

**Adopted Levels, Gammas**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli		NDS 108,2173 (2007)	1-Oct-2006

Q(β<sup>-</sup>)=-1222.1 16; S(n)=9.17×10<sup>3</sup> 6; S(p)=5542.7 17; Q(α)=-1494.9 17 [2012Wa38](#)

Note: Current evaluation has used the following Q record -1222.1 169140 505503 13 [2003Au03](#).

[Additional information 1.](#)

<sup>137</sup>La Levels

Cross Reference (XREF) Flags

<b>A</b>	<sup>137</sup> Ce ε decay (9.0 h)	<b>E</b>	<sup>130</sup> Te( <sup>11</sup> B,4nγ)
<b>B</b>	<sup>137</sup> Ce ε decay (34.4 h)	<b>F</b>	<sup>136</sup> Ba(p,p) E=7.0-12 MeV IAR
<b>C</b>	<sup>140</sup> Ce(p,α) E=17 MeV	<b>G</b>	<sup>136</sup> Ba(α,t)
<b>D</b>	<sup>138</sup> Ba(p,2nγ)	<b>H</b>	<sup>140</sup> Ce(μ <sup>-</sup> ,3nγ)

E(level)&	Jπ@	T <sub>1/2</sub> †	XREF	Comments
0.0 <sup>a</sup>	7/2 <sup>+</sup>	6×10 <sup>4</sup> y 2	ABCDE GH	%ε=100 μ=+2.700 15 ( <a href="#">2003Ii03</a> , <a href="#">2005St24</a> ) Q=+0.21 3 ( <a href="#">2003Ii03</a> , <a href="#">2005St24</a> ) μ,Q: Collinear fast beam laser spectroscopy. Other values: μ=+2.695 6, Q=+0.24 7, Optical spectroscopy ( <a href="#">1972Fi19</a> ). Other: <a href="#">1989Ra17</a> . J <sup>π</sup> : atomic beam ( <a href="#">1976Fu06</a> ), μ. Configuration=(π 1g <sub>7/2</sub> ). T <sub>1/2</sub> : from <a href="#">1956Br93</a> . Other: >400 y ( <a href="#">1948Ch03</a> ). Q=+0.24 7 Mössbauer effect ( <a href="#">1978Ge20</a> , <a href="#">2005St24</a> ). Other: <a href="#">1989Ra17</a> . J <sup>π</sup> : 10.6γ is M1, log ft=5.3 from 3/2 <sup>+</sup> parent. Configuration=(π 1d <sub>5/2</sub> ). T <sub>1/2</sub> : from <a href="#">1963Ru03</a> in <sup>137</sup> Ce ε decay.
10.59 4	5/2 <sup>+</sup>	89 ns 4	AB DE H	J <sup>π</sup> : γ to 7/2 <sup>+</sup> is M1+E2, log ft=6.5 via 3/2 <sup>+</sup> parent. J <sup>π</sup> : strong γ M1+E2 to 5/2 <sup>+</sup> , weaker γ to 7/2 <sup>+</sup> , syst. Configuration=(π 2d <sub>3/2</sub> ).
447.17 6	5/2 <sup>+</sup>		A CD H	J <sup>π</sup> : γ to 5/2 <sup>+</sup> is E2, no γ to 7/2 <sup>+</sup> , ε decay via 3/2 <sup>+</sup> . Configuration=(π 3s <sub>1/2</sub> ).
493.09 6	(3/2) <sup>+</sup> ‡		A CD H	J <sup>π</sup> : strong γ to 5/2 <sup>+</sup> is ΔJ=(1) M1+(E2), weak γ to 7/2 <sup>+</sup> , ε decay via 3/2 <sup>+</sup> .
641.96 6	1/2 <sup>+</sup> ‡		A CD	J <sup>π</sup> : γ to 7/2 <sup>+</sup> is ΔJ=2 E2, ε decay via 11/2 <sup>-</sup> .
709.30 6	(3/2) <sup>+</sup> ‡		A CD	J <sup>π</sup> : γ to 5/2 <sup>+</sup> is ΔJ=1 M1+E2, γ from 9/2 <sup>+</sup> (required by γγ data). Not consistent with ε decay via 3/2 <sup>+</sup> .
762.27 <sup>a</sup> 10	11/2 <sup>+</sup> ‡		BCDE H	J <sup>π</sup> : γ to 7/2 <sup>+</sup> is M1+E2, γ from 11/2 <sup>-</sup> is E1.
781.57 9	(7/2) <sup>+</sup>		AB D	J <sup>π</sup> : γ to 7/2 <sup>+</sup> is M1+E2, γ from 11/2 <sup>-</sup> .
835.37 8	9/2 <sup>+</sup> ‡		BCDE H	J <sup>π</sup> : γ to 7/2 <sup>+</sup> is ΔJ=1 M1+E2, ε decay via 3/2 <sup>+</sup> parent.
917.44 11	9/2 <sup>+</sup> ‡		B D	J <sup>π</sup> : γ to 7/2 <sup>+</sup> is ΔJ=1 M1+E2, ε decay via 3/2 <sup>+</sup> parent.
926.33 6	5/2 <sup>+</sup> ‡		A D	J <sup>π</sup> : M2 γ to 7/2 <sup>+</sup> . E1 γ to 9/2 <sup>+</sup> . T <sub>1/2</sub> . Configuration=(π 1h <sub>11/2</sub> ). T <sub>1/2</sub> : ≤0.41 7 ( <a href="#">1967Va21</a> ) in <sup>137</sup> Ce ε decay.
1004.62 8	11/2 <sup>-</sup> ‡	0.41 ns 7	BCDE G	J <sup>π</sup> : γ to 5/2 <sup>+</sup> , no γ to 7/2 <sup>+</sup> , ε decay via 3/2 <sup>+</sup> parent.
1171.37 10	(1/2 <sup>+</sup> ,3/2 <sup>-</sup> )		A D	J <sup>π</sup> : γ to 11/2 <sup>+</sup> is E2.
1174.4 10			D	
1255.1 10			D	
1314.3 10			D	
1365.0 10			D	
1473.9 10	(7/2) <sup>+</sup> ‡		D	J <sup>π</sup> : γ to 11/2 <sup>-</sup> is M1.
1535.4 10			D	
1651.6 <sup>c</sup> 10	(9/2) <sup>-</sup> ‡		D	

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**Adopted Levels, Gammas (continued)**

<sup>137</sup>La Levels (continued)

E(level)&	J <sup>π</sup> @	T <sub>1/2</sub> <sup>†</sup>	XREF	Comments
1723.16 <i>19</i>	13/2 <sup>+</sup> ‡		DE	J <sup>π</sup> : γ to 9/2 <sup>+</sup> is E2, γ to 11/2 <sup>+</sup> level.
1728.53 <i>c 12</i>	13/2 <sup>-</sup> ‡		DE	J <sup>π</sup> : γ to 11/2 <sup>-</sup> is M1+E2.
1786.74 <i>c 12</i>	15/2 <sup>-</sup> ‡		DE	J <sup>π</sup> : γ to 11/2 <sup>-</sup> is ΔJ=2 E2, γ to 13/2 <sup>-</sup> .
1791.8 <i>a 3</i>	15/2 <sup>+</sup> ‡		DE	J <sup>π</sup> : γ to 11/2 <sup>+</sup> is ΔJ=2 E2.
1801.0 <i>10</i>			D	
1863.96 <i>22</i>	(17/2) <sup>+</sup>		DE	J <sup>π</sup> : γ to 13/2 <sup>+</sup> is ΔJ=1; no γ to J<13/2.
1869.50 <i>b 21</i>	19/2 <sup>-</sup> ‡	342 ns 25	DE	μ=+2.34 6 μ: Time dependent perturbed angular distribution (1982KiZV, 2005St24). Other: 1989Ra17. J <sup>π</sup> : γ to 15/2 <sup>-</sup> is ΔJ=2 E2, syst of 19/2 <sup>-</sup> isomers in N=80 nuclei. Configuration=((π 1g <sub>7/2</sub> )(ν 1h <sub>11/2</sub> ) <sup>-1</sup> (ν 2d <sub>3/2</sub> ) <sup>-1</sup> ). T <sub>1/2</sub> : From 2004Va03. Other values: 364 ns 5 (1982KiZV), 360 ns 40 (1982Ko05).
1881.56 <i>15</i>	19/2 <sup>-</sup>		DE	
1894.4 <i>10</i>			D	
1963.0 <i>8</i>			CD	
1973.3 <i>10</i>			D	
2009.95 <i>21</i>	21/2 <sup>+</sup>		DE	
2025			C	
2054.1 <i>11</i>			D	
2064			C	
2100.9 <i>15</i>			D	
2104			C	
2155			C	
2206			C	
2337.38 <i>e 17</i>	21/2 <sup>+</sup>		DE	
2340.00 <i>b 20</i>	21/2 <sup>-</sup>		E	
2415			C	
2473			C	
2583			C	
2649.6 <i>a 4</i>	19/2 <sup>+</sup>		E	
2687			C	
2771			C	
2832.17 <i>d 17</i>	21/2 <sup>+</sup>		E	
2869			C	
2882.53 <i>f 23</i>	25/2 <sup>+</sup>		E	
2920.30 <i>d 18</i>	23/2 <sup>-</sup>		E	
2931			C	
3002			C	
3041.10 <i>b 20</i>	23/2 <sup>-</sup>		E	
3099.30 <i>e 19</i>	25/2 <sup>+</sup>		E	
3117			C	
3191			C	
3201.10 <i>d 20</i>	25/2 <sup>+</sup>		E	
3249			C	
3251.90 <i>f 21</i>	27/2 <sup>-</sup>		E	
3300			C	
3429.60 <i>d 20</i>	27/2 <sup>-</sup>		E	
3434			C	
3517.3 <i>a 4</i>	23/2 <sup>+</sup>		E	
3539			C	
3543.10 <i>f 23</i>	29/2 <sup>+</sup>		E	

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**Adopted Levels, Gammas (continued)** $^{137}\text{La}$  Levels (continued)

E(level)&	J <sup>π</sup> @	XREF	E(level)&	J <sup>π</sup> @	XREF
3547.31 21	25/2 <sup>-</sup>	E	4940.2 3	(31/2 <sup>-</sup> )	E
3589.71 <sup>b</sup> 20	25/2 <sup>-</sup>	E	5120.8 3	(31/2 <sup>-</sup> )	E
3846.1 <sup>f</sup> 3	31/2 <sup>-</sup>	E	5254.6 <sup>c</sup> 3	33/2 <sup>-</sup>	E
3934.30 <sup>e</sup> 21	29/2 <sup>+</sup>	E	5470.71 <sup>e</sup> 25	35/2 <sup>-</sup>	E
3963.71 <sup>b</sup> 21	27/2 <sup>-</sup>	E	5541.2 <sup>b</sup> 4	(31/2,33/2)	E
4030.5 3	(27/2,29/2)	E	5771.2 <sup>c</sup> 4	(35/2 <sup>-</sup> )	E
4105.3 3	(27/2,29/2)	E	5882.3 <sup>f</sup> 4	(37/2 <sup>-</sup> )	E
4108.11 24	25/2 <sup>-</sup>	E	5985.3 <sup>c</sup> 4	(39/2 <sup>-</sup> )	E
4346.71 <sup>c</sup> 20	27/2 <sup>-</sup>	E	7846	(3/2 <sup>+</sup> ) <sup>#</sup>	F
4485.8 <sup>b</sup> 3	29/2 <sup>-</sup>	E	8133	(1/2 <sup>+</sup> ) <sup>#</sup>	F
4548.41 <sup>e</sup> 21	31/2 <sup>-</sup>	E	9609	(7/2 <sup>-</sup> ) <sup>#</sup>	F
4583.8 4	33/2 <sup>-</sup>	E	9985	(3/2 <sup>-</sup> ) <sup>#</sup>	F
4609.91 <sup>c</sup> 22	29/2 <sup>-</sup>	E	10461	(1/2 <sup>-</sup> ) <sup>#</sup>	F
4896.71 <sup>c</sup> 24	31/2 <sup>-</sup>	E	10636	(5/2 <sup>-</sup> ,7/2 <sup>-</sup> ) <sup>#</sup>	F
4896.72 <sup>e</sup> 23	33/2 <sup>+</sup>	E	11130	(5/2 <sup>-</sup> ,7/2 <sup>-</sup> ) <sup>#</sup>	F
4918.1 <sup>f</sup> 4	33/2 <sup>-</sup>	E	11188	(1/2 <sup>-</sup> ,3/2 <sup>-</sup> ) <sup>#</sup>	F

† T<sub>1/2</sub> ≤ 1.5 ns for all excited states seen in (p,2nγ), except for the 10.6- and 1869-keV levels.

‡ From analysis of γ(θ) and α(K)exp for γ from (p,2nγ).

# From analysis of isobaric analog resonances in (p,p).

@ Configuration from 2006Ch38, 1982Ko05, and 1975He20.

& Deduced by evaluators from a least-squares fit to adopted γ-ray energies.

<sup>a</sup> Band(A): g.s. Band.

<sup>b</sup> Band(B): γ sequence based on 19/2<sup>-</sup>.

<sup>c</sup> Band(C): γ sequence based on 27/2<sup>-</sup>.

<sup>d</sup> Band(D): Sequence of E1 transitions based on 21/2<sup>+</sup>.

<sup>e</sup> Band(E): Sequence of E1 transitions based on 19/2<sup>-</sup>.

<sup>f</sup> Band(F): γ sequence based on 13/2<sup>+</sup>.

**Adopted Levels, Gammas (continued)**

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\dagger$	$E_f$	$J_f^\pi$	Mult. <sup>†</sup>	$\gamma(^{137}\text{La})$		Comments
							$\alpha^{\textcircled{a}}$		
10.59	5/2 <sup>+</sup>	10.61 <sup>‡</sup> 5	100 <sup>‡</sup>	0.0	7/2 <sup>+</sup>	M1	117.6	24	$\alpha(\text{L})=93.2$ 19; $\alpha(\text{M})=19.4$ 4; $\alpha(\text{N}+..)=5.01$ 10 $\alpha(\text{N})=4.26$ 9; $\alpha(\text{O})=0.690$ 14; $\alpha(\text{P})=0.0528$ 11 B(M1)(W.u.)=0.00175 11 Mult.: From <sup>137</sup> Ce $\epsilon$ decay (9.0 h).
447.17	5/2 <sup>+</sup>	436.59 <sup>‡</sup> 9	15.0 <sup>‡</sup> 5	10.59	5/2 <sup>+</sup>	E2	0.01509		$\alpha(\text{K})=0.01254$ 18; $\alpha(\text{L})=0.00201$ 3; $\alpha(\text{M})=0.000424$ 6; $\alpha(\text{N}+..)=0.0001075$ 15 $\alpha(\text{N})=9.21 \times 10^{-5}$ 13; $\alpha(\text{O})=1.444 \times 10^{-5}$ 21; $\alpha(\text{P})=8.78 \times 10^{-7}$ 13 Mult.: From <sup>137</sup> Ce $\epsilon$ decay (9.0 h).
		447.15 <sup>‡</sup> 8	100 <sup>‡</sup> 5	0.0	7/2 <sup>+</sup>	M1+E2	0.0165	25	$\alpha(\text{K})=0.0140$ 23; $\alpha(\text{L})=0.00199$ 13; $\alpha(\text{M})=0.000416$ 24; $\alpha(\text{N}+..)=0.000107$ 7 $\alpha(\text{N})=9.1 \times 10^{-5}$ 6; $\alpha(\text{O})=1.46 \times 10^{-5}$ 12; $\alpha(\text{P})=1.04 \times 10^{-6}$ 22 Mult.: From <sup>137</sup> Ce $\epsilon$ decay (9.0 h).
493.09	(3/2) <sup>+</sup>	482.47 <sup>‡</sup> 10	100 <sup>‡</sup> 4	10.59	5/2 <sup>+</sup>	M1+E2	0.0135	22	$\alpha(\text{K})=0.0115$ 20; $\alpha(\text{L})=0.00161$ 14; $\alpha(\text{M})=0.00034$ 3; $\alpha(\text{N}+..)=8.6 \times 10^{-5}$ 8 $\alpha(\text{N})=7.4 \times 10^{-5}$ 6; $\alpha(\text{O})=1.18 \times 10^{-5}$ 12; $\alpha(\text{P})=8.5 \times 10^{-7}$ 18
641.96	1/2 <sup>+</sup>	493.03 <sup>‡</sup> 10 148.83 <sup>‡</sup> 8 631.38 <sup>‡</sup> 6	23 <sup>‡</sup> 1 6.7 <sup>‡</sup> 27 100 <sup>‡</sup> 5	0.0 493.09 10.59	7/2 <sup>+</sup> (3/2) <sup>+</sup> 5/2 <sup>+</sup>	E2	0.00558		$\alpha(\text{K})=0.00472$ 7; $\alpha(\text{L})=0.000681$ 10; $\alpha(\text{M})=0.0001424$ 20; $\alpha(\text{N}+..)=3.64 \times 10^{-5}$ 5 $\alpha(\text{N})=3.11 \times 10^{-5}$ 5; $\alpha(\text{O})=4.95 \times 10^{-6}$ 7; $\alpha(\text{P})=3.40 \times 10^{-7}$ 5 Mult.: From <sup>137</sup> Ce $\epsilon$ decay (9.0 h).
709.30	(3/2) <sup>+</sup>	698.72 <sup>‡</sup> 11	100 <sup>‡</sup> 5	10.59	5/2 <sup>+</sup>	M1+(E2)	0.0053	10	$\alpha(\text{K})=0.0046$ 9; $\alpha(\text{L})=0.00061$ 9; $\alpha(\text{M})=0.000126$ 18; $\alpha(\text{N}+..)=3.2 \times 10^{-5}$ 5 $\alpha(\text{N})=2.8 \times 10^{-5}$ 4; $\alpha(\text{O})=4.5 \times 10^{-6}$ 7; $\alpha(\text{P})=3.4 \times 10^{-7}$ 8 Mult.: From <sup>137</sup> Ce $\epsilon$ decay (9.0 h).
762.27	11/2 <sup>+</sup>	709.30 <sup>‡</sup> 11 762.3 <sup>#</sup> 1	3.4 <sup>‡</sup> 6 100 <sup>#</sup>	0.0 0.0	7/2 <sup>+</sup> 7/2 <sup>+</sup>	E2	0.00352		$\alpha(\text{K})=0.00300$ 5; $\alpha(\text{L})=0.000416$ 6; $\alpha(\text{M})=8.66 \times 10^{-5}$ 13; $\alpha(\text{N}+..)=2.22 \times 10^{-5}$ 4 $\alpha(\text{N})=1.89 \times 10^{-5}$ 3; $\alpha(\text{O})=3.04 \times 10^{-6}$ 5; $\alpha(\text{P})=2.18 \times 10^{-7}$ 3 Mult.: From <sup>137</sup> Ce $\epsilon$ decay (34.4 h).
781.57	(7/2) <sup>+</sup>	770.97 <sup>‡</sup> 10	100 <sup>‡</sup> 6	10.59	5/2 <sup>+</sup>	M1+E2	0.0042	8	$\alpha(\text{K})=0.0036$ 7; $\alpha(\text{L})=0.00048$ 8; $\alpha(\text{M})=9.9 \times 10^{-5}$ 15; $\alpha(\text{N}+..)=2.5 \times 10^{-5}$ 4 $\alpha(\text{N})=2.2 \times 10^{-5}$ 4; $\alpha(\text{O})=3.5 \times 10^{-6}$ 6; $\alpha(\text{P})=2.7 \times 10^{-7}$ 6
835.37	9/2 <sup>+</sup>	781.57 <sup>‡</sup> 13 824.82 <sup>#</sup> 12	50 <sup>‡</sup> 6 100 <sup>#</sup> 5	0.0 10.59	7/2 <sup>+</sup> 5/2 <sup>+</sup>	E2	0.00293		$\alpha(\text{K})=0.00250$ 4; $\alpha(\text{L})=0.000342$ 5; $\alpha(\text{M})=7.11 \times 10^{-5}$ 10;

**Adopted Levels, Gammas (continued)**

$\gamma(^{137}\text{La})$  (continued)

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\dagger$	$E_f$	$J_f^\pi$	Mult. <sup>†</sup>	$\alpha^@$	Comments
								$\alpha(\text{N+..})=1.82\times 10^{-5}$ 3 $\alpha(\text{N})=1.556\times 10^{-5}$ 22; $\alpha(\text{O})=2.50\times 10^{-6}$ 4; $\alpha(\text{P})=1.82\times 10^{-7}$ 3 Mult.: From <sup>137</sup> Ce $\epsilon$ decay (34.4 h).
835.37	9/2 <sup>+</sup>	835.38 <sup>#</sup> 12	23 <sup>#</sup> 1	0.0	7/2 <sup>+</sup>	M1+E2	0.0035 7	$\alpha(\text{K})=0.0030$ 6; $\alpha(\text{L})=0.00039$ 6; $\alpha(\text{M})=8.1\times 10^{-5}$ 13; $\alpha(\text{N+..})=2.1\times 10^{-5}$ 4 $\alpha(\text{N})=1.8\times 10^{-5}$ 3; $\alpha(\text{O})=2.9\times 10^{-6}$ 5; $\alpha(\text{P})=2.2\times 10^{-7}$ 5
917.44	9/2 <sup>+</sup>	906.84 <sup>#</sup> 16 917.45 <sup>#</sup> 17	22 <sup>#</sup> 4 100 <sup>#</sup> 17	10.59 0.0	5/2 <sup>+</sup> 7/2 <sup>+</sup>	Q M1+E2	0.0028 5	$\alpha(\text{K})=0.0024$ 5; $\alpha(\text{L})=0.00031$ 5; $\alpha(\text{M})=6.5\times 10^{-5}$ 10; $\alpha(\text{N+..})=1.7\times 10^{-5}$ 3 $\alpha(\text{N})=1.42\times 10^{-5}$ 22; $\alpha(\text{O})=2.3\times 10^{-6}$ 4; $\alpha(\text{P})=1.8\times 10^{-7}$ 4
926.33	5/2 <sup>+</sup>	217.03 <sup>‡</sup> 5 433.22 <sup>‡</sup> 9	7.6 <sup>‡</sup> 10 100 <sup>‡</sup> 2	709.30 493.09	(3/2) <sup>+</sup> (3/2) <sup>+</sup>	E2+M1	0.018 3	$\alpha(\text{K})=0.0152$ 24; $\alpha(\text{L})=0.00218$ 13; $\alpha(\text{M})=0.000455$ 22; $\alpha(\text{N+..})=0.000117$ 7 $\alpha(\text{N})=0.000100$ 6; $\alpha(\text{O})=1.59\times 10^{-5}$ 12; $\alpha(\text{P})=1.12\times 10^{-6}$ 23
		479.12 <sup>‡</sup> 10	23 <sup>‡</sup> 1	447.17	5/2 <sup>+</sup>	E2+M1	0.0138 22	$\alpha(\text{K})=0.0117$ 20; $\alpha(\text{L})=0.00164$ 14; $\alpha(\text{M})=0.00034$ 3; $\alpha(\text{N+..})=8.8\times 10^{-5}$ 8 $\alpha(\text{N})=7.5\times 10^{-5}$ 6; $\alpha(\text{O})=1.20\times 10^{-5}$ 12; $\alpha(\text{P})=8.7\times 10^{-7}$ 19
		915.80 <sup>‡</sup> 13	99 <sup>‡</sup> 3	10.59	5/2 <sup>+</sup>	(M1+E2)	0.0028 5	$\alpha(\text{K})=0.0024$ 5; $\alpha(\text{L})=0.00031$ 5; $\alpha(\text{M})=6.5\times 10^{-5}$ 10; $\alpha(\text{N+..})=1.7\times 10^{-5}$ 3 $\alpha(\text{N})=1.43\times 10^{-5}$ 22; $\alpha(\text{O})=2.3\times 10^{-6}$ 4; $\alpha(\text{P})=1.8\times 10^{-7}$ 4 Mult.: From <sup>137</sup> Ce $\epsilon$ decay (9.0 h).
		926.35 <sup>‡</sup> 13	65 <sup>‡</sup> 2	0.0	7/2 <sup>+</sup>	M1+E2	0.0027 5	$\alpha(\text{K})=0.0024$ 5; $\alpha(\text{L})=0.00031$ 5; $\alpha(\text{M})=6.3\times 10^{-5}$ 10; $\alpha(\text{N+..})=1.6\times 10^{-5}$ 3 $\alpha(\text{N})=1.39\times 10^{-5}$ 22; $\alpha(\text{O})=2.3\times 10^{-6}$ 4; $\alpha(\text{P})=1.8\times 10^{-7}$ 4 Mult.: From <sup>137</sup> Ce $\epsilon$ decay (9.0 h).
1004.62	11/2 <sup>-</sup>	87.2 <sup>#</sup> 2	2.0 <sup>#</sup> 3	917.44	9/2 <sup>+</sup>	[E1]	0.343 6	$\alpha(\text{K})=0.292$ 5; $\alpha(\text{L})=0.0408$ 7; $\alpha(\text{M})=0.00842$ 13; $\alpha(\text{N+..})=0.00212$ 4 $\alpha(\text{N})=0.00182$ 3; $\alpha(\text{O})=0.000283$ 5; $\alpha(\text{P})=1.75\times 10^{-5}$ 3 B(E1)(W.u.)=1.6 $\times 10^{-5}$ 4
		169.26 <sup>#</sup> 4	100 <sup>#</sup> 6	835.37	9/2 <sup>+</sup>	E1	0.0550	$\alpha(\text{K})=0.0471$ 7; $\alpha(\text{L})=0.00625$ 9; $\alpha(\text{M})=0.001290$ 18; $\alpha(\text{N+..})=0.000328$ 5 $\alpha(\text{N})=0.000281$ 4; $\alpha(\text{O})=4.46\times 10^{-5}$ 7; $\alpha(\text{P})=3.07\times 10^{-6}$ 5 B(E1)(W.u.)=0.000113 22 Mult.: From <sup>137</sup> Ce $\epsilon$ decay (34.4 h).
		993.81 <sup>#</sup> 21	0.45 <sup>#</sup> 6	10.59	5/2 <sup>+</sup>	[E3]	0.00411	$\alpha(\text{K})=0.00345$ 5; $\alpha(\text{L})=0.000518$ 8; $\alpha(\text{M})=0.0001088$ 16; $\alpha(\text{N+..})=2.78\times 10^{-5}$ 4 $\alpha(\text{N})=2.38\times 10^{-5}$ 4; $\alpha(\text{O})=3.79\times 10^{-6}$ 6; $\alpha(\text{P})=2.61\times 10^{-7}$ 4 B(E3)(W.u.)=11.0 25

**Adopted Levels, Gammas (continued)**

$\gamma(^{137}\text{La})$  (continued)

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\dagger$	$E_f$	$J_f^\pi$	Mult. <sup>†</sup>	$\delta$	$\alpha^@$	Comments
1004.62	11/2 <sup>-</sup>	1004.49 <sup>#</sup> 20	5.1 <sup>#</sup> 6	0.0	7/2 <sup>+</sup>	M2+(E3)	<0.8	0.0061 6	$\alpha(\text{K})=0.0052$ 5; $\alpha(\text{L})=0.00071$ 5; $\alpha(\text{M})=0.000147$ 11; $\alpha(\text{N+..})=3.8\times 10^{-5}$ 3 $\alpha(\text{N})=3.24\times 10^{-5}$ 23; $\alpha(\text{O})=5.3\times 10^{-6}$ 4; $\alpha(\text{P})=4.1\times 10^{-7}$ 4 Mult.: From <sup>137</sup> Ce $\epsilon$ decay (34.4 h).
1171.37	(1/2 <sup>+</sup> , 3/2 <sup>-</sup> )	529.3 <sup>‡</sup> 2 678.26 <sup>‡</sup> 12 724.4 <sup>‡</sup> 3 1160.85 <sup>‡</sup> 22	24 <sup>‡</sup> 12 60 <sup>‡</sup> 24 48 <sup>‡</sup> 24 100 <sup>‡</sup> 10	641.96 493.09 447.17 10.59	1/2 <sup>+</sup> (3/2) <sup>+</sup> 5/2 <sup>+</sup> 5/2 <sup>+</sup>				
1174.4		681.3	100	493.09	(3/2) <sup>+</sup>				
1255.1		250.5	100	1004.62	11/2 <sup>-</sup>				
1314.3		867.1	100	447.17	5/2 <sup>+</sup>	Q			
1365.0		871.9	100	493.09	(3/2) <sup>+</sup>				
1473.9	(7/2) <sup>+</sup>	711.6	100	762.27	11/2 <sup>+</sup>	E2		0.00415	$\alpha(\text{K})=0.00353$ 5; $\alpha(\text{L})=0.000496$ 7; $\alpha(\text{M})=0.0001034$ 15; $\alpha(\text{N+..})=2.65\times 10^{-5}$ 4 $\alpha(\text{N})=2.26\times 10^{-5}$ 4; $\alpha(\text{O})=3.62\times 10^{-6}$ 5; $\alpha(\text{P})=2.56\times 10^{-7}$ 4
1535.4		753.8	100	781.57	(7/2) <sup>+</sup>	D			
1651.6	(9/2) <sup>-</sup>	647.0	100	1004.62	11/2 <sup>-</sup>	M1		0.00758	$\alpha(\text{K})=0.00652$ 10; $\alpha(\text{L})=0.000839$ 12; $\alpha(\text{M})=0.0001736$ 25; $\alpha(\text{N+..})=4.49\times 10^{-5}$ 7 $\alpha(\text{N})=3.82\times 10^{-5}$ 6; $\alpha(\text{O})=6.24\times 10^{-6}$ 9; $\alpha(\text{P})=4.97\times 10^{-7}$ 7
1723.16	13/2 <sup>+</sup>	887.7 7	100 19	835.37	9/2 <sup>+</sup>	E2		0.00248	$\alpha(\text{K})=0.00212$ 3; $\alpha(\text{L})=0.000286$ 4; $\alpha(\text{M})=5.95\times 10^{-5}$ 9; $\alpha(\text{N+..})=1.528\times 10^{-5}$ 22 $\alpha(\text{N})=1.303\times 10^{-5}$ 19; $\alpha(\text{O})=2.10\times 10^{-6}$ 3; $\alpha(\text{P})=1.549\times 10^{-7}$ 22
1728.53	13/2 <sup>-</sup>	961.0 2 723.9 1	81 15 100	762.27 1004.62	11/2 <sup>+</sup> 11/2 <sup>-</sup>	D M1+E2		0.0049 9	$\alpha(\text{K})=0.0042$ 8; $\alpha(\text{L})=0.00056$ 9; $\alpha(\text{M})=0.000115$ 17; $\alpha(\text{N+..})=3.0\times 10^{-5}$ 5 $\alpha(\text{N})=2.5\times 10^{-5}$ 4; $\alpha(\text{O})=4.1\times 10^{-6}$ 7; $\alpha(\text{P})=3.1\times 10^{-7}$ 7
1786.74	15/2 <sup>-</sup>	58.2 2		1728.53	13/2 <sup>-</sup>	M1		5.16 9	$\alpha(\text{K})=4.40$ 8; $\alpha(\text{L})=0.601$ 11; $\alpha(\text{M})=0.1249$ 22; $\alpha(\text{N+..})=0.0322$ 6 $\alpha(\text{N})=0.0274$ 5; $\alpha(\text{O})=0.00446$ 8; $\alpha(\text{P})=0.000344$ 6
		782.1 1	100	1004.62	11/2 <sup>-</sup>	E2		0.00332	$\alpha(\text{K})=0.00283$ 4; $\alpha(\text{L})=0.000390$ 6; $\alpha(\text{M})=8.11\times 10^{-5}$ 12; $\alpha(\text{N+..})=2.08\times 10^{-5}$ 3 $\alpha(\text{N})=1.775\times 10^{-5}$ 25; $\alpha(\text{O})=2.85\times 10^{-6}$ 4; $\alpha(\text{P})=2.06\times 10^{-7}$ 3
1791.8	15/2 <sup>+</sup>	1029.6	100	762.27	11/2 <sup>+</sup>	E2		0.00180	$\alpha(\text{K})=0.001539$ 22; $\alpha(\text{L})=0.000203$ 3; $\alpha(\text{M})=4.21\times 10^{-5}$ 6; $\alpha(\text{N+..})=1.084\times 10^{-5}$ 16 $\alpha(\text{N})=9.24\times 10^{-6}$ 13; $\alpha(\text{O})=1.494\times 10^{-6}$ 21; $\alpha(\text{P})=1.127\times 10^{-7}$ 16
1801.0		796.4	100	1004.62	11/2 <sup>-</sup>				

**Adopted Levels, Gammas (continued)**

$\gamma(^{137}\text{La})$  (continued)

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\dagger$	$E_f$	$J_f^\pi$	Mult. $^\dagger$	$\alpha^@$	Comments
1863.96	(17/2) <sup>+</sup>	72.2 2	44 9	1791.8	15/2 <sup>+</sup>	M1	2.76 5	$\alpha(\text{K})=2.35$ 4; $\alpha(\text{L})=0.320$ 6; $\alpha(\text{M})=0.0666$ 11; $\alpha(\text{N}+..)=0.0172$ 3 $\alpha(\text{N})=0.01464$ 24; $\alpha(\text{O})=0.00238$ 4; $\alpha(\text{P})=0.000184$ 3
		140.9 2	100 22	1723.16	13/2 <sup>+</sup>	E2	0.594	$\alpha(\text{K})=0.420$ 7; $\alpha(\text{L})=0.1366$ 21; $\alpha(\text{M})=0.0299$ 5; $\alpha(\text{N}+..)=0.00732$ 12 $\alpha(\text{N})=0.00637$ 10; $\alpha(\text{O})=0.000926$ 14; $\alpha(\text{P})=2.43 \times 10^{-5}$ 4
1869.50	19/2 <sup>-</sup>	83.2	100	1786.74	15/2 <sup>-</sup>	E2	3.85	$\alpha(\text{K})=2.07$ 3; $\alpha(\text{L})=1.392$ 20; $\alpha(\text{M})=0.309$ 5; $\alpha(\text{N}+..)=0.0747$ 11 $\alpha(\text{N})=0.0654$ 10; $\alpha(\text{O})=0.00922$ 13; $\alpha(\text{P})=0.0001083$ 16 B(E2)(W.u.)=2.04 20
1881.56	19/2 <sup>-</sup>	94.8 1	100	1786.74	15/2 <sup>-</sup>	E2	2.41	$\alpha(\text{K})=1.424$ 21; $\alpha(\text{L})=0.770$ 12; $\alpha(\text{M})=0.170$ 3; $\alpha(\text{N}+..)=0.0413$ 7 $\alpha(\text{N})=0.0361$ 6; $\alpha(\text{O})=0.00513$ 8; $\alpha(\text{P})=7.60 \times 10^{-5}$ 11
1894.4		889.8	100	1004.62	11/2 <sup>-</sup>			
1963.0		957.5	100	1004.62	11/2 <sup>-</sup>			
1973.3		968.7	100	1004.62	11/2 <sup>-</sup>			
2009.95	21/2 <sup>+</sup>	46.1		1963.0				
		146.1 2	100	1863.96	(17/2) <sup>+</sup>	E2	0.523	$\alpha(\text{K})=0.374$ 6; $\alpha(\text{L})=0.1173$ 18; $\alpha(\text{M})=0.0256$ 4; $\alpha(\text{N}+..)=0.00628$ 10 $\alpha(\text{N})=0.00546$ 9; $\alpha(\text{O})=0.000797$ 12; $\alpha(\text{P})=2.18 \times 10^{-5}$ 4
2054.1		262.3	100	1791.8	15/2 <sup>+</sup>			
2100.9		206.5	100	1894.4				
2337.38	21/2 <sup>+</sup>	455.8 1	100	1881.56	19/2 <sup>-</sup>	E1	0.00424	$\alpha(\text{K})=0.00365$ 6; $\alpha(\text{L})=0.000465$ 7; $\alpha(\text{M})=9.59 \times 10^{-5}$ 14; $\alpha(\text{N}+..)=2.47 \times 10^{-5}$ 4 $\alpha(\text{N})=2.10 \times 10^{-5}$ 3; $\alpha(\text{O})=3.40 \times 10^{-6}$ 5; $\alpha(\text{P})=2.57 \times 10^{-7}$ 4
2340.00	21/2 <sup>-</sup>	470.5 1	100	1869.50	19/2 <sup>-</sup>	M1	0.01665	$\alpha(\text{K})=0.01430$ 20; $\alpha(\text{L})=0.00186$ 3; $\alpha(\text{M})=0.000385$ 6; $\alpha(\text{N}+..)=9.97 \times 10^{-5}$ 14 $\alpha(\text{N})=8.48 \times 10^{-5}$ 12; $\alpha(\text{O})=1.383 \times 10^{-5}$ 20; $\alpha(\text{P})=1.096 \times 10^{-6}$ 16
2649.6	19/2 <sup>+</sup>	857.8 2	100	1791.8	15/2 <sup>+</sup>	E2	0.00268	$\alpha(\text{K})=0.00229$ 4; $\alpha(\text{L})=0.000311$ 5; $\alpha(\text{M})=6.46 \times 10^{-5}$ 9; $\alpha(\text{N}+..)=1.659 \times 10^{-5}$ 24 $\alpha(\text{N})=1.414 \times 10^{-5}$ 20; $\alpha(\text{O})=2.28 \times 10^{-6}$ 4; $\alpha(\text{P})=1.671 \times 10^{-7}$ 24
2832.17	21/2 <sup>+</sup>	950.6 1	100	1881.56	19/2 <sup>-</sup>	E1	$8.84 \times 10^{-4}$	$\alpha(\text{K})=0.000765$ 11; $\alpha(\text{L})=9.47 \times 10^{-5}$ 14; $\alpha(\text{M})=1.95 \times 10^{-5}$ 3; $\alpha(\text{N}+..)=5.03 \times 10^{-6}$ 7 $\alpha(\text{N})=4.28 \times 10^{-6}$ 6; $\alpha(\text{O})=6.96 \times 10^{-7}$ 10; $\alpha(\text{P})=5.49 \times 10^{-8}$ 8
2882.53	25/2 <sup>+</sup>	872.6 2	100	2009.95	21/2 <sup>+</sup>	E2	0.00258	$\alpha(\text{K})=0.00220$ 3; $\alpha(\text{L})=0.000298$ 5; $\alpha(\text{M})=6.20 \times 10^{-5}$ 9; $\alpha(\text{N}+..)=1.592 \times 10^{-5}$ 23 $\alpha(\text{N})=1.357 \times 10^{-5}$ 19; $\alpha(\text{O})=2.19 \times 10^{-6}$ 3; $\alpha(\text{P})=1.609 \times 10^{-7}$ 23
2920.30	23/2 <sup>-</sup>	88.1 2	23 4	2832.17	21/2 <sup>+</sup>	E1	0.334 6	$\alpha(\text{K})=0.284$ 5; $\alpha(\text{L})=0.0396$ 7; $\alpha(\text{M})=0.00818$ 13; $\alpha(\text{N}+..)=0.00206$ 4 $\alpha(\text{N})=0.00177$ 3; $\alpha(\text{O})=0.000275$ 5; $\alpha(\text{P})=1.70 \times 10^{-5}$ 3
		580.3 1	56 6	2340.00	21/2 <sup>-</sup>	M1+E2	0.0084 15	$\alpha(\text{K})=0.0072$ 14; $\alpha(\text{L})=0.00098$ 12; $\alpha(\text{M})=0.000204$ 24; $\alpha(\text{N}+..)=5.2 \times 10^{-5}$ 7 $\alpha(\text{N})=4.5 \times 10^{-5}$ 6; $\alpha(\text{O})=7.2 \times 10^{-6}$ 10; $\alpha(\text{P})=5.3 \times 10^{-7}$ 12
		582.9 1	100 10	2337.38	21/2 <sup>+</sup>	E1	0.00242	$\alpha(\text{K})=0.00209$ 3; $\alpha(\text{L})=0.000263$ 4; $\alpha(\text{M})=5.42 \times 10^{-5}$ 8; $\alpha(\text{N}+..)=1.396 \times 10^{-5}$ 20 $\alpha(\text{N})=1.189 \times 10^{-5}$ 17; $\alpha(\text{O})=1.93 \times 10^{-6}$ 3; $\alpha(\text{P})=1.481 \times 10^{-7}$ 21

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<sup>137</sup>La<sub>80-7</sub>

From ENSDF

<sup>137</sup>La<sub>80-7</sub>

**Adopted Levels, Gammas (continued)**

$\gamma(^{137}\text{La})$  (continued)

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\dagger$	$E_f$	$J_f^\pi$	Mult. <sup>†</sup>	$\alpha^@$	Comments
2920.30	23/2 <sup>-</sup>	910.4 2	12.0 24	2009.95	21/2 <sup>+</sup>	M2	0.00857	$\alpha(\text{K})=0.00732$ 11; $\alpha(\text{L})=0.000990$ 14; $\alpha(\text{M})=0.000206$ 3; $\alpha(\text{N+..})=5.34\times 10^{-5}$ 8
3041.10	23/2 <sup>-</sup>	701.1 1	41 4	2340.00	21/2 <sup>-</sup>	M1	0.00624	$\alpha(\text{N})=4.54\times 10^{-5}$ 7; $\alpha(\text{O})=7.40\times 10^{-6}$ 11; $\alpha(\text{P})=5.81\times 10^{-7}$ 9 $\alpha(\text{K})=0.00537$ 8; $\alpha(\text{L})=0.000690$ 10; $\alpha(\text{M})=0.0001426$ 20; $\alpha(\text{N+..})=3.69\times 10^{-5}$ 6
		1171.6 1	100 10	1869.50	19/2 <sup>-</sup>	E2	$1.37\times 10^{-3}$	$\alpha(\text{N})=3.14\times 10^{-5}$ 5; $\alpha(\text{O})=5.13\times 10^{-6}$ 8; $\alpha(\text{P})=4.09\times 10^{-7}$ 6 $\alpha(\text{K})=0.001177$ 17; $\alpha(\text{L})=0.0001530$ 22; $\alpha(\text{M})=3.17\times 10^{-5}$ 5; $\alpha(\text{N+..})=1.158\times 10^{-5}$ 17
3099.30	25/2 <sup>+</sup>	179.0 1	100 10	2920.30	23/2 <sup>-</sup>	E1	0.0472	$\alpha(\text{N})=6.94\times 10^{-6}$ 10; $\alpha(\text{O})=1.126\times 10^{-6}$ 16; $\alpha(\text{P})=8.63\times 10^{-8}$ 12; $\alpha(\text{IPF})=3.42\times 10^{-6}$ 5
		216.8 2	58 12	2882.53	25/2 <sup>+</sup>	E2	0.1356	$\alpha(\text{K})=0.0405$ 6; $\alpha(\text{L})=0.00535$ 8; $\alpha(\text{M})=0.001104$ 16; $\alpha(\text{N+..})=0.000281$ 4
3201.10	25/2 <sup>+</sup>	280.8 1	100	2920.30	23/2 <sup>-</sup>	E1	0.01415	$\alpha(\text{N})=0.000240$ 4; $\alpha(\text{O})=3.82\times 10^{-5}$ 6; $\alpha(\text{P})=2.65\times 10^{-6}$ 4 $\alpha(\text{K})=0.1054$ 15; $\alpha(\text{L})=0.0238$ 4; $\alpha(\text{M})=0.00513$ 8; $\alpha(\text{N+..})=0.001273$ 19
3251.90	27/2 <sup>-</sup>	152.6 1	100	3099.30	25/2 <sup>+</sup>	E1	0.0731	$\alpha(\text{N})=0.001101$ 16; $\alpha(\text{O})=0.0001650$ 24; $\alpha(\text{P})=6.66\times 10^{-6}$ 10 $\alpha(\text{K})=0.01216$ 17; $\alpha(\text{L})=0.001577$ 23; $\alpha(\text{M})=0.000325$ 5; $\alpha(\text{N+..})=8.33\times 10^{-5}$ 12
3429.60	27/2 <sup>-</sup>	228.5 1	33 3	3201.10	25/2 <sup>+</sup>	E1	0.0244	$\alpha(\text{N})=7.11\times 10^{-5}$ 10; $\alpha(\text{O})=1.141\times 10^{-5}$ 16; $\alpha(\text{P})=8.30\times 10^{-7}$ 12 $\alpha(\text{K})=0.0626$ 9; $\alpha(\text{L})=0.00835$ 12; $\alpha(\text{M})=0.001723$ 25; $\alpha(\text{N+..})=0.000438$ 7
		330.3 1	100 10	3099.30	25/2 <sup>+</sup>	E1	0.00933	$\alpha(\text{N})=0.000375$ 6; $\alpha(\text{O})=5.94\times 10^{-5}$ 9; $\alpha(\text{P})=4.03\times 10^{-6}$ 6 $\alpha(\text{K})=0.0209$ 3; $\alpha(\text{L})=0.00274$ 4; $\alpha(\text{M})=0.000565$ 8; $\alpha(\text{N+..})=0.0001443$ 21
3517.3	23/2 <sup>+</sup>	867.7 2	100	2649.6	19/2 <sup>+</sup>	E2	0.00261	$\alpha(\text{N})=0.0001232$ 18; $\alpha(\text{O})=1.97\times 10^{-5}$ 3; $\alpha(\text{P})=1.405\times 10^{-6}$ 20 $\alpha(\text{K})=0.00802$ 12; $\alpha(\text{L})=0.001034$ 15; $\alpha(\text{M})=0.000213$ 3; $\alpha(\text{N+..})=5.47\times 10^{-5}$ 8
3543.10	29/2 <sup>+</sup>	291.2 1	100	3251.90	27/2 <sup>-</sup>	E1	0.01287	$\alpha(\text{N})=4.66\times 10^{-5}$ 7; $\alpha(\text{O})=7.51\times 10^{-6}$ 11; $\alpha(\text{P})=5.54\times 10^{-7}$ 8 $\alpha(\text{K})=0.00223$ 4; $\alpha(\text{L})=0.000302$ 5; $\alpha(\text{M})=6.28\times 10^{-5}$ 9; $\alpha(\text{N+..})=1.614\times 10^{-5}$ 23
3547.31	25/2 <sup>-</sup>	506.2 1	100 10	3041.10	23/2 <sup>-</sup>	M1+E2	0.0119 20	$\alpha(\text{N})=1.376\times 10^{-5}$ 20; $\alpha(\text{O})=2.22\times 10^{-6}$ 4; $\alpha(\text{P})=1.629\times 10^{-7}$ 23 $\alpha(\text{K})=0.01107$ 16; $\alpha(\text{L})=0.001433$ 21; $\alpha(\text{M})=0.000296$ 5; $\alpha(\text{N+..})=7.58\times 10^{-5}$ 11
		1207.3 2	34 7	2340.00	21/2 <sup>-</sup>	E2	$1.29\times 10^{-3}$	$\alpha(\text{N})=6.46\times 10^{-5}$ 9; $\alpha(\text{O})=1.038\times 10^{-5}$ 15; $\alpha(\text{P})=7.58\times 10^{-7}$ 11 $\alpha(\text{K})=0.0101$ 18; $\alpha(\text{L})=0.00141$ 14; $\alpha(\text{M})=0.00029$ 3; $\alpha(\text{N+..})=7.6\times 10^{-5}$ 8 $\alpha(\text{N})=6.4\times 10^{-5}$ 6; $\alpha(\text{O})=1.04\times 10^{-5}$ 12; $\alpha(\text{P})=7.5\times 10^{-7}$ 16 $\alpha(\text{K})=0.001107$ 16; $\alpha(\text{L})=0.0001434$ 20; $\alpha(\text{M})=2.97\times 10^{-5}$ 5; $\alpha(\text{N+..})=1.472\times 10^{-5}$ 21



**Adopted Levels, Gammas (continued)**

$\gamma(^{137}\text{La})$  (continued)

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\dagger$	$E_f$	$J_f^\pi$	Mult. $^\ddagger$	$\alpha^@$	Comments
3589.71	25/2 <sup>-</sup>	548.6 1	100 10	3041.10	23/2 <sup>-</sup>	M1+E2	0.0097 17	$\alpha(\text{N})=6.51 \times 10^{-6}$ 10; $\alpha(\text{O})=1.056 \times 10^{-6}$ 15; $\alpha(\text{P})=8.12 \times 10^{-8}$ 12; $\alpha(\text{IPF})=7.07 \times 10^{-6}$ 11 $\alpha(\text{K})=0.0083$ 16; $\alpha(\text{L})=0.00114$ 13; $\alpha(\text{M})=0.00024$ 3; $\alpha(\text{N}+..)=6.1 \times 10^{-5}$ 7
		1249.7 1	70 7	2340.00	21/2 <sup>-</sup>	E2	$1.21 \times 10^{-3}$	$\alpha(\text{N})=5.2 \times 10^{-5}$ 6; $\alpha(\text{O})=8.4 \times 10^{-6}$ 11; $\alpha(\text{P})=6.1 \times 10^{-7}$ 14 $\alpha(\text{K})=0.001032$ 15; $\alpha(\text{L})=0.0001333$ 19; $\alpha(\text{M})=2.76 \times 10^{-5}$ 4; $\alpha(\text{N}+..)=2.00 \times 10^{-5}$ 3
3846.1	31/2 <sup>-</sup>	303.0 1	100	3543.10	29/2 <sup>+</sup>	E1	0.01162	$\alpha(\text{N})=6.05 \times 10^{-6}$ 9; $\alpha(\text{O})=9.82 \times 10^{-7}$ 14; $\alpha(\text{P})=7.57 \times 10^{-8}$ 11; $\alpha(\text{IPF})=1.294 \times 10^{-5}$ 19 $\alpha(\text{K})=0.00999$ 14; $\alpha(\text{L})=0.001292$ 19; $\alpha(\text{M})=0.000267$ 4; $\alpha(\text{N}+..)=6.83 \times 10^{-5}$ 10
3934.30	29/2 <sup>+</sup>	504.7 1	100	3429.60	27/2 <sup>-</sup>	E1	0.00335	$\alpha(\text{N})=5.83 \times 10^{-5}$ 9; $\alpha(\text{O})=9.36 \times 10^{-6}$ 14; $\alpha(\text{P})=6.86 \times 10^{-7}$ 10 $\alpha(\text{K})=0.00288$ 4; $\alpha(\text{L})=0.000366$ 6; $\alpha(\text{M})=7.54 \times 10^{-5}$ 11; $\alpha(\text{N}+..)=1.94 \times 10^{-5}$ 3
3963.71	27/2 <sup>-</sup>	374.0 1	100 10	3589.71	25/2 <sup>-</sup>	M1	0.0298	$\alpha(\text{N})=1.652 \times 10^{-5}$ 24; $\alpha(\text{O})=2.67 \times 10^{-6}$ 4; $\alpha(\text{P})=2.04 \times 10^{-7}$ 3 $\alpha(\text{K})=0.0256$ 4; $\alpha(\text{L})=0.00336$ 5; $\alpha(\text{M})=0.000695$ 10; $\alpha(\text{N}+..)=0.000180$ 3
		416.4 1	50 5	3547.31	25/2 <sup>-</sup>	M1	0.0227	$\alpha(\text{N})=0.0001529$ 22; $\alpha(\text{O})=2.49 \times 10^{-5}$ 4; $\alpha(\text{P})=1.97 \times 10^{-6}$ 3 $\alpha(\text{K})=0.0195$ 3; $\alpha(\text{L})=0.00254$ 4; $\alpha(\text{M})=0.000527$ 8; $\alpha(\text{N}+..)=0.0001362$ 19
4030.5	(27/2,29/2)	483.2 2	100	3547.31	25/2 <sup>-</sup>			$\alpha(\text{N})=0.0001159$ 17; $\alpha(\text{O})=1.89 \times 10^{-5}$ 3; $\alpha(\text{P})=1.495 \times 10^{-6}$ 21
4105.3	(27/2,29/2)	558.0 2	100	3547.31	25/2 <sup>-</sup>			
4108.11	25/2 <sup>-</sup>	1067.0 2	100	3041.10	23/2 <sup>-</sup>	M1+E2	0.0020 4	$\alpha(\text{K})=0.0017$ 3; $\alpha(\text{L})=0.00022$ 4; $\alpha(\text{M})=4.6 \times 10^{-5}$ 7; $\alpha(\text{N}+..)=1.18 \times 10^{-5}$ 18
4346.71	27/2 <sup>-</sup>	238.6 2	24 5	4108.11	25/2 <sup>-</sup>	M1+E2	0.0978 16	$\alpha(\text{N})=1.00 \times 10^{-5}$ 15; $\alpha(\text{O})=1.6 \times 10^{-6}$ 3; $\alpha(\text{P})=1.28 \times 10^{-7}$ 24 $\alpha(\text{K})=0.080$ 3; $\alpha(\text{L})=0.014$ 3; $\alpha(\text{M})=0.0029$ 7; $\alpha(\text{N}+..)=0.00074$ 15
		757.0 1	100 10	3589.71	25/2 <sup>-</sup>	M1	0.00519	$\alpha(\text{N})=0.00063$ 13; $\alpha(\text{O})=9.9 \times 10^{-5}$ 17; $\alpha(\text{P})=5.7 \times 10^{-6}$ 8 $\alpha(\text{K})=0.00447$ 7; $\alpha(\text{L})=0.000572$ 8; $\alpha(\text{M})=0.0001183$ 17; $\alpha(\text{N}+..)=3.06 \times 10^{-5}$ 5
		799.4 2	21 4	3547.31	25/2 <sup>-</sup>	M1	0.00456	$\alpha(\text{N})=2.60 \times 10^{-5}$ 4; $\alpha(\text{O})=4.25 \times 10^{-6}$ 6; $\alpha(\text{P})=3.40 \times 10^{-7}$ 5 $\alpha(\text{K})=0.00393$ 6; $\alpha(\text{L})=0.000502$ 7; $\alpha(\text{M})=0.0001037$ 15; $\alpha(\text{N}+..)=2.69 \times 10^{-5}$ 4
		917.1 2	21 4	3429.60	27/2 <sup>-</sup>	M1	0.00330	$\alpha(\text{N})=2.28 \times 10^{-5}$ 4; $\alpha(\text{O})=3.73 \times 10^{-6}$ 6; $\alpha(\text{P})=2.98 \times 10^{-7}$ 5 $\alpha(\text{K})=0.00284$ 4; $\alpha(\text{L})=0.000362$ 5; $\alpha(\text{M})=7.47 \times 10^{-5}$ 11; $\alpha(\text{N}+..)=1.93 \times 10^{-5}$ 3
		1094.8 2	14 3	3251.90	27/2 <sup>-</sup>	M1	0.00219	$\alpha(\text{N})=1.644 \times 10^{-5}$ 23; $\alpha(\text{O})=2.69 \times 10^{-6}$ 4; $\alpha(\text{P})=2.15 \times 10^{-7}$ 3 $\alpha(\text{K})=0.00189$ 3; $\alpha(\text{L})=0.000239$ 4; $\alpha(\text{M})=4.93 \times 10^{-5}$ 7;

**Adopted Levels, Gammas (continued)**

$\gamma(^{137}\text{La})$  (continued)

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\dagger$	$E_f$	$J_f^\pi$	Mult. $^\dagger$	$\alpha^@$	Comments
4485.8	29/2 <sup>-</sup>	522.1 2	100	3963.71	27/2 <sup>-</sup>	M1	0.01284	$\alpha(\text{N+..})=1.276 \times 10^{-5}$ 18 $\alpha(\text{N})=1.084 \times 10^{-5}$ 16; $\alpha(\text{O})=1.774 \times 10^{-6}$ 25; $\alpha(\text{P})=1.426 \times 10^{-7}$ 20 $\alpha(\text{K})=0.01104$ 16; $\alpha(\text{L})=0.001431$ 20; $\alpha(\text{M})=0.000296$ 5; $\alpha(\text{N+..})=7.66 \times 10^{-5}$ 11
4548.41	31/2 <sup>-</sup>	201.7 1	44 4	4346.71	27/2 <sup>-</sup>	E2	0.1729	$\alpha(\text{N})=6.51 \times 10^{-5}$ 10; $\alpha(\text{O})=1.063 \times 10^{-5}$ 15; $\alpha(\text{P})=8.44 \times 10^{-7}$ 12 $\alpha(\text{K})=0.1329$ 19; $\alpha(\text{L})=0.0316$ 5; $\alpha(\text{M})=0.00681$ 10; $\alpha(\text{N+..})=0.001688$ 24
		614.1 1	100 10	3934.30	29/2 <sup>+</sup>	E1	0.00216	$\alpha(\text{N})=0.001462$ 21; $\alpha(\text{O})=0.000218$ 3; $\alpha(\text{P})=8.28 \times 10^{-6}$ 12 $\alpha(\text{K})=0.00186$ 3; $\alpha(\text{L})=0.000234$ 4; $\alpha(\text{M})=4.83 \times 10^{-5}$ 7; $\alpha(\text{N+..})=1.244 \times 10^{-5}$ 18
		1118.8 2	31 6	3429.60	27/2 <sup>-</sup>	E2	$1.51 \times 10^{-3}$	$\alpha(\text{N})=1.059 \times 10^{-5}$ 15; $\alpha(\text{O})=1.717 \times 10^{-6}$ 24; $\alpha(\text{P})=1.324 \times 10^{-7}$ 19 $\alpha(\text{K})=0.001294$ 19; $\alpha(\text{L})=0.0001691$ 24; $\alpha(\text{M})=3.50 \times 10^{-5}$ 5; $\alpha(\text{N+..})=9.76 \times 10^{-6}$ 14 $\alpha(\text{N})=7.68 \times 10^{-6}$ 11; $\alpha(\text{O})=1.244 \times 10^{-6}$ 18; $\alpha(\text{P})=9.48 \times 10^{-8}$ 14; $\alpha(\text{IPF})=7.48 \times 10^{-7}$ 12
4583.8	33/2 <sup>-</sup>	98.0 2	100	4485.8	29/2 <sup>-</sup>	E2	2.14 4	$\alpha(\text{K})=1.291$ 20; $\alpha(\text{L})=0.663$ 12; $\alpha(\text{M})=0.1466$ 25; $\alpha(\text{N+..})=0.0356$ 6 $\alpha(\text{N})=0.0311$ 6; $\alpha(\text{O})=0.00442$ 8; $\alpha(\text{P})=6.93 \times 10^{-5}$ 11
4609.91	29/2 <sup>-</sup>	263.2 1	100	4346.71	27/2 <sup>-</sup>	M1+E2	0.0731 19	$\alpha(\text{K})=0.060$ 4; $\alpha(\text{L})=0.0100$ 15; $\alpha(\text{M})=0.0021$ 4; $\alpha(\text{N+..})=0.00053$ 8 $\alpha(\text{N})=0.00046$ 7; $\alpha(\text{O})=7.2 \times 10^{-5}$ 9; $\alpha(\text{P})=4.3 \times 10^{-6}$ 7
4896.71	31/2 <sup>-</sup>	286.8 1	100	4609.91	29/2 <sup>-</sup>	M1+E2	0.057 3	$\alpha(\text{K})=0.047$ 4; $\alpha(\text{L})=0.0075$ 8; $\alpha(\text{M})=0.00159$ 20; $\alpha(\text{N+..})=0.00040$ 5 $\alpha(\text{N})=0.00035$ 4; $\alpha(\text{O})=5.4 \times 10^{-5}$ 5; $\alpha(\text{P})=3.4 \times 10^{-6}$ 6
4896.72	33/2 <sup>+</sup>	348.3 1	100	4548.41	31/2 <sup>-</sup>	E1	0.00816	$\alpha(\text{K})=0.00702$ 10; $\alpha(\text{L})=0.000903$ 13; $\alpha(\text{M})=0.000186$ 3; $\alpha(\text{N+..})=4.78 \times 10^{-5}$ 7
4918.1	33/2 <sup>-</sup>	1072.0 2	100	3846.1	31/2 <sup>-</sup>	M1+E2	0.0020 4	$\alpha(\text{N})=4.07 \times 10^{-5}$ 6; $\alpha(\text{O})=6.56 \times 10^{-6}$ 10; $\alpha(\text{P})=4.87 \times 10^{-7}$ 7 $\alpha(\text{K})=0.0017$ 3; $\alpha(\text{L})=0.00022$ 4; $\alpha(\text{M})=4.5 \times 10^{-5}$ 7; $\alpha(\text{N+..})=1.17 \times 10^{-5}$ 18
4940.2	(31/2 <sup>-</sup> )	391.8 2	100	4548.41	31/2 <sup>-</sup>	(M1+E2)	0.024 3	$\alpha(\text{N})=9.9 \times 10^{-6}$ 15; $\alpha(\text{O})=1.61 \times 10^{-6}$ 25; $\alpha(\text{P})=1.27 \times 10^{-7}$ 24 $\alpha(\text{K})=0.020$ 3; $\alpha(\text{L})=0.00291$ 8; $\alpha(\text{M})=0.000609$ 12; $\alpha(\text{N+..})=0.000156$ 5
5120.8	(31/2 <sup>-</sup> )	1157.1 2	100	3963.71	27/2 <sup>-</sup>	(E2)	$1.41 \times 10^{-3}$	$\alpha(\text{N})=0.000133$ 3; $\alpha(\text{O})=2.12 \times 10^{-5}$ 10; $\alpha(\text{P})=1.5 \times 10^{-6}$ 3 $\alpha(\text{K})=0.001207$ 17; $\alpha(\text{L})=0.0001571$ 22; $\alpha(\text{M})=3.25 \times 10^{-5}$ 5; $\alpha(\text{N+..})=1.076 \times 10^{-5}$ 15
5254.6	33/2 <sup>-</sup>	314.4 2	57 12	4940.2	(31/2 <sup>-</sup> )	(M1+E2)	0.044 4	$\alpha(\text{N})=7.13 \times 10^{-6}$ 10; $\alpha(\text{O})=1.157 \times 10^{-6}$ 17; $\alpha(\text{P})=8.85 \times 10^{-8}$ 13; $\alpha(\text{IPF})=2.38 \times 10^{-6}$ 4
		357.9 2	100 19	4896.71	31/2 <sup>-</sup>	M1	0.0334	$\alpha(\text{K})=0.036$ 4; $\alpha(\text{L})=0.0057$ 4; $\alpha(\text{M})=0.00119$ 10; $\alpha(\text{N+..})=0.000302$ 20 $\alpha(\text{N})=0.000259$ 19; $\alpha(\text{O})=4.09 \times 10^{-5}$ 18; $\alpha(\text{P})=2.7 \times 10^{-6}$ 5 $\alpha(\text{K})=0.0287$ 4; $\alpha(\text{L})=0.00376$ 6; $\alpha(\text{M})=0.000780$ 11;

**Adopted Levels, Gammas (continued)**

$\gamma(^{137}\text{La})$  (continued)

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\dagger$	$E_f$	$J_f^\pi$	Mult. <sup>†</sup>	$\alpha^{\text{@}}$	Comments
5470.71	35/2 <sup>-</sup>	574.0 1	100	4896.72	33/2 <sup>+</sup>	E1	0.00250	$\alpha(\text{N+..})=0.000202$ 3 $\alpha(\text{N})=0.0001715$ 25; $\alpha(\text{O})=2.80\times 10^{-5}$ 4; $\alpha(\text{P})=2.21\times 10^{-6}$ 4 $\alpha(\text{K})=0.00216$ 3; $\alpha(\text{L})=0.000272$ 4; $\alpha(\text{M})=5.61\times 10^{-5}$ 8; $\alpha(\text{N+..})=1.445\times 10^{-5}$ 21 $\alpha(\text{N})=1.230\times 10^{-5}$ 18; $\alpha(\text{O})=1.99\times 10^{-6}$ 3; $\alpha(\text{P})=1.532\times 10^{-7}$ 22
5541.2 5771.2	(31/2,33/2) (35/2 <sup>-</sup> )	1055.4 2 516.6 2	100 100	4485.8 5254.6	29/2 <sup>-</sup> 33/2 <sup>-</sup>	(M1+E2)	0.0113 19	$\alpha(\text{K})=0.0096$ 18; $\alpha(\text{L})=0.00134$ 14; $\alpha(\text{M})=0.00028$ 3; $\alpha(\text{N+..})=7.1\times 10^{-5}$ 8 $\alpha(\text{N})=6.1\times 10^{-5}$ 6; $\alpha(\text{O})=9.8\times 10^{-6}$ 12; $\alpha(\text{P})=7.1\times 10^{-7}$ 16
5882.3	(37/2 <sup>-</sup> )	964.2 2	100	4918.1	33/2 <sup>-</sup>	(E2)	0.00207	$\alpha(\text{K})=0.001771$ 25; $\alpha(\text{L})=0.000236$ 4; $\alpha(\text{M})=4.90\times 10^{-5}$ 7; $\alpha(\text{N+..})=1.259\times 10^{-5}$ 18
5985.3	(39/2 <sup>-</sup> )	214.1 2	100	5771.2	(35/2 <sup>-</sup> )	E2	0.1414	$\alpha(\text{N})=1.073\times 10^{-5}$ 15; $\alpha(\text{O})=1.733\times 10^{-6}$ 25; $\alpha(\text{P})=1.295\times 10^{-7}$ 19 $\alpha(\text{K})=0.1097$ 16; $\alpha(\text{L})=0.0250$ 4; $\alpha(\text{M})=0.00538$ 8; $\alpha(\text{N+..})=0.001336$ 20 $\alpha(\text{N})=0.001156$ 17; $\alpha(\text{O})=0.000173$ 3; $\alpha(\text{P})=6.92\times 10^{-6}$ 10

† From <sup>138</sup>Ba(p,2n $\gamma$ ) and <sup>130</sup>Te(<sup>11</sup>B,4n $\gamma$ ), unless otherwise specified.

‡ From <sup>137</sup>Ce  $\epsilon$  decay (9.0 h).

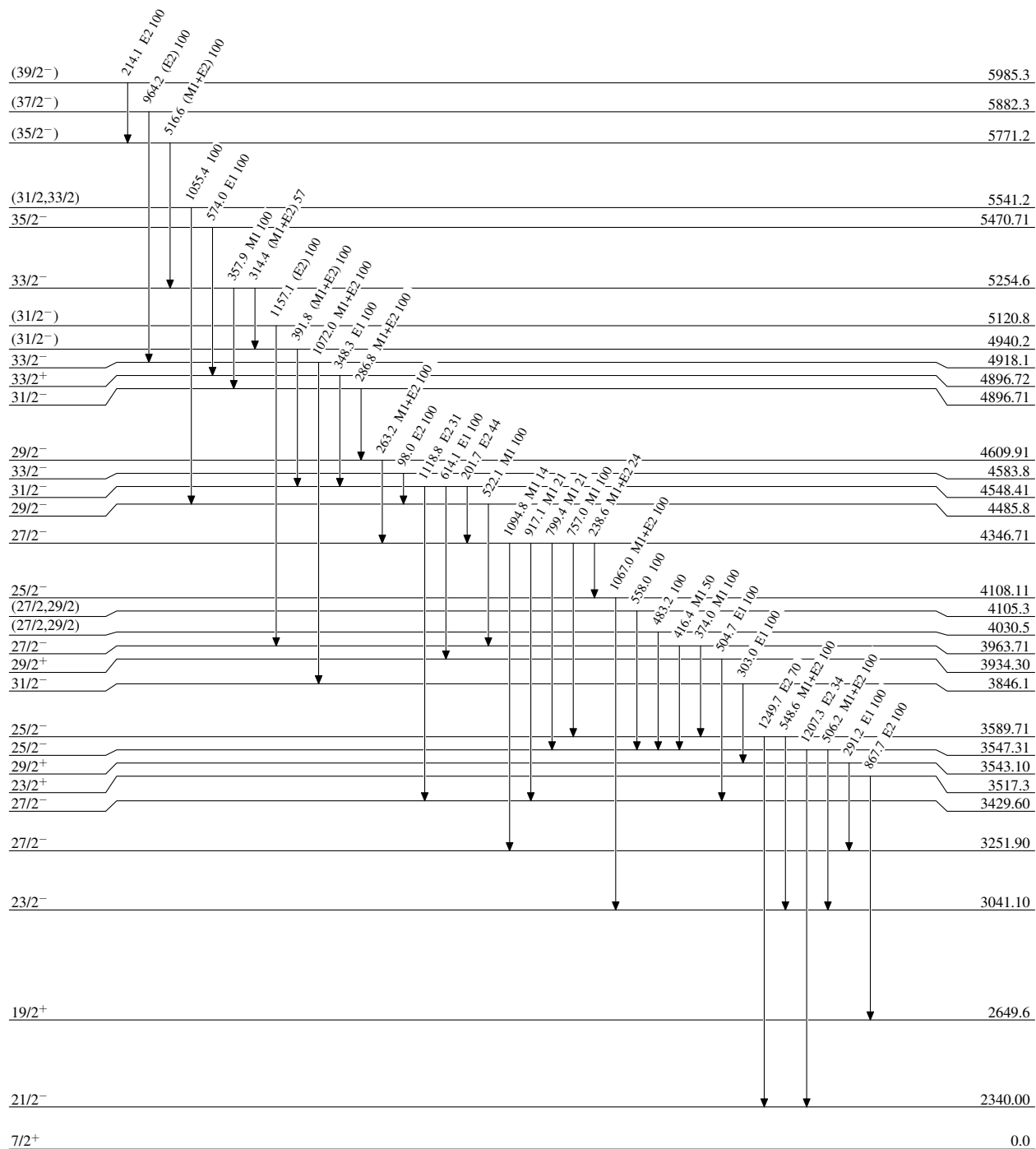
# From <sup>137</sup>Ce  $\epsilon$  decay (34.4 h).

@ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with "Frozen Orbitals" approximation based on  $\gamma$ -ray energies, assigned multiplicities, and mixing ratios, unless otherwise specified.

**Adopted Levels, Gammas**

**Level Scheme**

Intensities: Relative photon branching from each level

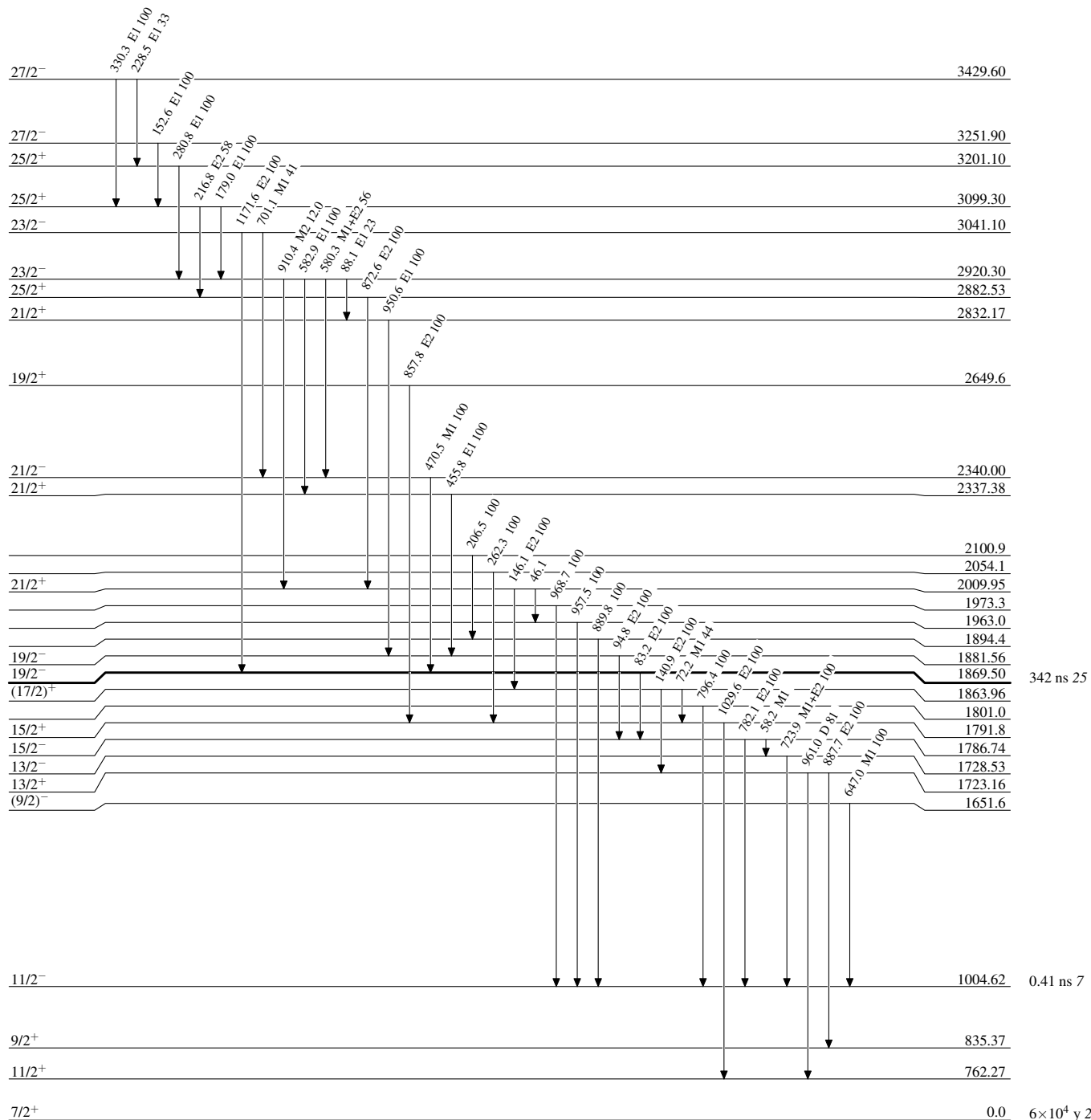


6 × 10<sup>4</sup> y 2

**Adopted Levels, Gammas**

**Level Scheme (continued)**

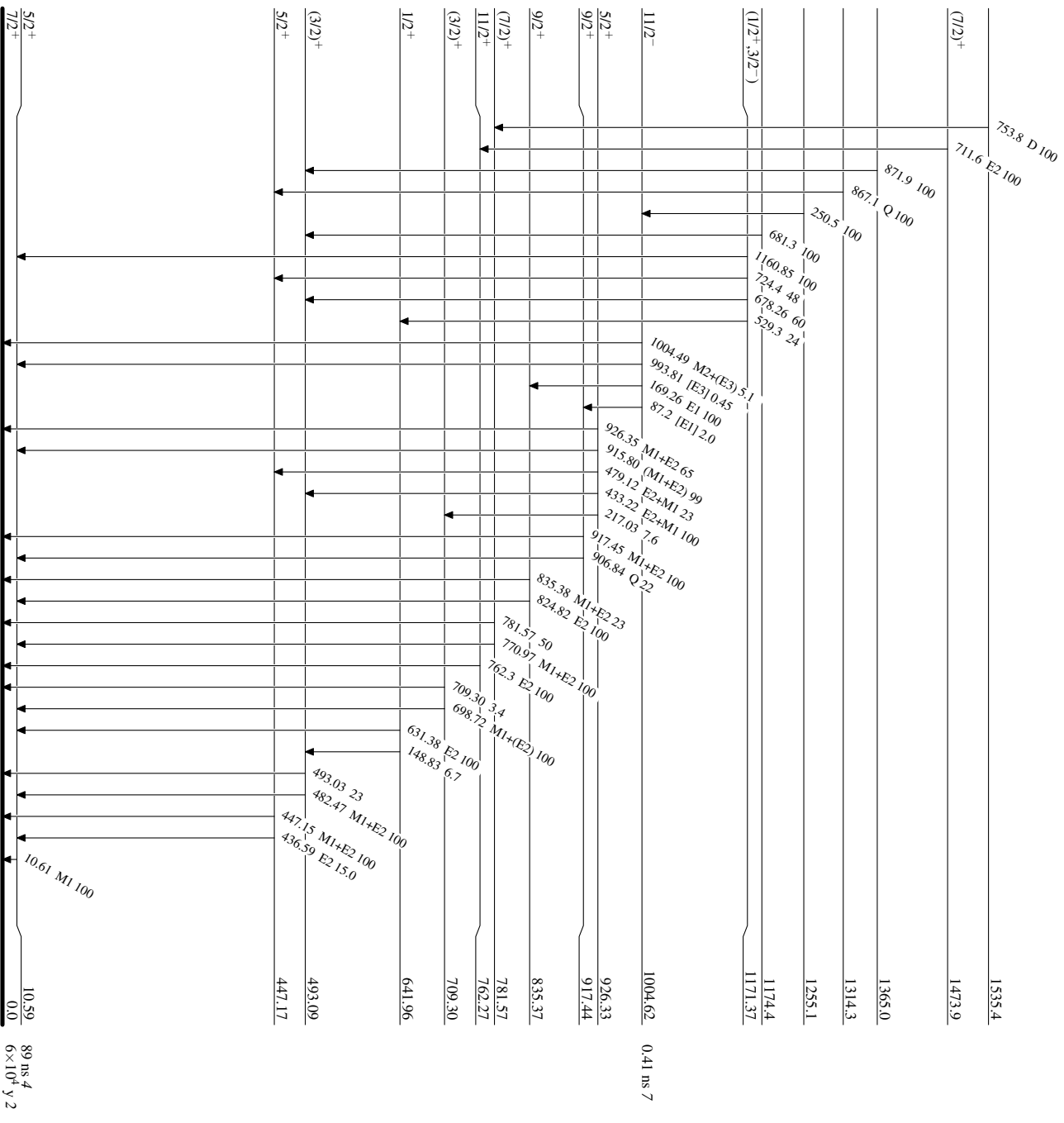
Intensities: Relative photon branching from each level



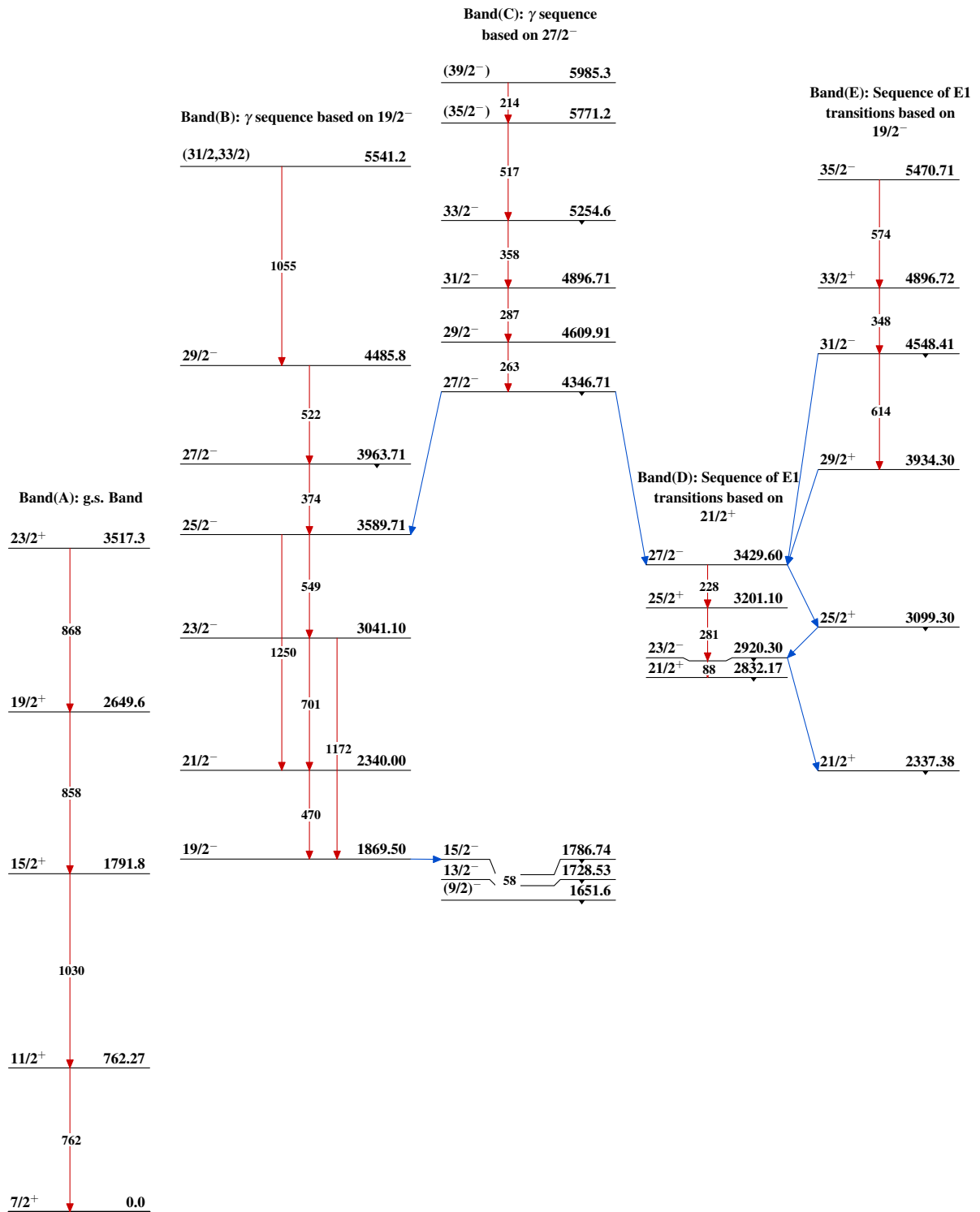
**Adopted Levels, Gammas**

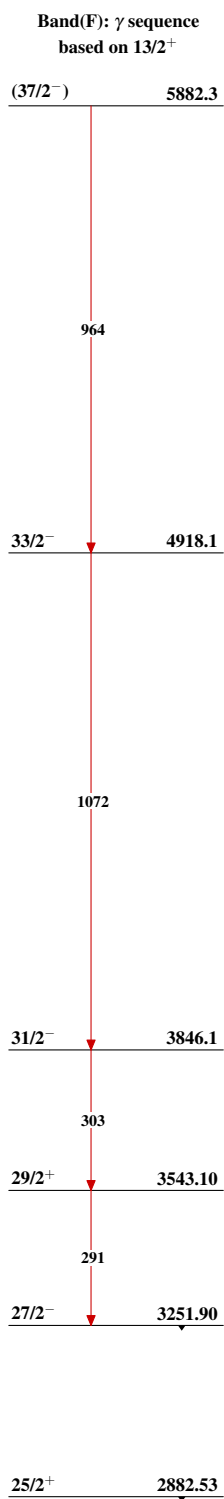
**Level Scheme (continued)**

Intensities: Relative photon branching from each level



<sup>137</sup>La<sub>80</sub>  
<sup>57</sup>La<sub>80</sub>

**Adopted Levels, Gammas** $^{137}_{57}\text{La}_{80}$

**Adopted Levels, Gammas (continued)** $^{137}_{57}\text{La}_{80}$