

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	E. A. McCutchan and A. A. Sonzogni		NDS 115, 135 (2014)	1-Nov-2013

$Q(\beta^-) = -7.45 \times 10^3$ 6; S(n)=12353 7; S(p)=7899 6; $Q(\alpha) = -5404$ 6 [2012Wa38](#)
 S(2n)=21802 7; S(2p)=13683 6 ([2012Wa38](#)).
 α : [Additional information 1](#).

 ^{88}Zr LevelsCross Reference (XREF) Flags

A	^{88}Nb ε decay (14.55 min)	E	$^{74}\text{Ge}(^{18}\text{O}, 4n\gamma)$	I	$^{90}\text{Zr}(p, t)$
B	^{88}Nb ε decay (7.78 min)	F	$^{86}\text{Sr}(\alpha, 2n\gamma)$	J	$^{92}\text{Mo}(d, ^6\text{Li})$
C	^{88}Zr IT decay (1.320 μs)	G	$^{89}\text{Y}(\alpha, p4n\gamma)$		
D	$^{12}\text{C}(^{84}\text{Sr}, ^{88}\text{Zr}\gamma)$	H	$^{89}\text{Y}(p, 2n\gamma)$		

E(level) [†]	J ^π	T _{1/2} [‡]	XREF	Comments
0.0	0 ⁺	83.4 d 3	ABCDEFGHIJ	$\% \varepsilon = 100$ T _{1/2} : from 1973St29 . Others: 82.6 d 2 (private communication quoted by 1984Pr01), 85 d (1953Hy52). $\delta \langle r^2 \rangle_{^{90,88}} = 0.061 \text{ fm}^2$ 5 (2013An02 , 2003Th03).
1057.03 4	2 ⁺	2.50 ps 28	ABCDEFGHIJ	$\mu = +0.60$ 22 J ^π : E2 1057 γ to 0 ⁺ , L(p,t)=2. T _{1/2} : from DSAM in $^{12}\text{C}(^{84}\text{Sr}, ^{88}\text{Zr}\gamma)$. Other: 0.83 ps +4–2 from DSAM in $^{89}\text{Y}(p, 2n\gamma)$. μ : from transient field technique in $^{12}\text{C}(^{84}\text{Sr}, ^{88}\text{Zr}\gamma)$.
1521.4 7	0 ⁺		HIJ	J ^π : L(p,t)=0.
1817.86 6	2 ⁺	0.59 ps 5	B D FGHIJ	J ^π : L(d, ^6Li)=2; L(p,t)=(2), $\gamma\gamma(\theta)$ in $^{89}\text{Y}(p, 2n\gamma)$. T _{1/2} : from DSAM in $^{12}\text{C}(^{84}\text{Sr}, ^{88}\text{Zr}\gamma)$. Other: 0.21 ps 9 from DSAM in $^{89}\text{Y}(p, 2n\gamma)$.
2139.59 5	4 ⁺	1.52 ps 14	ABCDEFGHIJ	$\mu = +2.6$ 7 J ^π : L(p,t)=4. T _{1/2} : from DSAM in $^{12}\text{C}(^{84}\text{Sr}, ^{88}\text{Zr}\gamma)$. μ : from transient field technique in $^{12}\text{C}(^{84}\text{Sr}, ^{88}\text{Zr}\gamma)$.
2231.0 [@] 5	0 ⁺		HIJ	J ^π : L(p,t)=0.
2455.88 7	3 ⁻	1.94 ps 21	B D FGHIJ	J ^π : L(p,t)=3. T _{1/2} : from DSAM in $^{12}\text{C}(^{84}\text{Sr}, ^{88}\text{Zr}\gamma)$.
2539.00 6	5 ⁻		ABC EFGHI	J ^π : L(p,t)=5.
2568.3 3	2 ⁺		HIJ	J ^π : L(p,t)=2.
2605.20 14	4 ⁺		B F I	J ^π : L(p,t)=4.
2673.7 5			B	
2801.13 8	5 ⁻		AB EFGHIJ	J ^π : L(p,t)=5.
2810.80 6	6 ⁺		A C EFGHI	J ^π : L(p,t)=6.
2887.79 6	8 ⁺	1.320 μs 25	A C EFGHI	$\% \text{IT} = 100$ $Q = +0.51$ 3; $\mu = -1.811$ 16 J ^π : E2 77 γ to 6 ⁺ , L(p,t)=(8,6). T _{1/2} : from $\gamma(t)$ (1978Ha52). Others: 1.41 μs +12–9 (2004Ch35) using $\gamma(t)$; 1.28 μs 10, 1.75 μs 20 from $\gamma(t)$ in $^{89}\text{Y}(p, 2n\gamma)$. μ : from $g = -0.2264$ 20 measured by $\gamma(\text{H}, \theta, t)$ in heavy-ion reactions (1978Ha52). Other: $g = -0.20$ 2 from $^{89}\text{Y}(p, 2n\gamma)$. Q: from time-differential perturbed γ -ray angular distribution of ions implanted in non-cubic crystals (1985Ra09). Sign determined by 1986Be06 .
2888 3	(2 ⁺)		I	J ^π : L(p,t)=(2).
2928 3	3 ⁻		I	J ^π : L(p,t)=3.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{88}Zr Levels (continued)

E(level) [†]	J ^π	T _{1/2} [‡]	XREF		Comments
2989.67 7	5 ⁻		B	HI	J ^π : L(p,t)=5.
2998.4 3			B		
3027 3	2 ⁺			I	J ^π : L(p,t)=2.
3032.77 8	3 ⁻		B	I	J ^π : L(p,t)=3.
3074.9 @ 3	(4 ⁺)			HI	J ^π : L(p,t)=(4).
3093.6 @ 3	5 ⁻			HI	J ^π : L(p,t)=5.
3213.70 11	(6 ⁺)		A		J ^π : log ft=7.5 from (8 ⁺), 1074γ to 4 ⁺ .
3223.8 4			B		
3277.01 8	(3 ⁻ ,4,5 ⁻)		B		J ^π : 287γ to 5 ⁻ , 821γ to 3 ⁻ .
3.30×10 ³				I	
3374.37 9	(3 ⁻ ,4,5 ⁻)		B		J ^π : 573γ to 5 ⁻ , 918.5γ to 3 ⁻ .
3390.70 6	8 ⁺	21 ps I	A	EFGH	J ^π : from γ(θ) and linear polarization in $^{74}\text{Ge}(^{18}\text{O},4n\gamma)$.
3426.47 17			B		
3.43×10 ³	(0 ⁺)			I	J ^π : L(p,t)=(0).
3483.63 13	(7 ⁻)		A	EFG	J ^π : 7,9,11 from γ(θ) and linear polarization of populating 1003γ in $^{74}\text{Ge}(^{18}\text{O},4n\gamma)$, 944.5γ to 5 ⁻ .
3568.18 15	(3,4 ⁺)		B		J ^π : log ft=6.8 from (4 ⁻), 2511γ to 2 ⁺ .
3617.44 24	(7 ⁻)		A	FG	J ^π : J=7 from γ(θ) in $^{89}\text{Y}(\alpha,p4n\gamma)$, 817γ to 5 ⁻ .
3637.76 15	(3,4 ⁺)		B		J ^π : log ft=6.7 from (4 ⁻), 2581γ to 2 ⁺ .
3875.04 14	(3 ⁻ ,4,5 ⁻)		B		J ^π : 1336γ to 5 ⁻ , 1419γ to 3 ⁻ .
3938.28 14	(3,4,5)		B		J ^π : log φt=6.3 from (4 ⁻).
3947.58 13	(3,4,5)		B		J ^π : log ft=6.2 from (4 ⁻).
3968.2 3	(3 ⁻ ,4,5)		B		J ^π : log ft=6.8 from (4 ⁻), 1429γ to 5 ⁻ .
3.99×10 ³ ?				I	Possibly identical to one of the neighboring levels.
4024.9 3	(3 ⁻ ,4,5)		B		J ^π : log ft=6.9 from (4 ⁻), 1224γ to 5 ⁻ .
4059.22 14	(3 ⁻ ,4,5 ⁻)		B		J ^π : 1520γ to 5 ⁻ , 1604γ to 3 ⁻ .
4084.22 13	(3 ⁻ ,4,5)		B		J ^π : log ft=6.1 from (4 ⁻), 1095γ to 5 ⁻ .
4112.38 13	(3,4,5)		B		J ^π : log ft=6.5 from (4 ⁻).
4155.5 4	(3,4,5)		B		J ^π : log ft=7.1 from (4 ⁻).
4.17×10 ³ ?				I	Possibly identical to one of the neighboring levels.
4206.1 3	(3,4,5 ⁻)		B		J ^π : log ft=6.6 from (4 ⁻), 1750γ to 3 ⁻ .
4208.17 10	(3 ⁻ ,4,5 ⁻)		B		J ^π : 1407γ to 5 ⁻ , 1752γ to 3 ⁻ .
4237.0 4	(7,8 ⁺)		A		J ^π : log ft=7.1 from (8 ⁺), 1426γ to 6 ⁺ .
4307.9 3	(3 ⁻ ,4,5 ⁻)		B		J ^π : 1319γ to 5 ⁻ , 1852γ to 3 ⁻ .
4335.6 4	(3,4 ⁺)		B		J ^π : log ft=7.0 from (4 ⁻), 3278.5γ to 2 ⁺ .
4348.3 3			A		
4.37×10 ³ ?				I	Possibly identical to one of the neighboring levels.
4388.34 25	(7,8 ⁺)		A		J ^π : log ft=6.9 from (8 ⁺), 1175γ to (6 ⁺).
4413.07 11	10 ⁺	<1.4 ps		EF	J ^π : E2 1022γ to 8 ⁺ , γ(θ) and linear polarization in $^{74}\text{Ge}(^{18}\text{O},4n\gamma)$.
4461.88 22	(7,8 ⁺)		A		J ^π : log ft=6.4 from (8 ⁺), 1652γ to 6 ⁺ .
4486.31 12	(9 ⁻)			EFG	J ^π : (E2) 1003γ to (7 ⁻), (E1) 1096γ to 8 ⁺ .
4612.29 11	9 ⁺	<0.17 ns	A	EFG	J ^π : 7 ⁺ ,9 ⁺ from γ(θ) and linear polarization in $^{74}\text{Ge}(^{18}\text{O},4n\gamma)$. Probable 199γ to 10 ⁺ .
4672.7 3	(3 ⁻ ,4,5)		B		J ^π : log ft=6.8 from (4 ⁻), 1871.5γ to 5 ⁻ .
4713.08 11	10 ^{-#}	2.25 ns 17		EFG	
4797.63 11	11 ^{-#}	50 ps 4		EFG	
4934.5 3	(7,8 ⁺)		A		J ^π : log ft=6.2 from (8 ⁺), 1721γ to (6 ⁺).
5087.9 3	(7,8 ⁺)		A		J ^π : log ft=6.5 from (8 ⁺), 2277γ to 6 ⁺ .
5166.2? 4	(10,11,12) [#]	0.66 ps 14		EF	
5229.47 13	12 ⁺	10 ps I		EFG	J ^π : E2 816γ to 10 ⁺ .
5583.85 12	12 ^{-#}	<0.7 ps		EFG	
5665.91 15	12 ^{+#}	0.28 ps 10		EFG	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{88}Zr Levels (continued)

E(level) [†]	J ^π	T _{1/2} [‡]	XREF	Comments
5787.2 5	(7,8,9)		A	J ^π : log ft=6.2 from (8 ⁺).
5950.75 16	(13) ⁺	<0.10 ps	EFG	J ^π : (11,13) ⁺ from γ(θ) and transition strength in $^{74}\text{Ge}(^{18}\text{O},4n\gamma)$. High spin favored in heavy ion fusion reactions.
6000.8? 3	(13) ⁻ [#]	<0.7 ps	E	
6032.52? 13	(12 ⁻) [#]		E	
6192.94 12	13 ⁻	1.70 ps 14	E	J ^π : E2 1395γ to 11 ⁻ .
6238.79 16	(14) ⁺ [#]	1.0 ps 3	E	
6501.32 24	(14) ⁺ [#]	0.16 ps 3	E	
6578.2 5			E	
6765.33 23	(14) ⁻ [#]	≤0.49 ps	E	
6826.66 23	(15) ⁺ [#]	0.10 ps 2	E	
7228.2 3	(15) ⁻ [#]	≤0.8 ps	E	
7431.9 4		0.10 ps 3	E	
7536.5 4	(15 ⁻) [#]	≤0.33 ps	E	
7878.9 4	(16 ⁻) [#]	≤0.50 ps	E	
8200.2 5	(17 ⁻) [#]	0.3 ps +4-1	E	
8925.2 5	(18 ⁻) [#]	<0.3 ps	E	
9912.6? 5	(19 ⁻) [#]	>0.7 ps	E	
10557.3? 9	(20) [#]	≤0.1 ps	E	
11199.7? 11	(21) [#]	0.22 ps 14	E	

[†] Level energies with ΔE≤1 keV are from a least-squares fit to the Adopted Gammas, except where noted. Those with ΔE>1 keV are from (p,t).

[‡] From Doppler-shift attenuation and Recoil-distance Doppler-shift in $^{74}\text{Ge}(^{18}\text{O},4n\gamma)$, except where noted.

[#] From γ(θ), linear polarization and γ decay pattern in $^{74}\text{Ge}(^{18}\text{O},4n\gamma)$.

[@] From $^{89}\text{Y}(p,2n\gamma)$. 2009Br05 quote precise level energies but do not provide the γ-ray energies of the depopulating transitions.

Adopted Levels, Gammas (continued)

$\gamma(^{88}\text{Zr})$										
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π	Mult. [‡]	$\delta^\ddagger$	α	$I_{(\gamma+ce)}^\#$	Comments
1057.03	2 ⁺	1057.01 4	100	0.0	0 ⁺	E2		5.91×10^{-4}		$\alpha(\text{K})=0.000522$ 8; $\alpha(\text{L})=5.79 \times 10^{-5}$ 9; $\alpha(\text{M})=1.003 \times 10^{-5}$ 14; $\alpha(\text{N})=1.422 \times 10^{-6}$ 20; $\alpha(\text{O})=9.95 \times 10^{-8}$ 14 B(E2)(W.u.)=7.4 9
1521.4	0 ⁺	464.5		1057.03	2 ⁺	[E2]		0.00524	100	ce(K)/($\gamma+ce$)=0.00457 7; ce(L)/($\gamma+ce$)=0.000536 8; ce(M)/($\gamma+ce$)=9.31 $\times 10^{-5}$ 13; ce(N)/($\gamma+ce$)=1.304 $\times 10^{-5}$ 19 ce(O)/($\gamma+ce$)=8.51 $\times 10^{-7}$ 12 $\alpha(\text{K})=0.00459$ 7; $\alpha(\text{L})=0.000539$ 8; $\alpha(\text{M})=9.36 \times 10^{-5}$ 14; $\alpha(\text{N})=1.311 \times 10^{-5}$ 19; $\alpha(\text{O})=8.56 \times 10^{-7}$ 12
		1521.2		0.0	0 ⁺	(E0)			0.05 1	Mult.: from ce. No corresponding γ observed. X(E0/E2)=0.0050 11 (2005Ki02).
1817.86	2 ⁺	760.76 9	100.0 27	1057.03	2 ⁺	M1+E2	+0.26 4	1.23×10^{-3}		$\alpha(\text{K})=0.001083$ 16; $\alpha(\text{L})=0.0001195$ 17; $\alpha(\text{M})=2.07 \times 10^{-5}$ 3; $\alpha(\text{N})=2.95 \times 10^{-6}$ 5; $\alpha(\text{O})=2.10 \times 10^{-7}$ 3 B(E2)(W.u.)=6.5 20; B(M1)(W.u.)=0.051 5 Mult.: D+Q from $\gamma\gamma(\theta)$ in $^{89}\text{Y}(\text{p},2\text{n}\gamma)$, $\Delta\pi=\text{no}$ from level scheme. δ : from $\gamma\gamma(\theta)$ in $^{89}\text{Y}(\text{p},2\text{n}\gamma)$. Other: -0.10 13 from $\gamma(\theta)$ in $^{86}\text{Sr}(\alpha,2\text{n}\gamma)$.
		1817.89 9	56.7 12	0.0	0 ⁺	[E2]		4.14×10^{-4}		$\alpha(\text{K})=0.0001716$ 24; $\alpha(\text{L})=1.87 \times 10^{-5}$ 3; $\alpha(\text{M})=3.23 \times 10^{-6}$ 5; $\alpha(\text{N})=4.60 \times 10^{-7}$ 7; $\alpha(\text{O})=3.28 \times 10^{-8}$ 5 B(E2)(W.u.)=0.75 7 I_γ : from ^{88}Nb ε decay (7.78 min). Others: 21 21 from $^{89}\text{Y}(\alpha,\text{p}4\text{n}\gamma)$ and 72 from $^{89}\text{Y}(\text{p},2\text{n}\gamma)$.
2139.59	4 ⁺	1082.53 4	100	1057.03	2 ⁺	E2		5.61×10^{-4}		$\alpha(\text{K})=0.000495$ 7; $\alpha(\text{L})=5.48 \times 10^{-5}$ 8; $\alpha(\text{M})=9.50 \times 10^{-6}$ 14; $\alpha(\text{N})=1.347 \times 10^{-6}$ 19; $\alpha(\text{O})=9.44 \times 10^{-8}$ 14 B(E2)(W.u.)=10.8 10
2455.88	3 ⁻	316.3 2	3.74 15	2139.59	4 ⁺	[E1]		0.00421		$\alpha(\text{K})=0.00371$ 6; $\alpha(\text{L})=0.000411$ 6; $\alpha(\text{M})=7.10 \times 10^{-5}$ 10; $\alpha(\text{N})=1.003 \times 10^{-5}$ 15; $\alpha(\text{O})=6.87 \times 10^{-7}$ 10 B(E1)(W.u.)=0.000184 22
		638.00 9	100 3	1817.86	2 ⁺	[E1]		7.33×10^{-4}		$\alpha(\text{K})=0.000648$ 9; $\alpha(\text{L})=7.10 \times 10^{-5}$ 10; $\alpha(\text{M})=1.228 \times 10^{-5}$ 18; $\alpha(\text{N})=1.742 \times 10^{-6}$ 25 $\alpha(\text{O})=1.223 \times 10^{-7}$ 18 B(E1)(W.u.)=0.00060 7
		1399.40 20	9.5 11	1057.03	2 ⁺	[E1]		3.28×10^{-4}		$\alpha(\text{K})=0.0001391$ 20; $\alpha(\text{L})=1.502 \times 10^{-5}$ 21; $\alpha(\text{M})=2.60 \times 10^{-6}$ 4; $\alpha(\text{N})=3.70 \times 10^{-7}$ 6;

Adopted Levels, Gammas (continued)

$\gamma(^{88}\text{Zr})$ (continued)									
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π	Mult. [‡]	$\delta^\ddagger$	α	Comments
									$\alpha(\text{O})=2.64\times 10^{-8}$ 4 $\text{B(E1)(W.u.)}=5.4\times 10^{-6}$ 9 I_γ : from ^{88}Nb ε decay (7.78 min). Other: 11.8 from $^{89}\text{Y}(\text{p},2\text{n}\gamma)$.
2539.00	5 ⁻	399.41 3	100	2139.59	4 ⁺	E1		0.00227	$\alpha(\text{K})=0.00201$ 3; $\alpha(\text{L})=0.000221$ 3; $\alpha(\text{M})=3.83\times 10^{-5}$ 6; $\alpha(\text{N})=5.41\times 10^{-6}$ 8; $\alpha(\text{O})=3.75\times 10^{-7}$ 6
2568.3	2 ⁺	1511.3 3	100	1057.03	2 ⁺	M1+E2	-0.54 22	3.61×10^{-4} 6	$\alpha(\text{K})=0.000252$ 4; $\alpha(\text{L})=2.74\times 10^{-5}$ 4; $\alpha(\text{M})=4.75\times 10^{-6}$ 7; $\alpha(\text{N})=6.76\times 10^{-7}$ 10; $\alpha(\text{O})=4.84\times 10^{-8}$ 8 Mult.: D+Q from $\gamma\gamma(\theta)$ in $^{89}\text{Y}(\text{p},2\text{n}\gamma)$, $\Delta\pi=\text{no}$ from level scheme. δ : from $\gamma\gamma(\theta)$ in $^{89}\text{Y}(\text{p},2\text{n}\gamma)$.
2605.20	4 ⁺	465. 2 1548.2 2	100.0 9 68 5	2139.59 4 ⁺ 1057.03 2 ⁺		[E2]		3.67×10^{-4}	$\alpha(\text{K})=0.000234$ 4; $\alpha(\text{L})=2.55\times 10^{-5}$ 4; $\alpha(\text{M})=4.43\times 10^{-6}$ 7; $\alpha(\text{N})=6.29\times 10^{-7}$ 9; $\alpha(\text{O})=4.47\times 10^{-8}$ 7
2673.7		134.6 5	100	2539.00 5 ⁻					
2801.13	5 ⁻	262.04 13	100 3	2539.00 5 ⁻		M1(+E2)	+0.3 6	0.017 7	$\alpha(\text{K})=0.015$ 6; $\alpha(\text{L})=0.0017$ 9; $\alpha(\text{M})=0.00030$ 15; $\alpha(\text{N})=4.3\times 10^{-5}$ 20; $\alpha(\text{O})=2.9\times 10^{-6}$ 10 Mult.: D(+Q) from $\gamma(\theta)$ in $^{86}\text{Sr}(\alpha,2\text{n}\gamma)$, $\Delta\pi=\text{no}$ from level scheme. δ : from $\gamma\gamma(\theta)$ in $^{89}\text{Y}(\text{p},2\text{n}\gamma)$.
		661.60 10	19.6 10	2139.59 4 ⁺		[E1]		6.76×10^{-4}	$\alpha(\text{K})=0.000598$ 9; $\alpha(\text{L})=6.54\times 10^{-5}$ 10; $\alpha(\text{M})=1.132\times 10^{-5}$ 16; $\alpha(\text{N})=1.606\times 10^{-6}$ 23 $\alpha(\text{O})=1.128\times 10^{-7}$ 16
2810.80	6 ⁺	271.81 2	49.9 18	2539.00 5 ⁻		E1		0.00637	$\alpha(\text{K})_{\text{exp}}=0.0046$ 12 $\alpha(\text{K})=0.00562$ 8; $\alpha(\text{L})=0.000623$ 9; $\alpha(\text{M})=0.0001077$ 15; $\alpha(\text{N})=1.518\times 10^{-5}$ 22 $\alpha(\text{O})=1.034\times 10^{-6}$ 15 $\alpha(\text{K})_{\text{exp}}$: from ^{88}Nb ε decay (14.55 min).
		671.20 4	100.0 13	2139.59 4 ⁺		E2		0.00181	$\alpha(\text{K})=0.001595$ 23; $\alpha(\text{L})=0.000182$ 3; $\alpha(\text{M})=3.15\times 10^{-5}$ 5; $\alpha(\text{N})=4.44\times 10^{-6}$ 7; $\alpha(\text{O})=3.02\times 10^{-7}$ 5
2887.79	8 ⁺	76.99 1	100	2810.80 6 ⁺		E2		2.87	$\alpha(\text{K})=2.29$ 4; $\alpha(\text{L})=0.487$ 7; $\alpha(\text{M})=0.0856$ 12; $\alpha(\text{N})=0.01103$ 16; $\alpha(\text{O})=0.000355$ 5 $\text{B(E2)(W.u.)}=1.75$ 4 Mult.: from K/L/M measured in ^{88}Nb ε decay (14.55 min).
2989.67	5 ⁻	189.1 3 384.6 3 450.52 16 533.82 9	1.20 15 <1.3 100.0 30 46.3 15	2801.13 5 ⁻ 2605.20 4 ⁺ 2539.00 5 ⁻ 2455.88 3 ⁻		[E2]		0.00345	$\alpha(\text{K})=0.00303$ 5; $\alpha(\text{L})=0.000351$ 5; $\alpha(\text{M})=6.10\times 10^{-5}$ 9; $\alpha(\text{N})=8.56\times 10^{-6}$ 12; $\alpha(\text{O})=5.68\times 10^{-7}$ 8
2998.4		850.0 1 542.9 5 1180.4 ^b 4	7.5 3 100 50 370 60	2139.59 4 ⁺ 2455.88 3 ⁻ 1817.86 2 ⁺					

Adopted Levels, Gammas (continued)

 $\gamma(^{88}\text{Zr})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π	Mult. [‡]	$\delta^\ddagger$	α	Comments
3032.77	3 ⁻	576.7 2 892.8 5 1975.7 1	18.5 8 9.9 10 100 3	2455.88 3 ⁻ 2139.59 4 ⁺ 1057.03 2 ⁺					
3213.70	(6 ⁺)	402.9 @ 1074.1 1	34 11 100 15	2810.80 6 ⁺ 2139.59 4 ⁺					
3223.8		684.8 4	100	2539.00 5 ⁻					
3277.01	(3 ⁻ ,4,5 ⁻)	244.2 2 287.3 2 476.0 3 671.9 @ 738.0 ^a 1 821.2 1	12.1 11 25.3 16 15.3 21 100 16 <59 ^a 57.4 26	3032.77 3 ⁻ 2989.67 5 ⁻ 2801.13 5 ⁻ 2605.20 4 ⁺ 2539.00 5 ⁻ 2455.88 3 ⁻					
3374.37	(3 ⁻ ,4,5 ⁻)	97.4 @ 10 384.6 ^a 3 573.20 ^a 10 835.5 ^a 5 918.50 10	2.5 9 <4.9 ^a <52 ^a <3.3 ^a 100 6	3277.01 (3 ⁻ ,4,5 ⁻) 2989.67 5 ⁻ 2801.13 5 ⁻ 2539.00 5 ⁻ 2455.88 3 ⁻					
3390.70	8 ⁺	177.0 @ 502.91 3	0.10 10 100.0 10	3213.70 (6 ⁺) 2887.79 8 ⁺		M1+E2	-0.15 7	0.00317	$\alpha(\text{K})=0.00280$ 5; $\alpha(\text{L})=0.000312$ 6; $\alpha(\text{M})=5.41\times 10^{-5}$ 9; $\alpha(\text{N})=7.69\times 10^{-6}$ 13; $\alpha(\text{O})=5.44\times 10^{-7}$ 9 B(E2)(W.u.)=0.8 8; B(M1)(W.u.)=0.0080 5 δ : Other: -0.06 9 from $\gamma(\theta)$ in $^{86}\text{Sr}(\alpha,2n\gamma)$.
3426.47		625.3 2 1286.9 3	100 4 43 4	2801.13 5 ⁻ 2139.59 4 ⁺					
3483.63	(7 ⁻)	672.8 @ 944.51 24	70 30 100 8	2810.80 6 ⁺ 2539.00 5 ⁻					
3568.18	(3,4 ⁺)	1112.30 20 2511.10 20	85 6 100 6	2455.88 3 ⁻ 1057.03 2 ⁺					
3617.44	(7 ⁻)	806.6 3	86 17	2810.80 6 ⁺		(E1)		4.42×10 ⁻⁴	$\alpha(\text{K})=0.000391$ 6; $\alpha(\text{L})=4.26\times 10^{-5}$ 6; $\alpha(\text{M})=7.38\times 10^{-6}$ 11; $\alpha(\text{N})=1.048\times 10^{-6}$ 15; $\alpha(\text{O})=7.40\times 10^{-8}$ 11 Mult.: D from $\gamma(\theta)$ in $^{89}\text{Y}(\alpha,p4n\gamma)$, $\Delta\pi$ =yes from level scheme.
3637.76	(3,4 ⁺)	816.7 7 604.8 2 1497.8 10	100 14 33 4 12 4	2801.13 5 ⁻ 3032.77 3 ⁻ 2139.59 4 ⁺					
3875.04	(3 ⁻ ,4,5 ⁻)	2580.9 2 598.1 3 885.0 ^b 5 1336.0 2 1419.2 2	100 4 61 4 16 5 96 8 100 5	1057.03 2 ⁺ 3277.01 (3 ⁻ ,4,5 ⁻) 2989.67 5 ⁻ 2539.00 5 ⁻ 2455.88 3 ⁻					

Adopted Levels, Gammas (continued) $\gamma(^{88}\text{Zr})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ †	I_γ †	E_f	J_f^π
3938.28	(3,4,5)	564.1 4	7.1 13	3374.37	(3 ⁻ ,4,5 ⁻)
		1137.3 ^b 10	9 4	2801.13	5 ⁻
		1399.4 2	100 13	2539.00	5 ⁻
		1482.2 ^b 2	17.1 17	2455.88	3 ⁻
3947.58	(3,4,5)	573.20 ^a 10	^a	3374.37	(3 ⁻ ,4,5 ⁻)
		949.4 ^b 5		2998.4	
		1342.4 ^b 20		2605.20	4 ⁺
3968.2	(3 ⁻ ,4,5)	1167.0 5	39 6	2801.13	5 ⁻
		1429.2 3	100 11	2539.00	5 ⁻
4024.9	(3 ⁻ ,4,5)	1223.8 3	100	2801.13	5 ⁻
4059.22	(3 ⁻ ,4,5 ⁻)	1026.3 2	44 4	3032.77	3 ⁻
		1069.7 5	58 23	2989.67	5 ⁻
		1520.2 2	100 5	2539.00	5 ⁻
		1603.6 3	41 4	2455.88	3 ⁻
4084.22	(3 ⁻ ,4,5)	657.6 5	43 4	3426.47	
		709.6 3	20.0 29	3374.37	(3 ⁻ ,4,5 ⁻)
		1094.6 2	100 6	2989.67	5 ⁻
		1283.3 3	26 4	2801.13	5 ⁻
		1479.0 2	95 6	2605.20	4 ⁺
		1545.2 @	36 5	2539.00	5 ⁻
		1944.5 10	14 5	2139.59	4 ⁺
4112.38	(3,4,5)	738.00 & 10		3374.37	(3 ⁻ ,4,5 ⁻)
		835.5 & 5		3277.01	(3 ⁻ ,4,5 ⁻)
4155.5	(3,4,5)	781.1 4	100	3374.37	(3 ⁻ ,4,5 ⁻)
4206.1	(3,4,5 ⁻)	1173.5 ^b 5	32 8	3032.77	3 ⁻
		1532.2 ^b 10	20 8	2673.7	
		1750.2 3	100 9	2455.88	3 ⁻
4208.17	(3 ⁻ ,4,5 ⁻)	781.7 @ ^b		3426.47	
		931.2 1	73 4	3277.01	(3 ⁻ ,4,5 ⁻)
		1209.0 ^b 10	5 3	2998.4	
		1218.2 4	23 4	2989.67	5 ⁻
		1406.8 2	72 3	2801.13	5 ⁻
		1752.4 2	100 5	2455.88	3 ⁻
4237.0	(7,8 ⁺)	1349.1 5	100 18	2887.79	8 ⁺
		1426.3 6	85 27	2810.80	6 ⁺
4307.9	(3 ⁻ ,4,5 ⁻)	1318.6 ^b 5		2989.67	5 ⁻
		1506.8 @		2801.13	5 ⁻
		1851.9 ^b 3		2455.88	3 ⁻
4335.6	(3,4 ⁺)	3278.5 4	100	1057.03	2 ⁺
4348.3		957.6 4	100	3390.70	8 ⁺

Adopted Levels, Gammas (continued)

$\gamma(^{88}\text{Zr})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π	Mult. [‡]	$\delta^\ddagger$	α	Comments
4348.3		1134.6 @		3213.70	(6 ⁺)				
4388.34	(7,8 ⁺)	997.6 3	93 14	3390.70	8 ⁺				
		1174.7 5	100 11	3213.70	(6 ⁺)				
4413.07	10 ⁺	1022.3 2	100 3	3390.70	8 ⁺	E2		6.38×10 ⁻⁴	$\alpha(\text{K})=0.000563$ 8; $\alpha(\text{L})=6.25\times 10^{-5}$ 9; $\alpha(\text{M})=1.083\times 10^{-5}$ 16; $\alpha(\text{N})=1.536\times 10^{-6}$ 22 $\alpha(\text{O})=1.073\times 10^{-7}$ 15 B(E2)(W.u.)>15
		1525.14 ^b 20	1.80 25	2887.79	8 ⁺	(E2)		3.66×10 ⁻⁴	$\alpha(\text{K})=0.000241$ 4; $\alpha(\text{L})=2.63\times 10^{-5}$ 4; $\alpha(\text{M})=4.56\times 10^{-6}$ 7; $\alpha(\text{N})=6.48\times 10^{-7}$ 9; $\alpha(\text{O})=4.60\times 10^{-8}$ 7 B(E2)(W.u.)>0.037
4461.88	(7,8 ⁺)	1071.2 @	87 33	3390.70	8 ⁺				
		1247.8 5	44 13	3213.70	(6 ⁺)				
		1573.9 3	100 13	2887.79	8 ⁺				
		1651.6 4	91 13	2810.80	6 ⁺				
4486.31	(9 ⁻)	1002.67 7	100 4	3483.63	(7 ⁻)	(E2)		6.67×10 ⁻⁴	$\alpha(\text{K})=0.000588$ 9; $\alpha(\text{L})=6.54\times 10^{-5}$ 10; $\alpha(\text{M})=1.134\times 10^{-5}$ 16; $\alpha(\text{N})=1.607\times 10^{-6}$ 23 $\alpha(\text{O})=1.121\times 10^{-7}$ 16
		1095.61 12	67 3	3390.70	8 ⁺	(E1)		2.43×10 ⁻⁴	$\alpha(\text{K})=0.000215$ 3; $\alpha(\text{L})=2.33\times 10^{-5}$ 4; $\alpha(\text{M})=4.03\times 10^{-6}$ 6; $\alpha(\text{N})=5.73\times 10^{-7}$ 8; $\alpha(\text{O})=4.07\times 10^{-8}$ 6 I _γ : from ⁷⁴ Ge(¹⁸ O,4nγ).
4612.29	9 ⁺	199.19 ^b 10	1.9 5	4413.07	10 ⁺	M1(+E2)	-0.2 +3-9	0.03 3	$\alpha(\text{K})=0.03$ 3; $\alpha(\text{L})=0.003$ 4; $\alpha(\text{M})=0.0006$ 7; $\alpha(\text{N})=8.\text{E}-5$ 9; $\alpha(\text{O})=6.\text{E}-6$ 5 B(M1)(W.u.)>0.00025
		1221.70 14	100 3	3390.70	8 ⁺	(M1+E2)	-0.25 7	4.50×10 ⁻⁴	$\alpha(\text{K})=0.000390$ 6; $\alpha(\text{L})=4.26\times 10^{-5}$ 6; $\alpha(\text{M})=7.38\times 10^{-6}$ 11; $\alpha(\text{N})=1.050\times 10^{-6}$ 15; $\alpha(\text{O})=7.52\times 10^{-8}$ 11 B(E2)(W.u.)>0.0014; B(M1)(W.u.)>6.1×10 ⁻⁵ δ : from $\gamma(\theta)$ ⁸⁶ Sr(α ,2nγ). Others: -0.7 3 from ⁷⁴ Ge(¹⁸ O,4nγ), -0.3 2 from ⁸⁹ Y(α ,p4nγ).
		1724.49 ^b 20	4.1 9	2887.79	8 ⁺	M1(+E2)	+0.05 8	3.73×10 ⁻⁴	$\alpha(\text{K})=0.000195$ 3; $\alpha(\text{L})=2.12\times 10^{-5}$ 3; $\alpha(\text{M})=3.68\times 10^{-6}$ 6; $\alpha(\text{N})=5.24\times 10^{-7}$ 8; $\alpha(\text{O})=3.76\times 10^{-8}$ 6 B(M1)(W.u.)>9.7×10 ⁻⁷
4672.7	(3 ⁻ ,4,5)	1871.5 3	100	2801.13	5 ⁻				
4713.08	10 ⁻	100.79 2	100.0 24	4612.29	9 ⁺	E1		0.1110	$\alpha(\text{K})=0.0978$ 14; $\alpha(\text{L})=0.01106$ 16; $\alpha(\text{M})=0.00191$ 3; $\alpha(\text{N})=0.000265$ 4; $\alpha(\text{O})=1.682\times 10^{-5}$ 24 B(E1)(W.u.)=0.000102 9 δ : $\delta(\text{M2/E1})=-0.02$ 4.
		226.62 28	24.6 23	4486.31	(9 ⁻)	(M1+E2)	-0.05 3	0.0226	$\alpha(\text{K})=0.0199$ 3; $\alpha(\text{L})=0.00227$ 4; $\alpha(\text{M})=0.000395$ 7; $\alpha(\text{N})=5.59\times 10^{-5}$ 9; $\alpha(\text{O})=3.90\times 10^{-6}$ 6 B(E2)(W.u.)=0.008 +10-8; B(M1)(W.u.)=0.000142 18 δ : weighted average of -0.09 5 from ⁷⁴ Ge(¹⁸ O,4nγ) and -0.03 3 from ⁸⁹ Y(α ,p4nγ).

Adopted Levels, Gammas (continued)

$\gamma(^{88}\text{Zr})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π	Mult. [‡]	$\delta^\ddagger$	α	Comments
4713.08	10 ⁻	299.90 13	9.4 8	4413.07	10 ⁺	E1		0.00486	$\alpha(\text{K})=0.00429$ 6; $\alpha(\text{L})=0.000475$ 7; $\alpha(\text{M})=8.21\times 10^{-5}$ 12; $\alpha(\text{N})=1.159\times 10^{-5}$ 17; $\alpha(\text{O})=7.92\times 10^{-7}$ 12 B(E1)(W.u.)= 3.6×10^{-7} 5 δ : $\delta(\text{M2/E1})=+0.2$ 5.
4797.63	11 ⁻	84.55 2	100.0 23	4713.08	10 ⁻	M1(+E2)	-0.02 6	0.325 12	$\alpha(\text{K})=0.285$ 9; $\alpha(\text{L})=0.0333$ 19; $\alpha(\text{M})=0.0058$ 4; $\alpha(\text{N})=0.00082$ 5; $\alpha(\text{O})=5.62\times 10^{-5}$ 15 B(M1)(W.u.)=0.48 5 Mult.: Other: (E1) proposed in ⁸⁹ Y(α ,p4n γ). $\alpha(\text{K})=0.00221$ 4; $\alpha(\text{L})=0.000244$ 4; $\alpha(\text{M})=4.22\times 10^{-5}$ 6; $\alpha(\text{N})=5.97\times 10^{-6}$ 9; $\alpha(\text{O})=4.13\times 10^{-7}$ 6 B(E1)(W.u.)= 1.44×10^{-5} 15 δ : $\delta(\text{M2/E1})=-0.03$ 4.
		384.56 10	18.1 10	4413.07	10 ⁺	E1		0.00251	$\alpha(\text{K})=0.00284$ 4; $\alpha(\text{L})=0.000328$ 5; $\alpha(\text{M})=5.70\times 10^{-5}$ 9; $\alpha(\text{N})=8.00\times 10^{-6}$ 12; $\alpha(\text{O})=5.33\times 10^{-7}$ 8
4934.5	(7,8 ⁺)	546.1 5	29 7	4388.34	(7,8 ⁺)	(E2)		0.00323	
		586.1 5		4348.3					
		1543.8 @	100 12	3390.70 8 ⁺					
		1720.8 4	84 10	3213.70 (6 ⁺)					
5087.9	(7,8 ⁺)	2277.1 3	100	2810.80 6 ⁺					
5166.2?	(10,11,12)	368.6 ^b 4	100	4797.63 11 ⁻					
5229.47	12 ⁺	816.40 7	100.0 25	4413.07	10 ⁺	E2		1.09 $\times 10^{-3}$	$\alpha(\text{K})=0.000962$ 14; $\alpha(\text{L})=0.0001081$ 16; $\alpha(\text{M})=1.87\times 10^{-5}$ 3; $\alpha(\text{N})=2.65\times 10^{-6}$ 4; $\alpha(\text{O})=1.83\times 10^{-7}$ 3 B(E2)(W.u.)=6.7 7
5583.85	12 ⁻	786.11 7	100.0 9	4797.63	11 ⁻	M1(+E2)	0.00 4	1.14 $\times 10^{-3}$	$\alpha(\text{K})=0.001003$ 14; $\alpha(\text{L})=0.0001104$ 16; $\alpha(\text{M})=1.92\times 10^{-5}$ 3; $\alpha(\text{N})=2.73\times 10^{-6}$ 4; $\alpha(\text{O})=1.94\times 10^{-7}$ 3 B(M1)(W.u.)>0.065 δ : Other: -0.3 1 from $\gamma(\theta)$ in ⁸⁹ Y(α ,p4n γ). $\alpha(\text{K})=0.00391$ 6; $\alpha(\text{L})=0.000437$ 7; $\alpha(\text{M})=7.59\times 10^{-5}$ 12; $\alpha(\text{N})=1.078\times 10^{-5}$ 17; $\alpha(\text{O})=7.61\times 10^{-7}$ 12 B(E2)(W.u.)<1.9 $\times 10^2$; B(M1)(W.u.)>0.59
5665.91	12 ⁺	436.49 7	100	5229.47	12 ⁺	M1(+E2)	<0.16	0.00443	
5787.2	(7,8,9)	2396.5 5	100	3390.70 8 ⁺					
5950.75	(13) ⁺	285.19 20	3.8 4	5665.91	12 ⁺	M1(+E2)	<0.14	0.01267 22	$\alpha(\text{K})=0.01116$ 20; $\alpha(\text{L})=0.001264$ 24; $\alpha(\text{M})=0.000220$ 4; $\alpha(\text{N})=3.12\times 10^{-5}$ 6; $\alpha(\text{O})=2.18\times 10^{-6}$ 4 B(M1)(W.u.)>0.29
		366.5 ^b 4	18 10	5583.85	12 ⁻				

Adopted Levels, Gammas (continued)

$\gamma(^{88}\text{Zr})$ (continued)									
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π	Mult. [‡]	$\delta^\ddagger$	α	Comments
5950.75	(13) ⁺	721.21 14	100.0 29	5229.47	12 ⁺	(M1+E2)	-0.10 6	1.38×10^{-3}	$\alpha(\text{K})=0.001216$ 18; $\alpha(\text{L})=0.0001342$ 19; $\alpha(\text{M})=2.33 \times 10^{-5}$ 4; $\alpha(\text{N})=3.31 \times 10^{-6}$ 5; $\alpha(\text{O})=2.36 \times 10^{-7}$ 4 B(M1)(W.u.)>0.47 δ : weighted average of -0.07 4 from $^{74}\text{Ge}(^{18}\text{O},4n\gamma)$ and -0.20 7 from $^{89}\text{Y}(\alpha,p4n\gamma)$.
6000.8?	(13) ⁻	417.0 ^b 3	100	5583.85	12 ⁻	M1(+E2)	-0.07 12	0.00493 10	$\alpha(\text{K})=0.00435$ 9; $\alpha(\text{L})=0.000487$ 11; $\alpha(\text{M})=8.45 \times 10^{-5}$ 19; $\alpha(\text{N})=1.20 \times 10^{-5}$ 3; $\alpha(\text{O})=8.47 \times 10^{-7}$ 16 B(M1)(W.u.)>0.42
6032.52?	(12 ⁻)	1234.92 ^b 15	100	4797.63	11 ⁻	M1(+E2)	<0.09	4.42×10^{-4}	$\alpha(\text{K})=0.000382$ 6; $\alpha(\text{L})=4.17 \times 10^{-5}$ 6; $\alpha(\text{M})=7.22 \times 10^{-6}$ 11; $\alpha(\text{N})=1.028 \times 10^{-6}$ 15; $\alpha(\text{O})=7.37 \times 10^{-8}$ 11
6192.94	13 ⁻	160.42 3	15.5 15	6032.52?	(12 ⁻)	M1(+E2)	-0.08 8	0.057 3	$\alpha(\text{K})=0.0499$ 24; $\alpha(\text{L})=0.0058$ 4; $\alpha(\text{M})=0.00100$ 7; $\alpha(\text{N})=0.000142$ 9; $\alpha(\text{O})=9.8 \times 10^{-6}$ 4 B(E2)(W.u.)=8.E+1 +16-8; B(M1)(W.u.)=0.28 4
		608.90 10	54.5 30	5583.85	12 ⁻	M1(+E2)	-0.05 14	0.00202	$\alpha(\text{K})=0.00178$ 3; $\alpha(\text{L})=0.000198$ 3; $\alpha(\text{M})=3.43 \times 10^{-5}$ 6; $\alpha(\text{N})=4.88 \times 10^{-6}$ 8; $\alpha(\text{O})=3.46 \times 10^{-7}$ 5
		1395.39 7	100 5	4797.63	11 ⁻	E2		3.76×10^{-4}	B(E2)(W.u.)=0.14 +76-14; B(M1)(W.u.)=0.0182 20 $\alpha(\text{K})=0.000288$ 4; $\alpha(\text{L})=3.16 \times 10^{-5}$ 5; $\alpha(\text{M})=5.47 \times 10^{-6}$ 8; $\alpha(\text{N})=7.77 \times 10^{-7}$ 11; $\alpha(\text{O})=5.50 \times 10^{-8}$ 8 B(E2)(W.u.)=1.58 17
6238.79	(14) ⁺	288.05 4	100.0 9	5950.75	(13) ⁺	(M1+E2)	-0.10 5	0.01236 24	$\alpha(\text{K})=0.01088$ 21; $\alpha(\text{L})=0.001233$ 25; $\alpha(\text{M})=0.000214$ 5; $\alpha(\text{N})=3.04 \times 10^{-5}$ 6; $\alpha(\text{O})=2.13 \times 10^{-6}$ 4 B(E2)(W.u.)=1.0 $\times 10^2$ +11-10; B(M1)(W.u.)=0.74 23 δ : from $\gamma(\theta)$ in $^{89}\text{Y}(\alpha,p4n\gamma)$. Other: <0.11 in $^{74}\text{Ge}(^{18}\text{O},4n\gamma)$.
		1009.25 15	21.7 11	5229.47	12 ⁺	(E2)		6.57×10^{-4}	$\alpha(\text{K})=0.000580$ 9; $\alpha(\text{L})=6.44 \times 10^{-5}$ 9; $\alpha(\text{M})=1.116 \times 10^{-5}$ 16; $\alpha(\text{N})=1.582 \times 10^{-6}$ 23 $\alpha(\text{O})=1.105 \times 10^{-7}$ 16 B(E2)(W.u.)=4.1 13
6501.32	(14) ⁺	550.6 3	100	5950.75	(13) ⁺	M1(+E2)	0.00 5	0.00255	$\alpha(\text{K})=0.00225$ 4; $\alpha(\text{L})=0.000250$ 4; $\alpha(\text{M})=4.33 \times 10^{-5}$ 7; $\alpha(\text{N})=6.16 \times 10^{-6}$ 9; $\alpha(\text{O})=4.37 \times 10^{-7}$ 7 B(M1)(W.u.)=0.82 16
6578.2		627.5 5	100	5950.75	(13) ⁺				
6765.33	(14) ⁻	572.39 20	100	6192.94	13 ⁻	(M1+E2)	-0.16 7	0.00234	$\alpha(\text{K})=0.00207$ 3; $\alpha(\text{L})=0.000229$ 4; $\alpha(\text{M})=3.98 \times 10^{-5}$ 7; $\alpha(\text{N})=5.66 \times 10^{-6}$ 9; $\alpha(\text{O})=4.01 \times 10^{-7}$ 6 B(E2)(W.u.)>3.0; B(M1)(W.u.)>0.23
6826.66	(15) ⁺	325.34 10	33.4 14	6501.32	(14) ⁺	M1(+E2)	<0.09	0.00906	$\alpha(\text{K})=0.00798$ 12; $\alpha(\text{L})=0.000899$ 13;

Adopted Levels, Gammas (continued)

$\gamma(^{88}\text{Zr})$ (continued)

<u>E_i(level)</u>	<u>J_i^{π}</u>	<u>E_{γ}^{$\dagger$}</u>	<u>I_{γ}^{$\dagger$}</u>	<u>E_f</u>	<u>J_f^{π}</u>	<u>Mult.^{$\ddagger$}</u>	<u>$\delta^{\ddagger}$</u>	<u>α</u>	<u>Comments</u>
									$\alpha(\text{M})=0.0001562$ 23; $\alpha(\text{N})=2.22\times 10^{-5}$ 4 $\alpha(\text{O})=1.558\times 10^{-6}$ 23 B(E2)(W.u.)<1.6 $\times 10^2$; B(M1)(W.u.)>1.3 $\alpha(\text{K})=0.00194$ 3; $\alpha(\text{L})=0.000215$ 4; $\alpha(\text{M})=3.74\times 10^{-5}$ 6; $\alpha(\text{N})=5.31\times 10^{-6}$ 8; $\alpha(\text{O})=3.77\times 10^{-7}$ 6
6826.66	(15) ⁺	587.85 20	100 6	6238.79	(14) ⁺	M1(+E2)	<0.22	0.00220 4	B(E2)(W.u.)<1.5 $\times 10^2$; B(M1)(W.u.)>0.61 $\alpha(\text{K})=0.00338$ 5; $\alpha(\text{L})=0.000377$ 6; $\alpha(\text{M})=6.55\times 10^{-5}$ 10; $\alpha(\text{N})=9.30\times 10^{-6}$ 14; $\alpha(\text{O})=6.58\times 10^{-7}$ 10 B(M1)(W.u.)>0.28
7228.2	(15) ⁻	462.87 20	100	6765.33	(14) ⁻	M1(+E2)	+0.01 5	0.00383	
7431.9		605.2 3	100	6826.66	(15) ⁺	D(+Q)	<0.21		
7536.5	(15) ⁻	771.1 3	100 12	6765.33	(14) ⁻	M1(+E2)	0.00 12	1.19 $\times 10^{-3}$	$\alpha(\text{K})=0.001047$ 15; $\alpha(\text{L})=0.0001153$ 17; $\alpha(\text{M})=2.00\times 10^{-5}$ 3; $\alpha(\text{N})=2.85\times 10^{-6}$ 4; $\alpha(\text{O})=2.03\times 10^{-7}$ 3 B(M1)(W.u.)>0.15
7878.9	(16) ⁻	342.2 4	100 19	7536.5	(15) ⁻	M1(+E2)	-0.05 9	0.00798 16	$\alpha(\text{K})=0.00703$ 14; $\alpha(\text{L})=0.000791$ 17; $\alpha(\text{M})=0.000137$ 3; $\alpha(\text{N})=1.95\times 10^{-5}$ 4; $\alpha(\text{O})=1.373\times 10^{-6}$ 25 B(M1)(W.u.)>0.58
		650.9 4	86 19	7228.2	(15) ⁻	M1(+E2)	-0.14 +20-40	0.00174 6	$\alpha(\text{K})=0.00154$ 5; $\alpha(\text{L})=0.000170$ 7; $\alpha(\text{M})=2.95\times 10^{-5}$ 11; $\alpha(\text{N})=4.19\times 10^{-6}$ 15; $\alpha(\text{O})=2.98\times 10^{-7}$ 8 B(M1)(W.u.)>0.068
8200.2	(17) ⁻	321.30 20	100	7878.9	(16) ⁻	M1(+E2)	0.00 3	0.00931 14	$\alpha(\text{K})=0.00820$ 12; $\alpha(\text{L})=0.000924$ 13; $\alpha(\text{M})=0.0001606$ 23; $\alpha(\text{N})=2.28\times 10^{-5}$ 4 $\alpha(\text{O})=1.603\times 10^{-6}$ 23 B(M1)(W.u.)=2.2 +8-22
8925.2	(18) ⁻	724.85 20	100	8200.2	(17) ⁻	M1(+E2)	-0.09 14	1.36 $\times 10^{-3}$ 2	$\alpha(\text{K})=0.001202$ 18; $\alpha(\text{L})=0.0001326$ 20; $\alpha(\text{M})=2.30\times 10^{-5}$ 4; $\alpha(\text{N})=3.27\times 10^{-6}$ 5; $\alpha(\text{O})=2.33\times 10^{-7}$ 4 B(M1)(W.u.)>0.19
9912.6?	(19) ⁻	987.35 ^b 20	93 17	8925.2	(18) ⁻	M1(+E2)	-0.11 16	6.91 $\times 10^{-4}$	$\alpha(\text{K})=0.000611$ 9; $\alpha(\text{L})=6.70\times 10^{-5}$ 10; $\alpha(\text{M})=1.161\times 10^{-5}$ 17; $\alpha(\text{N})=1.653\times 10^{-6}$ 24 $\alpha(\text{O})=1.181\times 10^{-7}$ 17 B(E2)(W.u.)>0.83; B(M1)(W.u.)>0.016
		1712.50 ^b 20	100 7	8200.2	(17) ⁻	E2		3.90 $\times 10^{-4}$	$\alpha(\text{K})=0.000192$ 3; $\alpha(\text{L})=2.09\times 10^{-5}$ 3; $\alpha(\text{M})=3.63\times 10^{-6}$ 5; $\alpha(\text{N})=5.16\times 10^{-7}$ 8; $\alpha(\text{O})=3.67\times 10^{-8}$ 6 B(E2)(W.u.)<1.2
10557.3?	(20)	644.7 ^b 7	100	9912.6?	(19) ⁻	D(+Q)	<0.25		

Adopted Levels, Gammas (continued)

$\gamma(^{88}\text{Zr})$ (continued)

$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π	Mult. [‡]	$\delta^\ddagger$	α	Comments
11199.7?	(21)	642.4 ^b 7	100	10557.3?	(20)	D(+Q)	-0.3 +4-9	0.00184 6	$\alpha(\text{K})=0.00160$ 11; $\alpha(\text{L})=0.00018$ 1

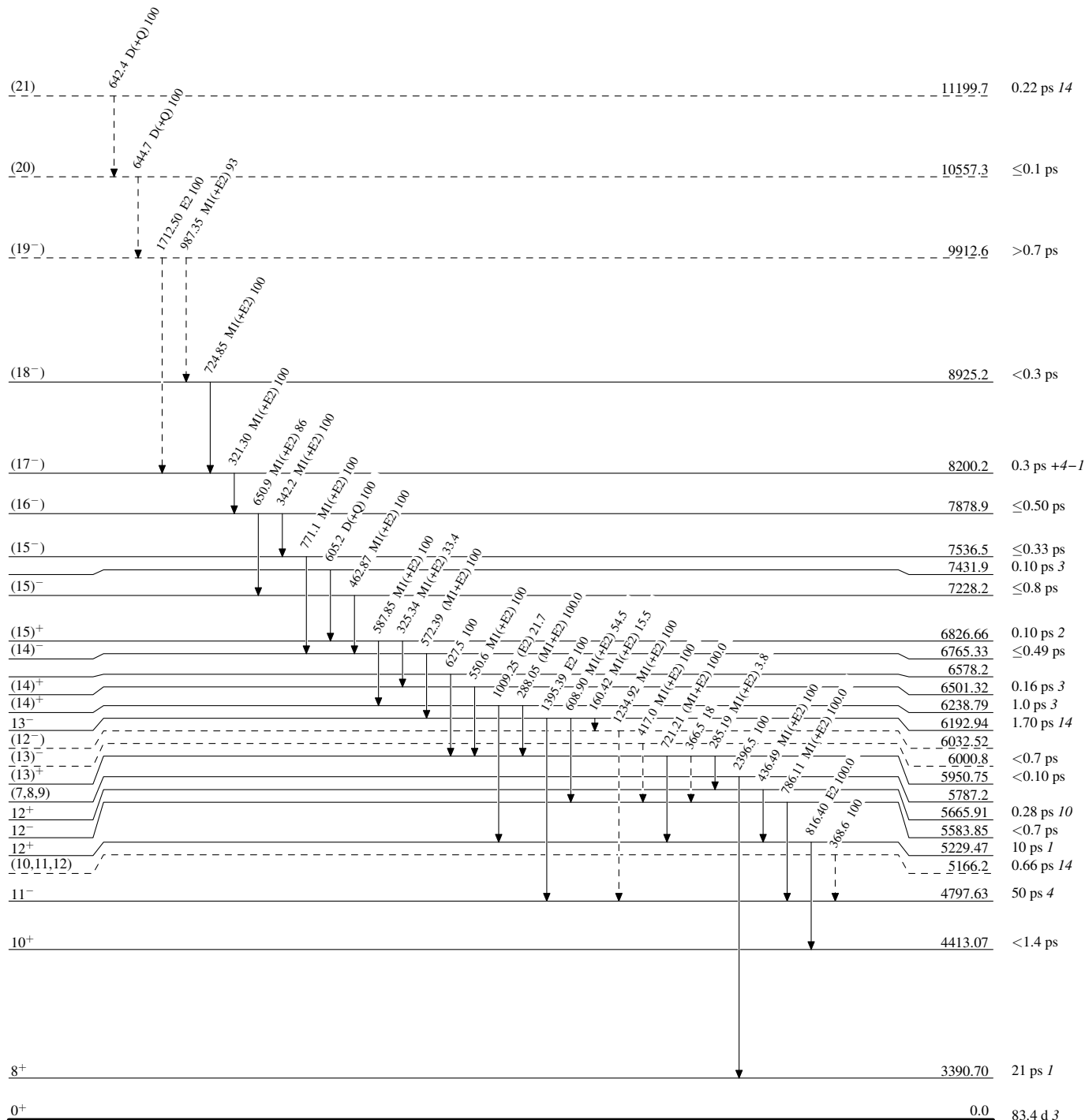
[†] Weighted averages of all decay and reaction data.
[‡] From $\gamma(\theta)$ and linear polarization in $^{74}\text{Ge}(^{18}\text{O},4n\gamma)$, except where noted.
[#] Total $I(\gamma+\text{ce})$ branching ratio from $^{89}\text{Y}(p,2n\gamma)$.
[@] From level-energy difference.
[&] Multiply placed.
^a Multiply placed with undivided intensity.
^b Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

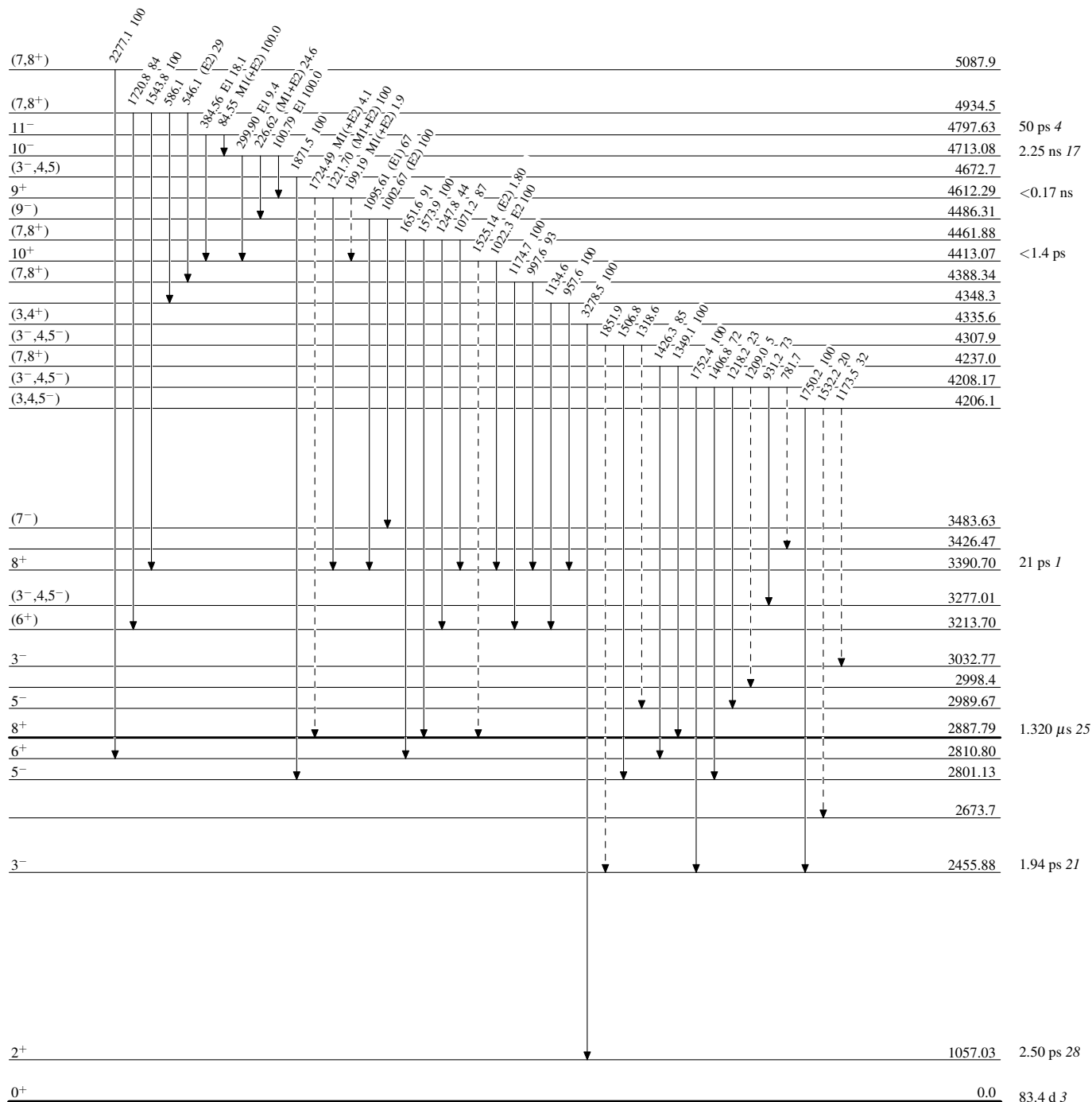
-----► γ Decay (Uncertain)

Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

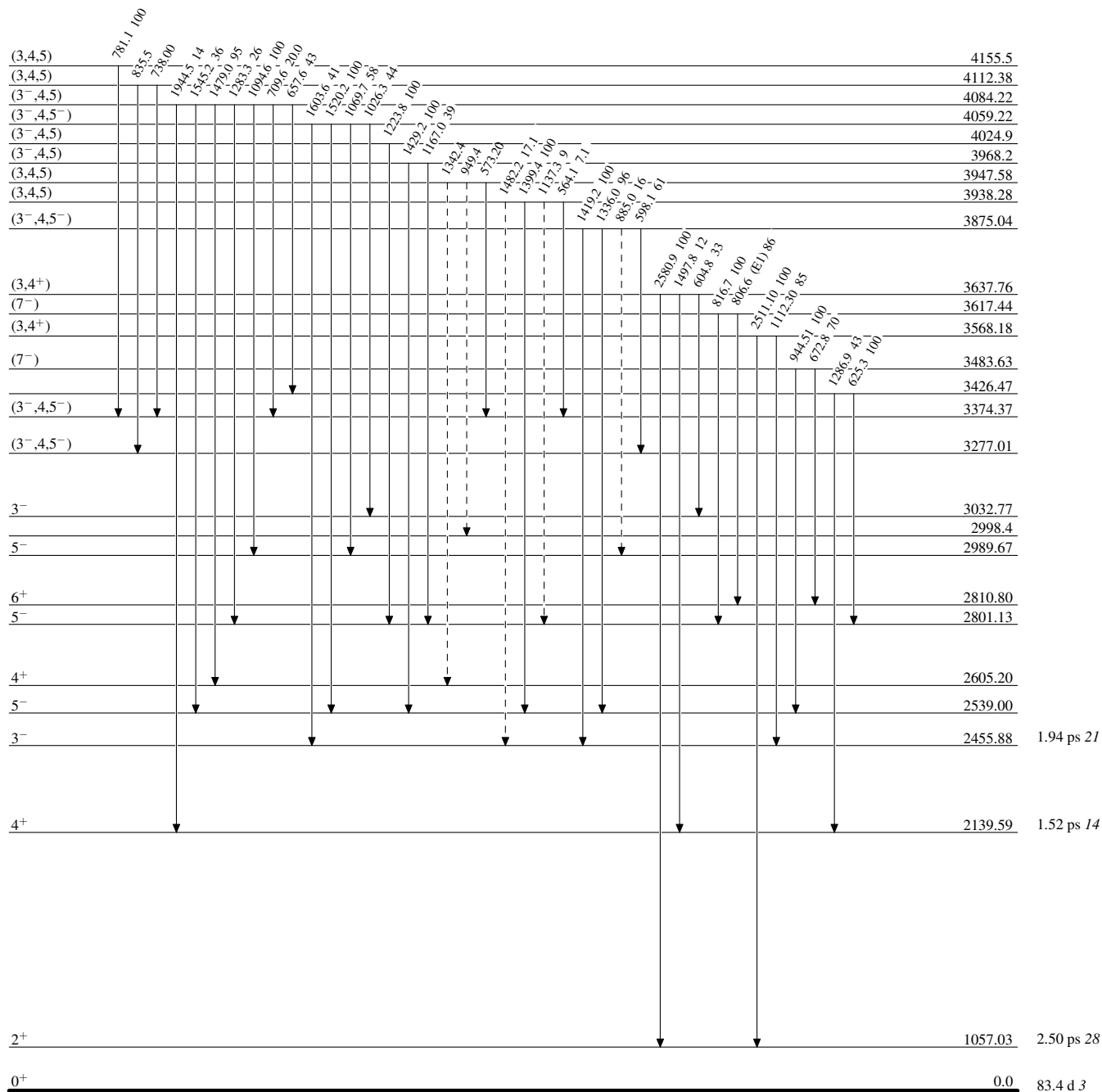
-----► γ Decay (Uncertain)

Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)


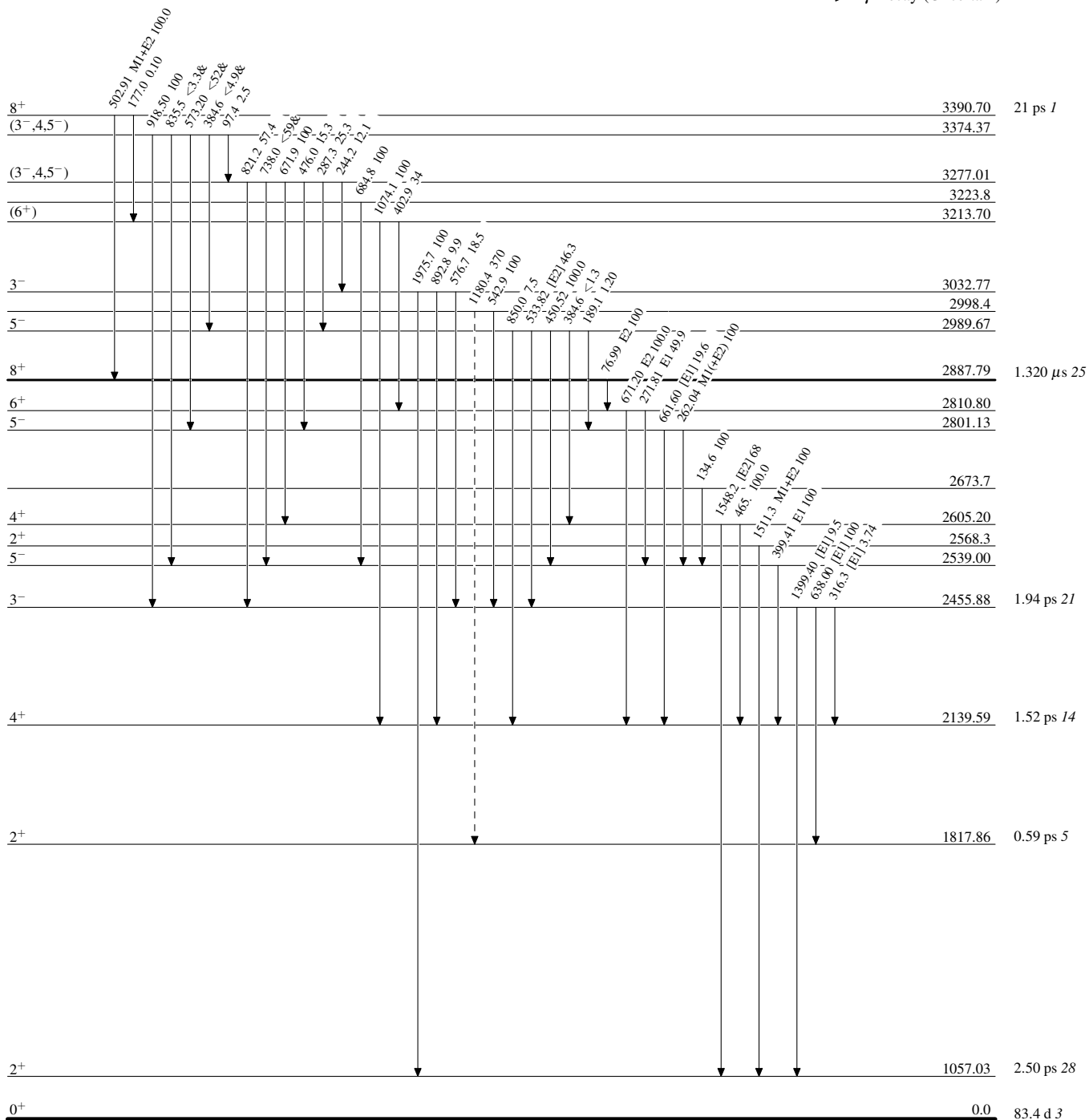
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

-----► γ Decay (Uncertain)



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

