
6613	1/2	B	
6619.2		B	
6620 *15*		D	
6626.2	1/2	B	
6631.2	3/2	B	
6642	1/2	B	
6654		B	
6665	1/2	B	
6672		B	
6690? *20*		D	XREF: D(?)
6740 *15*		D	
6870? *15*		D	XREF: D(?)

[†] Additional information 3.

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Adopted Levels, Gammas (continued)

^{65}Ni Levels (continued)

‡ From a least-squares fit to γ-ray energies for levels connected with γ transitions and from (d,p) for other levels, unless otherwise noted. For the fitting purpose only, where not available, $\Delta E\gamma$=0.5 keV is assumed for Eγ values quoted to nearest tenth keV and 1 keV for integer Eγ values.

Assignments for levels in (n,γ):res are from analysis of neutron resonance data (2018MuZY).

@ From shell model calculations and level systematics in ^{208}Pb(^{64}Ni,Xγ).

Adopted Levels, Gammas (continued)

$\gamma(^{65}Ni)$

Additional information 4.

E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	α[†]	Comments
63.40	1/2$^-$	63.38 *5*	100	0.0	5/2$^-$	(E2)		3.24 *5*	B(E2)(W.u.)=0.123 *7* α(K)=2.82 *4*; α(L)=0.365 *5*; α(M)=0.0503 *7* α(N)=0.001468 *21* E_γ: weighted average of 63.41 *7* from (n,γ) E=th and 63.36 *5* from (d,pγ). Other: 63.4 *4* from ^{65}Co β^- decay. Mult.: α(total)≈5 deduced from intensity imbalance in (n,γ) E=th (1972Co31) suggests predominantly E2.
310.37	3/2$^-$	246.9 *1*	1.5 *2*	63.40	1/2$^-$				
		310.4[@] *1*	100	0.0	5/2$^-$	(M1+E2)	+0.191 *13*	0.00283 *5*	α(K)=0.00254 *4*; α(L)=0.000252 *4*; α(M)=3.56×10^{-5} *6* α(N)=1.513×10^{-6} *25* E_γ: others: 310.5 *1* from (n,γ) E=th, 310 *3* from (^{18}O,^{17}Oγ), and 310.4 *2* from (^{64}Ni,Xγ).
692.30	3/2$^-$	382.0 *1*	7.6 *14*	310.37	3/2$^-$	[M1,E2]		0.0028 *12*	α(K)=0.0025 *11*; α(L)=2.5×10^{-4} *11*; α(M)=3.5×10^{-5} *15* α(N)=1.5×10^{-6} *6* E_γ: others: 383.8 *3* from ^{65}Co β^- decay is discrepant; 382 *3* from (^{18}O,^{17}Oγ), 382.4 *4* from (^{64}Ni,Xγ). I_γ: weighted average of 6.9 *9* from (n,γ) E=th and 10.5 *19* from (^{64}Ni,Xγ).
		629.0 *1*	100 *7*	63.40	1/2$^-$	(M1+E2)	+0.052 *11*	0.000526 *7*	α(K)=0.000473 *7*; α(L)=4.63×10^{-5} *6*; α(M)=6.53×10^{-6} *9* α(N)=2.82×10^{-7} *4* E_γ: others: 629 *3* from (^{18}O,^{17}Oγ), 629.4 *3* from (^{64}Ni,Xγ). I_γ: from (^{18}O,^{17}Oγ). Others: 100 *14* from (n,γ) E=th and 100 *10* from (^{64}Ni,Xγ).
		692.4 *1*	17.6 *24*	0.0	5/2$^-$	(M1+E2)	+0.03 *2*	0.000427 *6*	α(K)=0.000384 *5*; α(L)=3.76×10^{-5} *5*; α(M)=5.30×10^{-6} *7* α(N)=2.288×10^{-7} *32* E_γ: others: 693 *3* from (^{18}O,^{17}Oγ), 692.7 *5* from (^{64}Ni,Xγ). I_γ: unweighted average of 18.9 *29* from (n,γ) E=th, 21.0 *12* from (^{18}O,^{17}Oγ), and 12.9 *14* from (^{64}Ni,Xγ).
1017.17	9/2$^+$	1017.1 *1*	100	0.0	5/2$^-$	[M2]		0.000432 *6*	α(K)=0.000388 *5*; α(L)=3.82×10^{-5} *5*; α(M)=5.39×10^{-6} *8* α(N)=2.327×10^{-7} *33* B(M2)(W.u.)=0.0688 *+31−28* E_γ: others: 1013 *3* from (^{18}O,^{17}Oγ) and 1017.0 *1* from (^{64}Ni,Xγ).

$^{65}_{28}Ni_{37}$-7

Adopted Levels, Gammas (continued)

γ(^{65}Ni) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	α[†]	Comments
1141.10	(5/2$^-$,7/2$^-$)	1141.1[@] *2*	100	0.0	5/2$^-$				E_γ: others: 1140.7 *8* from (n,γ) E=th and 1143 *4* from (^{18}O,^{17}Oγ).
1273.75	(5/2$^-$)	963.4[@] *2*	100 *9*	310.37	3/2$^-$				E_γ: other: 963.1 *6* from (n,γ) E=th. I_γ: other: 100 *12* from ^{65}Co β$^-$ decay.
		1210.5 *2*	66 *5*	63.40	1/2$^-$				E_γ: weighted average of 1210.6 *2* from ^{65}Co β$^-$ decay and 1210.2 *3* from (n,γ) E=th. I_γ: weighted average of 61 *9* from ^{65}Co β$^-$ decay and 67 *5* from (n,γ) E=th.
		1273.6 *3*	51 *7*	0.0	5/2$^-$				E_γ: weighted average of 1273.3 *4* from ^{65}Co β$^-$ decay and 1273.7 *3* from (n,γ) E=th. I_γ: weighted average of 61 *7* from ^{65}Co β$^-$ decay and 46 *5* from (n,γ) E=th.
1417.67	1/2$^-$	725.5 *3*	1.00 *12*	692.30	3/2$^-$	[M1,E2]		0.00047 *8*	α(K)=0.00042 *7*; α(L)=4.1×10^{-5} *7*; α(M)=5.8×10^{-6} *10* α(N)=2.5×10^{-7} *4* E_γ: other: 726 *4* from (^{18}O,^{17}Oγ). I_γ: other: 78 *6* from (^{18}O,^{17}Oγ) is discrepant.
		1107.3 *1*	100 *12*	310.37	3/2$^-$	(M1+E2)	+0.017 *8*	0.0001634 *23*	α(K)=0.0001463 *20*; α(L)=1.425×10^{-5} *20*; α(M)=2.007×10^{-6} *28* α(N)=8.70×10^{-8} *12*; α(IPF)=7.29×10^{-7} *10* E_γ: other: 1107 *4* from (^{18}O,^{17}Oγ). I_γ: other: 100 *8* from (^{18}O,^{17}Oγ).
		1417.7 *2*	5.8 *7*	0.0	5/2$^-$	[E2]		0.0001699 *24*	α(K)=9.98×10^{-5} *14*; α(L)=9.72×10^{-6} *14*; α(M)=1.369×10^{-6} *19* α(N)=5.91×10^{-8} *8*; α(IPF)=5.90×10^{-5} *8* E_γ: other: 1418 *4* from (^{18}O,^{17}Oγ). I_γ: other: 56 *5* from (^{18}O,^{17}Oγ) is discrepant.
1609.4	7/2$^-$	1299		310.37	3/2$^-$				E_γ: from level-energy difference; seen in (d,pγ).
1920.44	5/2$^+$	779.3 *1*	1.7 *4*	1141.10	(5/2$^-$,7/2$^-$)				
		903.2 *1*	6.8 *8*	1017.17	9/2$^+$				
		1228.2 *2*	74 *6*	692.30	3/2$^-$	(E1+M2)	−0.09 *4*	0.0001419 *23*	α(K)=6.59×10^{-5} *18*; α(L)=6.40×10^{-6} *18*; α(M)=9.01×10^{-7} *25* α(N)=3.90×10^{-8} *11*; α(IPF)=6.86×10^{-5} *11*
		1610.1 *1*	100 *8*	310.37	3/2$^-$				E_γ: other: 1210 *90* from (d,pγ). E_γ: weighted average of 1610.0 *1* from (n,γ),(pol n,γ) E=th and 1610.3 *2* from (^{64}Ni,Xγ). Other: 1610 *5* from (^{18}O,^{17}Oγ).
2146.81	3/2$^-$	1454.5 *2*	33.9 *35*	692.30	3/2$^-$				

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Adopted Levels, Gammas (continued)

γ(^{65}Ni) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π	Comments
2146.81	3/2$^-$	1836.4 *3*	2.89 *35*	310.37	3/2$^-$	
		2083.3 *5*	100 *12*	63.40	1/2$^-$	
		2146.7 *8*	69 *8*	0.0	5/2$^-$	
2168.78		2168.7 *2*	100	0.0	5/2$^-$	
2185.90	(11/2$^+$)	1168.7 *2*	100	1017.17	9/2$^+$	
2.30×10^3	(9/2$^+$)	1150[&] *80*		1141.10	(5/2$^-$,7/2$^-$)	
		129×10^1[&] *10*		1017.17	9/2$^+$	
2324.16	3/2$^{(-)}$	906.5 *2*	23.9 *34*	1417.67	1/2$^-$	
		1632.0 *1*	89 *9*	692.30	3/2$^-$	
		2013.7 *1*	100 *9*	310.37	3/2$^-$	
		2260.6 *1*	57 *7*	63.40	1/2$^-$	
		2324.1 *1*	96 *9*	0.0	5/2$^-$	
2519.50	(13/2$^+$)	1502.3 *2*	100	1017.17	9/2$^+$	E_γ: from (64NI,XG). Other: 1460 *100* from (d,pγ).
2711.19	(3/2$^+$)	1293.6 *1*	29.4 *28*	1417.67	1/2$^-$	
		1437.6 *5*	0.89 *11*	1273.75	(5/2$^-$)	
		2400.7 *1*	100 *11*	310.37	3/2$^-$	E_γ: other: 2490 *160* from (d,pγ).
		2647.7 *1*	39 *4*	63.40	1/2$^-$	E_γ: other: 2740 *180* from (d,pγ).
2792.97	5/2$^+$	1652.0 *2*	4.8 *17*	1141.10	(5/2$^-$,7/2$^-$)	
		2100.8 *4*	48 *6*	692.30	3/2$^-$	
		2482.5 *1*	100 *10*	310.37	3/2$^-$	
2901.77	(3/2)$^+$	2589.6 *8*	59 *8*	310.37	3/2$^-$	
		2838.3 *1*	100 *9*	63.40	1/2$^-$	
		2902.2 *3*	38 *5*	0.0	5/2$^-$	
2906.52	(13/2$^+$)	720.6 *2*	100 *7*	2185.90	(11/2$^+$)	
		1889.5 *5*	27 *7*	1017.17	9/2$^+$	
3014.40	3/2$^+$	2704.5 *6*	14 *4*	310.37	3/2$^-$	
		2950.9 *2*	86 *9*	63.40	1/2$^-$	
		3014.3 *2*	100 *11*	0.0	5/2$^-$	
3044.20	(5/2$^+$)	2733.8 *2*	100	310.37	3/2$^-$	
3105.76	(1/2$^-$,3/2$^-$)	1832.0 *2*	100	1273.75	(5/2$^-$)	
3279.37	(3/2)$^+$	1359.1 *4*	4.0 *5*	1920.44	5/2$^+$	
		1861.6 *2*	12.5 *10*	1417.67	1/2$^-$	
		2005.5 *4*	3.3 *5*	1273.75	(5/2$^-$)	
		2969.1 *2*	40 *5*	310.37	3/2$^-$	
		3215.9 *2*	100 *10*	63.40	1/2$^-$	
		3279.2 *2*	4.8 *8*	0.0	5/2$^-$	
3410.59	(3/2$^+$)	1490.0 *4*	5.2 *8*	1920.44	5/2$^+$	
		1992.8 *4*	11.1 *11*	1417.67	1/2$^-$	
		2718.4 *6*	17.4 *21*	692.30	3/2$^-$	
		3100.2 *2*	100 *11*	310.37	3/2$^-$	
3451.66	(3/2$^+$)	1531.3 *6*	11.7 *21*	1920.44	5/2$^+$	

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Adopted Levels, Gammas (continued)

γ(^{65}Ni) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π
3451.66	(3/2$^+$)	2033.7 *5*	10.6 *21*	1417.67	1/2$^-$
		2759.3 *2*	100 *10*	692.30	3/2$^-$
		3451.7 *4*	25.5 *32*	0.0	5/2$^-$
3509.19	(3/2$^+$)	1588.7 *2*	100 *7*	1920.44	5/2$^+$
		2817.8 *6*	37.0 *33*	692.30	3/2$^-$
		3509.0 *2*	20.7 *23*	0.0	5/2$^-$
3523.00	(15/2$^+$)	616.5 *3*	100 *11*	2906.52	(13/2$^+$)
		1003.5 *4*	30 *7*	2519.50	(13/2$^+$)
3.53×10^3	5/2$^+$	3.22×10^3[&] *21*		310.37	3/2$^-$
3962.64	(3/2$^+$)	1793.8 *5*	13.7 *11*	2168.78	
		2545.3 *8*	7.4 *11*	1417.67	1/2$^-$
		2688.9 *3*	21.1 *21*	1273.75	(5/2$^-$)
		3269.8 *5*	11.6 *16*	692.30	3/2$^-$
		3652.0 *5*	44 *5*	310.37	3/2$^-$
		3962.8 *5*	100 *11*	0.0	5/2$^-$
4001.44	(1/2$^-$,3/2)	1290.1 *5*	5.3 *4*	2711.19	(3/2$^+$)
		1832.7 *5*	2.17 *29*	2168.78	
		3309.3 *3*	66 *6*	692.30	3/2$^-$
		3691.0 *5*	100 *12*	310.37	3/2$^-$
		3937.6 *5*	11.1 *14*	63.40	1/2$^-$
		4000.8 *5*	4.0 *6*	0.0	5/2$^-$
4011.3	(17/2$^+$)	488.3 *4*	100 *13*	3523.00	(15/2$^+$)
		1491.6 *6*	37 *10*	2519.50	(13/2$^+$)
4344.61	1/2$^+$	2927.1 *5*	93 *8*	1417.67	1/2$^-$
		3652.1 *2*	100 *10*	692.30	3/2$^-$
		4033.7 *5*	51 *6*	310.37	3/2$^-$
4391.78	(3/2)$^+$	2244.8 *5*	3.9 *8*	2146.81	3/2$^-$
		2471.6 *8*	4.10 *34*	1920.44	5/2$^+$
		2974.5 *8*	21.4 *17*	1417.67	1/2$^-$
		4080.8 *5*	20.5 *26*	310.37	3/2$^-$
		4391.6 *5*	100 *11*	0.0	5/2$^-$
4508.0	(1/2,3/2,5/2$^+$)	2338.9 *5*	100	2168.78	
4544.46	(1/2$^-$,3/2)	1642.9 *5*	41.3 *32*	2901.77	(3/2)$^+$
		2220 *1*	23.3 *21*	2324.16	3/2$^{(-)}$
		2397.8 *8*	34.9 *32*	2146.81	3/2$^-$
		3126.7 *6*	27.0 *32*	1417.67	1/2$^-$
		3851.8 *5*	49 *7*	692.30	3/2$^-$
		4233.5 *8*	100 *11*	310.37	3/2$^-$
		4544.3 *5*	38 *5*	0.0	5/2$^-$
4655.32	(3/2)$^+$	2734.1 *5*	8.7 *16*	1920.44	5/2$^+$
		3237.1 *5*	23.1 *22*	1417.67	1/2$^-$

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Adopted Levels, Gammas (continued)

γ(^{65}Ni) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π	Mult.[#]	δ[#]	α[†]	Comments
4655.32	(3/2)$^+$	3381.9 *5*	9.6 *14*	1273.75	(5/2$^-$)				
		4345.2 *5*	99 *11*	310.37	3/2$^-$				
		4655.5 *5*	100 *12*	0.0	5/2$^-$				
4781		≈4700[a]		63.40	1/2$^-$				
5029?		≈4850[a]							
5212?		≈5200[a]		0.0	5/2$^-$				
5530		≈5400[a]		63.40	1/2$^-$				
5710		≈4600[&]		1141.10	(5/2$^-$,7/2$^-$)				
		≈5700[a]		0.0	5/2$^-$				
(6098.26)	1/2$^+$	1442.9 *8*	0.071 *6*	4655.32	(3/2)$^+$				
		1553.6 *5*	0.0618 *31*	4544.46	(1/2$^-$,3/2)				
		1589.9 *5*	0.0096 *6*	4508.0	(1/2,3/2,5/2$^+$)				
		1706.4 *2*	0.062 *5*	4391.78	(3/2)$^+$				
		1753.5 *2*	0.078 *5*	4344.61	1/2$^+$				
		2096.6 *5*	0.211 *13*	4001.44	(1/2$^-$,3/2)	D			
		2135.6 *6*	0.127 *6*	3962.64	(3/2$^+$)				
		2589.0 *5*	0.143 *9*	3509.19	(3/2$^+$)	(M1+E2)	−0.08 *3*	0.000548 *8*	α(K)=3.14×10^{-5} *4*; α(L)=3.03×10^{-6} *4*; α(M)=4.28×10^{-7} *6* α(N)=1.860×10^{-8} *26*; α(IPF)=0.000513 *7*
		2646.6 *5*	0.0509 *34*	3451.66	(3/2$^+$)				
		2687.7 *5*	0.075 *6*	3410.59	(3/2$^+$)				
		2819.2 *5*	0.217 *16*	3279.37	(3/2)$^+$				
		2992.7 *8*	0.0112 *13*	3105.76	(1/2$^-$,3/2$^-$)				
		3054.4 *8*	0.0031 *6*	3044.20	(5/2$^+$)				
		3084.0 *8*	0.0335 *25*	3014.40	3/2$^+$				
		3196.7 *5*	0.0391 *28*	2901.77	(3/2)$^+$				
		3305.2 *5*	0.0308 *25*	2792.97	5/2$^+$				
		3386.8 *3*	0.99 *6*	2711.19	(3/2$^+$)				
		3773.7 *3*	0.519 *25*	2324.16	3/2$^{(-)}$	(E1+M2)	−0.11 *3*	1.59×10^{-3} *2*	α(K)=1.252×10^{-5} *20*; α(L)=1.207×10^{-6} *19*; α(M)=1.700×10^{-7} *27* α(N)=7.40×10^{-9} *12*; α(IPF)=0.001579 *23*
		3951.3 *2*	1.74 *13*	2146.81	3/2$^-$	E1+M2	−0.13 *7*	1.66×10^{-3} *3*	α(K)=1.187×10^{-5} *30*; α(L)=1.144×10^{-6} *29*; α(M)=1.61×10^{-7} *4* α(N)=7.01×10^{-9} *18*; α(IPF)=0.001648 *30*
		4177.0 *7*	0.217 *16*	1920.44	5/2$^+$				
		4680.2 *3*	5.3 *6*	1417.67	1/2$^-$				
		5405.8 *1*	14.3 *19*	692.30	3/2$^-$	E1		2.14×10^{-3} *3*	α(K)=7.99×10^{-6} *11*; α(L)=7.69×10^{-7} *11*; α(M)=1.083×10^{-7} *15* α(N)=4.72×10^{-9} *7*; α(IPF)=0.002134 *30*
		5787.7 *5*	27 *4*	310.37	3/2$^-$	E1		2.25×10^{-3} *3*	α(K)=7.37×10^{-6} *10*; α(L)=7.10×10^{-7} *10*;

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Adopted Levels, Gammas (continued)

γ(^{65}Ni) (continued)

E_i(level)	E_γ[‡]	I_γ[‡]	E_f	J^π_f	Comments
					α(M)=9.99×10^{-8} *14* α(N)=4.35×10^{-9} *6*; α(IPF)=0.002237 *31*
(6098.26)	6034.7 *2*	100 *5*	63.40	1/2$^-$	

† Additional information 5.
‡ From ^{64}Ni(n,γ) E=th for transitions from low-spin (J<11/2) levels and from ^{208}Pb(^{64}Ni,Xγ) for those from high-spin (J≥11/2) levels, unless otherwise noted.
# From γγ(θ) in (n,γ) E=th (2020Po12), with magnetic or electric characters determined based on Δπ from level scheme, unless otherwise noted.
@ From ^{65}Co β$^-$ decay.
& From (d,pγ) only.
a The transition from (d,pγ) feeds the ground state and/or 63 level.

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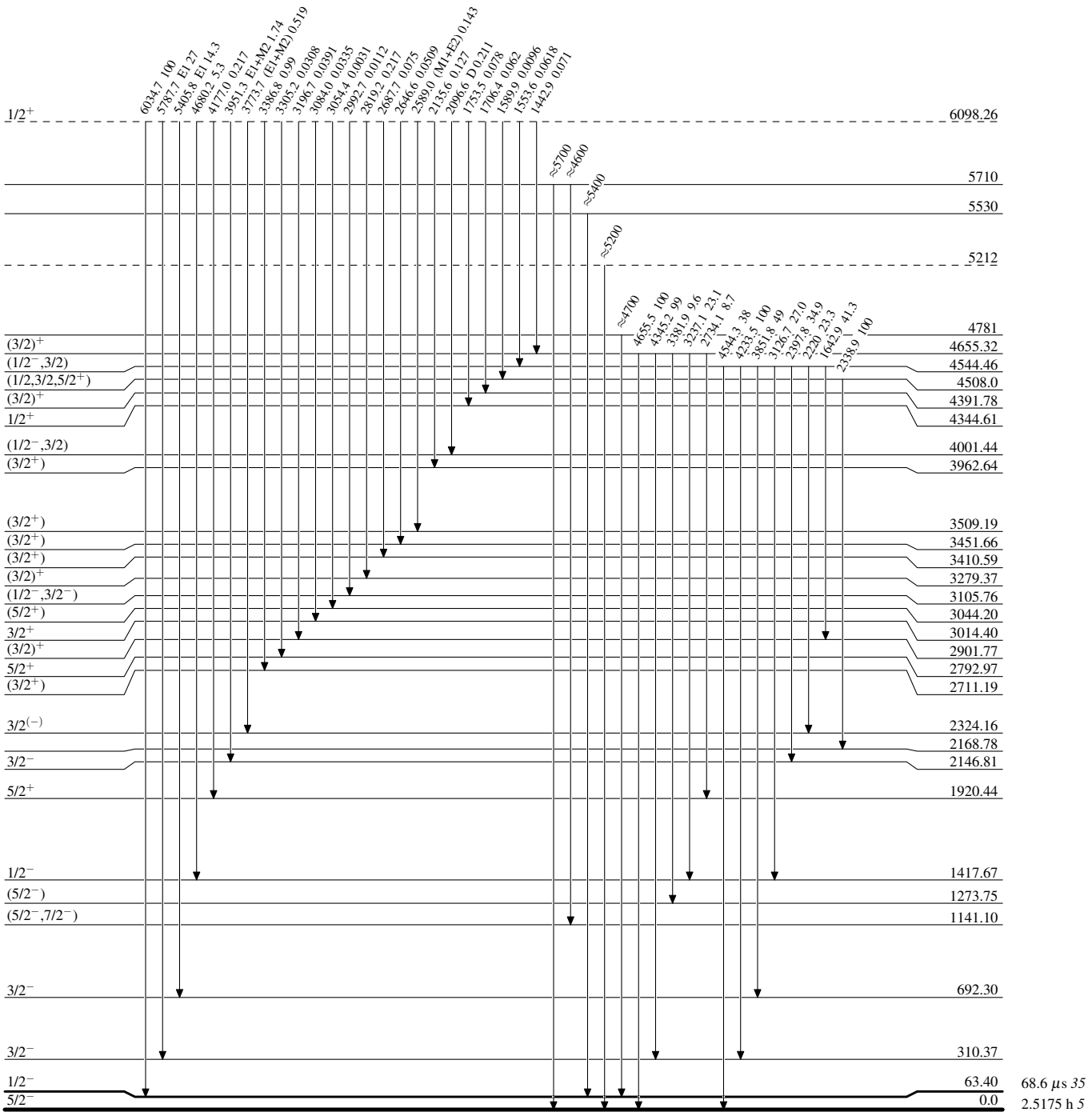
Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



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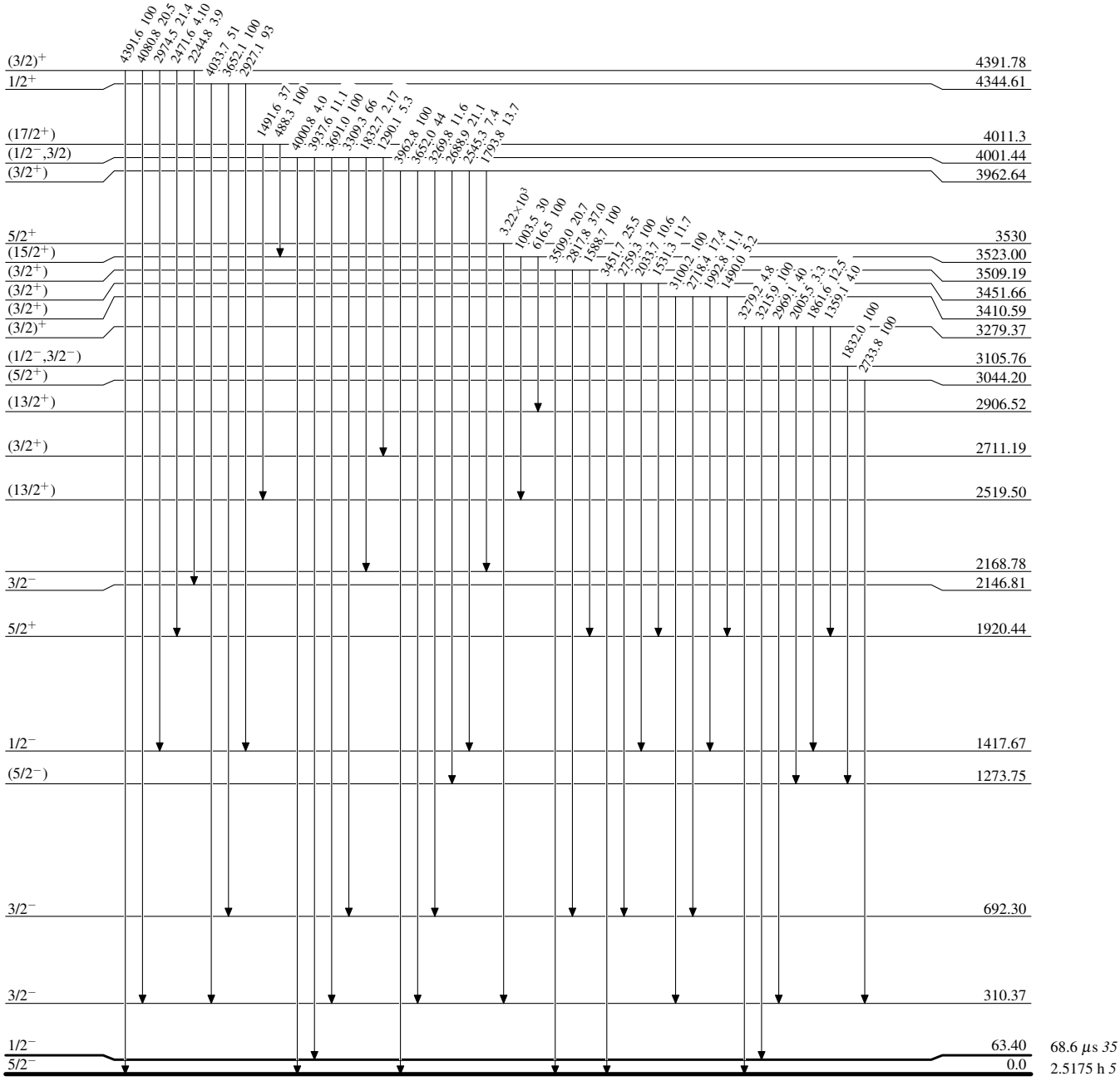
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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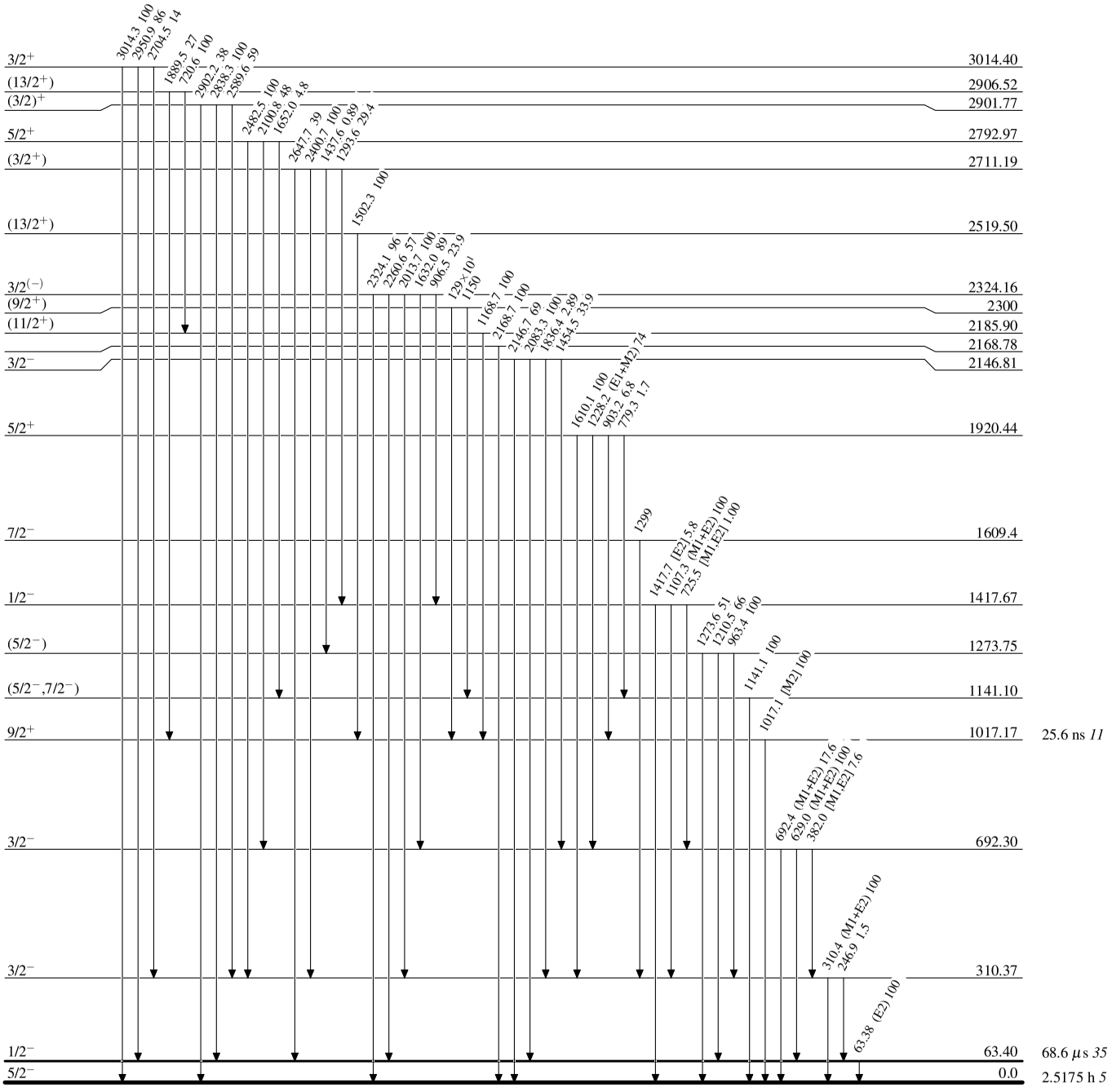
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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