

### Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich, Balraj Singh	NDS 111, 1211 (2010)		12-Apr-2010

$Q(\beta^-) = -5.53 \times 10^3$  4;  $S(n) = 1.003 \times 10^4$  8;  $S(p) = 2.25 \times 10^3$  4;  $Q(\alpha) = 3.35 \times 10^3$  4    [2012Wa38](#)

Note: Current evaluation has used the following Q record.

$Q(\beta^-) = -5510$  40;  $S(n) = 10030$  80;  $S(p) = 2250$  30;  $Q(\alpha) = 3350$  40    [2009AuZZ](#), [2003Au03](#)

[Additional information 1.](#)

Mass measurement: [2000Ra23](#).

<sup>163</sup>Lu has been the object of numerous studies of wobbling excitations in nuclei. For recent theoretical studies and analyses of this phenomenon in <sup>163</sup>Lu and related nuclides, see, e.g., [2007Ca08](#), [2006Al30](#), [2006Sh25](#), [2006Sh26](#), [2005Ha24](#).

### <sup>163</sup>Lu Levels

Labelling Scheme for the Quasiparticle Orbitals ([2004Je03](#)):

- A:  $\nu 5/2[642]$ ,  $\alpha = +1/2$ .
- B:  $\nu 5/2[642]$ ,  $\alpha = -1/2$ .
- C:  $\nu 3/2[651]$ ,  $\alpha = +1/2$ .
- D:  $\nu 3/2[651]$ ,  $\alpha = -1/2$ .
- E:  $\nu 5/2[523]$ ,  $\alpha = +1/2$ .
- F:  $\nu 5/2[523]$ ,  $\alpha = -1/2$ .
- G:  $\nu 3/2[521]$ ,  $\alpha = +1/2$ .
- H:  $\nu 3/2[521]$ ,  $\alpha = -1/2$ .
- a:  $\pi 1/2[411]$ ,  $\alpha = +1/2$ .
- b:  $\pi 1/2[411]$ ,  $\alpha = -1/2$ .
- c:  $\pi 7/2[404]$ ,  $\alpha = +1/2$ .
- d:  $\pi 7/2[404]$ ,  $\alpha = -1/2$ .
- e:  $\pi 7/2[523]$ ,  $\alpha = +1/2$ .
- f:  $\pi 7/2[523]$ ,  $\alpha = -1/2$ .
- g:  $\pi 9/2[514]$ ,  $\alpha = +1/2$ .
- h:  $\pi 9/2[514]$ ,  $\alpha = -1/2$ .
- k:  $\pi 5/2[402]$ ,  $\alpha = +1/2$ .
- l:  $\pi 5/2[402]$ ,  $\alpha = -1/2$ .
- m:  $\pi 1/2[660]$ ,  $\alpha = +1/2$ .
- n:  $\pi 1/2[541]$ ,  $\alpha = +1/2$ .

### Cross Reference (XREF) Flags

- A    <sup>163</sup>Hf  $\epsilon$  decay (40.0 s)
- B    <sup>139</sup>La(<sup>28</sup>Si,4n $\gamma$ )
- C    <sup>139</sup>La(<sup>29</sup>Si,5n $\gamma$ )

E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	T <sub>1/2</sub> <sup>#</sup>	XREF	Comments
0.0 <sup>f</sup>	1/2 <sup>(+)</sup>	3.97 min 13	ABC	$\% \epsilon + \% \beta^+ = 100$ $\mu = +0.0769$ 10 ( <a href="#">1998Ge13</a> , <a href="#">2005St24</a> ) $\Delta \langle r^2 \rangle (^{170}\text{Lu} - ^{163}\text{Lu}) = -0.835$ fm <sup>2</sup> (Laser spectroscopy, <a href="#">1998Ge13</a> ). from an evaluation of nuclear rms charge radii, <a href="#">2004An14</a> report $\langle r^2 \rangle^{1/2} = 5.258$ fm 9. $\mu$ : collinear fast beam laser spectroscopy ( <a href="#">1998Ge13</a> ). J <sup>π</sup> : spin from LASER hyperfine spectroscopy ( <a href="#">1998Ge13</a> ). Parity from probable $\pi 1/2[411]$ bandhead. T <sub>1/2</sub> : from <a href="#">1983Ge08</a> . Others: 4.1 min 2 ( <a href="#">1980Be39</a> ), <3 min ( <a href="#">1975Ad09</a> ).
16.84 <sup>g</sup> 22	(3/2 <sup>+</sup> )		ABC	

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**Adopted Levels, Gammas (continued)** $^{163}\text{Lu}$  Levels (continued)

E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	T <sub>1/2</sub> <sup>#</sup>	XREF	Comments
62.22 <sup>q</sup> 23	(5/2 <sup>+</sup> )		ABC	J <sup>π</sup> : M1 $\gamma$ to 1/2 <sup>(+)</sup> .
124.36 <sup>e</sup> 24	(7/2 <sup>+</sup> )		ABC	
190.87 <sup>f</sup> 20	(5/2 <sup>+</sup> )		BC	
195.31 <sup>c</sup> 24	(7/2 <sup>-</sup> )		ABC	
210.1 <sup>b</sup> 4	(9/2 <sup>-</sup> )		BC	
224.5 <sup>r</sup> 3	(7/2 <sup>+</sup> )		ABC	
250.09 <sup>g</sup> 23	(7/2 <sup>+</sup> )		ABC	
280.2? 3			A	
295.5 <sup>c</sup> 4	(11/2 <sup>-</sup> )		BC	
310.5 <sup>d</sup> 3	(9/2 <sup>+</sup> )		BC	
414.2 <sup>q</sup> 5	(9/2 <sup>+</sup> )		C	
492.1 <sup>b</sup> 4	(13/2 <sup>-</sup> )		BC	
520.5 <sup>e</sup> 3	(11/2 <sup>+</sup> )		BC	
520.85 <sup>f</sup> 22	(9/2 <sup>+</sup> )		BC	
620.94 <sup>g</sup> 24	(11/2 <sup>+</sup> )		BC	
642.2 <sup>r</sup> 7	(11/2 <sup>+</sup> )		C	
644.7 <sup>c</sup> 4	(15/2 <sup>-</sup> )	5.6 <sup>@</sup> ps +6-11	BC	
691.4 3			A	
715.6 3			A	
730.6 4			A	
754.8 <sup>d</sup> 3	(13/2 <sup>+</sup> )		BC	
875.2 <sup>q</sup> 7	(13/2 <sup>+</sup> )		C	
883.6 3			A	
937.4 <sup>b</sup> 4	(17/2 <sup>-</sup> )	1.4 <sup>@</sup> ps +8-7	BC	
967.86 <sup>f</sup> 24	(13/2 <sup>+</sup> )		BC	
1008.2 <sup>e</sup> 3	(15/2 <sup>+</sup> )		BC	
1106.91 <sup>g</sup> 25	(15/2 <sup>+</sup> )		BC	
1115.4 <sup>c</sup> 4	(19/2 <sup>-</sup> )	1.9 <sup>@</sup> ps +2-4	BC	
1152.4 <sup>r</sup> 8	(15/2 <sup>+</sup> )		C	
1282.5 <sup>d</sup> 3	(17/2 <sup>+</sup> )		BC	
1286.0? 10	(13/2 <sup>+</sup> )		C	
1417.0 <sup>q</sup> 7	(17/2 <sup>+</sup> )		C	
1485.8 <sup>b</sup> 4	(21/2 <sup>-</sup> )	0.9 <sup>@</sup> ps 3	BC	
1501.71 <sup>f</sup> 25	(17/2 <sup>+</sup> )		BC	
1562.1 <sup>e</sup> 3	(19/2 <sup>+</sup> )		BC	
1669.9 <sup>g</sup> 3	(19/2 <sup>+</sup> )		BC	
1677.4 <sup>c</sup> 4	(23/2 <sup>-</sup> )	1.0 <sup>@</sup> ps +2-3	BC	
1730.1 <sup>r</sup> 7	(19/2 <sup>+</sup> )		C	
1739.9 <sup>t</sup> 10	(13/2 <sup>+</sup> )		BC	
1867.7 <sup>d</sup> 3	(21/2 <sup>+</sup> )		BC	
1936.5 <sup>t</sup> 8	(17/2 <sup>+</sup> )		BC	
2009.0 6	(21/2 <sup>+</sup> )		C	
2020.6 <sup>q</sup> 7	(21/2 <sup>+</sup> )		C	
2087.6 <sup>f</sup> 3	(21/2 <sup>+</sup> )		C	
2104.4 <sup>b</sup> 4	(25/2 <sup>-</sup> )		BC	
2139.8 <sup>e</sup> 3	(23/2 <sup>+</sup> )		BC	
2199.6 <sup>t</sup> 4	(21/2 <sup>+</sup> )		BC	
2228.4 6	(23/2 <sup>+</sup> )		C	

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**Adopted Levels, Gammas (continued)** $^{163}\text{Lu}$  Levels (continued)

E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	T <sub>1/2</sub> <sup>#</sup>	XREF
2276.7 <sup>g</sup> <sub>3</sub>	(23/2 <sup>+</sup> )		BC
2307.6 <sup>c</sup> <sub>4</sub>	(27/2 <sup>-</sup> )	1.2 <sup>@</sup> ps +3-5	BC
2339.7 <sup>r</sup> <sub>10</sub>	(23/2 <sup>+</sup> )		C
2400.5 <sup>d</sup> <sub>3</sub>	(25/2 <sup>+</sup> )		BC
2410.8 <sup>j</sup> <sub>9</sub>	(21/2 <sup>+</sup> )		C
2437.1 <sup>k</sup> <sub>4</sub>	(23/2 <sup>+</sup> )		C
2488.6 <sub>7</sub>	(25/2 <sup>+</sup> )		C
2514.5 <sup>t</sup> <sub>4</sub>	(25/2 <sup>+</sup> )	3.3 <sup>&amp;</sup> ps +7-5	BC
2540.8 <sup>j</sup> <sub>4</sub>	(25/2 <sup>+</sup> )		C
2614.6 <sup>e</sup> <sub>3</sub>	(27/2 <sup>+</sup> )		BC
2681.1 <sup>k</sup> <sub>4</sub>	(27/2 <sup>+</sup> )		C
2685.7 <sub>6</sub>	(27/2 <sup>+</sup> )		C
2748.3 <sup>b</sup> <sub>4</sub>	(29/2 <sup>-</sup> )		BC
2773.5 <sup>g</sup> <sub>4</sub>	(27/2 <sup>+</sup> )		C
2803.7 <sup>d</sup> <sub>3</sub>	(29/2 <sup>+</sup> )		BC
2855.4 <sup>h</sup> <sub>7</sub>	(29/2 <sup>-</sup> )		BC
2861.2 <sup>j</sup> <sub>4</sub>	(29/2 <sup>+</sup> )		C
2900.8 <sup>t</sup> <sub>4</sub>	(29/2 <sup>+</sup> )	2.3 <sup>&amp;</sup> ps +5-4	BC
2925.0 <sup>c</sup> <sub>4</sub>	(31/2 <sup>-</sup> )		BC
3004.1 <sup>e</sup> <sub>3</sub>	(31/2 <sup>+</sup> )		BC
3021.5 <sup>i</sup> <sub>6</sub>	(31/2 <sup>-</sup> )		BC
3078.4 <sup>k</sup> <sub>4</sub>	(31/2 <sup>+</sup> )		C
3079.3 <sup>u</sup> <sub>9</sub>	(27/2 <sup>+</sup> )		C
3123.4 <sup>b</sup> <sub>4</sub>	(33/2 <sup>-</sup> )		BC
3130.7 <sup>g</sup> <sub>7</sub>	(31/2 <sup>+</sup> )		C
3245.2 <sup>d</sup> <sub>3</sub>	(33/2 <sup>+</sup> )		BC
3320.8 <sup>c</sup> <sub>4</sub>	(35/2 <sup>-</sup> )	4.2 <sup>@</sup> ps +5-6	BC
3323.9 <sup>j</sup> <sub>4</sub>	(33/2 <sup>+</sup> )		C
3351.1 <sup>t</sup> <sub>4</sub>	(33/2 <sup>+</sup> )	0.9 <sup>&amp;</sup> ps +5-3	BC
3418.8 <sup>h</sup> <sub>7</sub>	(33/2 <sup>-</sup> )		C
3483.8 <sup>e</sup> <sub>3</sub>	(35/2 <sup>+</sup> )		BC
3486.6 <sup>u</sup> <sub>7</sub>	(31/2 <sup>+</sup> )		C
3551.9 <sup>b</sup> <sub>4</sub>	(37/2 <sup>-</sup> )		BC
3572.1 <sup>k</sup> <sub>4</sub>	(35/2 <sup>+</sup> )		C
3635.8 <sup>m</sup> <sub>7</sub>	(35/2 <sup>+</sup> )		C
3667.8 <sup>i</sup> <sub>7</sub>	(35/2 <sup>-</sup> )		C
3789.9 <sup>d</sup> <sub>3</sub>	(37/2 <sup>+</sup> )		BC
3822.7 <sup>c</sup> <sub>4</sub>	(39/2 <sup>-</sup> )		BC
3863.6 <sup>v</sup> <sub>8</sub>	(33/2 <sup>+</sup> )		C
3866.4 <sup>t</sup> <sub>5</sub>	(37/2 <sup>+</sup> )	0.31 <sup>&amp;</sup> ps +14-11	BC
3892.6 <sup>j</sup> <sub>7</sub>	(37/2 <sup>+</sup> )		C
3958.3 <sup>u</sup> <sub>7</sub>	(35/2 <sup>+</sup> )		C
3996.0 <sup>h</sup> <sub>8</sub>	(37/2 <sup>-</sup> )		C
4068.3 <sup>e</sup> <sub>4</sub>	(39/2 <sup>+</sup> )		BC
4103.9 <sup>b</sup> <sub>4</sub>	(41/2 <sup>-</sup> )		BC
4150.8 <sup>k</sup> <sub>4</sub>	(39/2 <sup>+</sup> )		C
4253.8 <sup>i</sup> <sub>8</sub>	(39/2 <sup>-</sup> )		C

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**Adopted Levels, Gammas (continued)**

$^{163}\text{Lu}$ Levels (continued)				
E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	T <sub>1/2</sub> <sup>#</sup>	XREF	Comments
4255.6 <sup>m</sup> 7	(39/2 <sup>+</sup> )		C	
4309.3 <sup>o</sup> 7	(37/2 <sup>-</sup> )		C	
4369.2 <sup>v</sup> 7	(37/2 <sup>+</sup> )		C	
4405.9 <sup>d</sup> 4	(41/2 <sup>+</sup> )		BC	
4431.4 <sup>c</sup> 4	(43/2 <sup>-</sup> )		BC	
4445.0 <sup>t</sup> 5	(41/2 <sup>+</sup> )	0.25 <sup>a</sup> ps +5-7	BC	T <sub>1/2</sub> : other: 0.15 ps +6-5 (1993Sc13,1992ScZL). Q <sub>t</sub> =9.9 +11-10 (2004Go14).
4492.6 <sup>u</sup> 7	(39/2 <sup>+</sup> )		C	
4529.5 <sup>j</sup> 8	(41/2 <sup>+</sup> )		C	
4556.6 <sup>h</sup> 7	(41/2 <sup>-</sup> )		C	
4579.0 <sup>p</sup> 7	(39/2 <sup>-</sup> )		C	
4719.7 <sup>e</sup> 4	(43/2 <sup>+</sup> )		BC	
4760.7 <sup>b</sup> 5	(45/2 <sup>-</sup> )		BC	
4817.3 <sup>k</sup> 5	(43/2 <sup>+</sup> )		C	
4831.2 <sup>o</sup> 7	(41/2 <sup>-</sup> )		C	
4849.0 <sup>i</sup> 7	(43/2 <sup>-</sup> )		C	
4904.1 <sup>m</sup> 7	(43/2 <sup>+</sup> )		C	
4937.2 <sup>v</sup> 7	(41/2 <sup>+</sup> )		C	
5057.5 <sup>d</sup> 4	(45/2 <sup>+</sup> )		BC	
5084.0 <sup>t</sup> 5	(45/2 <sup>+</sup> )	173 <sup>a</sup> fs +24-27	BC	T <sub>1/2</sub> : other: 0.10 ps +4-3 (1993Sc13,1992ScZL). Q <sub>t</sub> =9.3 +7-6 (2004Go14).
5088.3 <sup>u</sup> 7	(43/2 <sup>+</sup> )		C	
5116.1 <sup>p</sup> 7	(43/2 <sup>-</sup> )		C	
5131.8 <sup>c</sup> 5	(47/2 <sup>-</sup> )	0.15 <sup>@</sup> ps 5	BC	
5168.8 <sup>h</sup> 7	(45/2 <sup>-</sup> )		C	
5209.6 <sup>l</sup> 7	(45/2 <sup>+</sup> )		C	
5243.4 <sup>j</sup> 10	(45/2 <sup>+</sup> )		C	
5387.9 <sup>e</sup> 4	(47/2 <sup>+</sup> )		BC	
5419.5 <sup>o</sup> 7	(45/2 <sup>-</sup> )		C	
5496.2 <sup>i</sup> 8	(47/2 <sup>-</sup> )		C	
5505.1 <sup>b</sup> 5	(49/2 <sup>-</sup> )	0.11 <sup>@</sup> ps +5-3	BC	
5557.4 <sup>m</sup> 7	(47/2 <sup>+</sup> )		C	
5559.5 <sup>k</sup> 5	(47/2 <sup>+</sup> )		C	
5564.2 <sup>v</sup> 5	(45/2 <sup>+</sup> )		C	
5720.1 <sup>d</sup> 4	(49/2 <sup>+</sup> )		BC	
5742.9 <sup>u</sup> 8	(47/2 <sup>+</sup> )	149 <sup>a</sup> fs +26-33	C	Q <sub>t</sub> =8.5 +10-7 (2004Go14).
5757.0 <sup>p</sup> 8	(47/2 <sup>-</sup> )		C	
5781.0 <sup>t</sup> 5	(49/2 <sup>+</sup> )	140 <sup>a</sup> fs +15-16	BC	T <sub>1/2</sub> : other: 0.08 ps +4-3 (1993Sc13,1992ScZL). Q <sub>t</sub> =8.3 +5-4 (2004Go14).
5853.1 <sup>h</sup> 8	(49/2 <sup>-</sup> )		C	
5898.2 <sup>l</sup> 8	(49/2 <sup>+</sup> )		C	
5916.9 <sup>c</sup> 5	(51/2 <sup>-</sup> )	0.12 <sup>@</sup> ps +3-6	BC	
6006.1 <sup>j</sup> 8	(49/2 <sup>+</sup> )		C	
6065.3 <sup>e</sup> 4	(51/2 <sup>+</sup> )		BC	
6108.2 <sup>o</sup> 9	(49/2 <sup>-</sup> )		C	
6223.5 <sup>i</sup> 10	(51/2 <sup>-</sup> )		C	
6246.5 <sup>m</sup> 8	(51/2 <sup>+</sup> )		C	
6249.3 <sup>v</sup> 8	(49/2 <sup>+</sup> )		C	

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**Adopted Levels, Gammas (continued)**

$^{163}\text{Lu}$ Levels (continued)				
E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	T <sub>1/2</sub> <sup>#</sup>	XREF	Comments
6319.9 <sup>w</sup> 9	(47/2 <sup>-</sup> )		C	
6334.1 <sup>b</sup> 5	(53/2 <sup>-</sup> )	0.09 <sup>@</sup> ps +6-4	BC	
6355.9 <sup>k</sup> 10	(51/2 <sup>+</sup> )		C	
6415.1 <sup>d</sup> 4	(53/2 <sup>+</sup> )		BC	
6454.2 <sup>u</sup> 8	(51/2 <sup>+</sup> )	100 <sup>a</sup> fs +12-15	C	Q <sub>t</sub> =8.7 +7-5 (2004Go14).
6502.7 <sup>p</sup> 10	(51/2 <sup>-</sup> )		C	
6533.6 <sup>t</sup> 5	(53/2 <sup>+</sup> )	82 <sup>a</sup> fs +6-7	BC	T <sub>1/2</sub> : others: 55 fs +21-28 (1993Sc13,1992ScZL), 0.10 ps (2002Sc11). Q <sub>t</sub> =8.9 4 (2004Go14).
6616.5 <sup>l</sup> 10	(53/2 <sup>+</sup> )		C	
6618.0 <sup>h</sup> 10	(53/2 <sup>-</sup> )		C	
6719.1 <sup>j</sup> 10	(53/2 <sup>+</sup> )		C	
6788.9 <sup>e</sup> 4	(55/2 <sup>+</sup> )		BC	
6790.0 <sup>c</sup> 8	(55/2 <sup>-</sup> )		BC	
6907.4 <sup>o</sup> 11	(53/2 <sup>-</sup> )		C	
6965.0 <sup>w</sup> 9	(51/2 <sup>-</sup> )		C	
6980.1 <sup>m</sup> 11	(55/2 <sup>+</sup> )		C	
6990.5 <sup>v</sup> 8	(53/2 <sup>+</sup> )		C	
7035.4 <sup>i</sup> 11	(55/2 <sup>-</sup> )		C	
7133.1 <sup>k</sup> 11	(55/2 <sup>+</sup> )		C	
7174.2 <sup>d</sup> 4	(57/2 <sup>+</sup> )		BC	
7179.1 <sup>s</sup> 10	(55/2 <sup>+</sup> )		C	
7220.4 <sup>u</sup> 9	(55/2 <sup>+</sup> )	66 <sup>a</sup> fs +9-12	C	Q <sub>t</sub> =8.9 +8-6 (2004Go14).
7246.9 <sup>b</sup> 9	(57/2 <sup>-</sup> )		BC	
7339.1 <sup>t</sup> 5	(57/2 <sup>+</sup> )	66 <sup>a</sup> fs 8	BC	T <sub>1/2</sub> : others: 0.04 ps 3 (1993Sc13,1992ScZL), 67 fs (2002Sc11). Q <sub>t</sub> =8.4 5 (2004Go14).
7351.2 <sup>p</sup> 12	(55/2 <sup>-</sup> )		C	
7391.0 <sup>l</sup> 12	(57/2 <sup>+</sup> )		C	
7466.8 <sup>h</sup> 12	(57/2 <sup>-</sup> )		C	
7507.0 <sup>j</sup> 12	(57/2 <sup>+</sup> )		C	
7584.4 <sup>e</sup> 4	(59/2 <sup>+</sup> )		BC	
7667.2 <sup>w</sup> 9	(55/2 <sup>-</sup> )		C	
7729.3 <sup>c</sup> 10	(59/2 <sup>-</sup> )		BC	
7785.3 <sup>m</sup> 12	(59/2 <sup>+</sup> )		C	
7786.4 <sup>v</sup> 9	(57/2 <sup>+</sup> )		C	
7813.9 <sup>o</sup> 13	(57/2 <sup>-</sup> )		C	
7903.4 <sup>i</sup> 13	(59/2 <sup>-</sup> )		C	
7955.9 <sup>k</sup> 13	(59/2 <sup>+</sup> )		C	
8011.1 <sup>d</sup> 4	(61/2 <sup>+</sup> )		BC	
8040.3 <sup>u</sup> 9	(59/2 <sup>+</sup> )	60 <sup>a</sup> fs +18-26	C	Q <sub>t</sub> =7.8 +17-12 (2004Go14).
8046.1 <sup>s</sup> 10	(59/2 <sup>+</sup> )		C	
8196.9 <sup>t</sup> 10	(61/2 <sup>+</sup> )	61 <sup>a</sup> fs +7-8	BC	T <sub>1/2</sub> : others: 53 fs (2002Sc11), 34 fs +35-33 (1992ScZL).
8222.8 <sup>b</sup> 11	(61/2 <sup>-</sup> )		BC	
8237.3 <sup>l</sup> 13	(61/2 <sup>+</sup> )		C	
8291.2 <sup>p</sup> 14	(59/2 <sup>-</sup> )		C	
8379.8 <sup>h</sup> 16	(61/2 <sup>-</sup> )		C	
8387.2 <sup>j</sup> 16	(61/2 <sup>+</sup> )		C	
8421.8 <sup>w</sup> 10	(59/2 <sup>-</sup> )		C	
8459.4 <sup>e</sup> 8	(63/2 <sup>+</sup> )		BC	

Continued on next page (footnotes at end of table)

**Adopted Levels, Gammas (continued)** $^{163}\text{Lu}$  Levels (continued)

E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	T <sub>1/2</sub> <sup>#</sup>	XREF	Comments
8636.2 <sup>v</sup> 9	(61/2 <sup>+</sup> )		C	
8668.7 <sup>m</sup> 14	(63/2 <sup>+</sup> )		C	
8713.6 <sup>c</sup> 12	(63/2 <sup>-</sup> )		C	
8790.3 <sup>o</sup> 15	(61/2 <sup>-</sup> )		C	
8845.6 <sup>i</sup> 17	(63/2 <sup>-</sup> )		C	
8855.7 <sup>k</sup> 17	(63/2 <sup>+</sup> )		C	
8913.2 <sup>u</sup> 11	(63/2 <sup>+</sup> )	44 <sup>a</sup> fs +9-15	C	Q <sub>t</sub> =7.9 +13-8 (2004Go14).
8927.0 <sup>d</sup> 9	(65/2 <sup>+</sup> )		BC	
8974.2 <sup>s</sup> 14	(63/2 <sup>+</sup> )		C	
9106.6 <sup>t</sup> 14	(65/2 <sup>+</sup> )	46 <sup>a</sup> fs +7-10	BC	Q <sub>t</sub> =7.4 +8-6 (2004Go14).
9154.2 <sup>l</sup> 15	(65/2 <sup>+</sup> )		C	
9231.8 <sup>w</sup> 14	(63/2 <sup>-</sup> )		C	
9252.8 <sup>b</sup> 13	(65/2 <sup>-</sup> )		C	
9284.6 <sup>p</sup> 17	(63/2 <sup>-</sup> )		C	
9331.0 <sup>j</sup> 19	(65/2 <sup>+</sup> )		C	
9376.3 <sup>h</sup> 19	(65/2 <sup>-</sup> )		C	
9408.7 <sup>e</sup> 10	(67/2 <sup>+</sup> )		BC	
9538.7 <sup>v</sup> 14	(65/2 <sup>+</sup> )		C	
9625.5 <sup>m</sup> 15	(67/2 <sup>+</sup> )		C	
9709.0 <sup>c</sup> 14	(67/2 <sup>-</sup> )		C	
9805.3 <sup>o</sup> 18	(65/2 <sup>-</sup> )		C	
9816.2 <sup>k</sup> 20	(67/2 <sup>+</sup> )		C	
9839.7 <sup>u</sup> 15	(67/2 <sup>+</sup> )	52 <sup>a</sup> fs +12-17	C	Q <sub>t</sub> =6.7 +11-8 (2004Go14).
9916.8 <sup>d</sup> 11	(69/2 <sup>+</sup> )		BC	
10069.2 <sup>t</sup> 14	(69/2 <sup>+</sup> )	33 <sup>a</sup> fs +12-8	BC	Q <sub>t</sub> =7.6 +15-9 (2004Go14).
10097.2 <sup>w</sup> 17	(67/2 <sup>-</sup> )		C	
10138.5 <sup>l</sup> 16	(69/2 <sup>+</sup> )		C	
10314.7 <sup>b</sup> 16	(69/2 <sup>-</sup> )		C	
10333.9 <sup>j</sup> 21	(69/2 <sup>+</sup> )		C	
10428.3 <sup>e</sup> 12	(71/2 <sup>+</sup> )		BC	
10494.5 <sup>v</sup> 17	(69/2 <sup>+</sup> )		C	
10653.5 <sup>m</sup> 17	(71/2 <sup>+</sup> )		C	
10714.9 <sup>c</sup> 17	(71/2 <sup>-</sup> )		C	
10819.9 <sup>u</sup> 18	(71/2 <sup>+</sup> )	39 <sup>a</sup> fs +12-20	C	Q <sub>t</sub> =6.7 +17-10 (2004Go14).
10876.3 <sup>o</sup> 21	(69/2 <sup>-</sup> )		C	
10978.4 <sup>d</sup> 13	(73/2 <sup>+</sup> )		BC	
11017.7 <sup>w</sup> 20	(71/2 <sup>-</sup> )		C	
11085.7 <sup>t</sup> 18	(73/2 <sup>+</sup> )		C	
11186.8 <sup>l</sup> 19	(73/2 <sup>+</sup> )		C	
11503.7 <sup>v</sup> 20	(73/2 <sup>+</sup> )		C	
11505.4 <sup>e</sup> 14	(75/2 <sup>+</sup> )		BC	
11729.9 <sup>n</sup> 20	(75/2 <sup>-</sup> )		C	
11749.0 <sup>m</sup> 20	(75/2 <sup>+</sup> )		C	
11781.4 <sup>c</sup> 20	(75/2 <sup>-</sup> )		C	
11854.6 <sup>u</sup> 21	(75/2 <sup>+</sup> )		C	
11993.4 <sup>w</sup> 22	(75/2 <sup>-</sup> )		C	
12098.1 <sup>d</sup> 16	(77/2 <sup>+</sup> )		BC	
12156.8 <sup>t</sup> 20	(77/2 <sup>+</sup> )		C	

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**Adopted Levels, Gammas (continued)** $^{163}\text{Lu}$  Levels (continued)

E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	XREF	E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	XREF	E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	XREF
12266.9 <sup>d</sup> 21	(77/2 <sup>+</sup> )	C	13283.0 <sup>f</sup> 23	(81/2 <sup>+</sup> )	C	15284 <sup>u</sup> 3	(87/2 <sup>+</sup> )	C
12566.7 <sup>v</sup> 22	(77/2 <sup>+</sup> )	C	13679.1 <sup>v</sup> 25	(81/2 <sup>+</sup> )	C	15689 <sup>f</sup> 3	(89/2 <sup>+</sup> )	C
12627.2 <sup>e</sup> 17	(79/2 <sup>+</sup> )	BC	13746.8 <sup>e</sup> 20	(83/2 <sup>+</sup> )	C	16024 <sup>n</sup> 4	(91/2 <sup>-</sup> )	C
12745 <sup>n</sup> 3	(79/2 <sup>-</sup> )	C	13798 <sup>n</sup> 3	(83/2 <sup>-</sup> )	C	16531 <sup>u</sup> 3	(91/2 <sup>+</sup> )	C
12862.4 <sup>m</sup> 22	(79/2 <sup>+</sup> )	C	14086.5 <sup>u</sup> 25	(83/2 <sup>+</sup> )	C	16958 <sup>f</sup> 3	(93/2 <sup>+</sup> )	C
12866.0 <sup>c</sup> 22	(79/2 <sup>-</sup> )	C	14110 <sup>w</sup> 3	(83/2 <sup>-</sup> )	C	17204 <sup>n</sup> 4	(95/2 <sup>-</sup> )	C
12943.5 <sup>u</sup> 23	(79/2 <sup>+</sup> )	C	14462.3 <sup>f</sup> 25	(85/2 <sup>+</sup> )	C	18262 <sup>f</sup> 3	(97/2 <sup>+</sup> )	C
13025.0 <sup>w</sup> 25	(79/2 <sup>-</sup> )	C	14826 <sup>v</sup> 5	(85/2 <sup>+</sup> )	C	18436 <sup>n</sup> 4	(99/2 <sup>-</sup> )	C
13198.3 <sup>d</sup> 19	(81/2 <sup>+</sup> )	C	14890 <sup>n</sup> 4	(87/2 <sup>-</sup> )	C			

<sup>†</sup> From least-squares fit to E $\gamma$ 's, assuming  $\Delta(E\gamma)=0.3$  keV for each  $\gamma$  ray, except for uncertain  $\gamma$  rays, for which 1 keV is assumed.

<sup>‡</sup> The assignments are as proposed by 2002Je05, 1999Do34 and 1992Sc03 in (HI,xn $\gamma$ ) which are based on  $\gamma\gamma(\theta)$  (DCO) data and associated band structures. The parentheses are added by the evaluators on account of lack of firm evidence for J $\pi$ 's of low-lying levels and bandheads. It is assumed that multipolarities are M1(+E2) for  $\Delta J=1$  and E2 for  $\Delta J=2$  transitions.

# For excited states, values are from DSAM or RDDS (1992ScZL, 1993Sc13, 2002Sc11 and 2004Go14) in (HI,xn $\gamma$ ) studies.

@ From RDDS (1992ScZL).

& From RDDS (1993Sc13, 1992ScZL).

<sup>a</sup> From DSAM (2004Go14).

<sup>b</sup> Band(A):  $\pi 7/2[523]$ ,  $\alpha=+1/2$ . Strongly-coupled band (1993Sc13, 1999Do34, 2002Je05, 2004Je03). Of the two possible choices (1992Sc03),  $\pi 7/2[523]$  and  $\pi 9/2[514]$ ,  $\pi 7/2[523]$  is preferred (1993Sc13, 1999Do34), based on the experimental Q<sub>t</sub> pattern with K=7/2 or 9/2 and a comparison of experimental and calculated B(M1) values. AB crossing at  $\hbar\omega\approx 0.26$  MeV.

<sup>c</sup> Band(a):  $\pi 7/2[523]$ ,  $\alpha=-1/2$ . Strongly-coupled band (1993Sc13, 1999Do34, 2002Je05, 2004Je03). See the comment for the signature= $+1/2$  partner of this band. AB crossing at  $\hbar\omega\approx 0.26$  MeV.

<sup>d</sup> Band(B):  $\pi 7/2[404]$ ,  $\alpha=+1/2$ . Strongly-coupled band (1992Sc03, 1999Do34, 2002Je05, 2004Je03). AB crossing at  $\hbar\omega\approx 0.26$  MeV; changes to ( $\pi 7/2[523]$ ) $\otimes$ AEBC after AB crossing.

<sup>e</sup> Band(b):  $\pi 7/2[404]$ ,  $\alpha=-1/2$ . Strongly-coupled band (1992Sc03, 1999Do34, 2002Je05, 2004Je03). AB crossing at  $\hbar\omega\approx 0.26$  MeV; changes to ( $\pi 7/2[523]$ ) $\otimes$ AEBC after AB crossing.

<sup>f</sup> Band(C):  $\pi 1/2[411]$ ,  $\alpha=+1/2$ . (1999Do34, 2002Je05, 2004Je03).

<sup>g</sup> Band(c):  $\pi 1/2[411]$ ,  $\alpha=-1/2$ . (1999Do34, 2002Je05, 2004Je03).

<sup>h</sup> Band(D): Band based on (29/2<sup>-</sup>),  $\alpha=+1/2$ . Possible continuation of the  $\pi 7/2[523]$  band into ( $\pi 7/2[523]$ ) $\otimes$ BC. EF and AD could also be involved at higher spins.

<sup>i</sup> Band(d): Band based on (31/2<sup>-</sup>),  $\alpha=-1/2$ . Possible continuation of the  $\pi 7/2[523]$  band into ( $\pi 7/2[523]$ ) $\otimes$ BC. EF and AD could also be involved at higher spins.

<sup>j</sup> Band(E): ( $\pi 7/2[404]$ ) $\otimes$ AB at low spins,  $\alpha=+1/2$ . ( $\pi 9/2[514]$ ) $\otimes$ AEBC at high spins.

<sup>k</sup> Band(e): ( $\pi 7/2[404]$ ) $\otimes$ AB at low spins,  $\alpha=-1/2$ . ( $\pi 9/2[514]$ ) $\otimes$ AEBC at high spins.

<sup>l</sup> Band(F): ( $\pi 7/2[523]$ ) $\otimes$ AHBC,  $\alpha=+1/2$ .

<sup>m</sup> Band(f): ( $\pi 7/2[523]$ ) $\otimes$ AHBC,  $\alpha=-1/2$ .

<sup>n</sup> Band(G): ( $\pi 1/2[660]$ ) $\otimes$ AEBC,  $\alpha=-1/2$ .

<sup>o</sup> Band(H): ( $\pi 9/2[514]$ ) $\otimes$ AB,  $\alpha=+1/2$ .

<sup>p</sup> Band(h): ( $\pi 9/2[514]$ ) $\otimes$ AB,  $\alpha=-1/2$ .

<sup>q</sup> Band(I):  $\pi 5/2[402]$ ,  $\alpha=+1/2$ . (2002Je05, 2004Je03).

<sup>r</sup> Band(i):  $\pi 5/2[402]$ ,  $\alpha=-1/2$ . (2002Je05, 2004Je03).

<sup>s</sup> Band(J): Band based on 55/2<sup>+</sup>,  $\alpha=-1/2$ .

<sup>t</sup> Band(K): Triaxial SD-1 band. (2004Je03, 2004Go14, 2002Je05, 2002Sc11, 2001Od03, 1999Do34, 1995Sc39). Q<sub>t</sub> varies from 9.9 to 7.6 (2004Go14) from the 41/2 to the 69/2 levels. Others: Q<sub>t</sub> over the entire band: 8.2 +10-6 (2002Sc11); 7.4 +7-4 or 7.7 +23-13 (2002Sc47); 10.7 7 (1993Sc13). Possible configuration= $\pi i_{13/2}$ , 1/2[660],  $\alpha=+1/2$ ;  $\beta_2\approx 0.42$  (1993Sc13, 1992Sc03). Percent population (relative to normal-deformed yrast band) $\approx 10$  (2004Je03, 1999Do34), 14 (2002Je05).

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**Adopted Levels, Gammas (continued)** $^{163}\text{Lu}$  Levels (continued)

- <sup>u</sup> Band(L): One-phonon wobbling-mode. Triaxial SD-2 band (2004Je03,2004Go14,2002Je05,2001Od03,1999Do34). One-phonon wobbling mode excitation built on yrast  $\pi i_{13/2}$  triaxial SD-1 band.  $Q_t$  varies from 8.5 to 6.7 (2004Go14) from the 47/2 to the 71/2 levels. Percent population (relative to normal-deformed yrast band) $\approx 3$  (2004Je03),  $\approx 2.0$  (2002Je05),  $\approx 2.5$  (1999Do34).
- <sup>v</sup> Band(M): Two-phonon wobbling-mode. Triaxial SD-3 band,  $\alpha=+1/2$  (2004Je03,2002Je05). Two-phonon wobbling mode excitation built on yrast triaxial SD-1 band. Percent population (relative to normal-deformed yrast band) $\approx 1.2$  (2004Je03),  $\approx 0.7$  (2002Je05).
- <sup>w</sup> Band(N): Triaxial SD-4 band.  $\alpha=-1/2$  (2004Je03,2002Je05). Possibly negative-parity yrast band. This band cannot be interpreted as a wobbling phonon excitation since its nature is different from SD-1 to SD-3 bands. Probable configuration= $\pi i_{13/2} \otimes (\nu i_{13/2}, \alpha=-1/2) \otimes (\nu h_{9/2}, \alpha=-1/2)$  Percent population (relative to normal-deformed yrast band) $\approx 0.9$  (2004Je03),  $\approx 0.35$  (2002Je05).



## Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$									
$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_f$	$J_f^\pi$	Mult.&	$\delta^\&$	$\alpha^c$	Comments
62.22	(5/2 <sup>+</sup> )	45.39 <sup><math>\S</math> 8</sup>	100 <sup><math>\S</math></sup>	16.84	(3/2 <sup>+</sup> )	M1 <sup><math>\S</math></sup>		6.12	
124.36	(7/2 <sup>+</sup> )	62.14 <sup><math>\S</math> 5</sup>	100 <sup><math>\S</math></sup>	62.22	(5/2 <sup>+</sup> )	M1 <sup><math>\S</math></sup>		2.43	
190.87	(5/2 <sup>+</sup> )	173.87 10	42 9	16.84	(3/2 <sup>+</sup> )	D <sup>#</sup>			
		190.90 20	100 7	0.0	1/2 <sup>(+)</sup>				
195.31	(7/2 <sup>-</sup> )	70.98 <sup><math>\S</math> 8</sup>	100 <sup><math>\S</math></sup>	124.36	(7/2 <sup>+</sup> )	E1 <sup><math>\S</math></sup>		0.849	
		133.08 <sup><math>\S</math> 10</sup>	24 <sup><math>\S</math> 1</sup>	62.22	(5/2 <sup>+</sup> )	$b$			
210.1	(9/2 <sup>-</sup> )	85.9 10	100	124.36	(7/2 <sup>+</sup> )				
224.5	(7/2 <sup>+</sup> )	162.25 15	100	62.22	(5/2 <sup>+</sup> )				$E_\gamma$ : from <sup>163</sup> Hf $\varepsilon$ decay.
250.09	(7/2 <sup>+</sup> )	188.2 10	47 10	62.22	(5/2 <sup>+</sup> )	D <sup>#</sup>			
		233.35 10	100 10	16.84	(3/2 <sup>+</sup> )	(Q) <sup>@</sup>			$E_\gamma$ : from <sup>163</sup> Hf $\varepsilon$ decay.
280.2?		84.9 1		195.31	(7/2 <sup>-</sup> )				
295.5	(11/2 <sup>-</sup> )	85.4 10	100	210.1	(9/2 <sup>-</sup> )				
310.5	(9/2 <sup>+</sup> )	186.15 10	100 14	124.36	(7/2 <sup>+</sup> )				
		247.6 <sup><math>d</math> 5</sup>	5.4 22	62.22	(5/2 <sup>+</sup> )				
414.2	(9/2 <sup>+</sup> )	189.8 10	100 35	224.5	(7/2 <sup>+</sup> )				
		352.0 10	52 14	62.22	(5/2 <sup>+</sup> )				
492.1	(13/2 <sup>-</sup> )	196.6 10	100 8	295.5	(11/2 <sup>-</sup> )	(D) <sup>#</sup>			$\delta(\text{Q/D})=+0.03$ 2.
		282.00 10	39 5	210.1	(9/2 <sup>-</sup> )	(Q) <sup>@</sup>			
520.5	(11/2 <sup>+</sup> )	106.2 10	16.5 17	414.2	(9/2 <sup>+</sup> )				
		210.0 10	58 6	310.5	(9/2 <sup>+</sup> )				
		296.1 5	4.4 14	224.5	(7/2 <sup>+</sup> )				
		396.5 10	100 9	124.36	(7/2 <sup>+</sup> )	(Q) <sup><math>a</math></sup>			
520.85	(9/2 <sup>+</sup> )	270.87 17	69 11	250.09	(7/2 <sup>+</sup> )	D <sup>#</sup>			
		296.5 <sup><math>d</math> 5</sup>	22 4	224.5	(7/2 <sup>+</sup> )				
		329.85 10	100 14	190.87	(5/2 <sup>+</sup> )	(Q) <sup>@</sup>			
620.94	(11/2 <sup>+</sup> )	207.0 10	4.4 32	414.2	(9/2 <sup>+</sup> )				
		370.93 9	100 14	250.09	(7/2 <sup>+</sup> )	(Q) <sup>@</sup>			
		396.3 <sup><math>d</math> 5</sup>	65 10	224.5	(7/2 <sup>+</sup> )				
642.2	(11/2 <sup>+</sup> )	228.0 10	67 16	414.2	(9/2 <sup>+</sup> )				
		417.8 10	100 13	224.5	(7/2 <sup>+</sup> )				
644.7	(15/2 <sup>-</sup> )	152.7 10	56 4	492.1	(13/2 <sup>-</sup> )	(M1+E2) <sup>#</sup>	+0.22 1	1.08 3	B(M1)(W.u.)=(0.27 +6-4); B(E2)(W.u.)=(2.7 +7-5)
		349.21 10	100 3	295.5	(11/2 <sup>-</sup> )	E2 <sup>@</sup>		0.0490	B(E2)(W.u.)=166 +34-16
691.4		496.07 10	100	195.31	(7/2 <sup>-</sup> )				
715.6		520.32 10	100	195.31	(7/2 <sup>-</sup> )				
730.6		535.25 20	100	195.31	(7/2 <sup>-</sup> )				
754.8	(13/2 <sup>+</sup> )	234.3 10	37 3	520.5	(11/2 <sup>+</sup> )				
		444.35 10	100 7	310.5	(9/2 <sup>+</sup> )				
875.2	(13/2 <sup>+</sup> )	233.0 10	91 15	642.2	(11/2 <sup>+</sup> )				

## Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$ (continued)									
$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^{\dagger}$	$I_\gamma^{\ddagger}$	$E_f$	$J_f^\pi$	Mult. &	$\delta^{\&}$	$\alpha^c$	Comments
875.2	(13/2 <sup>+</sup> )	461.0 <i>10</i>	100 20	414.2	(9/2 <sup>+</sup> )				
883.6		688.25 <i>10</i>	100	195.31	(7/2 <sup>-</sup> )				
937.4	(17/2 <sup>-</sup> )	292.64 <i>10</i>	100 7	644.7	(15/2 <sup>-</sup> )	(M1+E2) <sup>#</sup>	+0.03 1	0.183	B(M1)(W.u.)=(0.31 +16-18); B(E2)(W.u.)=(1.6 6)
		445.30 <i>10</i>	83 5	492.1	(13/2 <sup>-</sup> )	E2 <sup>a</sup>		0.0251	B(E2)(W.u.)=1.8×10 <sup>2</sup> +9-11
967.86	(13/2 <sup>+</sup> )	347.08 <i>17</i>	32 7	620.94	(11/2 <sup>+</sup> )	D			
		446.91 <i>10</i>	100 11	520.85	(9/2 <sup>+</sup> )	(Q) <sup>@</sup>			
1008.2	(15/2 <sup>+</sup> )	253.37 <i>10</i>	26.8 22	754.8	(13/2 <sup>+</sup> )				
		487.69 <i>10</i>	100 8	520.5	(11/2 <sup>+</sup> )				
1106.91	(15/2 <sup>+</sup> )	486.00 <i>10</i>	100	620.94	(11/2 <sup>+</sup> )	(Q) <sup>@</sup>			
1115.4	(19/2 <sup>-</sup> )	177.97 <i>10</i>	24 3	937.4	(17/2 <sup>-</sup> )	(M1+E2) <sup>#</sup>	+0.15 2	0.710 11	B(M1)(W.u.)=(0.34 +9-6); B(E2)(W.u.)=(1.2×10 <sup>2</sup> +5-4)
		470.63 <i>10</i>	100 8	644.7	(15/2 <sup>-</sup> )	E2 <sup>@</sup>		0.0217	B(E2)(W.u.)=1.7×10 <sup>2</sup> +4-3
1152.4	(15/2 <sup>+</sup> )	277.2 <i>10</i>	92 17	875.2	(13/2 <sup>+</sup> )				
		510.2 <i>10</i>	100 17	642.2	(11/2 <sup>+</sup> )				
1282.5	(17/2 <sup>+</sup> )	274.31 <i>10</i>	24.2 25	1008.2	(15/2 <sup>+</sup> )				
		527.77 <i>10</i>	100 10	754.8	(13/2 <sup>+</sup> )				
1286.0?	(13/2 <sup>+</sup> )	990.6 <sup>d</sup> <i>10</i>	100	295.5	(11/2 <sup>-</sup> )				
1417.0	(17/2 <sup>+</sup> )	264.6 <i>10</i>	27 10	1152.4	(15/2 <sup>+</sup> )				
		541.8 <i>10</i>	100 15	875.2	(13/2 <sup>+</sup> )				
1485.8	(21/2 <sup>-</sup> )	370.50 <i>10</i>	84 8	1115.4	(19/2 <sup>-</sup> )	(M1+E2) <sup>#</sup>	+0.05 3	0.0972	B(M1)(W.u.)=(0.21 8); B(E2)(W.u.)=(1.8 +23-18)
		548.49 <i>10</i>	100 7	937.4	(17/2 <sup>-</sup> )	(E2) <sup>a</sup>		0.0147 6	B(E2)(W.u.)=1.2×10 <sup>2</sup> 5
1501.71	(17/2 <sup>+</sup> )	394.90 <i>16</i>	54 8	1106.91	(15/2 <sup>+</sup> )				I $\gamma$ (395)/I $\gamma$ (534)=0.11 2 (1999Do34) is in disagreement.
		533.81 <i>10</i>	100 13	967.86	(13/2 <sup>+</sup> )	(Q) <sup>@</sup>			
1562.1	(19/2 <sup>+</sup> )	279.58 <i>10</i>	25.9 22	1282.5	(17/2 <sup>+</sup> )				I $\gamma$ (280)/I $\gamma$ (554)=0.13 3 (1992Sc03) is in disagreement.
		553.85 <i>10</i>	100 7	1008.2	(15/2 <sup>+</sup> )				
1669.9	(19/2 <sup>+</sup> )	562.96 <i>10</i>	100	1106.91	(15/2 <sup>+</sup> )				
1677.4	(23/2 <sup>-</sup> )	191.54 <i>10</i>	13.7 12	1485.8	(21/2 <sup>-</sup> )	(M1+E2) <sup>#</sup>	+0.18 9	0.576 13	B(M1)(W.u.)=(0.338 11); B(E2)(W.u.)=(1.5×10 <sup>2</sup> 14)
		562.00 <i>10</i>	100 7	1115.4	(19/2 <sup>-</sup> )	E2 <sup>@</sup>		0.0139 1	B(E2)(W.u.)=1.6×10 <sup>2</sup> +5-4
1730.1	(19/2 <sup>+</sup> )	313.1 <i>10</i>	44 33	1417.0	(17/2 <sup>+</sup> )				
		577.7 <i>10</i>	100 56	1152.4	(15/2 <sup>+</sup> )				
1739.9	(13/2 <sup>+</sup> )	453.9 <sup>d</sup> <i>10</i>	100	1286.0?	(13/2 <sup>+</sup> )				
1867.7	(21/2 <sup>+</sup> )	305.65 <i>10</i>	26 4	1562.1	(19/2 <sup>+</sup> )				
		585.17 <i>10</i>	100 9	1282.5	(17/2 <sup>+</sup> )				
1936.5	(17/2 <sup>+</sup> )	196.7 <i>10</i>	100 56	1739.9	(13/2 <sup>+</sup> )	(Q)			
		1292.0 <i>10</i>	6 4	644.7	(15/2 <sup>-</sup> )				
2009.0	(21/2 <sup>+</sup> )	592.0 <i>10</i>	100 29	1417.0	(17/2 <sup>+</sup> )				
		893.7 <i>10</i>	43 29	1115.4	(19/2 <sup>-</sup> )				
2020.6	(21/2 <sup>+</sup> )	290.5 <sup>d</sup> <i>10</i>	8 7	1730.1	(19/2 <sup>+</sup> )				
		603.5 <i>10</i>	100 17	1417.0	(17/2 <sup>+</sup> )				
2087.6	(21/2 <sup>+</sup> )	585.86 <i>17</i>	100	1501.71	(17/2 <sup>+</sup> )	@			

## Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$ (continued)									
$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_f$	$J_f^\pi$	Mult. &	$\delta^\&$	$\alpha^c$	Comments
2104.4	(25/2 <sup>-</sup> )	426.95 10	97 7	1677.4	(23/2 <sup>-</sup> )	(D) <sup>a</sup>			$\delta(Q/D)=+0.07\ 5.$
		618.72 10	100 8	1485.8	(21/2 <sup>-</sup> )	Q <sup>@</sup>			
2139.8	(23/2 <sup>+</sup> )	272.02 10	15.3 18	1867.7	(21/2 <sup>+</sup> )				
		577.73 10	100 8	1562.1	(19/2 <sup>+</sup> )				
		653.8 10	15.2 20	1485.8	(21/2 <sup>-</sup> )				
2199.6	(21/2 <sup>+</sup> )	263.3 10	100 10	1936.5	(17/2 <sup>+</sup> )	(Q) <sup>@</sup>			
		529.8 10	29 4	1669.9	(19/2 <sup>+</sup> )	(D) <sup>@</sup>			
		697.8 10	47 26	1501.71	(17/2 <sup>+</sup> )				
2228.4	(23/2 <sup>+</sup> )	666.3 10	100 38	1562.1	(19/2 <sup>+</sup> )				
		742.5 10	80 20	1485.8	(21/2 <sup>-</sup> )				
2276.7	(23/2 <sup>+</sup> )	606.85 10	100	1669.9	(19/2 <sup>+</sup> )				
2307.6	(27/2 <sup>-</sup> )	203.23 10	13.7 20	2104.4	(25/2 <sup>-</sup> )	(M1+E2) <sup>a</sup>	+0.30 8	0.476 13	B(M1)(W.u.)=(0.227 10); B(E2)(W.u.)=(2.4×10 <sup>2</sup> 12)
		630.14 10	100 5	1677.4	(23/2 <sup>-</sup> )	E2 <sup>@</sup>		0.01060	B(E2)(W.u.)=74 +32-20
2339.7	(23/2 <sup>+</sup> )	319.1 <sup>d</sup> 10	50 38	2020.6	(21/2 <sup>+</sup> )				
		609.6 10	100 88	1730.1	(19/2 <sup>+</sup> )				
2400.5	(25/2 <sup>+</sup> )	172.2 10	20.5 25	2228.4	(23/2 <sup>+</sup> )				
		260.84 10	100 8	2139.8	(23/2 <sup>+</sup> )				
		379.9 10	31 3	2020.6	(21/2 <sup>+</sup> )				
		391.5 10	12.1 25	2009.0	(21/2 <sup>+</sup> )				
		532.82 10	53 5	1867.7	(21/2 <sup>+</sup> )				
		723.1 10	57 5	1677.4	(23/2 <sup>-</sup> )	D <sup>#</sup>			
2410.8	(21/2 <sup>+</sup> )	680.7 10	100	1730.1	(19/2 <sup>+</sup> )				
2437.1	(23/2 <sup>+</sup> )	706.9 10	100 88	1730.1	(19/2 <sup>+</sup> )				
		951.2 10	62 62	1485.8	(21/2 <sup>-</sup> )				
2488.6	(25/2 <sup>+</sup> )	479.5 <sup>d</sup> 10	8 7	2009.0	(21/2 <sup>+</sup> )				
		620.9 10	100 13	1867.7	(21/2 <sup>+</sup> )				
2514.5	(25/2 <sup>+</sup> )	314.85 10	100 13	2199.6	(21/2 <sup>+</sup> )	(E2) <sup>@</sup>		0.0662	B(E2)(W.u.)=7.7×10 <sup>2</sup> +18-21
		426.8 3	23 4	2087.6	(21/2 <sup>+</sup> )	(E2) <sup>@</sup>		0.0281	B(E2)(W.u.)=39 +10-12
		505.8 10	5.1 26	2009.0	(21/2 <sup>+</sup> )				
2540.8	(25/2 <sup>+</sup> )	103.76 10	54 8	2437.1	(23/2 <sup>+</sup> )				
		130.0 10	69 15	2410.8	(21/2 <sup>+</sup> )				
		140.3 10	77 7	2400.5	(25/2 <sup>+</sup> )				
		863.38 10	100 46	1677.4	(23/2 <sup>-</sup> )				
2614.6	(27/2 <sup>+</sup> )	214.00 10	100 9	2400.5	(25/2 <sup>+</sup> )				
		386.2 10	11.6 17	2228.4	(23/2 <sup>+</sup> )				
		474.73 10	58 5	2139.8	(23/2 <sup>+</sup> )				
		510.1 10	27 3	2104.4	(25/2 <sup>-</sup> )				
2681.1	(27/2 <sup>+</sup> )	140.26 10	100 12	2540.8	(25/2 <sup>+</sup> )				
		244.02 10	32 5	2437.1	(23/2 <sup>+</sup> )				
		280.5 10	17.5 17	2400.5	(25/2 <sup>+</sup> )				

## Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$ (continued)									
$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_f$	$J_f^\pi$	Mult. &	$\delta^\&$	$\alpha^c$	Comments
2681.1	(27/2 <sup>+</sup> )	541.4 10	17.5 17	2139.8	(23/2 <sup>+</sup> )				
2685.7	(27/2 <sup>+</sup> )	545.9 10	100 12	2139.8	(23/2 <sup>+</sup> )				
		581.2 10	13 7	2104.4	(25/2 <sup>-</sup> )				
2748.3	(29/2 <sup>-</sup> )	440.61 10	69 7	2307.6	(27/2 <sup>-</sup> )	(D) <sup>a</sup>			$\delta(\text{Q/D})=-0.01$ 13.
		643.81 10	100 9	2104.4	(25/2 <sup>-</sup> )	(Q) <sup>@</sup>			
2773.5	(27/2 <sup>+</sup> )	496.72 19	100	2276.7	(23/2 <sup>+</sup> )				
2803.7	(29/2 <sup>+</sup> )	117.9 10	3.8 16	2685.7	(27/2 <sup>+</sup> )				
		188.99 10	100 14	2614.6	(27/2 <sup>+</sup> )				
		314.9 10	9.1 21	2488.6	(25/2 <sup>+</sup> )				
		403.20 10	70 6	2400.5	(25/2 <sup>+</sup> )				
2855.4	(29/2 <sup>-</sup> )	751.2 10	100	2104.4	(25/2 <sup>-</sup> )				
2861.2	(29/2 <sup>+</sup> )	180.2 10	100 9	2681.1	(27/2 <sup>+</sup> )				
		246.7 10	10.2 10	2614.6	(27/2 <sup>+</sup> )				
		320.44 10	42 9	2540.8	(25/2 <sup>+</sup> )				
2900.8	(29/2 <sup>+</sup> )	386.31 10	100	2514.5	(25/2 <sup>+</sup> )	(E2) <sup>@</sup>		0.0368	$\text{B(E2)(W.u.)}=5.2 \times 10^2 +9-12$
2925.0	(31/2 <sup>-</sup> )	176.85 10	14.1 16	2748.3	(29/2 <sup>-</sup> )	(D) <sup>#</sup>			
		617.48 10	100 7	2307.6	(27/2 <sup>-</sup> )	Q <sup>@</sup>			
3004.1	(31/2 <sup>+</sup> )	200.42 10	100 10	2803.7	(29/2 <sup>+</sup> )				
		318.4 10	1.6 13	2685.7	(27/2 <sup>+</sup> )				
		389.66 11	46 4	2614.6	(27/2 <sup>+</sup> )				
3021.5	(31/2 <sup>-</sup> )	166.1 10	7.3 18	2855.4	(29/2 <sup>-</sup> )				
		714.0 10	100 14	2307.6	(27/2 <sup>-</sup> )				
3078.4	(31/2 <sup>+</sup> )	217.17 10	100 10	2861.2	(29/2 <sup>+</sup> )				
		304.6 10	28 3	2773.5	(27/2 <sup>+</sup> )				
		397.34 10	93 10	2681.1	(27/2 <sup>+</sup> )				
3079.3	(27/2 <sup>+</sup> )	564.8 10	100	2514.5	(25/2 <sup>+</sup> )	(E2+M1)	-3.1 4	0.0155 6	
3123.4	(33/2 <sup>-</sup> )	102.0 10	6.3 8	3021.5	(31/2 <sup>-</sup> )				
		198.56 10	100 12	2925.0	(31/2 <sup>-</sup> )	(D) <sup>#</sup>			
		268.1 10	10 3	2855.4	(29/2 <sup>-</sup> )				
		374.74 10	20.2 25	2748.3	(29/2 <sup>-</sup> )				$E_\gamma$ : poor fit, level-energy difference=375.07.
3130.7	(31/2 <sup>+</sup> )	357.1 10	100	2773.5	(27/2 <sup>+</sup> )				
3245.2	(33/2 <sup>+</sup> )	241.1 10	99 8	3004.1	(31/2 <sup>+</sup> )				
		441.54 10	100 8	2803.7	(29/2 <sup>+</sup> )				
3320.8	(35/2 <sup>-</sup> )	197.29 10	100 17	3123.4	(33/2 <sup>-</sup> )	(M1) <sup>#</sup>		0.538	$\text{B(M1)(W.u.)}=0.39 +11-10$
		299.3 10	0.8 6	3021.5	(31/2 <sup>-</sup> )	[E2]		0.0771 14	$\text{B(E2)(W.u.)}=6$ 4
		395.99 10	20 3	2925.0	(31/2 <sup>-</sup> )	[E2]		0.0344	$\text{B(E2)(W.u.)}=30$ 3
3323.9	(33/2 <sup>+</sup> )	245.48 10	100 24	3078.4	(31/2 <sup>+</sup> )				
		462.66 10	82 29	2861.2	(29/2 <sup>+</sup> )				
3351.1	(33/2 <sup>+</sup> )	450.30 10	100	2900.8	(29/2 <sup>+</sup> )	[E2]		0.0243	$\text{B(E2)(W.u.)}=6.3 \times 10^2 +21-35$
3418.8	(33/2 <sup>-</sup> )	397.3 10	100 15	3021.5	(31/2 <sup>-</sup> )				

## Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$ (continued)									
$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_f$	$J_f^\pi$	Mult.&	$\delta^\&$	$\alpha^c$	Comments
3418.8	(33/2 <sup>-</sup> )	563.4 10	38 10	2855.4	(29/2 <sup>-</sup> )				
		670.7 10	96 15	2748.3	(29/2 <sup>-</sup> )				
3483.8	(35/2 <sup>+</sup> )	238.6 10	70 6	3245.2	(33/2 <sup>+</sup> )				
		479.68 10	100 8	3004.1	(31/2 <sup>+</sup> )				
3486.6	(31/2 <sup>+</sup> )	407.4 10	69 26	3079.3	(27/2 <sup>+</sup> )				
		585.9 10	100 35	2900.8	(29/2 <sup>+</sup> )	(E2+M1)	-3.1 4	0.0142 5	$\alpha(K)=0.0116$ 4; $\alpha(L)=0.00216$ 5
3551.9	(37/2 <sup>-</sup> )	231.04 10	100 7	3320.8	(35/2 <sup>-</sup> )	(D) <sup>#</sup>			$\delta(Q/D)=+0.25$ 5.
		428.44 10	27.8 22	3123.4	(33/2 <sup>-</sup> )				
3572.1	(35/2 <sup>+</sup> )	248.20 10	37 8	3323.9	(33/2 <sup>+</sup> )				
		441.3 10	57 10	3130.7	(31/2 <sup>+</sup> )				
		493.68 10	100 14	3078.4	(31/2 <sup>+</sup> )				
3635.8	(35/2 <sup>+</sup> )	312.0 10	100 17	3323.9	(33/2 <sup>+</sup> )				
		505.0 10	67 13	3130.7	(31/2 <sup>+</sup> )				
		557.4 10	83 20	3078.4	(31/2 <sup>+</sup> )				
3667.8	(35/2 <sup>-</sup> )	249.0 10	25 5	3418.8	(33/2 <sup>-</sup> )				
		646.3 10	100 14	3021.5	(31/2 <sup>-</sup> )				
		742.9 10	37 5	2925.0	(31/2 <sup>-</sup> )				
3789.9	(37/2 <sup>+</sup> )	306.06 10	100 8	3483.8	(35/2 <sup>+</sup> )				
		544.72 10	87 7	3245.2	(33/2 <sup>+</sup> )				
3822.7	(39/2 <sup>-</sup> )	270.87 10	100 6	3551.9	(37/2 <sup>-</sup> )	(D) <sup>#</sup>			$\delta(Q/D)=+0.22$ 3.
		501.93 10	41 3	3320.8	(35/2 <sup>-</sup> )	(Q) <sup>@</sup>			$I_\gamma(502)/I_\gamma(271)=0.70$ 6 ( <a href="#">1992Sc03</a> ) is in disagreement.
3863.6	(33/2 <sup>+</sup> )	377.0 <sup>d</sup> 10	33 27	3486.6	(31/2 <sup>+</sup> )				
		962.8 10	100 47	2900.8	(29/2 <sup>+</sup> )				
3866.4	(37/2 <sup>+</sup> )	515.30 10	100	3351.1	(33/2 <sup>+</sup> )	[E2]		0.01722	B(E2)(W.u.)=9.E+2 +4-5
3892.6	(37/2 <sup>+</sup> )	320.4 10	100 27	3572.1	(35/2 <sup>+</sup> )				
		568.6 10	41 14	3323.9	(33/2 <sup>+</sup> )				
3958.3	(35/2 <sup>+</sup> )	471.60 17	100 7	3486.6	(31/2 <sup>+</sup> )				
		607.1 10	83 6	3351.1	(33/2 <sup>+</sup> )	(E2+M1)	-3.1 4	0.0130 5	
3996.0	(37/2 <sup>-</sup> )	328.2 10	100 14	3667.8	(35/2 <sup>-</sup> )				
		577.2 10	88 14	3418.8	(33/2 <sup>-</sup> )				
4068.3	(39/2 <sup>+</sup> )	278.40 10	64 5	3789.9	(37/2 <sup>+</sup> )				
		584.45 10	100 8	3483.8	(35/2 <sup>+</sup> )				
4103.9	(41/2 <sup>-</sup> )	281.18 10	100 7	3822.7	(39/2 <sup>-</sup> )	(D) <sup>#</sup>			
		552.09 10	59 4	3551.9	(37/2 <sup>-</sup> )	(Q) <sup>@</sup>			$I_\gamma(552)/I_\gamma(281)=0.91$ 14 ( <a href="#">1992Sc03</a> ) is in disagreement.
4150.8	(39/2 <sup>+</sup> )	258.2 10	11 4	3892.6	(37/2 <sup>+</sup> )				
		578.71 10	100 13	3572.1	(35/2 <sup>+</sup> )				
4253.8	(39/2 <sup>-</sup> )	257.8 10	53 8	3996.0	(37/2 <sup>-</sup> )				
		586.0 10	100 15	3667.8	(35/2 <sup>-</sup> )				
4255.6	(39/2 <sup>+</sup> )	363.0 10	80 32	3892.6	(37/2 <sup>+</sup> )				
		619.8 10	100 48	3635.8	(35/2 <sup>+</sup> )				

## Adopted Levels, Gammas (continued)

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_f$	$J_f^\pi$	$\gamma(^{163}\text{Lu})$ (continued)			Comments
						Mult. &	$\delta^\&$	$\alpha^c$	
4255.6	(39/2 <sup>+</sup> )	683.6 <sup>d</sup> 10	48 32	3572.1	(35/2 <sup>+</sup> )				
4309.3	(37/2 <sup>-</sup> )	757.6 10	100 7	3551.9	(37/2 <sup>-</sup> )	(M1)		0.01539	
		988.6 10	9 7	3320.8	(35/2 <sup>-</sup> )				
4369.2	(37/2 <sup>+</sup> )	410.9 <sup>d</sup> 10	19 15	3958.3	(35/2 <sup>+</sup> )				
		505.5 10	100 38	3863.6	(33/2 <sup>+</sup> )				
		1018.1 10	69 23	3351.1	(33/2 <sup>+</sup> )	Q@			
4405.9	(41/2 <sup>+</sup> )	337.7 10	58 14	4068.3	(39/2 <sup>+</sup> )				
		616.17 10	100 8	3789.9	(37/2 <sup>+</sup> )				
4431.4	(43/2 <sup>-</sup> )	327.58 10	100 10	4103.9	(41/2 <sup>-</sup> )	(D) <sup>#</sup>			
		608.77 10	99 8	3822.7	(39/2 <sup>-</sup> )	Q@			
4445.0	(41/2 <sup>+</sup> )	578.65 10	100	3866.4	(37/2 <sup>+</sup> )	[E2]		0.01296	B(E2)(W.u.)=6.5×10 <sup>2</sup> +19-13
4492.6	(39/2 <sup>+</sup> )	534.3 10	100 7	3958.3	(35/2 <sup>+</sup> )				
		626.2 10	49 3	3866.4	(37/2 <sup>+</sup> )	(E2+M1)	-3.1 4	0.0121 5	
4529.5	(41/2 <sup>+</sup> )	636.8 10	100	3892.6	(37/2 <sup>+</sup> )				
4556.6	(41/2 <sup>-</sup> )	302.8 10	100 17	4253.8	(39/2 <sup>-</sup> )				
		560.6 10	96 17	3996.0	(37/2 <sup>-</sup> )				
		1004.8 10	75 25	3551.9	(37/2 <sup>-</sup> )				
4579.0	(39/2 <sup>-</sup> )	269.7 10	100 23	4309.3	(37/2 <sup>-</sup> )				
		756.4 10	91 21	3822.7	(39/2 <sup>-</sup> )	(M1)		0.01546	
		1027.1 10	16 7	3551.9	(37/2 <sup>-</sup> )				
4719.7	(43/2 <sup>+</sup> )	313.68 10	35 3	4405.9	(41/2 <sup>+</sup> )				
		651.30 10	100 7	4068.3	(39/2 <sup>+</sup> )				
4760.7	(45/2 <sup>-</sup> )	329.22 10	60 9	4431.4	(43/2 <sup>-</sup> )	#			
		656.60 10	100 8	4103.9	(41/2 <sup>-</sup> )	@			
4817.3	(43/2 <sup>+</sup> )	666.54 10	100	4150.8	(39/2 <sup>+</sup> )				
4831.2	(41/2 <sup>-</sup> )	252.2 10	100 25	4579.0	(39/2 <sup>-</sup> )				
		522.0 10	73 17	4309.3	(37/2 <sup>-</sup> )				
		727.3 10	48 10	4103.9	(41/2 <sup>-</sup> )	(M1)		0.01706	
4849.0	(43/2 <sup>-</sup> )	292.4 10	73 10	4556.6	(41/2 <sup>-</sup> )				
		595.2 10	100 17	4253.8	(39/2 <sup>-</sup> )				
		1026.3 10	57 10	3822.7	(39/2 <sup>-</sup> )				
4904.1	(43/2 <sup>+</sup> )	374.5 10	100 30	4529.5	(41/2 <sup>+</sup> )				
		648.5 10	100 27	4255.6	(39/2 <sup>+</sup> )				
4937.2	(41/2 <sup>+</sup> )	444.6 10	19 6	4492.6	(39/2 <sup>+</sup> )				
		568.0 10	100 19	4369.2	(37/2 <sup>+</sup> )				
		1070.8 10	31 9	3866.4	(37/2 <sup>+</sup> )				
5057.5	(45/2 <sup>+</sup> )	337.83 10	60 13	4719.7	(43/2 <sup>+</sup> )				
		652.59 21	100 8	4405.9	(41/2 <sup>+</sup> )				E <sub>γ</sub> : poor fit, level-energy difference=651.59.
5084.0	(45/2 <sup>+</sup> )	638.96 10	100	4445.0	(41/2 <sup>+</sup> )	[E2]		0.01026	B(E2)(W.u.)=5.7×10 <sup>2</sup> +9-8
5088.3	(43/2 <sup>+</sup> )	595.8 10	100 7	4492.6	(39/2 <sup>+</sup> )				

## Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$ (continued)									
$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_f$	$J_f^\pi$	Mult. &	$\delta^\&$	$\alpha^c$	Comments
5088.3	(43/2 <sup>+</sup> )	643.3 10	35.8 25	4445.0	(41/2 <sup>+</sup> )	(E2+M1)	-3.1 4	0.0113 4	
5116.1	(43/2 <sup>-</sup> )	285.1 10	100 26	4831.2	(41/2 <sup>-</sup> )				
		537.3 10	91 22	4579.0	(39/2 <sup>-</sup> )				
		684.3 10	22 17	4431.4	(43/2 <sup>-</sup> )				
5131.8	(47/2 <sup>-</sup> )	1012.2 10	30 13	4103.9	(41/2 <sup>-</sup> )	D			
		370.95 10	100 12	4760.7	(45/2 <sup>-</sup> )	[M1]		0.100	$\alpha(K)=0.083$ 3; $\alpha(L)=0.0125$ 4; $\alpha(M)=0.00281$ 9; $\alpha(N+..)=0.00086$ 3 B(M1)(W.u.)=1.4 6 B(E2)(W.u.)=1.9×10 <sup>2</sup> 7
5168.8	(45/2 <sup>-</sup> )	700.67 10	89 8	4431.4	(43/2 <sup>-</sup> )	[E2]		0.00831	
		319.8 10	81 19	4849.0	(43/2 <sup>-</sup> )				
		612.1 10	100 19	4556.6	(41/2 <sup>-</sup> )				
5209.6	(45/2 <sup>+</sup> )	1064.9 10	81 19	4103.9	(41/2 <sup>-</sup> )				
		305.6 10	30 22	4904.1	(43/2 <sup>+</sup> )				
		392.4 10	100 30	4817.3	(43/2 <sup>+</sup> )				
		680.1 10	63 19	4529.5	(41/2 <sup>+</sup> )				
5243.4	(45/2 <sup>+</sup> )	713.8 10	100	4529.5	(41/2 <sup>+</sup> )				
5387.9	(47/2 <sup>+</sup> )	330.37 10	64 7	5057.5	(45/2 <sup>+</sup> )				
		667.97 10	100 10	4719.7	(43/2 <sup>+</sup> )				
5419.5	(45/2 <sup>-</sup> )	303.3 10	84 22	5116.1	(43/2 <sup>-</sup> )				
		588.4 10	100 25	4831.2	(41/2 <sup>-</sup> )				
5496.2	(47/2 <sup>-</sup> )	658.8 10	16 16	4760.7	(45/2 <sup>-</sup> )				
		327.5 10	67 19	5168.8	(45/2 <sup>-</sup> )				
		647.2 10	100 19	4849.0	(43/2 <sup>-</sup> )				
5505.1	(49/2 <sup>-</sup> )	1064.7 10	33 14	4431.4	(43/2 <sup>-</sup> )				
		373.35 14	86 7	5131.8	(47/2 <sup>-</sup> )	[M1]		0.0953	B(M1)(W.u.)=1.7 +5-8 I $\gamma$ (373)/I $\gamma$ (744)=0.41 11 (1992Sc03) is in disagreement.
5557.4	(47/2 <sup>+</sup> )	744.31 10	100 8	4760.7	(45/2 <sup>-</sup> )	[E2]		0.00727	B(E2)(W.u.)=2.2×10 <sup>2</sup> +7-11
		347.9 10	58 39	5209.6	(45/2 <sup>+</sup> )				
		653.4 10	68 16	4904.1	(43/2 <sup>+</sup> )				
		740.0 10	100 16	4817.3	(43/2 <sup>+</sup> )				
5559.5	(47/2 <sup>+</sup> )	655.4 10	17 11	4904.1	(43/2 <sup>+</sup> )				
		742.20 10	100 19	4817.3	(43/2 <sup>+</sup> )				
5564.2	(45/2 <sup>+</sup> )	475.9 10	14 4	5088.3	(43/2 <sup>+</sup> )	(M1+E2)	-3.6 +10-19	0.0232 18	
		626.8 10	100 20	4937.2	(41/2 <sup>+</sup> )				
5720.1	(49/2 <sup>+</sup> )	1119.2 3	25 6	4445.0	(41/2 <sup>+</sup> )	(Q) <sup>@</sup>			
		332.1 10	57 6	5387.9	(47/2 <sup>+</sup> )				
		662.85 10	100 11	5057.5	(45/2 <sup>+</sup> )				
5742.9	(47/2 <sup>+</sup> )	654.6 10	100 6	5088.3	(43/2 <sup>+</sup> )	[E2]		0.00970	B(E2)(W.u.)=4.8×10 <sup>2</sup> +12-10
		658.9 10	24.3 21	5084.0	(45/2 <sup>+</sup> )	(E2+M1)	-3.1 4	0.0107 4	B(M1)(W.u.)=(0.0094 22); B(E2)(W.u.)=(101.4 25)
5757.0	(47/2 <sup>-</sup> )	337.4 10	74 18	5419.5	(45/2 <sup>-</sup> )				
		640.7 10	100 26	5116.1	(43/2 <sup>-</sup> )				
		996.4 10	15 12	4760.7	(45/2 <sup>-</sup> )				

## Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$ (continued)									
$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_f$	$J_f^\pi$	Mult. &	$\delta^\&$	$\alpha^c$	Comments
5781.0	(49/2 <sup>+</sup> )	696.97 10	100	5084.0	(45/2 <sup>+</sup> )	[E2]		0.00841	B(E2)(W.u.)=4.6×10 <sup>2</sup> +6−5
5853.1	(49/2 <sup>−</sup> )	356.9 10	65 24	5496.2	(47/2 <sup>−</sup> )				
		684.3 10	100 24	5168.8	(45/2 <sup>−</sup> )				
		1092.4 10	12 6	4760.7	(45/2 <sup>−</sup> )				
5898.2	(49/2 <sup>+</sup> )	338.8 10	75 13	5559.5	(47/2 <sup>+</sup> )	[M1] [E2]			
		340.8 10	63 38	5557.4	(47/2 <sup>+</sup> )				
		688.5 10	100 44	5209.6	(45/2 <sup>+</sup> )				
5916.9	(51/2 <sup>−</sup> )	411.55 10	91 10	5505.1	(49/2 <sup>−</sup> )			0.0737	B(M1)(W.u.)=1.2 +7−4
6006.1	(49/2 <sup>+</sup> )	785.18 10	100 11	5131.8	(47/2 <sup>−</sup> )	[E2]		0.00647	B(E2)(W.u.)=1.5×10 <sup>2</sup> +8−5
		446.6 10	21 13	5559.5	(47/2 <sup>+</sup> )				
		762.7 10	6 4	5243.4	(45/2 <sup>+</sup> )				
		796.4 10	100 32	5209.6	(45/2 <sup>+</sup> )				
6065.3	(51/2 <sup>+</sup> )	345.44 10	62 7	5720.1	(49/2 <sup>+</sup> )				
		677.14 10	100 10	5387.9	(47/2 <sup>+</sup> )				
6108.2	(49/2 <sup>−</sup> )	351.2 10	50 13	5757.0	(47/2 <sup>−</sup> )				
		688.7 10	100 25	5419.5	(45/2 <sup>−</sup> )				
6223.5	(51/2 <sup>−</sup> )	370.4 10	56 19	5853.1	(49/2 <sup>−</sup> )				
		727.3 10	100 25	5496.2	(47/2 <sup>−</sup> )				
6246.5	(51/2 <sup>+</sup> )	348.3 10	78 29	5898.2	(49/2 <sup>+</sup> )				
		686.8 10	17 14	5559.5	(47/2 <sup>+</sup> )				
		689.1 10	100 22	5557.4	(47/2 <sup>+</sup> )	Q@ (D) [M1] [E2]			
6249.3	(49/2 <sup>+</sup> )	685.1 10	100 19	5564.2	(45/2 <sup>+</sup> )				
		1165.3 10	24 6	5084.0	(45/2 <sup>+</sup> )				
6319.9	(47/2 <sup>−</sup> )	1235.9 10	100	5084.0	(45/2 <sup>+</sup> )				
6334.1	(53/2 <sup>−</sup> )	417.20 10	64 8	5916.9	(51/2 <sup>−</sup> )	[E2]		0.0711	B(M1)(W.u.)=1.3 +6−9
		829.00 10	100 10	5505.1	(49/2 <sup>−</sup> )			0.00575	B(E2)(W.u.)=1.8×10 <sup>2</sup> +9−13
6355.9	(51/2 <sup>+</sup> )	796.4 10	100	5559.5	(47/2 <sup>+</sup> )				
6415.1	(53/2 <sup>+</sup> )	349.62 10	65 6	6065.3	(51/2 <sup>+</sup> )				I $\gamma$ (350)/I $\gamma$ (695)=0.37 7 (1992Sc03) is in disagreement.
		694.96 10	100 10	5720.1	(49/2 <sup>+</sup> )	(E2+M1) [E2]			
6454.2	(51/2 <sup>+</sup> )	673.2 10	25 7	5781.0	(49/2 <sup>+</sup> )		−3.1 4	0.0102 4	B(M1)(W.u.)=(0.013 3); B(E2)(W.u.)=(1.4×10 <sup>2</sup> 4)
		711.2 10	100 15	5742.9	(47/2 <sup>+</sup> )			0.00804	B(E2)(W.u.)=4.7×10 <sup>2</sup> +12−11
6502.7	(51/2 <sup>−</sup> )	394.5 10	51 14	6108.2	(49/2 <sup>−</sup> )				
		745.7 10	100 26	5757.0	(47/2 <sup>−</sup> )	[E2]			
6533.6	(53/2 <sup>+</sup> )	752.61 10	100	5781.0	(49/2 <sup>+</sup> )			0.00709	B(E2)(W.u.)=5.4×10 <sup>2</sup> +5−4
6616.5	(53/2 <sup>+</sup> )	370.0 10	73 40	6246.5	(51/2 <sup>+</sup> )				
		718.4 10	100 27	5898.2	(49/2 <sup>+</sup> )				
6618.0	(53/2 <sup>−</sup> )	394.5 10	50 21	6223.5	(51/2 <sup>−</sup> )				
		764.9 10	100 29	5853.1	(49/2 <sup>−</sup> )				
6719.1	(53/2 <sup>+</sup> )	363.3 10	71 43	6355.9	(51/2 <sup>+</sup> )				
		713.0 10	100 57	6006.1	(49/2 <sup>+</sup> )				
6788.9	(55/2 <sup>+</sup> )	373.74 10	43 4	6415.1	(53/2 <sup>+</sup> )				I $\gamma$ (374)/I $\gamma$ (724)=1.2 4 (1992Sc03) is in disagreement.



## Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$ (continued)									
$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_f$	$J_f^\pi$	Mult. &	$\delta^\&$	$\alpha^c$	Comments
6788.9	(55/2 <sup>+</sup> )	723.69 10	100 10	6065.3	(51/2 <sup>+</sup> )				
6790.0	(55/2 <sup>-</sup> )	456.0 10	100 11	6334.1	(53/2 <sup>-</sup> )				
		872.8 10	100 11	5916.9	(51/2 <sup>-</sup> )				
6907.4	(53/2 <sup>-</sup> )	404.7 10	42 12	6502.7	(51/2 <sup>-</sup> )				
		799.2 10	100 23	6108.2	(49/2 <sup>-</sup> )				
6965.0	(51/2 <sup>-</sup> )	645.0 10	100 27	6319.9	(47/2 <sup>-</sup> )				
		1184.0 10	100 33	5781.0	(49/2 <sup>+</sup> )	D			
6980.1	(55/2 <sup>+</sup> )	363.6 10	64 21	6616.5	(53/2 <sup>+</sup> )				
		733.5 10	100 21	6246.5	(51/2 <sup>+</sup> )				
6990.5	(53/2 <sup>+</sup> )	741.2 10	100 19	6249.3	(49/2 <sup>+</sup> )				
		1209.5 10	25 9	5781.0	(49/2 <sup>+</sup> )	Q@			
7035.4	(55/2 <sup>-</sup> )	417.5 10	47 27	6618.0	(53/2 <sup>-</sup> )				
		811.9 10	100 33	6223.5	(51/2 <sup>-</sup> )				
7133.1	(55/2 <sup>+</sup> )	414.0 10	62 38	6719.1	(53/2 <sup>+</sup> )				
		777.3 10	100 88	6355.9	(51/2 <sup>+</sup> )				
7174.2	(57/2 <sup>+</sup> )	385.54 10	49 10	6788.9	(55/2 <sup>+</sup> )				
		758.85 12	100 11	6415.1	(53/2 <sup>+</sup> )				
7179.1	(55/2 <sup>+</sup> )	823.19 10	100	6355.9	(51/2 <sup>+</sup> )				
7220.4	(55/2 <sup>+</sup> )	686.8 10	15 4	6533.6	(53/2 <sup>+</sup> )	(E2+M1)	-3.1 4	0.0097 4	B(M1)(W.u.)=(0.013 3); B(E2)(W.u.)=(1.2×10 <sup>2</sup> 2)
		766.2 10	100 18	6454.2	(51/2 <sup>+</sup> )	[E2]		0.00682	B(E2)(W.u.)=5.3×10 <sup>2</sup> +16-15
7246.9	(57/2 <sup>-</sup> )	456.8 10	16 8	6790.0	(55/2 <sup>-</sup> )				
		913.0 10	100 11	6334.1	(53/2 <sup>-</sup> )				
7339.1	(57/2 <sup>+</sup> )	805.57 10	100	6533.6	(53/2 <sup>+</sup> )	[E2]		0.00612	B(E2)(W.u.)=4.7×10 <sup>2</sup> 6
7351.2	(55/2 <sup>-</sup> )	443.8 10	53 26	6907.4	(53/2 <sup>-</sup> )				
		848.5 10	100 26	6502.7	(51/2 <sup>-</sup> )				
7391.0	(57/2 <sup>+</sup> )	410.9 10	68 14	6980.1	(55/2 <sup>+</sup> )				
		774.5 10	100 14	6616.5	(53/2 <sup>+</sup> )				
7466.8	(57/2 <sup>-</sup> )	431.4 10	36 27	7035.4	(55/2 <sup>-</sup> )				
		848.9 10	100 27	6618.0	(53/2 <sup>-</sup> )				
7507.0	(57/2 <sup>+</sup> )	373.9 10	100 80	7133.1	(55/2 <sup>+</sup> )				
		787.9 10	100 60	6719.1	(53/2 <sup>+</sup> )				
7584.4	(59/2 <sup>+</sup> )	410.21 11	51 5	7174.2	(57/2 <sup>+</sup> )				I $\gamma$ (410)/I $\gamma$ (795)=1.01 17 (1992Sc03) is in disagreement.
		795.48 15	100 10	6788.9	(55/2 <sup>+</sup> )				
7667.2	(55/2 <sup>-</sup> )	702.2 10	100 64	6965.0	(51/2 <sup>-</sup> )				
		1133.6 10	44 16	6533.6	(53/2 <sup>+</sup> )	(D)			
7729.3	(59/2 <sup>-</sup> )	482.4 10	14 11	7246.9	(57/2 <sup>-</sup> )				
		939.2 10	100 29	6790.0	(55/2 <sup>-</sup> )				
7785.3	(59/2 <sup>+</sup> )	394.3 10	47 13	7391.0	(57/2 <sup>+</sup> )				
		805.3 10	100 13	6980.1	(55/2 <sup>+</sup> )				
7786.4	(57/2 <sup>+</sup> )	795.9 10	100 20	6990.5	(53/2 <sup>+</sup> )				
		1252.8 10	20 7	6533.6	(53/2 <sup>+</sup> )				

## Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$ (continued)									
$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_f$	$J_f^\pi$	Mult. &	$\delta^\&$	$\alpha^c$	Comments
7813.9	(57/2 <sup>-</sup> )	462.7 10	29 18	7351.2	(55/2 <sup>-</sup> )				
		906.5 10	100 24	6907.4	(53/2 <sup>-</sup> )				
7903.4	(59/2 <sup>-</sup> )	436.6 10	36 27	7466.8	(57/2 <sup>-</sup> )				
		868.0 10	100 27	7035.4	(55/2 <sup>-</sup> )				
7955.9	(59/2 <sup>+</sup> )	448.8 10	80 80	7507.0	(57/2 <sup>+</sup> )				
		822.7 10	100 80	7133.1	(55/2 <sup>+</sup> )				
8011.1	(61/2 <sup>+</sup> )	426.45 14	48 5	7584.4	(59/2 <sup>+</sup> )				
		837.45 22	100 10	7174.2	(57/2 <sup>+</sup> )				
8040.3	(59/2 <sup>+</sup> )	701.1 10	12 4	7339.1	(57/2 <sup>+</sup> )	(E2+M1)	-3.1 4	0.0093 3	B(M1)(W.u.)=(0.011 +7-6); B(E2)(W.u.)=(1.0×10 <sup>2</sup> +6-5)
		819.9 10	100 16	7220.4	(55/2 <sup>+</sup> )	[E2]		0.00589	B(E2)(W.u.)=4.3×10 <sup>2</sup> +21-16
8046.1	(59/2 <sup>+</sup> )	867.05 10	100	7179.1	(55/2 <sup>+</sup> )				
8196.9	(61/2 <sup>+</sup> )	857.7 10	100	7339.1	(57/2 <sup>+</sup> )	[E2]		0.00535	B(E2)(W.u.)=3.8×10 <sup>2</sup> 3
8222.8	(61/2 <sup>-</sup> )	493.5 10	20 16	7729.3	(59/2 <sup>-</sup> )				
		975.9 10	100 52	7246.9	(57/2 <sup>-</sup> )				
8237.3	(61/2 <sup>+</sup> )	452.0 10	57 13	7785.3	(59/2 <sup>+</sup> )				
		846.3 10	100 13	7391.0	(57/2 <sup>+</sup> )				
8291.2	(59/2 <sup>-</sup> )	477.3 10	38 31	7813.9	(57/2 <sup>-</sup> )				
		940.0 10	100 23	7351.2	(55/2 <sup>-</sup> )				
8379.8	(61/2 <sup>-</sup> )	913.0 10	100	7466.8	(57/2 <sup>-</sup> )				
8387.2	(61/2 <sup>+</sup> )	880.2 10	100	7507.0	(57/2 <sup>+</sup> )				
8421.8	(59/2 <sup>-</sup> )	754.6 10	100 50	7667.2	(55/2 <sup>-</sup> )				
		1082.6 10	30 10	7339.1	(57/2 <sup>+</sup> )	D			
8459.4	(63/2 <sup>+</sup> )	447.9 10	51 13	8011.1	(61/2 <sup>+</sup> )				$I_\gamma$ : other: 23 13 (1992Sc03).
		875.5 10	100 11	7584.4	(59/2 <sup>+</sup> )				
8636.2	(61/2 <sup>+</sup> )	849.8 10	100 22	7786.4	(57/2 <sup>+</sup> )				
		1297.0 <sup>d</sup> 10	22 14	7339.1	(57/2 <sup>+</sup> )				
8668.7	(63/2 <sup>+</sup> )	431.4 10	57 14	8237.3	(61/2 <sup>+</sup> )				
		883.4 10	100 19	7785.3	(59/2 <sup>+</sup> )				
8713.6	(63/2 <sup>-</sup> )	490.8 10	36 29	8222.8	(61/2 <sup>-</sup> )				
		984.3 10	100 43	7729.3	(59/2 <sup>-</sup> )				
8790.3	(61/2 <sup>-</sup> )	499.1 10	44 33	8291.2	(59/2 <sup>-</sup> )				
		976.4 10	100 33	7813.9	(57/2 <sup>-</sup> )				
8845.6	(63/2 <sup>-</sup> )	942.2 10	100	7903.4	(59/2 <sup>-</sup> )				
8855.7	(63/2 <sup>+</sup> )	899.9 10	100	7955.9	(59/2 <sup>+</sup> )				
8913.2	(63/2 <sup>+</sup> )	716.3 10	10 5	8196.9	(61/2 <sup>+</sup> )	[M1+E2]		0.013 5	
		872.9 10	100 23	8040.3	(59/2 <sup>+</sup> )	[E2]		0.00516	B(E2)(W.u.)=4.3×10 <sup>2</sup> +21-17
8927.0	(65/2 <sup>+</sup> )	467.7 10	56 13	8459.4	(63/2 <sup>+</sup> )				
		915.6 10	100 24	8011.1	(61/2 <sup>+</sup> )				
8974.2	(63/2 <sup>+</sup> )	928.1 10	100	8046.1	(59/2 <sup>+</sup> )				
9106.6	(65/2 <sup>+</sup> )	909.7 10	100	8196.9	(61/2 <sup>+</sup> )	[E2]		0.00473	B(E2)(W.u.)=3.7×10 <sup>2</sup> +8-6
9154.2	(65/2 <sup>+</sup> )	485.5 10	71 29	8668.7	(63/2 <sup>+</sup> )				

## Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$ (continued)								
$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_f$	$J_f^\pi$	Mult. &	$\alpha^c$	Comments
9154.2	(65/2 <sup>+</sup> )	916.8 10	100 29	8237.3	(61/2 <sup>+</sup> )			
9231.8	(63/2 <sup>-</sup> )	810.1 10	100	8421.8	(59/2 <sup>-</sup> )			
9252.8	(65/2 <sup>-</sup> )	539.2 10	57 43	8713.6	(63/2 <sup>-</sup> )			
		1030.0 10	100 57	8222.8	(61/2 <sup>-</sup> )			
9284.6	(63/2 <sup>-</sup> )	993.4 10	100	8291.2	(59/2 <sup>-</sup> )			
9331.0	(65/2 <sup>+</sup> )	943.8 10	100	8387.2	(61/2 <sup>+</sup> )			
9376.3	(65/2 <sup>-</sup> )	996.5 10	100	8379.8	(61/2 <sup>-</sup> )			
9408.7	(67/2 <sup>+</sup> )	481.7 10	95 33	8927.0	(65/2 <sup>+</sup> )			
		949.4 10	100 33	8459.4	(63/2 <sup>+</sup> )			
9538.7	(65/2 <sup>+</sup> )	902.5 10	100	8636.2	(61/2 <sup>+</sup> )			
9625.5	(67/2 <sup>+</sup> )	471.3 10	100 50	9154.2	(65/2 <sup>+</sup> )			
		956.8 10	63 37	8668.7	(63/2 <sup>+</sup> )			
9709.0	(67/2 <sup>-</sup> )	456.2 10	20 10	9252.8	(65/2 <sup>-</sup> )			
		995.4 10	100 50	8713.6	(63/2 <sup>-</sup> )			
9805.3	(65/2 <sup>-</sup> )	1015.0 10	100	8790.3	(61/2 <sup>-</sup> )			
9816.2	(67/2 <sup>+</sup> )	960.5 10	100	8855.7	(63/2 <sup>+</sup> )			
9839.7	(67/2 <sup>+</sup> )	926.5 10	100	8913.2	(63/2 <sup>+</sup> )	[E2]	0.00455	B(E2)(W.u.)=3.0×10 <sup>2</sup> +10-7
9916.8	(69/2 <sup>+</sup> )	508.0 10	24 14	9408.7	(67/2 <sup>+</sup> )			
		989.8 10	100 33	8927.0	(65/2 <sup>+</sup> )			
10069.2	(69/2 <sup>+</sup> )	962.53 14	100	9106.6	(65/2 <sup>+</sup> )	[E2]	0.00421	B(E2)(W.u.)=3.9×10 <sup>2</sup> +10-15
10097.2	(67/2 <sup>-</sup> )	865.3 10	100	9231.8	(63/2 <sup>-</sup> )			
10138.5	(69/2 <sup>+</sup> )	513.0 10	50 30	9625.5	(67/2 <sup>+</sup> )			
		984.4 10	100 50	9154.2	(65/2 <sup>+</sup> )			
10314.7	(69/2 <sup>-</sup> )	1061.9 10	100	9252.8	(65/2 <sup>-</sup> )			
10333.9	(69/2 <sup>+</sup> )	1002.9 10	100	9331.0	(65/2 <sup>+</sup> )			
10428.3	(71/2 <sup>+</sup> )	511.6 10	50 40	9916.8	(69/2 <sup>+</sup> )			
		1019.6 10	100 70	9408.7	(67/2 <sup>+</sup> )			
10494.5	(69/2 <sup>+</sup> )	955.8 10	100	9538.7	(65/2 <sup>+</sup> )			
10653.5	(71/2 <sup>+</sup> )	515.0 10	50 50	10138.5	(69/2 <sup>+</sup> )			
		1028.0 10	100 50	9625.5	(67/2 <sup>+</sup> )			
10714.9	(71/2 <sup>-</sup> )	1005.9 10	100	9709.0	(67/2 <sup>-</sup> )			
10819.9	(71/2 <sup>+</sup> )	980.2 10	100	9839.7	(67/2 <sup>+</sup> )	[E2]	0.00406	B(E2)(W.u.)=3.0×10 <sup>2</sup> +16-10
10876.3	(69/2 <sup>-</sup> )	1071.0 10	100	9805.3	(65/2 <sup>-</sup> )			
10978.4	(73/2 <sup>+</sup> )	550.1 10	50 40	10428.3	(71/2 <sup>+</sup> )			
		1061.6 10	100 70	9916.8	(69/2 <sup>+</sup> )			
11017.7	(71/2 <sup>-</sup> )	920.5 10	100	10097.2	(67/2 <sup>-</sup> )			
11085.7	(73/2 <sup>+</sup> )	1016.5 10	100	10069.2	(69/2 <sup>+</sup> )			
11186.8	(73/2 <sup>+</sup> )	1048.3 10		10138.5	(69/2 <sup>+</sup> )			
11503.7	(73/2 <sup>+</sup> )	1009.2 10	100	10494.5	(69/2 <sup>+</sup> )			
11505.4	(75/2 <sup>+</sup> )	527.0 10	50 38	10978.4	(73/2 <sup>+</sup> )			
		1077.1 10	100 75	10428.3	(71/2 <sup>+</sup> )			
11729.9	(75/2 <sup>-</sup> )	1015.0 10	100	10714.9	(71/2 <sup>-</sup> )	E2	0.00378	

**Adopted Levels, Gammas (continued)**

$\gamma(^{163}\text{Lu})$  (continued)

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_f$	$J_f^\pi$	Comments
11749.0	(75/2 <sup>+</sup> )	1095.5 10	100	10653.5	(71/2 <sup>+</sup> )	
11781.4	(75/2 <sup>-</sup> )	1066.5 10	100	10714.9	(71/2 <sup>-</sup> )	
11854.6	(75/2 <sup>+</sup> )	1034.7 10	100	10819.9	(71/2 <sup>+</sup> )	
11993.4	(75/2 <sup>-</sup> )	975.7 10	100	11017.7	(71/2 <sup>-</sup> )	
12098.1	(77/2 <sup>+</sup> )	1119.7 10	100	10978.4	(73/2 <sup>+</sup> )	$E_\gamma$ : 1117.4 (1992Sc03).
12156.8	(77/2 <sup>+</sup> )	1071.1 10	100	11085.7	(73/2 <sup>+</sup> )	
12266.9	(77/2 <sup>+</sup> )	1080.1 10	100	11186.8	(73/2 <sup>+</sup> )	
12566.7	(77/2 <sup>+</sup> )	1063.0 10	100	11503.7	(73/2 <sup>+</sup> )	
12627.2	(79/2 <sup>+</sup> )	1121.8 10	100	11505.4	(75/2 <sup>+</sup> )	
12745	(79/2 <sup>-</sup> )	1015.0 20	100	11729.9	(75/2 <sup>-</sup> )	
12862.4	(79/2 <sup>+</sup> )	1113.4 10	100	11749.0	(75/2 <sup>+</sup> )	
12866.0	(79/2 <sup>-</sup> )	1084.6 10	100	11781.4	(75/2 <sup>-</sup> )	
12943.5	(79/2 <sup>+</sup> )	1088.9 10		11854.6	(75/2 <sup>+</sup> )	
13025.0	(79/2 <sup>-</sup> )	1031.6 10		11993.4	(75/2 <sup>-</sup> )	
13198.3?	(81/2 <sup>+</sup> )	1100.2 <sup>d</sup> 10	100	12098.1	(77/2 <sup>+</sup> )	
13283.0	(81/2 <sup>+</sup> )	1126.2 10	100	12156.8	(77/2 <sup>+</sup> )	
13679.1	(81/2 <sup>+</sup> )	1112.4 10	100	12566.7	(77/2 <sup>+</sup> )	
13746.8	(83/2 <sup>+</sup> )	1119.6 10	100	12627.2	(79/2 <sup>+</sup> )	
13798	(83/2 <sup>-</sup> )	1052.8 10	100	12745	(79/2 <sup>-</sup> )	
14086.5	(83/2 <sup>+</sup> )	1143.0 10		12943.5	(79/2 <sup>+</sup> )	
14110?	(83/2 <sup>-</sup> )	1085.5 <sup>d</sup> 10	100	13025.0	(79/2 <sup>-</sup> )	
14462.3	(85/2 <sup>+</sup> )	1179.3 10	100	13283.0	(81/2 <sup>+</sup> )	
14826	(85/2 <sup>+</sup> )	1147 4	100	13679.1	(81/2 <sup>+</sup> )	
14890	(87/2 <sup>-</sup> )	1092.2 10	100	13798	(83/2 <sup>-</sup> )	
15284	(87/2 <sup>+</sup> )	1197.3 10	100	14086.5	(83/2 <sup>+</sup> )	
15689	(89/2 <sup>+</sup> )	1227.0 10	100	14462.3	(85/2 <sup>+</sup> )	
16024	(91/2 <sup>-</sup> )	1134.5 10	100	14890	(87/2 <sup>-</sup> )	
16531	(91/2 <sup>+</sup> )	1247.5 10	100	15284	(87/2 <sup>+</sup> )	
16958	(93/2 <sup>+</sup> )	1269.0 10	100	15689	(89/2 <sup>+</sup> )	
17204	(95/2 <sup>-</sup> )	1179.5 10	100	16024	(91/2 <sup>-</sup> )	
18262	(97/2 <sup>+</sup> )	1303.5 10	100	16958	(93/2 <sup>+</sup> )	
18436	(99/2 <sup>-</sup> )	1232.4 10	100	17204	(95/2 <sup>-</sup> )	

<sup>†</sup> From <sup>139</sup>La(<sup>29</sup>Si,5n $\gamma$ ) unless otherwise stated. These values, in general, agree within 0.3 keV with those from <sup>139</sup>La(<sup>28</sup>Si,4n $\gamma$ ).

<sup>‡</sup> Most values are from <sup>139</sup>La(<sup>29</sup>Si,5n $\gamma$ ), where a more complete set of values is given than in earlier <sup>139</sup>La(<sup>28</sup>Si,4n $\gamma$ ) study.

<sup>§</sup> From <sup>163</sup>Hf  $\epsilon$  decay.

<sup>&</sup> From  $\gamma(\theta)$ ,  $\gamma\gamma(\theta)$  and  $\gamma(\text{lin pol})$  in (HI,xn $\gamma$ ) studies, except as noted.

<sup>@</sup>  $\gamma\gamma(\theta)$  (DCO ratio) in (HI,xn $\gamma$ ) is consistent with  $\Delta J=2$ , stretched quadrupole. When  $T_{1/2}(\text{level})$  is known, RUL further limits the multipolarity to E2.

<sup>#</sup>  $\gamma\gamma(\theta)$  (DCO) in (HI,xn $\gamma$ ) is consistent with  $\Delta J=1$ , dipole, but  $\Delta J=2$  does not seem to be ruled out.

<sup>a</sup> From  $\gamma(\theta)$  in (HI,xn $\gamma$ ) (1983RoZW).

Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$  (continued)

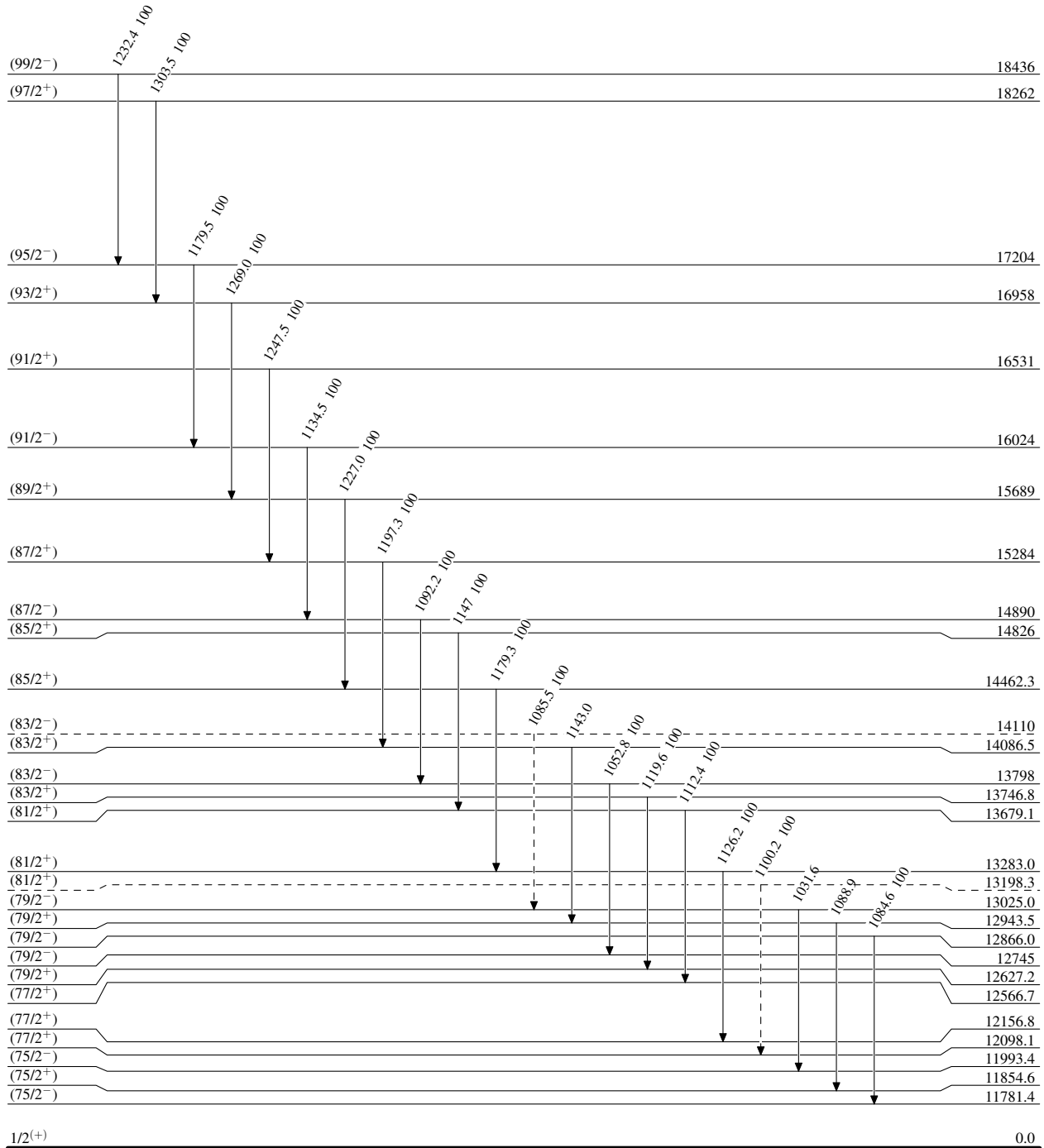
<sup>b</sup> From comparison to RUL. Isotropic distribution in ( $^{19}\text{F},4n\gamma$ ).  
<sup>c</sup> Total theoretical internal conversion coefficients, calculated using the BrIcc code ([2008Ki07](#)) with Frozen orbital approximation based on  $\gamma$ -ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.  
<sup>d</sup> Placement of transition in the level scheme is uncertain.

**Adopted Levels, Gammas**

Legend

Level Scheme

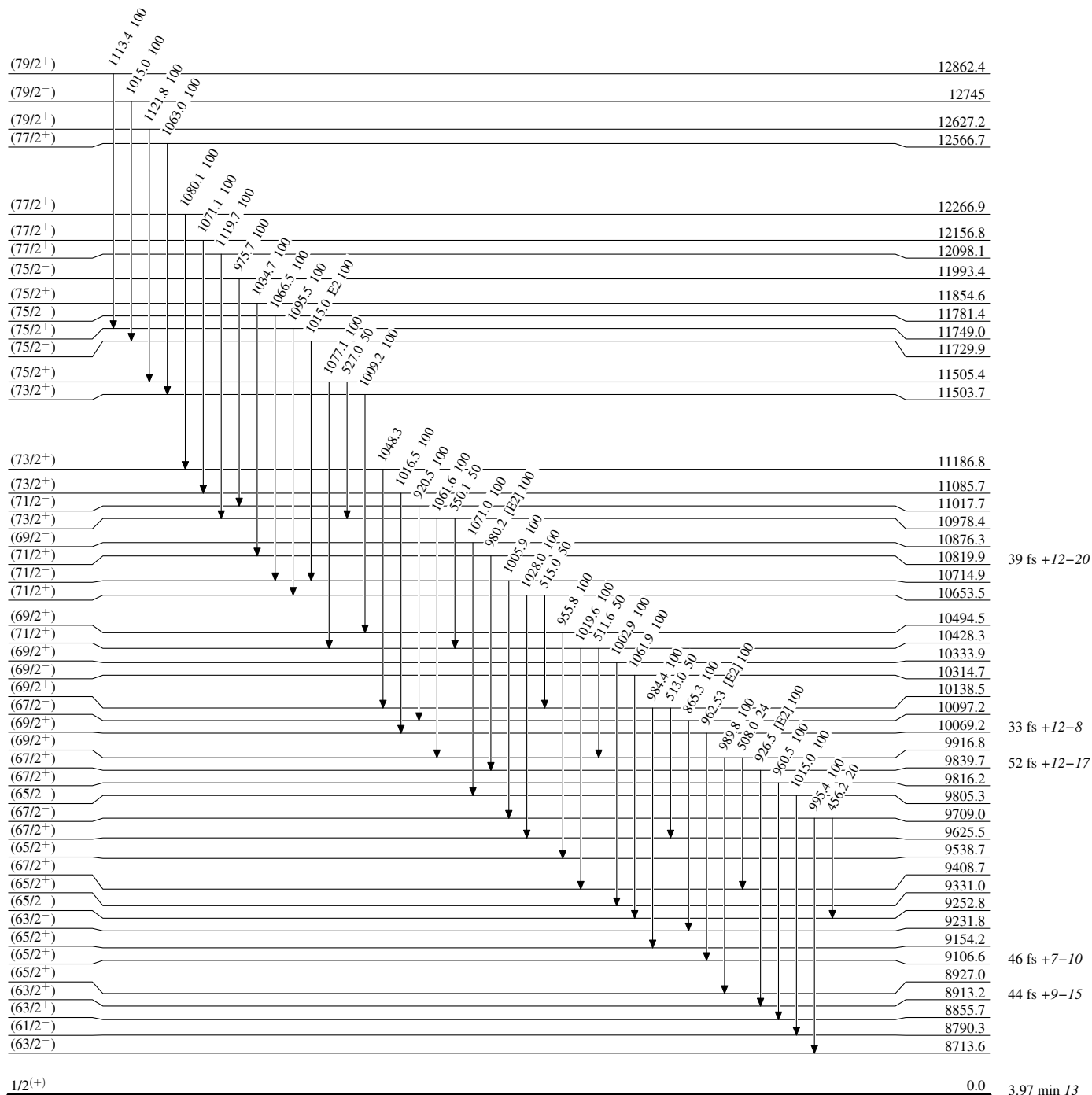
Intensities: Relative photon branching from each level

-----►  $\gamma$  Decay (Uncertain)

3.97 min 13

**Adopted Levels, Gammas****Level Scheme (continued)**

Intensities: Relative photon branching from each level

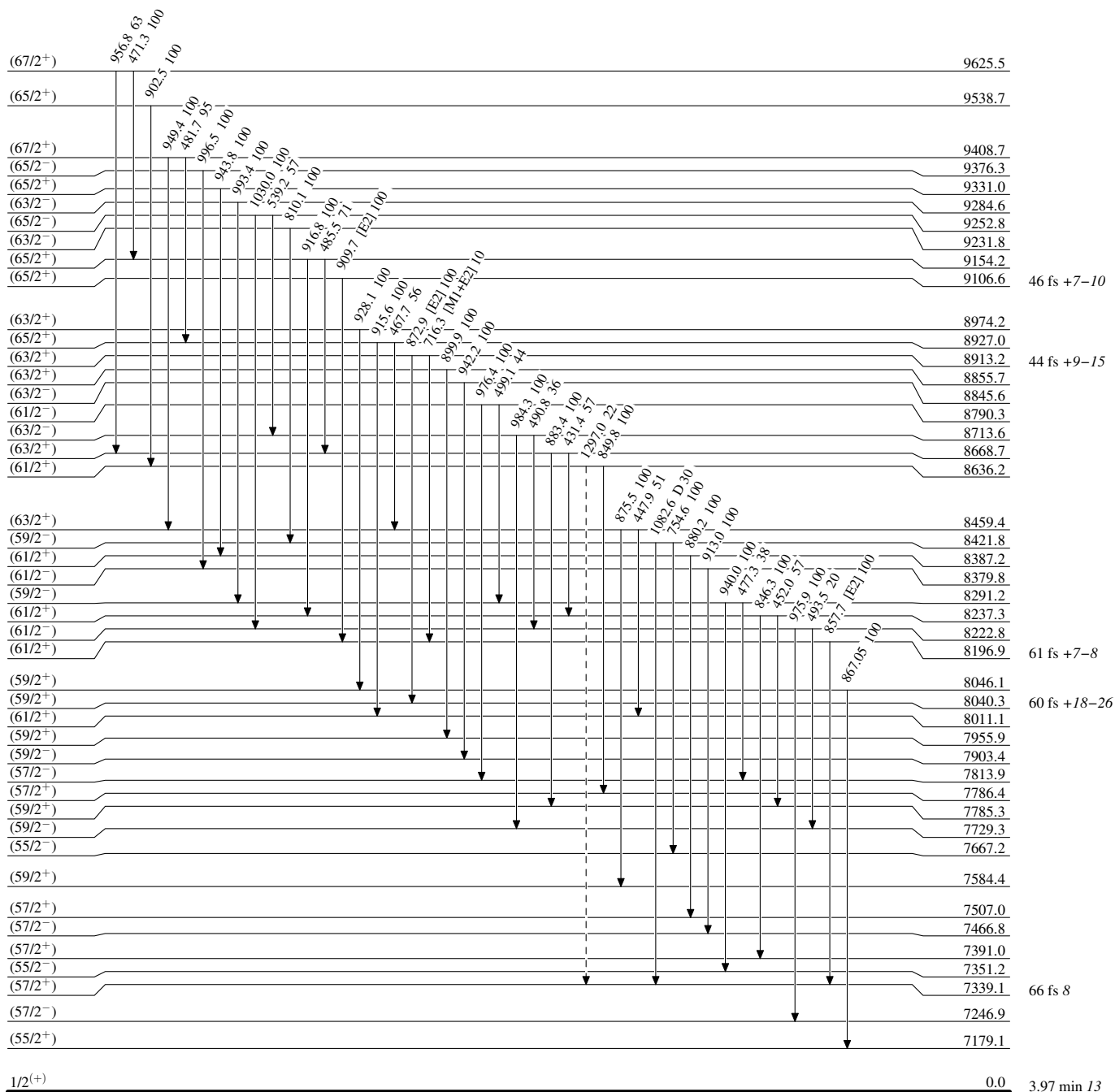


## Adopted Levels, Gammas

Legend

## Level Scheme (continued)

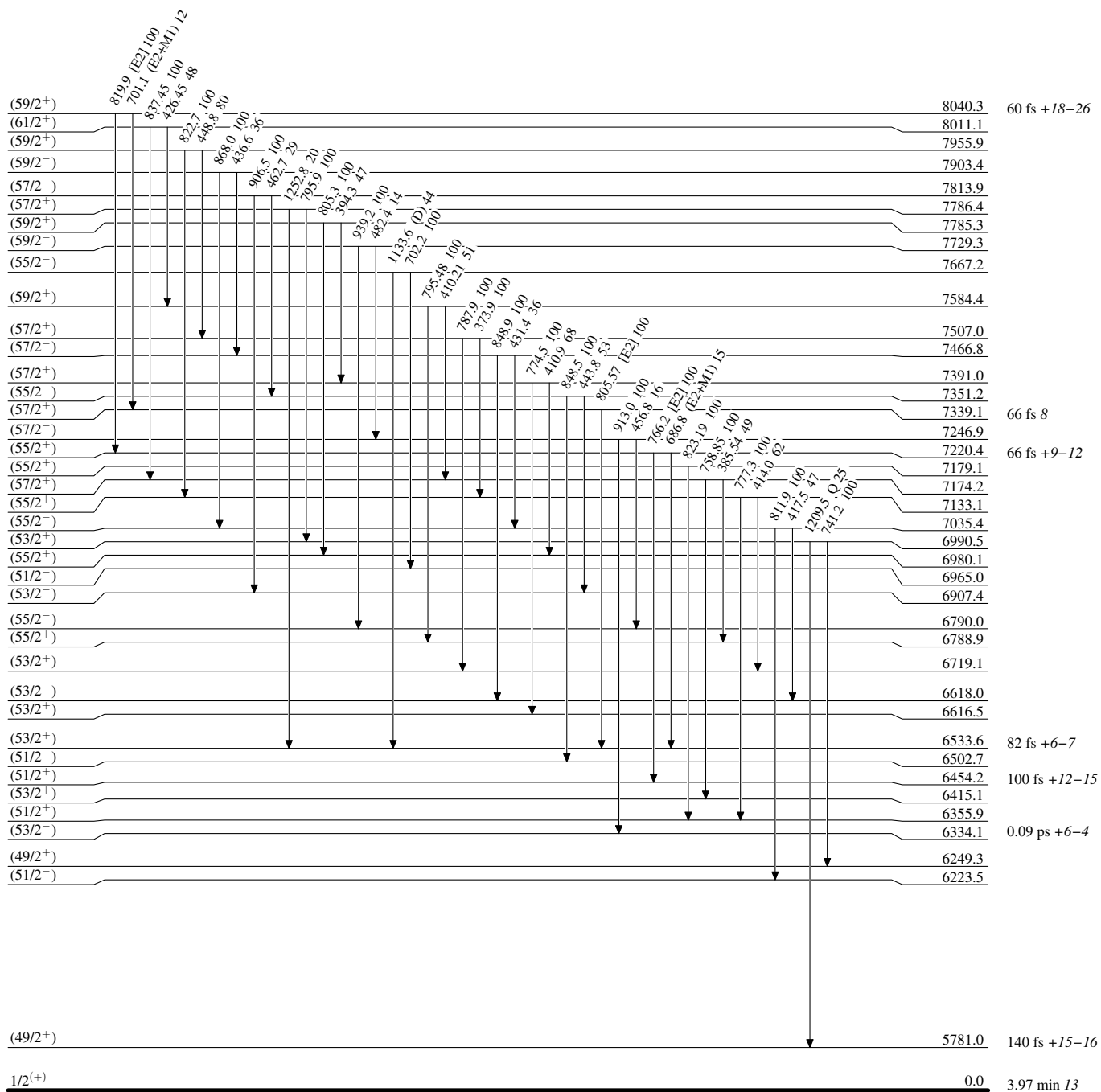
Intensities: Relative photon branching from each level

-----►  $\gamma$  Decay (Uncertain)



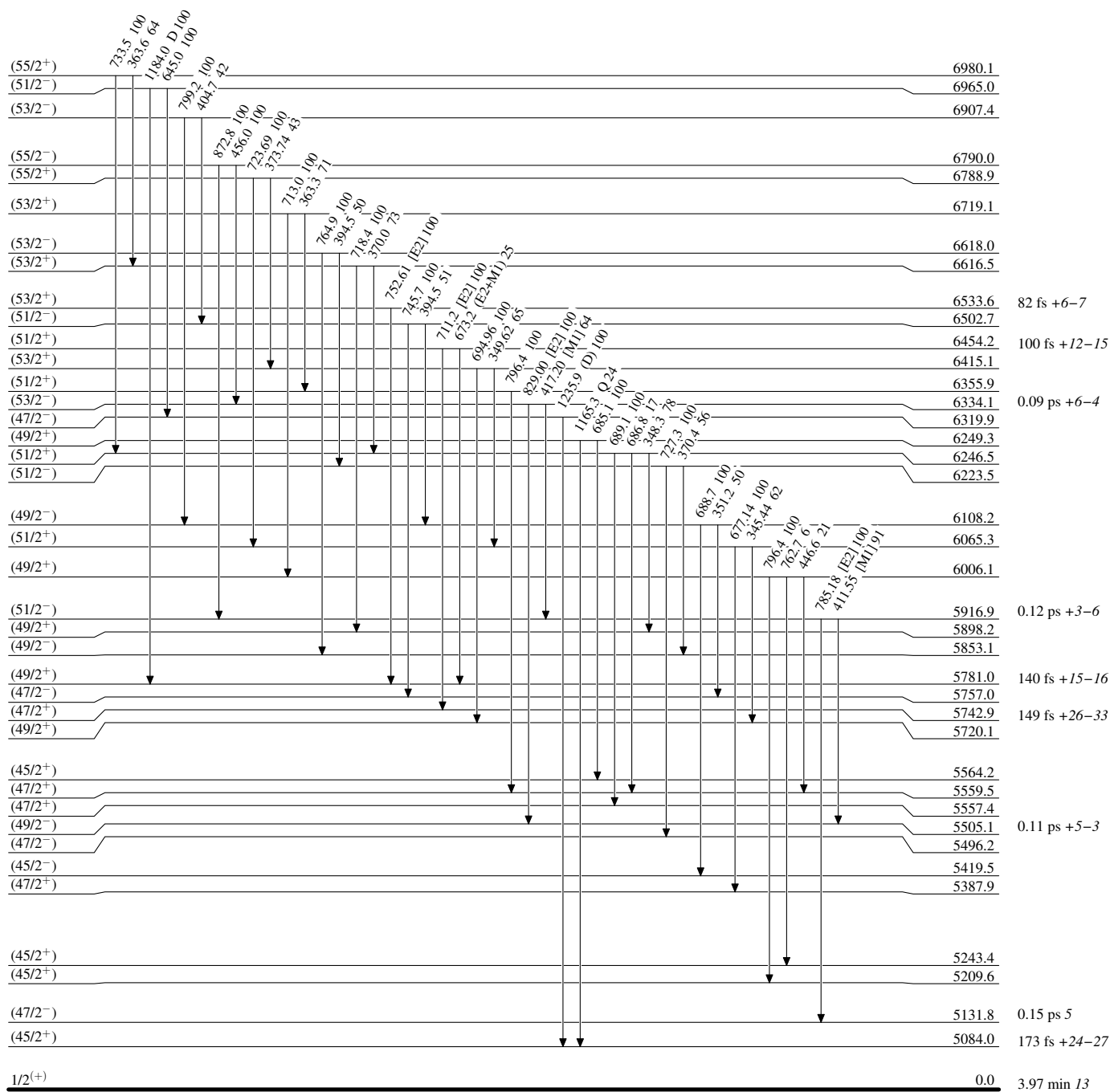
Adopted Levels, GammasLevel Scheme (continued)

Intensities: Relative photon branching from each level



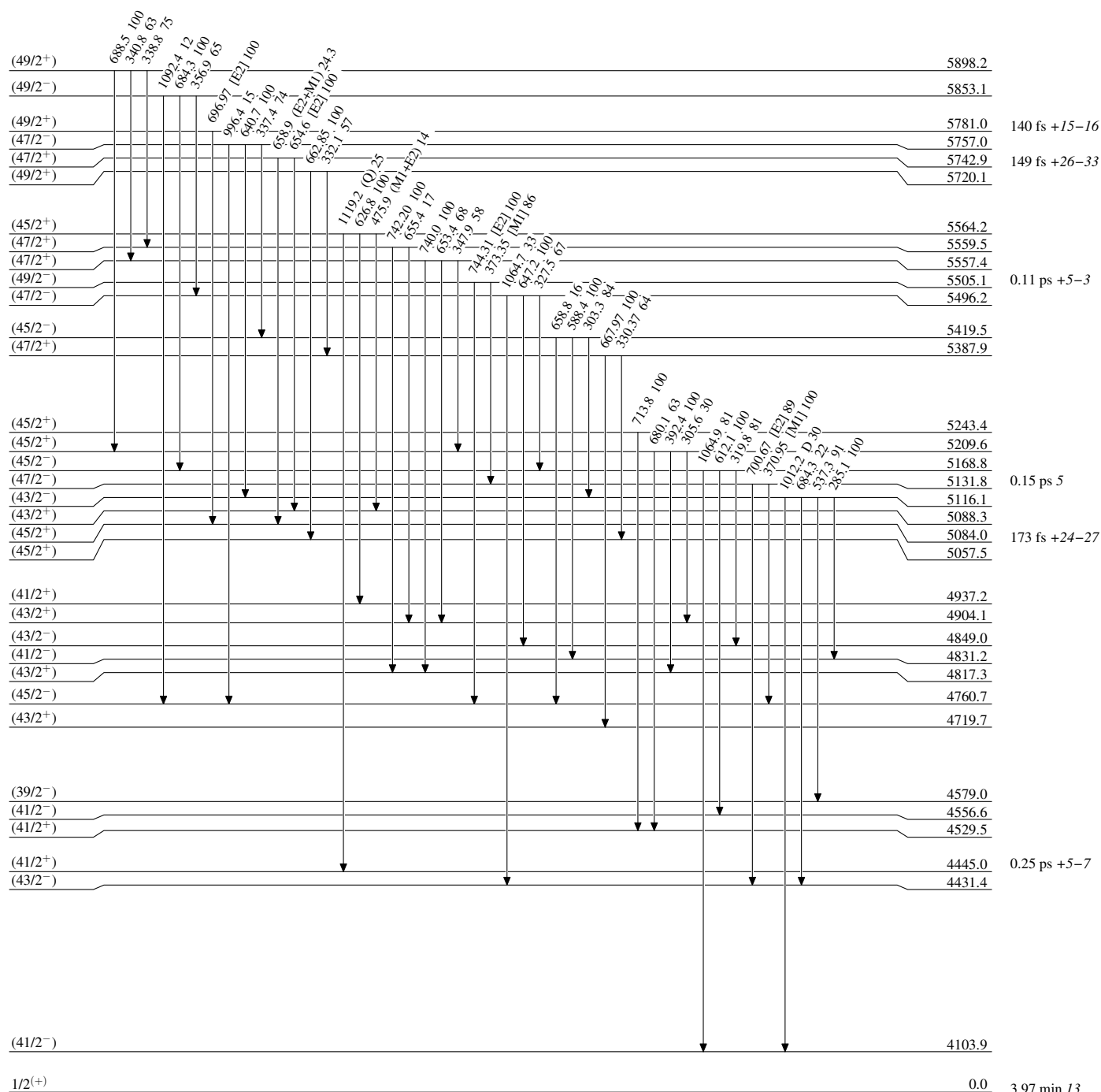
Adopted Levels, GammasLevel Scheme (continued)

Intensities: Relative photon branching from each level



Adopted Levels, GammasLevel Scheme (continued)

Intensities: Relative photon branching from each level

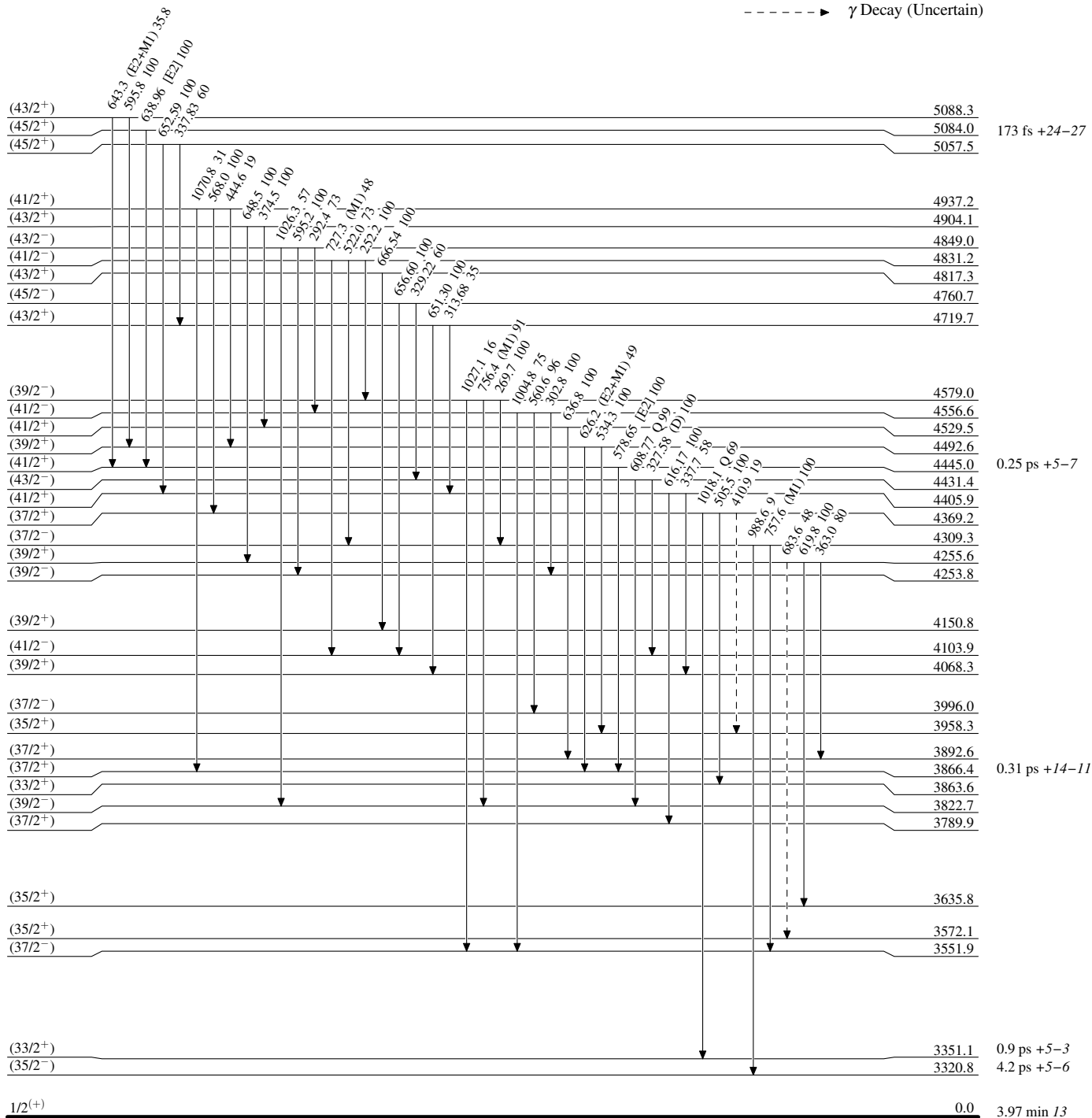


**Adopted Levels, Gammas**

Legend

**Level Scheme (continued)**

Intensities: Relative photon branching from each level

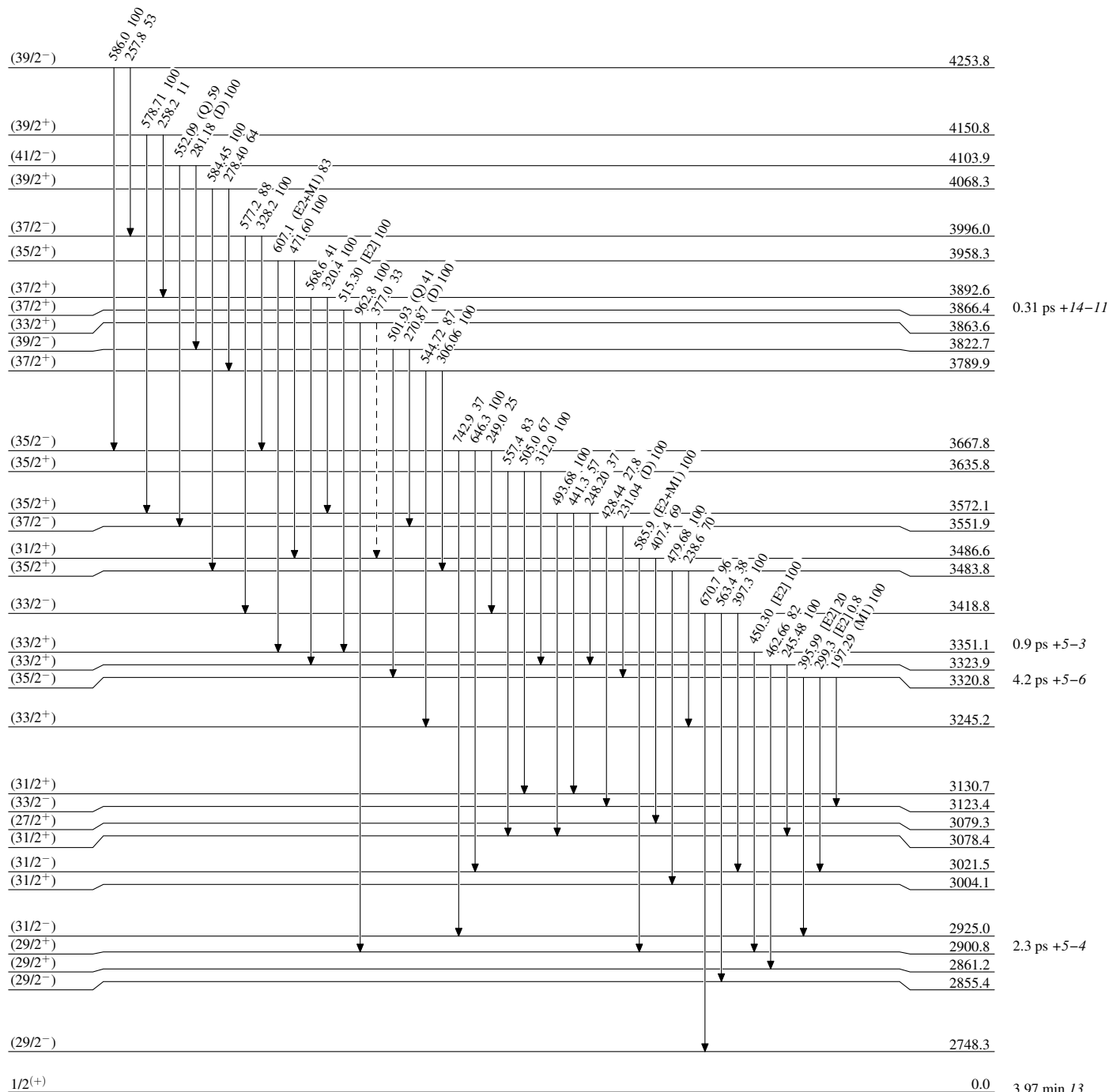
-----►  $\gamma$  Decay (Uncertain) $^{163}_{71}\text{Lu}_{92}$

# Adopted Levels, Gammas

Legend

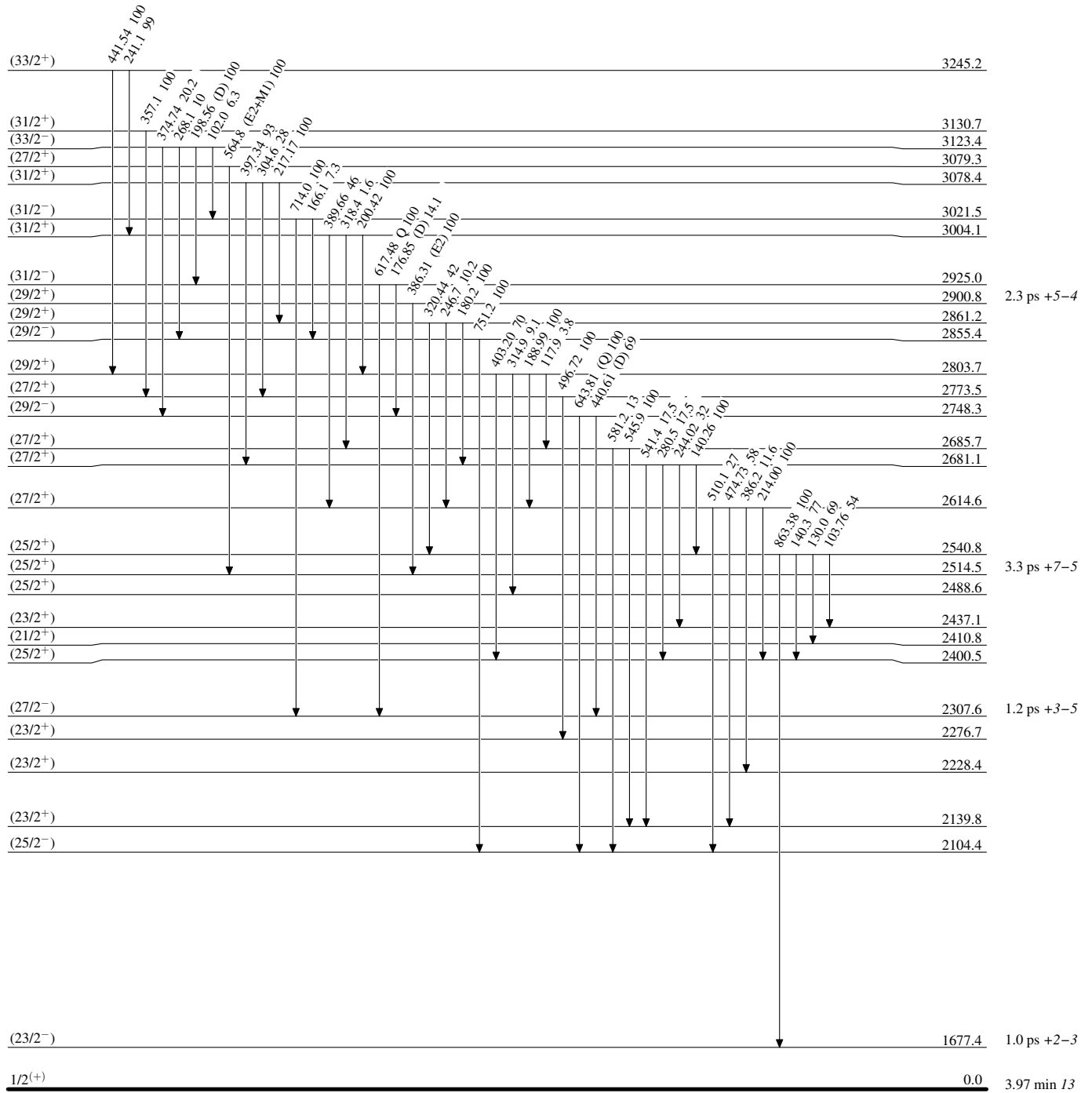
## Level Scheme (continued)

Intensities: Relative photon branching from each level

-----►  $\gamma$  Decay (Uncertain)


**Adopted Levels, Gammas****Level Scheme (continued)**

Intensities: Relative photon branching from each level

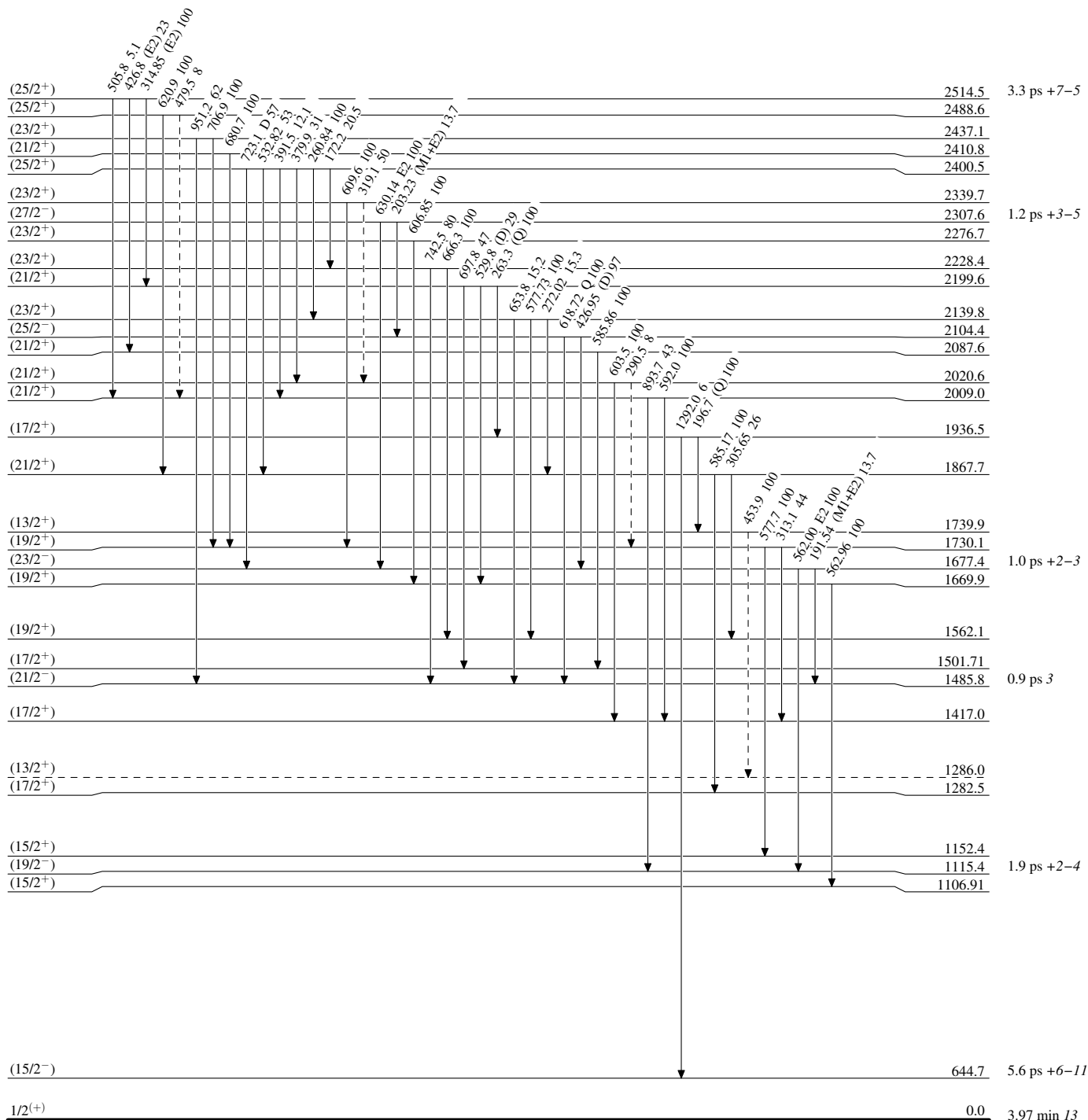


# Adopted Levels, Gammas

Legend

## Level Scheme (continued)

Intensities: Relative photon branching from each level

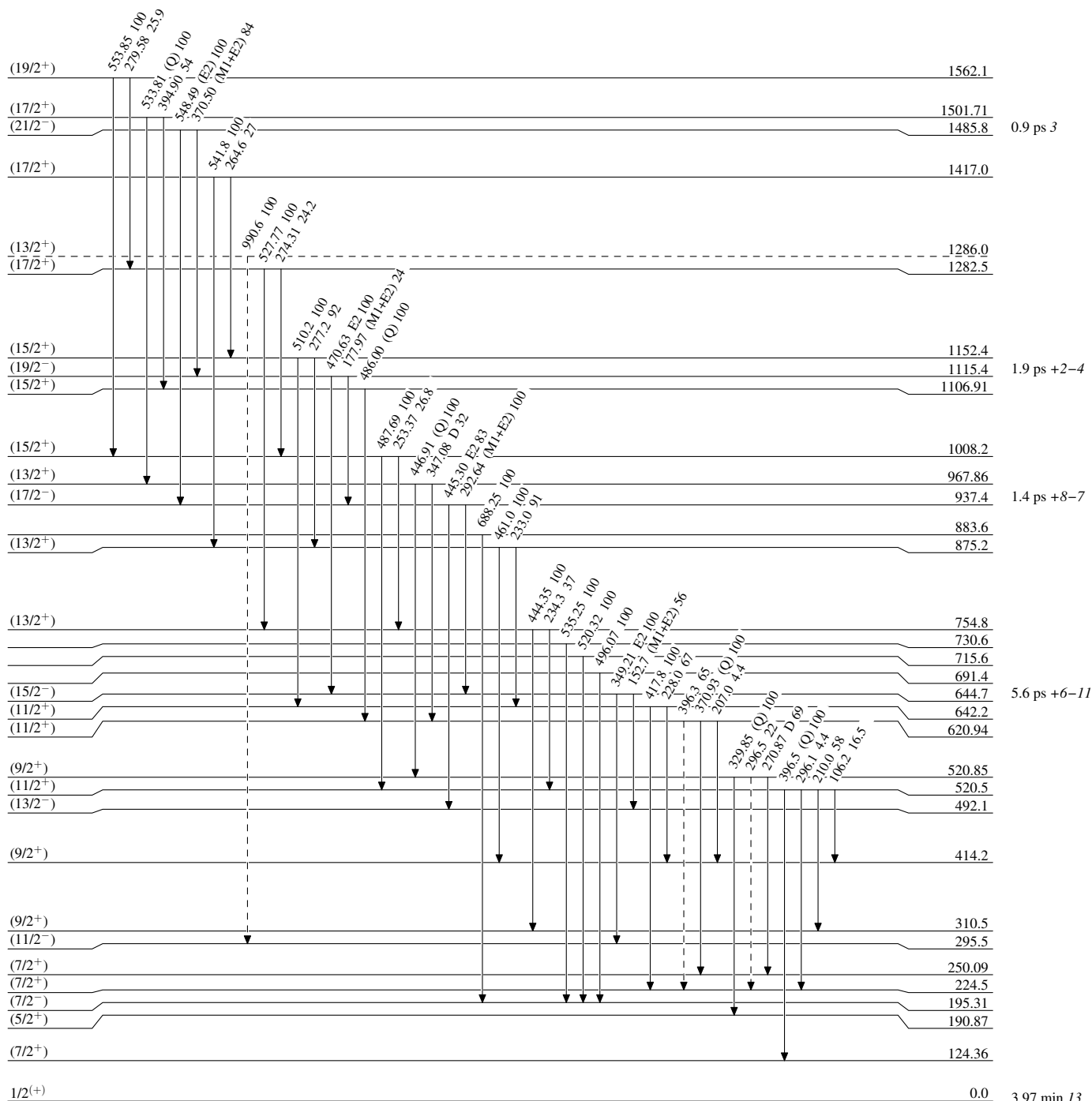
-----►  $\gamma$  Decay (Uncertain)


# Adopted Levels, Gammas

Legend

## Level Scheme (continued)

Intensities: Relative photon branching from each level

-----►  $\gamma$  Decay (Uncertain)


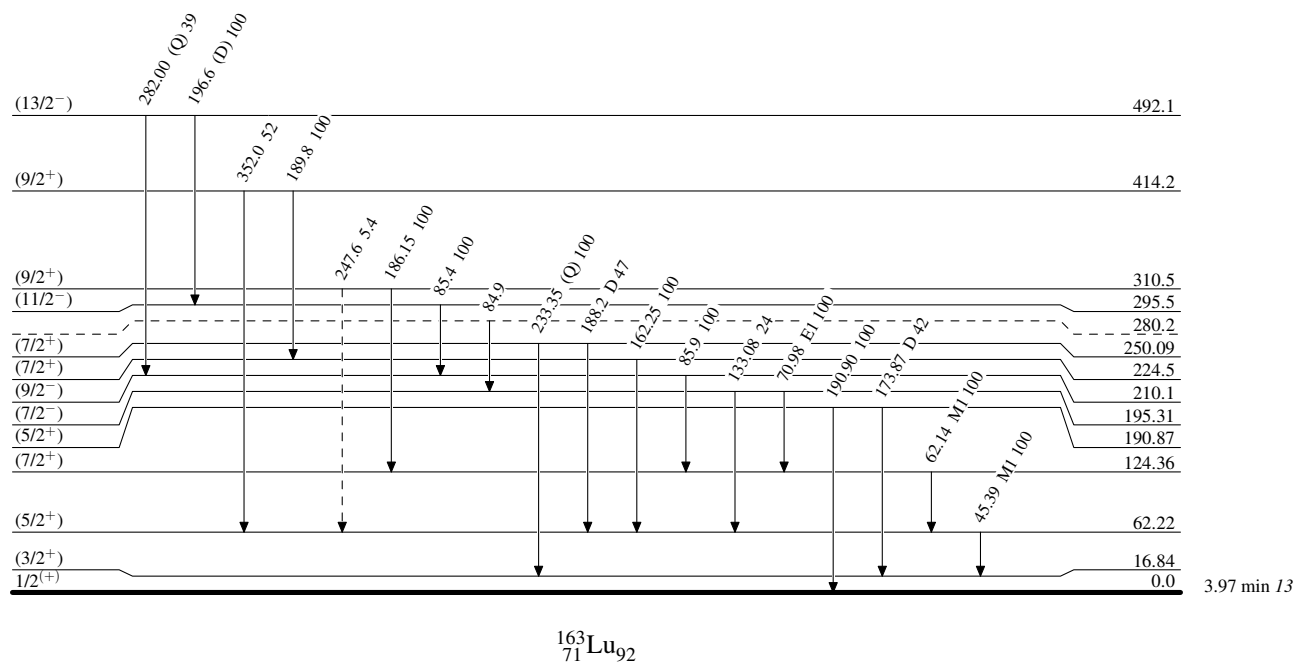


# Adopted Levels, Gammas

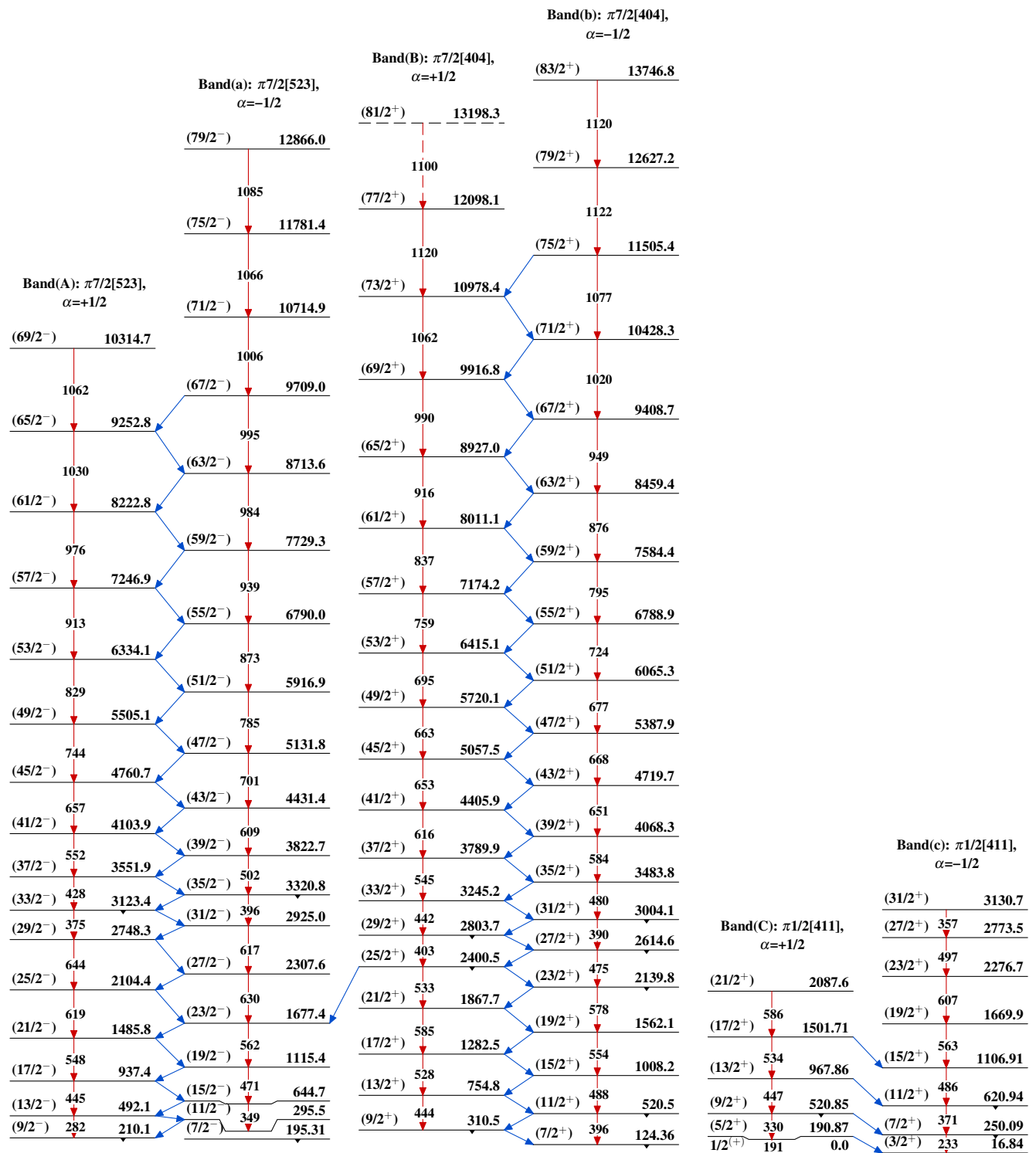
Legend

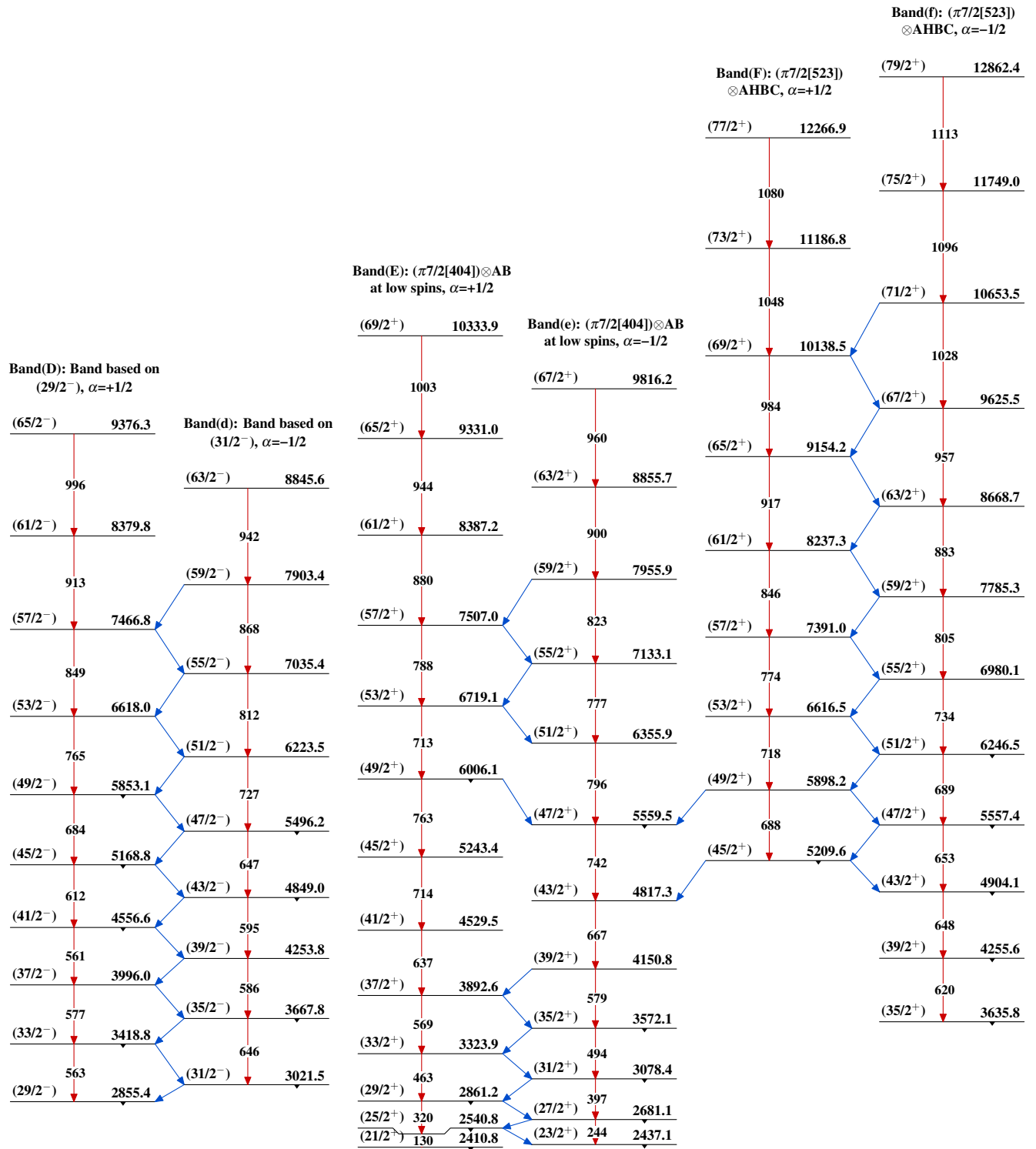
## Level Scheme (continued)

Intensities: Relative photon branching from each level

-----►  $\gamma$  Decay (Uncertain)


## Adopted Levels, Gammas



Adopted Levels, Gammas (continued)

Adopted Levels, Gammas (continued)

Band(G): ( $\pi 1/2[660]$ )  
 $\otimes \text{AEBC}, \alpha = -1/2$

(99/2 <sup>-</sup> )	18436
1232	
(95/2 <sup>-</sup> )	17204
1180	
(91/2 <sup>-</sup> )	16024
1134	
(87/2 <sup>-</sup> )	14890
1092	
(83/2 <sup>-</sup> )	13798
1053	
(79/2 <sup>-</sup> )	12745
1015	
(75/2 <sup>-</sup> )	11729.9

Band(H): ( $\pi 9/2[514]$ ) $\otimes \text{AB}$ ,  
 $\alpha = +1/2$

(69/2<sup>-</sup>) 10876.3

1071  
 (65/2<sup>-</sup>) 9805.3

1015  
 (61/2<sup>-</sup>) 8790.3

976  
 (57/2<sup>-</sup>) 7813.9

906  
 (53/2<sup>-</sup>) 6907.4

799  
 (49/2<sup>-</sup>) 6108.2

689  
 (45/2<sup>-</sup>) 5419.5

588  
 (41/2<sup>-</sup>) 4831.2

522  
 (37/2<sup>-</sup>) 4309.3

Band(h): ( $\pi 9/2[514]$ ) $\otimes \text{AB}$ ,  
 $\alpha = -1/2$

(63/2<sup>-</sup>) 9284.6

993  
 (59/2<sup>-</sup>) 8291.2

940  
 (55/2<sup>-</sup>) 7351.2

848  
 (51/2<sup>-</sup>) 6502.7

746  
 (47/2<sup>-</sup>) 5757.0

641  
 (43/2<sup>-</sup>) 5116.1

537  
 (39/2<sup>-</sup>) 4579.0

Band(J): Band based on  
 $55/2^+, \alpha = -1/2$

(63/2<sup>+</sup>) 8974.2

928  
 (59/2<sup>+</sup>) 8046.1

867  
 (55/2<sup>+</sup>) 7179.1

Band(I):  $\pi 5/2[402]$ ,  
 $\alpha = +1/2$

(21/2 <sup>+</sup> )	2020.6	(23/2 <sup>+</sup> )	2339.7
604		(19/2 <sup>+</sup> )	1730.1
542		(15/2 <sup>+</sup> )	1152.4
461		(11/2 <sup>+</sup> )	642.2
352		(7/2 <sup>+</sup> )	224.5
62.22			

Band(i):  $\pi 5/2[402]$ ,  
 $\alpha = -1/2$

**Adopted Levels, Gammas (continued)****Band(K): Triaxial SD-1  
band**

(97/2 <sup>+</sup> )	18262
1304	
(93/2 <sup>+</sup> )	16958
1269	
(89/2 <sup>+</sup> )	15689
1227	
(85/2 <sup>+</sup> )	14462.3
1179	
(81/2 <sup>+</sup> )	13283.0
1126	
(77/2 <sup>+</sup> )	12156.8
1071	
(73/2 <sup>+</sup> )	11085.7
1016	
(69/2 <sup>+</sup> )	10069.2
963	
(65/2 <sup>+</sup> )	9106.6
910	
(61/2 <sup>+</sup> )	8196.9
858	
(57/2 <sup>+</sup> )	7339.1
806	
(53/2 <sup>+</sup> )	6533.6
753	
(49/2 <sup>+</sup> )	5781.0
697	
(45/2 <sup>+</sup> )	5084.0
639	
(41/2 <sup>+</sup> )	4445.0
579	
(37/2 <sup>+</sup> )	3866.4
515	
(33/2 <sup>+</sup> )	3351.1
450	
(29/2 <sup>+</sup> )	2900.8
386	
(25/2 <sup>+</sup> )	2514.5
315	
(21/2 <sup>+</sup> )	2199.6
263	
(17/2 <sup>+</sup> )	1936.5
197	
(13/2 <sup>+</sup> )	1739.9

**Band(L): One-phonon  
wobbling-mode**

(91/2 <sup>+</sup> )	16531
1248	
(87/2 <sup>+</sup> )	15284
1197	
(83/2 <sup>+</sup> )	14086.5
1143	
(79/2 <sup>+</sup> )	12943.5
1089	
(75/2 <sup>+</sup> )	11854.6
1035	
(71/2 <sup>+</sup> )	10819.9
980	
(67/2 <sup>+</sup> )	9839.7
926	
(63/2 <sup>+</sup> )	8913.2
873	
(59/2 <sup>+</sup> )	8040.3
820	
(55/2 <sup>+</sup> )	7220.4
766	
(51/2 <sup>+</sup> )	6454.2
711	
(47/2 <sup>+</sup> )	5742.9
655	
(43/2 <sup>+</sup> )	5088.3
596	
(39/2 <sup>+</sup> )	4492.6
534	
(35/2 <sup>+</sup> )	3958.3
472	
(31/2 <sup>+</sup> )	3486.6
407	
(27/2 <sup>+</sup> )	3079.3

**Band(M): Two-phonon  
wobbling-mode**

(85/2 <sup>+</sup> )	14826
1147	
(81/2 <sup>+</sup> )	13679.1
1112	
(77/2 <sup>+</sup> )	12566.7
1063	
(73/2 <sup>+</sup> )	11503.7
1009	
(69/2 <sup>+</sup> )	10494.5
956	
(65/2 <sup>+</sup> )	9538.7
902	
(61/2 <sup>+</sup> )	8636.2
850	
(57/2 <sup>+</sup> )	7786.4
796	
(53/2 <sup>+</sup> )	6990.5
741	
(49/2 <sup>+</sup> )	6249.3
685	
(45/2 <sup>+</sup> )	5564.2
627	
(41/2 <sup>+</sup> )	4937.2
568	
(37/2 <sup>+</sup> )	4369.2
506	
(33/2 <sup>+</sup> )	3863.6

**Band(N): Triaxial SD-4  
band**

(83/2 <sup>-</sup> )	14110
1086	
(79/2 <sup>-</sup> )	13025.0
1032	
(75/2 <sup>-</sup> )	11993.4
976	
(71/2 <sup>-</sup> )	11017.7
920	
(67/2 <sup>-</sup> )	10097.2
865	
(63/2 <sup>-</sup> )	9231.8
810	
(59/2 <sup>-</sup> )	8421.8
755	
(55/2 <sup>-</sup> )	7667.2
702	
(51/2 <sup>-</sup> )	6965.0
645	
(47/2 <sup>-</sup> )	6319.9