

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 -5510 40 10030 80 2250 30 3350 40 [2009AuZZ,2003Au03](#).

[Additional information 1](#).

Mass measurement: [2000Ra23](#).

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

 ^{163}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 ^{163}Hf ε decay (40.0 s)
B $^{139}\text{La}(^{28}\text{Si}, 4n\gamma)$
C $^{139}\text{La}(^{29}\text{Si}, 5n\gamma)$

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

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Adopted Levels, Gammas (continued) ^{163}Lu Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} [#]	XREF	Comments
62.22 ^q 23	(5/2 ⁺)		ABC	J ^π : M1 γ to 1/2 ⁽⁺⁾ .
124.36 ^e 24	(7/2 ⁺)		ABC	
190.87 ^f 20	(5/2 ⁺)		BC	
195.31 ^c 24	(7/2 ⁻)		ABC	
210.1 ^b 4	(9/2 ⁻)		BC	
224.5 ^r 3	(7/2 ⁺)		ABC	
250.09 ^g 23	(7/2 ⁺)		ABC	
280.2? 3			A	
295.5 ^c 4	(11/2 ⁻)		BC	
310.5 ^d 3	(9/2 ⁺)		BC	
414.2 ^q 5	(9/2 ⁺)		C	
492.1 ^b 4	(13/2 ⁻)		BC	
520.5 ^e 3	(11/2 ⁺)		BC	
520.85 ^f 22	(9/2 ⁺)		BC	
620.94 ^g 24	(11/2 ⁺)		BC	
642.2 ^r 7	(11/2 ⁺)		C	
644.7 ^c 4	(15/2 ⁻)	5.6 [@] ps +6-11	BC	
691.4 3			A	
715.6 3			A	
730.6 4			A	
754.8 ^d 3	(13/2 ⁺)		BC	
875.2 ^q 7	(13/2 ⁺)		C	
883.6 3			A	
937.4 ^b 4	(17/2 ⁻)	1.4 [@] ps +8-7	BC	
967.86 ^f 24	(13/2 ⁺)		BC	
1008.2 ^e 3	(15/2 ⁺)		BC	
1106.91 ^g 25	(15/2 ⁺)		BC	
1115.4 ^c 4	(19/2 ⁻)	1.9 [@] ps +2-4	BC	
1152.4 ^r 8	(15/2 ⁺)		C	
1282.5 ^d 3	(17/2 ⁺)		BC	
1286.0? 10	(13/2 ⁺)		C	
1417.0 ^q 7	(17/2 ⁺)		C	
1485.8 ^b 4	(21/2 ⁻)	0.9 [@] ps 3	BC	
1501.71 ^f 25	(17/2 ⁺)		BC	
1562.1 ^e 3	(19/2 ⁺)		BC	
1669.9 ^g 3	(19/2 ⁺)		BC	
1677.4 ^c 4	(23/2 ⁻)	1.0 [@] ps +2-3	BC	
1730.1 ^r 7	(19/2 ⁺)		C	
1739.9 ^t 10	(13/2 ⁺)		BC	
1867.7 ^d 3	(21/2 ⁺)		BC	
1936.5 ^t 8	(17/2 ⁺)		BC	
2009.0 6	(21/2 ⁺)		C	
2020.6 ^q 7	(21/2 ⁺)		C	
2087.6 ^f 3	(21/2 ⁺)		C	
2104.4 ^b 4	(25/2 ⁻)		BC	
2139.8 ^e 3	(23/2 ⁺)		BC	
2199.6 ^t 4	(21/2 ⁺)		BC	
2228.4 6	(23/2 ⁺)		C	
2276.7 ^g 3	(23/2 ⁺)		BC	

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Adopted Levels, Gammas (continued) ^{163}Lu Levels (continued)

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

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Adopted Levels, Gammas (continued) ^{163}Lu Levels (continued)

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

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Adopted Levels, Gammas (continued)

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

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Adopted Levels, Gammas (continued) ^{163}Lu Levels (continued)

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

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Adopted Levels, Gammas (continued) ^{163}Lu Levels (continued)

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

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

[‡] The assignments are as proposed by 2002Je05, 1999Do34 and 1992Sc03 in (HI,xn γ) 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^π '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 γ) studies.

@ From RDDS (1992ScZL).

& From RDDS (1993Sc13, 1992ScZL).

^a From DSAM (2004Go14).

^b 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_t 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.

^c 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.

^d 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 $(\pi 7/2[523])\otimes\text{AEBC}$ after AB crossing.

^e 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 $(\pi 7/2[523])\otimes\text{AEBC}$ after AB crossing.

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

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

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

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

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

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

^l Band(F): $(\pi 7/2[523])\otimes\text{AHBC}$, $\alpha=+1/2$.

^m Band(f): $(\pi 7/2[523])\otimes\text{AHBC}$, $\alpha=-1/2$.

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

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

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

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

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

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

^t Band(K): Triaxial SD-1 band. (2004Je03, 2004Go14, 2002Je05, 2002Sc11, 2001Od03, 1999Do34, 1995Sc39). Q_t varies from 9.9 to 7.6 (2004Go14) from the $41/2$ to the $69/2$ levels. Others: Q_t 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) ≈ 10 (2004Je03, 1999Do34), 14 (2002Je05).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{163}Lu Levels (continued)

- ^u 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) ≈ 3 ([2004Je03](#)), ≈ 2.0 ([2002Je05](#)), ≈ 2.5 ([1999Do34](#)).
- ^v 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) ≈ 1.2 ([2004Je03](#)), ≈ 0.7 ([2002Je05](#)).
- ^w 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) ≈ 0.9 ([2004Je03](#)), ≈ 0.35 ([2002Je05](#)).

Adopted Levels, Gammas (continued)

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

Adopted Levels, Gammas (continued)

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

Adopted Levels, Gammas (continued)

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

Adopted Levels, Gammas (continued)

						$\gamma(^{163}\text{Lu})$ (continued)			Comments
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. @	$\delta^@$	α^d	
2681.1	(27/2 ⁺)	280.5 10	17.5 17	2400.5 (25/2 ⁺)					
		541.4 10	17.5 17	2139.8 (23/2 ⁺)					
2685.7	(27/2 ⁺)	545.9 10	100 12	2139.8 (23/2 ⁺)					
		581.2 10	13 7	2104.4 (25/2 ⁻)					
2748.3	(29/2 ⁻)	440.61 10	69 7	2307.6 (27/2 ⁻)	(D) ^b				$\delta(\text{Q/D})=-0.01$ 13.
		643.81 10	100 9	2104.4 (25/2 ⁻)	(Q) ^{&}				
2773.5	(27/2 ⁺)	496.72 19	100	2276.7 (23/2 ⁺)					
2803.7	(29/2 ⁺)	117.9 10	3.8 16	2685.7 (27/2 ⁺)					
		188.99 10	100 14	2614.6 (27/2 ⁺)					
		314.9 10	9.1 21	2488.6 (25/2 ⁺)					
		403.20 10	70 6	2400.5 (25/2 ⁺)					
2855.4	(29/2 ⁻)	751.2 10	100	2104.4 (25/2 ⁻)					
2861.2	(29/2 ⁺)	180.2 10	100 9	2681.1 (27/2 ⁺)					
		246.7 10	10.2 10	2614.6 (27/2 ⁺)					
		320.44 10	42 9	2540.8 (25/2 ⁺)					
2900.8	(29/2 ⁺)	386.31 10	100	2514.5 (25/2 ⁺)	(E2) ^{&}			0.0368	$\text{B(E2)(W.u.)}=5.2 \times 10^2$ +9-12
2925.0	(31/2 ⁻)	176.85 10	14.1 16	2748.3 (29/2 ⁻)	(D) ^a				
		617.48 10	100 7	2307.6 (27/2 ⁻)	Q ^{&}				
3004.1	(31/2 ⁺)	200.42 10	100 10	2803.7 (29/2 ⁺)					
		318.4 10	1.6 13	2685.7 (27/2 ⁺)					
		389.66 11	46 4	2614.6 (27/2 ⁺)					
3021.5	(31/2 ⁻)	166.1 10	7.3 18	2855.4 (29/2 ⁻)					
		714.0 10	100 14	2307.6 (27/2 ⁻)					
3078.4	(31/2 ⁺)	217.17 10	100 10	2861.2 (29/2 ⁺)					
		304.6 10	28 3	2773.5 (27/2 ⁺)					
		397.34 10	93 10	2681.1 (27/2 ⁺)					
3079.3	(27/2 ⁺)	564.8 10	100	2514.5 (25/2 ⁺)	(E2+M1)	-3.1 4		0.0155 6	
3123.4	(33/2 ⁻)	102.0 10	6.3 8	3021.5 (31/2 ⁻)					
		198.56 10	100 12	2925.0 (31/2 ⁻)	(D) ^a				
		268.1 10	10 3	2855.4 (29/2 ⁻)					
		374.74 10	20.2 25	2748.3 (29/2 ⁻)					E_γ : poor fit, level-energy difference=375.07.
3130.7	(31/2 ⁺)	357.1 10	100	2773.5 (27/2 ⁺)					
3245.2	(33/2 ⁺)	241.1 10	99 8	3004.1 (31/2 ⁺)					
		441.54 10	100 8	2803.7 (29/2 ⁺)					
3320.8	(35/2 ⁻)	197.29 10	100 17	3123.4 (33/2 ⁻)	(M1) ^a			0.538	$\text{B(M1)(W.u.)}=0.39$ +11-10
		299.3 10	0.8 6	3021.5 (31/2 ⁻)	[E2]			0.0771 14	$\text{B(E2)(W.u.)}=6$ 4
		395.99 10	20 3	2925.0 (31/2 ⁻)	[E2]			0.0344	$\text{B(E2)(W.u.)}=30$ 3
3323.9	(33/2 ⁺)	245.48 10	100 24	3078.4 (31/2 ⁺)					
		462.66 10	82 29	2861.2 (29/2 ⁺)					
3351.1	(33/2 ⁺)	450.30 10	100	2900.8 (29/2 ⁺)	[E2]			0.0243	$\text{B(E2)(W.u.)}=6.3 \times 10^2$ +21-35

Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$ (continued)									
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. @	$\delta^@$	α^d	Comments
3418.8	(33/2 ⁻)	397.3 10	100 15	3021.5 (31/2 ⁻)					
		563.4 10	38 10	2855.4 (29/2 ⁻)					
		670.7 10	96 15	2748.3 (29/2 ⁻)					
3483.8	(35/2 ⁺)	238.6 10	70 6	3245.2 (33/2 ⁺)					
		479.68 10	100 8	3004.1 (31/2 ⁺)					
3486.6	(31/2 ⁺)	407.4 10	69 26	3079.3 (27/2 ⁺)					
		585.9 10	100 35	2900.8 (29/2 ⁺)					
3551.9	(37/2 ⁻)	231.04 10	100 7	3320.8 (35/2 ⁻)	(E2+M1) (D) ^a	-3.1 4	0.0142 5		$\alpha(\text{K})=0.0116$ 4; $\alpha(\text{L})=0.00216$ 5 $\delta(\text{Q/D})=+0.25$ 5.
		428.44 10	27.8 22	3123.4 (33/2 ⁻)					
3572.1	(35/2 ⁺)	248.20 10	37 8	3323.9 (33/2 ⁺)					
		441.3 10	57 10	3130.7 (31/2 ⁺)					
		493.68 10	100 14	3078.4 (31/2 ⁺)					
3635.8	(35/2 ⁺)	312.0 10	100 17	3323.9 (33/2 ⁺)					
		505.0 10	67 13	3130.7 (31/2 ⁺)					
		557.4 10	83 20	3078.4 (31/2 ⁺)					
3667.8	(35/2 ⁻)	249.0 10	25 5	3418.8 (33/2 ⁻)					
		646.3 10	100 14	3021.5 (31/2 ⁻)					
		742.9 10	37 5	2925.0 (31/2 ⁻)					
3789.9	(37/2 ⁺)	306.06 10	100 8	3483.8 (35/2 ⁺)					
		544.72 10	87 7	3245.2 (33/2 ⁺)					
3822.7	(39/2 ⁻)	270.87 10	100 6	3551.9 (37/2 ⁻)	(D) ^a (Q) ^{&}				$\delta(\text{Q/D})=+0.22$ 3. $I_\gamma(502)/I_\gamma(271)=0.70$ 6 (1992Sc03) is in disagreement.
		501.93 10	41 3	3320.8 (35/2 ⁻)					
3863.6	(33/2 ⁺)	377.0 ^e 10	33 27	3486.6 (31/2 ⁺)					
		962.8 10	100 47	2900.8 (29/2 ⁺)					
3866.4	(37/2 ⁺)	515.30 10	100	3351.1 (33/2 ⁺)	[E2]		0.01722		B(E2)(W.u.)=9.E+2 +4-5
3892.6	(37/2 ⁺)	320.4 10	100 27	3572.1 (35/2 ⁺)					
		568.6 10	41 14	3323.9 (33/2 ⁺)					
3958.3	(35/2 ⁺)	471.60 17	100 7	3486.6 (31/2 ⁺)					
		607.1 10	83 6	3351.1 (33/2 ⁺)	(E2+M1)	-3.1 4	0.0130 5		
3996.0	(37/2 ⁻)	328.2 10	100 14	3667.8 (35/2 ⁻)					
		577.2 10	88 14	3418.8 (33/2 ⁻)					
4068.3	(39/2 ⁺)	278.40 10	64 5	3789.9 (37/2 ⁺)					
		584.45 10	100 8	3483.8 (35/2 ⁺)					
4103.9	(41/2 ⁻)	281.18 10	100 7	3822.7 (39/2 ⁻)	(D) ^a (Q) ^{&}				$I_\gamma(552)/I_\gamma(281)=0.91$ 14 (1992Sc03) is in disagreement.
		552.09 10	59 4	3551.9 (37/2 ⁻)					
4150.8	(39/2 ⁺)	258.2 10	11 4	3892.6 (37/2 ⁺)					
		578.71 10	100 13	3572.1 (35/2 ⁺)					
4253.8	(39/2 ⁻)	257.8 10	53 8	3996.0 (37/2 ⁻)					
		586.0 10	100 15	3667.8 (35/2 ⁻)					
4255.6	(39/2 ⁺)	363.0 10	80 32	3892.6 (37/2 ⁺)					
		619.8 10	100 48	3635.8 (35/2 ⁺)					

Adopted Levels, Gammas (continued)

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

Adopted Levels, Gammas (continued)

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

Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$ (continued)									
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. @	$\delta^@$	α^d	Comments
5757.0	(47/2 ⁻)	996.4 10	15 12	4760.7	(45/2 ⁻)				
5781.0	(49/2 ⁺)	696.97 10	100	5084.0	(45/2 ⁺)	[E2]		0.00841	B(E2)(W.u.)=4.6×10 ² +6-5
5853.1	(49/2 ⁻)	356.9 10	65 24	5496.2	(47/2 ⁻)				
		684.3 10	100 24	5168.8	(45/2 ⁻)				
		1092.4 10	12 6	4760.7	(45/2 ⁻)				
5898.2	(49/2 ⁺)	338.8 10	75 13	5559.5	(47/2 ⁺)				
		340.8 10	63 38	5557.4	(47/2 ⁺)				
		688.5 10	100 44	5209.6	(45/2 ⁺)				
5916.9	(51/2 ⁻)	411.55 10	91 10	5505.1	(49/2 ⁻)	[M1]		0.0737	B(M1)(W.u.)=1.2 +7-4
		785.18 10	100 11	5131.8	(47/2 ⁻)	[E2]		0.00647	B(E2)(W.u.)=1.5×10 ² +8-5
6006.1	(49/2 ⁺)	446.6 10	21 13	5559.5	(47/2 ⁺)				
		762.7 10	6 4	5243.4	(45/2 ⁺)				
		796.4 10	100 32	5209.6	(45/2 ⁺)				
6065.3	(51/2 ⁺)	345.44 10	62 7	5720.1	(49/2 ⁺)				
		677.14 10	100 10	5387.9	(47/2 ⁺)				
6108.2	(49/2 ⁻)	351.2 10	50 13	5757.0	(47/2 ⁻)				
		688.7 10	100 25	5419.5	(45/2 ⁻)				
6223.5	(51/2 ⁻)	370.4 10	56 19	5853.1	(49/2 ⁻)				
		727.3 10	100 25	5496.2	(47/2 ⁻)				
6246.5	(51/2 ⁺)	348.3 10	78 29	5898.2	(49/2 ⁺)				
		686.8 10	17 14	5559.5	(47/2 ⁺)				
		689.1 10	100 22	5557.4	(47/2 ⁺)				
6249.3	(49/2 ⁺)	685.1 10	100 19	5564.2	(45/2 ⁺)				
		1165.3 10	24 6	5084.0	(45/2 ⁺)	Q&			
6319.9	(47/2 ⁻)	1235.9 10	100	5084.0	(45/2 ⁺)	(D)			
6334.1	(53/2 ⁻)	417.20 10	64 8	5916.9	(51/2 ⁻)	[M1]		0.0711	B(M1)(W.u.)=1.3 +6-9
		829.00 10	100 10	5505.1	(49/2 ⁻)	[E2]		0.00575	B(E2)(W.u.)=1.8×10 ² +9-13
6355.9	(51/2 ⁺)	796.4 10	100	5559.5	(47/2 ⁺)				
6415.1	(53/2 ⁺)	349.62 10	65 6	6065.3	(51/2 ⁺)				I γ (350)/I γ (695)=0.37 7 (1992Sc03) is in disagreement.
		694.96 10	100 10	5720.1	(49/2 ⁺)				
6454.2	(51/2 ⁺)	673.2 10	25 7	5781.0	(49/2 ⁺)	(E2+M1)	-3.1 4	0.0102 4	B(M1)(W.u.)=(0.013 3); B(E2)(W.u.)=(1.4×10 ² 4)
		711.2 10	100 15	5742.9	(47/2 ⁺)	[E2]		0.00804	B(E2)(W.u.)=4.7×10 ² +12-11
6502.7	(51/2 ⁻)	394.5 10	51 14	6108.2	(49/2 ⁻)				
		745.7 10	100 26	5757.0	(47/2 ⁻)				
6533.6	(53/2 ⁺)	752.61 10	100	5781.0	(49/2 ⁺)	[E2]		0.00709	B(E2)(W.u.)=5.4×10 ² +5-4
6616.5	(53/2 ⁺)	370.0 10	73 40	6246.5	(51/2 ⁺)				
		718.4 10	100 27	5898.2	(49/2 ⁺)				
6618.0	(53/2 ⁻)	394.5 10	50 21	6223.5	(51/2 ⁻)				
		764.9 10	100 29	5853.1	(49/2 ⁻)				
6719.1	(53/2 ⁺)	363.3 10	71 43	6355.9	(51/2 ⁺)				
		713.0 10	100 57	6006.1	(49/2 ⁺)				

Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$ (continued)									
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. @	$\delta^@$	α^d	Comments
6788.9	(55/2 ⁺)	373.74 10	43 4	6415.1	(53/2 ⁺)				I γ (374)/I γ (724)=1.2 4 (1992Sc03) is in disagreement.
		723.69 10	100 10	6065.3	(51/2 ⁺)				
6790.0	(55/2 ⁻)	456.0 10	100 11	6334.1	(53/2 ⁻)				
		872.8 10	100 11	5916.9	(51/2 ⁻)				
6907.4	(53/2 ⁻)	404.7 10	42 12	6502.7	(51/2 ⁻)				
		799.2 10	100 23	6108.2	(49/2 ⁻)				
6965.0	(51/2 ⁻)	645.0 10	100 27	6319.9	(47/2 ⁻)				
		1184.0 10	100 33	5781.0	(49/2 ⁺)	D			
6980.1	(55/2 ⁺)	363.6 10	64 21	6616.5	(53/2 ⁺)				
		733.5 10	100 21	6246.5	(51/2 ⁺)				
6990.5	(53/2 ⁺)	741.2 10	100 19	6249.3	(49/2 ⁺)				
		1209.5 10	25 9	5781.0	(49/2 ⁺)	Q&			
7035.4	(55/2 ⁻)	417.5 10	47 27	6618.0	(53/2 ⁻)				
		811.9 10	100 33	6223.5	(51/2 ⁻)				
7133.1	(55/2 ⁺)	414.0 10	62 38	6719.1	(53/2 ⁺)				
		777.3 10	100 88	6355.9	(51/2 ⁺)				
7174.2	(57/2 ⁺)	385.54 10	49 10	6788.9	(55/2 ⁺)				
		758.85 12	100 11	6415.1	(53/2 ⁺)				
7179.1	(55/2 ⁺)	823.19 10	100	6355.9	(51/2 ⁺)				
7220.4	(55/2 ⁺)	686.8 10	15 4	6533.6	(53/2 ⁺)	(E2+M1)	-3.1 4	0.0097 4	B(M1)(W.u.)=(0.013 3); B(E2)(W.u.)=(1.2×10 ² 2)
		766.2 10	100 18	6454.2	(51/2 ⁺)	[E2]		0.00682	B(E2)(W.u.)=5.3×10 ² +16-15
7246.9	(57/2 ⁻)	456.8 10	16 8	6790.0	(55/2 ⁻)				
		913.0 10	100 11	6334.1	(53/2 ⁻)				
7339.1	(57/2 ⁺)	805.57 10	100	6533.6	(53/2 ⁺)	[E2]		0.00612	B(E2)(W.u.)=4.7×10 ² 6
7351.2	(55/2 ⁻)	443.8 10	53 26	6907.4	(53/2 ⁻)				
		848.5 10	100 26	6502.7	(51/2 ⁻)				
7391.0	(57/2 ⁺)	410.9 10	68 14	6980.1	(55/2 ⁺)				
		774.5 10	100 14	6616.5	(53/2 ⁺)				
7466.8	(57/2 ⁻)	431.4 10	36 27	7035.4	(55/2 ⁻)				
		848.9 10	100 27	6618.0	(53/2 ⁻)				
7507.0	(57/2 ⁺)	373.9 10	100 80	7133.1	(55/2 ⁺)				
		787.9 10	100 60	6719.1	(53/2 ⁺)				
7584.4	(59/2 ⁺)	410.21 11	51 5	7174.2	(57/2 ⁺)				I γ (410)/I γ (795)=1.01 17 (1992Sc03) is in disagreement.
		795.48 15	100 10	6788.9	(55/2 ⁺)				
7667.2	(55/2 ⁻)	702.2 10	100 64	6965.0	(51/2 ⁻)				
		1133.6 10	44 16	6533.6	(53/2 ⁺)	(D)			
7729.3	(59/2 ⁻)	482.4 10	14 11	7246.9	(57/2 ⁻)				
		939.2 10	100 29	6790.0	(55/2 ⁻)				
7785.3	(59/2 ⁺)	394.3 10	47 13	7391.0	(57/2 ⁺)				
		805.3 10	100 13	6980.1	(55/2 ⁺)				
7786.4	(57/2 ⁺)	795.9 10	100 20	6990.5	(53/2 ⁺)				

Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$ (continued)									
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. @	$\delta^@$	α^d	Comments
7786.4	(57/2 ⁺)	1252.8 10	20 7	6533.6	(53/2 ⁺)				
7813.9	(57/2 ⁻)	462.7 10	29 18	7351.2	(55/2 ⁻)				
		906.5 10	100 24	6907.4	(53/2 ⁻)				
7903.4	(59/2 ⁻)	436.6 10	36 27	7466.8	(57/2 ⁻)				
		868.0 10	100 27	7035.4	(55/2 ⁻)				
7955.9	(59/2 ⁺)	448.8 10	80 80	7507.0	(57/2 ⁺)				
		822.7 10	100 80	7133.1	(55/2 ⁺)				
8011.1	(61/2 ⁺)	426.45 14	48 5	7584.4	(59/2 ⁺)				
		837.45 22	100 10	7174.2	(57/2 ⁺)				
8040.3	(59/2 ⁺)	701.1 10	12 4	7339.1	(57/2 ⁺)	(E2+M1)	-3.1 4	0.0093 3	B(M1)(W.u.)=(0.011 +7-6); B(E2)(W.u.)=(1.0×10 ² +6-5)
		819.9 10	100 16	7220.4	(55/2 ⁺)	[E2]		0.00589	B(E2)(W.u.)=4.3×10 ² +21-16
8046.1	(59/2 ⁺)	867.05 10	100	7179.1	(55/2 ⁺)				
8196.9	(61/2 ⁺)	857.7 10	100	7339.1	(57/2 ⁺)	[E2]		0.00535	B(E2)(W.u.)=3.8×10 ² 3
8222.8	(61/2 ⁻)	493.5 10	20 16	7729.3	(59/2 ⁻)				
		975.9 10	100 52	7246.9	(57/2 ⁻)				
8237.3	(61/2 ⁺)	452.0 10	57 13	7785.3	(59/2 ⁺)				
		846.3 10	100 13	7391.0	(57/2 ⁺)				
8291.2	(59/2 ⁻)	477.3 10	38 31	7813.9	(57/2 ⁻)				
		940.0 10	100 23	7351.2	(55/2 ⁻)				
8379.8	(61/2 ⁻)	913.0 10	100	7466.8	(57/2 ⁻)				
8387.2	(61/2 ⁺)	880.2 10	100	7507.0	(57/2 ⁺)				
8421.8	(59/2 ⁻)	754.6 10	100 50	7667.2	(55/2 ⁻)				
		1082.6 10	30 10	7339.1	(57/2 ⁺)	D			
8459.4	(63/2 ⁺)	447.9 10	51 13	8011.1	(61/2 ⁺)				I _γ : other: 23 13 (1992Sc03).
		875.5 10	100 11	7584.4	(59/2 ⁺)				
8636.2	(61/2 ⁺)	849.8 10	100 22	7786.4	(57/2 ⁺)				
		1297.0 ^e 10	22 14	7339.1	(57/2 ⁺)				
8668.7	(63/2 ⁺)	431.4 10	57 14	8237.3	(61/2 ⁺)				
		883.4 10	100 19	7785.3	(59/2 ⁺)				
8713.6	(63/2 ⁻)	490.8 10	36 29	8222.8	(61/2 ⁻)				
		984.3 10	100 43	7729.3	(59/2 ⁻)				
8790.3	(61/2 ⁻)	499.1 10	44 33	8291.2	(59/2 ⁻)				
		976.4 10	100 33	7813.9	(57/2 ⁻)				
8845.6	(63/2 ⁻)	942.2 10	100	7903.4	(59/2 ⁻)				
8855.7	(63/2 ⁺)	899.9 10	100	7955.9	(59/2 ⁺)				
8913.2	(63/2 ⁺)	716.3 10	10 5	8196.9	(61/2 ⁺)	[M1+E2]		0.013 5	
		872.9 10	100 23	8040.3	(59/2 ⁺)	[E2]		0.00516	B(E2)(W.u.)=4.3×10 ² +21-17
8927.0	(65/2 ⁺)	467.7 10	56 13	8459.4	(63/2 ⁺)				
		915.6 10	100 24	8011.1	(61/2 ⁺)				
8974.2	(63/2 ⁺)	928.1 10	100	8046.1	(59/2 ⁺)				
9106.6	(65/2 ⁺)	909.7 10	100	8196.9	(61/2 ⁺)	[E2]		0.00473	B(E2)(W.u.)=3.7×10 ² +8-6

Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$ (continued)								
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. @	α^d	Comments
9154.2	(65/2 ⁺)	485.5 10	71 29	8668.7	(63/2 ⁺)			
		916.8 10	100 29	8237.3	(61/2 ⁺)			
9231.8	(63/2 ⁻)	810.1 10	100	8421.8	(59/2 ⁻)			
9252.8	(65/2 ⁻)	539.2 10	57 43	8713.6	(63/2 ⁻)			
		1030.0 10	100 57	8222.8	(61/2 ⁻)			
9284.6	(63/2 ⁻)	993.4 10	100	8291.2	(59/2 ⁻)			
9331.0	(65/2 ⁺)	943.8 10	100	8387.2	(61/2 ⁺)			
9376.3	(65/2 ⁻)	996.5 10	100	8379.8	(61/2 ⁻)			
9408.7	(67/2 ⁺)	481.7 10	95 33	8927.0	(65/2 ⁺)			
		949.4 10	100 33	8459.4	(63/2 ⁺)			
9538.7	(65/2 ⁺)	902.5 10	100	8636.2	(61/2 ⁺)			
9625.5	(67/2 ⁺)	471.3 10	100 50	9154.2	(65/2 ⁺)			
		956.8 10	63 37	8668.7	(63/2 ⁺)			
9709.0	(67/2 ⁻)	456.2 10	20 10	9252.8	(65/2 ⁻)			
		995.4 10	100 50	8713.6	(63/2 ⁻)			
9805.3	(65/2 ⁻)	1015.0 10	100	8790.3	(61/2 ⁻)			
9816.2	(67/2 ⁺)	960.5 10	100	8855.7	(63/2 ⁺)			
9839.7	(67/2 ⁺)	926.5 10	100	8913.2	(63/2 ⁺)	[E2]	0.00455	B(E2)(W.u.)=3.0×10 ² +10-7
9916.8	(69/2 ⁺)	508.0 10	24 14	9408.7	(67/2 ⁺)			
		989.8 10	100 33	8927.0	(65/2 ⁺)			
10069.2	(69/2 ⁺)	962.53 14	100	9106.6	(65/2 ⁺)	[E2]	0.00421	B(E2)(W.u.)=3.9×10 ² +10-15
10097.2	(67/2 ⁻)	865.3 10	100	9231.8	(63/2 ⁻)			
10138.5	(69/2 ⁺)	513.0 10	50 30	9625.5	(67/2 ⁺)			
		984.4 10	100 50	9154.2	(65/2 ⁺)			
10314.7	(69/2 ⁻)	1061.9 10	100	9252.8	(65/2 ⁻)			
10333.9	(69/2 ⁺)	1002.9 10	100	9331.0	(65/2 ⁺)			
10428.3	(71/2 ⁺)	511.6 10	50 40	9916.8	(69/2 ⁺)			
		1019.6 10	100 70	9408.7	(67/2 ⁺)			
10494.5	(69/2 ⁺)	955.8 10	100	9538.7	(65/2 ⁺)			
10653.5	(71/2 ⁺)	515.0 10	50 50	10138.5	(69/2 ⁺)			
		1028.0 10	100 50	9625.5	(67/2 ⁺)			
10714.9	(71/2 ⁻)	1005.9 10	100	9709.0	(67/2 ⁻)			
10819.9	(71/2 ⁺)	980.2 10	100	9839.7	(67/2 ⁺)	[E2]	0.00406	B(E2)(W.u.)=3.0×10 ² +16-10
10876.3	(69/2 ⁻)	1071.0 10	100	9805.3	(65/2 ⁻)			
10978.4	(73/2 ⁺)	550.1 10	50 40	10428.3	(71/2 ⁺)			
		1061.6 10	100 70	9916.8	(69/2 ⁺)			
11017.7	(71/2 ⁻)	920.5 10	100	10097.2	(67/2 ⁻)			
11085.7	(73/2 ⁺)	1016.5 10	100	10069.2	(69/2 ⁺)			
11186.8	(73/2 ⁺)	1048.3 10		10138.5	(69/2 ⁺)			
11503.7	(73/2 ⁺)	1009.2 10	100	10494.5	(69/2 ⁺)			
11505.4	(75/2 ⁺)	527.0 10	50 38	10978.4	(73/2 ⁺)			

Adopted Levels, Gammas (continued)

$\gamma(^{163}\text{Lu})$ (continued)								
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	E_f	J_f^π	Mult. @	α^d	Comments
11505.4	(75/2 ⁺)	1077.1 10	100 75	10428.3	(71/2 ⁺)	E2	0.00378	E_γ : 1117.4 (1992Sc03).
11729.9	(75/2 ⁻)	1015.0 10	100	10714.9	(71/2 ⁻)			
11749.0	(75/2 ⁺)	1095.5 10	100	10653.5	(71/2 ⁺)			
11781.4	(75/2 ⁻)	1066.5 10	100	10714.9	(71/2 ⁻)			
11854.6	(75/2 ⁺)	1034.7 10	100	10819.9	(71/2 ⁺)			
11993.4	(75/2 ⁻)	975.7 10	100	11017.7	(71/2 ⁻)			
12098.1	(77/2 ⁺)	1119.7 10	100	10978.4	(73/2 ⁺)			
12156.8	(77/2 ⁺)	1071.1 10	100	11085.7	(73/2 ⁺)			
12266.9	(77/2 ⁺)	1080.1 10	100	11186.8	(73/2 ⁺)			
12566.7	(77/2 ⁺)	1063.0 10	100	11503.7	(73/2 ⁺)			
12627.2	(79/2 ⁺)	1121.8 10	100	11505.4	(75/2 ⁺)			
12745	(79/2 ⁻)	1015.0 20	100	11729.9	(75/2 ⁻)			
12862.4	(79/2 ⁺)	1113.4 10	100	11749.0	(75/2 ⁺)			
12866.0	(79/2 ⁻)	1084.6 10	100	11781.4	(75/2 ⁻)			
12943.5	(79/2 ⁺)	1088.9 10		11854.6	(75/2 ⁺)			
13025.0	(79/2 ⁻)	1031.6 10		11993.4	(75/2 ⁻)			
13198.3?	(81/2 ⁺)	1100.2 ^e 10	100	12098.1	(77/2 ⁺)			
13283.0	(81/2 ⁺)	1126.2 10	100	12156.8	(77/2 ⁺)			
13679.1	(81/2 ⁺)	1112.4 10	100	12566.7	(77/2 ⁺)			
13746.8	(83/2 ⁺)	1119.6 10	100	12627.2	(79/2 ⁺)			
13798	(83/2 ⁻)	1052.8 10	100	12745	(79/2 ⁻)			
14086.5	(83/2 ⁺)	1143.0 10		12943.5	(79/2 ⁺)			
14110?	(83/2 ⁻)	1085.5 ^e 10	100	13025.0	(79/2 ⁻)			
14462.3	(85/2 ⁺)	1179.3 10	100	13283.0	(81/2 ⁺)			
14826	(85/2 ⁺)	1147 4	100	13679.1	(81/2 ⁺)			
14890	(87/2 ⁻)	1092.2 10	100	13798	(83/2 ⁻)			
15284	(87/2 ⁺)	1197.3 10	100	14086.5	(83/2 ⁺)			
15689	(89/2 ⁺)	1227.0 10	100	14462.3	(85/2 ⁺)			
16024	(91/2 ⁻)	1134.5 10	100	14890	(87/2 ⁻)			
16531	(91/2 ⁺)	1247.5 10	100	15284	(87/2 ⁺)			
16958	(93/2 ⁺)	1269.0 10	100	15689	(89/2 ⁺)			
17204	(95/2 ⁻)	1179.5 10	100	16024	(91/2 ⁻)			
18262	(97/2 ⁺)	1303.5 10	100	16958	(93/2 ⁺)			
18436	(99/2 ⁻)	1232.4 10	100	17204	(95/2 ⁻)			

[†] From $^{139}\text{La}(^{29}\text{Si},5\text{n}\gamma)$ unless otherwise stated. These values, in general, agree within 0.3 keV with those from $^{139}\text{La}(^{28}\text{Si},4\text{n}\gamma)$.

[‡] Most values are from $^{139}\text{La}(^{29}\text{Si},5\text{n}\gamma)$, where a more complete set of values is given than in earlier $^{139}\text{La}(^{28}\text{Si},4\text{n}\gamma)$ study.

From ^{163}Hf ε decay.

@ From $\gamma(\theta)$, $\gamma\gamma(\theta)$ and $\gamma(\text{lin pol})$ in (HI,xn γ) studies, except as noted.

Adopted Levels, Gammas (continued)

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

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

^a $\gamma\gamma(\theta)$ (DCO) in (HI,xn γ) is consistent with $\Delta J=1$, dipole, but $\Delta J=2$ does not seem to be ruled out.

^b From $\gamma(\theta)$ in (HI,xn γ) ([1983RoZW](#)).

^c From comparison to RUL. Isotropic distribution in ($^{19}\text{F},4n\gamma$).

^d Total theoretical internal conversion coefficients, calculated using the BrIcc code ([2008Ki07](#)) with Frozen orbital approximation based on γ -ray energies, assigned multiplicities, and mixing ratios, unless otherwise specified.

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

$^{163}_{71}\text{Lu}_{92-21}$

From ENSDF

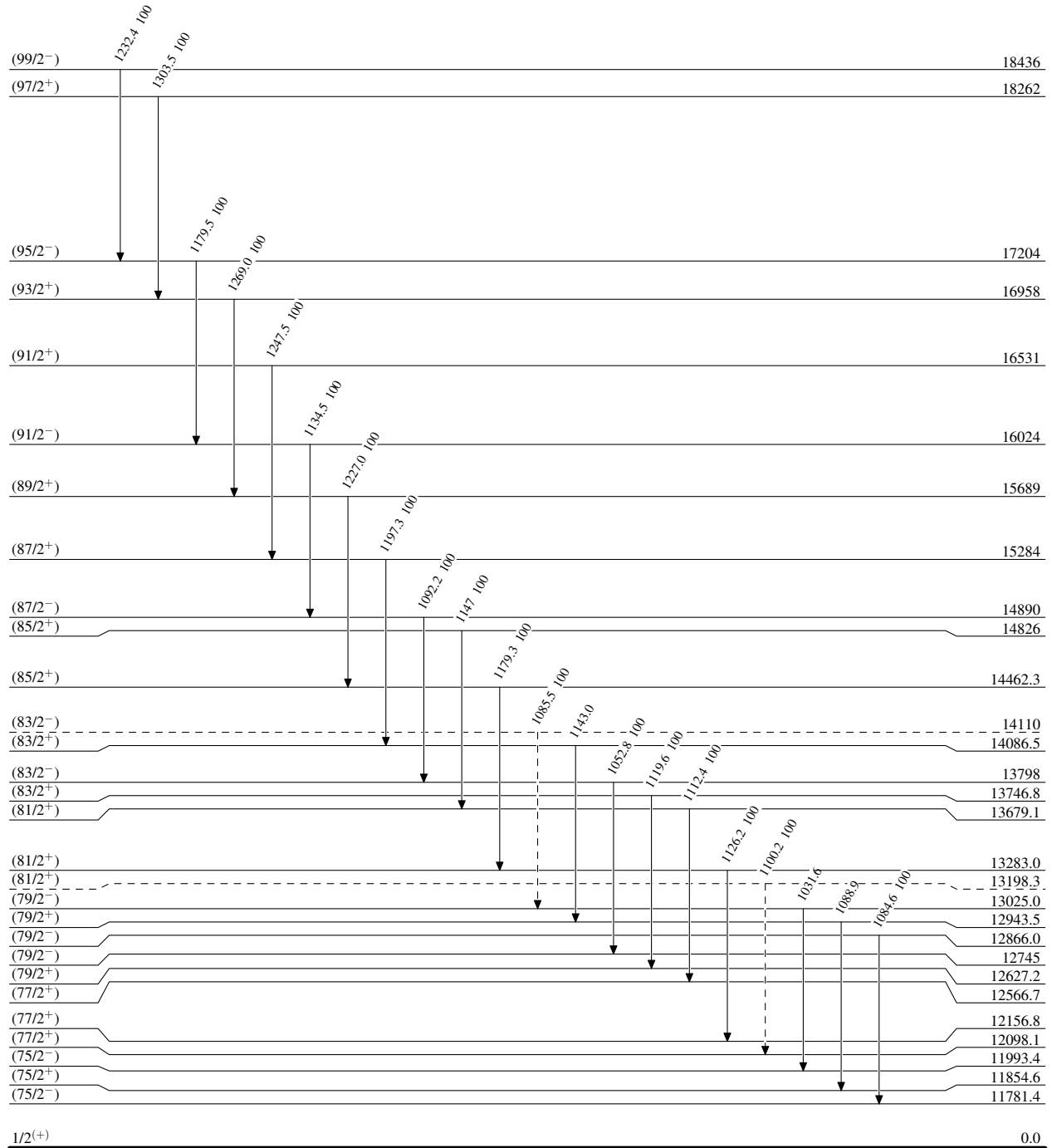
$^{163}_{71}\text{Lu}_{92-21}$

Adopted Levels, Gammas

Legend

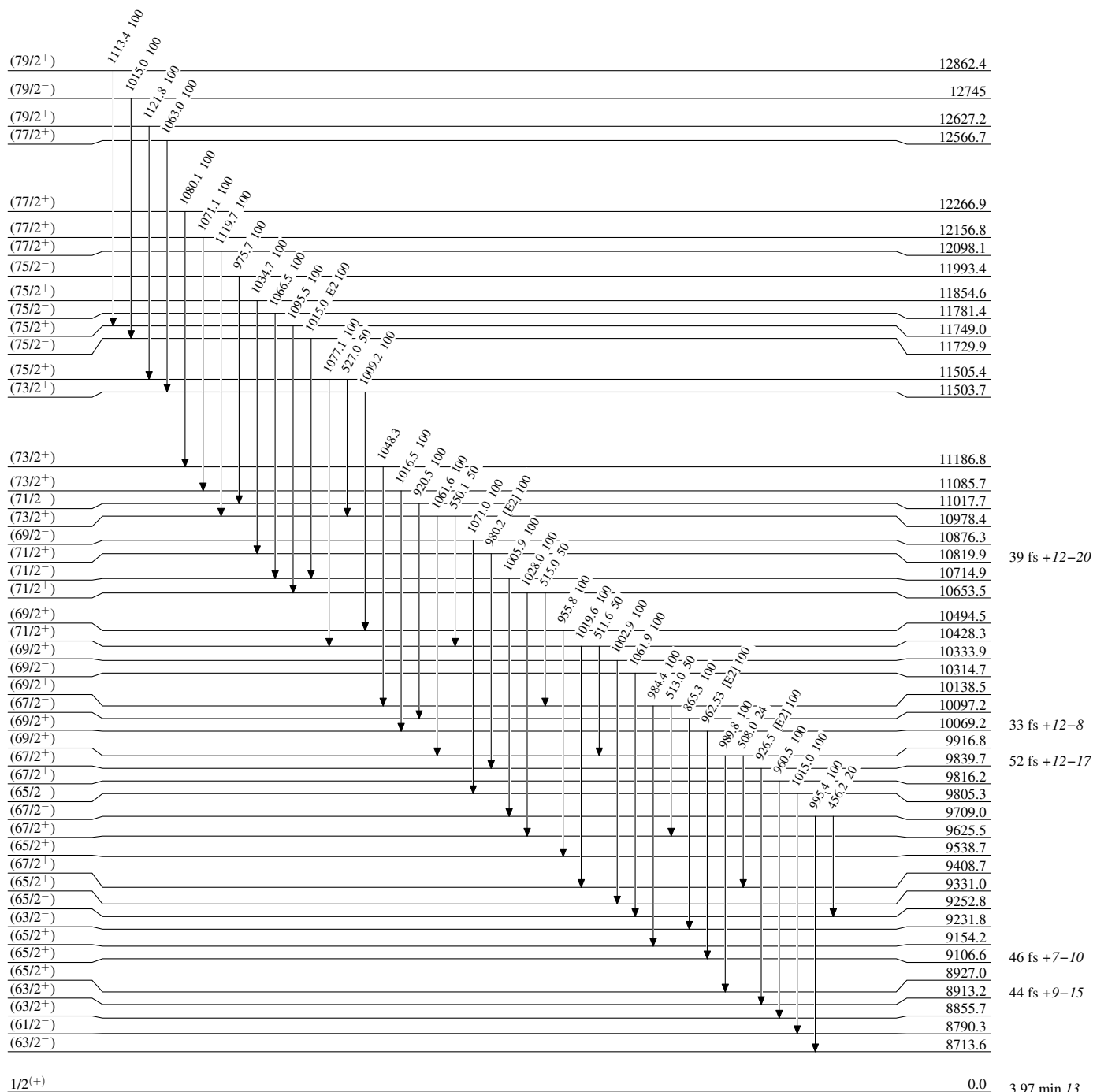
Level Scheme

Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)

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

Intensities: Relative photon branching from each level

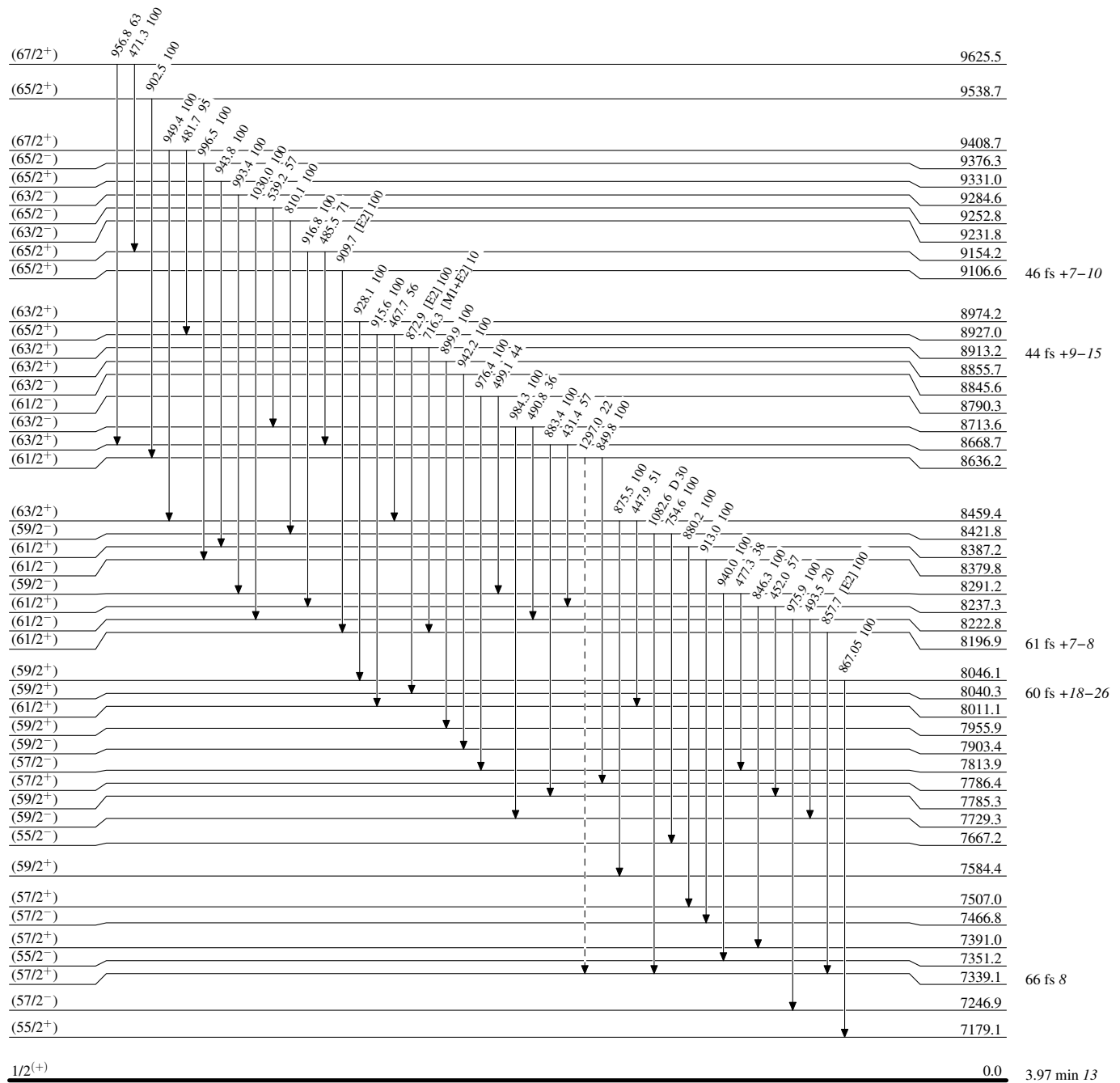


Adopted Levels, Gammas

Legend

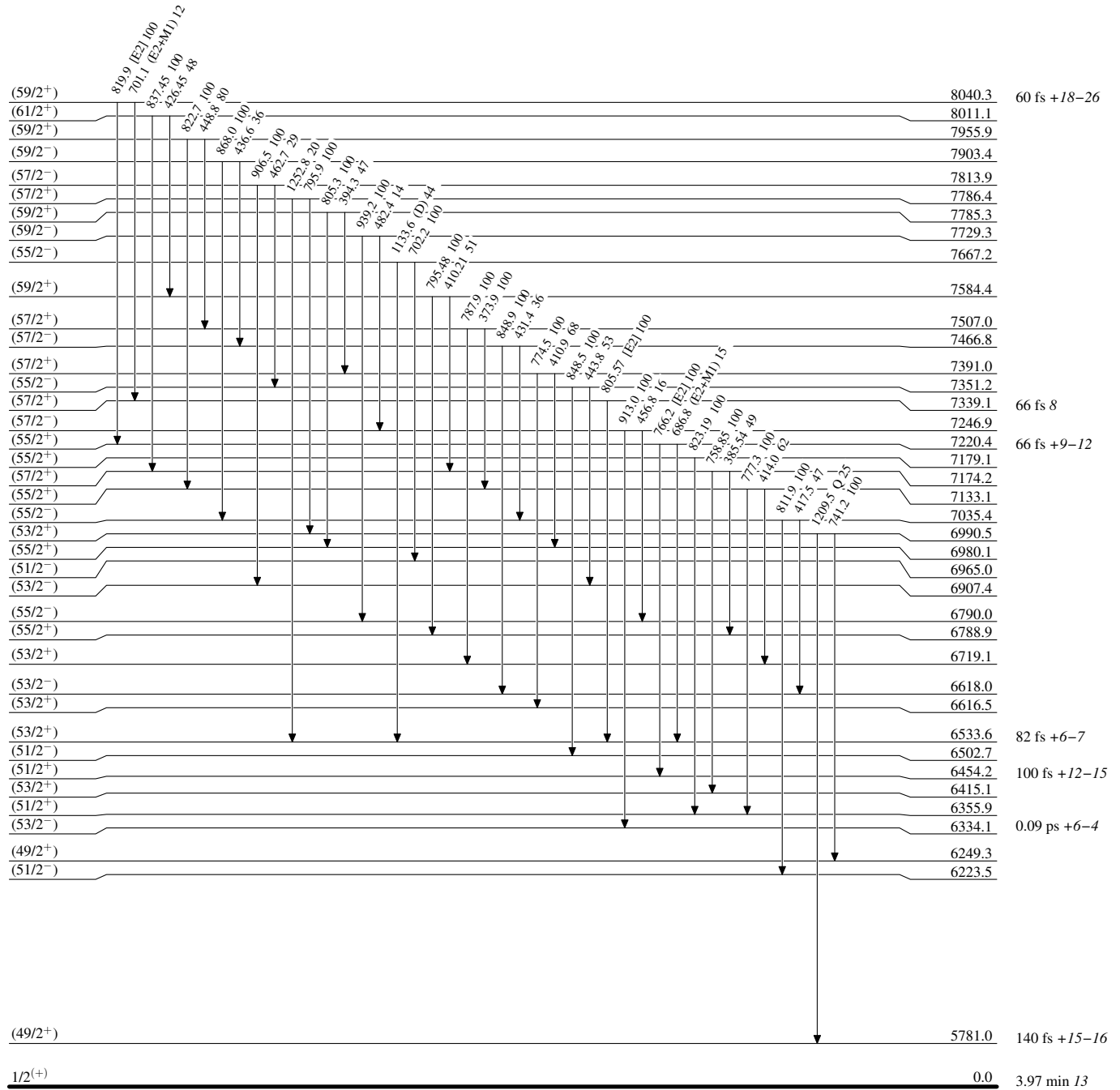
Level Scheme (continued)

Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)

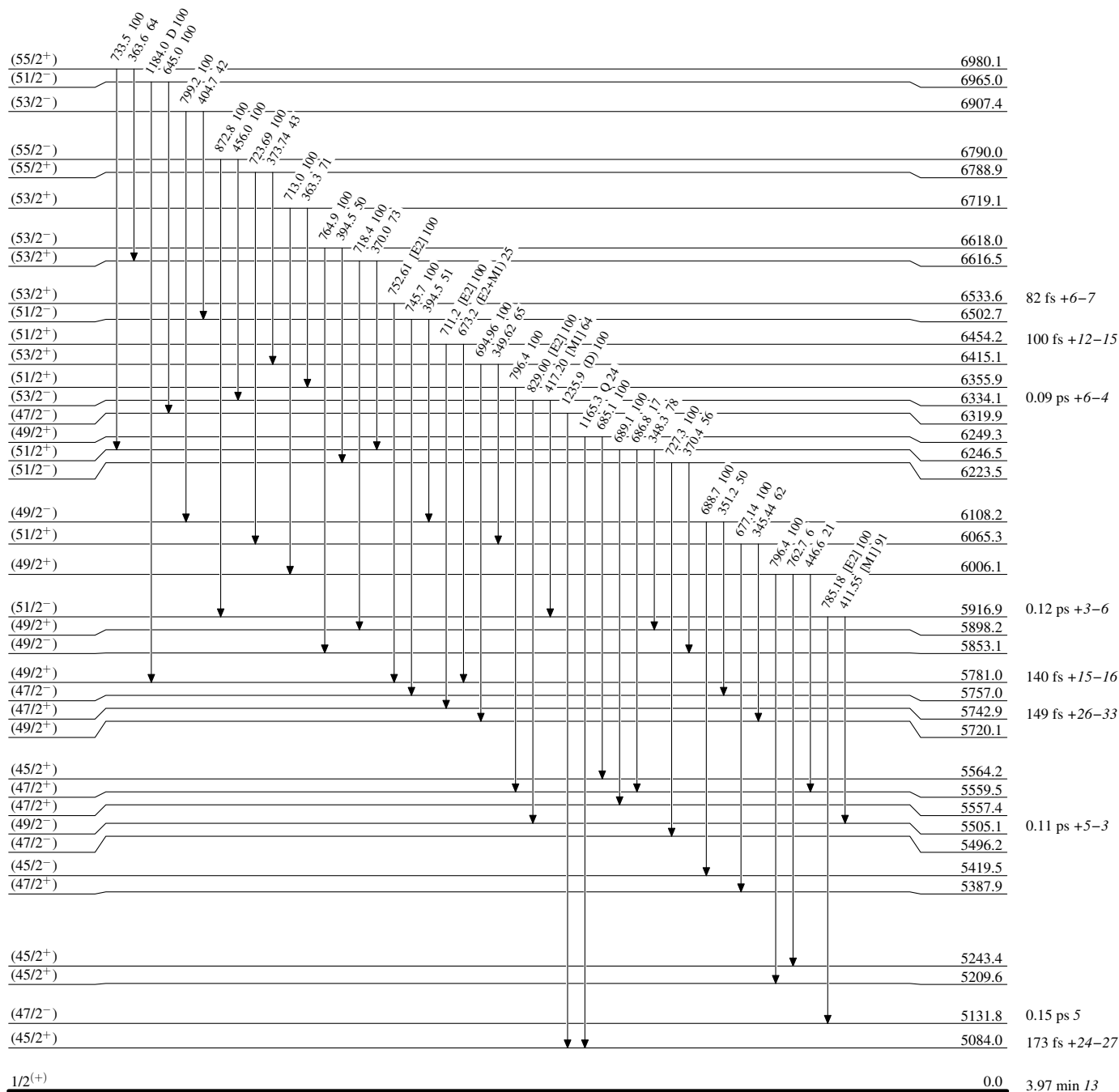
Adopted Levels, Gammas**Level Scheme (continued)**

Intensities: Relative photon branching from each level



Adopted Levels, GammasLevel Scheme (continued)

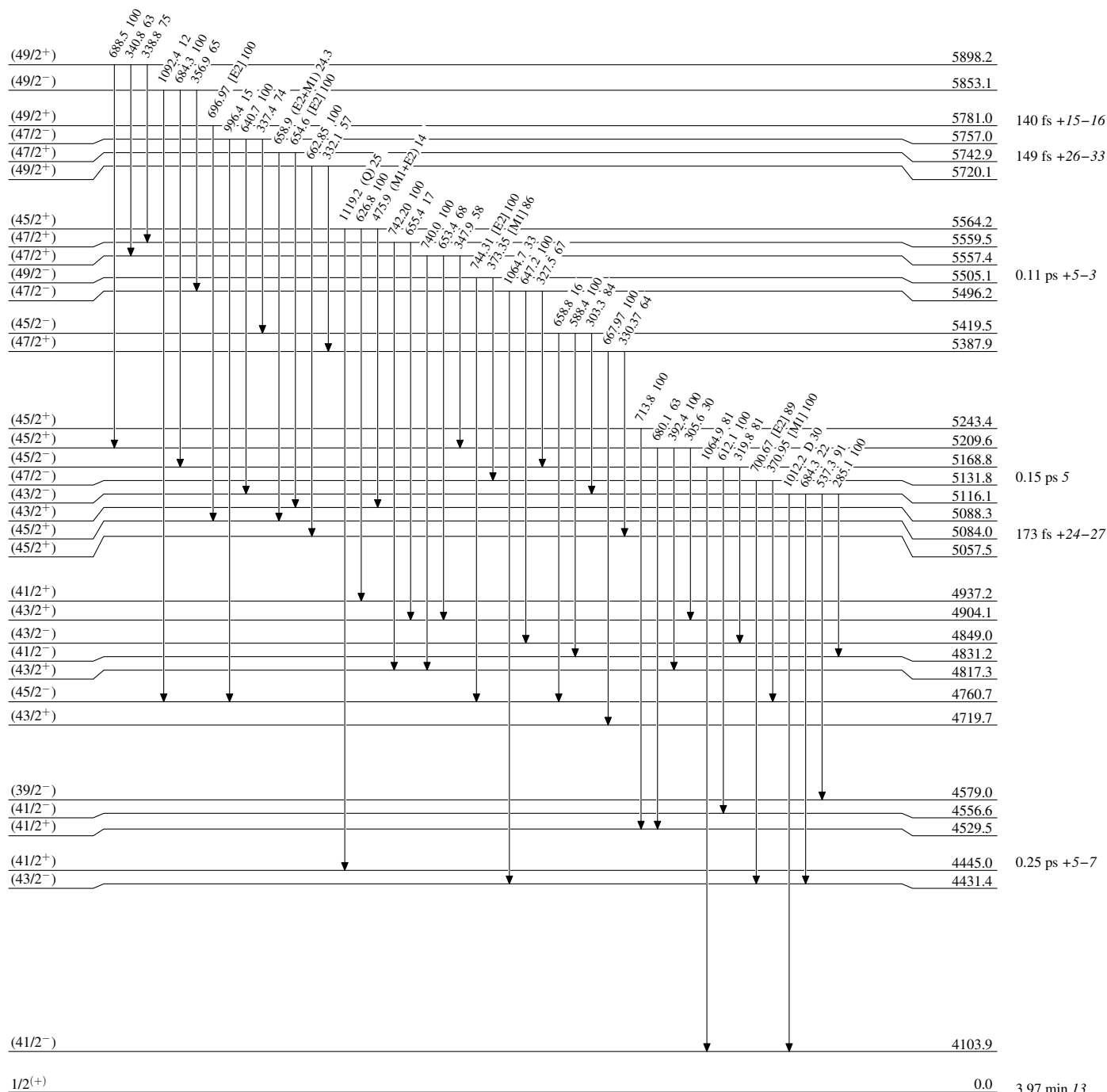
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

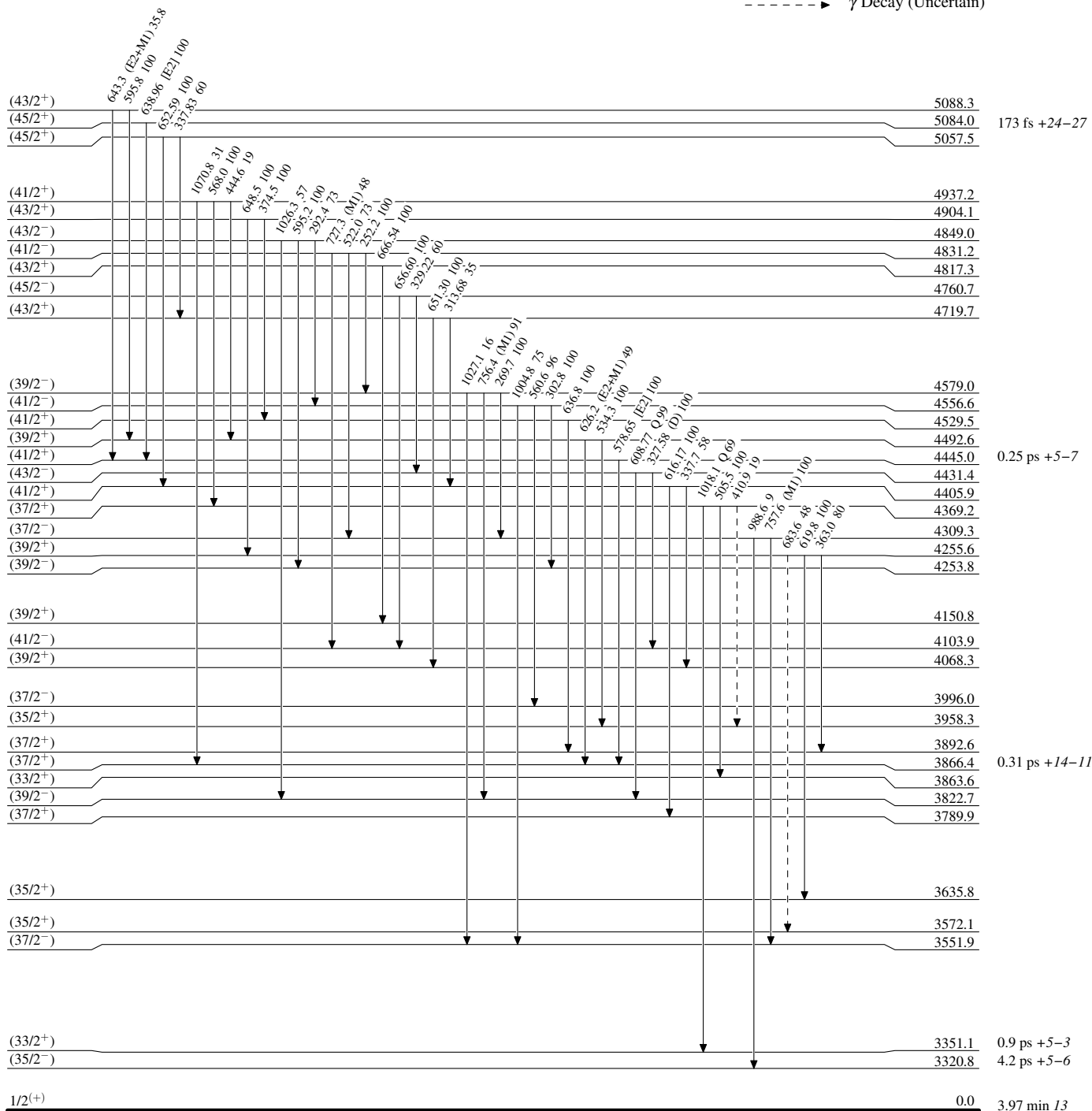


Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

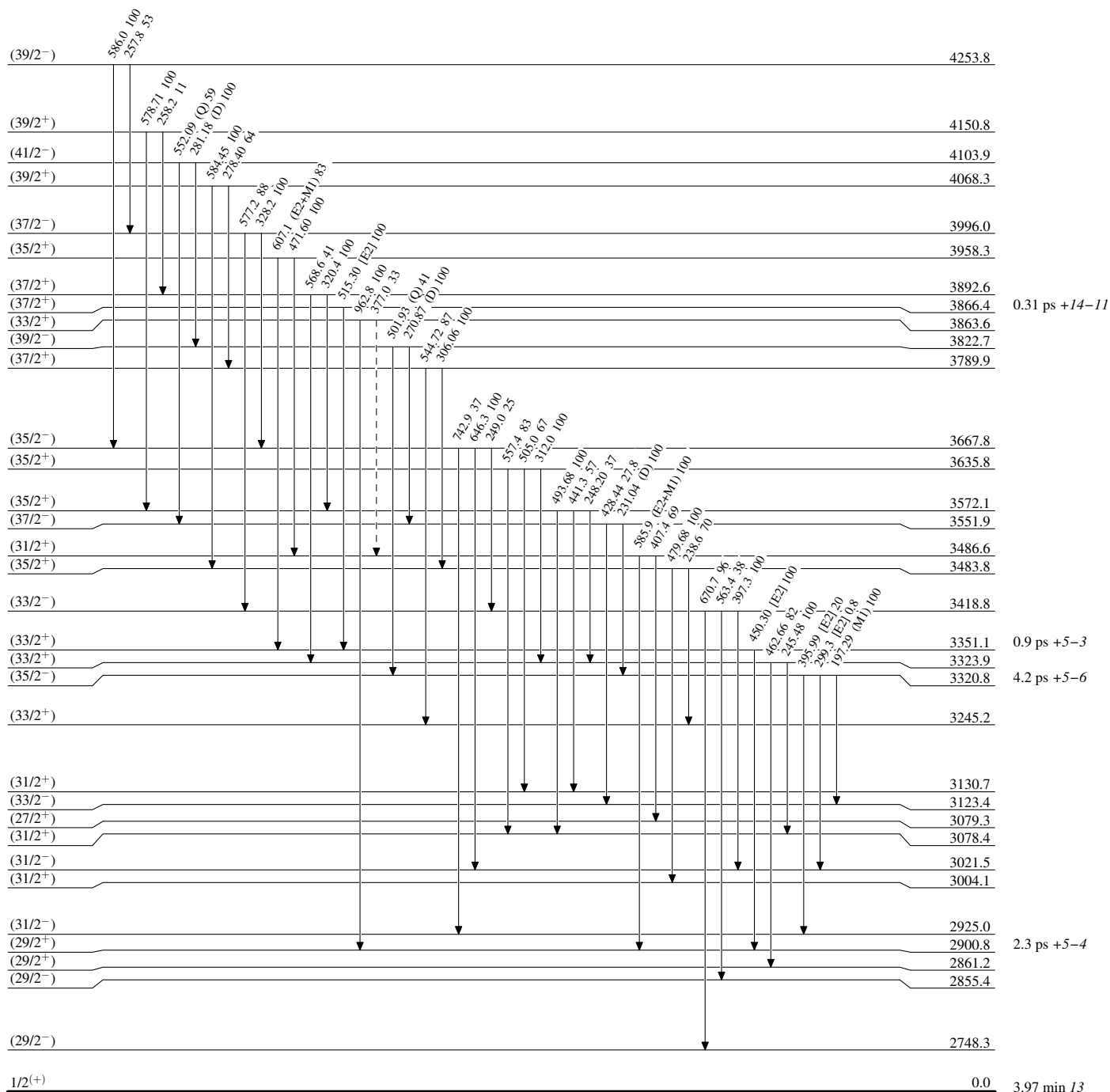
-----► γ Decay (Uncertain)


Adopted Levels, Gammas

Legend

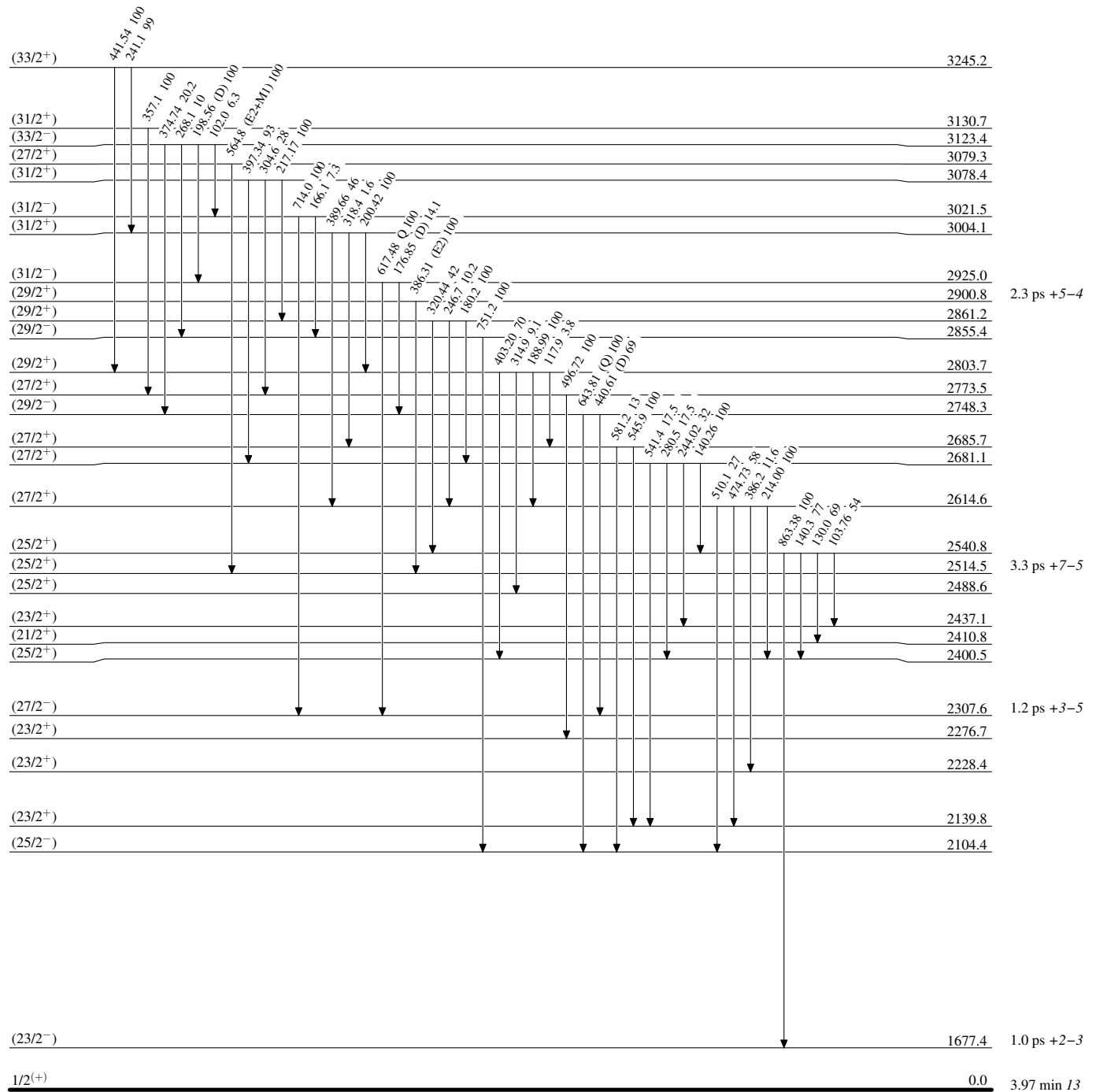
Level Scheme (continued)

Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)


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

Intensities: Relative photon branching from each level

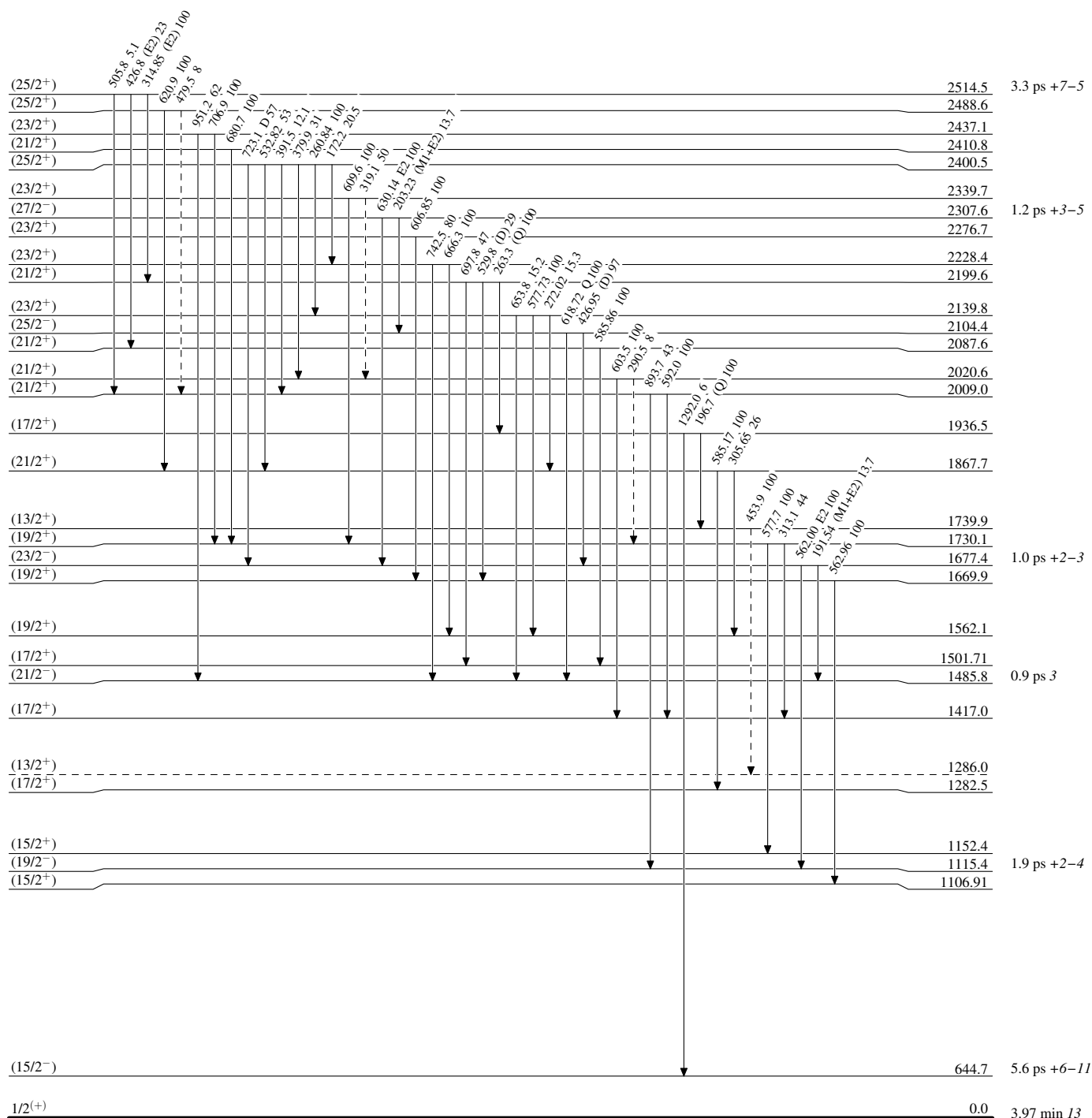


Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

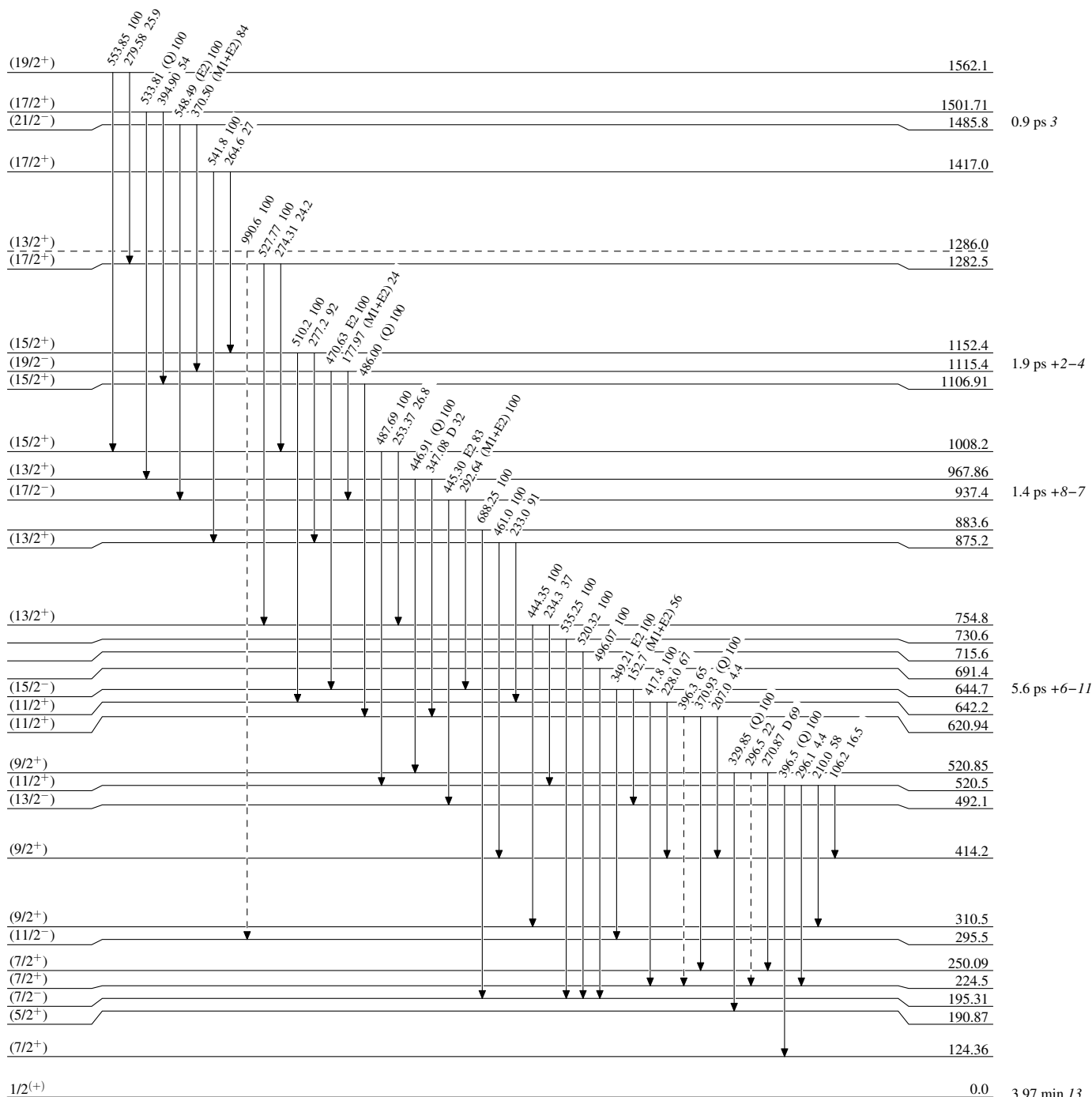
-----► γ Decay (Uncertain)

Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

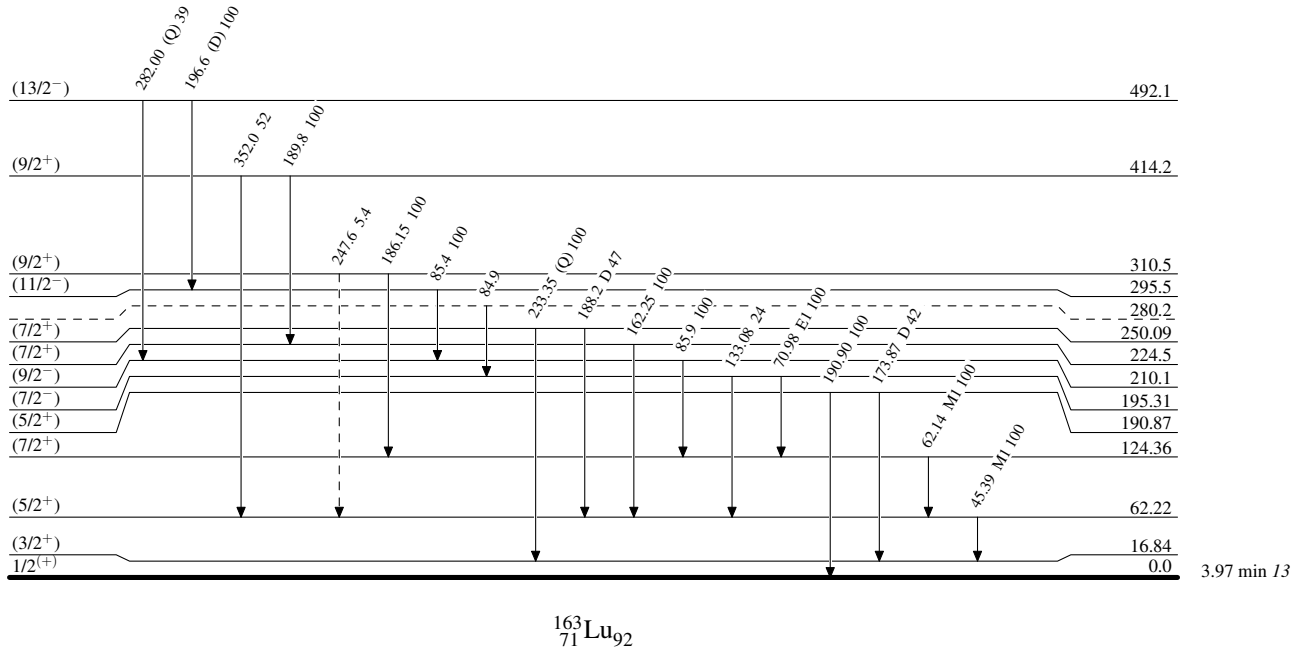
-----► γ Decay (Uncertain)


Adopted Levels, Gammas

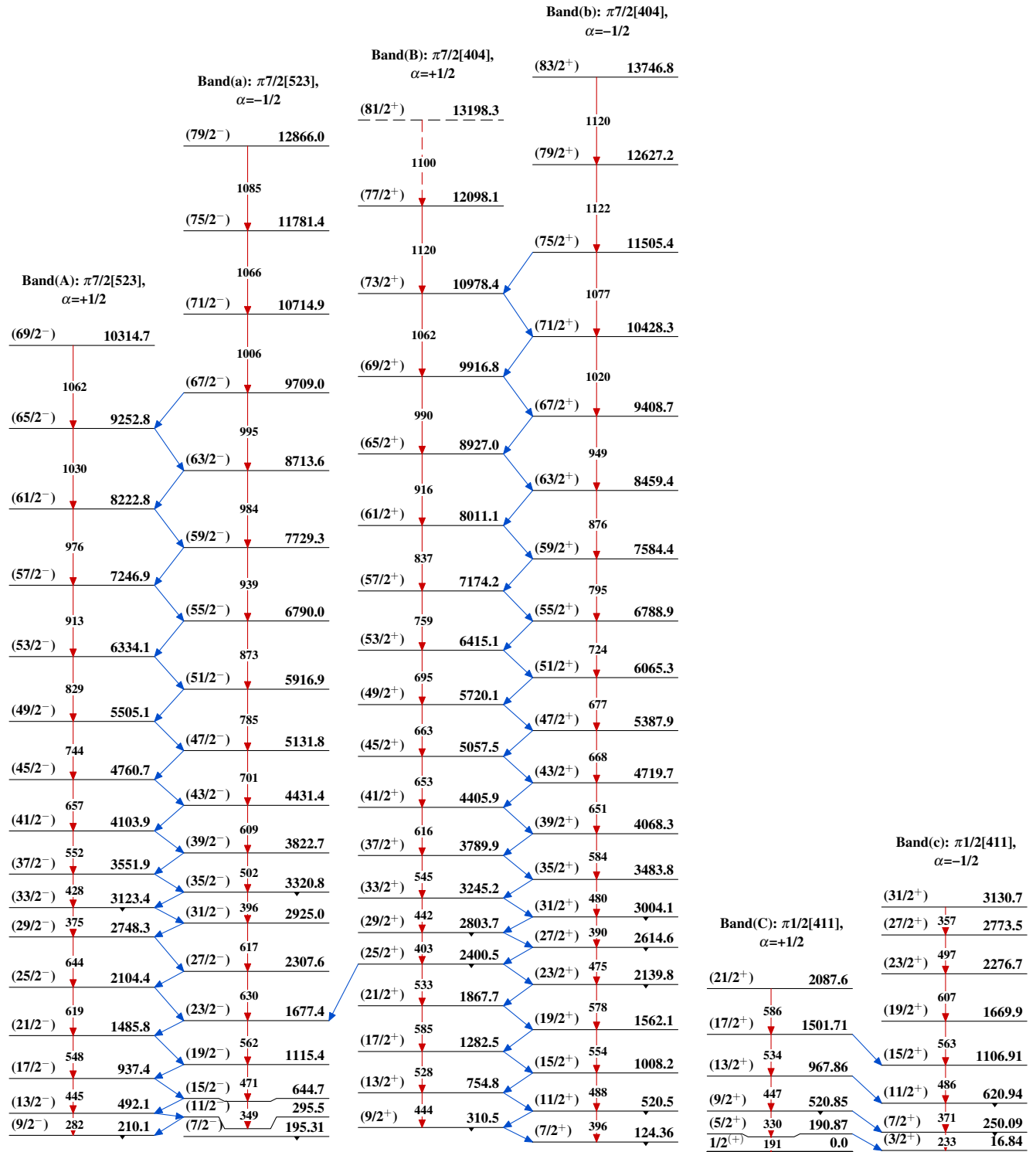
Legend

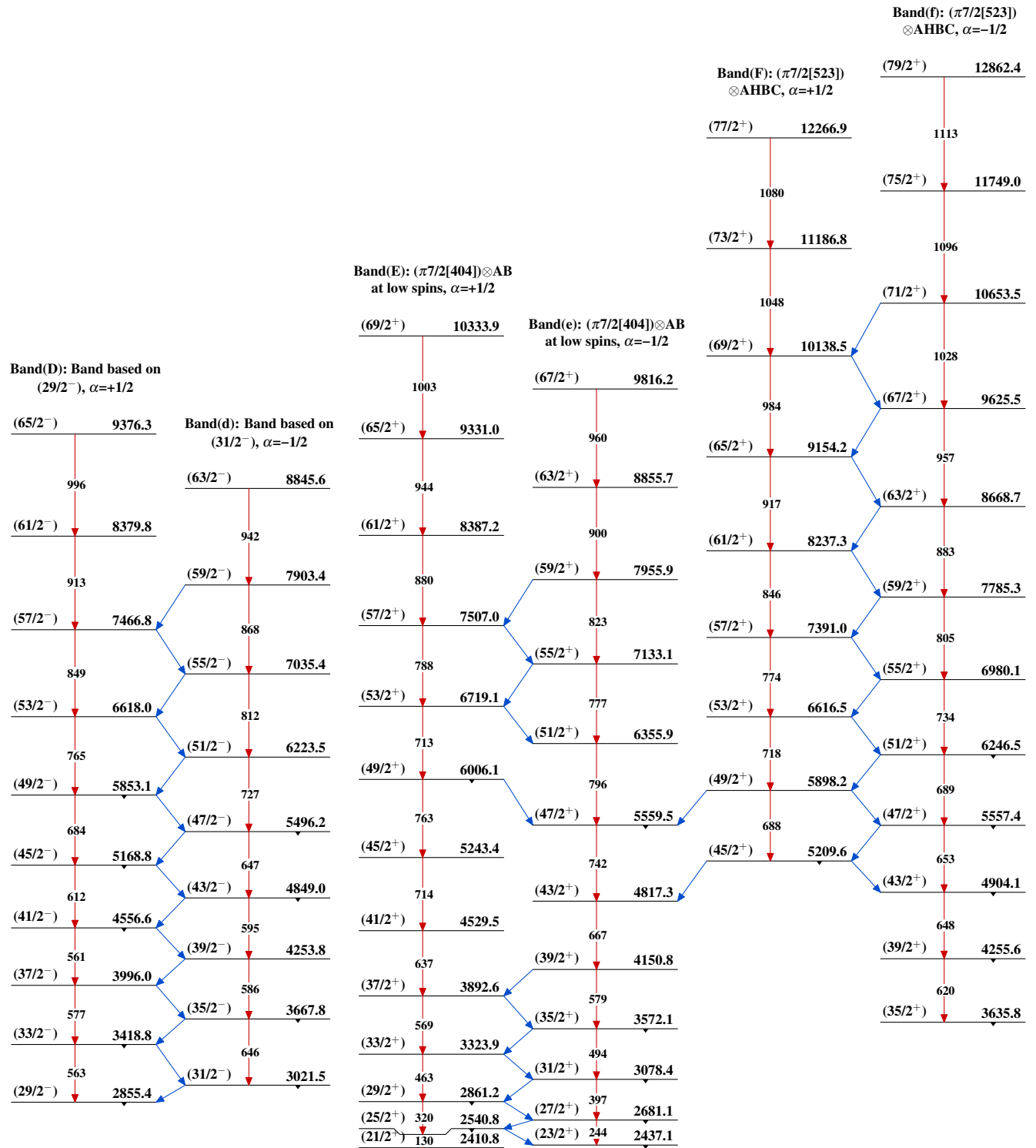
Level Scheme (continued)

Intensities: Relative photon branching from each level

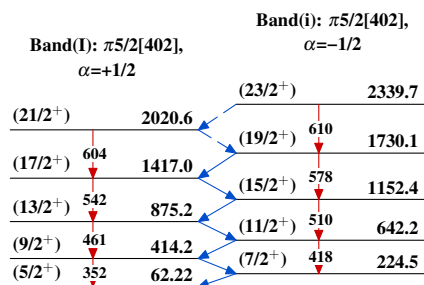
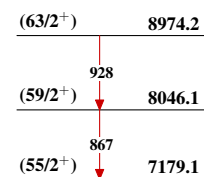
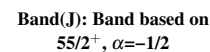
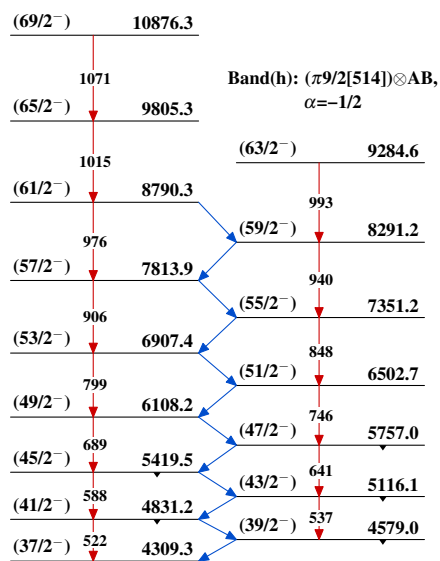
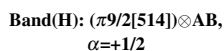
-----► γ Decay (Uncertain)

Adopted Levels, Gammas



Adopted Levels, Gammas (continued)

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



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

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

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

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

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

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

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

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