

Adopted Levels, Gammas

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

Q(β^-)=-3254.5 6; S(n)=7979.32 17; S(p)=7776.6 6; Q(α)=-4114.9 7 2021Wa16
 S(2n)=19841.2 15, S(2p)=14977.1 6, Q(ϵ)=1351.7 4 (2021Wa16).

Additional information 1.

Mass measurements: 2018Ki21 (mass excess=-65905 12), 1935St07, 1928As01, 1921De01.

2018Ki21: S(³⁶Ar,X) E=3.3 MeV at RIKEN. Measured σ , time-of-flight. Deduced mass excess using the multireflection time-of-flight mass spectrograph (MRTOF-MS).

See (n, γ):resonances for neutron resonance data from 2018MuZY for 405 resonance levels that are not listed in this dataset.

Other measurements:

2019Xi07: E(p)=1.4 GeV incident on UC_x target at ISOLDE-CERN facility. Measured hyperfine spectra using collinear laser spectroscopy using COLLAPS setup at ISOLDE-CERN. Deduced changes in mean square charge radii relative to ⁶⁸Zn.

2017Wr01: E(p)=1.4 GeV incident on UC_x target at ISOLDE-CERN facility. Measured hyperfine spectra using collinear laser spectroscopy using COLLAPS setup at ISOLDE-CERN. Deduced spins, μ , Q. Comparison with large-scale shell model calculations.

2013Ru10: ⁴²Ca(²⁸Si,4pn γ) E=83 MeV and 75 MeV ²⁸Si beam was provided by the K-130 cyclotron at JYFL with RITU recoil separator. Measured isomer T_{1/2} using JUROGAM II array and GREAT spectrometer with Recoil- β -tagging technique.

Theoretical calculations:

2023Ya20: calculated levels, J, π .

2023Ku26: calculated excitation energies, log ft, branching ratios.

2015Ka46: calculated low- and high-spin levels, J, π , B(E2).

2004Ho08: calculated nuclear moments.

2003Mi23: calculated binding energies, quadrupole deformation.

1995Fe15: calculated levels.

1994Ga37,1994Ga24: calculated levels, magnetic dipole moment.

1981Va10: calculated levels, transition strengths.

1981Sh11: calculated B(M1), B(E2).

1981Al15: calculated levels, transition strengths, nuclear moments, γ -ray branching ratios, T_{1/2}.

1976Va17: calculated levels, transition strengths.

1976Di08: calculated levels, B(M1), B(E2), quadrupole moment, T_{1/2}, γ -ray mixing ratio.

⁶⁵Zn Levels

Super-deformed and highly-deformed band assignments are from (²⁹Si,4p γ) (2000Yu02) and other band assignments are from (¹⁶O,2pn γ) (2001Mu24).

Cross Reference (XREF) Flags

A	⁶⁵ Ga $\epsilon+\beta^+$ decay (15.133 min)	F	⁶⁴ Zn(n, γ) E=10-100 keV	K	⁶⁶ Zn(p,d)
B	⁴⁰ Ca(²⁹ Si,4p γ)	G	⁶⁴ Zn(n, γ) E=thermal	L	⁶⁶ Zn(d,t)
C	⁵² Cr(¹⁶ O,2pn γ)	H	⁶⁴ Zn(d,p)	M	⁶⁶ Zn(³ He, α)
D	⁶² Ni(α ,n γ)	I	⁶⁵ Cu(p,n)		
E	⁶³ Cu(α ,pn γ)	J	⁶⁵ Cu(p,n γ)		

E(level) ^{†‡}	J $\pi^{\#}$	T _{1/2}	XREF	Comments
0.0 ^f	5/2 ⁻	243.93 d 9	ABCDEFGHIJKLM	% ϵ +% β^+ =100 μ =+0.7965 16 (1964By01,2019StZV) Q=-0.019 2 (1964By01,2021StZZ) J $^{\pi}$: spin=5/2 from measurement of hyperfine structure by collinear laser spectroscopy at ISOLDE-CERN (2017Wr01); π =- from L(d,p)=3 from

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Adopted Levels, Gammas (continued)

⁶⁵Zn Levels (continued)

<u>E(level)^{†‡}</u>	<u>J^π#</u>	<u>T_{1/2}</u>	<u>XREF</u>	<u>Comments</u>
				0 ⁺ . T _{1/2} : unweighted average of 244.0 d 2 (1972De24), 244.3 d 4 (1974Cr05), 243.75 d 12 (1975La16), 244.164 d 99 (2002Un02), 244.15 d 10 (2003Lu06), 243.8 d 3 (2004Va02), 243.66 d 9 (2004Sc04), and 243.62 d 9 (2006Ko31). Others: 210 d 30 (1939Sa02), 245.0 d 8 (1953To17), 243.5 d 8 (1957Ge07), 246.4 d 22 (1957Wr37), 245.7 d 11 (1960Ea02), 243.1 d 7, 244.12 d 12 and 242.78 d 19 (1965An07), 243.7 d 4 (1968An01), 243 d 4 (1968Ha47), 244.52 d 7 (1973Vi13), 244.16 d 10 (1992Un01). The weighted average is 243.87 9 with a reduced $\chi^2=4.64$. Note that results in 1965An07, 1968An01, 1982HoZJ, and 1992Un01 is superseded by 2002Un02, and 1983Wa26 is superseded by 2004Sc04. Uncertainty in 244.52 d 7 from 1973Vi13 seems unrealistically small making its value discrepant with most of other values, and therefore it is not included in the average. Additional information 2. μ, Q : adjusted values from 2019StZV evaluation for μ and from 2021StZZ evaluation for Q, based on the original values of $\mu=+0.7692$ 2 and $Q=-0.024$ 2 using optical double-resonance technique in 1964By01. Other: $\mu=+0.7695$ 16 and $Q=-0.024$ 15 from measurement of hyperfine structure by collinear laser spectroscopy at ISOLDE-CERN (2017Wr01). $\delta < r^2 >^{68,65} = -0.257$ 7 (stat) 25 (syst) (2019Xi07).
53.927 ^f 10	1/2 ⁻	1.62 μ s 6	A CDEFGHIJK M	J ^π : 53.9 γ E2 (from ce data) to 5/2 ⁻ ; 61.2 γ M1+E2, $\Delta J=1$ from 3/2 ⁻ ; L(d,p)=L(³ He, α)=L(p,d)=1 from 0 ⁺ .
115.124 13	3/2 ⁻	0.444 ns 9	ABCDEFGHIJK M	T _{1/2} : from $\beta\gamma(t)$ in ⁶⁵ Ga $\varepsilon+\beta^+$ decay. $\mu=-0.8$ 2 (1975We08,2020StZV) J ^π : 115 γ M1+E2 to 5/2 ⁻ ; L(d,p)=L(p,d)=L(³ He, α)=1 from 0 ⁺ . T _{1/2} : from pulsed-beam delayed- $\gamma(t)$ in (p,n γ). Others: 0.44 ns 2 (1975Ro25), 0.46 ns 7 (1968Li05) and 0.49 ns 9 (1971Sh36) in ⁶⁵ Ga $\varepsilon+\beta^+$ decay from delayed $\gamma(t)$. μ : from 2020StZV evaluation, based on an g-factor adjusted from the original value of g-factor=-0.47 12 measured using IPAD in 1975We08.
206.91 ^f 6	3/2 ⁻	150 ps 7	A CDEFGHIJK M	$\mu=+0.7$ 3 (1975We08,2020StZV) T _{1/2} : from pulsed-beam delayed $\gamma(t)$ in (p,n γ). Other: <0.2 ns from $\gamma\gamma^\pm(t)$ in ⁶⁵ Ga $\varepsilon+\beta^+$ decay. μ : from 2020StZV evaluation, based on an g-factor adjusted from the original value of g-factor=+0.44 15 measured using IPAD in 1975We08.
768.83 9	5/2 ⁻	1.3 ps +7-6	A DEFG IJK M	J ^π : from $\gamma(\theta)$ and $\gamma(\text{lin pol})$ in (α ,n γ); spin=5/2 also from $\gamma(\theta)$ in (p,n γ). T _{1/2} : weighted average of 1.31 ps +69-42 from (α ,n γ) and 10 ps 9 from (p,n γ), both by DSAM.
864.21 ^f 6	7/2 ⁻	3.4 ps +42-17	ABCDE iJ	XREF: i(865) J ^π : 749.1 γ E2, $\Delta J=2$ to 3/2 ⁻ . T _{1/2} : from DSAM in (α ,n γ) (1977Ch14). Other: >1.4 ps from DSAM in (p,n γ) (also 1977Ch14).
867.02 11	1/2 ⁻	0.55 ps +35-21	A DEFGHiJKLM	XREF: i(865) J ^π : L(d,p)=L(p,d)=L(d,t)=L(³ He, α)=1 from 0 ⁺ ; 1/2 is favored by $\gamma(\text{circ pol})$ in (n, γ) E=th. T _{1/2} : weighted average of 0.69 ps +35-21 from (α ,n γ) and 0.40 ps +37-22 from (p,n γ), both by DSAM in 1977Ch14. Other: <0.2 ns from $\gamma\gamma^\pm(t)$ in ⁶⁵ Ga $\varepsilon+\beta^+$ decay.

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Adopted Levels, Gammas (continued)

⁶⁵Zn Levels (continued)

E(level) †‡	J ^π #	T _{1/2}	XREF	Comments
909.69 9	3/2 ⁻	1.4 ps +7-6	A D FGHIJKLM	XREF: M(920) J ^π : from γ(θ) and γ(lin pol) in (α,nγ); spin=3/2 also from γ(circ pol) in (n,γ) E=th and γ(θ) in (p,nγ). L(d,p)=L(³ He,α)=1 from 0 ⁺ ; 909.7γ M1+E2 to 3/2 ⁻ . T _{1/2} : weighted average of 1.41 ps +69-42 from (α,nγ) and 12 ps 11 from (p,nγ) by DSAM.
1047.38 12	5/2 ⁻	0.38 ps 11	A CDEFG IJK	J ^π : from γ(θ) and γ(lin pol) in (α,nγ). T _{1/2} : from DSAM in (α,nγ). Other: 0.42 ps +42-20 from DSAM in (p,nγ).
1065.70 ^b 11	9/2 ⁺	0.575 ns 26	BCDE HIJK M	μ=1.1 2 (1975We21,2020StZV) J ^π : 1065.7γ M2+E3, ΔJ=2 to 5/2 ⁻ , 201.4γ E1 to 7/2 ⁻ . T _{1/2} : from DSAM in (p,nγ). Other: >1.4 ps from DSAM in (α,nγ). μ: from 2020StZV evaluation, based on an g-factor adjusted from the original value of g-factor=-0.35 10 measured using IPAD in 1975We21.
1252.68 11	7/2 ⁻	0.77 ps 39	DEF IJK M	XREF: F(1253?) J ^π : from γ(θ) and γ(lin pol) in (α,nγ). T _{1/2} : weighted average of 1.6 ps +8-6 from (α,nγ) and 0.59 ps +38-28 from (p,nγ), both by DSAM.
1263.05 ^f 16	(9/2 ⁻)		C	E(level): this level in (¹⁶ O,2pnγ) is considered by the evaluator as a different level from 1263 in other datasets because of different strongest de-excitation transitions which is not seen in the other. J ^π : as proposed in (¹⁶ O,2pnγ) based on 197γ to 9/2 ⁺ and 399γ to 7/2 ⁻ ; no details available about the supporting arguments for this assignment.
1263.47 17	9/2 ⁻	0.42 ps +37-18	DEF IJK M	J ^π : 1263.4γ E2(+M3), ΔJ=2 to 5/2 ⁻ , 399.4γ M1+E2 to 7/2 ⁻ . T _{1/2} : from DSAM in (p,nγ). Other: >1.4 ps from DSAM in (α,nγ).
1343.88 10	5/2 ⁻	0.8 ps +11-6	A D IJKL	J ^π : spin=5/2 from γ(θ) (α,nγ) and (p,nγ); 1228.8γ M1+E2 to 3/2 ⁻ . T _{1/2} : from DSAM in (p,nγ). Other: >1.4 ps from DSAM in (α,nγ).
1369.38 17	5/2 ⁺	0.69 ps +63-35	D F HIJKLM	XREF: F(1359) J ^π : spin=5/2 from γ(θ) in (α,nγ) and (p,nγ); 1254.1γ E1+M2 to 3/2 ⁻ ; L(d,p)=2 from 0 ⁺ . T _{1/2} : from DSAM in (p,nγ). Other: >1.4 ps from DSAM in (α,nγ).
1469.71 10	3/2 ⁻	147 fs 58	A D FGHIJKLM	XREF: M(1480) J ^π : from γ(θ,pol) in (α,nγ) and γ(circ pol) in (n,γ) E=th. T _{1/2} : weighted average of 0.125 ps 58 from (α,nγ) and 0.19 ps +9-7 from (p,nγ), both by DSAM.
1577.08 26	3/2 ⁻	173 fs 48	A D IJK	XREF: k(1588) J ^π : 1523.4γ M1+E2 to 1/2 ⁻ , 1576.9γ M1+E2 to 5/2 ⁻ . T _{1/2} : from DSAM in (α,nγ).
1588.20 27 1603?	7/2 ⁻	152 fs 62	A D F IJK M F	T _{1/2} : from DSAM in (α,nγ). Additional information 3. E(level): from ⁶⁴ Zn(n,γ) E=10-100 keV.
1779.6? 7			J	XREF: J(?)
1793.5? 7			J	XREF: J(?)
1907.4 4	(9/2)		D	J ^π : from γ(θ) and γ yields in (α,nγ).
1911 10	1/2 ⁺		FGH KL	XREF: F(1905)G(1907)K(1908) Additional information 4.

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Adopted Levels, Gammas (continued)

⁶⁵Zn Levels (continued)

E(level) ^{†‡}	J ^π #	T _{1/2}	XREF	Comments
1941.1 7	(1/2,3/2)		FG JK	E(level): from (d,p). J ^π : L(d,p)=0 from 0 ⁺ . XREF: J(?)
1950 20	(5/2 ⁻ ,7/2 ⁻)		i k M	J ^π : possible 1887.1γ to 1/2 ⁻ ; primary 6037γ from 1/2 ⁺ . XREF: i(1963)k(1956)
1958	7/2 ⁺	0.42 ps 11	D i k	J ^π : L(³ He,α)=(3) from 0 ⁺ . XREF: i(1963)k(1956) Additional information 5.
1976			i K	J ^π : 588γ M1+E2 to 5/2 ⁺ , 892γ M1+E2 to 9/2 ⁺ . T _{1/2} : from DSAM in (α,nγ). XREF: i(1963)
2053.46 14	13/2 ⁺	>1.4 ps	BCDE	J ^π : from γ(θ) and γ(pol) in (α,nγ); spin=13/2 also from γ(θ) in (α,pnγ). T _{1/2} : from DSAM in (α,nγ). XREF: K(2053)
2054 10			H K	XREF: K(2053)
2081.55 24	(1/2 ⁻ ,3/2 ⁻)		A g K	XREF: g(2080) J ^π : primary 5898γ from 1/2 ⁺ in (n,γ) E=th; possible allowed feeding from 3/2 ⁻ parent.
2135.2 8	9/2 ⁺	>1.4 ps	D	Additional information 6.
2137			F K	J ^π : from γ(θ) and γ(lin pol) in (α,nγ). XREF: F(2144?)
2137.85 ^e 13	11/2 ⁺	0.67 ps 18	BCDE	Additional information 7.
2202	(1/2,3/2,5/2 ⁺)		G K	J ^π : from γ(θ) and γ(lin pol) in (α,nγ). T _{1/2} : from DSAM in (α,nγ). XREF: G(2202)K(2202) Additional information 8.
2216	(1/2,3/2,5/2 ⁺)		FG K	J ^π : primary 5777γ from 1/2 ⁺ in (n,γ) E=th. XREF: F(2212) Additional information 9.
2230 20	(5/2 ⁻ ,7/2 ⁻)		K M	E(level): from (n,γ) E=th and (p,d). J ^π : primary 5777γ from 1/2 ⁺ in (n,γ) E=th.
2302.3 4			D F KL	E(level): from (³ He,α). J ^π : L(³ He,α)=(3) from 0 ⁺ . XREF: F(2308)K(2310)
2342			K	
2410			K	
2419.48 21	1/2 ⁻		A FGH K	J ^π : spin=1/2 from γ(circ pol) in (n,γ) E=th; L(d,p)=1 from 0 ⁺ . XREF: G(2438)m(2440) Additional information 10.
2430	(1/2,3/2,5/2 ⁺)		G K m	J ^π : primary 5559γ from 1/2 ⁺ in (n,γ) E=th; discrepant with L(³ He,α)=(3) at 2440 20. XREF: m(2440)
2458	(1/2,3/2)		G K m	Additional information 11. J ^π : primary 5520γ from 1/2 ⁺ in (n,γ) E=th; 1592γ to 1/2 ⁻ . Discrepant with L(³ He,α)=(3) at 2440 20.
2486			K	
2491 10	1/2 ⁺		FGH K	XREF: F(2491)G(2493)H(2491)K(2491) Additional information 12.
2522			F K	J ^π : L(d,p)=0 from 0 ⁺ . XREF: F(2520)K(2522) Additional information 13.
2532 10	3/2 ⁺ ,5/2 ⁺		H K M	XREF: K(2528)
2549.39? 23	(3/2 ⁻ ,5/2,7/2 ⁻)		A	J ^π : L(d,p)=2 from 0 ⁺ . But L(³ He,α)=3 from 0 ⁺ for a group at 2530 20 is inconsistent, probably a different level. XREF: A(?)

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Adopted Levels, Gammas (continued)

⁶⁵Zn Levels (continued)

E(level) ^{†‡}	J ^π #	T _{1/2}	XREF	Comments
2575 10	(1/2,3/2,5/2 ⁺)		FGH	J ^π : 1685.3γ to 7/2 ⁻ , 2433.6γ to 3/2 ⁻ . XREF: F(2577?)G(2573) Additional information 14.
2639?			G	J ^π : primary 5406γ from 1/2 ⁺ in (n,γ) E=th. XREF: G(?) Additional information 15.
2674 10	3/2 ⁺ ,5/2 ⁺		H M	XREF: M(2690) J ^π : L(d,p)=2 from 0 ⁺ , discrepant with L(³ He,α)=(3) for a level at 2690 20.
2730	(1/2,3/2,5/2 ⁺)		FG K	XREF: F(2720)G(2732) Additional information 16. J ^π : primary 5247γ from 1/2 ⁺ in (n,γ) E=th.
2740			K	
2811 10	(1/2 ⁻ ,3/2 ⁻)		H K	XREF: K(2803) J ^π : L(d,p)=(1) from 0 ⁺ .
2820 20	(7/2 ⁺ ,9/2 ⁺)		K M	XREF: K(2830) J ^π : L(³ He,α)=(4) from 0 ⁺ .
2860			K	
2870	5/2 ⁻ ,7/2 ⁻		K M	XREF: M(2880) J ^π : L(³ He,α)=3 from 0 ⁺ for a group at 2880 20.
2902			K	
2914	5/2 ⁻ ,7/2 ⁻		K M	XREF: M(2930) J ^π : L(³ He,α)=3 from 0 ⁺ for a group at 2930 20.
2923.54 ^c 13	13/2 ⁽⁺⁾		BCDE	J ^π : 1857.8γ ΔJ=2 to 9/2 ⁺ , 785.7γ D+Q, ΔJ=1 to 11/2 ⁺ .
2931.9 8	(13/2 ⁻)		DE	J ^π : (13/2) from γ(θ) in (α,nγ); 1668.4γ to 9/2 ⁻ .
2953			K	
2971			K	
2994	(1/2,3/2,5/2 ⁺)		Gh K	XREF: G(2996)h(3002)K(2994) Additional information 17. J ^π : primary 4983γ from 1/2 ⁺ in (n,γ) E=th.
3010	(3/2 ⁺ ,5/2 ⁺)		Gh K	XREF: G(3005?)h(3002)K(3010) Additional information 18. E(level): L(d,p)=2 from 0 ⁺ for a group at 3002 10 may be a doublet.
3023	(7/2 ⁺ ,9/2 ⁺)		K M	XREF: K(3023)M(3040) J ^π : L(³ He,α)=(4) from 0 ⁺ for a group at 3040 20.
3054 10	1/2 ⁺		GH K	XREF: G(3057)K(3053) Additional information 19. J ^π : L(d,p)=0 from 0 ⁺ .
3095			K	
3104 10	3/2 ⁺ ,5/2 ⁺		GH K	XREF: G(3109)K(3108) Additional information 20. J ^π : L(d,p)=2 for a level at 3104 10.
3120 20	1/2 ⁻ ,3/2 ⁻		M	J ^π : L(³ He,α)=1 from 0 ⁺ .
3150 5	(1/2 ⁻ ,3/2,5/2 ⁺)		G K	XREF: K(3150) Additional information 21. J ^π : primary 4829γ from 1/2 ⁺ in (n,γ) E=th; 3150γ to 5/2 ⁻ .
3170 20	5/2 ⁻ ,7/2 ⁻		M	J ^π : L(³ He,α)=3 from 0 ⁺ .
3192	(1/2,3/2,5/2 ⁺)		G	Additional information 22. J ^π : primary 4787γ from 1/2 ⁺ in (n,γ) E=th.
3207 10			H K	XREF: K(3211)
3221			K	
3225.14 ^b 18	17/2 ⁺	0.30 ps +12-10	BCDE	J ^π : spin=17/2 from γ(θ) in (α,pnγ); 1172.7γ E2, ΔJ=2 to 13/2 ⁺ . T _{1/2} : from DSAM in (α,pnγ).

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Adopted Levels, Gammas (continued)

⁶⁵Zn Levels (continued)

E(level) ^{†‡}	J ^π #	T _{1/2}	XREF	Comments
3239	(7/2 ⁺ ,9/2 ⁺)		K M	XREF: K(3239)M(3250) J ^π : L(³ He,α)=(4) from 0 ⁺ for a group at 3250 20.
3329	(1/2,3/2,5/2 ⁺)		gh k	XREF: g(3329)h(3355)k(3340) Additional information 23.
3335.5? 3340			D K	XREF: D(?)
3355 10	3/2 ⁺ ,5/2 ⁺		H K	XREF: K(3350) J ^π : L(d,p)=2 from 0 ⁺ .
3409 10	(1/2,3/2,5/2 ⁺)		GH	XREF: G(3396) Additional information 24.
3465	(3/2 ⁺ ,5/2 ⁺)		GH K	J ^π : primary 4583γ from 1/2 ⁺ in (n,γ) E=th. XREF: G(3468)H(3470?)K(3465) Additional information 25.
3472.11 ^e 15	(15/2 ⁺)		CDE	J ^π : L(d,p)=2 from 0 ⁺ for a broad group at 3470 40. J ^π : 1334γ (Q(+O)), ΔJ=(2) to 11/2 ⁺ , 1418.6γ to 13/2 ⁺ .
3533 10	3/2 ⁺ ,5/2 ⁺		H K	XREF: H(3533)K(3550) J ^π : L(d,p)=2 from 0 ⁺ .
3563	5/2 ⁻ ,7/2 ⁻		K M	XREF: K(3563)M(3580) J ^π : L(³ He,α)=3 from 0 ⁺ for a group at 3580 20.
3589	(1/2,3/2,5/2 ⁺)		G	Additional information 26. J ^π : primary 4390γ from 1/2 ⁺ in (n,γ) E=th.
3618 10	3/2 ⁺ ,5/2 ⁺		H	J ^π : L(d,p)=2 from 0 ⁺ .
3672 10	1/2 ⁺		H	J ^π : L(d,p)=0 from 0 ⁺ .
3714?			D	XREF: D(3714?) Additional information 27.
3730	(1/2,3/2,5/2 ⁺)		G K	XREF: G(3734)K(3730) Additional information 28.
3776			K	J ^π : primary 4245γ from 1/2 ⁺ in (n,γ) E=th.
3782.33 ^d 16	17/2 ⁽⁺⁾	≥0.28 ps	BCDE	J ^π : 1731.8γ Q, ΔJ=2 to 13/2 ⁺ , 557.3γ to 17/2 ⁺ . T _{1/2} : from DSAM in (α,pnγ).
3822 10	(1/2,3/2,5/2 ⁺)		GH K	XREF: G(3815)K(3810) Additional information 29.
3857 10	1/2 ⁺		H K	J ^π : primary 4164γ from 1/2 ⁺ in (n,γ) E=th. XREF: K(3844) J ^π : L(d,p)=0 from 0 ⁺ .
3880			K	
3889			K	
3902	(7/2 ⁺ ,9/2 ⁺)		K M	XREF: M(3920) J ^π : L(³ He,α)=(4) from 0 ⁺ for a group at 3920 20.
4024	(1/2,3/2,5/2 ⁺)		G	Additional information 30. J ^π : primary 3955γ from 1/2 ⁺ in (n,γ) E=th.
4039	(1/2,3/2,5/2 ⁺)		G	Additional information 31. J ^π : primary 3940γ from 1/2 ⁺ in (n,γ) E=th.
4077.91 ^c 18	(17/2 ⁺)	0.165 ps 45	BCDE	J ^π : 1155.6γ (E2), ΔJ=(2) to 13/2 ⁽⁺⁾ ; 605.9γ to (15/2 ⁺). T _{1/2} : deduced from 0.12 ps ≤ T _{1/2} ≤ 0.21 ps in (α,pnγ) by DSAM.
4100 20	3/2 ⁺ ,5/2 ⁺		K M	XREF: K(4086)M(4100) J ^π : L(³ He,α)=2 from 0 ⁺ .
4180 30	3/2 ⁺ ,5/2 ⁺		H K	XREF: H(4180)K(4200) J ^π : L(d,p)=2 from 0 ⁺ .
4236.22 19	(21/2 ⁺)		C	J ^π : 1011γ (Q), ΔJ=(2) to 17/2 ⁺ ; 826.8γ from (21/2 ⁺).
4270 20			M	
4350			h K	XREF: h(4370)K(4350)

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Adopted Levels, Gammas (continued)

⁶⁵Zn Levels (continued)

E(level) ^{†‡}	J ^π #	XREF	Comments
4393	(1/2,3/2,5/2 ⁺)	Gh	J ^π : 1/2 ⁺ from L(d,p)=0 for a possible composite level at 4370 30. XREF: G(4393)h(4370) Additional information 32. J ^π : primary 3586γ from 1/2 ⁺ in (n,γ) E=th. Other: 1/2 ⁺ from L(d,p)=0 for a possible composite level at 4370 30.
4490 20	5/2 ⁻ ,7/2 ⁻		M J ^π : L(³ He,α)=3 from 0 ⁺ .
4500 30	(1/2 ⁺)	H	J ^π : L(d,p)=(0) from 0 ⁺ .
4545.75 27		C	J ^π : 1320.6γ to 17/2 ⁺ .
4580 20	(5/2 ⁻ ,7/2 ⁻)		M J ^π : L(³ He,α)=(3) from 0 ⁺ .
4620	(1/2,3/2,5/2 ⁺)	G	Additional information 33. J ^π : primary 3359γ from 1/2 ⁺ in (n,γ) E=th.
4622.11 19	(21/2 ⁺)	CD	J ^π : 1397γ Q, ΔJ=2 to 17/2 ⁺ ; 787.8γ (D), ΔJ=(1) from (23/2 ⁺).
4639	(1/2,3/2,5/2 ⁺)	G	Additional information 34. J ^π : primary 3340γ from 1/2 ⁺ in (n,γ) E=th.
4660 20	5/2 ⁻ ,7/2 ⁻		M J ^π : L(³ He,α)=3 from 0 ⁺ .
4701.45 27		C	J ^π : 1476.3γ to 17/2 ⁺ .
4710 30	1/2 ⁺	H K	XREF: H(4710)K(4740) J ^π : L(d,p)=0 from 0 ⁺ .
4770 20	5/2 ⁻ ,7/2 ⁻		K M XREF: K(4780) J ^π : L(³ He,α)=3 from 0 ⁺ .
4880.42 21	(19/2 ⁺)	C	J ^π : 1407.8γ (Q), ΔJ=(2) to (15/2 ⁺), 803γ to (17/2 ⁺).
4885.5 8		DE	
4920 20	(7/2 ⁺ ,9/2 ⁺)	H M	XREF: H(4900)M(4920) J ^π : L(³ He,α)=(4) from 0 ⁺ .
4932.44 ^b 20	(21/2 ⁺)	BCDE	J ^π : 1709.2γ Q, ΔJ=2 to 17/2 ⁺ .
4970		K	
4980		K	
5000 20	(1/2 ⁻ ,3/2 ⁻)	K M	XREF: K(4990)M(5000) J ^π : L(³ He,α)=(1) from 0 ⁺ .
5063.09 ^d 19	(21/2 ⁺)	BCDE	J ^π : 1281.4γ Q, ΔJ=2 to 17/2 ⁽⁺⁾ , 439.9γ to (21/2 ⁺).
5100		K	
5120		H K	XREF: H(5160)K(5120)
5270? 30		H	XREF: H(?)
5339.72 ^c 27	(21/2 ⁺)	C	J ^π : 1261.8γ Q, ΔJ=2 to (17/2 ⁺); band assignment.
5360 20	(5/2 ⁻ ,7/2 ⁻)		M J ^π : L(³ He,α)=(3) from 0 ⁺ .
5409.97 19	(23/2 ⁺)	BCDE	J ^π : 346.3γ D+Q, ΔJ=1 to (21/2 ⁺); 357.2γ (D+Q), ΔJ=(1) from (25/2 ⁺).
5547	(1/2,3/2,5/2 ⁺)	G	Additional information 35. J ^π : primary 2432γ from 1/2 ⁺ in (n,γ) E=th.
5668.19 22	(25/2 ⁺)	C	J ^π : 256γ (D), ΔJ=(1) to (23/2 ⁺); 1315.6γ from (29/2 ⁺).
5767.39 ^b 19	(25/2 ⁺)	BCDE	XREF: D(5773?) J ^π : 835γ Q, ΔJ=2 to (21/2 ⁺); band assignment.
5803.20 27		C	
5810 20	5/2 ⁻ ,7/2 ⁻		M J ^π : L(³ He,α)=3 from 0 ⁺ .
6278.19 ^d 19	(25/2 ⁺)	C	J ^π : 1215.1γ Q, ΔJ=2 to (21/2 ⁺), 510.2γ (D) to (25/2 ⁺).
6522.13 22	(25/2 ⁺)	C	J ^π : 1459γ to (21/2 ⁺); 1163.4γ from (29/2 ⁺).
6752.54 ^c 33	(25/2 ⁺)	C	J ^π : 1412.8γ (Q), ΔJ=(2) to (21/2 ⁺); band assignment.
6841.18 20	(29/2 ⁺)	BC	J ^π : 1073.6γ Q, ΔJ=2 to (25/2 ⁺).
6983.92 21	(29/2 ⁺)	C	J ^π : 1216.7γ (Q), ΔJ=(2) to (25/2 ⁺); 1012.7γ from (33/2 ⁺).
7060.89 24	(29/2 ⁺)	C	J ^π : 1293.2γ Q, ΔJ=2 to (25/2 ⁺); 934.8γ from (33/2 ⁺).
7450 20	1/2 ⁻ ,3/2 ⁻		M J ^π : L(³ He,α)=1 from 0 ⁺ .
7685.51 ^d 21	(29/2 ⁺)	C	J ^π : 1407.3γ Q, ΔJ=2 to (25/2 ⁺), 245.2γ to (29/2 ⁺).
(7979.4 5)	1/2 ⁺	FG	Additional information 36.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

⁶⁵Zn Levels (continued)

E(level) ^{†‡}	J ^π #	XREF	Comments
			E(level): from (n,γ) E=th. S(n)=7979.33 17 (2021Wa16). J ^π : s-wave neutron capture from 0 ⁺ .
7995.98 ^b 21	(33/2 ⁺)	CD	XREF: D(8003?) J ^π : 1154.7γ Q, ΔJ=2 to (29/2 ⁺); band assignment.
8210 20	(1/2 ⁻ ,3/2 ⁻)	M	J ^π : L(³ He,α)=(1) from 0 ⁺ .
8326.3 ^c 4	(29/2 ⁺)	C	IAS of ⁶⁵ Cu 770 level. J ^π : 1573.7γ (Q), ΔJ=(2) to (25/2 ⁺); band assignment.
8560 20		M	IAS of ⁶⁵ Cu 1114 level.
8591.74 29		C	
8920 20		M	IAS of ⁶⁵ Cu 1482 level.
9060 20		M	IAS of ⁶⁵ Cu 1623 level.
9120 20		M	IAS of ⁶⁵ Cu 1725 level.
9222.99 ^b 24	(37/2 ⁺)	C	J ^π : 1227γ Q, ΔJ=2 to (33/2 ⁺); band assignment.
9520 20		M	IAS of ⁶⁵ Cu 2093 level.
10030?		M	XREF: M(?)
10571.61 ^b 26	(41/2 ⁺)	C	J ^π : 1348.6γ (Q,) ΔJ=(2) to (35/2 ⁺); band assignment.
x [@]	J	B	J ^π : ≥(25/2). J ^π : from coincidence observation of gammas in the SD band with γ rays from the 6842, normal deformed level.
			Additional information 37.
1341+x [@]	J+2	B	
2832+x [@]	J+4	B	
4500+x [@]	J+6	B	
6387+x [@]	J+8	B	
8508+x [@]	J+10	B	
10870+x [@]	J+12	B	
13533+x [@]	J+14	B	
16538+x [@]	J+16	B	
19887+x [@]	J+18	B	
y	J1	B	
744+y ^{&}	J1+1	B	
1621+y ^{&}	J1+2	B	
2478+y ^{&}	J1+3	B	
3396+y ^{&}	J1+4	B	
4338+y ^{&}	J1+5	B	
5357+y ^{&}	J1+6	B	
6402+y ^{&}	J1+7	B	
7610+y ^{&}	J1+8	B	
8841+y ^{&}	J1+9	B	
10307+y ^{&}	J1+10	B	
11658+y ^{&}	J1+11	B	
13295+y ^{&}	J1+12	B	
z ^a	J2	B	
688+z ^a	J2+1	B	
1454+z ^a	J2+2	B	
2304+z ^a	J2+3	B	
3250+z ^a	J2+4	B	
4238+z ^a	J2+5	B	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{65}Zn Levels (continued)

<u>E(level)^{†‡}</u>	<u>J^π#</u>	<u>XREF</u>
5353+z ^a	J2+6	B
6553+z ^a	J2+7	B
7906+z ^a	J2+8	B
9379+z ^a	J2+9	B
11029+z? ^a	J2+10	B

[†] Additional information 38.

[‡] From a least-square fit to γ -ray energies with uncertainties for levels connected with γ transitions and from transfer reactions as noted individually under comments, unless otherwise noted.

For high-spin yrast levels in ($^{16}\text{O}, 2p n \gamma$), it is assumed spin ascends as excitation energy increases.

@ Band(A): SD band (2000Yu02). Q(transition)=2.6 3. Configuration=(n,g9/2)³(p,g9/2)², $\alpha=+1/2$. Population intensity $\approx 2.5\%$ of the 202 γ from normal deformed state.

& Band(B): Highly-deformed band 1. Q(transition)=2.1 3. Configuration=(n,g9/2)²(p,g9/2)². Population intensity $\approx 50\%$ of SD band.

^a Band(C): Highly-deformed band 2. Configuration=(n,g9/2)³(p,g9/2)(p,f7/2). Population intensity $\approx 0.7\%$ of 202 γ from normal deformed state.

^b Band(D): Band based on 1065, 9/2⁺ level.

^c Band(E): Band based on 2923, 13/2⁺ level.

^d Band(F): Band based on 3783, 17/2⁺ level.

^e Band(G): Band based on 2138, 11/2⁺ level.

^f Seq.(H): Sequence based on g.s.

Adopted Levels, Gammas (continued)

γ(⁶⁵Zn)

Additional information 39.

<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ[@]</u>	<u>I_γ[@]</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.&</u>	<u>δ</u>	<u>α[†]</u>	<u>Comments</u>
53.927	1/2 ⁻	53.93 ^a 1	100	0.0	5/2 ⁻	E2		6.66 9	B(E2)(W.u.)=6.45 25 α(K)=5.66 8; α(L)=0.874 12; α(M)=0.1224 17 α(N)=0.00276 4 E _γ : others: 53.8 2 from ⁶⁵ Ga ε+β ⁺ decay and (α,nγ). Mult.: from ce data in (p,nγ) and ⁶⁵ Ga ε+β ⁺ decay.
115.124	3/2 ⁻	61.20 ^a 1	23.2 28	53.927	1/2 ⁻	M1+E2	+0.07 5	0.26 4	B(M1)(W.u.)=0.0368 +38-40; B(E2)(W.u.)=80 +150-70 α(K)=0.227 31; α(L)=0.025 5; α(M)=0.0035 6 α(N)=0.000132 15 E _γ : others: 61.1 2 from ⁶⁵ Ga ε+β ⁺ decay and (α,nγ). Mult.,δ: D+Q with ΔJ=1 and δ from γ(θ) in (α,nγ); E1+M2 ruled out by RUL. Others: δ(E2/M1)<0.1 from RUL, <0.4 from α(K)exp in (p,nγ).
		115.07 4	100 5	0.0	5/2 ⁻	M1+E2	-0.27 5	0.065 9	B(M1)(W.u.)=0.022 1; B(E2)(W.u.)=204 +79-66 α(K)=0.058 8; α(L)=0.0064 9; α(M)=0.00091 13 α(N)=3.3×10 ⁻⁵ 4 E _γ : weighted average of 115.1 2 from ⁶⁵ Ga ε+β ⁺ decay, 114.9 1 from (¹⁶ O,2pnγ), 115.1 2 from (α,nγ), and 115.09 4 from (p,nγ). I _γ : from (α,pnγ). Other: 100 10 from ⁶⁵ Ga ε+β ⁺ decay. Mult.: from ce data in (p,nγ). δ: weighted average of 0.29 3 from α(K)exp in (p,nγ) and 0.18 6 from γ(θ) in (α,nγ). The sign is from (α,nγ).
206.91	3/2 ⁻	92.0 ^{ae}	0.78 ^a	115.124	3/2 ⁻	[M1]		0.0768 11	α(K)=0.0686 10; α(L)=0.00719 10; α(M)=0.001031 14 α(N)=4.02×10 ⁻⁵ 6 B(M1)(W.u.)=0.00112 24 I _γ : other: I _γ <4.4 from ⁶⁵ Ga ε+β ⁺ decay.
		153.0 1	100 5	53.927	1/2 ⁻	M1+E2	+0.19 5	0.0237 22	B(M1)(W.u.)=0.0300 20; B(E2)(W.u.)=77 +44-35 α(K)=0.0212 20; α(L)=0.00222 22; α(M)=0.000319 31 α(N)=1.22×10 ⁻⁵ 10 E _γ : from (¹⁶ O,2pnγ). Others: 153.0 2 from ⁶⁵ Ga ε+β ⁺ decay and 153.0 2 from (α,nγ). I _γ : from (α,pnγ). Other: 100 9 from ⁶⁵ Ga ε+β ⁺ decay. Mult.: from ce data in (p,nγ); D+Q from γ(θ) in (α,nγ), E1+M2 ruled out by RUL.

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Zn})$ (continued)

<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ[@]</u>	<u>I_γ[@]</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.&</u>	<u>δ</u>	<u>α[†]</u>	<u>Comments</u>
206.91	3/2 ⁻	206.9 2	28 5	0.0	5/2 ⁻	M1+E2	+0.56 17	0.017 4	<p>δ: weighted average of 0.21 +4-5 from ce data in Cu(p,nγ) and +0.09 9 from γ(θ) in (α,nγ). The sign is from (α,nγ). B(M1)(W.u.)=0.00268 +54-58; B(E2)(W.u.)=33 +16-15 α(K)=0.0153 32; α(L)=0.00161 35; α(M)=0.00023 5 α(N)=8.6×10⁻⁶ 17 E_γ: other: 206.9 2 from (α,nγ). I_γ: weighted average of 36 6 from ⁶⁵Ga ε+β⁺ decay and 25.6 33 from (α,pnγ). Others: 35 from (α,nγ), 29 from (p,nγ). Mult.: D+Q from γ(θ) in (α,nγ); E1+M2 ruled out by RUL; also from ce data in (p,nγ).</p>
768.83	5/2 ⁻	562.1 ^a 5	3.2 25	206.91	3/2 ⁻	[M1,E2]		0.00112 27	<p>δ: unweighted average of +0.27 3 (1975We08) and +0.55 25 (1974Ni01) in (α,nγ), and 0.87 20 from α(K)exp in (p,nγ). α(K)=0.00100 24; α(L)=0.000102 25; α(M)=1.46×10⁻⁵ 35 α(N)=5.8×10⁻⁷ 13 E_γ: Not observed in ⁶⁵Ga ε decay data. I_γ: unweighted average of 5.7 19 from (α,nγ) and 0.67 17 from (p,nγ). B(M1)(W.u.)=0.0017 +24-10 if M1, B(E2)(W.u.)=9 +12-5 if E2. B(M1)(W.u.)=0.018 +14-6; B(E2)(W.u.)=11 +10-5 α(K)=0.000583 14; α(L)=5.85×10⁻⁵ 14; α(M)=8.39×10⁻⁶ 20 α(N)=3.37×10⁻⁷ 8 E_γ: also from (p,nγ). I_γ: weighted average of 78 12 from ⁶⁵Ga ε+β⁺ decay, 62.3 19 from (α,nγ), 71 9 from (α,pnγ), and 55.8 25 (1972Du03) and 60.0 14 (1974Ez01) from (p,nγ). Mult.: D+Q from γ(θ) in (p,nγ) and (α,nγ); E1+M2 ruled out by RUL.</p>
		653.7 2	60.2 15	115.124	3/2 ⁻	M1+E2	-0.40 7	0.000650 15	<p>δ: weighted average of -0.14 12 (1974Ni01) and -0.43 4 (1978Ko11) in (α,nγ), and -0.9 6 in (p,nγ), all from γ(θ). B(E2)(W.u.)=12 +10-5 α(K)=0.000622 9; α(L)=6.30×10⁻⁵ 9; α(M)=9.01×10⁻⁶ 13 α(N)=3.56×10⁻⁷ 5 E_γ: other: 714.8 3 from (p,nγ). I_γ: unweighted average of 13.5 14 from ⁶⁵Ga ε+β⁺ decay, 20.8 19 from (α,nγ), 15.6 22 from (α,pnγ), 11.6 10 (1972Du03) and 12.1 19 (1974Ez01) from (p,nsg).</p>
		714.8 2	14.7 17	53.927	1/2 ⁻	[E2]		0.000695 10	<p>B(M1)(W.u.)=0.020 +16-7; B(E2)(W.u.)=4.0 +43-21</p>
		768.7 2	100.0 19	0.0	5/2 ⁻	M1+E2	+0.27 7	0.000441 8	

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Zn})$ (continued)

<u>E_i(level)</u>	<u>J_i^{π}</u>	<u>E_{γ}[@]</u>	<u>I_{γ}[@]</u>	<u>E_f</u>	<u>J_f^{π}</u>	<u>Mult.&</u>	<u>δ</u>	<u>α^{\dagger}</u>	<u>Comments</u>
									$\alpha(\text{K})=0.000396\ 7$; $\alpha(\text{L})=3.96\times 10^{-5}\ 7$; $\alpha(\text{M})=5.67\times 10^{-6}\ 10$ $\alpha(\text{N})=2.29\times 10^{-7}\ 4$ E _{γ} : weighted average of 769.0 2 from ⁶⁵ Ga $\varepsilon+\beta^+$ decay, 768.4 2 from ($\alpha,\text{n}\gamma$), and 768.8 2 from (p,n γ). I _{γ} : from ($\alpha,\text{n}\gamma$). Others: 100 9 from ⁶⁵ Ga $\varepsilon+\beta^+$ decay, 100 11 from ($\alpha,\text{p}\text{n}\gamma$), and 100.0 27 from (p,n γ). Mult.: D+Q from $\gamma(\theta)$ in ($\alpha,\text{n}\gamma$) and (p,n γ); E1+M2 ruled out by RUL. δ : weighted average of +0.51 10-28 (1974Ni01) and +0.33 6 (1978Ko11) in ($\alpha,\text{n}\gamma$), +0.20 6 in (p,n γ).
864.21	7/2 ⁻	657.3 1	0.71 12	206.91	3/2 ⁻	[E2]		0.000878 12	$\alpha(\text{K})=0.000786\ 11$; $\alpha(\text{L})=7.97\times 10^{-5}\ 11$; $\alpha(\text{M})=1.141\times 10^{-5}\ 16$ $\alpha(\text{N})=4.50\times 10^{-7}\ 6$ B(E2)(W.u.)=0.53 +55-28 E _{γ} : from (¹⁶ O,2p $\text{n}\gamma$). Other: 657.4 6 from (p,n γ). I _{γ} : weighted average of 0.70 20 from ($\alpha,\text{p}\text{n}\gamma$) and 0.71 12 from (p,n γ). Other: 3.9 6 from (¹⁶ O,2p $\text{n}\gamma$) is significantly discrepant. B(E2)(W.u.)=6.2 +64-33
		749.1 1	16.0 29	115.124	3/2 ⁻	E2		0.000612 9	$\alpha(\text{K})=0.000548\ 8$; $\alpha(\text{L})=5.54\times 10^{-5}\ 8$; $\alpha(\text{M})=7.92\times 10^{-6}\ 11$ $\alpha(\text{N})=3.14\times 10^{-7}\ 4$ E _{γ} : weighted average of 749.0 1 from (¹⁶ O,2p $\text{n}\gamma$), 749.2 2 from ($\alpha,\text{n}\gamma$), and 749.3 3 from (p,n γ). I _{γ} : unweighted average of 10.9 5 from (¹⁶ O,2p $\text{n}\gamma$), 23 6 from ($\alpha,\text{n}\gamma$), 11.9 24 from ($\alpha,\text{p}\text{n}\gamma$), and 18.2 14 from (p,n γ). Mult.: Q, $\Delta\text{J}=2$ from DCO in (¹⁶ O,2p $\text{n}\gamma$) and $\gamma(\theta)$ in ($\alpha,\text{n}\gamma$); M2 ruled out by RUL.
		864.2 1	100.0 12	0.0	5/2 ⁻	M1+E2	-2.14 13	0.000406 6	B(M1)(W.u.)=0.0015 +16-8; B(E2)(W.u.)=16 +16-8 $\alpha(\text{K})=0.000364\ 5$; $\alpha(\text{L})=3.66\times 10^{-5}\ 5$; $\alpha(\text{M})=5.24\times 10^{-6}\ 8$ $\alpha(\text{N})=2.092\times 10^{-7}\ 30$ E _{γ} : weighted average of 864.9 4 from ⁶⁵ Ga $\varepsilon+\beta^+$ decay, 864.1 1 from (¹⁶ O,2p $\text{n}\gamma$), 864.5 4 from ($\alpha,\text{n}\gamma$), and 864.5 2 from (p,n γ). I _{γ} : from (¹⁶ O,2p $\text{n}\gamma$). Others: 100 6 from ($\alpha,\text{n}\gamma$), 100 6 from ($\alpha,\text{p}\text{n}\gamma$), and 100.0 14 from (p,n γ). Mult.: D+Q, $\Delta\text{J}=1$ from DCO in (¹⁶ O,2p $\text{n}\gamma$) and $\gamma(\theta)$ in ($\alpha,\text{n}\gamma$), (p,n γ) and ($\alpha,\text{p}\text{n}\gamma$); E1+M2 ruled out by RUL. δ : unweighted average of -2.27 3 (1974Ni01) and -2.17 4 (1978Ko11)

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Zn})$ (continued)

<u>E_i(level)</u>	<u>J^{π}_i</u>	<u>E_{γ}@</u>	<u>I_{γ}@</u>	<u>E_f</u>	<u>J^{π}_f</u>	<u>Mult.&</u>	<u>δ</u>	<u>α^\dagger</u>	<u>Comments</u>
867.02	1/2 ⁻	660.1 2	3.7 14	206.91	3/2 ⁻	[M1,E2]		0.00073 13	in (α ,n γ), -1.77 2 (1974Ez01) in (p,n γ), -2.33 20 (1994Ba55) in (α ,p,n γ). Other: -0.28 1 also from 1974Ez01 in (p,n γ), but inconsistent with other studies. α (K)=0.00066 12; α (L)=6.6×10 ⁻⁵ 13; α (M)=9.5×10 ⁻⁶ 18 α (N)=3.8×10 ⁻⁷ 7 E _{γ} : other: 660.0 4 from (p,n γ). I _{γ} : unweighted average of 2.3 6 from ⁶⁵ Ga ϵ + β^+ decay and 5.1 10 from (p,n γ). B(M1)(W.u.)=0.0048 +36-25 if M1, B(E2)(W.u.)=18 +14-9 if E2.
		751.9 2	100.0 12	115.124	3/2 ⁻	[M1,E2]		0.00053 8	α (K)=0.00047 7; α (L)=4.8×10 ⁻⁵ 7; α (M)=6.8×10 ⁻⁶ 10 α (N)=2.7×10 ⁻⁷ 4 E _{γ} : other: 751.8 2 from (p,n γ). I _{γ} : from (p,n γ). Other: 100 6 from ⁶⁵ Ga ϵ + β^+ decay. B(M1)(W.u.)=0.09 +6-3 if M1, B(E2)(W.u.)=2.6×10 ² +16-10 if E2. B(M1)(W.u.)=0.0017 +13-9
		813.1 2	2.5 9	53.927	1/2 ⁻	[M1]		0.000383 5	α (K)=0.000344 5; α (L)=3.44×10 ⁻⁵ 5; α (M)=4.93×10 ⁻⁶ 7 α (N)=1.991×10 ⁻⁷ 28 E _{γ} : weighted average of 813.0 2 from ⁶⁵ Ga ϵ + β^+ decay and 813.6 5 from (p,n γ). I _{γ} : unweighted average of 1.60 14 from ⁶⁵ Ga ϵ + β^+ decay and 3.3 5 from (p,n γ). B(E2)(W.u.)=2.6 +17-11
		867.0 3	2.06 33	0.0	5/2 ⁻	[E2]		0.000418 6	α (K)=0.000374 5; α (L)=3.77×10 ⁻⁵ 5; α (M)=5.39×10 ⁻⁶ 8 α (N)=2.148×10 ⁻⁷ 30 E _{γ} : weighted average of 867.1 3 from ⁶⁵ Ga ϵ + β^+ decay and 866.6 6 from (p,n γ). I _{γ} : weighted average of 2.0 4 from ⁶⁵ Ga ϵ + β^+ decay and 2.10 33 from (p,n γ). B(M1)(W.u.)=0.11 +12-5
909.69	3/2 ⁻	140.2 4	3.8 6	768.83	5/2 ⁻	[M1+E2]	<0.13	0.0263 14	α (K)=0.0234 12; α (L)=0.00244 14; α (M)=0.000350 20 α (N)=1.37×10 ⁻⁵ 6 E _{γ} ,I _{γ} : only reported in (p,n γ). δ : deduced by the evaluator from RUL=300 for B(E2)(W.u.). α (K)=0.00056 9; α (L)=5.6×10 ⁻⁵ 10; α (M)=8.1×10 ⁻⁶ 14 α (N)=3.2×10 ⁻⁷ 5 E _{γ} : other: 702.9 3 from (p,n γ). I _{γ} : weighted average of 22.5 31 from ⁶⁵ Ga ϵ + β^+ decay, 14.6 21 from
		702.9 2	18.4 12	206.91	3/2 ⁻	[M1,E2]		0.00063 10	

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Zn})$ (continued)

<u>E_i(level)</u>	<u>J_i^{π}</u>	<u>E_{γ}[@]</u>	<u>I_{γ}[@]</u>	<u>E_f</u>	<u>J_f^{π}</u>	<u>Mult.&</u>	<u>δ</u>	<u>α^\dagger</u>	<u>Comments</u>
909.69	3/2 ⁻	794.6 2	47.9 21	115.124	3/2 ⁻	M1+E2	+0.44 12	0.000422 11	(α ,n γ), and 18.7 8 from (p,n γ). B(M1)(W.u.)=0.0040 +31-14 if M1, B(E2)(W.u.)=14 +10-5 if E2. B(M1)(W.u.)=0.0061 +46-21; B(E2)(W.u.)=3.1 +29-16 α (K)=0.000378 10; α (L)=3.79 \times 10 ⁻⁵ 10; α (M)=5.43 \times 10 ⁻⁶ 14 α (N)=2.19 \times 10 ⁻⁷ 5 E _{γ} : other: 794.6 2 from (p,n γ). I _{γ} : from (α ,n γ). Others: 46 4 from ⁶⁵ Ga ϵ + β ⁺ decay and 49.5 30 from (p,n γ). Mult.: D+Q from γ (θ) in (α ,n γ) and (p,n γ); E1+M2 ruled out by RUL. δ : weighted average of +0.40 12 from (α ,n γ) and +0.77 +42-30 from (p,n γ).
		855.8 2	36 5	53.927	1/2 ⁻	M1+E2	-0.85 20	0.000381 12	B(M1)(W.u.)=0.0025 +20-10; B(E2)(W.u.)=4.2 +33-18 α (K)=0.000342 11; α (L)=3.42 \times 10 ⁻⁵ 11; α (M)=4.91 \times 10 ⁻⁶ 16 α (N)=1.97 \times 10 ⁻⁷ 6 E _{γ} : other: 855.7 2 from (p,n γ). I _{γ} : unweighted average of 32.7 31 from ⁶⁵ Ga ϵ + β ⁺ decay, 45.8 21 from (α ,n γ), and 29.2 20 from (p,n γ). Mult.: D+Q from γ (θ) in (α ,n γ) and (p,n γ); E1+M2 ruled out by RUL. δ : weighted average of -0.96 20 from (α ,n γ) and -0.6 3 from (p,n γ). B(M1)(W.u.)=0.0095 +71-32; B(E2)(W.u.)=1.2 +10-5 α (K)=0.000276 4; α (L)=2.75 \times 10 ⁻⁵ 4; α (M)=3.95 \times 10 ⁻⁶ 6 α (N)=1.595 \times 10 ⁻⁷ 23 E _{γ} : weighted average of 909.9 2 from ⁶⁵ Ga ϵ + β ⁺ decay, 909.5 3 from (α ,n γ), and 909.6 2 from (p,n γ). I _{γ} : from (α ,n γ). Others: 100 7 from ⁶⁵ Ga ϵ + β ⁺ decay and 100 4 from (p,n γ). Mult., δ : D+Q and δ from γ (θ) in (α ,n γ); E1+M2 ruled out by RUL. Other: δ =+1.7 11 from (p,n γ). α (K)=0.008 4; α (L)=9; α (M)=1.3 \times 10 ⁻⁴ 7 α (N)=4.7 \times 10 ⁻⁶ 24 Only reported in (p,n γ). B(M1)(W.u.)=0.0134 +66-37 if M1, B(E2)(W.u.)=2.9 \times 10 ² +14-8 if E2. B(E2)(W.u.)=2.9 \times 10 ² +14-8 upper bound exceeds RUL=300 if E2. α (K)=0.00036 4; α (L)=3.6 \times 10 ⁻⁵ 4; α (M)=5.2 \times 10 ⁻⁶ 6
		909.7 2	100.0 21	0.0	5/2 ⁻	M1+E2	+0.25 4	0.000307 4	
1047.38	5/2 ⁻	278.2 5	0.79 16	768.83	5/2 ⁻	[M1,E2]		0.009 5	
		840.3 ^e	<3.2	206.91	3/2 ⁻	[M1,E2]		0.00041 5	

Adopted Levels, Gammas (continued)

γ(⁶⁵Zn) (continued)

<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ[@]</u>	<u>I_γ[@]</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.&</u>	<u>δ</u>	<u>α[†]</u>	<u>Comments</u>
1047.38	5/2 ⁻	932.2 2	100.0 14	115.124	3/2 ⁻	M1+E2	-0.42 5	0.000298 5	α(N)=2.09×10 ⁻⁷ 24 Only reported in (p,nγ). B(M1)(W.u.)<0.0028 if M1, B(E2)(W.u.)<6.6 if E2. B(M1)(W.u.)=0.038 +16-9; B(E2)(W.u.)=12.9 +61-37 α(K)=0.000267 4; α(L)=2.67×10 ⁻⁵ 4; α(M)=3.82×10 ⁻⁶ 6 α(N)=1.542×10 ⁻⁷ 23 E _γ : weighted average of 932.4 2 from ⁶⁵ Ga ε+β ⁺ decay, 932.1 2 from (¹⁶ O,2pnγ), 932.1 5 from (α,nγ), and 932.2 2 from (p,nγ). I _γ : from 1974Ez01 in (α,nγ). Others: 100.0 32 from 1977Ch14 in (p,nγ), 100 8 from ⁶⁵ Ga ε+β ⁺ decay and 100 5 from (p,nγ). Mult.,δ: D+Q and δ from γ(θ) in (α,nγ); E1+M2 ruled out by RUL. α(K)=0.000268 4; α(L)=2.69×10 ⁻⁵ 4; α(M)=3.85×10 ⁻⁶ 5 α(N)=1.538×10 ⁻⁷ 22 B(E2)(W.u.)=1.57 +68-37 E _γ : weighted average of 993.8 4 from ⁶⁵ Ga ε+β ⁺ decay and 993.5 4 from (p,nγ). I _γ : weighted average of 2.45 25 from ⁶⁵ Ga ε+β ⁺ decay and 3.0 7 from (p,nγ).
		993.7 4	2.51 25	53.927	1/2 ⁻	[E2]		0.000299 4	
		1047.4 2	53.6 19	0.0	5/2 ⁻	M1+E2		0.000246 18	α(K)=0.000220 16; α(L)=2.20×10 ⁻⁵ 17; α(M)=3.15×10 ⁻⁶ 24 α(N)=1.27×10 ⁻⁷ 9 E _γ : weighted average of 1047.5 2 from ⁶⁵ Ga ε+β ⁺ decay and 1047.3 2 from (p,nγ). Other: 1047.2 10 from (α,nγ). I _γ : weighted average of 49.5 32 from ⁶⁵ Ga ε+β ⁺ decay, 61.3 32 from (α,nγ), 53.1 14 (1974Ez01) and 52 5 (1977Ch14) from (p,nγ). Mult.,δ: D+Q and δ=-0.40 7 or +6.4 +15-19 from γ(θ) in (p,nγ); E1+M2 ruled out by RUL. B(M1)(W.u.)=0.0171 +71-37 if M1, B(E2)(W.u.)=26 +11-6 if E2. B(E1)(W.u.)=8.19×10 ⁻⁵ +41-38 α(K)=0.00651 9; α(L)=0.000654 9; α(M)=9.33×10 ⁻⁵ 13 α(N)=3.64×10 ⁻⁶ 5 E _γ : weighted average of 201.3 1 from (¹⁶ O,2pnγ), 201.4 1 from (α,nγ), and 201.5 2 from (p,nγ). I _γ : from (¹⁶ O,2pnγ). Others: 100 6 from (α,nγ), 100 5 from (α,pnγ), and 100.0 10 from (p,nγ).
1065.70	9/2 ⁺	201.4 1	100.0 10	864.21	7/2 ⁻	E1		0.00726 10	

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Zn})$ (continued)

<u>E_i(level)</u>	<u>J_i^{π}</u>	<u>E_{γ}[@]</u>	<u>I_{γ}[@]</u>	<u>E_f</u>	<u>J_f^{π}</u>	<u>Mult. &</u>	<u>δ</u>	<u>α^\dagger</u>	<u>Comments</u>
1065.70	9/2 ⁺	1065.7 3	8.0 18	0.0	5/2 ⁻	M2+E3	-0.13 2	0.000488 7	<p>Mult.,δ: $\delta(\text{M2/E1})=0.00$ 1 from $\gamma(\theta)$ and $\gamma(\text{lin pol})$ in ($\alpha,\text{n}\gamma$); M2 component probably unlikely based on RUL. Other: $\delta(\text{Q/D})=0.02$ 1 from $\gamma(\theta)$ in ($\alpha,\text{p}\text{n}\gamma$). B(M2)(W.u.)=0.175 37; B(E3)(W.u.)=6.6 +27-23 $\alpha(\text{K})=0.000438$ 6; $\alpha(\text{L})=4.41\times 10^{-5}$ 6; $\alpha(\text{M})=6.33\times 10^{-6}$ 9 $\alpha(\text{N})=2.55\times 10^{-7}$ 4 E_{γ}: unweighted average of 1065.1 1 from (¹⁶O,2p$\text{n}\gamma$), 1066.1 4 from ($\alpha,\text{n}\gamma$), and 1066.0 3 from (p,$\text{n}\gamma$). I_{γ}: unweighted average of 5.3 7 from (¹⁶O,2p$\text{n}\gamma$), 12 6 from ($\alpha,\text{n}\gamma$), 4.6 9 from ($\alpha,\text{p}\text{n}\gamma$), and 9.9 10 from (p,$\text{n}\gamma$).</p>
1252.68	7/2 ⁻	483.9 ^a 2	30.7 17	768.83	5/2 ⁻	M1+E2	+0.03 1	1.19 $\times 10^{-3}$ 2	<p>Mult.,δ: from $\gamma(\theta)$ and $\gamma(\text{lin pol})$ in ($\alpha,\text{n}\gamma$). B(M1)(W.u.)=0.042 +34-15; B(E2)(W.u.)=0.27 +35-16 $\alpha(\text{K})=0.001071$ 15; $\alpha(\text{L})=0.0001079$ 15; $\alpha(\text{M})=1.547\times 10^{-5}$ 22 $\alpha(\text{N})=6.22\times 10^{-7}$ 9 E_{γ}: other: 484.0 3 from ($\alpha,\text{n}\gamma$). I_{γ}: weighted average of 31.2 17 from ($\alpha,\text{n}\gamma$), 37 7 from ($\alpha,\text{p}\text{n}\gamma$), and 28.2 28 from (p,$\text{n}\gamma$). δ: D+Q and δ from $\gamma(\theta)$ in ($\alpha,\text{n}\gamma$); E1+M2 ruled out by RUL. Other: $\delta(\text{Q/D})=+0.02$ 3 or -4.7 +6-8 from $\gamma(\theta)$ in (p,$\text{n}\gamma$). $\alpha(\text{K})=0.0002373$ 33; $\alpha(\text{L})=2.378\times 10^{-5}$ 33; $\alpha(\text{M})=3.41\times 10^{-6}$ 5 $\alpha(\text{N})=1.364\times 10^{-7}$ 19 B(E2)(W.u.)=20 +17-7 E_{γ}: other: 1046 1 from ($\alpha,\text{n}\gamma$). I_{γ}: others: 100 7 from ($\alpha,\text{n}\gamma$) and 100 12 from ($\alpha,\text{p}\text{n}\gamma$). B(E2)(W.u.)=5.0 +41-17 $\alpha(\text{K})=0.0001956$ 27; $\alpha(\text{L})=1.957\times 10^{-5}$ 27; $\alpha(\text{M})=2.80\times 10^{-6}$ 4 $\alpha(\text{N})=1.125\times 10^{-7}$ 16; $\alpha(\text{IPF})=2.355\times 10^{-6}$ 35 E_{γ}: other: 1138 1 from ($\alpha,\text{n}\gamma$). I_{γ}: weighted average of 33 7 from ($\alpha,\text{n}\gamma$) and 38.1 28 from (p,$\text{n}\gamma$). Mult.: pure E2 assumed based on $\gamma(\theta)$ in (p,$\text{n}\gamma$) but with large uncertainty; $\Delta\pi$=no from level scheme.</p>
		1045.7 ^a 2	100 ^a 4	206.91	3/2 ⁻	[E2]		0.000265 4	<p>$\alpha(\text{K})=0.0002373$ 33; $\alpha(\text{L})=2.378\times 10^{-5}$ 33; $\alpha(\text{M})=3.41\times 10^{-6}$ 5 $\alpha(\text{N})=1.364\times 10^{-7}$ 19 B(E2)(W.u.)=20 +17-7 E_{γ}: other: 1046 1 from ($\alpha,\text{n}\gamma$). I_{γ}: others: 100 7 from ($\alpha,\text{n}\gamma$) and 100 12 from ($\alpha,\text{p}\text{n}\gamma$). B(E2)(W.u.)=5.0 +41-17 $\alpha(\text{K})=0.0001956$ 27; $\alpha(\text{L})=1.957\times 10^{-5}$ 27; $\alpha(\text{M})=2.80\times 10^{-6}$ 4 $\alpha(\text{N})=1.125\times 10^{-7}$ 16; $\alpha(\text{IPF})=2.355\times 10^{-6}$ 35 E_{γ}: other: 1138 1 from ($\alpha,\text{n}\gamma$). I_{γ}: weighted average of 33 7 from ($\alpha,\text{n}\gamma$) and 38.1 28 from (p,$\text{n}\gamma$). Mult.: pure E2 assumed based on $\gamma(\theta)$ in (p,$\text{n}\gamma$) but with large uncertainty; $\Delta\pi$=no from level scheme.</p>
		1137.5 ^a 2	37.4 28	115.124	3/2 ⁻	(E2)		0.0002204 31	<p>$\alpha(\text{K})=0.0001956$ 27; $\alpha(\text{L})=1.957\times 10^{-5}$ 27; $\alpha(\text{M})=2.80\times 10^{-6}$ 4 $\alpha(\text{N})=1.125\times 10^{-7}$ 16; $\alpha(\text{IPF})=2.355\times 10^{-6}$ 35 E_{γ}: other: 1138 1 from ($\alpha,\text{n}\gamma$). I_{γ}: weighted average of 33 7 from ($\alpha,\text{n}\gamma$) and 38.1 28 from (p,$\text{n}\gamma$). Mult.: pure E2 assumed based on $\gamma(\theta)$ in (p,$\text{n}\gamma$) but with large uncertainty; $\Delta\pi$=no from level scheme.</p>
		1252.8 ^a 3	17.9 ^a 22	0.0	5/2 ⁻	[M1,E2]		0.000183 11	<p>$\alpha(\text{K})=0.000151$ 8; $\alpha(\text{L})=1.50\times 10^{-5}$ 8; $\alpha(\text{M})=2.15\times 10^{-6}$ 11 $\alpha(\text{N})=8.7\times 10^{-8}$ 4; $\alpha(\text{IPF})=1.56\times 10^{-5}$ 25</p>

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Zn})$ (continued)

<u>E_i(level)</u>	<u>J^{π}_i</u>	<u>E_{γ}</u> @	<u>I_{γ}</u> @	<u>E_f</u>	<u>J^{π}_f</u>	<u>Mult.&</u>	<u>δ</u>	<u>α^{\dagger}</u>	<u>Comments</u>
1263.05?	(9/2 ⁻)	197.0 ^e 2	100 50	1065.70	9/2 ⁺				B(M1)(W.u.)=0.0014 +12-5 if M1, B(E2)(W.u.)=1.5 +12-5 if E2. E _{γ} ,I _{γ} : from (¹⁶ O,2pn γ) only; not seen in any other studies.
1263.47	9/2 ⁻	399.2 2 399.4 ^a 3	63 38 5.0 13	864.21	7/2 ⁻ 7/2 ⁻	M1+E2	-0.023 10	1.86×10 ⁻³ 3	E _{γ} ,I _{γ} : from (¹⁶ O,2pn γ). α (K)=0.001665 24; α (L)=0.0001684 24; α (M)=2.415×10 ⁻⁵ 34 α (N)=9.68×10 ⁻⁷ 14 B(M1)(W.u.)=0.039 +31-20; B(E2)(W.u.)=0.22 +32-17 E _{γ} : other: 399 3 from (α ,n γ). I _{γ} : unweighted average of 7.5 11 from (α ,n γ), 3.1 5 from (α ,pn γ), and 4.5 5 from (p,n γ). Mult., δ : D+Q and δ from γ (θ) in (α ,n γ); E1+M2 ruled out by RUL.
		1263.4 ^b 2	100.0 5	0.0	5/2 ⁻	E2(+M3)	+0.03 3	0.0001935 29	α (K)=0.0001555 24; α (L)=1.552×10 ⁻⁵ 24; α (M)=2.224×10 ⁻⁶ 35 α (N)=8.95×10 ⁻⁸ 14; α (IPF)=2.016×10 ⁻⁵ 29 B(E2)(W.u.)=26 +20-12 E _{γ} : other: 1263.3 2 from (p,n γ). I _{γ} : from (p,n γ). Others: 100.0 11 from (α ,n γ) and 100 5 from (α ,pn γ). Mult., δ : from γ (θ) and γ (lin pol) in (α ,n γ). α (K)=0.0016 5; α (L)=1.6×10 ⁻⁴ 5; α (M)=2.3×10 ⁻⁵ 7 α (N)=8.9×10 ⁻⁷ 26 B(M1)(W.u.)=0.0058 +94-36 if M1, B(E2)(W.u.)=42 +67-26 if E2.
1343.88	5/2 ⁻	479.7 ^a 3	3.8 ^a 6	864.21	7/2 ⁻	[M1,E2]		0.0017 5	α (K)=0.00094 22; α (L)=9.6×10 ⁻⁵ 23; α (M)=1.37×10 ⁻⁵ 32 α (N)=5.4×10 ⁻⁷ 12 E _{γ} ,I _{γ} : other: 574.8 5 with I _{γ} =4 4 from ⁶⁵ Ga ϵ + β ⁺ decay. B(M1)(W.u.)=0.0017 +27-11 if M1, B(E2)(W.u.)=8 +14-5 if E2.
		574.9 ^a 4	1.89 ^a 32	768.83	5/2 ⁻	[M1,E2]		0.00105 24	
		1137.0 2	22.3 16	206.91	3/2 ⁻	(M1+E2)			E _{γ} : weighted average of 1137.1 2 from ⁶⁵ Ga ϵ + β ⁺ decay and 1136.7 4 from (p,n γ). I _{γ} : weighted average of 26 5 from ⁶⁵ Ga ϵ + β ⁺

Adopted Levels, Gammas (continued)

γ(⁶⁵Zn) (continued)

<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ[@]</u>	<u>I_γ[@]</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.&</u>	<u>δ</u>	<u>α[†]</u>	<u>Comments</u>
1343.88	5/2 ⁻	1228.8 2	100.0 31	115.124	3/2 ⁻	M1+E2	-0.34 3	0.0001777 25	decay, 23.4 16 from (α,nγ), and 19.7 21 from (p,nγ). Mult.,δ: D+Q with δ=+0.16 20 or ≤-3.2 from γ(θ) in (p,nγ); Δπ=no from level scheme. B(M1)(W.u.)=0.008 +13-5; B(E2)(W.u.)=1.0 +17-6 α(K)=0.0001504 21; α(L)=1.497×10 ⁻⁵ 21; α(M)=2.146×10 ⁻⁶ 30 α(N)=8.69×10 ⁻⁸ 12; α(IPF)=1.009×10 ⁻⁵ 16 E _γ : weighted average of 1228.9 2 from ⁶⁵ Ga ε+β ⁺ decay and 1228.6 2 from (p,nγ). I _γ : from (α,nγ). Others: 100 7 from ⁶⁵ Ga ε+β ⁺ decay and 100.0 35 from (p,nγ). Mult.: D+Q from γ(θ) in (α,nγ) and (p,nγ); E1+M2 ruled out by RUL. δ: weighted average of -0.33 3 from (α,nγ) and -0.44 12 from (p,nγ). Other: -1.25 20 also from (p,nγ) seems less likely. α(K)=0.0001484 21; α(L)=1.481×10 ⁻⁵ 21; α(M)=2.121×10 ⁻⁶ 30 α(N)=8.54×10 ⁻⁸ 12; α(IPF)=2.59×10 ⁻⁵ 4 B(E2)(W.u.)=0.24 +38-14 E _γ ,I _γ : other: 1289.8 7 with I _γ =3.2 20 from ⁶⁵ Ga ε+β ⁺ decay. α(K)=0.000131 6; α(L)=1.30×10 ⁻⁵ 6; α(M)=1.86×10 ⁻⁶ 8 α(N)=7.53×10 ⁻⁸ 32; α(IPF)=3.4×10 ⁻⁵ 5 E _γ : weighted average of 1343.9 2 from ⁶⁵ Ga ε+β ⁺ decay and 1343.7 2 from (p,nγ). I _γ : weighted average of 31.8 23 from ⁶⁵ Ga ε+β ⁺ decay, 32.8 16 from (α,nγ), and 29.1 27 from (p,nγ). Mult.,δ: D+Q and δ(Q/D)=-0.5 +2-3 or ≥+4.3 from γ(θ) in (p,nγ); E1+M2 ruled out by RUL. B(M1)(W.u.)=0.0022 +35-13 if M1, B(E2)(W.u.)=2.0 +32-13 if E2. B(E1)(W.u.)=1.8×10 ⁻⁴ +18-9; B(M2)(W.u.)=0.8 +11-5 α(K)=7.57×10 ⁻⁵ 11; α(L)=7.50×10 ⁻⁶ 11; α(M)=1.075×10 ⁻⁶ 15 α(N)=4.34×10 ⁻⁸ 6; α(IPF)=8.52×10 ⁻⁵ 12 B(M2)(W.u.)=0.8 +11-5 upper bound exceeds RUL=1. E _γ : weighted average of 1253.9 2 from (α,nγ) and 1254.2 2 from (p,nγ). I _γ : from (p,nγ). Mult.,δ: from γ(θ) and γ(lin pol) in (α,nγ). Other: δ(Q/D)=-0.14 2 from γ(θ) in (p,nγ) seems unlikely based on RUL for M2 component.
		1289.8 ^a 4	3.0 ^a 5	53.927	1/2 ⁻	[E2]		0.0001913 27	
		1343.8 2	31.8 16	0.0	5/2 ⁻	M1+E2		0.000179 11	
1369.38	5/2 ⁺	1254.1 2	100.0 26	115.124	3/2 ⁻	E1+M2	-0.04 1	0.0001695 24	

Adopted Levels, Gammas (continued)

γ(⁶⁵Zn) (continued)

<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ[@]</u>	<u>I_γ[@]</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.&</u>	<u>δ</u>	<u>α[†]</u>	<u>Comments</u>
1369.38	5/2 ⁺	1369.7 3	69.5 26	0.0	5/2 ⁻	(E1)		0.0002342 33	B(E1)(W.u.)=9.7×10 ⁻⁵ +94-46 α(K)=6.47×10 ⁻⁵ 9; α(L)=6.41×10 ⁻⁶ 9; α(M)=9.18×10 ⁻⁷ 13 α(N)=3.71×10 ⁻⁸ 5; α(IPF)=0.0001621 23 E _γ : weighted mean of 1368.94 24 from ⁶² Ni(α,nγ) and 1369.7 3 from (p,nγ). I _γ : from (p,nγ). Mult.: D+Q with δ(Q/D)=-0.11 8 from γ(θ) in (p,nγ); Δπ=yes from level scheme, but M2 compolent seems unlikely based on RUL.
1469.71	3/2 ⁻	422.3 3	6.7 10	1047.38	5/2 ⁻	[M1+E2]	<0.5	0.00181 18	α(K)=0.00162 16; α(L)=0.000164 17; α(M)=2.36×10 ⁻⁵ 24 α(N)=9.4×10 ⁻⁷ 9 B(M1)(W.u.)=0.07 +8-4 E _γ : weighted average of 422.2 3 from ⁶⁵ Ga ε+β ⁺ decay and 422.5 4 from (p,nγ). I _γ : weighted average of 7.3 18 from ⁶⁵ Ga ε+β ⁺ decay and 6.5 10 from (p,nγ). δ: deduced by the evaluator from RUL=300 for B(E2)(W.u.).
		560.1 2	10.9 11	909.69	3/2 ⁻	[M1,E2]		0.00113 27	α(K)=0.00101 24; α(L)=0.000103 25; α(M)=1.5×10 ⁻⁵ 4 α(N)=5.8×10 ⁻⁷ 13 B(M1)(W.u.)=0.053 +33-16 if M1, B(E2)(W.u.)=2.8×10 ² +18-8 if E2. B(E2)(W.u.)=2.8×10 ² +18-8 upper bound exceeds RUL=300 if E2.
		602.7 3	8.3 9	867.02	1/2 ⁻	[M1,E2]		0.00093 20	α(K)=0.00083 18; α(L)=8.4×10 ⁻⁵ 18; α(M)=1.21×10 ⁻⁵ 26 α(N)=4.8×10 ⁻⁷ 10 E _γ : other: 602.6 5 from (p,nγ). I _γ : weighted average of 8.6 9 from ⁶⁵ Ga ε+β ⁺ decay and 7.8 11 from (p,nγ). B(M1)(W.u.)=0.032 +21-10 if M1, B(E2)(W.u.)=147 +95-44 if E2.
		700.8 ^e 10		768.83	5/2 ⁻				Only reported in (p,nγ).
		1262.7 2	9.5 14	206.91	3/2 ⁻	[M1,E2]		0.000183 11	α(K)=0.000148 7; α(L)=1.48×10 ⁻⁵ 8; α(M)=2.12×10 ⁻⁶ 11 α(N)=8.5×10 ⁻⁸ 4; α(IPF)=1.73×10 ⁻⁵ 27 E _γ : other: 1262.3 8 from (p,nγ). I _γ : weighted average of 13 4 from ⁶⁵ Ga ε+β ⁺ decay and 9.1 14 from (p,nγ). B(M1)(W.u.)=0.0040 +26-13 if M1, B(E2)(W.u.)=4.2 +27-13 if E2.
		1354.5 2	100 4	115.124	3/2 ⁻	M1+E2	+2.1 3	0.0001863 28	B(M1)(W.u.)=0.0063 +49-21; B(E2)(W.u.)=25 +15-8

Adopted Levels, Gammas (continued)

γ(⁶⁵Zn) (continued)

<u>E_i(level)</u>	<u>J_i^π</u>	<u>E_γ[@]</u>	<u>I_γ[@]</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.&</u>	<u>δ</u>	<u>α[†]</u>	<u>Comments</u>
1469.71	3/2 ⁻	1415.2 7	33 4	53.927	1/2 ⁻	M1+E2	+0.24 5	0.0001714 25	α(K)=0.0001318 19; α(L)=1.313×10 ⁻⁵ 19; α(M)=1.882×10 ⁻⁶ 28 α(N)=7.59×10 ⁻⁸ 11; α(IPF)=3.94×10 ⁻⁵ 8 E _γ : weighted average of 1354.6 2 from ⁶⁵ Ga ε+β ⁺ decay and 1354.4 2 from (p,nγ). I _γ : from (α,nγ). Others: 100 7 from ⁶⁵ Ga ε+β ⁺ decay and 100 4 from (p,nγ). Mult.,δ: D+Q and δ from γ(θ) in (α,nγ); E1+M2 ruled out by RUL. B(M1)(W.u.)=0.0094 +61-28; B(E2)(W.u.)=0.45 +36-20
		1469.8 2	7.9 14	0.0	5/2 ⁻	[M1,E2]		0.000188 13	α(K)=0.0001138 16; α(L)=1.130×10 ⁻⁵ 16; α(M)=1.620×10 ⁻⁶ 23 α(N)=6.57×10 ⁻⁸ 9; α(IPF)=4.46×10 ⁻⁵ 7 E _γ : unweighted average of 1415.8 2 from ⁶⁵ Ga ε+β ⁺ decay and 1414.5 3 from (p,nγ). I _γ : unweighted average of 29.1 29 from ⁶⁵ Ga ε+β ⁺ decay, 40.0 29 from (α,nγ), and 29.3 24 from (p,nγ). δ: D+Q and δ from γ(θ) in (α,nγ); E1+M2 ruled out by RUL.
1577.08	3/2 ⁻	807.6 ^e 10 1370 ^e 1461.9 ^e 10 1523.4 4	77 13	768.83 206.91 115.124 53.927	5/2 ⁻ 3/2 ⁻ 3/2 ⁻ 1/2 ⁻	M1+E2	-2.5 3	0.0002085 31	α(K)=0.000109 4; α(L)=1.09×10 ⁻⁵ 4; α(M)=1.56×10 ⁻⁶ 6 α(N)=6.30×10 ⁻⁸ 22; α(IPF)=6.7×10 ⁻⁵ 9 E _γ : other: 1470.0 4 from (p,nγ). I _γ : unweighted average of 9.2 9 from ⁶⁵ Ga ε+β ⁺ decay and 6.5 10 from (p,nγ). B(M1)(W.u.)=0.0021 +14-7 if M1, B(E2)(W.u.)=1.6 +11-5 if E2. Only reported in (p,nγ). Only reported in (α,nγ). Only reported in (p,nγ). B(M1)(W.u.)=0.0022 +11-6; B(E2)(W.u.)=9.6 +38-24 α(K)=0.0001041 15; α(L)=1.036×10 ⁻⁵ 15; α(M)=1.485×10 ⁻⁶ 21 α(N)=6.00×10 ⁻⁸ 8; α(IPF)=9.24×10 ⁻⁵ 15 E _γ : weighted average of 1523.9 8 from ⁶⁵ Ga ε+β ⁺ decay and 1523.3 4 from (p,nγ). I _γ : unweighted average of 90 6 from (α,nγ) and 63.9 26 from (p,nγ). Mult.,δ: D+Q and δ from γ(θ) in (α,nγ); E1+M2 ruled out by RUL. Other: δ(Q/D)>+0.46 for J(1577)=3/2.
		1576.9 4	100.0 26	0.0	5/2 ⁻	M1+E2	+1.2 +12-7	0.000213 13	α(K)=9.57×10 ⁻⁵ 26; α(L)=9.51×10 ⁻⁶ 26; α(M)=1.36×10 ⁻⁶ 4

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Zn})$ (continued)

<u>E_i(level)</u>	<u>J_i^{π}</u>	<u>E_{γ}[@]</u>	<u>I_{γ}[@]</u>	<u>E_f</u>	<u>J_f^{π}</u>	<u>Mult.&</u>	<u>δ</u>	<u>α^\dagger</u>	<u>Comments</u>
1588.20	7/2 ⁻	818.9 ^a 10	14.7 15	768.83	5/2 ⁻	M1+E2	-0.23 3	0.000383 6	$\alpha(\text{N})=5.52\times 10^{-8}$ 14; $\alpha(\text{IPF})=0.000107$ 10 B(M1)(W.u.)=0.0075 +83-48; B(E2)(W.u.)=7.2 +42-48 E _{γ} : weighted average of 1576.6 4 from ⁶⁵ Ga $\varepsilon+\beta^+$ decay and 1577.2 4 from (p,n γ). I _{γ} : from (p,n γ). Others: 100 6 from (α ,n γ); I γ (1577 γ)/I γ (1523 γ)=44 18/100 80 from ⁶⁵ Ga $\varepsilon+\beta^+$ decay is inconsistent. Mult., δ : D+Q and δ from $\gamma(\theta)$ in (p,n γ) for J(1577)=3/2; E1+M2 ruled out by RUL. B(M1)(W.u.)=0.025 +17-8; B(E2)(W.u.)=3.3 +25-12 $\alpha(\text{K})=0.000344$ 5; $\alpha(\text{L})=3.43\times 10^{-5}$ 5; $\alpha(\text{M})=4.92\times 10^{-6}$ 7 $\alpha(\text{N})=1.988\times 10^{-7}$ 29 I _{γ} : from (α ,n γ). Mult., δ : D+Q and δ from $\gamma(\theta)$ in (α ,n γ); E1+M2 ruled out by RUL.
		1473.1 ^a 4	32.4 30	115.124	3/2 ⁻	[E2]		0.0002020 28	B(E2)(W.u.)=7.6 +51-23 $\alpha(\text{K})=0.0001124$ 16; $\alpha(\text{L})=1.119\times 10^{-5}$ 16; $\alpha(\text{M})=1.604\times 10^{-6}$ 22 $\alpha(\text{N})=6.47\times 10^{-8}$ 9; $\alpha(\text{IPF})=7.67\times 10^{-5}$ 11 I _{γ} : from (α ,n γ). Other: 33.0 33 from (p,n γ). B(M1)(W.u.)=0.022 +15-7; B(E2)(W.u.)=1.41 +96-43 $\alpha(\text{K})=9.17\times 10^{-5}$ 13; $\alpha(\text{L})=9.10\times 10^{-6}$ 13; $\alpha(\text{M})=1.304\times 10^{-6}$ 18 $\alpha(\text{N})=5.29\times 10^{-8}$ 7; $\alpha(\text{IPF})=9.78\times 10^{-5}$ 14 E _{γ} : other: 1588.2 4 from (p,n γ). I _{γ} : from (α ,n γ). Other: 100.0 33 from (p,n γ). Mult.: D+Q from $\gamma(\theta)$ in (α ,n γ) and (p,n γ); E1+M2 ruled out by RUL. δ : weighted average of +0.31 2 from (α ,n γ) and +0.29 4 from (p,n γ). Only reported in (p,n γ). Only reported in (p,n γ). Only reported in (p,n γ). Only reported in (p,n γ).
		1588.2 4	100.0 30	0.0	5/2 ⁻	M1+E2	+0.31 2	0.0002000 28	
1779.6?		1725.6 ^e 10		53.927	1/2 ⁻				Only reported in (p,n γ).
		1779.6 ^e 10		0.0	5/2 ⁻				Only reported in (p,n γ).
1793.5?		1739.5 ^e 10		53.927	1/2 ⁻				Only reported in (p,n γ).
		1793.5 ^e 10		0.0	5/2 ⁻				Only reported in (p,n γ).
1907.4	(9/2)	1138.7 ^b 4		768.83	5/2 ⁻				
		1906.7 ^{be} 8		0.0	5/2 ⁻				
1941.1	(1/2,3/2)	1826	100	115.124	3/2 ⁻				E _{γ} ,I _{γ} : from (n, γ) E=thermal.
		1887.1 ^e 10		53.927	1/2 ⁻				
		1941.1 ^e 10		0.0	5/2 ⁻				
1958	7/2 ⁺	588	26.6 13	1369.38	5/2 ⁺	M1+E2	+0.11 1	0.000777 11	B(M1)(W.u.)=0.054 +20-11; B(E2)(W.u.)=3.1 +14-8

Adopted Levels, Gammas (continued)

$\gamma(^{65}\text{Zn})$ (continued)

<u>E_i(level)</u>	<u>J_i^{π}</u>	<u>E_{γ}[@]</u>	<u>I_{γ}[@]</u>	<u>E_f</u>	<u>J_f^{π}</u>	<u>Mult.&</u>	<u>δ</u>	<u>α^\dagger</u>	<u>Comments</u>
1958	7/2 ⁺	892	100.0 13	1065.70	9/2 ⁺	M1+E2	-0.27 1	0.000321 5	$\alpha(\text{K})=0.000696$ 10; $\alpha(\text{L})=6.99\times 10^{-5}$ 10; $\alpha(\text{M})=1.003\times 10^{-5}$ 14 $\alpha(\text{N})=4.04\times 10^{-7}$ 6 E _{γ} ,I _{γ} : fom (α ,n γ). Mult., δ : D+Q and δ from $\gamma(\theta)$ in (α ,n γ); E1+M2 ruled out by RUL. B(M1)(W.u.)=0.054 +20-11; B(E2)(W.u.)=8.3 +31-18 $\alpha(\text{K})=0.000288$ 4; $\alpha(\text{L})=2.87\times 10^{-5}$ 4; $\alpha(\text{M})=4.12\times 10^{-6}$ 6 $\alpha(\text{N})=1.665\times 10^{-7}$ 23 E _{γ} ,I _{γ} : fom (α ,n γ). Mult., δ : D+Q and δ from $\gamma(\theta)$ in (α ,n γ); E1+M2 ruled out by RUL.
2053.46	13/2 ⁺	987.8 1	100	1065.70	9/2 ⁺	E2(+M3)	+0.01 2	0.000303 4	B(E2)(W.u.)<28 $\alpha(\text{K})=0.000272$ 4; $\alpha(\text{L})=2.72\times 10^{-5}$ 4; $\alpha(\text{M})=3.90\times 10^{-6}$ 6 $\alpha(\text{N})=1.561\times 10^{-7}$ 22 E _{γ} : from (¹⁶ O,2pn γ). Other: 987.9 2 from (α ,n γ). Mult., δ : from $\gamma(\theta)$ and $\gamma(\text{pol})$ in (α ,n γ). Other: $\delta(\text{O/Q})=-0.02$ 10 from $\gamma(\theta)$ in (α ,pn γ).
2081.55	(1/2 ⁻ ,3/2 ⁻)	1874.6 ^e 3	95 18	206.91	3/2 ⁻				
		1966.4 ^e 4	100 9	115.124	3/2 ⁻				
2135.2	9/2 ⁺	1069 ^e		1065.70	9/2 ⁺				
		1271		864.21	7/2 ⁻	E1+M2	-0.06 1	0.0001794 25	$\alpha(\text{K})=7.44\times 10^{-5}$ 11; $\alpha(\text{L})=7.37\times 10^{-6}$ 11; $\alpha(\text{M})=1.056\times 10^{-6}$ 15 $\alpha(\text{N})=4.27\times 10^{-8}$ 6; $\alpha(\text{IPF})=9.66\times 10^{-5}$ 14 Mult., δ : from $\gamma(\theta)$ and $\gamma(\text{lin pol})$ in (α ,n γ). B(M1)(W.u.)=0.0177 +70-39; B(E2)(W.u.)=12.9 +52-32 $\alpha(\text{K})=0.0002046$ 31; $\alpha(\text{L})=2.042\times 10^{-5}$ 32; $\alpha(\text{M})=2.93\times 10^{-6}$ 5 $\alpha(\text{N})=1.181\times 10^{-7}$ 18 E _{γ} : from (¹⁶ O,2pn γ). Other: 1072.0 4 from (α ,n γ). Mult., δ : from $\gamma(\theta)$ and $\gamma(\text{lin pol})$ in (α ,n γ). E _{γ} ,I _{γ} : from (n, γ) E=th. E _{γ} ,I _{γ} : from (n, γ) E=th.
2137.85	11/2 ⁺	1072.1 1	100	1065.70	9/2 ⁺	M1+E2	+0.71 7	0.0002281 35	
2202	(1/2,3/2,5/2 ⁺)	1294	100	909.69	3/2 ⁻				
		2086	77	115.124	3/2 ⁻				
2302.3		1533.4 ^b 4	100	768.83	5/2 ⁻				
2419.48	1/2 ⁻	2212.4 3	100 9	206.91	3/2 ⁻				
		2304.3 13	8 4	115.124	3/2 ⁻				

Adopted Levels, Gammas (continued)

E _i (level)	J ^π _i	γ(⁶⁵ Zn) (continued)							Comments
		E _γ [@]	I _γ [@]	E _f	J ^π _f	Mult.&	δ	α [†]	
2419.48	1/2 ⁻	2365.6 3 2419.7 8	29.0 31 2.6 18	53.927 0.0	1/2 ⁻ 5/2 ⁻				
2458	(1/2,3/2)	1592	100	867.02	1/2 ⁻				E _γ : from (n,γ) E=th.
2549.39?	(3/2 ⁻ ,5/2,7/2 ⁻)	1685.3 ^e 4 2433.6 ^e 4 2549.8 ^e 4	60 15 16.9 17 100 11	864.21 115.124 0.0	7/2 ⁻ 3/2 ⁻ 5/2 ⁻				
2923.54	13/2 ⁽⁺⁾	785.7 1	62 15	2137.85	11/2 ⁺	D+Q	+0.6 2		E _γ : from (¹⁶ O,2pnγ). Other: 785.6 3 from (α,nγ). I _γ : unweighted average of 77 12 from (¹⁶ O,2pnγ) and 47 6 from (α,nγ). Mult.,δ: from γ(θ) in (α,nγ); D+Q with ΔJ=1 from DCO in (¹⁶ O,2pnγ).
		1857.8 1	100 6	1065.70	9/2 ⁺	Q			E _γ : from (¹⁶ O,2pnγ). Other: 1857.5 5 from (α,nγ). I _γ : from (α,nγ). Other: 100 14 from (¹⁶ O,2pnγ); I _γ (1858γ)/I _γ (786γ)=56 13/100 12 in (α,pnγ) is discrepant.
2931.9	(13/2 ⁻)	1668.4 ^b 8	100	1263.47	9/2 ⁻	(Q+O)	-0.07 5		Mult.,δ: from γ(θ) in (α,nγ).
3150	(1/2 ⁻ ,3/2,5/2 ⁺)	3150	100	0.0	5/2 ⁻				E _γ : from (n,γ) E=th.
3225.14	17/2 ⁺	1172.7 [‡] 2	100	2053.46	13/2 ⁺	E2		0.0002089 29	B(E2)(W.u.)=55 +28-16 α(K)=0.0001827 26; α(L)=1.826×10 ⁻⁵ 26; α(M)=2.62×10 ⁻⁶ 4 α(N)=1.051×10 ⁻⁷ 15; α(IPF)=5.26×10 ⁻⁶ 8 E _γ : uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=1171.67. E _γ : weighted average of 1172.7 1 from (¹⁶ O,2pnγ) and 1173.4 4 from (α,nγ). Mult.: Q, ΔJ=2 from DCO in (¹⁶ O,2pnγ); Q+O with δ(O/Q)=-0.07 8 from γ(θ) in (α,pnγ); M2, M3 ruled out by RUL.
3335.5?		1199 ^{be} 1282.0 ^{be} 5		2137.85 2053.46	11/2 ⁺ 13/2 ⁺				
3409	(1/2,3/2,5/2 ⁺)	3190	100	206.91	3/2 ⁻				E _γ : from (n,γ) E=th.
3472.11	(15/2 ⁺)	548.9 2 1334.0 2	34 13 100 9	2923.54 2137.85	13/2 ⁽⁺⁾ 11/2 ⁺	(Q+(O))	-0.00 6		E _γ : weighted average of 1334.0 1 from (¹⁶ O,2pnγ) and 1334.8 5 from (α,nγ). I _γ : from (α,nγ). Other: 100 24 from (¹⁶ O,2pnγ). Mult.,δ: from γ(θ) in (α,nγ).
		1418.6 1	67 20	2053.46	13/2 ⁺	(D+Q)	+0.8 4		E _γ : other: 1418.5 5 from (α,nγ).

Adopted Levels, Gammas (continued)

							$\gamma(^{65}\text{Zn})$ (continued)		
E_i (level)	J_i^π	E_γ @	I_γ @	E_f	J_f^π	Mult.&	α^\dagger		Comments
3714?		1575 ^{be}		2137.85	11/2 ⁺				I_γ : unweighted average of 87 19 from (¹⁶ O,2pn γ) and 47 9 from (α ,n γ). Mult., δ : from $\gamma(\theta)$ in (α ,n γ).
3782.33	17/2 ⁽⁺⁾	557.3 1	44 9	3225.14	17/2 ⁺	[M1,E2]	0.00115 28		α (K)=0.00103 25; α (L)=0.000104 26; α (M)= 1.5×10^{-5} 4 α (N)= 5.9×10^{-7} 14 E_γ : other: 557.6 3 from (α ,n γ). I_γ : weighted average of 61 10 from (¹⁶ O,2pn γ), 52 12 from (α ,n γ), and 33 7 from (α ,pn γ). B(M1)(W.u.) \leq 0.13 if M1.
		858.7 1	55 9	2923.54	13/2 ⁽⁺⁾	(E2)	0.000428 6		α (K)=0.000384 5; α (L)= 3.86×10^{-5} 5; α (M)= 5.53×10^{-6} 8 α (N)= 2.201×10^{-7} 31 B(E2)(W.u.) \leq 95
		1731.8 12	100 12	2053.46	13/2 ⁺	(E2)	0.000276 4		Mult.: Q, $\Delta J=2$ from DCO in (¹⁶ O,2pn γ); M2 is less likely. B(E2)(W.u.) \leq 4.9 α (K)= 8.16×10^{-5} 11; α (L)= 8.11×10^{-6} 11; α (M)= 1.162×10^{-6} 16 α (N)= 4.70×10^{-8} 7; α (IPF)=0.0001850 26 E_γ : unweighted average of 1730.6 1 from (¹⁶ O,2pn γ) and 1733.0 8 from (α ,n γ). I_γ : others: 100 12 from (α ,n γ) and 100 25 from (α ,pn γ). Mult.: Q, $\Delta J=2$ from DCO in (¹⁶ O,2pn γ); Q+O from $\gamma(\theta)$ in (α ,n γ) and (α ,pn γ) with δ (O/Q)=0.00 5 and -0.13 25, respectively; M2 is less likely.
4077.91	(17/2 ⁺)	605.9 1	66 22	3472.11	(15/2 ⁺)	[M1,E2]	0.00092 19		α (K)=0.00082 17; α (L)= 8.3×10^{-5} 18; α (M)= 1.19×10^{-5} 26 α (N)= 4.7×10^{-7} 10 E_γ : other: 606.2 4 from (α ,n γ). I_γ : weighted average of 52 16 from (¹⁶ O,2pn γ) and 100 25 from (α ,n γ). B(M1)(W.u.)=0.238 +99-73 if M1. B(E2)(W.u.)= 1.08×10^3 +45-33 exceeds RUL=300 if E2.
		1155.6 9	100 8	2923.54	13/2 ⁽⁺⁾	(E2)	0.0002141 30		α (K)=0.0001888 27; α (L)= 1.888×10^{-5} 27; α (M)= 2.70×10^{-6} 4 α (N)= 1.086×10^{-7} 15; α (IPF)= 3.64×10^{-6} 9 B(E2)(W.u.)=65 +28-15 E_γ : unweighted average of 1154.7 1 from (¹⁶ O,2pn γ) and 1156.5 5 from (α ,n γ). I_γ : others: 100 33 (α ,n γ), and 100 13 from (α ,pn γ). Mult.: from DCO in (¹⁶ O,2pn γ), with $\Delta J=(2)$; (M2) ruled out by RUL. Other: D+Q from $\gamma(\theta)$ in (α ,pn γ) is inconsistent.
4236.22	(21/2 ⁺)	1011.0 1	100	3225.14	17/2 ⁺	(Q)			

Adopted Levels, Gammas (continued) $\gamma(^{65}\text{Zn})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^{\text{@}}$	$I_\gamma^{\text{@}}$	E_f	J_f^π	Mult. &	δ	Comments
4545.75		1320.6 2	100	3225.14	17/2 ⁺			
4622.11	(21/2 ⁺)	839.7 2	24 11	3782.33	17/2 ⁽⁺⁾			
		1397.0 1	100 11	3225.14	17/2 ⁺	Q		E_γ : other: 1397.3 5 from ($\alpha, n\gamma$).
4701.45		1476.3 2	100	3225.14	17/2 ⁺			
4880.42	(19/2 ⁺)	803.0 2	80 27	4077.91	(17/2 ⁺)			
		1407.8 2	100 20	3472.11	(15/2 ⁺)	(Q)		
4885.5		1660.3 ^b 8	100	3225.14	17/2 ⁺			E_γ : other: 1661.1 fom ($\alpha, p n\gamma$).
4932.44	(21/2 ⁺)	1150.3 2	9.0 27	3782.33	17/2 ⁽⁺⁾			
		1709.2 14	100 5	3225.14	17/2 ⁺	Q		E_γ : unweighted average of 1707.8 1 from (¹⁶ O,2pn γ) and 1710.5 8 from ($\alpha, n\gamma$). Mult.: Q, $\Delta J=2$ from DCO in (¹⁶ O,2pn γ); Q+O with $\delta=-0.03$ 15 from $\gamma(\theta)$ in ($\alpha, p n\gamma$).
5063.09	(21/2 ⁺)	439.9 [‡] 2	7 4	4622.11	(21/2 ⁺)			E_γ : uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=440.98.
		826.8 1	19 5	4236.22	(21/2 ⁺)			
		1281.4 6	100 8	3782.33	17/2 ⁽⁺⁾	Q		E_γ : unweighted average of 1280.8 1 from (¹⁶ O,2pn γ) and 1282.0 5 from ($\alpha, n\gamma$). Mult.: other: (D+Q) with $\delta=-0.07$ 9 from $\gamma(\theta)$ in ($\alpha, n\gamma$) is discrepant.
		1837.9 1	28 5	3225.14	17/2 ⁺	(Q)		
5339.72	(21/2 ⁺)	1261.8 2	100	4077.91	(17/2 ⁺)	Q		
5409.97	(23/2 ⁺)	346.3 3	100.0 35	5063.09	(21/2 ⁺)	D(+Q)	+0.04 +2-5	E_γ : weighted average of 346.0 1 from (¹⁶ O,2pn γ) and 346.6 3 from ($\alpha, n\gamma$). δ : from $\gamma(\theta)$ in ($\alpha, n\gamma$).
		787.8 1	26.7 35	4622.11	(21/2 ⁺)	(D)		E_γ : not seen in ($\alpha, n\gamma$) and ($\alpha, p n\gamma$).
5668.19	(25/2 ⁺)	256.0 ^{#c} 1	100	5409.97	(23/2 ⁺)	(D)		E_γ : very poor fit and omitted in the fitting; level-energy difference=258.23.
5767.39	(25/2 ⁺)	357.2 1	21 5	5409.97	(23/2 ⁺)	(D+Q)		
		704.2 1	42.5 28	5063.09	(21/2 ⁺)	Q		
		835.0 1	100.0 22	4932.44	(21/2 ⁺)	Q		
5803.20		740.1 2	100	5063.09	(21/2 ⁺)			
6278.19	(25/2 ⁺)	510.2 [‡] 1	100 9	5767.39	(25/2 ⁺)	(D)		E_γ : uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=510.80.
		1215.1 1	74 26	5063.09	(21/2 ⁺)	Q		
		1656.2 1	63 9	4622.11	(21/2 ⁺)			
6522.13	(25/2 ⁺)	244.0 2	92 25	6278.19	(25/2 ⁺)			
		1459.0 2	100 50	5063.09	(21/2 ⁺)			
6752.54	(25/2 ⁺)	1412.8 2	100	5339.72	(21/2 ⁺)	(Q)		
6841.18	(29/2 ⁺)	563.0 2	18 4	6278.19	(25/2 ⁺)			
		1073.6 1	100 16	5767.39	(25/2 ⁺)	Q		
		1173.0 1	25 4	5668.19	(25/2 ⁺)			

Adopted Levels, Gammas (continued)

γ(⁶⁵Zn) (continued)

E _i (level)	J _i ^π	E _γ [@]	I _γ [@]	E _f	J _f ^π	Mult. &	Comments
6841.18	(29/2 ⁺)	1431.3 1	20.0 33	5409.97	(23/2 ⁺)		
6983.92	(29/2 ⁺)	1216.7 1	100 14	5767.39	(25/2 ⁺)	(Q)	
		1315.6 2	51 26	5668.19	(25/2 ⁺)		
7060.89	(29/2 ⁺)	1293.2 2	100	5767.39	(25/2 ⁺)	Q	
7685.51	(29/2 ⁺)	845.2 [‡] 2	44 14	6841.18	(29/2 ⁺)		E _γ : uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=844.33.
		1163.4 2	33 14	6522.13	(25/2 ⁺)		
		1407.3 1	100 25	6278.19	(25/2 ⁺)	Q	
		1916.1 [‡] 2	56 22	5767.39	(25/2 ⁺)		E _γ : uncertainty multiplied by a factor of 3 in the fitting; level-energy difference=1918.09.
(7979.4)	1/2 ⁺	2432	2.64 9	5547	(1/2,3/2,5/2 ⁺)		
		3340	1.23 4	4639	(1/2,3/2,5/2 ⁺)		
		3359	1.00 4	4620	(1/2,3/2,5/2 ⁺)		
		3586	1.38 6	4393	(1/2,3/2,5/2 ⁺)		
		3940	0.92 4	4039	(1/2,3/2,5/2 ⁺)		
		3955	1.09 4	4024	(1/2,3/2,5/2 ⁺)		
		4164	2.43 6	3822	(1/2,3/2,5/2 ⁺)		
		4245	1.70 4	3730	(1/2,3/2,5/2 ⁺)		
		4390	1.70 4	3589	(1/2,3/2,5/2 ⁺)		
		4511	0.92 4	3465	(3/2 ⁺ ,5/2 ⁺)		
		4583	3.60 6	3409	(1/2,3/2,5/2 ⁺)		
		4650	0.90 4	3329	(1/2,3/2,5/2 ⁺)		
		4787	1.82 4	3192	(1/2,3/2,5/2 ⁺)		
		4829	4.79 6	3150	(1/2 ⁻ ,3/2,5/2 ⁺)		
		4870	2.70 6	3104	3/2 ⁺ ,5/2 ⁺		
		4922	1.36 4	3054	1/2 ⁺		
		4974 ^e	1.3	3010	(3/2 ⁺ ,5/2 ⁺)		
		4983	1.19 4	2994	(1/2,3/2,5/2 ⁺)		
		5247	1.86 4	2730	(1/2,3/2,5/2 ⁺)		
		5340 ^e	1.1	2639?			
		5406	1.55 4	2575	(1/2,3/2,5/2 ⁺)		
		5459 ^d		2522			
		5486 ^d	1.07 4	2491	1/2 ⁺		
		5520	2.9	2458	(1/2,3/2)		
		5541	3.31 6	2430	(1/2,3/2,5/2 ⁺)		
		5560	7.89 6	2419.48	1/2 ⁻		
		5671 ^{de}		2302.3			
		5762	2.01 4	2216	(1/2,3/2,5/2 ⁺)		
		5777	9.62 6	2202	(1/2,3/2,5/2 ⁺)		
		5835 ^{de}		2137			

Adopted Levels, Gammas (continued) $\gamma(^{65}\text{Zn})$ (continued)

<u>E_i(level)</u>	<u>J_i^{π}</u>	<u>E_{γ}@</u>	<u>I_{γ}@</u>	<u>E_f</u>	<u>J_f^{π}</u>	<u>Mult.&</u>
(7979.4)	1/2 ⁺	5898	1.11 4	2081.55	(1/2 ⁻ ,3/2 ⁻)	
		6037	10.59 9	1941.1	(1/2,3/2)	
		6071	0.90 6	1911	1/2 ⁺	
		6376 ^d		1603?		
		6389 ^d		1588.20	7/2 ⁻	
		6510	8.45 6	1469.71	3/2 ⁻	
		6620 ^d		1369.38	5/2 ⁺	
		6713 ^{de}		1263.47	9/2 ⁻	
		6726 ^{de}		1252.68	7/2 ⁻	
		6932 ^d		1047.38	5/2 ⁻	
		7069	14.48 11	909.69	3/2 ⁻	
		7112	14.06 11	867.02	1/2 ⁻	
		7215 ^d		768.83	5/2 ⁻	
		7772 ^d		206.91	3/2 ⁻	
		7863	100.0 9	115.124	3/2 ⁻	
		7924 ^d		53.927	1/2 ⁻	
		7979 ^d		0.0	5/2 ⁻	
7995.98	(33/2 ⁺)	934.8 2	5 4	7060.89	(29/2 ⁺)	
		1012.7 2	9.0 27	6983.92	(29/2 ⁺)	
		1154.7 1	100 11	6841.18	(29/2 ⁺)	Q
8326.3	(29/2 ⁺)	1573.7 2	100	6752.54	(25/2 ⁺)	(Q)
8591.74		1607.8 2	100	6983.92	(29/2 ⁺)	
9222.99	(37/2 ⁺)	1227.0 1	100	7995.98	(33/2 ⁺)	Q
10571.61	(41/2 ⁺)	1348.6 1	100	9222.99	(37/2 ⁺)	(Q)
1341+x	J+2	1341 ^e	100	x	J	
2832+x	J+4	1491	100	1341+x	J+2	
4500+x	J+6	1668	100	2832+x	J+4	
6387+x	J+8	1887	100	4500+x	J+6	
8508+x	J+10	2121	100	6387+x	J+8	
10870+x	J+12	2362	100	8508+x	J+10	
13533+x	J+14	2663	100	10870+x	J+12	
16538+x	J+16	3005	100	13533+x	J+14	
19887+x	J+18	3349	100	16538+x	J+16	
1621+y	J1+2	1621	100	y	J1	
2478+y	J1+3	1734	100	744+y	J1+1	
3396+y	J1+4	918		2478+y	J1+3	
		1775	100 33	1621+y	J1+2	
4338+y	J1+5	942		3396+y	J1+4	
		1859	100 18	2478+y	J1+3	

Adopted Levels, Gammas (continued) $\gamma(^{65}\text{Zn})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ @	I_γ @	E_f	J_f^π	$E_i(\text{level})$	J_i^π	E_γ @	I_γ @	E_f	J_f^π
5357+y	J1+6	1020		4338+y	J1+5	2304+z	J2+3	850		1454+z	J2+2
		1961	100 25	3396+y	J1+4			1615		688+z	J2+1
6402+y	J1+7	1046		5357+y	J1+6	3250+z	J2+4	945		2304+z	J2+3
		2063	100 18	4338+y	J1+5			1796		1454+z	J2+2
7610+y	J1+8	1208		6402+y	J1+7	4238+z	J2+5	988		3250+z	J2+4
		2254	100 22	5357+y	J1+6			1934		2304+z	J2+3
8841+y	J1+9	1231		7610+y	J1+8	5353+z	J2+6	1114		4238+z	J2+5
		2439	100 23	6402+y	J1+7			2104		3250+z	J2+4
10307+y	J1+10	2697	100	7610+y	J1+8	6553+z	J2+7	1201 ^e		5353+z	J2+6
11658+y	J1+11	2817	100	8841+y	J1+9			2314		4238+z	J2+5
13295+y	J1+12	2987	100	10307+y	J1+10	7906+z	J2+8	1353 ^e		6553+z	J2+7
688+z	J2+1	688	100	z	J2			2553		5353+z	J2+6
1454+z	J2+2	766		688+z	J2+1	9379+z	J2+9	2826	100	6553+z	J2+7
		1455		z	J2	11029+z?	J2+10	3123 ^e	100	7906+z	J2+8

† [Additional information 40.](#)

‡ Poor fit; uncertainty multiplied by a factor in the fitting.

Very poor fit and omitted in the fitting.

@ From ^{65}Ga $\varepsilon+\beta^+$ decay up to 2549 level ($J\leq 7/2$), and from ($^{16}\text{O},2p n\gamma$) for high-spin ($J\geq 11/2$) levels above 2000 up to 10572 level, unless otherwise noted. Values for SD bands based on $E=x$ and $E=y$ are from ($^{29}\text{Si},4p\gamma$).

& From $\gamma\gamma(\text{DCO})$ for high-spin levels ($J\geq 11/2$) above $E(\text{level})>2000$ with $\Delta J=2$ for Q, $\Delta J=1$ (or 0 in a few cases) for D or D+Q, unless otherwise noted; for other levels, see arguments in individual comments.

^a From (p,n γ).

^b From (α ,n γ).

^c Primary transitions from (n, γ) $E=\text{th}$.

^d Primary transitions from (n, γ) $E=10\text{-}100$ keV, but not seen in (n, γ).

^e Placement of transition in the level scheme is uncertain.

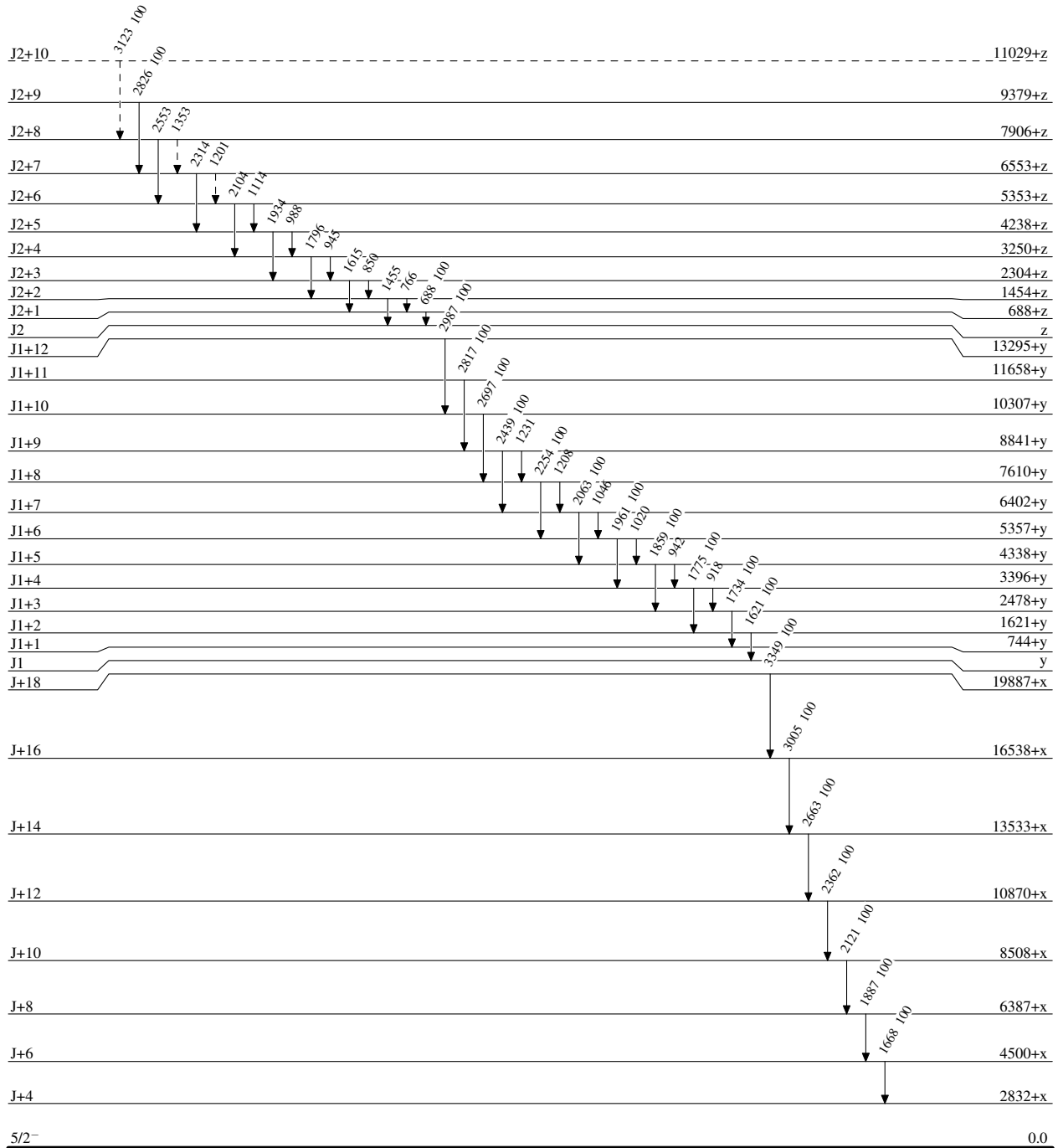
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

-----▶ γ Decay (Uncertain)



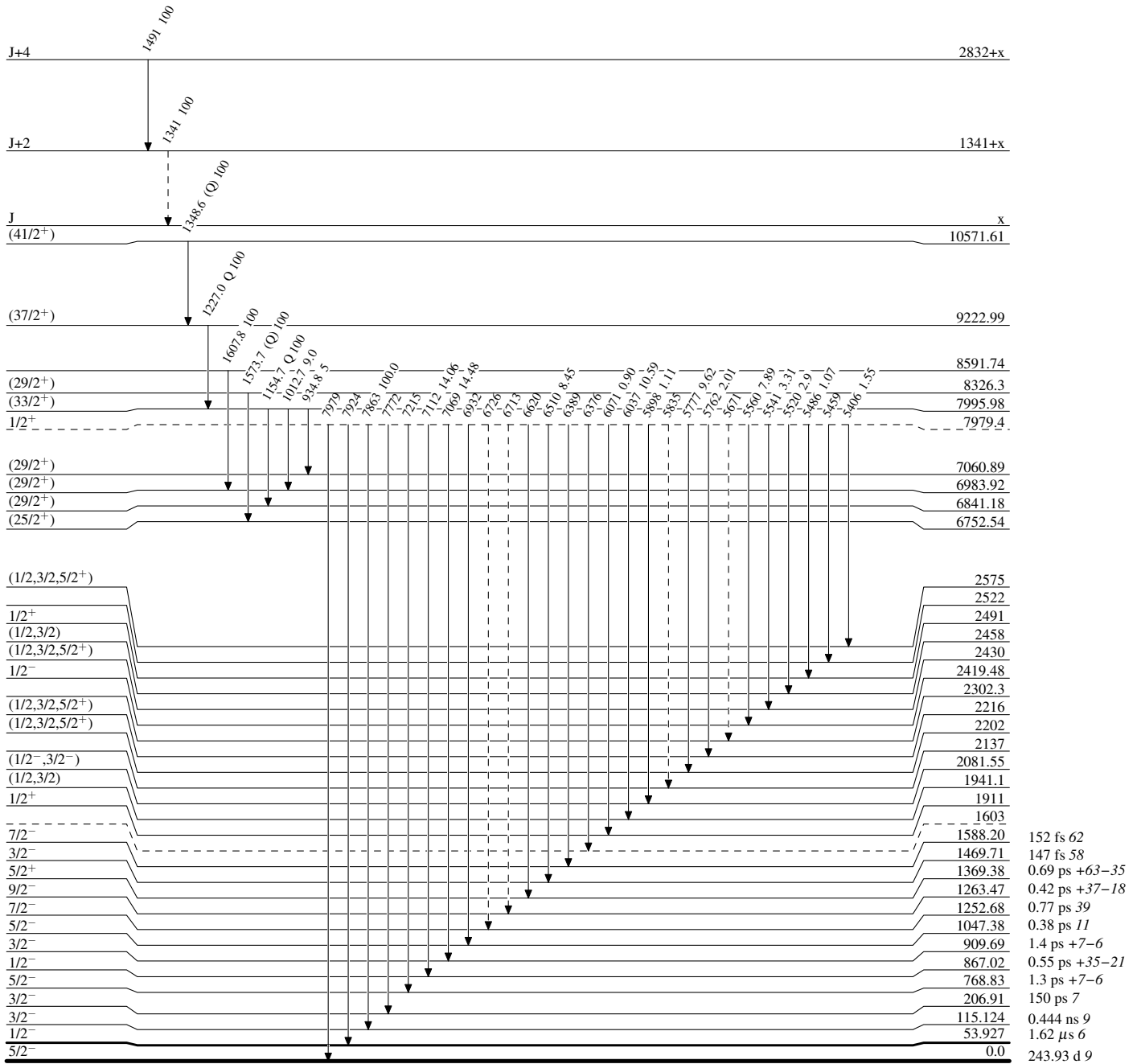
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----▶ γ Decay (Uncertain)



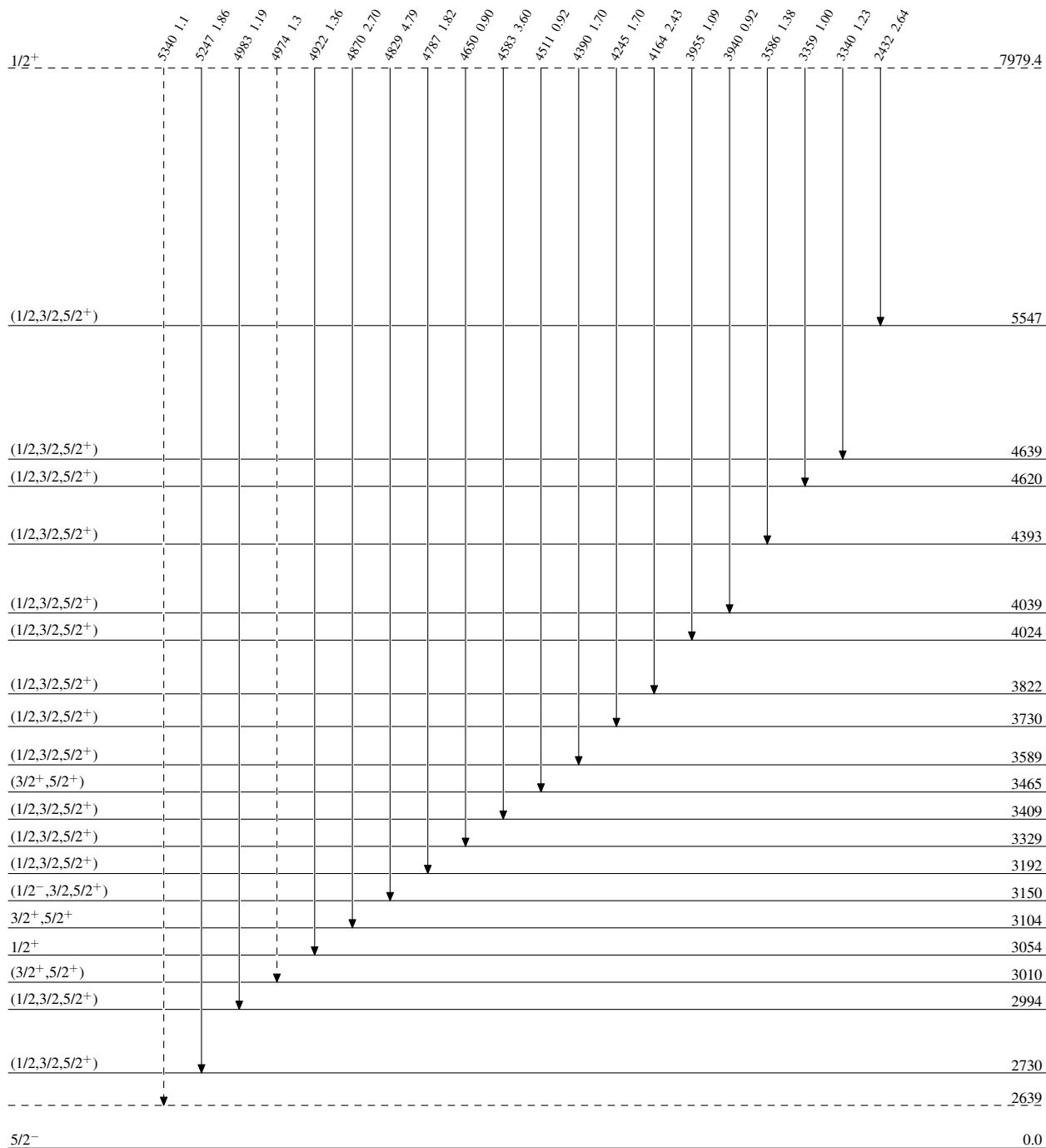
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----▶ γ Decay (Uncertain)

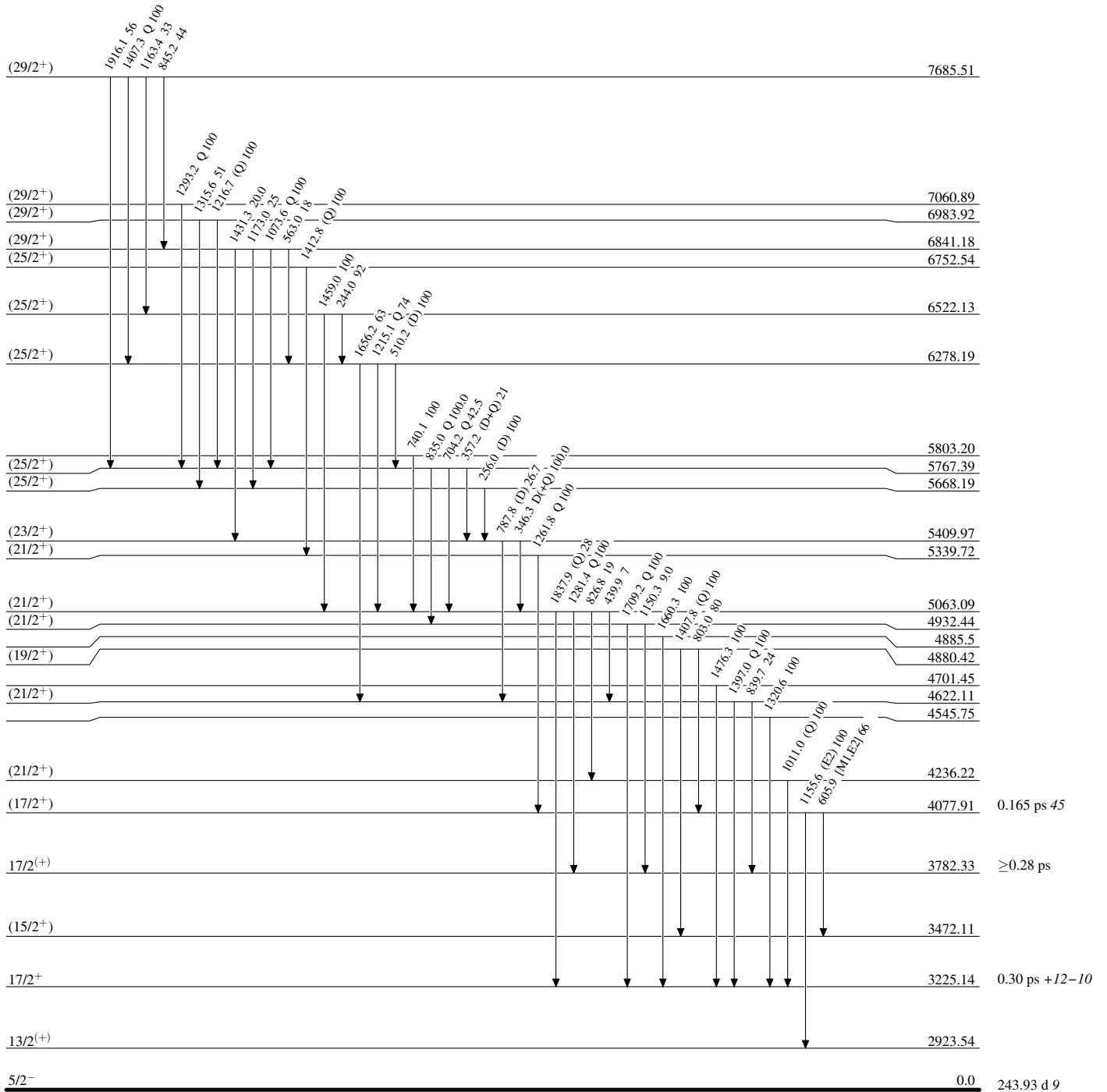


$^{65}_{30}\text{Zn}_{35}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



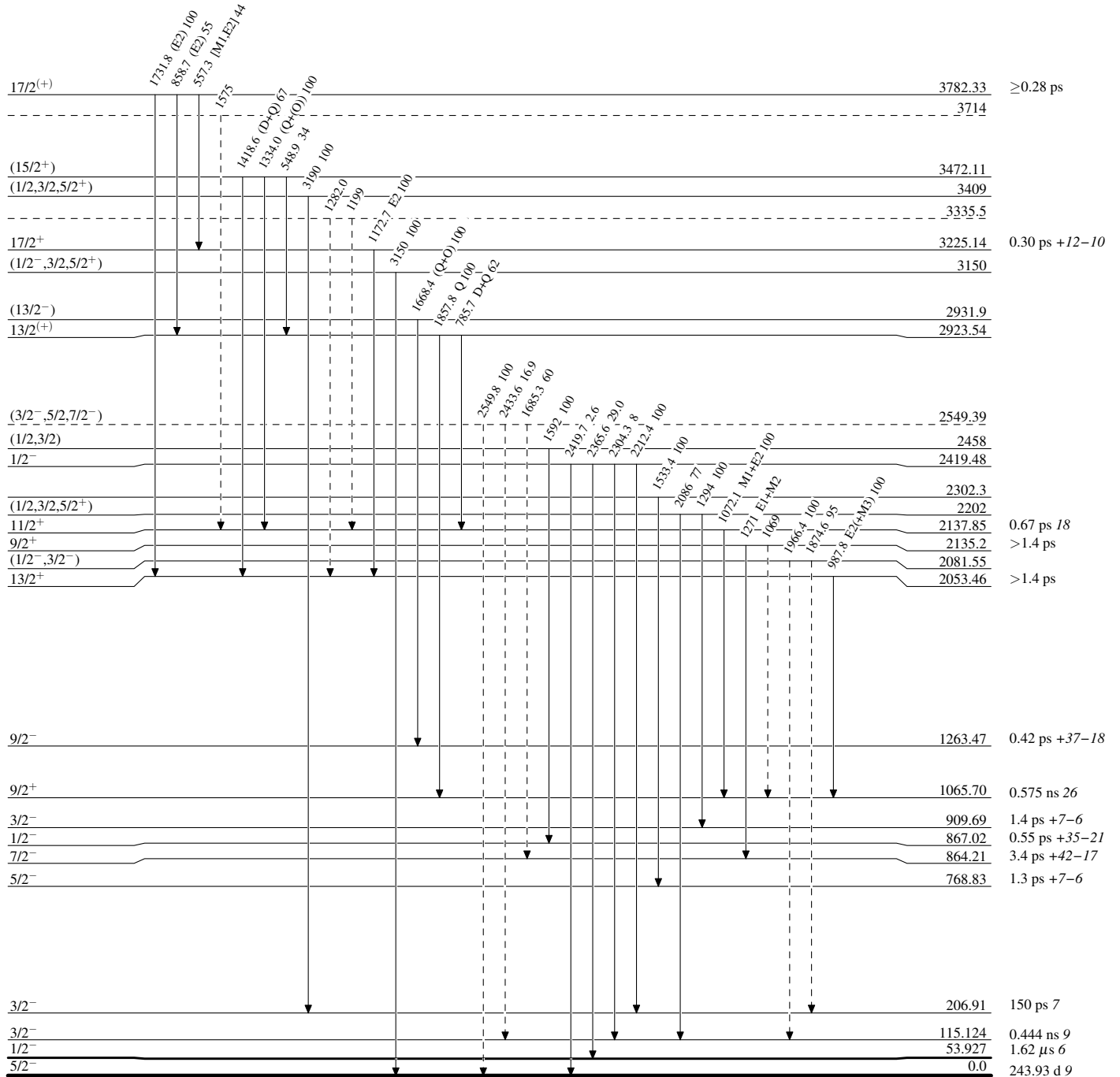
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----▶ γ Decay (Uncertain)



$^{65}_{30}\text{Zn}_{35}$

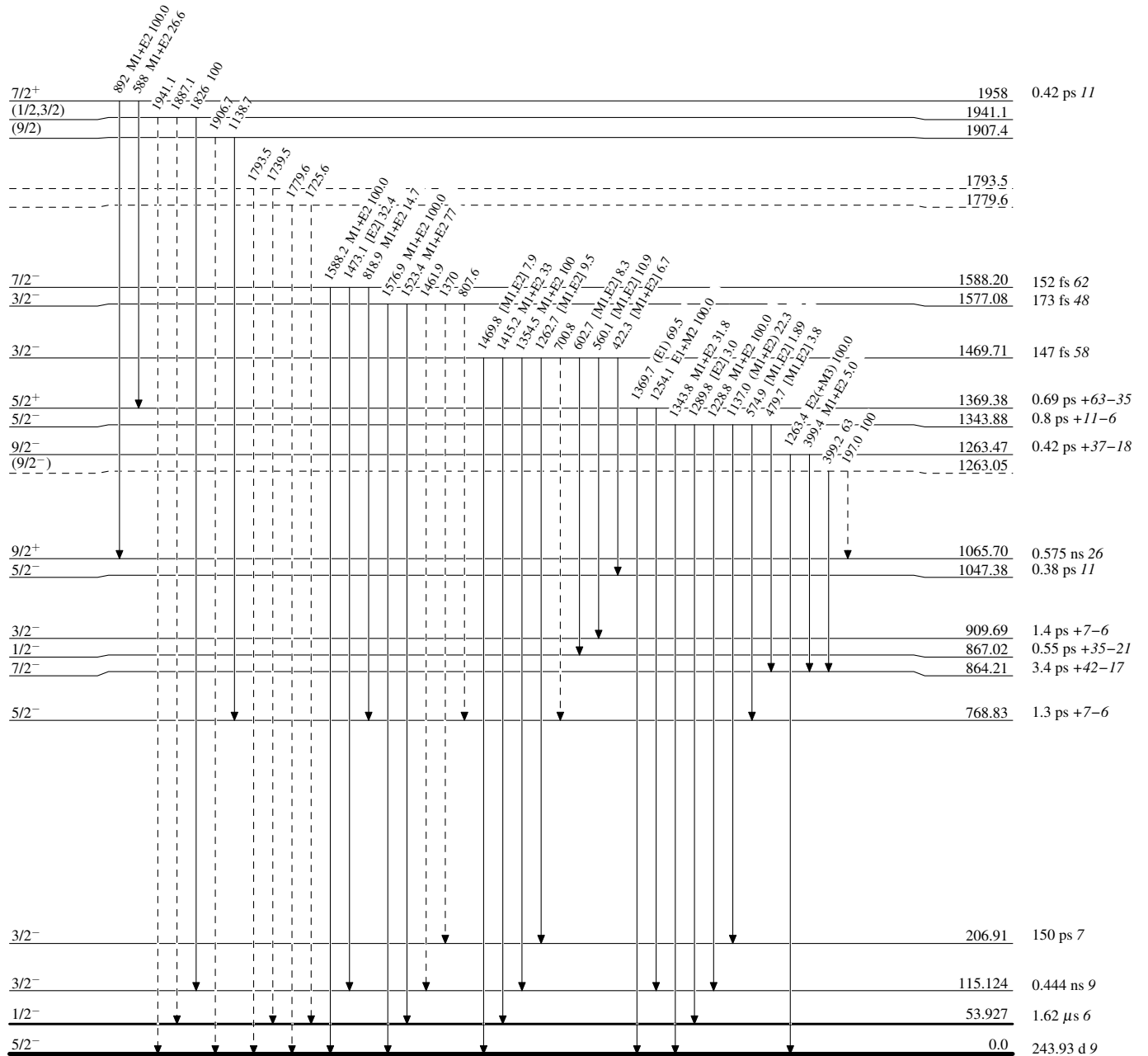
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----▶ γ Decay (Uncertain)



$^{65}_{30}\text{Zn}_{35}$

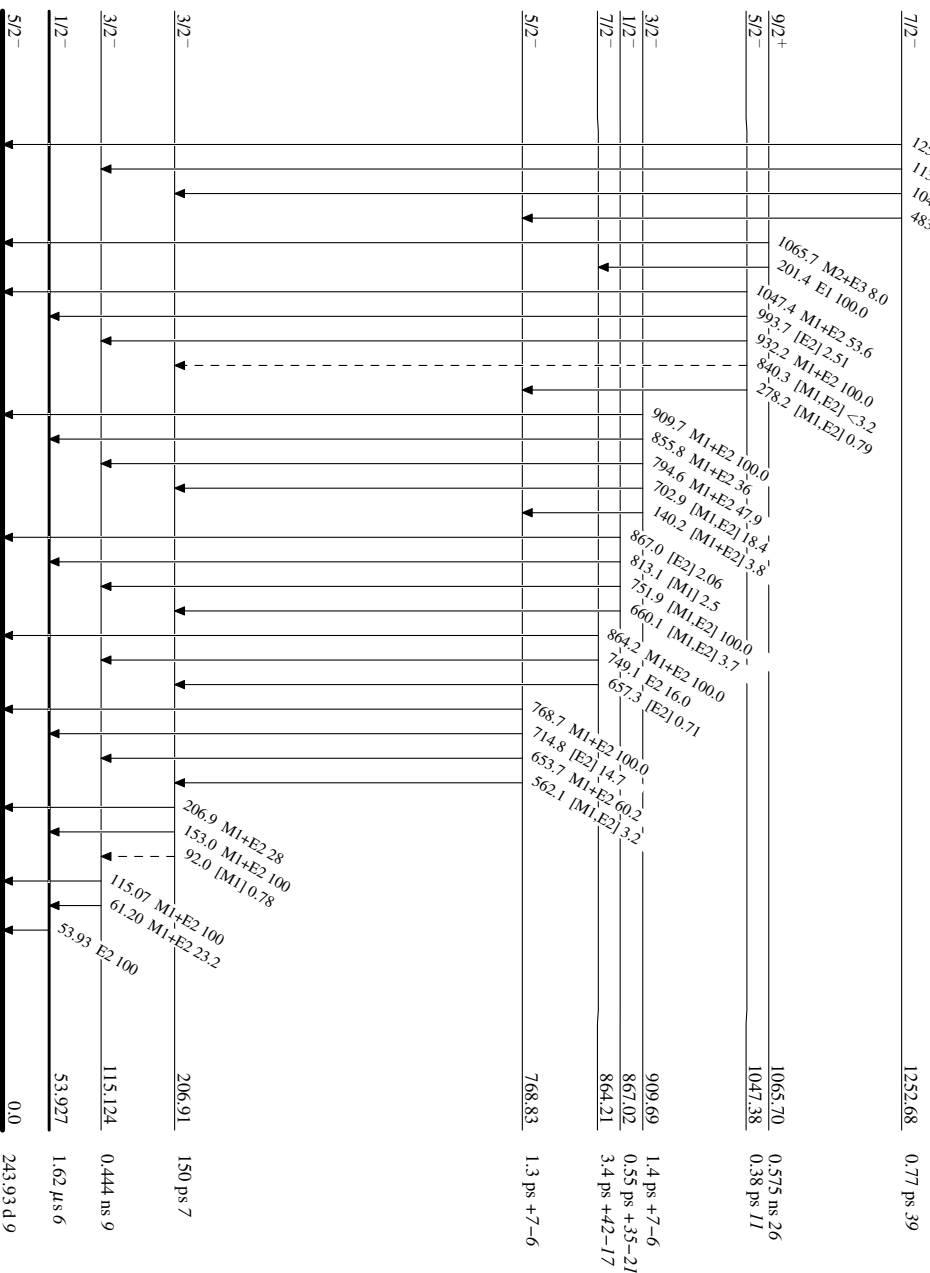
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----▶ γ Decay (Uncertain)



⁶⁵Zn₃₅

Adopted Levels, Gammas

Band(C): Highly-deformed band 2

J2+10	11029+z
J2+9	9379+z
J2+8	7906+z
J2+7	6553+z
J2+6	5353+z
J2+5	4238+z
J2+4	3250+z
J2+3	2304+z
J2+2	1454+z
J2+1	688+z
J2	z

Band(B): Highly-deformed band 1

J1+12	13295+y
J1+11	11658+y
J1+10	10307+y
J1+9	8841+y
J1+8	7610+y
J1+7	6402+y
J1+6	5357+y
J1+5	4338+y
J1+4	3396+y
J1+3	2478+y
J1+2	1621+y
J1+1	744+y

Band(A): SD band (2000Yu02)

J+18	19887+x
J+16	16538+x
J+14	13533+x
J+12	10870+x
J+10	8508+x
J+8	6387+x
J+6	4500+x
J+4	2832+x
J+2	1341+x
J	x

Band(D): Band based on 1065, 9/2⁺ level

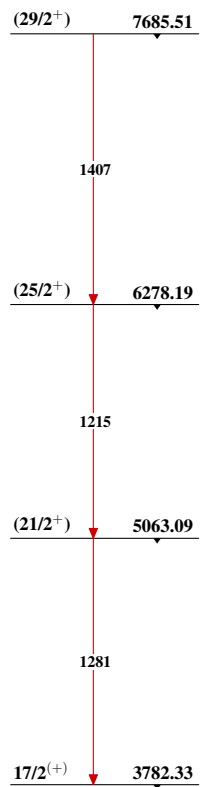
(41/2 ⁺)	10571.61
(37/2 ⁺)	9222.99
(33/2 ⁺)	7995.98
(25/2 ⁺)	5767.39
(21/2 ⁺)	4932.44
17/2 ⁺	3225.14
9/2 ⁺	1065.70

Band(E): Band based on 2923, 13/2⁺ level

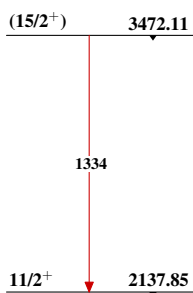
(29/2 ⁺)	8326.3
(25/2 ⁺)	6752.54
(21/2 ⁺)	5339.72
(17/2 ⁺)	4077.91
13/2 ⁽⁺⁾	2923.54

Adopted Levels, Gammas (continued)

Band(F): Band based on 3783, 17/2⁺ level



Band(G): Band based on 2138, 11/2⁺ level



Seq.(H): Sequence based on g.s

