Adopted Levels, Gammas

History

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

Q(β^-)=−5.53×10^3 *4*; S(n)=1.003×10^4 *8*; S(p)=2.25×10^3 *4*; Q(α)=3.35×10^3 *4* 2012Wa38
Note: Current evaluation has used the following Q record.
Q(β^-)=−5510 *40*; S(n)=10030 *80*; S(p)=2250 *30*; Q(α)=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: ν5/2[642], α=+1/2.
B: ν5/2[642], α=−1/2.
C: ν3/2[651], α=+1/2.
D: ν3/2[651], α=−1/2.
E: ν5/2[523], α=+1/2.
F: ν5/2[523], α=−1/2.
G: ν3/2[521], α=+1/2.
H: ν3/2[521], α=−1/2.
a: π1/2[411], α=+1/2.
b: π1/2[411], α=−1/2.
c: π7/2[404], α=+1/2.
d: π7/2[404], α=−1/2.
e: π7/2[523], α=+1/2.
f: π7/2[523], α=−1/2.
g: π9/2[514], α=+1/2.
h: π9/2[514], α=−1/2.
k: π5/2[402], α=+1/2.
l: π5/2[402], α=−1/2.
m: π1/2[660], α=+1/2.
n: π1/2[541], α=+1/2.

Cross Reference (XREF) Flags

A ^{163}Hf ε decay (40.0 s)
B ^{139}La(^{28}Si,4nγ)
C ^{139}La(^{29}Si,5nγ)

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]	XREF	Comments
0.0[f]	1/2$^{(+)}$	3.97 min *13*	ABC	%ε+%β^+=100 μ=+0.0769 *10* (1998Ge13,2005St24) Δ<r^2>(^{170}Lu−^{163}Lu)=−0.835 fm^2 (Laser spectroscopy, 1998Ge13). from an evaluation of nuclear rms charge radii, 2004An14 report <r^2>$^{1/2}$=5.258 fm *9*. μ: collinear fast beam laser spectroscopy (1998Ge13). J$^\pi$: spin from LASER hyperfine spectroscopy (1998Ge13). Parity from probable π1/2[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)[†]	Jπ[‡]	$T_{1/2}$[#]	XREF	Comments
62.22[q] *23*	(5/2+)		ABC	Jπ: 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)[†]	Jπ[‡]	$T_{1/2}$[#]	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+)		C
2514.5[t] 4	(25/2+)	3.3[&] ps +7−5	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+)		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+)	2.3[&] ps +5−4	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+)		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+)	0.31[&] ps +14−11	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
4255.6[m] 7	(39/2+)		C
4309.3[o] 7	(37/2−)		C

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Adopted Levels, Gammas (continued)

^{163}Lu Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$[#]	XREF	Comments
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	
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	

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Adopted Levels, Gammas (continued)

^{163}Lu Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	XREF	Comments
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	
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	

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Adopted Levels, Gammas (continued)

^{163}Lu Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	XREF	Comments
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[t] *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	
12266.9[l] *21*	(77/2+)		C	
12566.7[v] *22*	(77/2+)		C	
12627.2[e] *17*	(79/2+)		BC	
12745[n] *3*	(79/2−)		C	
12862.4[m] *22*	(79/2+)		C	
12866.0[c] *22*	(79/2−)		C	

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Adopted Levels, Gammas (continued)

^{163}Lu Levels (continued)

E(level)†	Jπ‡	XREF	E(level)†	Jπ‡	XREF	E(level)†	Jπ‡	XREF
12943.5[u] *23*	(79/2+)	C	14086.5[u] *25*	(83/2+)	C	16024[n] *4*	(91/2−)	C
13025.0[w] *25*	(79/2−)	C	14110?[w] *3*	(83/2−)	C	16531[u] *3*	(91/2+)	C
13198.3?[d] *19*	(81/2+)	C	14462.3[t] *25*	(85/2+)	C	16958[t] *3*	(93/2+)	C
13283.0[t] *23*	(81/2+)	C	14826[v] *5*	(85/2+)	C	17204[n] *4*	(95/2−)	C
13679.1[v] *25*	(81/2+)	C	14890[n] *4*	(87/2−)	C	18262[t] *3*	(97/2+)	C
13746.8[e] *20*	(83/2+)	C	15284[u] *3*	(87/2+)	C	18436[n] *4*	(99/2−)	C
13798[n] *3*	(83/2−)	C	15689[t] *3*	(89/2+)	C			

† From least-squares fit to Eγ′s, assuming Δ(Eγ)=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,xnγ) which are based on γγ(θ) (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 ΔJ=1 and E2 for ΔJ=2 transitions.

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

@ From RDDS (1992ScZL).

& From RDDS (1993Sc13,1992ScZL).

[a] From DSAM (2004Go14).

[b] Band(A): π7/2[523], α=+1/2. Strongly-coupled band (1993Sc13,1999Do34,2002Je05,2004Je03). Of the two possible choices (1992Sc03), π7/2[523] and π9/2[514], π7/2[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 ħω≈0.26 MeV.

[c] Band(a): π7/2[523], α=−1/2. Strongly-coupled band (1993Sc13,1999Do34,2002Je05,2004Je03). See the comment for the signature=+1/2 partner of this band. AB crossing at ħω≈0.26 MeV.

[d] Band(B): π7/2[404], α=+1/2. Strongly-coupled band (1992Sc03,1999Do34,2002Je05,2004Je03). AB crossing at ħω≈0.26 MeV; changes to (π7/2[523])⊗AEBC after AB crossing.

[e] Band(b): π7/2[404], α=−1/2. Strongly-coupled band (1992Sc03,1999Do34,2002Je05,2004Je03). AB crossing at ħω≈0.26 MeV; changes to (π7/2[523])⊗AEBC after AB crossing.

[f] Band(C): π1/2[411], α=+1/2. (1999Do34,2002Je05,2004Je03).

[g] Band(c): π1/2[411], α=−1/2. (1999Do34,2002Je05,2004Je03).

[h] Band(D): Band based on (29/2−), α=+1/2. Possible continuation of the π7/2[523] band into (π7/2[523])⊗BC. EF and AD could also be involved at higher spins.

[i] Band(d): Band based on (31/2−), α=−1/2. Possible continuation of the π7/2[523] band into (π7/2[523])⊗BC. EF and AD could also be involved at higher spins.

[j] Band(E): (π7/2[404])⊗AB at low spins, α=+1/2. (π9/2[514])⊗AEBC at high spins.

[k] Band(e): (π7/2[404])⊗AB at low spins, α=−1/2. (π9/2[514])⊗AEBC at high spins.

[l] Band(F): (π7/2[523])⊗AHBC, α=+1/2.

[m] Band(f): (π7/2[523])⊗AHBC, α=−1/2.

[n] Band(G): (π1/2[660])⊗AEBC, α=−1/2.

[o] Band(H): (π9/2[514])⊗AB, α=+1/2.

[p] Band(h): (π9/2[514])⊗AB, α=−1/2.

[q] Band(I): π5/2[402], α=+1/2. (2002Je05,2004Je03).

[r] Band(i): π5/2[402], α=−1/2. (2002Je05,2004Je03).

[s] Band(J): Band based on 55/2+, α=−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=π$i_{13/2}$, 1/2[660], α=+1/2; β_2≈0.42 (1993Sc13,1992Sc03). Percent population (relative to normal-deformed yrast band)≈10 (2004Je03,1999Do34), 14 (2002Je05).

[u] Band(L): One-phonon wobbling-mode. Triaxial SD-2 band (2004Je03,2004Go14,2002Je05,2001Od03,1999Do34). One-phonon

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{163}Lu Levels (continued)

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, α=+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. α=−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)

γ(^{163}Lu)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[@]	δ[@]	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]			δ(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[&]		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$^+$)				
		461.0 *10*	100 *20*	414.2	(9/2$^+$)				
883.6		688.25 *10*	100	195.31	(7/2$^-$)				

$^{163}_{71}Lu_{92}$-9

Adopted Levels, Gammas (continued)

γ(^{163}Lu) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[@]	δ[@]	α[d]	Comments
937.4	(17/2⁻)	292.64 *10*	100 *7*	644.7	(15/2⁻)	(M1+E2)[a]	+0.03 *1*	0.183	B(M1)(W.u.)=(0.31 *+16−18*); B(E2)(W.u.)=(1.6 *6*)
		445.30 *10*	83 *5*	492.1	(13/2⁻)	E2[b]		0.0251	B(E2)(W.u.)=1.8×10^2 *+9−11*
967.86	(13/2⁺)	347.08 *17*	32 *7*	620.94	(11/2⁺)	D			
		446.91 *10*	100 *11*	520.85	(9/2⁺)	(Q)[&]			
1008.2	(15/2⁺)	253.37 *10*	26.8 *22*	754.8	(13/2⁺)				
		487.69 *10*	100 *8*	520.5	(11/2⁺)				
1106.91	(15/2⁺)	486.00 *10*	100	620.94	(11/2⁺)	(Q)[&]			
1115.4	(19/2⁻)	177.97 *10*	24 *3*	937.4	(17/2⁻)	(M1+E2)[a]	+0.15 *2*	0.710 *11*	B(M1)(W.u.)=(0.34 *+9−6*); B(E2)(W.u.)=(1.2×10^2 *+5−4*)
		470.63 *10*	100 *8*	644.7	(15/2⁻)	E2[&]		0.0217	B(E2)(W.u.)=1.7×10^2 *+4−3*
1152.4	(15/2⁺)	277.2 *10*	92 *17*	875.2	(13/2⁺)				
		510.2 *10*	100 *17*	642.2	(11/2⁺)				
1282.5	(17/2⁺)	274.31 *10*	24.2 *25*	1008.2	(15/2⁺)				
		527.77 *10*	100 *10*	754.8	(13/2⁺)				
1286.0?	(13/2⁺)	990.6[e] *10*	100	295.5	(11/2⁻)				
1417.0	(17/2⁺)	264.6 *10*	27 *10*	1152.4	(15/2⁺)				
		541.8 *10*	100 *15*	875.2	(13/2⁺)				
1485.8	(21/2⁻)	370.50 *10*	84 *8*	1115.4	(19/2⁻)	(M1+E2)[a]	+0.05 *3*	0.0972	B(M1)(W.u.)=(0.21 *8*); B(E2)(W.u.)=(1.8 *+23−18*)
		548.49 *10*	100 *7*	937.4	(17/2⁻)	(E2)[b]		0.0147 *6*	B(E2)(W.u.)=1.2×10^2 *5*
1501.71	(17/2⁺)	394.90 *16*	54 *8*	1106.91	(15/2⁺)				Iγ(395)/Iγ(534)=0.11 *2* (1999Do34) is in disagreement.
		533.81 *10*	100 *13*	967.86	(13/2⁺)	(Q)[&]			
1562.1	(19/2⁺)	279.58 *10*	25.9 *22*	1282.5	(17/2⁺)				Iγ(280)/Iγ(554)=0.13 *3* (1992Sc03) is in disagreement.
		553.85 *10*	100 *7*	1008.2	(15/2⁺)				
1669.9	(19/2⁺)	562.96 *10*	100	1106.91	(15/2⁺)				
1677.4	(23/2⁻)	191.54 *10*	13.7 *12*	1485.8	(21/2⁻)	(M1+E2)[a]	+0.18 *9*	0.576 *13*	B(M1)(W.u.)=(0.338 *11*); B(E2)(W.u.)=(1.5×10^2 *14*)
		562.00 *10*	100 *7*	1115.4	(19/2⁻)	E2[&]		0.0139 *1*	B(E2)(W.u.)=1.6×10^2 *+5−4*
1730.1	(19/2⁺)	313.1 *10*	44 *33*	1417.0	(17/2⁺)				
		577.7 *10*	100 *56*	1152.4	(15/2⁺)				
1739.9	(13/2⁺)	453.9[e] *10*	100	1286.0?	(13/2⁺)				
1867.7	(21/2⁺)	305.65 *10*	26 *4*	1562.1	(19/2⁺)				
		585.17 *10*	100 *9*	1282.5	(17/2⁺)				
1936.5	(17/2⁺)	196.7 *10*	100 *56*	1739.9	(13/2⁺)	(Q)			
		1292.0 *10*	6 *4*	644.7	(15/2⁻)				
2009.0	(21/2⁺)	592.0 *10*	100 *29*	1417.0	(17/2⁺)				
		893.7 *10*	43 *29*	1115.4	(19/2⁻)				
2020.6	(21/2⁺)	290.5[e] *10*	8 *7*	1730.1	(19/2⁺)				
		603.5 *10*	100 *17*	1417.0	(17/2⁺)				
2087.6	(21/2⁺)	585.86 *17*	100	1501.71	(17/2⁺)	[&]			
2104.4	(25/2⁻)	426.95 *10*	97 *7*	1677.4	(23/2⁻)	(D)[b]			δ(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⁺)				

$^{163}_{71}Lu_{92}$-10

Adopted Levels, Gammas (continued)

γ(^{163}Lu) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[@]	δ[@]	α[d]	Comments
2139.8	(23/2$^+$)	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$^+$)				
		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]			δ(Q/D)=−0.01 *13*.
		643.81 *10*	100 *9*	2104.4	(25/2$^-$)	(Q)[&]			

$^{163}_{71}Lu_{92}$-11

Adopted Levels, Gammas (continued)

γ(^{163}Lu) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[@]	δ[@]	α[d]	Comments
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	B(E2)(W.u.)=5.2×10^2 *+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	B(M1)(W.u.)=0.39 *+11−10*
		299.3 *10*	0.8 *6*	3021.5	(31/2$^-$)	[E2]		0.0771 *14*	B(E2)(W.u.)=6 *4*
		395.99 *10*	20 *3*	2925.0	(31/2$^-$)	[E2]		0.0344	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	B(E2)(W.u.)=6.3×10^2 *+21−35*
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$^+$)	(E2+M1)	−3.1 *4*	0.0142 *5*	α(K)=0.0116 *4*; α(L)=0.00216 *5*
3551.9	(37/2$^-$)	231.04 *10*	100 *7*	3320.8	(35/2$^-$)	(D)[a]			δ(Q/D)=+0.25 *5*.
		428.44 *10*	27.8 *22*	3123.4	(33/2$^-$)				

$^{163}_{71}Lu_{92}$-12

Adopted Levels, Gammas (continued)

γ(^{163}Lu) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[@]	δ[@]	α[d]	Comments
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]			δ(Q/D)=+0.22 *3*.
		501.93 *10*	41 *3*	3320.8	(35/2$^-$)	(Q)[&]			Iγ(502)/Iγ(271)=0.70 *6* (1992Sc03) is in disagreement.
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]			
		552.09 *10*	59 *4*	3551.9	(37/2$^-$)	(Q)[&]			Iγ(552)/Iγ(281)=0.91 *14* (1992Sc03) is in disagreement.
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$^+$)				
		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[&]			

$^{163}_{71}Lu_{92}$-13

Adopted Levels, Gammas (continued)

γ(^{163}Lu) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[@]	δ[@]	α[d]	Comments
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$^+$)				
		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	α(K)=0.083 *3*; α(L)=0.0125 *4*; α(M)=0.00281 *9*; α(N+..)=0.00086 *3* B(M1)(W.u.)=1.4 *6*
		700.67 *10*	89 *8*	4431.4	(43/2$^-$)	[E2]		0.00831	B(E2)(W.u.)=1.9×10^2 *7*
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$^+$)				

$^{163}_{71}Lu_{92}$-14

Adopted Levels, Gammas (continued)

γ(^{163}Lu) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[@]	δ[@]	α[d]	Comments
5209.6	(45/2$^+$)	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	B(M1)(W.u.)=1.7 *+5−8* Iγ(373)/Iγ(744)=0.41 *11* (1992Sc03) is in disagreement.
		744.31 *10*	100 *8*	4760.7	(45/2$^-$)	[E2]		0.00727	B(E2)(W.u.)=2.2×10^2 *+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	B(E2)(W.u.)=4.8×10^2 *+12−10*
		658.9 *10*	24.3 *21*	5084.0	(45/2$^+$)	(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$^-$)	337.4 *10*	74 *18*	5419.5	(45/2$^-$)				
		640.7 *10*	100 *26*	5116.1	(43/2$^-$)				
		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$^+$)				

$^{163}_{71}Lu_{92}$-15

Adopted Levels, Gammas (continued)

γ(^{163}Lu) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[@]	δ[@]	α[d]	Comments
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$^+$)				Iγ(350)/Iγ(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$^+$)				
6788.9	(55/2$^+$)	373.74 *10*	43 *4*	6415.1	(53/2$^+$)				Iγ(374)/Iγ(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$^+$)				

$^{163}_{71}Lu_{92}$-16

Adopted Levels, Gammas (continued)

γ(^{163}Lu) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[@]	δ[@]	α[d]	Comments
7174.2	(57/2$^+$)	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$^+$)				Iγ(410)/Iγ(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$^+$)				
		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$^-$)				

$^{163}_{71}Lu_{92}$-17

Adopted Levels, Gammas (continued)

γ(^{163}Lu) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[@]	α[d]	Comments
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*
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*

$^{163}_{71}Lu_{92}$-18

Adopted Levels, Gammas (continued)

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

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[@]	α[d]	Comments
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$^+$)			
		1077.1 *10*	100 *75*	10428.3	(71/2$^+$)			
11729.9	(75/2$^-$)	1015.0 *10*	100	10714.9	(71/2$^-$)	E2	0.00378	
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$^+$)			E_γ: 1117.4 (1992Sc03).
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$^-$)			

$^{163}_{71}Lu_{92}$-19

Adopted Levels, Gammas (continued)

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

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π
14462.3	$(85/2^+)$	1179.3 *10*	100	13283.0	$(81/2^+)$	16531	$(91/2^+)$	1247.5 *10*	100	15284	$(87/2^+)$
14826	$(85/2^+)$	1147 *4*	100	13679.1	$(81/2^+)$	16958	$(93/2^+)$	1269.0 *10*	100	15689	$(89/2^+)$
14890	$(87/2^-)$	1092.2 *10*	100	13798	$(83/2^-)$	17204	$(95/2^-)$	1179.5 *10*	100	16024	$(91/2^-)$
15284	$(87/2^+)$	1197.3 *10*	100	14086.5	$(83/2^+)$	18262	$(97/2^+)$	1303.5 *10*	100	16958	$(93/2^+)$
15689	$(89/2^+)$	1227.0 *10*	100	14462.3	$(85/2^+)$	18436	$(99/2^-)$	1232.4 *10*	100	17204	$(95/2^-)$
16024	$(91/2^-)$	1134.5 *10*	100	14890	$(87/2^-)$						

† From $^{139}La(^{29}Si,5n\gamma)$ unless otherwise stated. These values, in general, agree within 0.3 keV with those from $^{139}La(^{28}Si,4n\gamma)$.
‡ Most values are from $^{139}La(^{29}Si,5n\gamma)$, where a more complete set of values is given than in earlier $^{139}La(^{28}Si,4n\gamma)$ study.
# From ^{163}Hf ε decay.
@ From $\gamma(\theta)$, $\gamma\gamma(\theta)$ and γ(lin pol) in (HI,xnγ) studies, except as noted.
& $\gamma\gamma(\theta)$ (DCO ratio) in (HI,xnγ) is consistent with $\Delta J=2$, stretched quadrupole. When $T_{1/2}$(level) is known, RUL further limits the multipolarity to E2.
a $\gamma\gamma(\theta)$ (DCO) in (HI,xnγ) is consistent with $\Delta J=1$, dipole, but $\Delta J=2$ does not seem to be ruled out.
b From $\gamma(\theta)$ in (HI,xnγ) (1983RoZW).
c From comparison to RUL. Isotropic distribution in (^{19}F,4nγ).
d Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
e Placement of transition in the level scheme is uncertain.

$^{163}_{71}Lu_{92}$-20

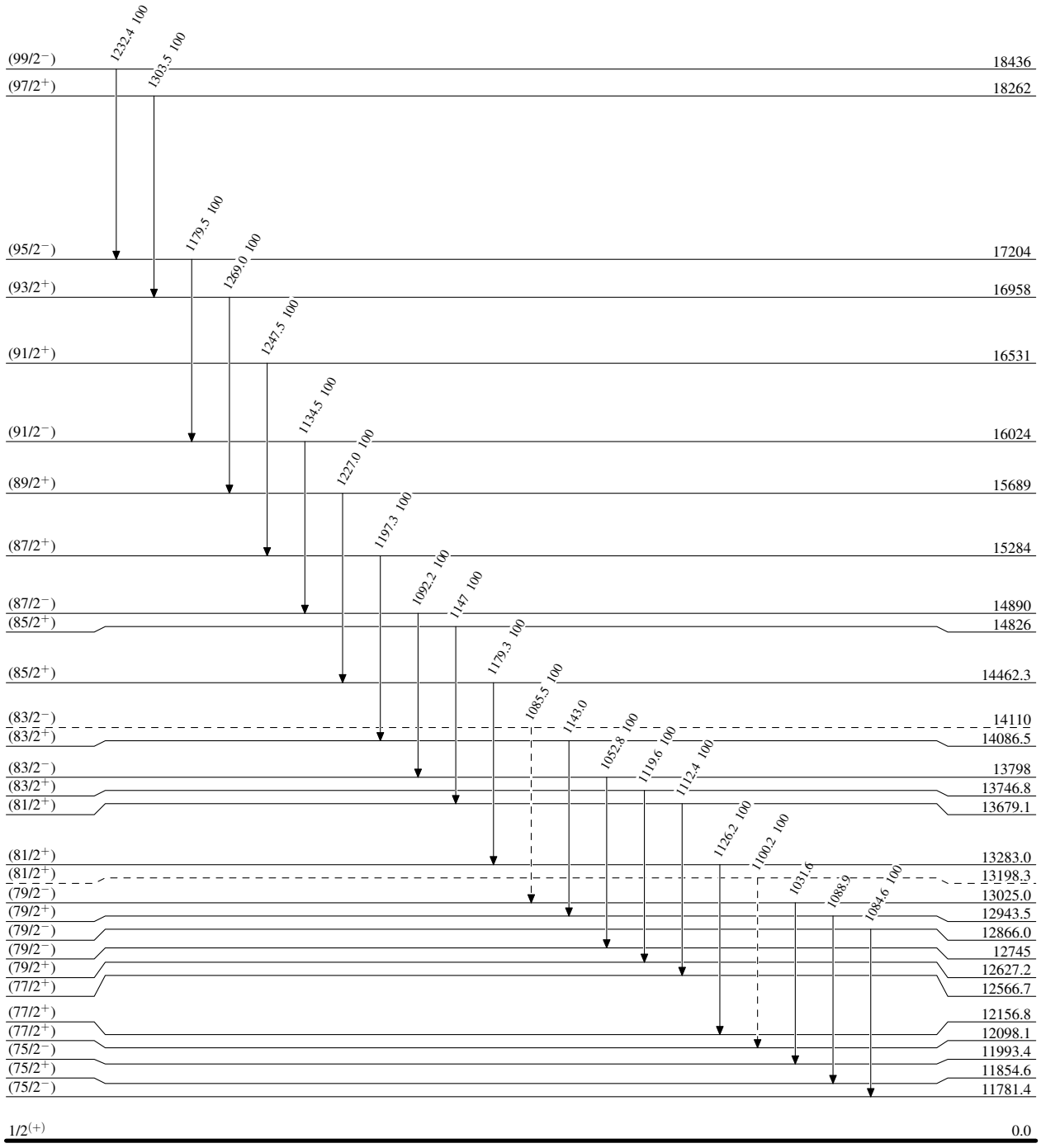
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

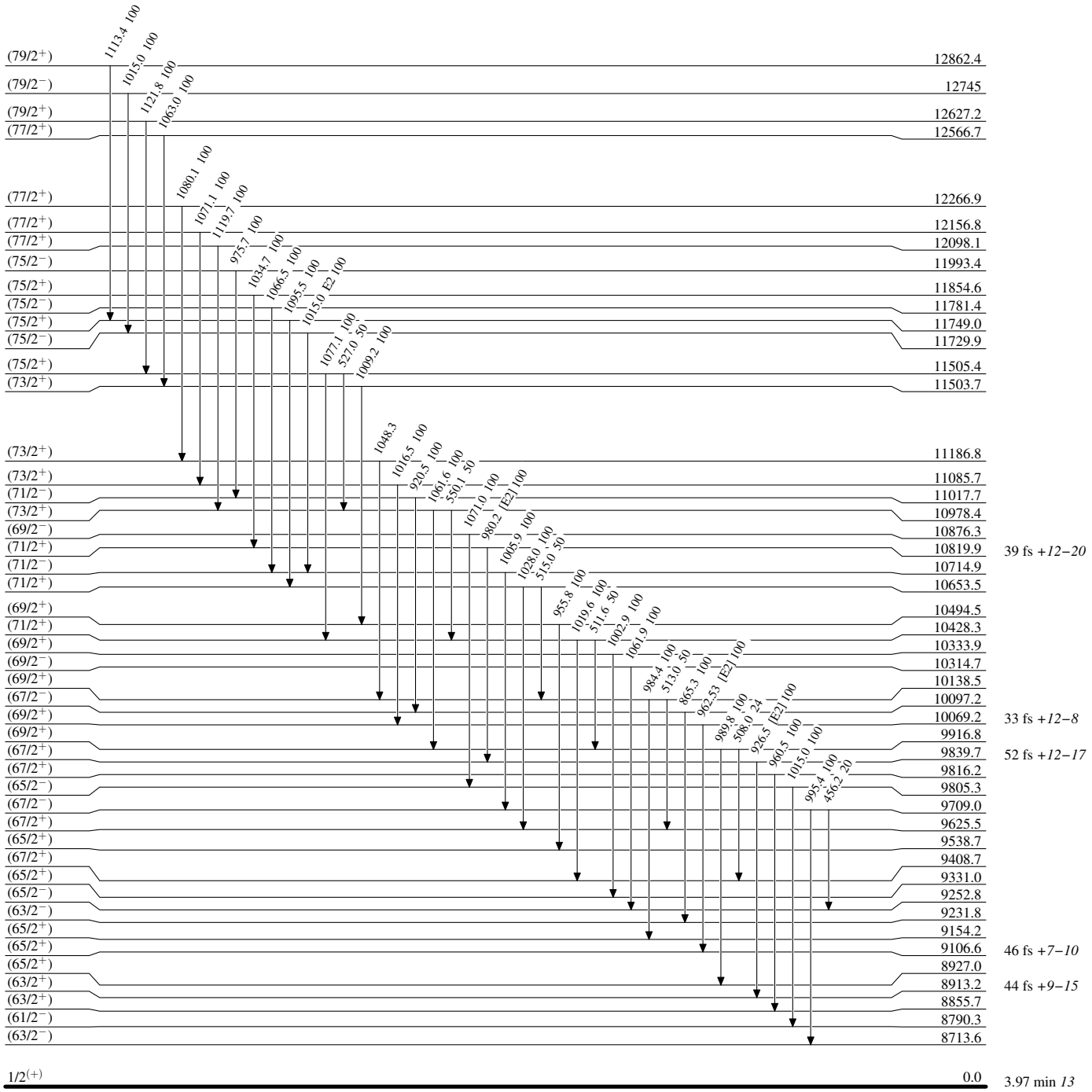


$^{163}_{71}Lu_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{163}_{71}Lu_{92}$

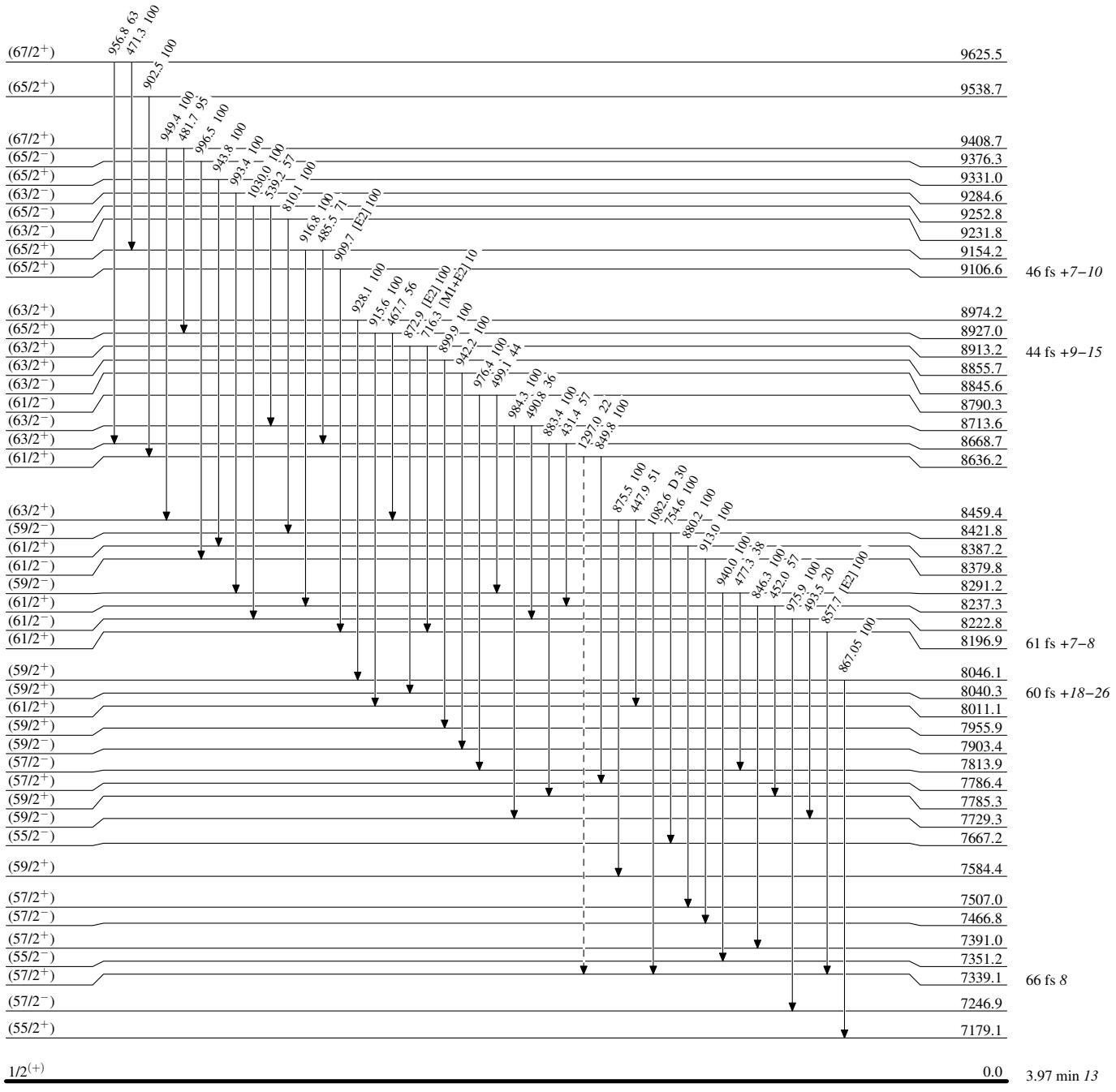
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

– – – – – – ► γ Decay (Uncertain)

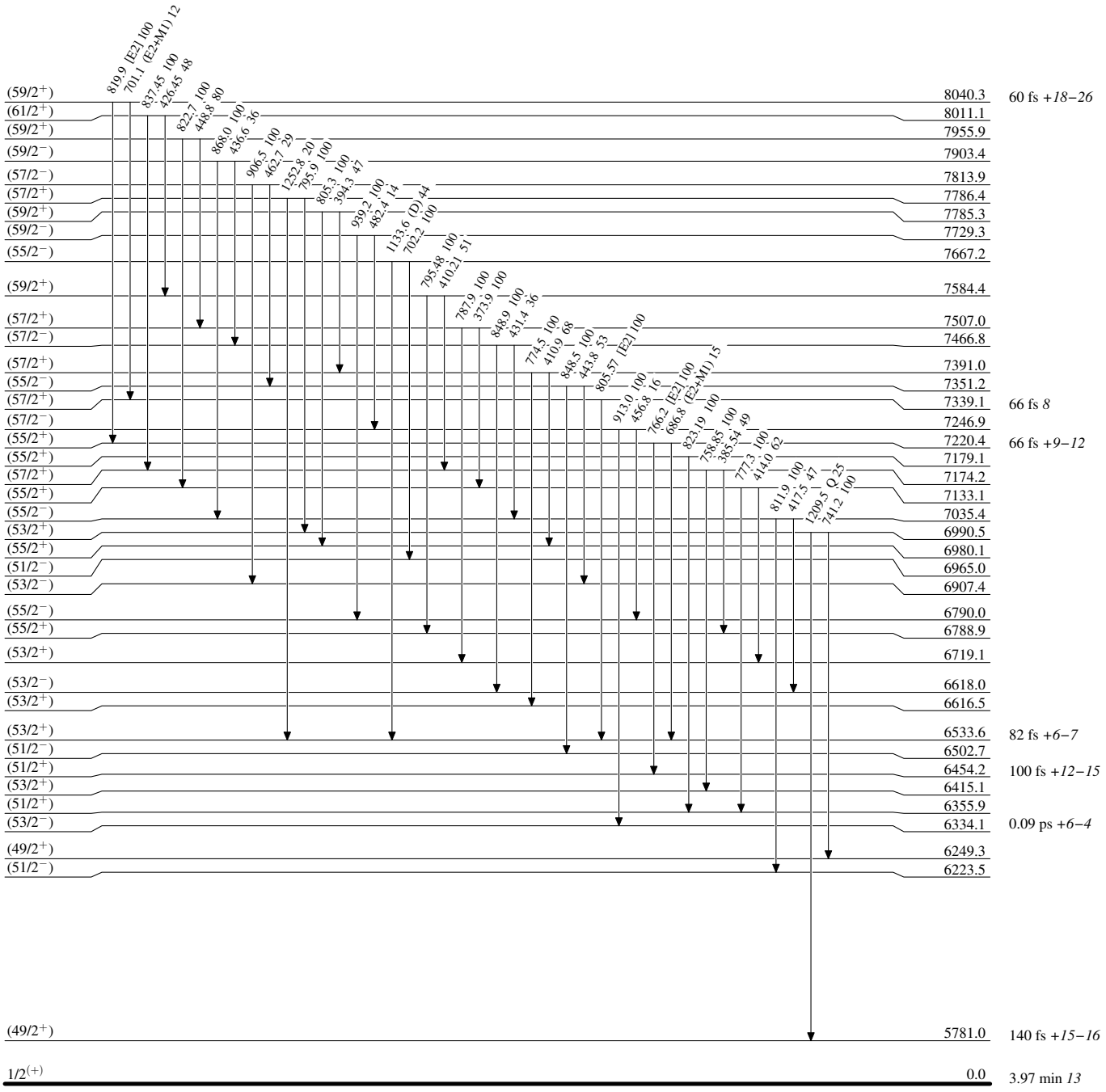


$^{163}_{71}Lu_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

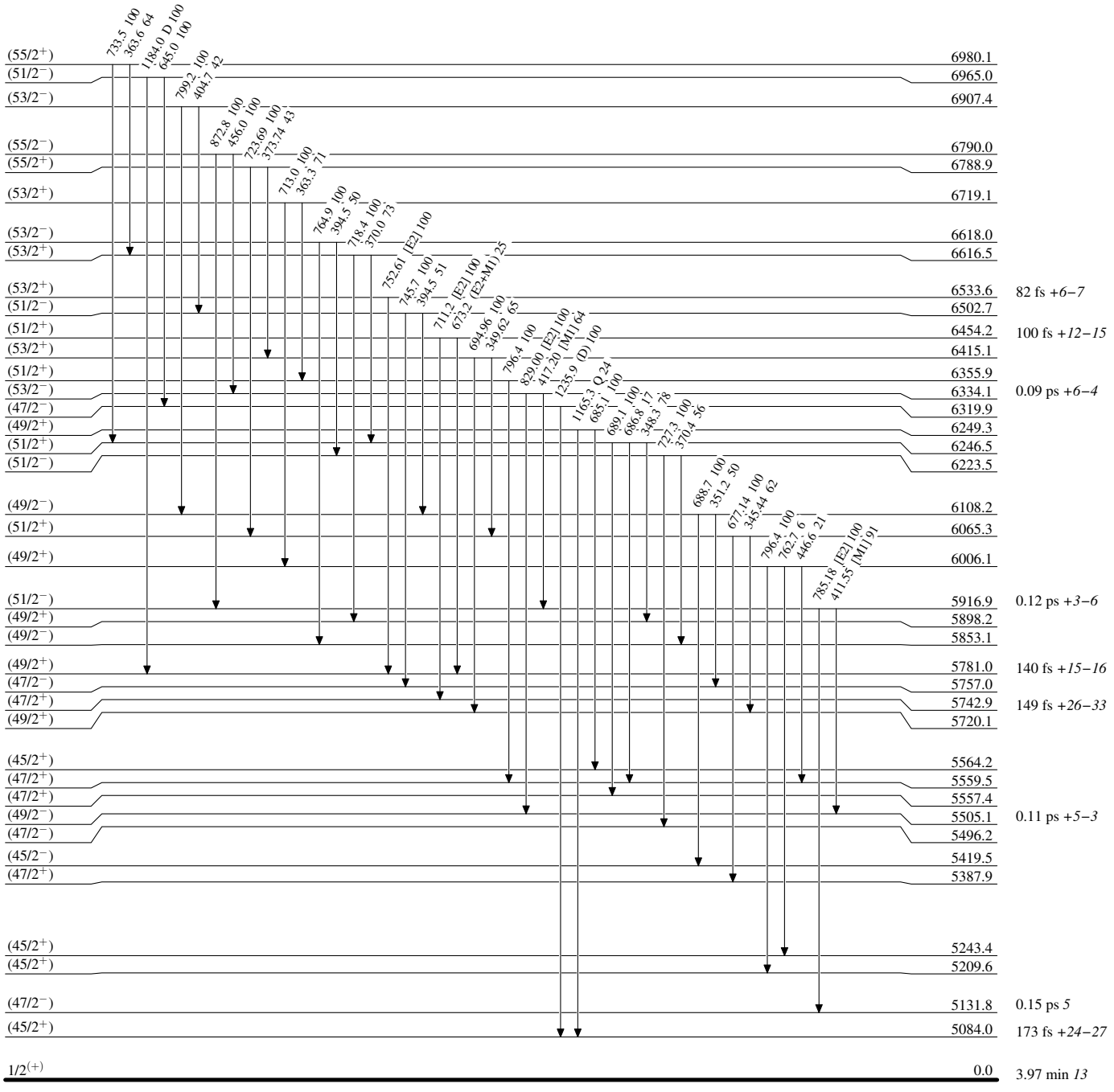


$^{163}_{71}Lu_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

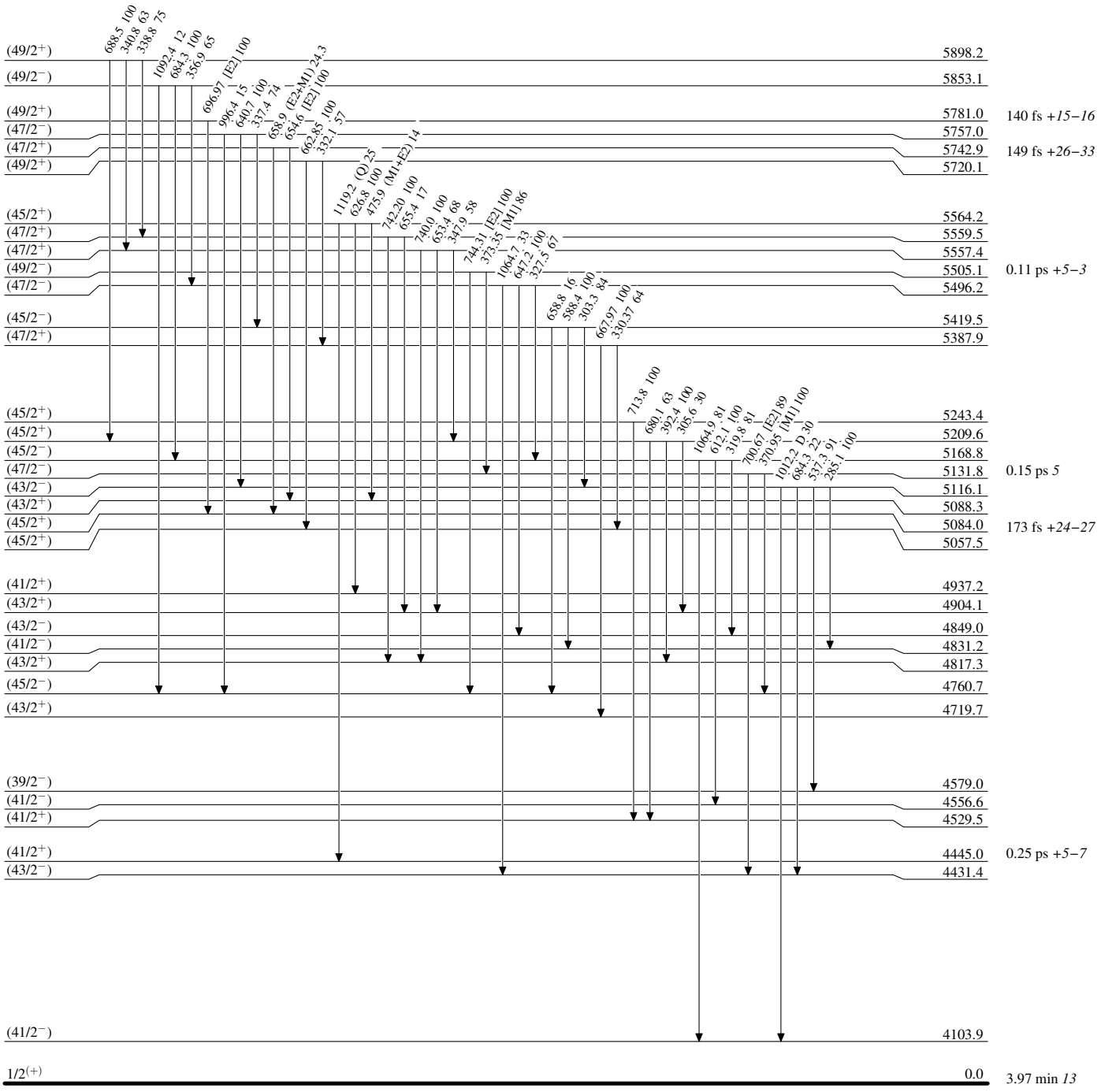


$^{163}_{71}Lu_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



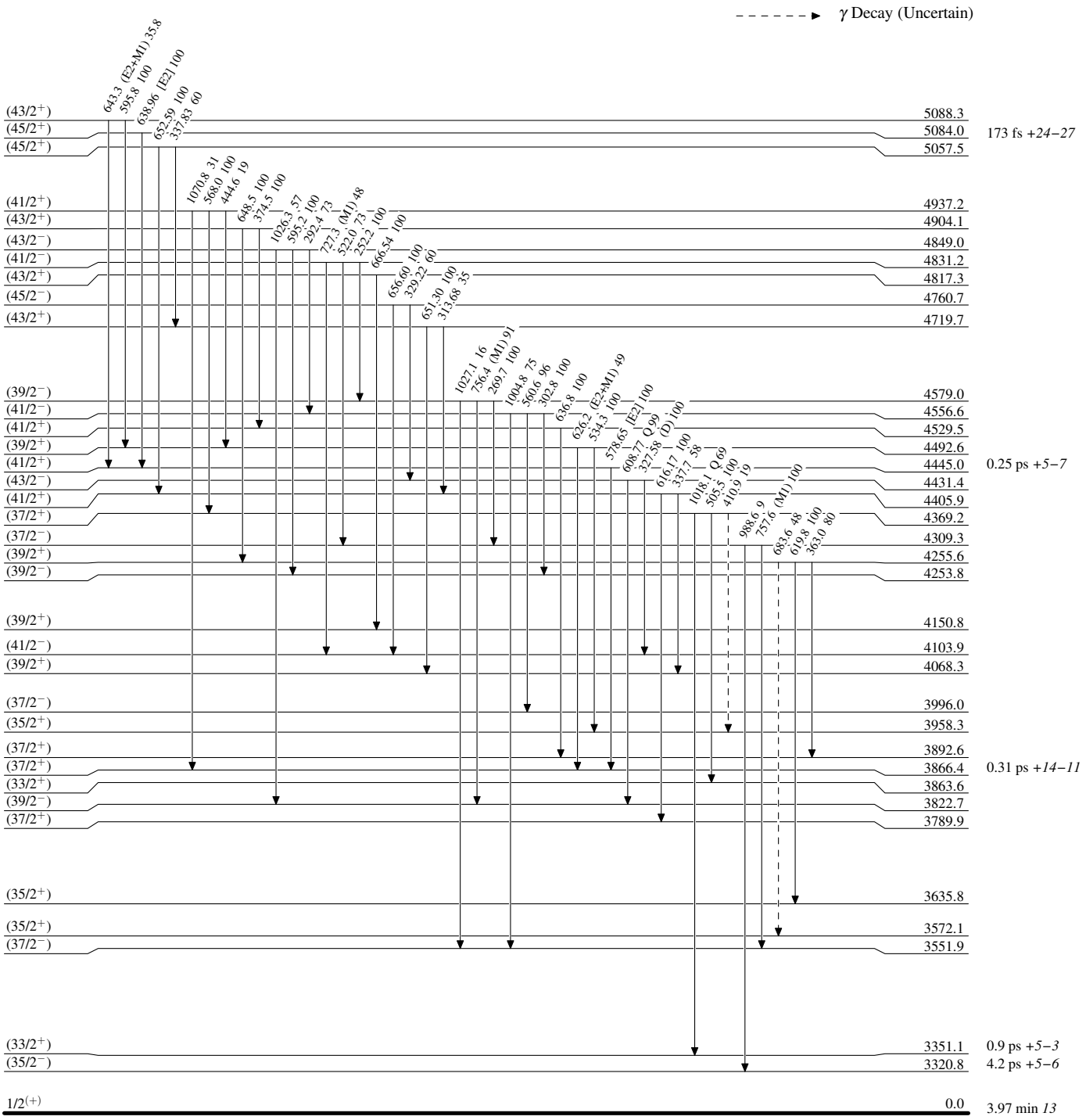
$^{163}_{71}Lu_{92}$

Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{163}_{71}Lu_{92}$

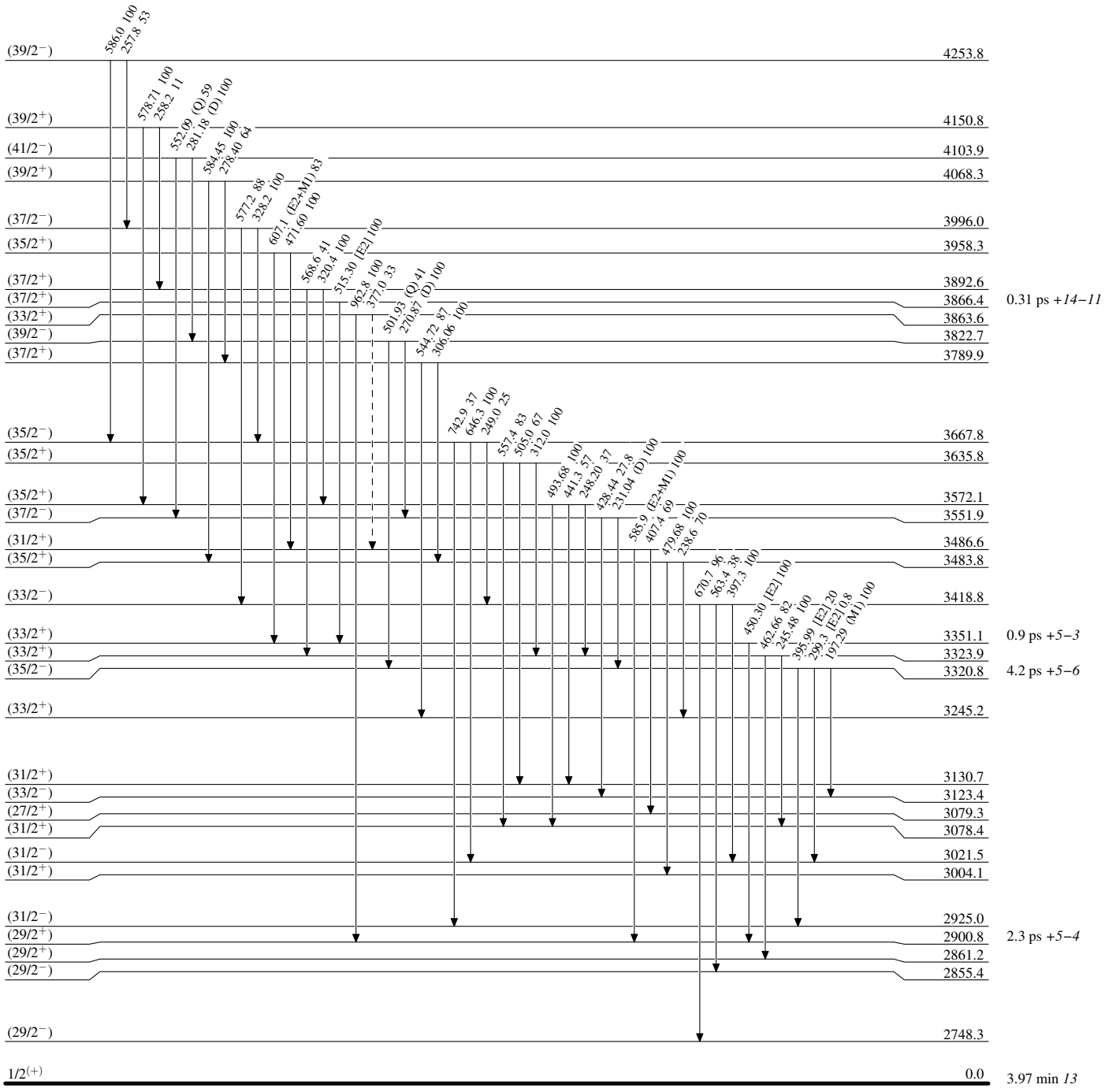
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

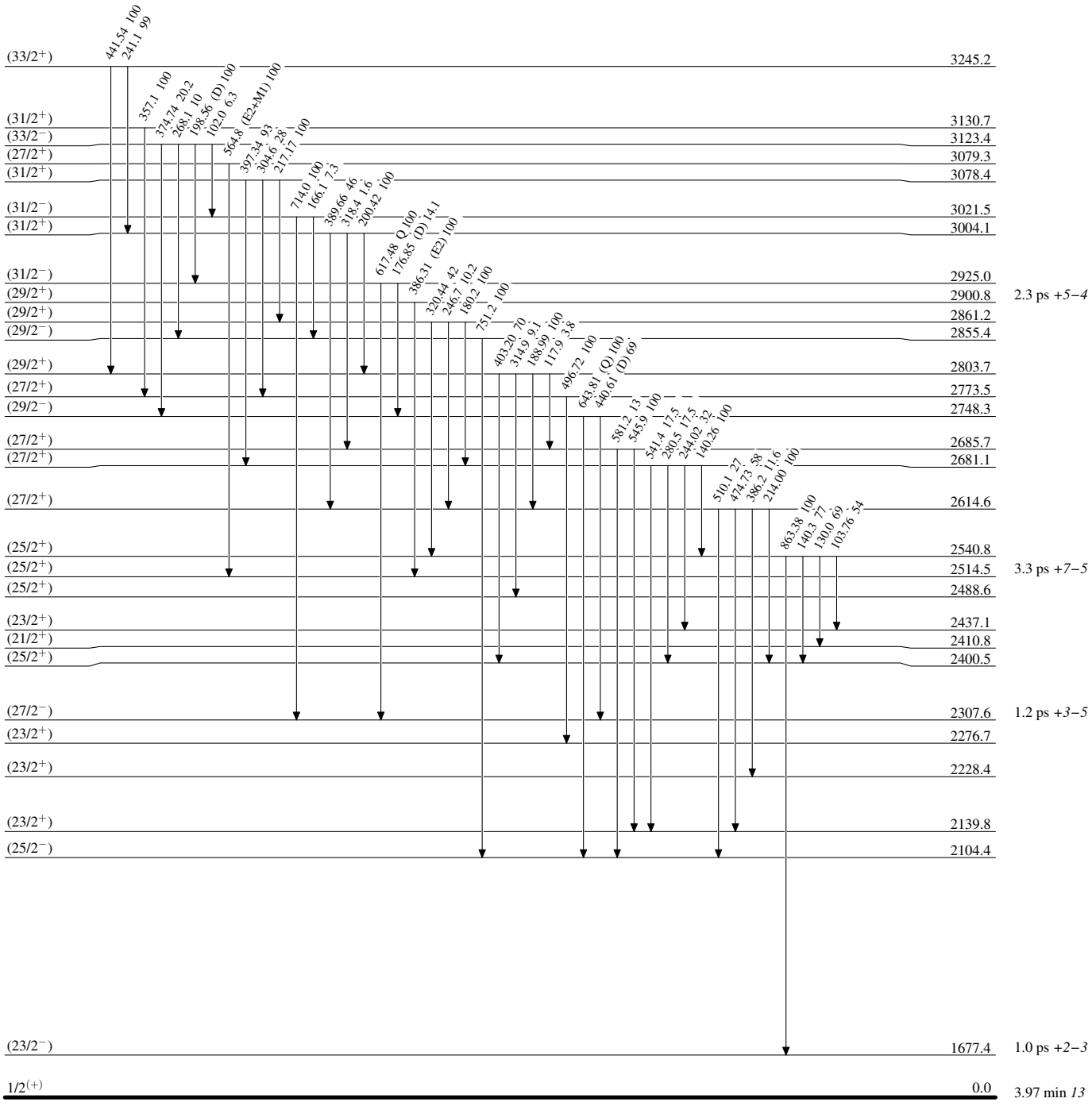


$^{163}_{71}Lu_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{163}_{71}Lu_{92}$

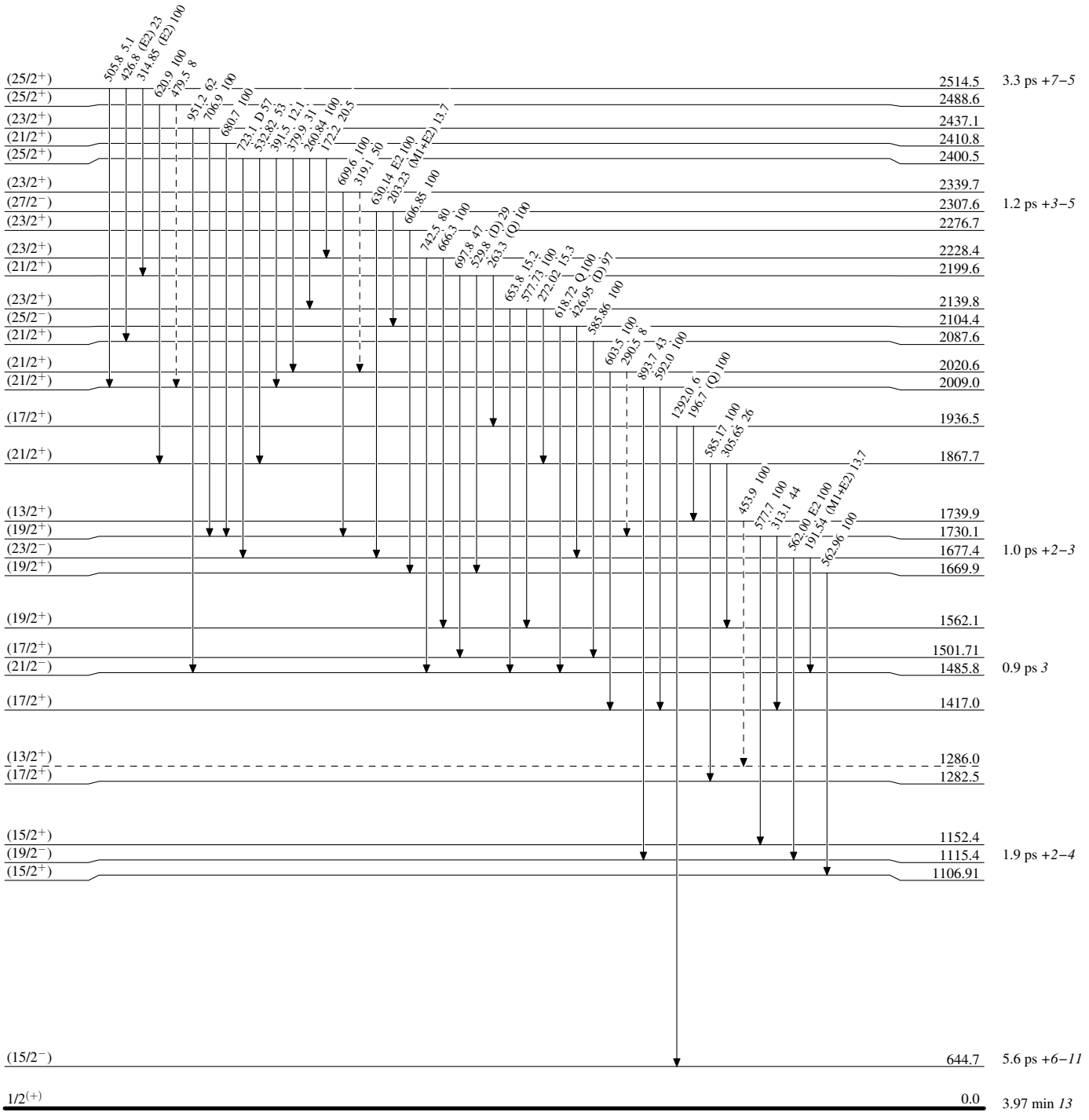
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{163}_{71}Lu_{92}$

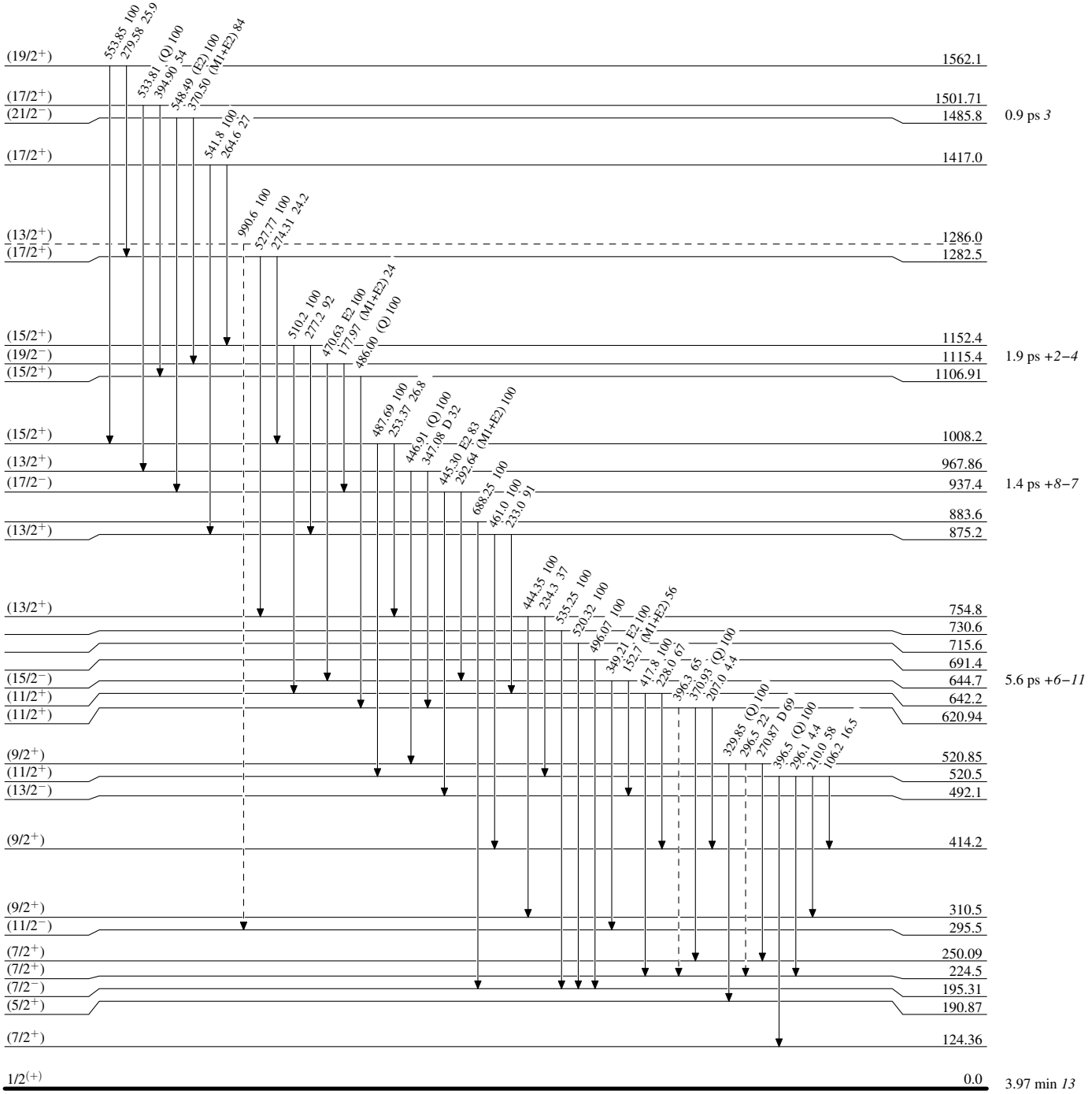
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{163}_{71}Lu_{92}$

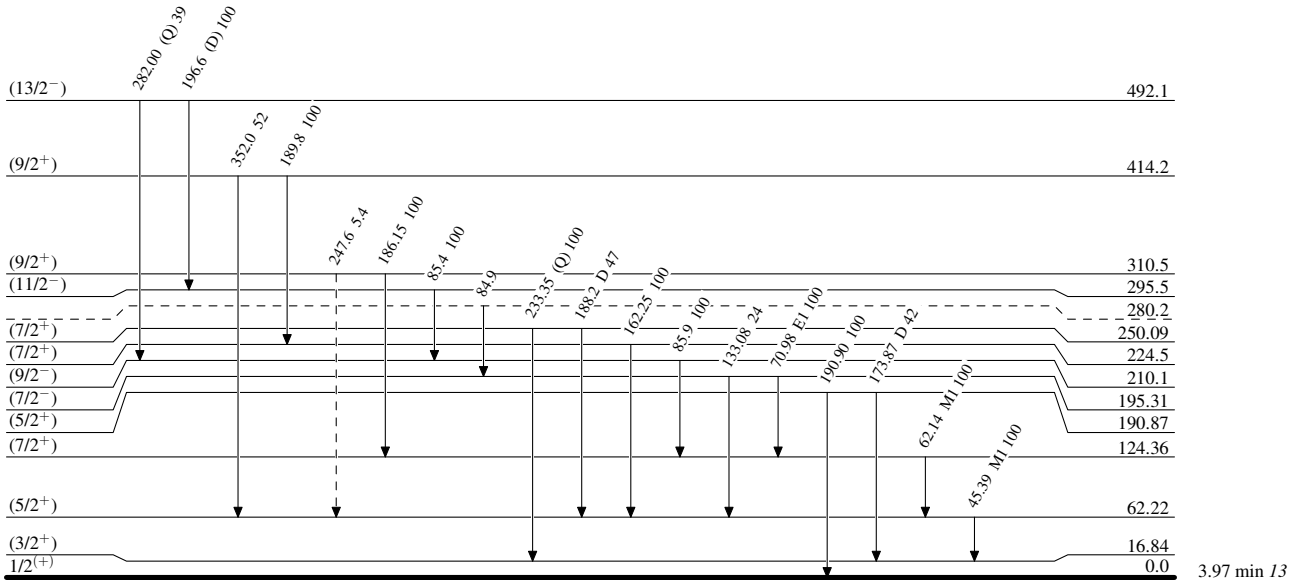
Adopted Levels, Gammas

Legend

Level Scheme (continued)

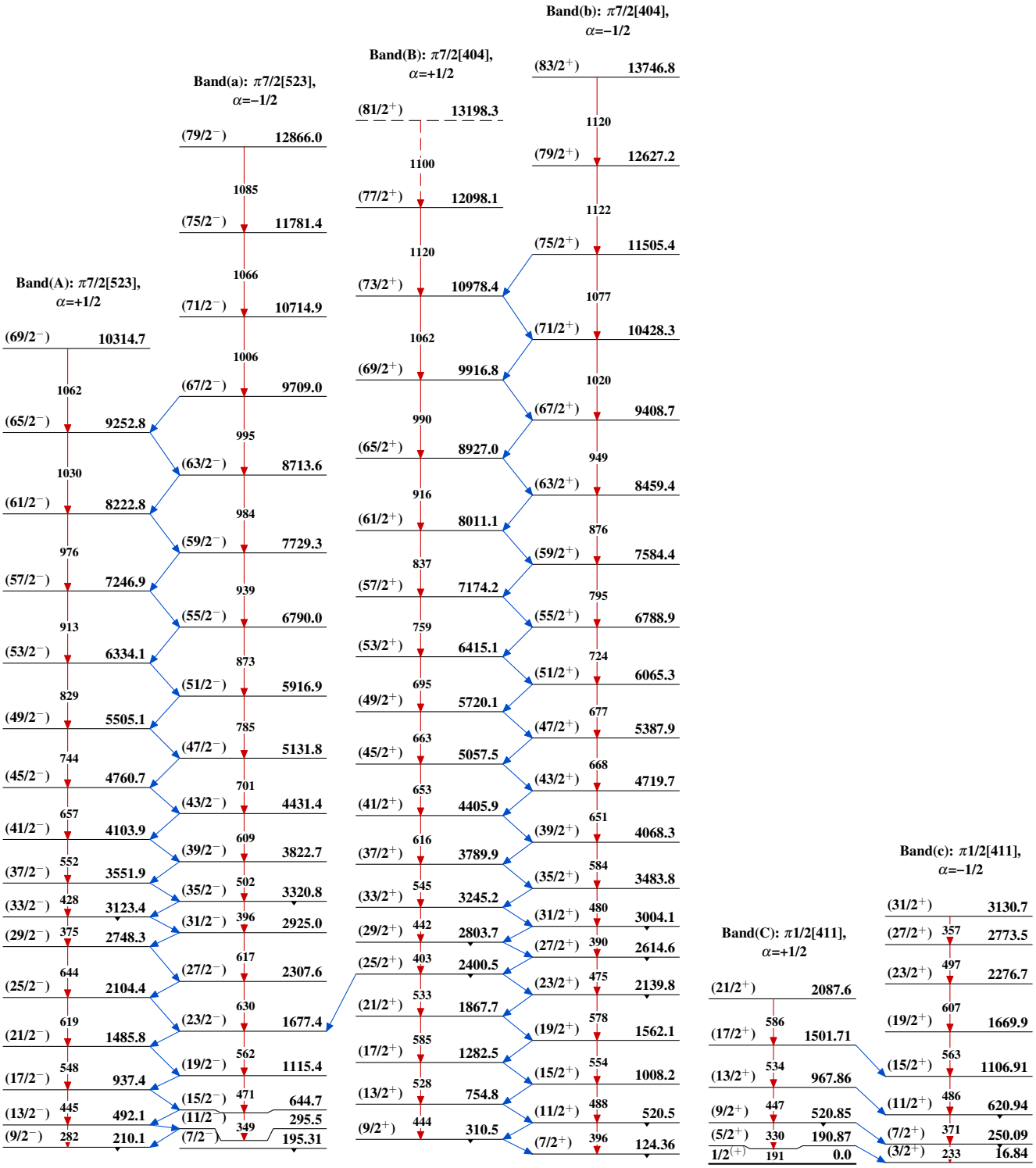
Intensities: Relative photon branching from each level

γ Decay (Uncertain)

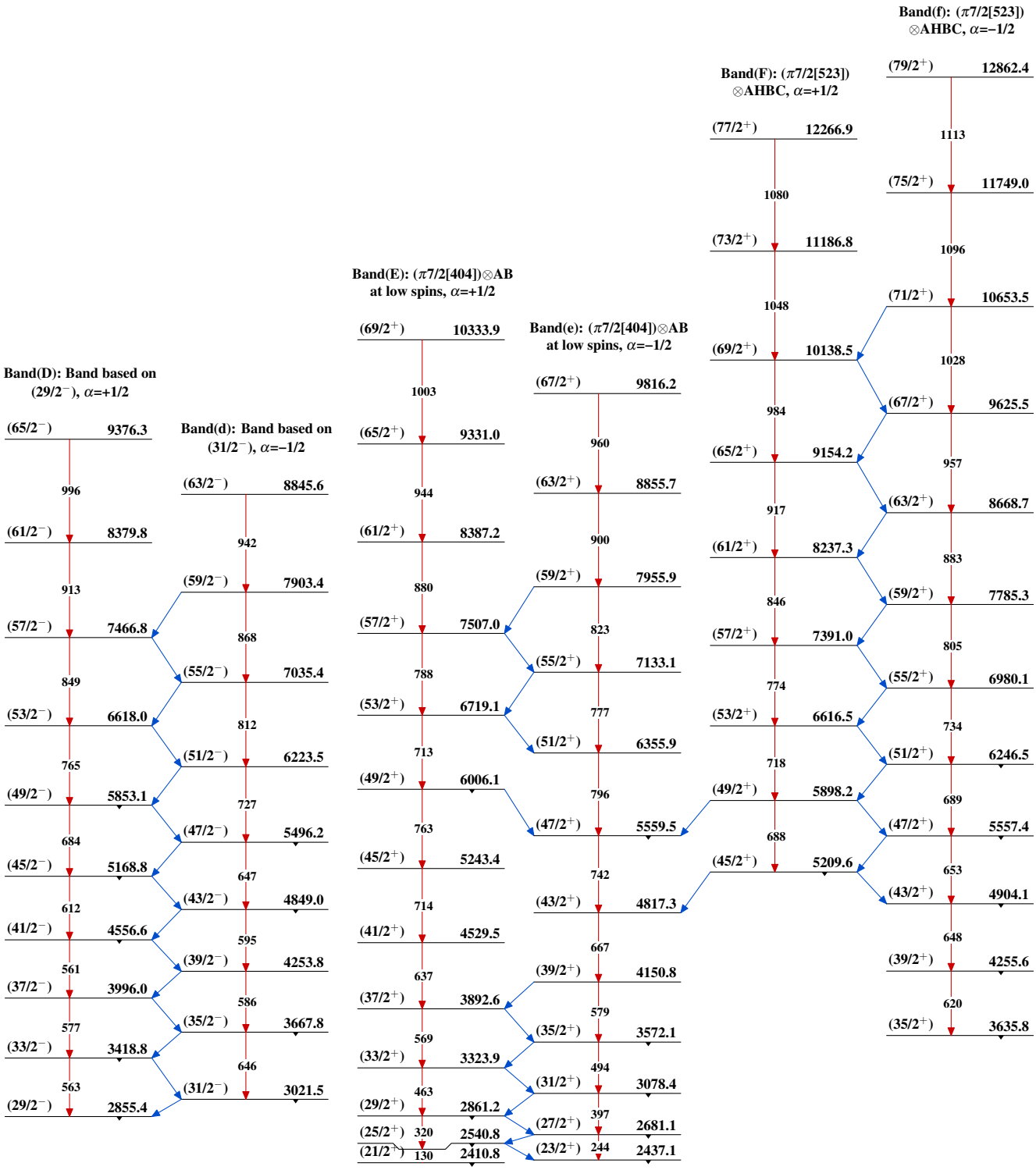


$^{163}_{71}Lu_{92}$

Adopted Levels, Gammas

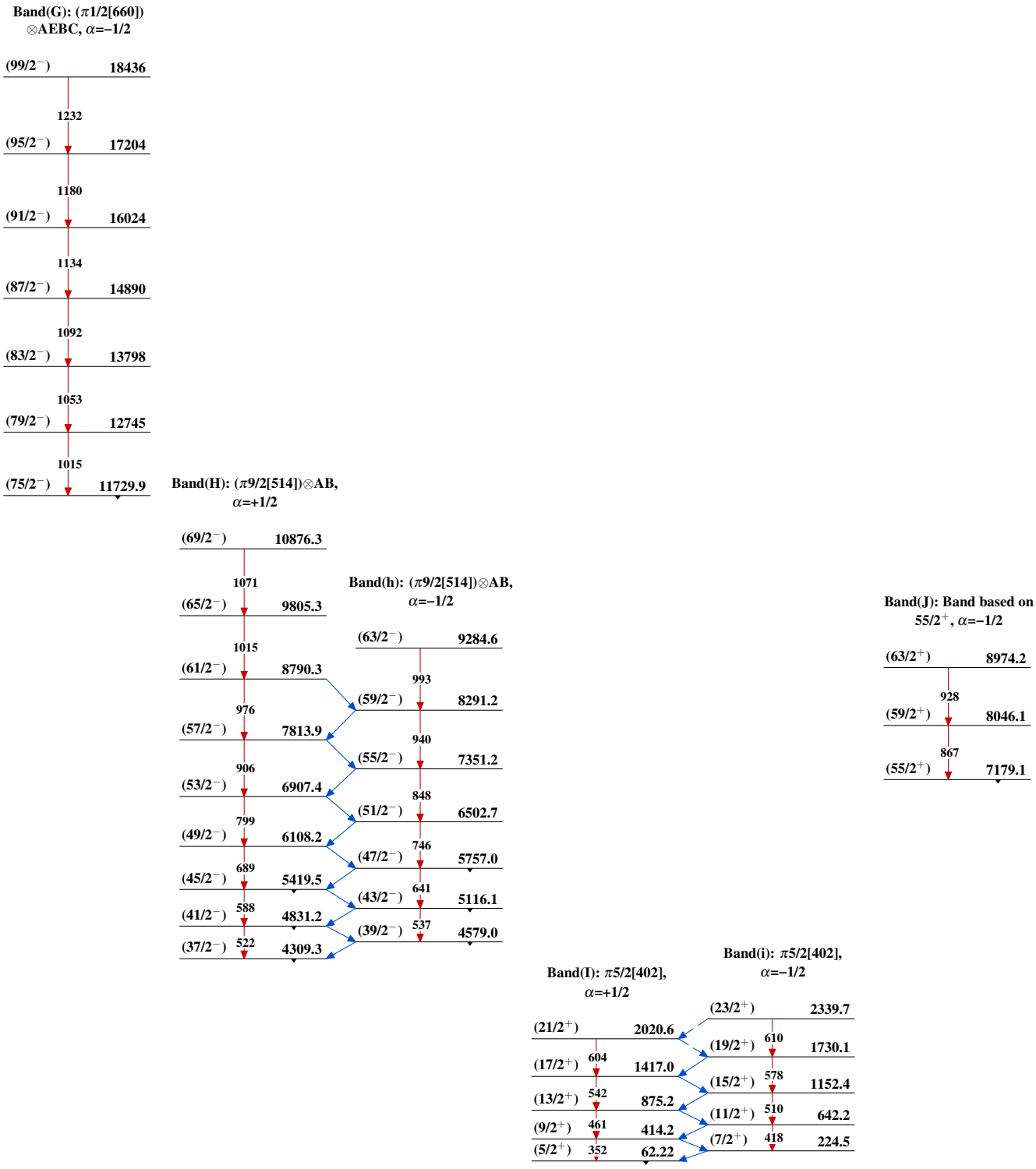


Adopted Levels, Gammas (continued)

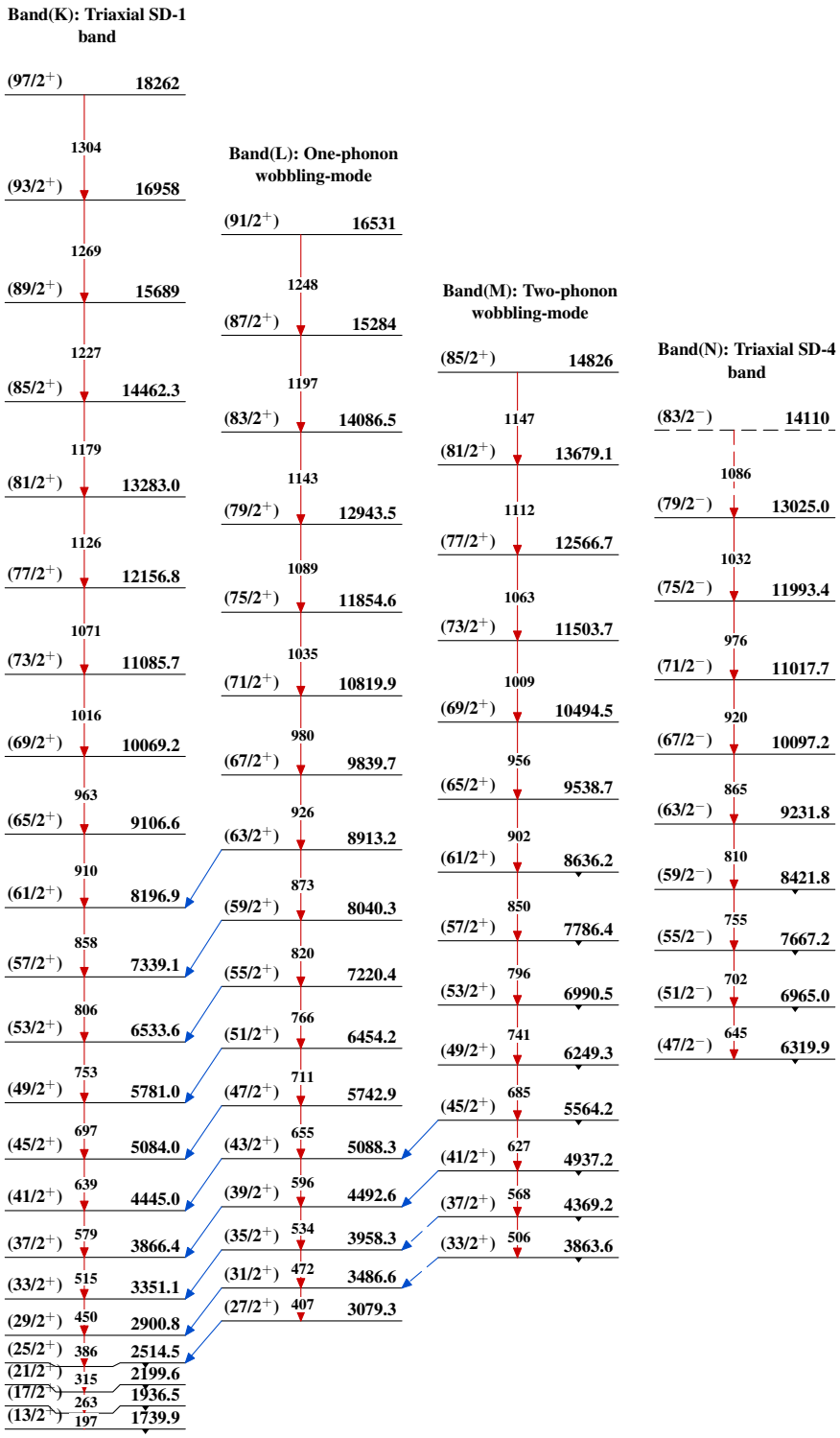


$^{163}_{71}Lu_{92}$

Adopted Levels, Gammas (continued)



Adopted Levels, Gammas (continued)



$^{163}_{71}Lu_{92}$

^{163}Hf ε decay (40.0 s) 1982Sc15

History

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

Parent: ^{163}Hf: E=0.0; $T_{1/2}$=40.0 s *6*; Q(ε)=5510 *40*; %ε+%$β^+$ decay=100.0
^{163}Hf-$T_{1/2}$: From the ^{163}Hf Adopted Levels.
^{163}Hf-Q(ε): From 2009AuZZ, 2003Au03.
^{163}Hf-%ε+%$β^+$ decay: %α<0.0001 (1995Hi12).
Additional information 1.
1982Sc15: ^{142}Nd(^{24}Mg,3n) E=105-133 MeV. He-jet. Measured x-rays, γ′s, γγ-coin, γ(t), and α′s. Identification by cross-bombardment (^{141}Pr(^{24}Mg,X) E=110-130 MeV) and excitation functions.
Others:
1995Hi12: ^{163}Hf produced by ^{135}Ba(^{32}S,xn) E=172 MeV. Measured γ, α. Authors state that the decay scheme proposed by 1982Sc15 is confirmed and %α(measured)<0.0001.
1982Br31 (also 1989Br19,1987Es08,1981Br30): ^{147}Sm(^{20}Ne,4n) E=110, 139 MeV. Chem separation. Measured γ′s and $T_{1/2}$. Identification by ^{163}Lu 163γ.
1981LiZM: Yb(^{3}He,xn). On-line separation; fluoride compounds. Measured x-rays, γ′s, and K x ray(t).

^{163}Lu Levels

E(level)[†]	Jπ[‡]	Comments
0.0	1/2(+)	
17.0	(3/2+)	E(level): level proposed based on (^{29}Si,5nγ) results of 1999Do34, 2002Je05.
62.39[#] *8*	(5/2+)	
124.5[#]	(7/2+)	E(level): order of 62γ-71γ cascade is from 1999Do34 and 2002Je05 in (^{29}Si,5nγ).
195.47[#] *13*	(7/2−)	Jπ: parity is based on the present ordering of 71γ-62γ cascade.
224.64 *17*	(7/2+)	
250.35 *10*	(7/2+)	
280.37? *17*		
691.54 *17*		
715.79 *17*		
730.72 *24*		
883.72 *17*		

[†] The level scheme from 1982Sc15 is now built on the top of the 17.0 level, as proposed in the (^{29}Si,5nγ) study of 1999Do34 and 2002Je05 from the observation of parallel γ rays of 191.0 and 174.0 from a level at 191 keV.
[‡] From Adopted Levels.
[#] Width of prompt peak (FWHM) is <30 ns.

γ(^{163}Lu)

All gammas are observed in coincidence with Lu x-rays and $γ^±$ and, except for the 688.2γ, measured $T_{1/2}$′s are consistent with the mean value of ^{163}Hf ground state $T_{1/2}$. In addition excitation function measured for all γ′s except the three weakest γ rays in the (^{24}Mg,3n) reaction are in agreement with those expected for a three-particle evaporation reaction.

Eγ	Iγ	Ei(level)	$J_i^π$	E_f	$J_f^π$	Mult.[†]	α[‡]	Comments
45.39 *8*	48 *2*	62.39	(5/2+)	17.0	(3/2+)	M1	6.12	α(L)=4.76 *8*; α(M)=1.071 *16*; α(N+..)=0.293 *5* α(N)=0.253 *4*; α(O)=0.0374 *6*; α(P)=0.00230 *4*
62.14 *5*	64 *5*	124.5	(7/2+)	62.39	(5/2+)	M1	2.43	α(L)=1.89 *3*; α(M)=0.426 *6*; α(N+..)=0.1163 *17* α(N)=0.1005 *15*; α(O)=0.01488 *22*; α(P)=0.000917 *13* Iγ: from comparison with Iγ(71γ) in γγ spectrum gated

Continued on next page (footnotes at end of table)

^{163}Hf ε decay (40.0 s) 1982Sc15 (continued)

γ(^{163}Lu) (continued)

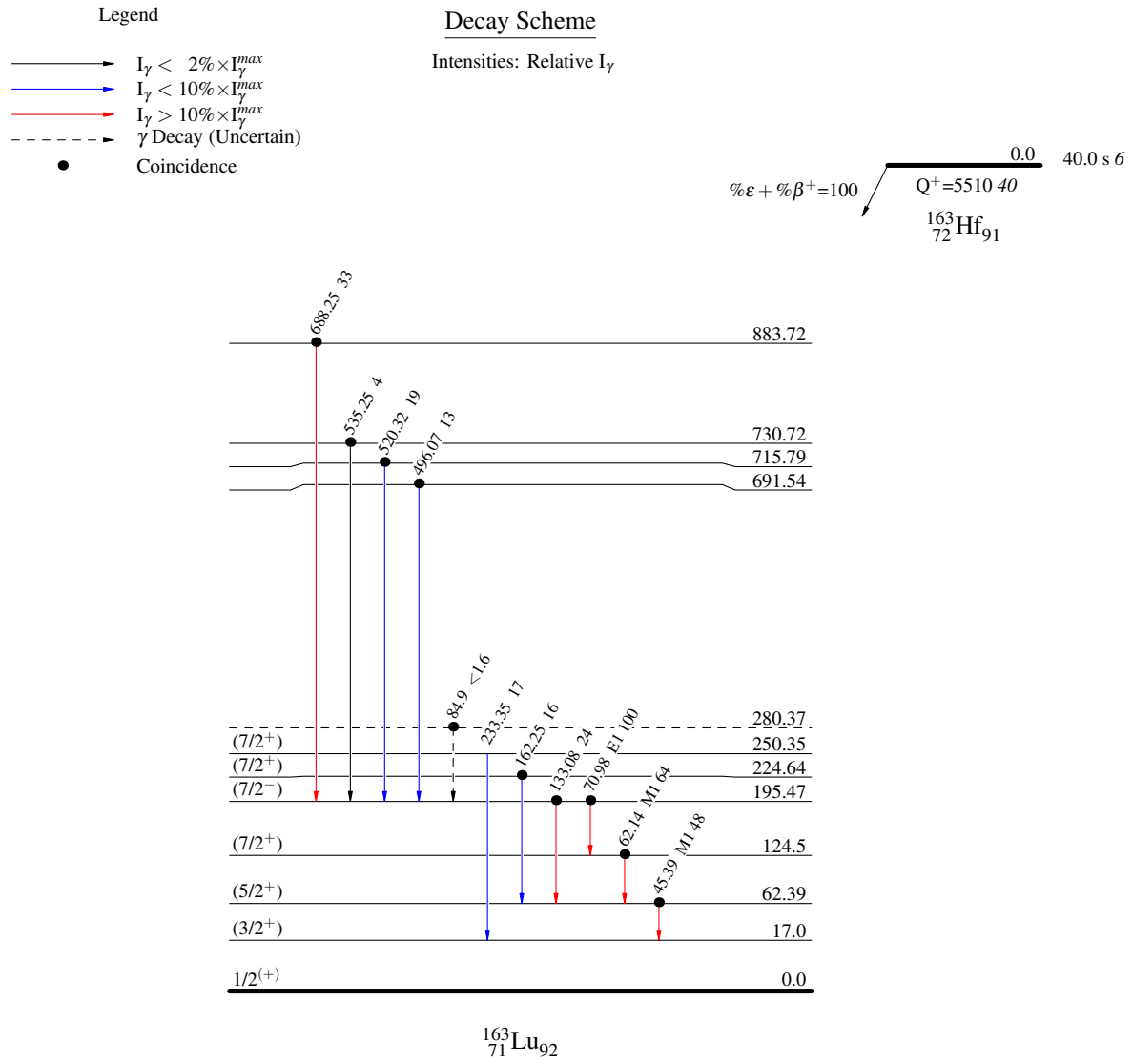
E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[‡]	Comments
								on 45γ.
								Additional information 2.
70.98 *8*	100	195.47	(7/2⁻)	124.5	(7/2⁺)	E1	0.849	α(K)=0.689 *10*; α(L)=0.1244 *18*; α(M)=0.0281 *4*; α(N+..)=0.00736 *11* α(N)=0.00646 *10*; α(O)=0.000861 *13*; α(P)=3.56×10^{-5} *5* Also assigned to ^{163}Hf decay by 1982Br31.
84.9[#] *1*	<1.6	280.37?		195.47	(7/2⁻)			
133.08 *10*	24 *1*	195.47	(7/2⁻)	62.39	(5/2⁺)			
162.25 *15*	16 *1*	224.64	(7/2⁺)	62.39	(5/2⁺)			
233.35 *10*	17 *1*	250.35	(7/2⁺)	17.0	(3/2⁺)			
496.07 *10*	13 *1*	691.54		195.47	(7/2⁻)			
520.32 *10*	19 *1*	715.79		195.47	(7/2⁻)			
535.25 *20*	4 *1*	730.72		195.47	(7/2⁻)			
688.25 *10*	33 *4*	883.72		195.47	(7/2⁻)			

[†] From a comparison of experimental intensity ratios in γγ with the predicted values using α′s (for M1 and E1). Based on width of prompt peak, multipolarities higher than E1, M1, E2 are excluded.

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

[#] Placement of transition in the level scheme is uncertain.

^{163}Hf ε decay (40.0 s) 1982Sc15



^{139}La(^{28}Si,4nγ) 1992Sc03

History

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

Includes reactions ^{122}Sn(^{45}Sc,4nγ); ^{147}Sm(^{19}F,3nγ); ^{148}Sm(^{19}F,4nγ).

1992Sc03, 1992ScZL: ^{139}La(^{28}Si,4nγ) E=150 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$ (DCO) with an array of 12-Compton suppressed Ge detectors and 48 BGO detectors. Cranked shell-model and total-Routhian surface calculations. See 1995Sc39 for theoretical analysis of π1/2[660], large deformation (triaxial superdeformed) band.

1993Sc13, 1992ScZL: ^{147}Sm(^{19}F,3nγ) E=85 MeV. Measured lifetimes by DSAM (Doppler-shift attenuation) and RDDS (recoil-distance Doppler shift) methods. The detector array for the DSAM experiment consisted of 12 Compton-suppressed Ge detectors and 10 BaF_2 detectors. For the RDDS method, the detector array contained 19 Ge detectors and 30 BaF_2 detectors.

Others:

1992Li13: ^{148}Sm(^{19}F,4nγ) E=92 MeV. Measured γ, $\gamma\gamma$ with three Compton-suppressed Ge detectors and two other Ge detectors. Two bands, each with a signature partner, were reported. No γ-ray intensities reported.

1994Ch77, 1990Gr18: ^{122}Sn(^{45}Sc,4nγ) E=192 MeV. Description of a computer code for analysis of 2-dimensional $\gamma\gamma$ data.

Earlier measurements:

1986HoZD: ^{122}Sn(^{45}Sc,4nγ) E=192 MeV. Measured γ, $\gamma\gamma$, $\gamma\gamma(\theta)$ (DCO at 24° and 63°) with an array of five Compton-suppressed Ge detectors and three additional Ge detectors. The inner ball consisted of 72 NaI detectors. γ-ray intensities were not reported. Three bands, two with signature partners, were reported.

1983RoZW: ^{148}Sm(^{19}F,4nγ) E=80-105 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, excitation functions. One band with a signature partner reported.

1983WaZO: ^{148}Sm(^{19}F,4nγ). Measured γ, $\gamma\gamma$ with an array of five Ge detectors and a multiplicity filter of NaI detectors. Evidence for $h_{11/2}$ band (to 47/2$^-$) and $g_{7/2}$ band found. Details of this study are not available.

^{163}Lu Levels

The present level scheme is from 1992Sc03 with modifications as suggested by 2002Je05 (also 1999Do34). See also 1992Li13 and 1993Sc13. The detailed results from 2002Je05 and 1999Do34 are given in a separate ^{139}La(^{29}Si,5nγ) data set.

E(level)[†]	J$^\pi$[#]	T$_{1/2}$[‡]	Comments
0.0[j]	1/2$^+$[c]		
16.8[dk] 3	3/2$^+$[c]		Additional information 1.
62.19 8	5/2$^+$		
124.32[g] 10	7/2$^+$		
190.7[j] 8	5/2$^+$[c]		
195.29[i] 11	7/2$^-$		
210.2[h] 3	9/2$^-$		
223.8 6	7/2$^+$		
249.4[k] 5	7/2$^+$[c]		
294.8[i] 4	11/2$^-$		
310.51[f] 25	9/2$^+$		
491.3[h] 4	13/2$^-$		
520.3[j] 9	9/2$^+$[c]		
520.41[g] 25	11/2$^+$		
620.0[k] 6	11/2$^+$[c]		
643.8[i] 4	15/2$^-$	5.6[&] ps +6−11	
754.5[f] 3	13/2$^+$		
936.3[h] 5	17/2$^-$	1.4[&] ps +8−7	
967.3[j] 10	13/2$^+$[c]		
1007.7[g] 3	15/2$^+$		

Continued on next page (footnotes at end of table)

^{139}La(^{28}Si,4nγ) 1992Sc03 (continued)

^{163}Lu Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$[‡]
1105.7[k] 8	15/2+[c]	
1114.4[i] 5	19/2−	1.9[&] ps +2−4
1281.9[f] 4	17/2+	
1484.6[h] 5	21/2−	0.9[&] ps 3
1501.2[j] 11	17/2+[c]	
1561.1[g] 4	19/2+	
1668.5[k] 9	19/2+[c]	
1676.0[i] 4	23/2−	1.0[&] ps +2−3
1738.3[l] 13	(13/2+)	
1866.7[f] 4	21/2+	
1935.0[l] 13	(17/2+)	
2102.6[h] 5	25/2−	
2138.6[g] 4	23/2+	
2199.0[el] 12	(21/2+)	
2275.4[j] 11	23/2+[c]	
2305.9[i] 5	27/2−	1.2[&] ps +3−5
2399.1[f] 4	25/2+	
2513.7[l] 12	(25/2+)	3.3[a] ps +7−5
2613.3[g] 5	27/2+	
2746.2[h] 5	29/2−	
2802.3[f] 5	29/2+	
2853.5 9	(29/2−)	
2899.7[l] 12	(29/2+)	2.3[a] ps +5−4
2923.2[i] 6	31/2−	
3002.7[g] 5	31/2+	
3020.0 8	(31/2−)	
3121.6[h] 6	33/2−	
3243.8[f] 5	33/2+	
3318.7[i] 6	35/2−	4.2[&] ps +5−6
3349.7[l] 13	(33/2+)	0.9[a] ps +5−3
3482.4[g] 5	35/2+	
3549.6[h] 6	37/2−	
3788.2[f] 6	37/2+	
3820.3[i] 7	39/2−	
3864.6[l] 13	(37/2+)	0.31 ps +14−11
4066.6[g] 6	39/2+	
4101.4[h] 7	41/2−	
4403.9[f] 6	41/2+	
4428.8[i] 7	43/2−	
4442.7[l] 13	(41/2+)	0.15 ps +6−5
4717.4[g] 7	43/2+	
4757.8[h] 7	45/2−	
5055.0[f] 7	45/2+	
5081.4[l] 14	(45/2+)	0.10 ps +4−3
5129.0[i] 7	47/2−	0.15[@] ps 5
5385.6[g] 7	47/2+	
5502.0[h] 7	49/2−	0.11[@] ps +5−3
5717.1[f] 7	49/2+	
5778.4[l] 14	(49/2+)	0.08 ps +4−3
5913.4[i] 8	51/2−	0.12[@] ps +3−6
6062.4[g] 7	51/2+	
6330.3[h] 8	53/2−	0.09[@] ps +6−4
6412.3[f] 7	53/2+	
6530.4[l] 14	(53/2+)	0.055 ps +21−28
6785.7[i] 8	55/2−	
6785.9[g] 8	55/2+	
7171.5[f] 8	57/2+	
7243.4[h] 8	57/2−	
7335.6[l] 15	(57/2+)	0.04 ps 3
7581.5[g] 8	59/2+	
7725.3[i] 9	59/2−	
8008.8[f] 8	61/2+	
8193.3[l] 15	(61/2+)	0.034[@] ps +35−33
8219.1[h] 9	61/2−	
8457.0[g] 8	63/2+	
8924.4[f] 9	65/2+	
9101.7[l] 16	(65/2+)	
9405.6[g] 9	67/2+	
9914.7[f] 9	69/2+	
10063.6[l] 17	(69/2+)	
10423.8[g] 9	71/2+	
10976.8[f] 10	73/2+	
11500.7[g] 10	75/2+	
12094.2[f] 14	77/2+	
12621.6[g] 14	79/2+	
13254.6?[bf] 17	81/2+	
14480.0?[bf] 20	85/2+	

[†] From least-squares fit to Eγ′s. Note that the lowest state in 1992Sc03 is now placed at 17.0 keV by 2002Je05. The level scheme given by 1992Sc03 is modified in accordance with results from 2002Je05. This results in shifting the energies of the low-lying levels upwards by ≈17 keV, moving lower by ≈54 keV the positions of the π7/2[404] and π7/2[523] band members, and the lowest γ at 264 in SD band from 1484, (17/2+) to 1220, (13/2+) (1992Sc03) is now placed from a 2200, 21/2+ to 1936, 17/2+ level (2002Je05,1999Do34). Thus all the higher members of the SD band as shown by 1992Sc03 are pushed up in energy by ≈715 keV and in spin by two units.

Continued on next page (footnotes at end of table)

^{139}La(^{28}Si,4nγ) 1992Sc03 (continued)

^{163}Lu Levels (continued)

‡ From DSAM (1993Sc13,1992ScZL), unless otherwise stated.
# The assignments are as proposed by 1992Sc03, based on $\gamma\gamma(\theta)$ (DCO) data and associated band structures. It is assumed that multipolarities are M1(+E2) for $\Delta J=1$ and E2 for $\Delta J=2$ transitions.
@ From DSAM (1992ScZL).
& From RDDS (1992ScZL).
a From RDDS (1993Sc13,1992ScZL).
b Level proposed by 1992Sc03 in the $\pi 7/2[404]$ band is considered as uncertain since it is not given in the high-statistics experiment of 2002Je05 and 2004Je03. The level is not included in the 'Adopted Levels'.
c From 2002Je05.
d From ^{139}La(^{29}Si,5nγ).
e A 533.9γ from this level proposed by 1992Sc03 is now placed from 1500 level (2002Je05).
f Band(A): $\pi 7/2[404]$ band, $\alpha=+1/2$. Strongly coupled proton band (1992Sc03).
g Band(B): $\pi 7/2[404]$ band, $\alpha=-1/2$. Strongly coupled proton band (1992Sc03).
h Band(C): $\pi 7/2[523]$ band, $\alpha=+1/2$. Strongly coupled proton band (1993Sc13). Of the two possible choices (1992Sc03) of $\pi 7/2[523]$ 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.
i Band(D): $\pi 7/2[523]$ band, $\alpha=-1/2$. Strongly coupled proton band (1993Sc13). See comments on signature partner of this band.
j Band(E): $\pi 1/2[411]$ band, $\alpha=+1/2$. Band adopted from 2002Je05, 1999Do34.
k Band(e): $\pi 1/2[411]$ band, $\alpha=-1/2$.
l Band(F): Triaxial SD-1 band (1995Sc39,1992Sc03). The lowest γ at 264 in SD-1 band from 1484, $(17/2^+)$ to 1220, $(13/2^+)$ (1992Sc03) is now placed from a 2200, $21/2^+$ to 1936, $17/2^+$ level (2002Je05,1999Do34). Thus all the higher members of the SD-1 band as shown by 1992Sc03 are pushed up in energy by ≈715 keV and in spin by two units. Configuration=$\pi i_{13/2}$, 1/2[660], $\alpha=+1/2$. $\beta_2\approx 0.42$ (1993Sc13,1992Sc03); $Q_t=10.7$ *7* (1993Sc13, lifetime data). This value is about twice as large as that for other deformed bands for ^{163}Lu and in this mass region. See 1995Sc39 for discussion of this band and for a detailed comparison with population of a similar 1/2[660] large deformation (triaxial superdeformed) band in ^{165}Lu.

$\gamma(^{163}Lu)$

DCO ratios (1992Sc03) refer to Iγ(30°)/Iγ (90°), where Iγ(30°) is intensity along the 30° axis (in 30° x 90° $\gamma\gamma$ matrix) when gates are set on stretched $\Delta J=2$ transitions on the 90° axis. Iγ(90°) is the intensity on the 90° axis while the gates are set on stretched $\Delta J=2$ transitions on the 30° axis. DCO ratio is ≈1.0 for stretched $\Delta J=2$ (E2) and ≈0.7 for $\Delta J=1$, dipole transitions.

Intensities in ^{148}Sm(^{19}F,4nγ) (1983RoZW)

Eγ	Iγ		Eγ	Iγ	
132.90 *15*	35 *4*		349.3 *1*	105 *5*	
152.70 *15*	74 *8*		370.6 *1*	71 *7*	
177.00 *15*			396.10 *15*	71 *7*	
177.80 *15*	61 *6*		426.90 *15*	32 *3*	
180.00 *15*	13 *2*		440.90 *15*	21 *2*	
191.50 *15*	28 *3*		445.10 *15*	99 *5*	
196.80 *15*	242 *12*	b	470.8 *1*	168 *8*	
198.80 *15*	69 *7*	b	501.90 *15*	15 *2*	
203.00 *15*	47 *5*	a	548.20 *15*	44 *5*	
231.0 *1*	47 *5*		562.1 *1*	180 *9*	
270.9 *1*	37 *4*		609.10 *15*	26 *3*	
281.50 *15*	53 *6*		617.8 *1*	131 *7*	
292.8 *1*	81 *4*		618.00 *15*	14 *2*	
327.70 *15*	18 *2*		630.2 *1*	146 *10*	a
329.10 *15*	12 *1*		644.10 *15*	39 *4*	

a: possible contamination from ^{163}Yb
b: intensity is uncertain due to ^{19}F line

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
45.39[#] *8*		62.19	$5/2^+$	16.8	$3/2^+$		Placement based on the proposed 16.8 level as the first excited state (1999Do34,2002Je05).
62.14[#] *5*		124.32	$7/2^+$	62.19	$5/2^+$		
70.98[#] *8*		195.29	$7/2^-$	124.32	$7/2^+$		
84.5 *5*	17 *8*	294.8	$11/2^-$	210.2	$9/2^-$		
85.9[b]		210.2	$9/2^-$	124.32	$7/2^+$		
101.6 *10*	<4	3121.6	$33/2^-$	3020.0	$(31/2^-)$		
133.08[#] *10*		195.29	$7/2^-$	62.19	$5/2^+$		
152.5 *3*	38 *3*	643.8	$15/2^-$	491.3	$13/2^-$	(D)[&]	R(DCO)=0.80 *18*. δ(Q/D)=+0.22 *1* (1983RoZW).
161.9 *10*	<2.0	223.8	$7/2^+$	62.19	$5/2^+$		
173.8 *10*	<1.0	190.7	$5/2^+$	16.8	$3/2^+$		
177.0 *3*	13.5 *20*	2923.2	$31/2^-$	2746.2	$29/2^-$	(D)[&]	R(DCO)=0.74 *20*.
178.1 *3*	23 *4*	1114.4	$19/2^-$	936.3	$17/2^-$	D[&]	R(DCO)=0.74 *20*. δ(Q/D)=+0.15 *2* (1983RoZW).
186.2 *3*	42.0 *25*	310.51	$9/2^+$	124.32	$7/2^+$		
189.0 *3*	17.4 *11*	2802.3	$29/2^+$	2613.3	$27/2^+$		
191.4 *3*	14.0 *15*	1676.0	$23/2^-$	1484.6	$21/2^-$	(D+Q)[&]	R(DCO)=0.86 *18*. δ(Q/D)=+0.18 *9* (1983RoZW).
196.5 *3*	36.2 *20*	491.3	$13/2^-$	294.8	$11/2^-$	(D)[&]	R(DCO)=0.76 *20*. δ(Q/D)=+0.03 *2* (1983RoZW).
196.7[b]		1935.0	$(17/2^+)$	1738.3	$(13/2^+)$		
197.1 *5*	61 *22*	3318.7	$35/2^-$	3121.6	$33/2^-$	(D)[&]	R(DCO)=0.76 *20*.
198.4 *5*	42 *15*	3121.6	$33/2^-$	2923.2	$31/2^-$	(D)[&]	R(DCO)=0.76 *20*.
200.4 *3*	15.6 *8*	3002.7	$31/2^+$	2802.3	$29/2^+$		
203.3 *3*	8.0 *10*	2305.9	$27/2^-$	2102.6	$25/2^-$	(D+Q)	Mult.: $\Delta J=1$, D+Q transition from $\gamma(\theta)$ (1983RoZW). δ(Q/D)=+0.30 *8* (1983RoZW).
209.9 *3*	13.3 *10*	520.41	$11/2^+$	310.51	$9/2^+$		
214.1 *3*	17.2 *9*	2613.3	$27/2^+$	2399.1	$25/2^+$		
230.9 *3*	48.4 *20*	3549.6	$37/2^-$	3318.7	$35/2^-$	(D)[&]	R(DCO)=0.71 *18*. δ(Q/D)=+0.25 *5* (1983RoZW).
232.6 *5*	5 *3*	249.4	$7/2^+$	16.8	$3/2^+$		
234.1 *3*	6.4 *12*	754.5	$13/2^+$	520.41	$11/2^+$		
238.6 *3*	10.8 *7*	3482.4	$35/2^+$	3243.8	$33/2^+$		
241.1 *3*	11.3 *10*	3243.8	$33/2^+$	3002.7	$31/2^+$		
253.2 *3*	8.0 *13*	1007.7	$15/2^+$	754.5	$13/2^+$		
260.6 *3*	15.4 *15*	2399.1	$25/2^+$	2138.6	$23/2^+$		
264.0 *5*	3.0 *10*	2199.0	$(21/2^+)$	1935.0	$(17/2^+)$		
268.1 *10*	<4	3121.6	$33/2^-$	2853.5	$(29/2^-)$		
270.7 *3*	34.5 *15*	3820.3	$39/2^-$	3549.6	$37/2^-$	(D)[&]	R(DCO)=0.80 *15*. δ(Q/D)=+0.22 *3* (1983RoZW).
271.9 *3*	3.7 *5*	2138.6	$23/2^+$	1866.7	$21/2^+$		
274.2 *3*	4.6 *9*	1281.9	$17/2^+$	1007.7	$15/2^+$		
278.3 *5*	<12	4066.6	$39/2^+$	3788.2	$37/2^+$		
279.2 *5*	3.0 *6*	1561.1	$19/2^+$	1281.9	$17/2^+$		
281.0 *5*	10.5 *15*	491.3	$13/2^-$	210.2	$9/2^-$	(Q)[@]	R(DCO)=0.92 *13*.
281.1 *5*	33 *4*	4101.4	$41/2^-$	3820.3	$39/2^-$	(D)[&]	R(DCO)=0.92 *13*.
292.5 *3*	43.0 *15*	936.3	$17/2^-$	643.8	$15/2^-$	D[&]	R(DCO)=0.99 *24*. δ(Q/D)=+0.03 *1* (1983RoZW).
296.5 *10*	<2.0	520.3	$9/2^+$	223.8	$7/2^+$		
298.7 *10*	<4	3318.7	$35/2^-$	3020.0	$(31/2^-)$		
305.6 *5*	7.7 *15*	1866.7	$21/2^+$	1561.1	$19/2^+$		

Continued on next page (footnotes at end of table)

^{139}La(^{28}Si,4nγ) 1992Sc03 (continued)

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

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
305.9 *5*	8.0 *20*	3788.2	37/2$^+$	3482.4	35/2$^+$		
313.7 *3*	6.9 *8*	4717.4	43/2$^+$	4403.9	41/2$^+$		
314.7 *3*	8.1 *9*	2513.7	(25/2$^+$)	2199.0	(21/2$^+$)		
327.4 *5*	12 *4*	4428.8	43/2$^-$	4101.4	41/2$^-$	(D)[&]	R(DCO)=0.80 *18*.
329.0 *5*	11.5 *12*	4757.8	45/2$^-$	4428.8	43/2$^-$	[&]	R(DCO)=0.80 *18*.
329.6 *5*	2.5 *15*	520.3	9/2$^+$	190.7	5/2$^+$		
330.5 *5*	6.0 *20*	5385.6	47/2$^+$	5055.0	45/2$^+$		
331.5 *5*	5.5 *20*	5717.1	49/2$^+$	5385.6	47/2$^+$		
337.4 *5*	7.9 *10*	4403.9	41/2$^+$	4066.6	39/2$^+$		
337.7 *5*	7.0 *10*	5055.0	45/2$^+$	4717.4	43/2$^+$		
345.3 *3*	6.1 *5*	6062.4	51/2$^+$	5717.1	49/2$^+$		
349.0 *3*	60.0 *20*	643.8	15/2$^-$	294.8	11/2$^-$	(E2)[@]	R(DCO)=0.82 *17*.
349.9 *3*	3.8 *7*	6412.3	53/2$^+$	6062.4	51/2$^+$		
370.2 *3*	24.2 *25*	1484.6	21/2$^-$	1114.4	19/2$^-$	(D)[&]	R(DCO)=0.82 *18*. δ(Q/D)=+0.05 *3* (1983RoZW).
370.5 *5*	5 *3*	620.0	11/2$^+$	249.4	7/2$^+$		
371.2 *3*	10.9 *25*	5129.0	47/2$^-$	4757.8	45/2$^-$		
373.0 *3*	9.0 *20*	5502.0	49/2$^-$	5129.0	47/2$^-$		
373.6 *3*	6.3 *5*	6785.9	55/2$^+$	6412.3	53/2$^+$		
375.4 *5*	8 *3*	3121.6	33/2$^-$	2746.2	29/2$^-$		
385.6 *3*	3.5 *3*	7171.5	57/2$^+$	6785.9	55/2$^+$		
386.0 *3*	9.5 *10*	2899.7	(29/2$^+$)	2513.7	(25/2$^+$)		
389.4 *3*	8.6 *5*	3002.7	31/2$^+$	2613.3	27/2$^+$		
395.5 *5*	12 *4*	3318.7	35/2$^-$	2923.2	31/2$^-$		
396.1 *3*	22.1 *20*	520.41	11/2$^+$	124.32	7/2$^+$	(Q)	Mult.: ΔJ=2, Q from $\gamma(\theta)$ (1983RoZW).
396.2 *5*	<2	620.0	11/2$^+$	223.8	7/2$^+$		
403.1 *3*	14.0 *12*	2802.3	29/2$^+$	2399.1	25/2$^+$		
410.1 *3*	7.1 *10*	7581.5	59/2$^+$	7171.5	57/2$^+$		
411.4 *3*	10.4 *12*	5913.4	51/2$^-$	5502.0	49/2$^-$		
416.9 *3*	9.5 *12*	6330.3	53/2$^-$	5913.4	51/2$^-$		
426.6 *3*	19 *3*	2102.6	25/2$^-$	1676.0	23/2$^-$	(D)	Mult.: ΔJ=1, D(+Q) transition from $\gamma(\theta)$ (1983RoZW). δ(Q/D)=+0.07 *5* (1983RoZW).
427.3 *3*	4.8 *5*	8008.8	61/2$^+$	7581.5	59/2$^+$		
428.0 *3*	18.0 *22*	3549.6	37/2$^-$	3121.6	33/2$^-$		
440.3 *3*	14 *4*	2746.2	29/2$^-$	2305.9	27/2$^-$	(D)	Mult.: ΔJ=1, D(+Q) transition from $\gamma(\theta)$ (1983RoZW). δ(Q/D)=−0.01 *13* (1983RoZW).
441.5 *3*	13.0 *20*	3243.8	33/2$^+$	2802.3	29/2$^+$		
444.0 *3*	23.7 *20*	754.5	13/2$^+$	310.51	9/2$^+$		
445.0 *3*	39.0 *16*	936.3	17/2$^-$	491.3	13/2$^-$		
447.0 *5*	3.5 *10*	967.3	13/2$^+$	520.3	9/2$^+$		
448.2 *5*	2.0 *10*	8457.0	63/2$^+$	8008.8	61/2$^+$		
450.0 *3*	9.5 *12*	3349.7	(33/2$^+$)	2899.7	(29/2$^+$)		
470.6 *3*	100.0 *20*	1114.4	19/2$^-$	643.8	15/2$^-$	E2[@]	R(DCO)=1.16 *12*.
474.7 *3*	10.3 *8*	2613.3	27/2$^+$	2138.6	23/2$^+$		
479.7 *3*	12.3 *6*	3482.4	35/2$^+$	3002.7	31/2$^+$		
485.7 *5*	6.0 *25*	1105.7	15/2$^+$	620.0	11/2$^+$		
487.3 *3*	23 *3*	1007.7	15/2$^+$	520.41	11/2$^+$		
x492[a]							
501.6 *3*	24.2 *20*	3820.3	39/2$^-$	3318.7	35/2$^-$	(Q)[@]	R(DCO)=0.94 *11*.
514.9 *3*	10.0 *10*	3864.6	(37/2$^+$)	3349.7	(33/2$^+$)		
527.4 *3*	18.8 *19*	1281.9	17/2$^+$	754.5	13/2$^+$		
532.5 *3*	6.5 *6*	2399.1	25/2$^+$	1866.7	21/2$^+$		
533.9 *5*	5.0 *15*	1501.2	17/2$^+$	967.3	13/2$^+$		Placement from 2002Je05.
544.5 *3*	11.4 *10*	3788.2	37/2$^+$	3243.8	33/2$^+$		

Continued on next page (footnotes at end of table)

^{139}La(^{28}Si,4nγ) 1992Sc03 (continued)

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

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
548.3 *3*	26 *3*	1484.6	21/2$^-$	936.3	17/2$^-$	(E2)	Mult.: ΔJ=2, Q from $\gamma(\theta)$ (1983RoZW).
551.8 *3*	30.0 *25*	4101.4	41/2$^-$	3549.6	37/2$^-$	(Q)[@]	R(DCO)=0.82 *21*.
553.4 *3*	23.2 *15*	1561.1	19/2$^+$	1007.7	15/2$^+$		
561.6 *3*	105.9 *22*	1676.0	23/2$^-$	1114.4	19/2$^-$	E2[@]	R(DCO)=1.01 *11*.
562.8 *5*	4.0 *20*	1668.5	19/2$^+$	1105.7	15/2$^+$		
577.5 *3*	20.1 *18*	2138.6	23/2$^+$	1561.1	19/2$^+$		
x578[a]							
578.1 *3*	10.5 *10*	4442.7	(41/2$^+$)	3864.6	(37/2$^+$)		
584.2 *5*	<15	4066.6	39/2$^+$	3482.4	35/2$^+$		
584.8 *5*	25 *3*	1866.7	21/2$^+$	1281.9	17/2$^+$		
606.9 *5*	3.5 *23*	2275.4	23/2$^+$	1668.5	19/2$^+$		
608.5 *5*	17 *4*	4428.8	43/2$^-$	3820.3	39/2$^-$	Q[@]	R(DCO)=1.16 *14*.
615.7 *3*	11.0 *15*	4403.9	41/2$^+$	3788.2	37/2$^+$		
617.3 *5*	90 *15*	2923.2	31/2$^-$	2305.9	27/2$^-$	Q[@]	R(DCO)=0.95 *10*.
618.0 *5*	24 *4*	2102.6	25/2$^-$	1484.6	21/2$^-$	Q[@]	R(DCO)=0.95 *10*.
629.9 *3*	86.3 *22*	2305.9	27/2$^-$	1676.0	23/2$^-$	E2[@]	R(DCO)=1.21 *10*.
638.7 *3*	9.5 *10*	5081.4	(45/2$^+$)	4442.7	(41/2$^+$)		
643.6 *3*	23.9 *12*	2746.2	29/2$^-$	2102.6	25/2$^-$	(Q)[@]	R(DCO)=1.0 *3*.
650.6 *5*	15 *4*	4717.4	43/2$^+$	4066.6	39/2$^+$		
650.9 *5*	15 *4*	5055.0	45/2$^+$	4403.9	41/2$^+$		
656.4 *3*	17.6 *15*	4757.8	45/2$^-$	4101.4	41/2$^-$	[@]	R(DCO)=1.0 *3*.
662.0 *3*	10.8 *11*	5717.1	49/2$^+$	5055.0	45/2$^+$		
668.2 *3*	11.1 *12*	5385.6	47/2$^+$	4717.4	43/2$^+$		
676.8 *3*	10.3 *6*	6062.4	51/2$^+$	5385.6	47/2$^+$		
695.2 *3*	10.2 *9*	6412.3	53/2$^+$	5717.1	49/2$^+$		
697.0 *3*	9.0 *10*	5778.4	(49/2$^+$)	5081.4	(45/2$^+$)		
697.8[b]		2199.0	(21/2$^+$)	1501.2	17/2$^+$		
700.2 *3*	15.2 *20*	5129.0	47/2$^-$	4428.8	43/2$^-$		
714.1 *10*	<4	3020.0	(31/2$^-$)	2305.9	27/2$^-$		
723.1 *3*	9.0 *10*	2399.1	25/2$^+$	1676.0	23/2$^-$	D[&]	R(DCO)=0.58 *22*.
723.5 *5*	5.5 *20*	6785.9	55/2$^+$	6062.4	51/2$^+$		
744.2 *3*	22 *3*	5502.0	49/2$^-$	4757.8	45/2$^-$		
750.9 *10*	<4	2853.5	(29/2$^-$)	2102.6	25/2$^-$		
752.0 *3*	7.0 *8*	6530.4	(53/2$^+$)	5778.4	(49/2$^+$)		
759.2 *3*	8.6 *6*	7171.5	57/2$^+$	6412.3	53/2$^+$		
784.5 *3*	14.3 *15*	5913.4	51/2$^-$	5129.0	47/2$^-$		
795.7 *3*	7.0 *6*	7581.5	59/2$^+$	6785.9	55/2$^+$		
805.2 *3*	5.2 *6*	7335.6	(57/2$^+$)	6530.4	(53/2$^+$)		
828.3 *3*	16.0 *18*	6330.3	53/2$^-$	5502.0	49/2$^-$		
837.3 *3*	8.5 *8*	8008.8	61/2$^+$	7171.5	57/2$^+$		
857.7 *3*	3.3 *5*	8193.3	(61/2$^+$)	7335.6	(57/2$^+$)		
872.2 *3*	11.9 *10*	6785.7	55/2$^-$	5913.4	51/2$^-$		
875.5 *3*	8.6 *10*	8457.0	63/2$^+$	7581.5	59/2$^+$		
908.4 *5*	1.4 *8*	9101.7	(65/2$^+$)	8193.3	(61/2$^+$)		
913.1 *3*	9.8 *10*	7243.4	57/2$^-$	6330.3	53/2$^-$		
915.6 *3*	4.0 *5*	8924.4	65/2$^+$	8008.8	61/2$^+$		
939.6 *3*	10.0 *17*	7725.3	59/2$^-$	6785.7	55/2$^-$		
948.6 *3*	5.0 *5*	9405.6	67/2$^+$	8457.0	63/2$^+$		
961.9 *5*	2.6 *10*	10063.6	(69/2$^+$)	9101.7	(65/2$^+$)		
975.7 *3*	7.0 *8*	8219.1	61/2$^-$	7243.4	57/2$^-$		
990.3 *3*	4.1 *4*	9914.7	69/2$^+$	8924.4	65/2$^+$		
1018.2 *3*	2.7 *5*	10423.8	71/2$^+$	9405.6	67/2$^+$		
1062.1 *3*	3.3 *4*	10976.8	73/2$^+$	9914.7	69/2$^+$		

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^{139}La(^{28}Si,4nγ) 1992Sc03 (continued)

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

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π
1076.9 *3*	4.1 *7*	11500.7	$75/2^+$	10423.8	$71/2^+$
1117.4 *10*	1.5 *15*	12094.2	$77/2^+$	10976.8	$73/2^+$
1120.8 *10*	1.5 *15*	12621.6	$79/2^+$	11500.7	$75/2^+$
1160.4 *10*	2.0 *15*	13254.6?	$81/2^+$	12094.2	$77/2^+$
1225.4 *10*		14480.0?	$85/2^+$	13254.6?	$81/2^+$

[†] Uncertainties are 0.3 for strong and well resolved lines, 0.5 for doublets and when intensity uncertainty is ≥25%, and 1.0 for weak or uncertain lines.
[‡] Uncertainties are 5-10%, but a few intense Iγ′s (230.9γ, 292.5γ, 349.0γ, 445.0γ, 470.6γ, 561.6γ, 629.9γ) are quoted (1992Sc03) with 2-4% uncertainty.
[#] From Adopted Gammas.
[@] DCO ratio is consistent with ΔJ=2 (E2).
[&] DCO ratio is consistent with ΔJ=1 (dipole), but ΔJ=2 does not seem to be ruled out by the quoted R(DCO).
[a] A possible 492-578 cascade proposed by 1992Sc03 above the 486-563-607 cascade is given in the level scheme of 2002Je05 also, but higher up in the 1/2[411] band.
[b] From 2002Je05.
[x] γ ray not placed in level scheme.

^{139}La(^{28}Si,4nγ) 1992Sc03

Level Scheme

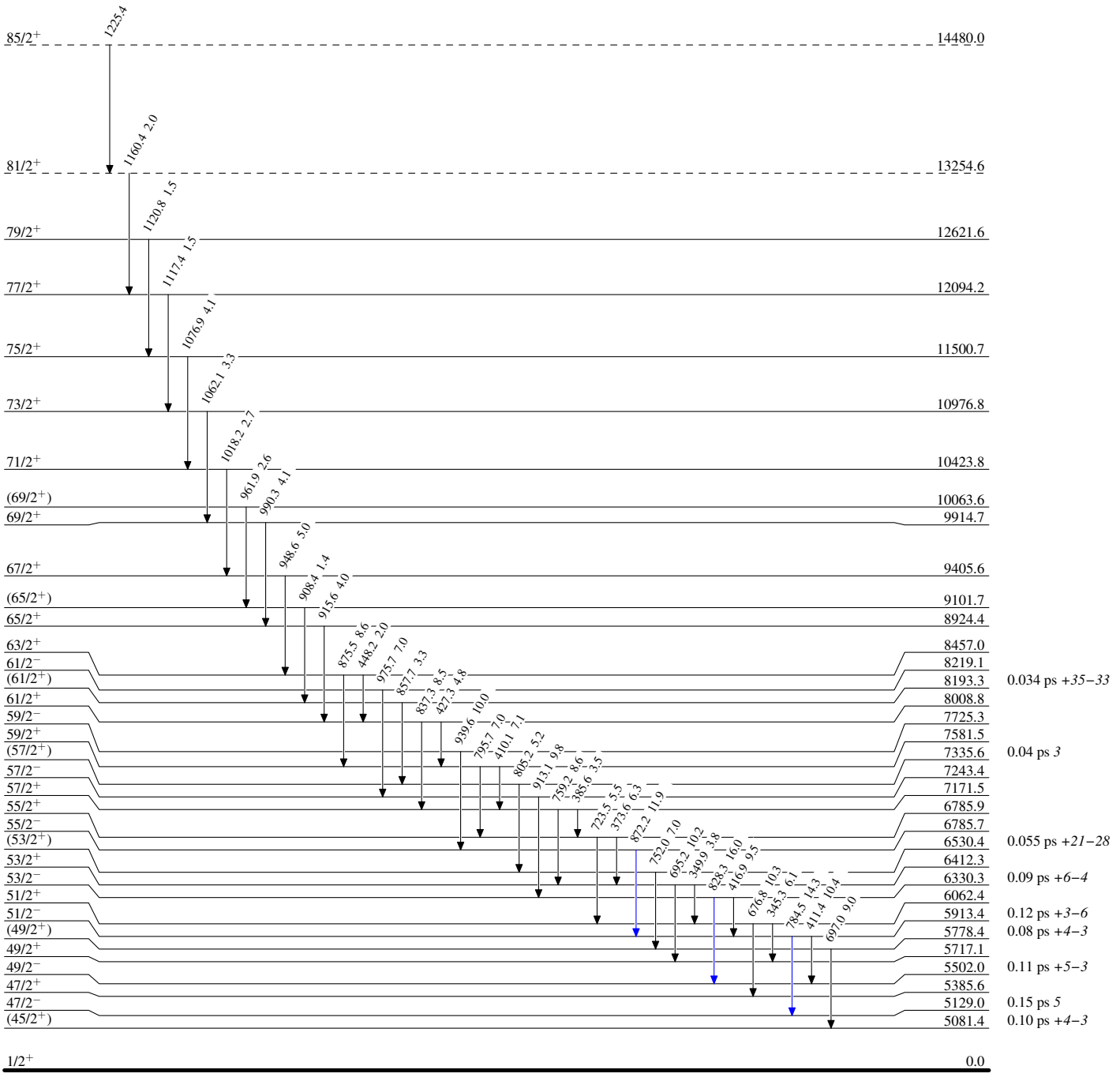
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



$^{163}_{71}Lu_{92}$

^{139}La(^{28}Si,4nγ) 1992Sc03

Level Scheme (continued)

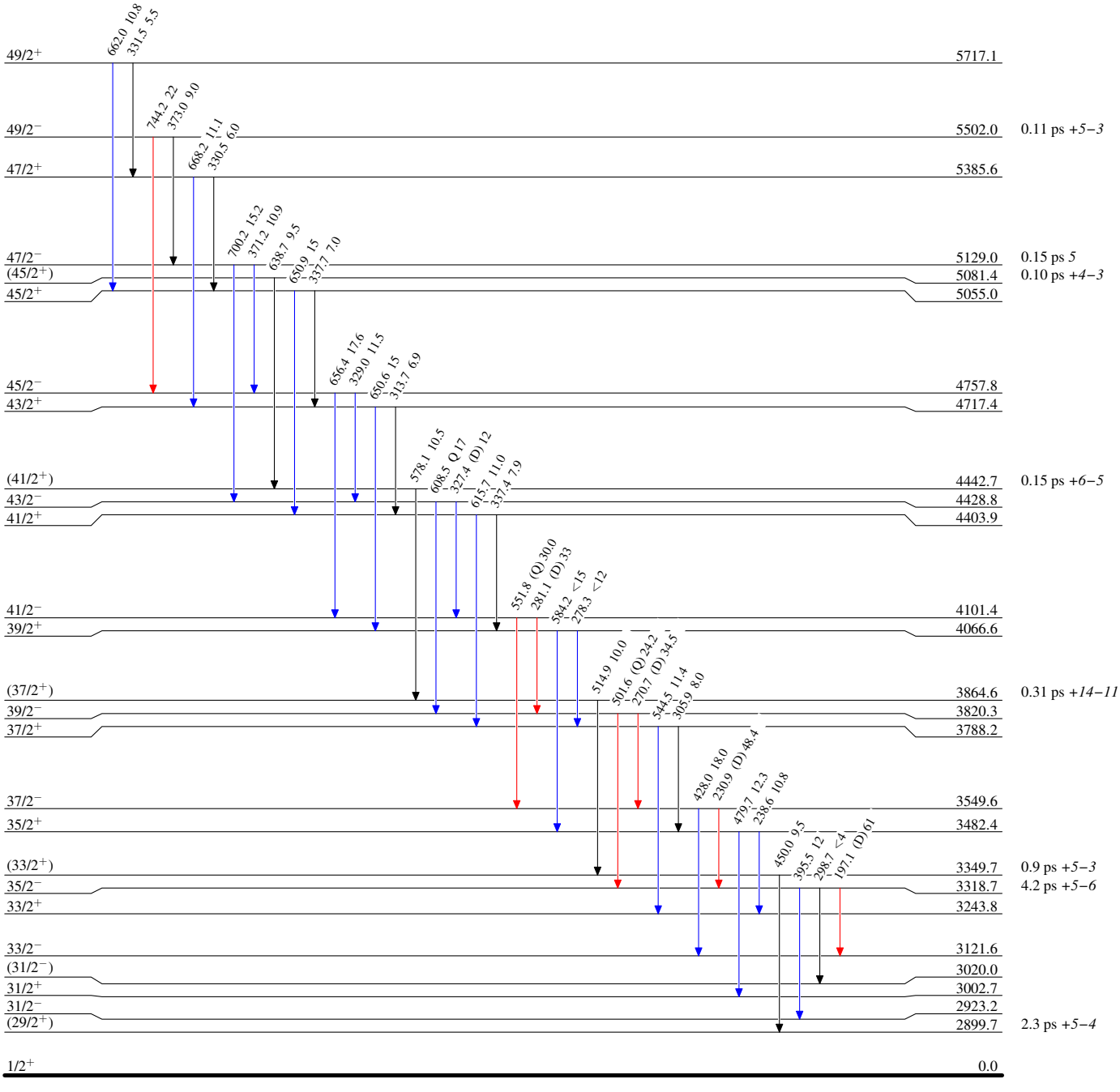
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



$^{163}_{71}Lu_{92}$

^{139}La(^{28}Si,4nγ) 1992Sc03

Level Scheme (continued)

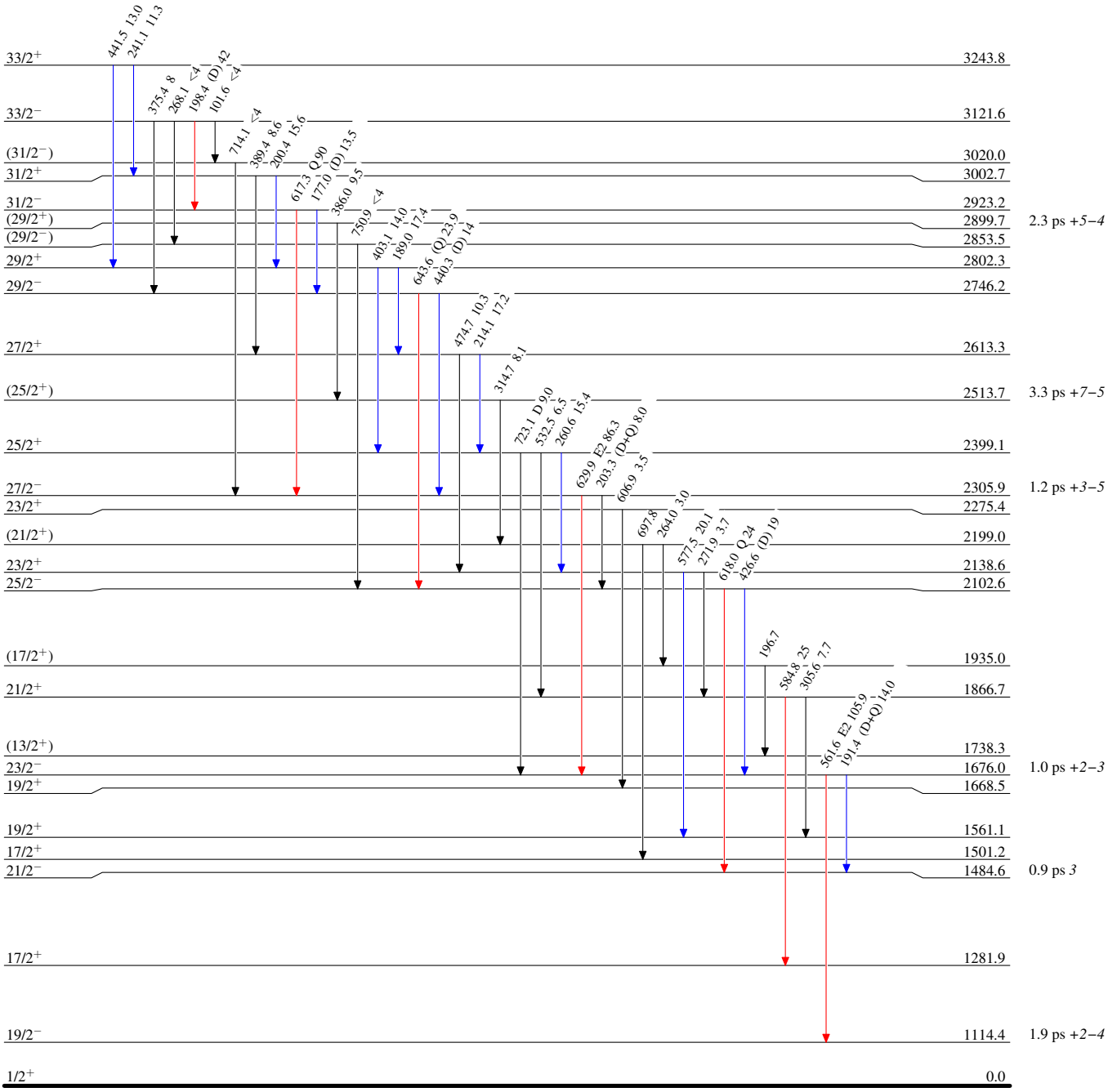
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

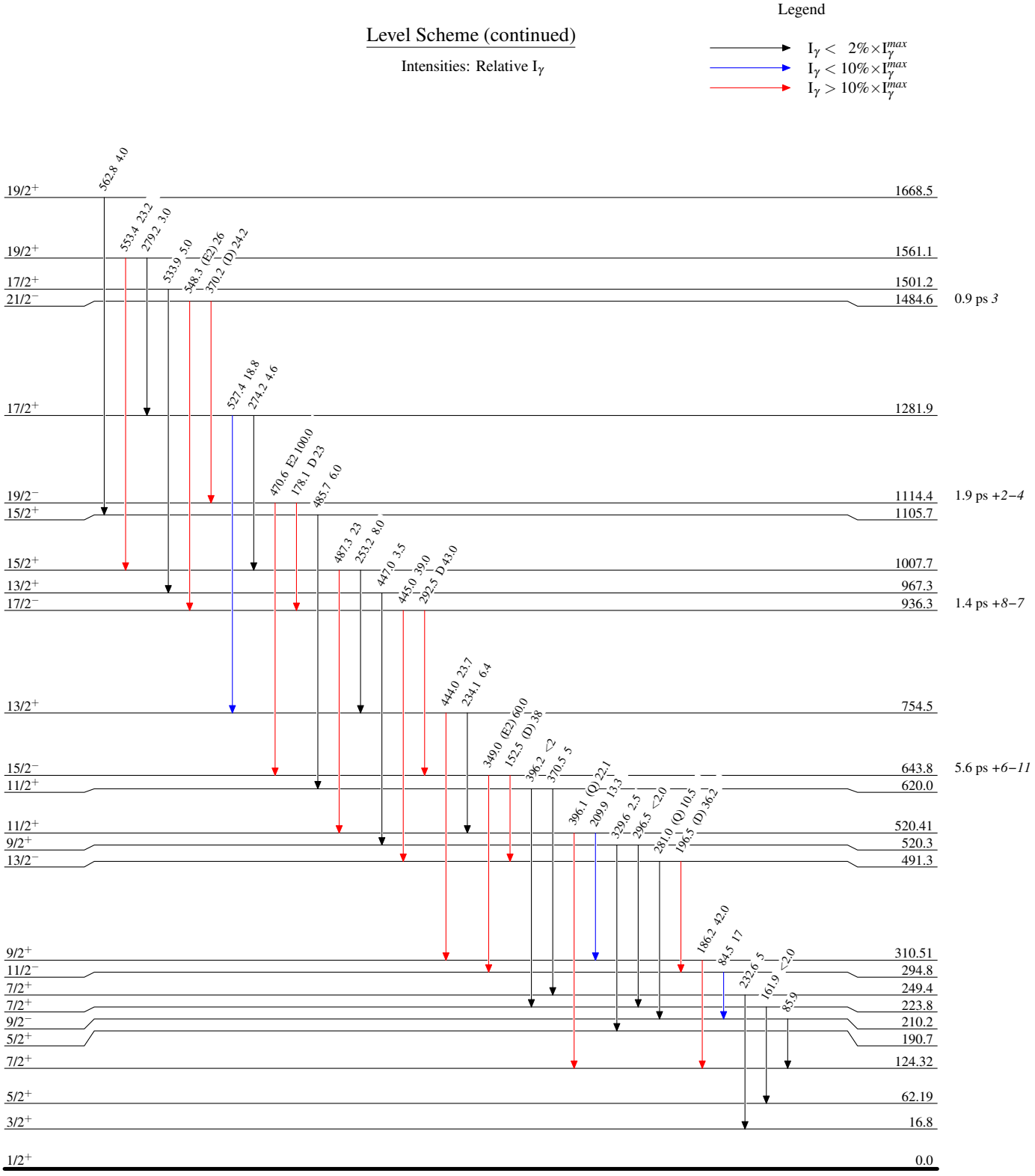


$^{163}_{71}Lu_{92}$

^{139}La(^{28}Si,4nγ) 1992Sc03

Level Scheme (continued)

Intensities: Relative I_γ

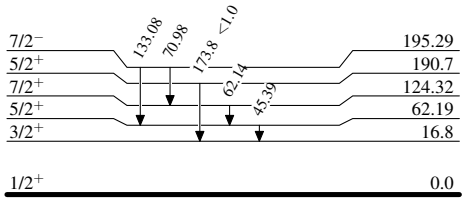


$^{163}_{71}Lu_{92}$

^{139}La(^{28}Si,4nγ) 1992Sc03

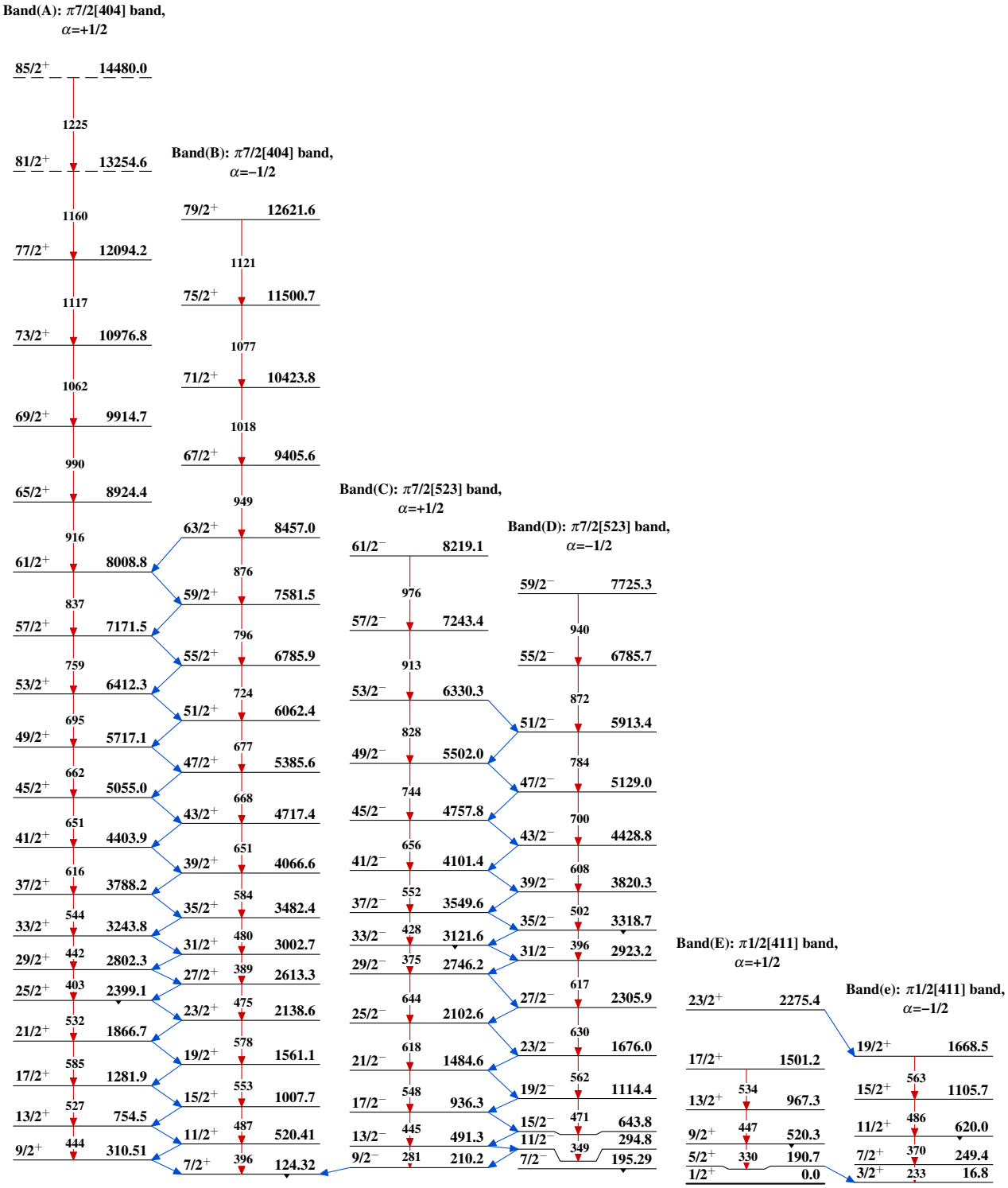
Level Scheme (continued)

Intensities: Relative I_γ



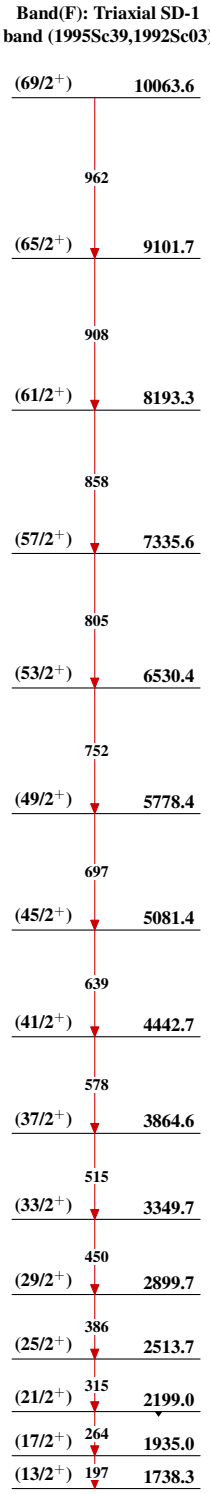
$^{163}_{71}Lu_{92}$

^{139}La(^{28}Si,4nγ) 1992Sc03



$^{163}_{71}Lu_{92}$

^{139}La(^{28}Si,4nγ) 1992Sc03 (continued)



$^{163}_{71}Lu_{92}$

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05

History

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

Includes ^{123}Sb(^{44}Ca,4nγ) from 2004Go14 and ^{124}Sn(^{45}Sc,6nγ) from 2002Sc47.

2004Je03 (also 2004JeZZ, 2004Ha21,2002Je10): E=157 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, $\gamma\gamma(\theta)$(DCO), $\gamma\gamma$(lin pol) with Euroball detector array which consisted of 15 Cluster, 25 Clover, and 27 Tapered Ge detectors. The numerical data are from the RADWARE file in 2004JeZZ,

2002Je05, 2002Od01, 2001Od03 (also 2001Od02,2001Ha54): E=152 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, $\gamma\gamma(\theta)$(DCO), γ(lin pol) using the EUROBALL IV array with 15 Cluster detectors, 25 Clover detectors and 26 tapered single-element Ge detectors. Deduced four SD bands in addition to other normal deformed bands. In 2002Od01, the data were analyzed to investigate properties of the nucleus at excitations above the energy of the resolvable discrete bands using fluctuation analysis of Eγ-Eγ spectrum. About 40 two-step paths were found for triaxial strongly deformed bands, about half of which feed normal-deformed structures.

Others:

2004Go14: ^{123}Sb(^{44}Ca,4nγ) E=190 MeV. Measured Eγ, Iγ, $\gamma\gamma$, lifetimes by DSAM for two TSD bands; deduced Q_t.

2002Sc11: E=145 MeV. Measured lifetimes of members in SD-1 band by Doppler-shift attenuation method, deduced transition quadrupole moment.

2002Sc47: ^{124}Sn(^{45}Sc,^{6}nγ) E=217 MeV. Measured Eγ, Iγ, $\gamma\gamma$ using GAMMASPHERE array with 100 Compton-suppressed Ge detectors. Measured lifetimes by DSA for (yrast) SD-1 band and deduced transition quadrupole moment.

1999Do34: E=145 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma g(\theta)$(DCO) using EUROBALL array with 13 Cluster detectors, 25 Clover detectors and 28 tapered single-element Ge detectors. Deduced two SD bands and several normal deformed bands.

All data are from 2004Je03 unless otherwise stated. The experiments reported In 2004Je03 and 2002Je05 are by the same group using the same reaction and detector arrangement, but the counting statistics In 2004Je03 is about 2.5 times higher than In 2002Je05 with the result that several new bands have been found In 2004Je03 In addition to extending some of the bands by several transitions to higher spins.

^{163}Lu Levels

Q_t values are from 2004Go14, unless otherwise stated.

Labelling Scheme for the Quasiparticle Orbitals (2004Je03):

A: ν5/2[642], α=+1/2.
B: ν5/2[642], α=−1/2.
C: ν3/2[651], α=+1/2.
D: ν3/2[651], α=−1/2.
E: ν5/2[523], α=+1/2.
F: ν5/2[523], α=−1/2.
G: ν3/2[521], α=+1/2.
H: ν3/2[521], α=−1/2.
a: π1/2[411], α=+1/2.
b: π1/2[411], α=−1/2.
c: π7/2[404], α=+1/2.
d: π7/2[404], α=−1/2.
e: π7/2[523], α=+1/2.
f: π7/2[523], α=−1/2.
g: π9/2[514], α=+1/2.
h: π9/2[514], α=−1/2.
k: π5/2[402], α=+1/2.
l: π5/2[402], α=−1/2.
m: π1/2[660], α=+1/2.
n: π1/2[541], α=+1/2.

Continued on next page (footnotes at end of table)

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

^{163}Lu Levels (continued)

E(level)†	Jπ‡	E(level)†	Jπ‡
0.0[c]	1/2+	2399.3[a] 6	25/2+
16.95[d] 23	3/2+	2409.7[g] 10	21/2+
61.2[n] 7	5/2+	2435.9[h] 6	23/2+
123.1[b] 6	7/2+	2487.5 9	25/2+
190.83[c] 20	5/2+	2514.0[q] 4	25/2+
193.9[&] 9	7/2−	2539.7[g] 6	25/2+
209.0[@] 6	9/2−	2613.4[b] 6	27/2+
223.4[o] 9	7/2+	2680.0[h] 6	27/2+
249.7[d] 3	7/2+	2684.5 8	27/2+
294.3[&] 6	11/2−	2747.1[@] 6	29/2−
309.3[a] 6	9/2+	2773.0[d] 4	27/2+
413.3[n] 7	9/2+	2802.5[a] 6	29/2+
490.9[@] 6	13/2−	2854.2[e] 8	29/2−
519.3[b] 6	11/2+	2860.1[g] 6	29/2+
520.64[c] 23	9/2+	2900.3[q] 4	29/2+
620.6[d] 3	11/2+	2923.8[&] 6	31/2−
641.3[o] 9	11/2+	3002.9[b] 6	31/2+
643.6[&] 6	15/2−	3020.3[f] 8	31/2−
753.7[a] 6	13/2+	3077.2[h] 6	31/2+
874.2[n] 9	13/2+	3078.8[r] 9	27/2+
936.2[@] 6	17/2−	3122.2[@] 6	33/2−
967.58[c] 25	13/2+	3129.8[d] 8	31/2+
1007.0[b] 6	15/2+	3244.0[a] 6	33/2+
1106.5[d] 3	15/2+	3319.6[&] 6	35/2−
1114.1[&] 6	19/2−	3322.7[g] 6	33/2+
1151.4[o] 9	15/2+	3350.6[q] 5	33/2+
1281.3[a] 6	17/2+	3417.6[e] 8	33/2−
1285.0? 10	(13/2+)	3482.7[b] 6	35/2+
1416.0[n] 8	17/2+	3486.2[r] 7	31/2+
1484.6[@] 6	21/2−	3550.6[@] 6	37/2−
1501.4[c] 3	17/2+	3570.9[h] 6	35/2+
1560.9[b] 6	19/2+	3634.7[j] 8	35/2+
1669.5[d] 3	19/2+	3666.7[f] 8	35/2−
1676.2[&] 6	23/2−	3788.7[a] 6	37/2+
1729.1[o] 8	19/2+	3821.5[&] 6	39/2−
1738.9[q] 11	13/2+	3863.2[s] 8	33/2+
1866.6[a] 6	21/2+	3865.9[q] 5	37/2+
1935.7[q] 8	17/2+	3891.4[g] 8	37/2+
2008.0 7	21/2+	3957.8[r] 7	35/2+
2019.5[n] 9	21/2+	3994.8[e] 9	37/2−
2087.3[c] 3	21/2+	4067.1[b] 7	39/2+
2103.2[@] 6	25/2−	4102.7[@] 6	41/2−
2138.6[b] 6	23/2+	4149.7[h] 6	39/2+
2199.2[q] 4	21/2+	4252.7[f] 9	39/2−
2227.2 8	23/2+	4254.5[j] 8	39/2+
2276.3[d] 3	23/2+	4308.1[l] 8	37/2−
2306.4[&] 6	27/2−	4368.7[s] 7	37/2+
2338.6[o] 11	23/2+	4404.8[a] 7	41/2+

Continued on next page (footnotes at end of table)

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

^{163}Lu Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$[#]	Comments
4430.2[&] 6	43/2$^-$		
4444.6[q] 5	41/2$^+$	0.25 ps +5−7	Q$_t$=9.9 +11−10.
4492.1[r] 7	39/2$^+$		
4528.4[g] 8	41/2$^+$		
4555.4[e] 9	41/2$^-$		
4577.7[m] 8	39/2$^-$		
4718.6[b] 7	43/2$^+$		
4759.5[@] 6	45/2$^-$		
4816.1[h] 6	43/2$^+$		
4830.0[l] 8	41/2$^-$		
4847.8[f] 9	43/2$^-$		
4903.0[j] 8	43/2$^+$		
4936.8[s] 7	41/2$^+$		
5056.4[a] 7	45/2$^+$		
5083.5[q] 5	45/2$^+$	173 fs +24−27	Q$_t$=9.3 +7−6.
5087.9[r] 7	43/2$^+$		
5114.9[m] 8	43/2$^-$		
5130.6[&] 6	47/2$^-$		
5167.6[e] 9	45/2$^-$		
5208.5[i] 8	45/2$^+$		
5242.2[g] 11	45/2$^+$		
5386.8[b] 7	47/2$^+$		
5418.3[l] 9	45/2$^-$		
5495.0[f] 9	47/2$^-$		
5503.9[@] 6	49/2$^-$		
5556.3[j] 8	47/2$^+$		
5558.3[h] 6	47/2$^+$		
5563.7[s] 6	45/2$^+$		
5719.0[a] 7	49/2$^+$		
5742.5[r] 8	47/2$^+$	149 fs +26−33	Q$_t$=8.5 +10−7.
5755.8[m] 9	47/2$^-$		
5780.5[q] 5	49/2$^+$	140 fs +15−16	Q$_t$=8.3 +5−4.
5851.9[e] 9	49/2$^-$		
5897.1[i] 9	49/2$^+$		
5915.7[&] 6	51/2$^-$		
6005.0[g] 9	49/2$^+$		
6064.2[b] 7	51/2$^+$		
6106.9[l] 10	49/2$^-$		
6222.3[f] 11	51/2$^-$		
6245.3[j] 9	51/2$^+$		
6248.8[s] 8	49/2$^+$		
6319.5[t] 9	47/2$^{(-)}$		
6332.9[@] 6	53/2$^-$		
6354.7[h] 10	51/2$^+$		
6414.0[a] 7	53/2$^+$		
6453.7[r] 8	51/2$^+$	100 fs +12−15	Q$_t$=8.7 +7−5.
6501.4[m] 11	51/2$^-$		
6533.1[q] 5	53/2$^+$	82 fs +6−7	T$_{1/2}$: other: 100 fs (2002Sc11). Q$_t$=8.9 4 (2004Go14), 8.1 +10−11 (2002Sc11).

Continued on next page (footnotes at end of table)

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

^{163}Lu Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	Comments
6615.4[i] 11	53/2+		
6616.7[e] 11	53/2−		
6718.0[g] 11	53/2+		
6787.7[b] 7	55/2+		
6788.8[&] 9	55/2−		
6906.2[l] 12	53/2−		
6964.5[t] 9	51/2(−)		
6978.9[j] 11	55/2+		
6990.0[s] 8	53/2+		
7034.2[f] 12	55/2−		
7131.9[h] 12	55/2+		
7173.0[a] 7	57/2+		
7177.9[p] 10	55/2+		
7219.9[r] 9	55/2+	66 fs +9−12	Q_t=8.9 +8−6.
7245.7[@] 10	57/2−		
7338.7[q] 5	57/2+	66 fs 8	$T_{1/2}$: other: 67 fs (2002Sc11). Q_t=8.4 5 (2004Go14), 8.3 +19−18 (2002Sc11).
7350.0[m] 13	55/2−		
7389.8[i] 12	57/2+		
7465.6[e] 13	57/2−		
7505.8[g] 13	57/2+		
7583.3[b] 7	59/2+		
7666.7[t] 9	55/2(−)		
7728.0[&] 11	59/2−		
7784.2[j] 13	59/2+		
7785.9[s] 9	57/2+		
7812.7[l] 14	57/2−		
7902.2[f] 14	59/2−		
7954.7[h] 14	59/2+		
8010.0[a] 7	61/2+		
8039.8[r] 9	59/2+	60 fs +18−26	Q_t=7.8 +17−12.
8044.9[p] 10	59/2+		
8196.4[q] 10	61/2+	61 fs +7−8	Q_t=7.5 +5−4 (2004Go14), 8.0 +16−15 (2002Sc11). $T_{1/2}$: other: 53 fs (2002Sc11).
8221.5[@] 12	61/2−		
8236.2[i] 14	61/2+		
8290.0[m] 15	59/2−		
8378.6[e] 17	61/2−		
8386.1[g] 16	61/2+		
8421.3[t] 10	59/2(−)		
8458.3[b] 9	63/2+		
8635.7[s] 10	61/2+		
8667.5[j] 15	63/2+		
8712.3[&] 13	63/2−		
8789.1[l] 16	61/2−		
8844.4[f] 17	63/2−		
8854.6[h] 17	63/2+		
8912.7[r] 11	63/2+	44 fs +9−15	Q_t=7.9 +13−8.
8925.8[a] 10	65/2+		

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^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

^{163}Lu Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	Comments
8973.0[p] *14*	63/2+		
9106.1[q] *14*	65/2+	46 fs *+7−10*	Q_t=7.4 *+8−6*.
9153.0[i] *15*	65/2+		
9231.4[t] *14*	63/2(−)		
9251.6[@] *14*	65/2−		
9283.4[m] *18*	63/2−		
9329.8[g] *19*	65/2+		
9375.1[e] *19*	65/2−		
9407.6[b] *11*	67/2+		
9538.2[s] *14*	65/2+		
9624.3[j] *16*	67/2+		
9707.7[&] *15*	67/2−		
9804.1[l] *19*	65/2−		
9815.1[h] *20*	67/2+		
9839.2[r] *15*	67/2+	52 fs *+12−17*	Q_t=6.7 *+11−8*.
9915.6[a] *12*	69/2+		
10068.6[q] *14*	69/2+	33 fs *+12−8*	Q_t=7.6 *+15−9*.
10096.7[t] *17*	67/2(−)		
10137.4[i] *17*	69/2+		
10313.5[@] *17*	69/2−		E(level): In 2002Je05, the 69/2− member was proposed At 10265 decaying by a 1012.3γ.
10332.8[g] *22*	69/2+		
10427.1[b] *13*	71/2+		
10494.0[s] *17*	69/2+		
10652.4[j] *17*	71/2+		
10713.7[&] *18*	71/2−		
10819.4[r] *18*	71/2+	39 fs *+12−20*	Q_t=6.7 *+17−10*.
10875.1[l] *21*	69/2−		
10977.2[a] *14*	73/2+		
11017.2[t] *20*	71/2(−)		
11085.2[q] *18*	73/2+		
11185.6[i] *19*	73/2+		
11503.2[s] *20*	73/2+		
11504.2[b] *15*	75/2+		
11728.7[k] *20*	75/2−		
11748.0[j] *20*	75/2+		
11780.2[&] *20*	75/2−		
11854.1[r] *21*	75/2+		
11992.9[t] *22*	75/2(−)		
12096.9[a] *17*	77/2+		
12156.2[q] *20*	77/2+		
12265.7[i] *22*	77/2+		
12566.2[s] *22*	77/2+		
12626.0[b] *18*	79/2+		
12744[k] *3*	79/2−		
12862[j] *11*	79/2+		
12864.8[&] *23*	79/2−		
12943.0[r] *23*	79/2+		
13024.5[t] *25*	79/2(−)		
13197.1[a] *20*	81/2+		

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^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

^{163}Lu Levels (continued)

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
13282.5[q] 23	81/2+	14110[t] 3	83/2(−)	15689[q] 3	89/2+	18261[q] 3	97/2+
13678.6[s] 25	81/2+	14461.8[q] 25	85/2+	16023[k] 4	91/2−	18435[k] 4	99/2−
13745.7[b] 21	83/2+	14826[s] 5	85/2+	16531[r] 3	91/2+		
13797[k] 3	83/2−	14889[k] 4	87/2−	16958[q] 3	93/2+		
14086.0[r] 25	83/2+	15283[r] 3	87/2+	17203[k] 4	95/2−		

† From least-squares fit to Eγ's. The levels at 10265, (69/2−) decaying by a 1012.3γ and 10346, (69/2−) decaying by a 1062.0γ proposed in 2002Je05 have been omitted here since they are not confirmed by 2004Je03.

‡ The assignments are As proposed by 2004Je03 based on band assignments and γγ(θ) data (2004Je03,2002Je05,1999Do34) for selected transitions. In the 'Adopted Levels', the assignments are the same except that parentheses are added by the evaluators since Jπ's of some of the bandheads are not defined by strong rules for spin-parity assignments.

From DSAM (2004Go14), unless otherwise stated.

@ Band(A): π7/2[523], α=+1/2. Strongly-coupled band (1993Sc13,1999Do34,2002Je05,2004Je03). Of the two possible choices (1992Sc03), π7/2[523] and π9/2[514], π7/2[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 ħω≈0.26 MeV.

& Band(a): π7/2[523], α=−1/2. Strongly-coupled band (1993Sc13,1999Do34,2002Je05,2004Je03). See also the comment for the signature=+1/2 component of this band. AB crossing at ħω≈0.26 MeV.

[a] Band(B): π7/2[404], α=+1/2. Strongly-coupled band (1992Sc03,1999Do34,2002Je05,2004Je03). AB crossing at ħω≈0.26 MeV; changes to (π7/2[523])⊗AEBC after AB crossing.

[b] Band(b): π7/2[404], α=−1/2. Strongly-coupled band (1992Sc03,1999Do34,2002Je05,2004Je03). AB crossing at ħω≈0.26 MeV; changes to π7/2[523]⊗AEBC after AB crossing.

[c] Band(C): π1/2[411], α=+1/2. (1999Do34,2002Je05,2004Je03).

[d] Band(c): π1/2[411], α=−1/2. (1999Do34,2002Je05,2004Je03).

[e] Band(D): Band based on (29/2−), α=+1/2. Possible continuation of the π7/2[523] band into (π7/2[523])⊗BC. EF and AD could also be involved at higher spins (2004Je03).

[f] Band(d): Band based on (31/2−), α=−1/2. Possible continuation of the π7/2[523] band into (π7/2[523])⊗BC. EF and AD could also be involved at higher spins (2004Je03).

[g] Band(E): (π7/2[404])⊗AB at low spins, α=+1/2. (π9/2[514])⊗AEBC at high spins (2004Je03,2002Je05).

[h] Band(e): (π7/2[404])⊗AB at low spins, α=−1/2. 9/2[514]⊗AEBC at high spins (2004Je03,2002Je05).

[i] Band(F): (π7/2[523])⊗AHBC, α=+1/2. (2004Je03).

[j] Band(f): (π7/2[523])⊗AHBC, α=−1/2. (2004Je03).

[k] Band(G): (π1/2[660])⊗AEBC,α=−1/2. (2004Je03).

[l] Band(H): (π9/2[514])⊗AB, α=+1/2. (2004Je03,2002Je05). This band has spins less by one unit in 2002Je05 than in 2004Je03.

[m] Band(h): (π9/2[514])⊗AB, α=−1/2. (2004Je03,2002Je05). This band has spins less by one unit in 2002Je05 than in 2004Je03.

[n] Band(I): π5/2[402], α=+1/2. (2002Je05,2004Je03).

[o] Band(i): π5/2[402], α=−1/2. (2002Je05,2004Je03).

[p] Band(J): Band based on 55/2+, α=−1/2.

[q] 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=π$i_{13/2}$, 1/2[660], α=+1/2; β_2≈0.42 (1993Sc13,1992Sc03). Percent population (relative to normal-deformed yrast band)≈10 (2004Je03,1999Do34), 14 (2002Je05).

[r] Band(L): One-phonon wobbling-mode Triaxial SD-2 band (2004Je03,2004Go14,2002Je05,2001Od03,1999Do34). One-phonon wobbling mode excitation built on yrast π$i_{13/2}$ 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).

[s] Band(M): Two-phonon wobbling-mode Triaxial SD-3 band, α=+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).

[t] Band(N): Triaxial SD-4 band, α=−1/2 (2004Je03,2002Je05). Possibly negative-parity yrast band. This band cannot be interpreted

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^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

^{163}Lu Levels (continued)

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).

$\gamma(^{163}Lu)$

POL=$(I_{vertical}-I_{horizontal})/(I_{vertical}+I_{horizontal})$ (2004Je03).
DCO=$I^{\gamma_1}{}_{25^\circ}(gate^{\gamma_2}{}_{90^\circ})/I^{\gamma_1}{}_{90^\circ}(gate^{\gamma_2}{}_{25^\circ})$ (2004Je03).

E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
(45.39 *8*)		61.2	$5/2^+$	16.95	$3/2^+$		E_γ: from the 'Adopted Gammas'.
62.1 *10*	5.6 *20*	123.1	$7/2^+$	61.2	$5/2^+$		E_γ: 61.5 (1999Do34).
70.7 *10*	4.3 *30*	193.9	$7/2^-$	123.1	$7/2^+$		
85.4 *10*	5.5 *12*	294.3	$11/2^-$	209.0	$9/2^-$		
85.9 *10*	13.5 *27*	209.0	$9/2^-$	123.1	$7/2^+$		
102.0 *10*	2.5 *3*	3122.2	$33/2^-$	3020.3	$31/2^-$		
103.76@ *10*	0.70 *10*	2539.7	$25/2^+$	2435.9	$23/2^+$		
106.2 *10*	4.9 *5*	519.3	$11/2^+$	413.3	$9/2^+$		
117.9 *10*	0.7 *3*	2802.5	$29/2^+$	2684.5	$27/2^+$		
130.0 *10*	0.90 *20*	2539.7	$25/2^+$	2409.7	$21/2^+$		
132.8 *10*	6.5 *22*	193.9	$7/2^-$	61.2	$5/2^+$		
140.26@ *10*	5.7 *7*	2680.0	$27/2^+$	2539.7	$25/2^+$		
140.3 *10*	1.00 *10*	2539.7	$25/2^+$	2399.3	$25/2^+$		
152.7 *10*	40 *3*	643.6	$15/2^-$	490.9	$13/2^-$		
162.2 *10*	10.2 *22*	223.4	$7/2^+$	61.2	$5/2^+$		E_γ: 161.6 (1999Do34).
166.1 *10*	1.6 *4*	3020.3	$31/2^-$	2854.2	$29/2^-$		
172.2 *10*	4.9 *6*	2399.3	$25/2^+$	2227.2	$23/2^+$		
173.87 *10*	7.7 *18*	190.83	$5/2^+$	16.95	$3/2^+$	D	DCO=0.38 *8* (1999Do34) Iγ(174)/Iγ(191)=8.4 *13*/3.4 *4* (1999Do34) is in disagreement.
176.85@ *10*	12.1 *14*	2923.8	$31/2^-$	2747.1	$29/2^-$		
177.97@ *10*	19.0 *22*	1114.1	$19/2^-$	936.2	$17/2^-$		
180.2 *10*	9.8 *9*	2860.1	$29/2^+$	2680.0	$27/2^+$		
186.15@ *10*	18.4 *26*	309.3	$9/2^+$	123.1	$7/2^+$		
188.2 *10*	5.0 *9*	249.7	$7/2^+$	61.2	$5/2^+$	D	DCO=0.60 *9* (1999Do34). Iγ(188)/Iγ(233)=6.9 *10*/18.0 *18* (1999Do34) is in disagreement.
188.99@ *10*	18.6 *26*	2802.5	$29/2^+$	2613.4	$27/2^+$		
189.8 *10*	8.8 *31*	413.3	$9/2^+$	223.4	$7/2^+$		
190.90 *20*	18.2 *12*	190.83	$5/2^+$	0.0	$1/2^+$		
191.54@ *10*	16.0 *14*	1676.2	$23/2^-$	1484.6	$21/2^-$		
196.6 *10*	49 *4*	490.9	$13/2^-$	294.3	$11/2^-$		
196.7 *10*	9# *5*	1935.7	$17/2^+$	1738.9	$13/2^+$	(Q)	DCO=0.8 *4* (1999Do34) I_γ: Iγ(197)/Iγ(386)=3.4 *4*/100 (1999Do34).
197.29@ *10*	48 *8*	3319.6	$35/2^-$	3122.2	$33/2^-$		
198.56@ *10*	40 *5*	3122.2	$33/2^-$	2923.8	$31/2^-$		
200.42@ *10*	31 *3*	3002.9	$31/2^+$	2802.5	$29/2^+$		
203.23@ *10*	13.7 *20*	2306.4	$27/2^-$	2103.2	$25/2^-$		
207.0 *10*	1.1 *8*	620.6	$11/2^+$	413.3	$9/2^+$		Iγ(207)/Iγ(371)=4.2 *8*/9.4 *14* (1999Do34) is in disagreement.
210.0 *10*	17.2 *17*	519.3	$11/2^+$	309.3	$9/2^+$		

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^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

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

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
214.00[@] *10*	29.4 *28*	2613.4	27/2$^+$	2399.3	25/2$^+$		
217.17[@] *10*	13.6 *13*	3077.2	31/2$^+$	2860.1	29/2$^+$		
228.0 *10*	7.1 *17*	641.3	11/2$^+$	413.3	9/2$^+$		
231.04[@] *10*	87 *6*	3550.6	37/2$^-$	3319.6	35/2$^-$		
232.9 *10*	8.7 *22*	249.7	7/2$^+$	16.95	3/2$^+$	(Q)	DCO=0.75 *11* (1999Do34).
233.0 *10*	8.0 *13*	874.2	13/2$^+$	641.3	11/2$^+$		
234.3 *10*	16.5 *15*	753.7	13/2$^+$	519.3	11/2$^+$		
238.6 *10*	18.4 *15*	3482.7	35/2$^+$	3244.0	33/2$^+$		
241.1 *10*	26.8 *21*	3244.0	33/2$^+$	3002.9	31/2$^+$		
244.02[@] *10*	1.8 *3*	2680.0	27/2$^+$	2435.9	23/2$^+$		
245.48[@] *10*	3.8 *9*	3322.7	33/2$^+$	3077.2	31/2$^+$		
246.7 *10*	1.00 *10*	2860.1	29/2$^+$	2613.4	27/2$^+$		
247.6[&b] *5*	1.0 *4*	309.3	9/2$^+$	61.2	5/2$^+$		I_γ: deduced from Iγ(248)/Iγ(488)=1.6 *6*/100 (1999Do34).
248.20[@] *10*	1.8 *4*	3570.9	35/2$^+$	3322.7	33/2$^+$		
249.0 *10*	5.5 *11*	3666.7	35/2$^-$	3417.6	33/2$^-$		
252.2 *10*	5.2 *13*	4830.0	41/2$^-$	4577.7	39/2$^-$		
253.37[@] *10*	16.9 *14*	1007.0	15/2$^+$	753.7	13/2$^+$		
257.8 *10*	2.8 *4*	4252.7	39/2$^-$	3994.8	37/2$^-$		
258.2 *10*	2.0 *8*	4149.7	39/2$^+$	3891.4	37/2$^+$		
260.84[@] *10*	23.9 *19*	2399.3	25/2$^+$	2138.6	23/2$^+$		
263.3 *10*	3.8[#] *20*	2199.2	21/2$^+$	1935.7	17/2$^+$	(Q)	DCO=0.78 *11* (1999Do34) Iγ(263)/Iγ(386)=18.7 *19*/100 (1999Do34).
264.6 *10*	2.5 *9*	1416.0	17/2$^+$	1151.4	15/2$^+$		
268.1 *10*	4.0 *11*	3122.2	33/2$^-$	2854.2	29/2$^-$		
269.7 *10*	4.3 *10*	4577.7	39/2$^-$	4308.1	37/2$^-$		
270.87 *17*	12.9 *20*	520.64	9/2$^+$	249.7	7/2$^+$	D	DCO=0.59 *8* (1999Do34). Iγ(271)/Iγ(330)=9.3 *11*/16.3 *16* (1999Do34).
270.87[@] *10*	63 *4*	3821.5	39/2$^-$	3550.6	37/2$^-$		
272.02[@] *10*	9.3 *11*	2138.6	23/2$^+$	1866.6	21/2$^+$		
274.31[@] *10*	9.7 *10*	1281.3	17/2$^+$	1007.0	15/2$^+$		
277.2 *10*	6.5 *12*	1151.4	15/2$^+$	874.2	13/2$^+$		
278.40[@] *10*	23.0 *17*	4067.1	39/2$^+$	3788.7	37/2$^+$		
279.58[@] *10*	18.9 *16*	1560.9	19/2$^+$	1281.3	17/2$^+$		
280.5 *10*	1.00 *10*	2680.0	27/2$^+$	2399.3	25/2$^+$		
281.18[@] *10*	57 *4*	4102.7	41/2$^-$	3821.5	39/2$^-$		
282.00[@] *10*	19.1 *22*	490.9	13/2$^-$	209.0	9/2$^-$		
285.1 *10*	2.3 *6*	5114.9	43/2$^-$	4830.0	41/2$^-$		
287.7 *10*	1.0 *4*	4816.1	43/2$^+$	4528.4	41/2$^+$		
290.5[b] *10*	0.5 *4*	2019.5	21/2$^+$	1729.1	19/2$^+$		
292.4 *10*	2.2 *3*	4847.8	43/2$^-$	4555.4	41/2$^-$		
292.64[@] *10*	45 *3*	936.2	17/2$^-$	643.6	15/2$^-$		
296.1[&b] *5*	1.3 *4*	519.3	11/2$^+$	223.4	7/2$^+$		I_γ: deduced from Iγ(296)/Iγ(488)=2.1 *7*/100 (1999Do34).
296.5[&b] *5*	4.5 *9*	520.64	9/2$^+$	223.4	7/2$^+$		I_γ: deduced from Iγ(296)/Iγ(330)=3.6 *7*/16.3 *16* and Iγ(296)/Iγ(271)=3.6 *7*/9.3 *11* (1999Do34).
299.3 *10*	0.4 *3*	3319.6	35/2$^-$	3020.3	31/2$^-$		
302.8 *10*	2.4 *4*	4555.4	41/2$^-$	4252.7	39/2$^-$		
303.3 *10*	2.7 *7*	5418.3	45/2$^-$	5114.9	43/2$^-$		
304.6 *10*	3.8 *4*	3077.2	31/2$^+$	2773.0	27/2$^+$		
305.6 *10*	0.8 *6*	5208.5	45/2$^+$	4903.0	43/2$^+$		
305.65[@] *10*	9.1 *13*	1866.6	21/2$^+$	1560.9	19/2$^+$		

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^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

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

E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
306.06@ *10*	27.1 *21*	3788.7	37/2$^+$	3482.7	35/2$^+$		
312.0 *10*	3.0 *5*	3634.7	35/2$^+$	3322.7	33/2$^+$		
313.1 *10*	1.2 *9*	1729.1	19/2$^+$	1416.0	17/2$^+$		
313.68@ *10*	15.9 *12*	4718.6	43/2$^+$	4404.8	41/2$^+$		
314.85 *10*	77# *10*	2514.0	25/2$^+$	2199.2	21/2$^+$	(Q)	DCO=0.88 *13* (1999Do34) I_γ: Iγ(315)/Iγ(386)=68 *7*/100 (1999Do34).
314.9 *10*	1.7 *4*	2802.5	29/2$^+$	2487.5	25/2$^+$		
318.4 *10*	0.5 *4*	3002.9	31/2$^+$	2684.5	27/2$^+$		
319.1b *10*	0.4 *3*	2338.6	23/2$^+$	2019.5	21/2$^+$		
319.8 *10*	1.7 *4*	5167.6	45/2$^-$	4847.8	43/2$^-$		
320.4 *10*	2.2 *6*	3891.4	37/2$^+$	3570.9	35/2$^+$		
320.44@ *10*	4.1 *9*	2860.1	29/2$^+$	2539.7	25/2$^+$		
327.5 *10*	1.4 *4*	5495.0	47/2$^-$	5167.6	45/2$^-$		
327.58@ *10*	24.0 *24*	4430.2	43/2$^-$	4102.7	41/2$^-$		
328.2 *10*	4.3 *6*	3994.8	37/2$^-$	3666.7	35/2$^-$		
329.22@ *10*	13.3 *20*	4759.5	45/2$^-$	4430.2	43/2$^-$		
329.85@ *10*	18.7 *26*	520.64	9/2$^+$	190.83	5/2$^+$	(Q)	DCO=0.79 *17* (1999Do34)
330.37 *15*	14.3 *15*	5386.8	47/2$^+$	5056.4	45/2$^+$		
332.1 *10*	9.9 *10*	5719.0	49/2$^+$	5386.8	47/2$^+$		
337.4 *10*	2.5 *6*	5755.8	47/2$^-$	5418.3	45/2$^-$		
337.7 *10*	16 *4*	4404.8	41/2$^+$	4067.1	39/2$^+$		
337.83@ *10*	19 *4*	5056.4	45/2$^+$	4718.6	43/2$^+$		
338.8 *10*	1.20 *20*	5897.1	49/2$^+$	5558.3	47/2$^+$		
340.8 *10*	1.0 *6*	5897.1	49/2$^+$	5556.3	47/2$^+$		
345.44@ *10*	9.1 *10*	6064.2	51/2$^+$	5719.0	49/2$^+$		
347.08 *17*	7.4 *15*	967.58	13/2$^+$	620.6	11/2$^+$	D	DCO=0.76 *16* (1999Do34). I_γ: Iγ(347)/Iγ(447)=7.1 *11*/36 *4* (1999Do34).
347.9 *10*	1.8 *12*	5556.3	47/2$^+$	5208.5	45/2$^+$		
348.3 *10*	4.5 *17*	6245.3	51/2$^+$	5897.1	49/2$^+$		
349.21@ *10*	72 *4*	643.6	15/2$^-$	294.3	11/2$^-$		
349.62@ *10*	10.6 *10*	6414.0	53/2$^+$	6064.2	51/2$^+$		
349.7 *10*	1.5 *7*	6354.7	51/2$^+$	6005.0	49/2$^+$		
351.2 *10*	2.4 *6*	6106.9	49/2$^-$	5755.8	47/2$^-$		
352.0 *10*	4.6 *12*	413.3	9/2$^+$	61.2	5/2$^+$		
356.9 *10*	1.1 *4*	5851.9	49/2$^-$	5495.0	47/2$^-$		
357.1 *10*	2.7 *6*	3129.8	31/2$^+$	2773.0	27/2$^+$		
363.0 *10*	2.0 *8*	4254.5	39/2$^+$	3891.4	37/2$^+$		
363.3 *10*	0.5 *3*	6718.0	53/2$^+$	6354.7	51/2$^+$		
363.6 *10*	0.9 *3*	6978.9	55/2$^+$	6615.4	53/2$^+$		
370.0 *10*	1.1 *6*	6615.4	53/2$^+$	6245.3	51/2$^+$		
370.4 *10*	0.9 *3*	6222.3	51/2$^-$	5851.9	49/2$^-$		
370.50@ *10*	24.8 *24*	1484.6	21/2$^-$	1114.1	19/2$^-$		
370.93@ *10*	25.0 *35*	620.6	11/2$^+$	249.7	7/2$^+$	(Q)	DCO=0.83 *12* (1999Do34).
370.95@ *10*	17.2 *21*	5130.6	47/2$^-$	4759.5	45/2$^-$		
373.35 *14*	16.0 *14*	5503.9	49/2$^-$	5130.6	47/2$^-$		
373.74@ *10*	6.0 *6*	6787.7	55/2$^+$	6414.0	53/2$^+$		
373.9 *10*	0.5 *4*	7505.8	57/2$^+$	7131.9	55/2$^+$		
374.5 *10*	3.0 *9*	4903.0	43/2$^+$	4528.4	41/2$^+$		
374.74@ *10*	8.0 *10*	3122.2	33/2$^-$	2747.1	29/2$^-$		E_γ: poor fit; level-energy difference=375.08.
377.0b *10*	0.5# *4*	3863.2	33/2$^+$	3486.2	31/2$^+$		
378.8 *10*	2.0 *7*	4528.4	41/2$^+$	4149.7	39/2$^+$		

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^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

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

E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
379.9 *10*	7.3 *8*	2399.3	25/2$^+$	2019.5	21/2$^+$		
385.54@ *10*	4.9 *10*	7173.0	57/2$^+$	6787.7	55/2$^+$		
386.2 *10*	3.4 *5*	2613.4	27/2$^+$	2227.2	23/2$^+$		
386.31 *10*	100 *5*	2900.3	29/2$^+$	2514.0	25/2$^+$	Q	DCO=0.95 *13* (1999Do34)
389.66 *11*	14.4 *14*	3002.9	31/2$^+$	2613.4	27/2$^+$		
391.5 *10*	2.9 *6*	2399.3	25/2$^+$	2008.0	21/2$^+$		
392.4 *10*	2.7 *8*	5208.5	45/2$^+$	4816.1	43/2$^+$		
394.3 *10*	1.4 *4*	7784.2	59/2$^+$	7389.8	57/2$^+$		
394.5 *10*	3.4 *9*	6501.4	51/2$^-$	6106.9	49/2$^-$		
394.5 *10*	0.7 *3*	6616.7	53/2$^-$	6222.3	51/2$^-$		
394.90 *16*	7.5 *11*	1501.4	17/2$^+$	1106.5	15/2$^+$		I_γ: Iγ(395)/Iγ(534)=4.1 *6*/37 *4* (1999Do34) is in disagreement.
395.99@ *10*	9.5 *15*	3319.6	35/2$^-$	2923.8	31/2$^-$		
396.3&b *5*	16 *4*	620.6	11/2$^+$	223.4	7/2$^+$		I_γ: deduced from Iγ(396)/Iγ(371)=6.1 *9*/9.4 *14* (1999Do34).
396.5 *10*	29.7 *28*	519.3	11/2$^+$	123.1	7/2$^+$		
397.3 *10*	5.2 *8*	3417.6	33/2$^-$	3020.3	31/2$^-$		
397.34@ *10*	12.7 *13*	3077.2	31/2$^+$	2680.0	27/2$^+$		
403.20@ *10*	13.1 *12*	2802.5	29/2$^+$	2399.3	25/2$^+$		
404.7 *10*	1.1 *3*	6906.2	53/2$^-$	6501.4	51/2$^-$		
407.4 *10*	5.0# *19*	3486.2	31/2$^+$	3078.8	27/2$^+$		
410.21 *11*	4.5 *4*	7583.3	59/2$^+$	7173.0	57/2$^+$		
410.9b *10*	0.5# *4*	4368.7	37/2$^+$	3957.8	35/2$^+$		
410.9 *10*	1.5 *3*	7389.8	57/2$^+$	6978.9	55/2$^+$		
411.55@ *10*	8.5 *9*	5915.7	51/2$^-$	5503.9	49/2$^-$		
414.0 *10*	0.5 *3*	7131.9	55/2$^+$	6718.0	53/2$^+$		
417.20@ *10*	6.7 *8*	6332.9	53/2$^-$	5915.7	51/2$^-$		
417.5 *10*	0.7 *4*	7034.2	55/2$^-$	6616.7	53/2$^-$		
417.8 *10*	10.6 *14*	641.3	11/2$^+$	223.4	7/2$^+$		
426.45 *14*	3.5 *4*	8010.0	61/2$^+$	7583.3	59/2$^+$		
426.8 *3*	18# *3*	2514.0	25/2$^+$	2087.3	21/2$^+$	(Q)	DCO=0.84 *12* (1999Do34) I_γ: Iγ(427)/Iγ(386)=12.5 *19*/100 (1999Do34).
426.95@ *10*	37.8 *26*	2103.2	25/2$^-$	1676.2	23/2$^-$		
428.44@ *10*	24.2 *19*	3550.6	37/2$^-$	3122.2	33/2$^-$		
431.4 *10*	0.4 *3*	7465.6	57/2$^-$	7034.2	55/2$^-$		
431.4 *10*	1.2 *3*	8667.5	63/2$^+$	8236.2	61/2$^+$		
436.6 *10*	0.4 *3*	7902.2	59/2$^-$	7465.6	57/2$^-$		
440.61@ *10*	14.4 *15*	2747.1	29/2$^-$	2306.4	27/2$^-$		
441.3 *10*	2.8 *5*	3570.9	35/2$^+$	3129.8	31/2$^+$		
441.54@ *10*	27.0 *21*	3244.0	33/2$^+$	2802.5	29/2$^+$		
443.8 *10*	1.0 *5*	7350.0	55/2$^-$	6906.2	53/2$^-$		
444.35@ *10*	44 *3*	753.7	13/2$^+$	309.3	9/2$^+$		
444.6 *10*	0.60# *20*	4936.8	41/2$^+$	4492.1	39/2$^+$		
445.30@ *10*	37.4 *21*	936.2	17/2$^-$	490.9	13/2$^-$		
446.6 *10*	1.0 *6*	6005.0	49/2$^+$	5558.3	47/2$^+$		
446.91@ *10*	22.9 *25*	967.58	13/2$^+$	520.64	9/2$^+$	(Q)	DCO=0.82 *18* (1999Do34)
447.9@ *10*	2.3 *6*	8458.3	63/2$^+$	8010.0	61/2$^+$		
448.8 *10*	0.4 *4*	7954.7	59/2$^+$	7505.8	57/2$^+$		
450.30 *10*	96# *9*	3350.6	33/2$^+$	2900.3	29/2$^+$		
452.0 *10*	1.3 *3*	8236.2	61/2$^+$	7784.2	59/2$^+$		
453.9b *10*	0.20# *20*	1738.9	13/2$^+$	1285.0?	(13/2$^+$)		

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^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

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

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	Comments
456.0 *10*	8.5 *9*	6788.8	$55/2^-$	6332.9	$53/2^-$			
456.2 *10*	0.20 *10*	9707.7	$67/2^-$	9251.6	$65/2^-$			
456.8 *10*	1.2 *6*	7245.7	$57/2^-$	6788.8	$55/2^-$			
461.0 *10*	8.8 *18*	874.2	$13/2^+$	413.3	$9/2^+$			
462.66[@] *10*	3.1 *11*	3322.7	$33/2^+$	2860.1	$29/2^+$			
462.7 *10*	0.5 *3*	7812.7	$57/2^-$	7350.0	$55/2^-$			
467.7 *10*	2.5 *6*	8925.8	$65/2^+$	8458.3	$63/2^+$			
470.63[@] *10*	79 *6*	1114.1	$19/2^-$	643.6	$15/2^-$			
471.3 *10*	0.8 *4*	9624.3	$67/2^+$	9153.0	$65/2^+$			
471.60 *17*	10.6[#] *7*	3957.8	$35/2^+$	3486.2	$31/2^+$			
474.73[@] *10*	16.9 *14*	2613.4	$27/2^+$	2138.6	$23/2^+$			
475.9 *10*	0.70[#] *20*	5563.7	$45/2^+$	5087.9	$43/2^+$	(M1+E2)	−3.6 *+10−19*	Mult.,δ: Iγ(25°)/Iγ(90°)=0.49 *10* (2002Je10); δ=−0.19 *+8−12* is also possible but less likely from model considerations.
477.3 *10*	0.5 *4*	8290.0	$59/2^-$	7812.7	$57/2^-$			
479.5[b] *10*	0.9 *8*	2487.5	$25/2^+$	2008.0	$21/2^+$			
479.68[@] *10*	26.2 *22*	3482.7	$35/2^+$	3002.9	$31/2^+$			
481.7 *10*	2.0 *7*	9407.6	$67/2^+$	8925.8	$65/2^+$			
482.4 *10*	0.5 *4*	7728.0	$59/2^-$	7245.7	$57/2^-$			
485.5 *10*	1.0 *4*	9153.0	$65/2^+$	8667.5	$63/2^+$			
486.00[@] *10*	15.8 *20*	1106.5	$15/2^+$	620.6	$11/2^+$	(Q)		DCO=0.78 *11* (1999Do34)
487.69[@] *10*	63 *5*	1007.0	$15/2^+$	519.3	$11/2^+$			
490.8 *10*	0.5 *4*	8712.3	$63/2^-$	8221.5	$61/2^-$			
493.5 *10*	0.5 *4*	8221.5	$61/2^-$	7728.0	$59/2^-$			
493.68[@] *10*	4.9 *7*	3570.9	$35/2^+$	3077.2	$31/2^+$			
496.72 *19*	3.4 *8*	2773.0	$27/2^+$	2276.3	$23/2^+$			
499.1 *10*	0.4 *3*	8789.1	$61/2^-$	8290.0	$59/2^-$			
501.93[@] *10*	26.0 *19*	3821.5	$39/2^-$	3319.6	$35/2^-$			
505.0 *10*	2.0 *4*	3634.7	$35/2^+$	3129.8	$31/2^+$			
505.5 *10*	2.6[#] *10*	4368.7	$37/2^+$	3863.2	$33/2^+$			
505.8 *10*	3.9[#] *20*	2514.0	$25/2^+$	2008.0	$21/2^+$			
508.0 *10*	0.5 *3*	9915.6	$69/2^+$	9407.6	$67/2^+$			
510.1 *10*	7.9 *8*	2613.4	$27/2^+$	2103.2	$25/2^-$			
510.2 *10*	7.1 *12*	1151.4	$15/2^+$	641.3	$11/2^+$			
511.6 *10*	0.5 *4*	10427.1	$71/2^+$	9915.6	$69/2^+$			
513.0 *10*	0.5 *3*	10137.4	$69/2^+$	9624.3	$67/2^+$			
515.0 *10*	0.5 *5*	10652.4	$71/2^+$	10137.4	$69/2^+$			
515.30 *10*	87[#] *8*	3865.9	$37/2^+$	3350.6	$33/2^+$			
522.0 *10*	3.8 *9*	4830.0	$41/2^-$	4308.1	$37/2^-$			
527.0 *10*	0.4 *3*	11504.2	$75/2^+$	10977.2	$73/2^+$			
527.77[@] *10*	40 *4*	1281.3	$17/2^+$	753.7	$13/2^+$			
529.8 *10*	0.5[#] *4*	2199.2	$21/2^+$	1669.5	$19/2^+$	(D)		DCO=0.97 *14* (1999Do34) I$_\gamma$: Iγ(530)/Iγ(386)=5.4 *8*/100 (1999Do34).
532.82[@] *10*	12.7 *12*	2399.3	$25/2^+$	1866.6	$21/2^+$			
533.81[@] *10*	13.9 *18*	1501.4	$17/2^+$	967.58	$13/2^+$	(Q)		DCO=0.85 *12* (1999Do34)
534.3 *10*	11.5[#] *8*	4492.1	$39/2^+$	3957.8	$35/2^+$			
537.3 *10*	2.1 *5*	5114.9	$43/2^-$	4577.7	$39/2^-$			
539.2 *10*	0.4 *3*	9251.6	$65/2^-$	8712.3	$63/2^-$			
541.4 *10*	1.00 *10*	2680.0	$27/2^+$	2138.6	$23/2^+$			

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^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

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

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	Comments
541.8 *10*	9.2 *14*	1416.0	17/2$^+$	874.2	13/2$^+$			
544.72[@] *10*	23.5 *18*	3788.7	37/2$^+$	3244.0	33/2$^+$			
545.9 *10*	13.6 *16*	2684.5	27/2$^+$	2138.6	23/2$^+$			
548.49[@] *10*	29.5 *22*	1484.6	21/2$^-$	936.2	17/2$^-$			
550.1 *10*	0.5 *4*	10977.2	73/2$^+$	10427.1	71/2$^+$			
552.09[@] *10*	33.8 *25*	4102.7	41/2$^-$	3550.6	37/2$^-$			
553.85[@] *10*	73 *5*	1560.9	19/2$^+$	1007.0	15/2$^+$			
557.4 *10*	2.5 *6*	3634.7	35/2$^+$	3077.2	31/2$^+$			
560.6 *10*	2.3 *4*	4555.4	41/2$^-$	3994.8	37/2$^-$			
562.00[@] *10*	117 *8*	1676.2	23/2$^-$	1114.1	19/2$^-$			
562.96 *10*	16.4 *22*	1669.5	19/2$^+$	1106.5	15/2$^+$			
563.4 *10*	2.0 *5*	3417.6	33/2$^-$	2854.2	29/2$^-$			
564.8 *10*	5.3[#] *20*	3078.8	27/2$^+$	2514.0	25/2$^+$			
568.0 *10*	3.2[#] *6*	4936.8	41/2$^+$	4368.7	37/2$^+$			
568.6 *10*	0.9 *3*	3891.4	37/2$^+$	3322.7	33/2$^+$			
577.2 *10*	3.8 *6*	3994.8	37/2$^-$	3417.6	33/2$^-$			
577.7 *10*	2.7 *15*	1729.1	19/2$^+$	1151.4	15/2$^+$			
577.73[@] *10*	61 *5*	2138.6	23/2$^+$	1560.9	19/2$^+$			
578.65 *10*	79[#] *8*	4444.6	41/2$^+$	3865.9	37/2$^+$			
578.71[@] *10*	18.2 *23*	4149.7	39/2$^+$	3570.9	35/2$^+$			
581.2 *10*	1.8 *10*	2684.5	27/2$^+$	2103.2	25/2$^-$			
584.45[@] *10*	36 *3*	4067.1	39/2$^+$	3482.7	35/2$^+$			
585.17[@] *10*	35 *3*	1866.6	21/2$^+$	1281.3	17/2$^+$			
585.86 *17*	18.3 *21*	2087.3	21/2$^+$	1501.4	17/2$^+$			
585.9 *10*	7.2[#] *25*	3486.2	31/2$^+$	2900.3	29/2$^+$			
586.0 *10*	5.3 *8*	4252.7	39/2$^-$	3666.7	35/2$^-$			
588.4 *10*	3.2 *8*	5418.3	45/2$^-$	4830.0	41/2$^-$			
592.0 *10*	2.8 *8*	2008.0	21/2$^+$	1416.0	17/2$^+$			
595.2 *10*	3.0 *5*	4847.8	43/2$^-$	4252.7	39/2$^-$			
595.8 *10*	12.0[#] *8*	5087.9	43/2$^+$	4492.1	39/2$^+$			
603.5 *10*	6.0 *10*	2019.5	21/2$^+$	1416.0	17/2$^+$			
606.85[@] *10*	9.7 *14*	2276.3	23/2$^+$	1669.5	19/2$^+$			
607.1 *10*	8.8[#] *6*	3957.8	35/2$^+$	3350.6	33/2$^+$	(E2+M1)	−3.1 *4*	Mult.,δ: from Iγ(25°)/Iγ(90°)=0.42 *2*, DCO=0.34 *6*, POL=+0.05 *5* (2002Je05,2001Od03).
608.77[@] *10*	23.8 *19*	4430.2	43/2$^-$	3821.5	39/2$^-$			
609.6 *10*	0.8 *7*	2338.6	23/2$^+$	1729.1	19/2$^+$			
612.1 *10*	2.1 *4*	5167.6	45/2$^-$	4555.4	41/2$^-$			
616.17[@] *10*	27.7 *22*	4404.8	41/2$^+$	3788.7	37/2$^+$			
617.48[@] *10*	86 *6*	2923.8	31/2$^-$	2306.4	27/2$^-$			
618.72[@] *10*	39 *3*	2103.2	25/2$^-$	1484.6	21/2$^-$			
619.8 *10*	2.5 *12*	4254.5	39/2$^+$	3634.7	35/2$^+$			
620.9 *10*	10.7 *14*	2487.5	25/2$^+$	1866.6	21/2$^+$			
626.2 *10*	5.6[#] *4*	4492.1	39/2$^+$	3865.9	37/2$^+$	(E2+M1)	−3.1 *4*	Mult.,δ: from Iγ(25°)/Iγ(90°)=0.47 *2*, DCO=0.33 *6*, POL=+0.12 *5* (2002Je05,2001Od03).
626.8 *10*	5.1[#] *10*	5563.7	45/2$^+$	4936.8	41/2$^+$			
630.14[@] *10*	100 *5*	2306.4	27/2$^-$	1676.2	23/2$^-$			
636.8 *10*	3.8 *8*	4528.4	41/2$^+$	3891.4	37/2$^+$			
638.96 *10*	63[#] *6*	5083.5	45/2$^+$	4444.6	41/2$^+$			

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^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

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

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	Comments
640.7 *10*	3.4 *9*	5755.8	47/2$^-$	5114.9	43/2$^-$			
643.3 *10*	4.3[#] *3*	5087.9	43/2$^+$	4444.6	41/2$^+$	(E2+M1)	−3.1 *4*	Mult.,δ: from DCO=0.32 *6*, POL=+0.11 *5* (2002Je05,2001Od03).
643.81[@] *10*	21.0 *18*	2747.1	29/2$^-$	2103.2	25/2$^-$			
645.0 *10*	1.5[#] *4*	6964.5	51/2$^{(-)}$	6319.5	47/2$^{(-)}$			
646.3 *10*	22 *3*	3666.7	35/2$^-$	3020.3	31/2$^-$			
647.2 *10*	2.1 *4*	5495.0	47/2$^-$	4847.8	43/2$^-$			
648.5 *10*	3.0 *8*	4903.0	43/2$^+$	4254.5	39/2$^+$			
651.30[@] *10*	46 *3*	4718.6	43/2$^+$	4067.1	39/2$^+$			
652.59 *21*	31.4 *24*	5056.4	45/2$^+$	4404.8	41/2$^+$			E_γ: Poor fit. Level-energy difference=651.6.
653.4 *10*	2.1 *5*	5556.3	47/2$^+$	4903.0	43/2$^+$			
653.8 *10*	9.3 *12*	2138.6	23/2$^+$	1484.6	21/2$^-$			
654.6 *10*	14.0[#] *9*	5742.5	47/2$^+$	5087.9	43/2$^+$			
655.4 *10*	0.8 *5*	5558.3	47/2$^+$	4903.0	43/2$^+$			
656.60[@] *10*	22.2 *18*	4759.5	45/2$^-$	4102.7	41/2$^-$			
658.8 *10*	0.5 *5*	5418.3	45/2$^-$	4759.5	45/2$^-$			
658.9 *10*	3.4[#] *3*	5742.5	47/2$^+$	5083.5	45/2$^+$	(E2+M1)	−3.1 *4*	Mult.,δ: from Iγ(25°)/Iγ(90°)=0.47 *2*, DCO=0.30 *6*, POL=+0.17 *9* (2002Je05,2001Od03).
662.85[@] *10*	17.5 *20*	5719.0	49/2$^+$	5056.4	45/2$^+$			
666.3 *10*	4.0 *15*	2227.2	23/2$^+$	1560.9	19/2$^+$			
666.54[@] *10*	11.9 *14*	4816.1	43/2$^+$	4149.7	39/2$^+$			
667.97[@] *10*	22.5 *22*	5386.8	47/2$^+$	4718.6	43/2$^+$			
670.7 *10*	5.0 *8*	3417.6	33/2$^-$	2747.1	29/2$^-$			
673.2 *10*	3.4[#] *10*	6453.7	51/2$^+$	5780.5	49/2$^+$	(E2+M1)	−3.1 *4*	Mult.,δ: from Iγ(25°)/Iγ(90°)=0.46 *2*, DCO=0.38 *6*, POL=+0.18 *9* (2002Je05,2001Od03).
677.14[@] *10*	14.7 *15*	6064.2	51/2$^+$	5386.8	47/2$^+$			
680.1 *10*	1.7 *5*	5208.5	45/2$^+$	4528.4	41/2$^+$			
680.7 *10*	1.4 *11*	2409.7	21/2$^+$	1729.1	19/2$^+$			
683.6[b] *10*	1.2 *8*	4254.5	39/2$^+$	3570.9	35/2$^+$			
684.3 *10*	0.5 *4*	5114.9	43/2$^-$	4430.2	43/2$^-$			Iγ(25°)/Iγ(90°)=1.73 *35* (2004Je03). Mult.: ΔJ=0 transition.
684.3 *10*	1.7 *4*	5851.9	49/2$^-$	5167.6	45/2$^-$			
685.1 *10*	6.2[#] *12*	6248.8	49/2$^+$	5563.7	45/2$^+$			
686.8 *10*	1.0 *8*	6245.3	51/2$^+$	5558.3	47/2$^+$			
686.8 *10*	1.7[#] *5*	7219.9	55/2$^+$	6533.1	53/2$^+$			
688.5 *10*	1.6 *7*	5897.1	49/2$^+$	5208.5	45/2$^+$			
688.7 *10*	4.8 *12*	6106.9	49/2$^-$	5418.3	45/2$^-$			
689.1 *10*	5.8 *13*	6245.3	51/2$^+$	5556.3	47/2$^+$			
694.96 *10*	16.4 *17*	6414.0	53/2$^+$	5719.0	49/2$^+$			
696.97 *11*	48[#] *5*	5780.5	49/2$^+$	5083.5	45/2$^+$			
697.8 *10*	1.8[#] *10*	2199.2	21/2$^+$	1501.4	17/2$^+$			I_γ: Iγ(697)/Iγ(386)=23 *5*/100 (1999Do34) for an unresolved 697 peak.
700.67[@] *10*	15.3 *14*	5130.6	47/2$^-$	4430.2	43/2$^-$			
701.1 *10*	1.1[#] *4*	8039.8	59/2$^+$	7338.7	57/2$^+$			
702.2 *10*	2.5[#] *16*	7666.7	55/2$^{(-)}$	6964.5	51/2$^{(-)}$			
706.9 *10*	0.8 *7*	2435.9	23/2$^+$	1729.1	19/2$^+$			
711.2 *10*	13.4[#] *20*	6453.7	51/2$^+$	5742.5	47/2$^+$			
713.0 *10*	0.7 *4*	6718.0	53/2$^+$	6005.0	49/2$^+$			
713.8 *10*	1.0 *6*	5242.2	45/2$^+$	4528.4	41/2$^+$			

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^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

γ(^{163}Lu) (continued)

E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
714.0 *10*	22 *3*	3020.3	31/2$^-$	2306.4	27/2$^-$		
716.3 *10*	0.6# *3*	8912.7	63/2$^+$	8196.4	61/2$^+$		
718.4 *10*	1.5 *4*	6615.4	53/2$^+$	5897.1	49/2$^+$		
723.1 *10*	13.7 *13*	2399.3	25/2$^+$	1676.2	23/2$^-$		
723.69@ *10*	14.0 *14*	6787.7	55/2$^+$	6064.2	51/2$^+$		
727.3 *10*	2.5 *5*	4830.0	41/2$^-$	4102.7	41/2$^-$	(M1)	DCO=0.99 *18*, POL=−0.22 *4*, Iγ(25°)/Iγ(90°)=1.61 *31* (2004Je03). Mult.: ΔJ=0 transition.
727.3 *10*	1.6 *4*	6222.3	51/2$^-$	5495.0	47/2$^-$		E_γ: 1999Do34 erroneously placed this γ from 43/2$^-$ member of this band defining a level At 4981.
733.5 *10*	1.4 *3*	6978.9	55/2$^+$	6245.3	51/2$^+$		
740.0 *10*	3.1 *5*	5556.3	47/2$^+$	4816.1	43/2$^+$		
741.2 *10*	4.7# *9*	6990.0	53/2$^+$	6248.8	49/2$^+$		
742.20@ *10*	4.7 *9*	5558.3	47/2$^+$	4816.1	43/2$^+$		
742.5 *10*	3.2 *8*	2227.2	23/2$^+$	1484.6	21/2$^-$		
742.9 *10*	8.1 *12*	3666.7	35/2$^-$	2923.8	31/2$^-$		
744.31@ *10*	18.7 *15*	5503.9	49/2$^-$	4759.5	45/2$^-$		
745.7 *10*	6.6 *17*	6501.4	51/2$^-$	5755.8	47/2$^-$		
751.2 *10*	6.2 *12*	2854.2	29/2$^-$	2103.2	25/2$^-$		
752.61 *10*	37# *4*	6533.1	53/2$^+$	5780.5	49/2$^+$		
754.6 *10*	3.0# *15*	8421.3	59/2$^{(-)}$	7666.7	55/2$^{(-)}$		
756.4 *10*	3.9 *9*	4577.7	39/2$^-$	3821.5	39/2$^-$	(M1)	DCO=1.22 *24*; POL=−0.12 *3* for 757.6+756.4 (2004Je03). Iγ(25°)/Iγ(90°)=1.68 *34* for doublet (2004Je03). Mult.: ΔJ=0 transition.
757.6 *10*	5.6 *4*	4308.1	37/2$^-$	3550.6	37/2$^-$	(M1)	DCO=1.22 *24*; POL=−0.12 *3* for 757.6+756.4 (2004Je03). Iγ(25°)/Iγ(90°)=1.68 *34* for doublet (2004Je03). Mult.: ΔJ=0 transition.
758.85 *12*	10.0 *11*	7173.0	57/2$^+$	6414.0	53/2$^+$		
762.7 *10*	0.30 *20*	6005.0	49/2$^+$	5242.2	45/2$^+$		
764.9 *10*	1.4 *4*	6616.7	53/2$^-$	5851.9	49/2$^-$		
766.2 *10*	11.1# *20*	7219.9	55/2$^+$	6453.7	51/2$^+$		
774.5 *10*	2.2 *3*	7389.8	57/2$^+$	6615.4	53/2$^+$		
777.3 *10*	0.8 *7*	7131.9	55/2$^+$	6354.7	51/2$^+$		
785.18 *10*	9.3 *10*	5915.7	51/2$^-$	5130.6	47/2$^-$		
787.9 *10*	0.5 *3*	7505.8	57/2$^+$	6718.0	53/2$^+$		
795.48 *15*	8.9 *9*	7583.3	59/2$^+$	6787.7	55/2$^+$		
795.9 *10*	4.1# *8*	7785.9	57/2$^+$	6990.0	53/2$^+$		
796.4 *10*	4.7 *15*	6005.0	49/2$^+$	5208.5	45/2$^+$		
796.4 *10*	4.7 *9*	6354.7	51/2$^+$	5558.3	47/2$^+$		
799.2 *10*	2.6 *6*	6906.2	53/2$^-$	6106.9	49/2$^-$		
805.3 *10*	3.0 *4*	7784.2	59/2$^+$	6978.9	55/2$^+$		
805.57 *10*	29# *3*	7338.7	57/2$^+$	6533.1	53/2$^+$		
810.1 *10*	2.5 *10*	9231.4	63/2$^{(-)}$	8421.3	59/2$^{(-)}$		
811.9 *10*	1.5 *5*	7034.2	55/2$^-$	6222.3	51/2$^-$		
819.9 *10*	9.0# *14*	8039.8	59/2$^+$	7219.9	55/2$^+$		
822.7 *10*	0.5 *4*	7954.7	59/2$^+$	7131.9	55/2$^+$		
823.19@ *10*	1.3 *6*	7177.9	55/2$^+$	6354.7	51/2$^+$		
829.00@ *10*	10.4 *10*	6332.9	53/2$^-$	5503.9	49/2$^-$		
837.45 *22*	7.3 *7*	8010.0	61/2$^+$	7173.0	57/2$^+$		
846.3 *10*	2.3 *3*	8236.2	61/2$^+$	7389.8	57/2$^+$		
848.5 *10*	1.9 *5*	7350.0	55/2$^-$	6501.4	51/2$^-$		

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^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

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

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π
848.9 *10*	1.1 *3*	7465.6	57/2$^-$	6616.7	53/2$^-$
849.8 *10*	3.6[#] *8*	8635.7	61/2$^+$	7785.9	57/2$^+$
857.7 *10*	16.9[#] *23*	8196.4	61/2$^+$	7338.7	57/2$^+$
863.38[@] *10*	1.3 *6*	2539.7	25/2$^+$	1676.2	23/2$^-$
865.3 *10*	2.0[#] *10*	10096.7	67/2$^{(-)}$	9231.4	63/2$^{(-)}$
867.05[@] *10*	0.4 *3*	8044.9	59/2$^+$	7177.9	55/2$^+$
868.0 *10*	1.1 *3*	7902.2	59/2$^-$	7034.2	55/2$^-$
872.8 *10*	8.5 *9*	6788.8	55/2$^-$	5915.7	51/2$^-$
872.9 *10*	6.0[#] *14*	8912.7	63/2$^+$	8039.8	59/2$^+$
875.5 *10*	4.5 *5*	8458.3	63/2$^+$	7583.3	59/2$^+$
880.2 *10*	0.5 *3*	8386.1	61/2$^+$	7505.8	57/2$^+$
883.4 *10*	2.1 *4*	8667.5	63/2$^+$	7784.2	59/2$^+$
893.7 *10*	1.2 *8*	2008.0	21/2$^+$	1114.1	19/2$^-$
899.9 *10*	0.5 *3*	8854.6	63/2$^+$	7954.7	59/2$^+$
902.5 *10*	2.5[#] *6*	9538.2	65/2$^+$	8635.7	61/2$^+$
906.5 *10*	1.7 *4*	7812.7	57/2$^-$	6906.2	53/2$^-$
909.7 *10*	13.5[#] *19*	9106.1	65/2$^+$	8196.4	61/2$^+$
913.0 *10*	7.3 *8*	7245.7	57/2$^-$	6332.9	53/2$^-$
913.0 *10*	0.9 *4*	8378.6	61/2$^-$	7465.6	57/2$^-$
915.6 *10*	4.5 *11*	8925.8	65/2$^+$	8010.0	61/2$^+$
916.8 *10*	1.4 *4*	9153.0	65/2$^+$	8236.2	61/2$^+$
920.5 *10*	1.5[#] *9*	11017.2	71/2$^{(-)}$	10096.7	67/2$^{(-)}$
926.5 *10*	4.5[#] *12*	9839.2	67/2$^+$	8912.7	63/2$^+$
928.1 *10*	0.4 *3*	8973.0	63/2$^+$	8044.9	59/2$^+$
939.2 *10*	3.5 *10*	7728.0	59/2$^-$	6788.8	55/2$^-$
940.0 *10*	1.3 *3*	8290.0	59/2$^-$	7350.0	55/2$^-$
942.2 *10*	0.7 *4*	8844.4	63/2$^-$	7902.2	59/2$^-$
943.8 *10*	0.20 *10*	9329.8	65/2$^+$	8386.1	61/2$^+$
949.4 *10*	2.1 *7*	9407.6	67/2$^+$	8458.3	63/2$^+$
951.2 *10*	0.5 *5*	2435.9	23/2$^+$	1484.6	21/2$^-$
955.8 *10*	1.7[#] *5*	10494.0	69/2$^+$	9538.2	65/2$^+$
956.8 *10*	0.5 *3*	9624.3	67/2$^+$	8667.5	63/2$^+$
960.5 *10*	0.10 *5*	9815.1	67/2$^+$	8854.6	63/2$^+$
962.53 *14*	7.0[#] *12*	10068.6	69/2$^+$	9106.1	65/2$^+$
962.8 *10*	1.5[#] *7*	3863.2	33/2$^+$	2900.3	29/2$^+$
975.7 *10*	1.2[#] *5*	11992.9	75/2$^{(-)}$	11017.2	71/2$^{(-)}$
975.9 *10*	2.5 *13*	8221.5	61/2$^-$	7245.7	57/2$^-$
976.4 *10*	0.9 *3*	8789.1	61/2$^-$	7812.7	57/2$^-$
980.2 *10*	2.0[#] *8*	10819.4	71/2$^+$	9839.2	67/2$^+$
984.3 *10*	1.4 *6*	8712.3	63/2$^-$	7728.0	59/2$^-$
984.4 *10*	1.0 *5*	10137.4	69/2$^+$	9153.0	65/2$^+$
988.6 *10*	0.5 *4*	4308.1	37/2$^-$	3319.6	35/2$^-$
989.8 *10*	2.1 *7*	9915.6	69/2$^+$	8925.8	65/2$^+$
990.6[b] *10*	0.4[#] *3*	1285.0?	(13/2$^+$)	294.3	11/2$^-$
993.4 *10*	0.5 *4*	9283.4	63/2$^-$	8290.0	59/2$^-$
995.4 *10*	1.0 *5*	9707.7	67/2$^-$	8712.3	63/2$^-$
996.4 *10*	0.5 *4*	5755.8	47/2$^-$	4759.5	45/2$^-$
996.5 *10*	0.6 *4*	9375.1	65/2$^-$	8378.6	61/2$^-$
1002.9 *10*	0.10 *10*	10332.8	69/2$^+$	9329.8	65/2$^+$
1004.8 *10*	1.8 *6*	4555.4	41/2$^-$	3550.6	37/2$^-$
1005.9 *10*	1.0 *6*	10713.7	71/2$^-$	9707.7	67/2$^-$

Continued on next page (footnotes at end of table)

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

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

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
1009.2 *10*	1.2[#] *4*	11503.2	73/2$^+$	10494.0	69/2$^+$		
1012.2 *10*	0.7 *3*	5114.9	43/2$^-$	4102.7	41/2$^-$	D	DCO=0.72 *20* (2004Je03) Iγ(25°)/Iγ(90°)=1.03 *20* (2004Je03). Mult.: ΔJ=1 transition.
1015.0 *10*	0.5 *4*	9804.1	65/2$^-$	8789.1	61/2$^-$		
1015.0[a] *10*	0.40[a] *20*	11728.7	75/2$^-$	10713.7	71/2$^-$	E2	POL=+0.11 *3*, Iγ(25°)/Iγ(90°)=1.43 *25* (2004Je03). Mult.: ΔJ=2 transition.
1015.0[a] *20*	0.30[a] *20*	12744	79/2$^-$	11728.7	75/2$^-$		
1016.5 *10*	5.0[#] *12*	11085.2	73/2$^+$	10068.6	69/2$^+$		
1018.1 *10*	1.8[#] *6*	4368.7	37/2$^+$	3350.6	33/2$^+$	Q	Mult.: Iγ(25°)/Iγ(90°)=1.41 *15* consistent with ΔJ=2, Q (2002Je10).
1019.6 *10*	1.0 *7*	10427.1	71/2$^+$	9407.6	67/2$^+$		
1026.3 *10*	1.7 *3*	4847.8	43/2$^-$	3821.5	39/2$^-$		
1027.1 *10*	0.7 *3*	4577.7	39/2$^-$	3550.6	37/2$^-$		
1028.0 *10*	1.0 *5*	10652.4	71/2$^+$	9624.3	67/2$^+$		
1030.0 *10*	0.7 *4*	9251.6	65/2$^-$	8221.5	61/2$^-$		
1031.6 *10*	0.7[#] *3*	13024.5	79/2$^{(-)}$	11992.9	75/2$^{(-)}$		
1034.7 *10*	1.2[#] *5*	11854.1	75/2$^+$	10819.4	71/2$^+$		
1048.3 *10*	0.20 *10*	11185.6	73/2$^+$	10137.4	69/2$^+$		
1052.8 *10*	0.30 *10*	13797	83/2$^-$	12744	79/2$^-$		
1061.6 *10*	1.0 *7*	10977.2	73/2$^+$	9915.6	69/2$^+$		
1061.9 *10*	0.30 *10*	10313.5	69/2$^-$	9251.6	65/2$^-$		
1063.0 *10*	1.0[#] *4*	12566.2	77/2$^+$	11503.2	73/2$^+$		
1064.7 *10*	0.7 *3*	5495.0	47/2$^-$	4430.2	43/2$^-$		
1064.9 *10*	1.7 *4*	5167.6	45/2$^-$	4102.7	41/2$^-$		
1066.5 *10*	0.30 *20*	11780.2	75/2$^-$	10713.7	71/2$^-$		
1070.8 *10*	1.0[#] *3*	4936.8	41/2$^+$	3865.9	37/2$^+$		
1071.0 *10*	0.4 *3*	10875.1	69/2$^-$	9804.1	65/2$^-$		
1071.1 *10*	3.5[#] *10*	12156.2	77/2$^+$	11085.2	73/2$^+$		
1077.1 *10*	0.8 *6*	11504.2	75/2$^+$	10427.1	71/2$^+$		
1080.1 *10*	0.10 *5*	12265.7	77/2$^+$	11185.6	73/2$^+$		
1082.6 *10*	0.9[#] *3*	8421.3	59/2$^{(-)}$	7338.7	57/2$^+$	D	Iγ(25°)/Iγ(90°)=0.71 *13* (2004Je03).
1084.6 *10*	0.10 *10*	12864.8	79/2$^-$	11780.2	75/2$^-$		
1085.5[b] *10*	0.20[#] *10*	14110	83/2$^{(-)}$	13024.5	79/2$^{(-)}$		
1088.9 *10*	1.0[#] *5*	12943.0	79/2$^+$	11854.1	75/2$^+$		
1092.2 *10*	0.20 *10*	14889	87/2$^-$	13797	83/2$^-$		
1092.4 *10*	0.20 *10*	5851.9	49/2$^-$	4759.5	45/2$^-$		
1095.5 *10*	0.5 *3*	11748.0	75/2$^+$	10652.4	71/2$^+$		
1100.2[b] *10*	0.20 *10*	13197.1	81/2$^+$	12096.9	77/2$^+$		
1112.4 *10*	0.7[#] *3*	13678.6	81/2$^+$	12566.2	77/2$^+$		
1113.4 *10*	0.30 *10*	12862	79/2$^+$	11748.0	75/2$^+$		
1119.2 *3*	1.3[#] *3*	5563.7	45/2$^+$	4444.6	41/2$^+$	(Q)	Mult.: Iγ(25°)/Iγ(90°)=1.49 *8* (2002Je10) consistent with ΔJ=2.
1119.6 *10*	0.30 *20*	13745.7	83/2$^+$	12626.0	79/2$^+$		
1119.7 *10*	0.5 *4*	12096.9	77/2$^+$	10977.2	73/2$^+$		
1121.8 *10*	0.5 *4*	12626.0	79/2$^+$	11504.2	75/2$^+$		
1126.2 *10*	1.2[#] *5*	13282.5	81/2$^+$	12156.2	77/2$^+$		
1133.6 *10*	1.1[#] *4*	7666.7	55/2$^{(-)}$	6533.1	53/2$^+$	(D)	Iγ(25°)/Iγ(90°)=0.75 *22* (2004Je03).
1134.5 *10*	0.10 *5*	16023	91/2$^-$	14889	87/2$^-$		
1143.0 *10*	0.8[#] *4*	14086.0	83/2$^+$	12943.0	79/2$^+$		
1147 *4*	0.5[#] *4*	14826	85/2$^+$	13678.6	81/2$^+$		

Continued on next page (footnotes at end of table)

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)

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

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
1165.3 *10*	1.5[#] *4*	6248.8	49/2$^+$	5083.5	45/2$^+$	Q	Mult.: DCO=1.01 *15*, Iγ(25°)/Iγ(90°)=1.44 *10* (2002Je10,2002Je05).
1179.3 *10*	1.1[#] *5*	14461.8	85/2$^+$	13282.5	81/2$^+$		
1179.5 *10*	0.10 *5*	17203	95/2$^-$	16023	91/2$^-$		
1184.0 *10*	1.5[#] *5*	6964.5	51/2$^{(-)}$	5780.5	49/2$^+$	D	DCO=0.58 *17*, Iγ(25°)/Iγ(90°)=0.66 *20* (2004Je03).
1197.3 *10*	0.6[#] *3*	15283	87/2$^+$	14086.0	83/2$^+$		
1209.5 *10*	1.2[#] *4*	6990.0	53/2$^+$	5780.5	49/2$^+$	Q	Mult.: DCO=1.04 *15*, Iγ(25°)/Iγ(90°)=1.46 *10* (2002Je10) consistent with ΔJ=2, quadrupole.
1227.0 *10*	1.1[#] *5*	15689	89/2$^+$	14461.8	85/2$^+$		
1232.4 *10*	0.10 *5*	18435	99/2$^-$	17203	95/2$^-$		
1235.9 *10*	0.6[#] *3*	6319.5	47/2$^{(-)}$	5083.5	45/2$^+$	(D)	Iγ(25°)/Iγ(90°)=0.70 *21*.
1247.5 *10*	0.40[#] *20*	16531	91/2$^+$	15283	87/2$^+$		
1252.8 *10*	0.8[#] *3*	7785.9	57/2$^+$	6533.1	53/2$^+$		
1269.0 *10*	0.9[#] *5*	16958	93/2$^+$	15689	89/2$^+$		
1292.0 *10*	0.5[#] *4*	1935.7	17/2$^+$	643.6	15/2$^-$		
1297.0[b] *10*	0.8[#] *5*	8635.7	61/2$^+$	7338.7	57/2$^+$		
1303.5 *10*	0.7[#] *4*	18261	97/2$^+$	16958	93/2$^+$		

[†] From RADWARE file (2004JeZZ) received from the authors of 2004Je03. The energy uncertainties for 105 γ transitions were found to be too small to give an acceptable least-squares fit. A large number of gamma-ray energies deviated from the fitted values by more than two times the quoted uncertainties. The evaluators have assigned a minimum uncertainty of 0.1 keV. This results in a better least-squares fit of the level scheme. Uncertainty of 1.0 keV assigned in the RADWARE file is a default value. Many Eγ values are the same as in 2002Je05.

[‡] From RADWARE file supplied by D.R. Jensen (Feb. 6, 2004) (2004JeZZ). The values are relative to 100 for 630γ from 2307 level for normal-deformed bands and relative to 100 for 386γ from 2900 level for SD band transitions. Many Iγ values are the same as in 2002Je05. To obtain intensities for SD bands relative to 100 for 630γ, divide each intensity by 7.25 (2002Je05).

[#] Relative to 100 for 386γ from 2900 level in SD-1 band. To obtain intensity relative to 100 for 630γ from 2307 level in normal-deformed structure, divide by 7.25 (factor given by 2002Je05).

[@] ΔEγ increased to 0.1 keV (by the evaluators). Uncertainty quoted by 2004Je03 in the authors′ RADWARE file (2004JeZZ) is from 0.03-0.09 keV, which fails to give an acceptable least squares fit to the level scheme.

[&] From 1999Do34 only, treated As uncertain by the evaluators since it is not confirmed In the high-statistics data of 2004Je03.

[a] Multiply placed with intensity suitably divided.

[b] Placement of transition in the level scheme is uncertain.

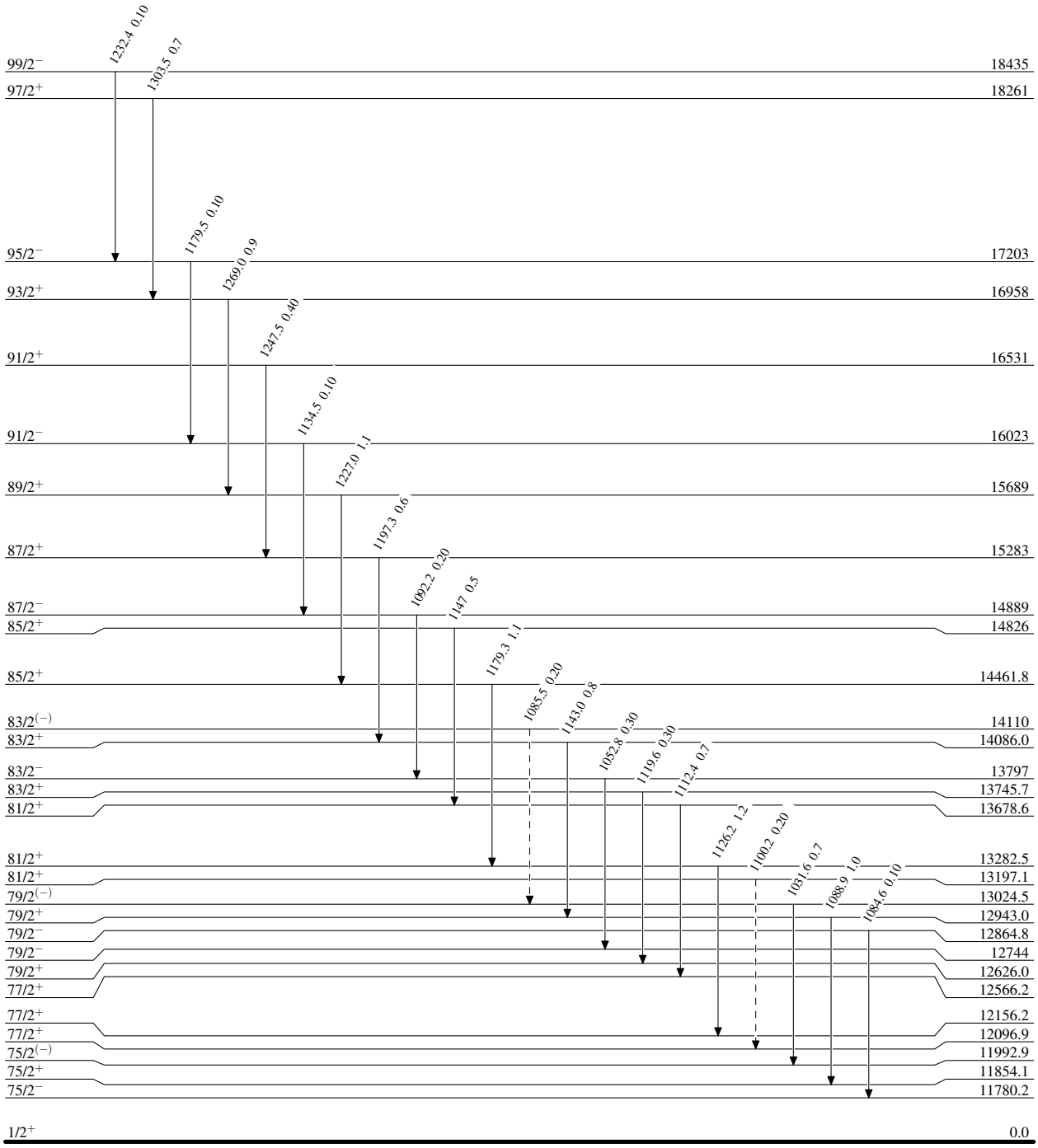
^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05

Level Scheme

Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



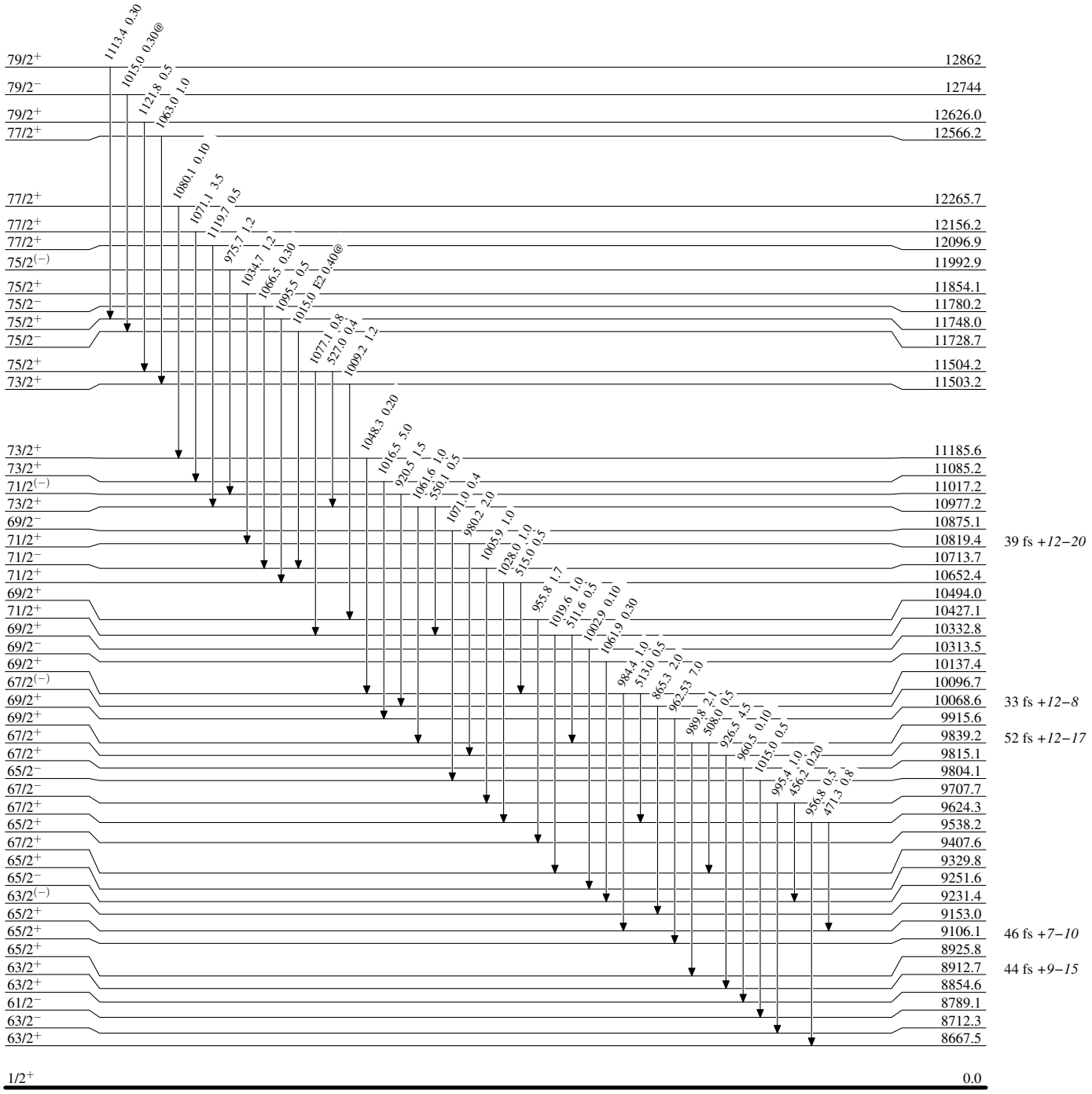
$^{163}_{71}Lu_{92}$

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



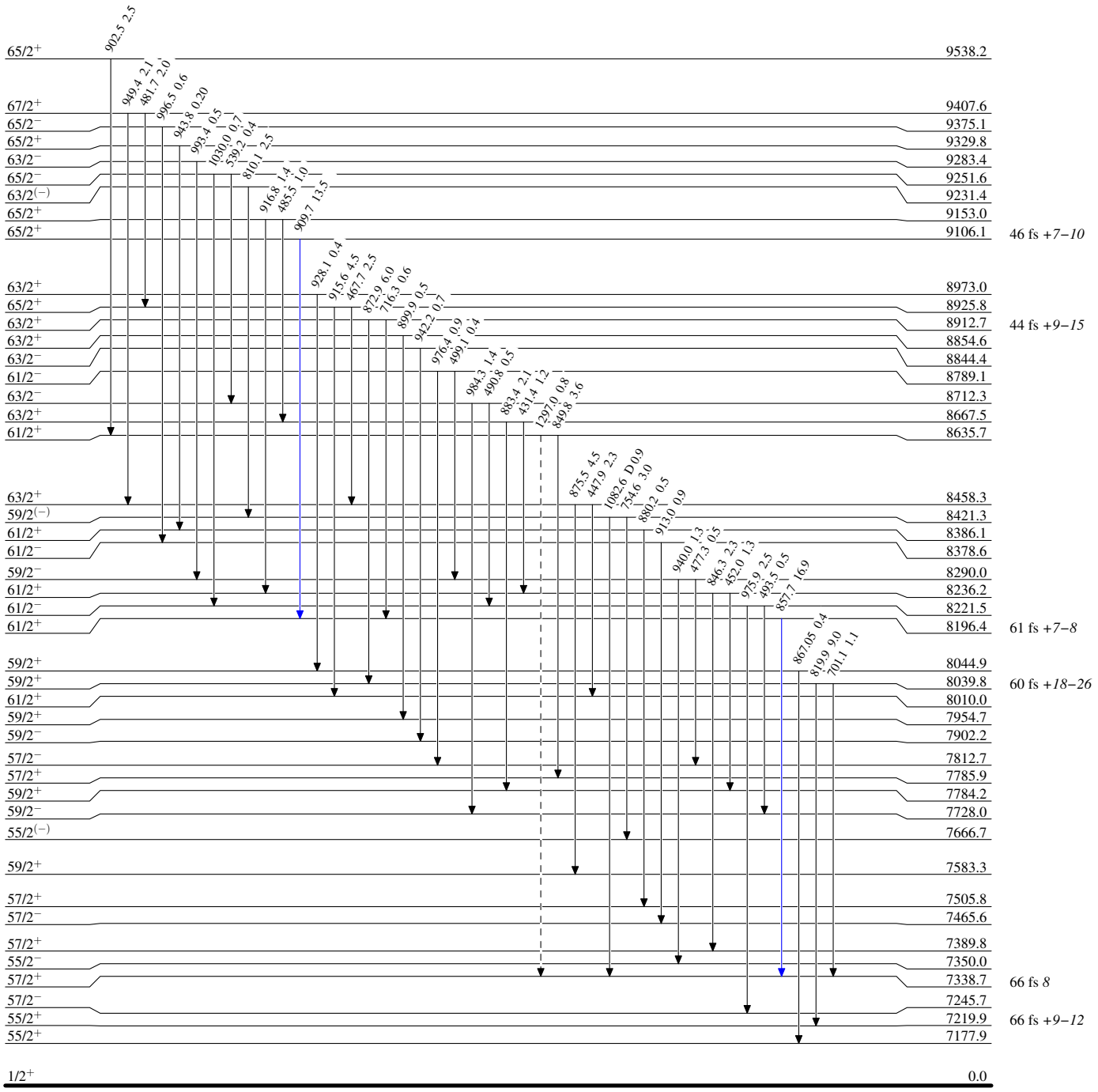
$^{163}_{71}Lu_{92}$

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



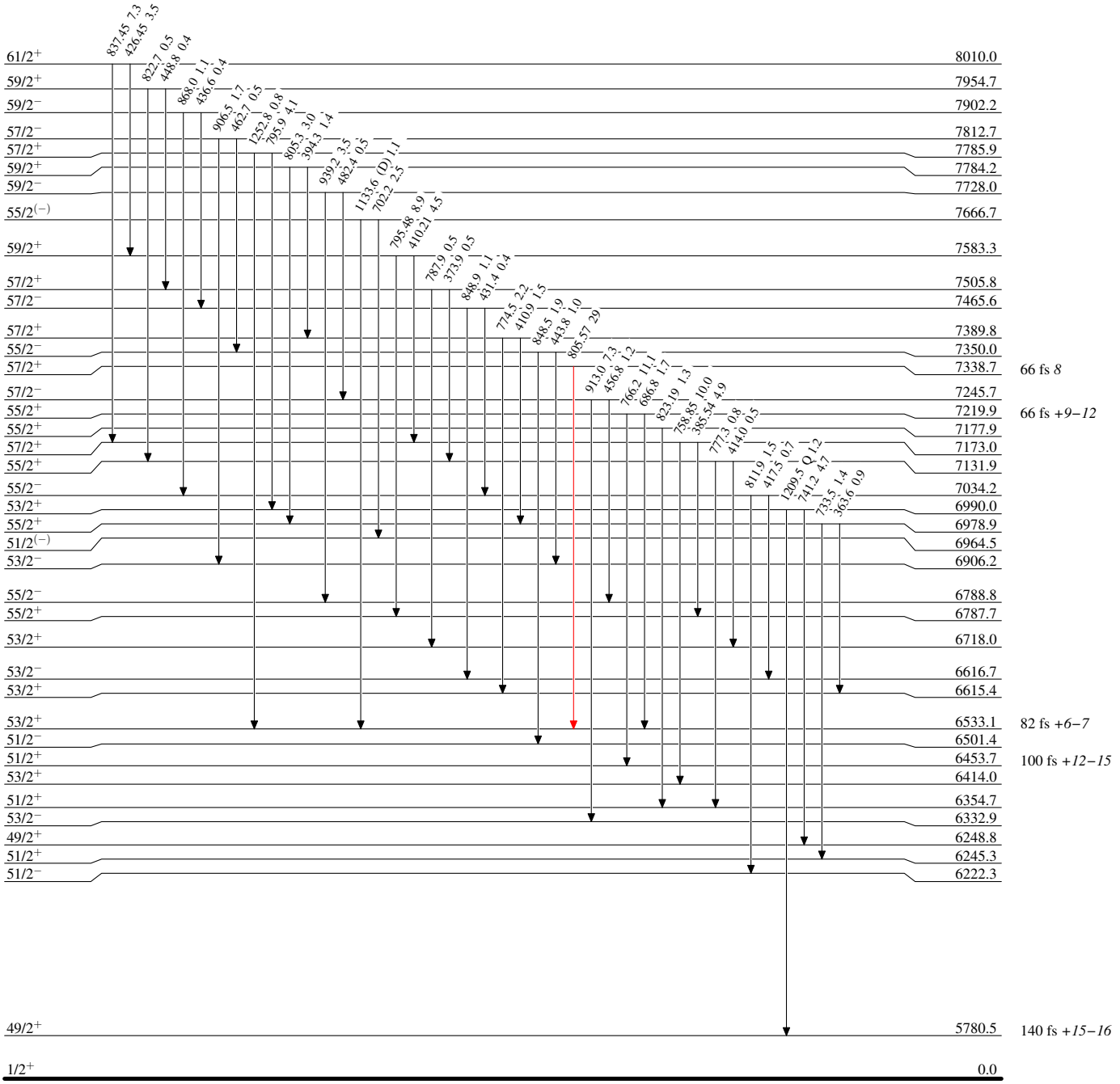
$^{163}_{71}Lu_{92}$

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



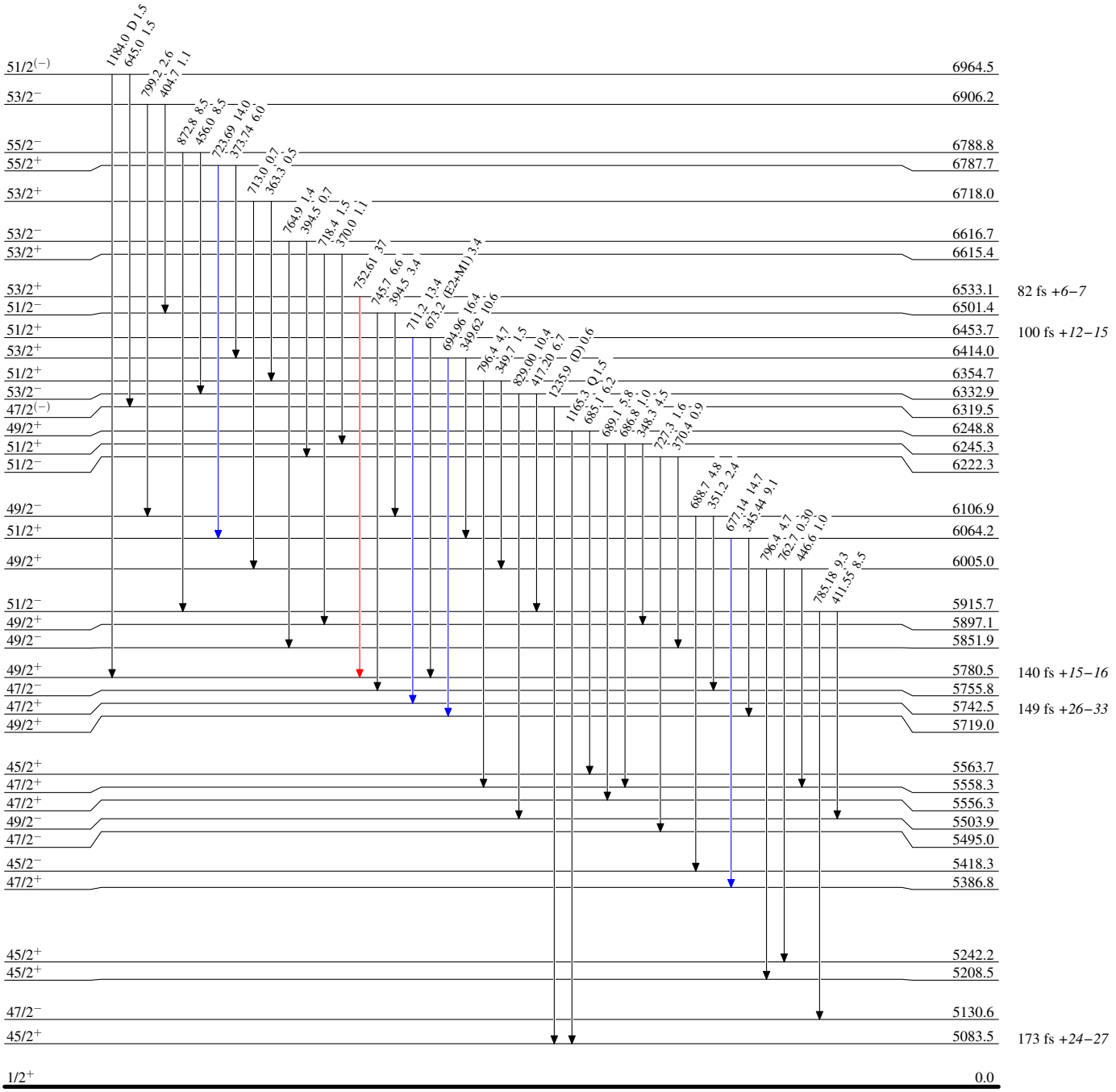
$^{163}_{71}Lu_{92}$

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



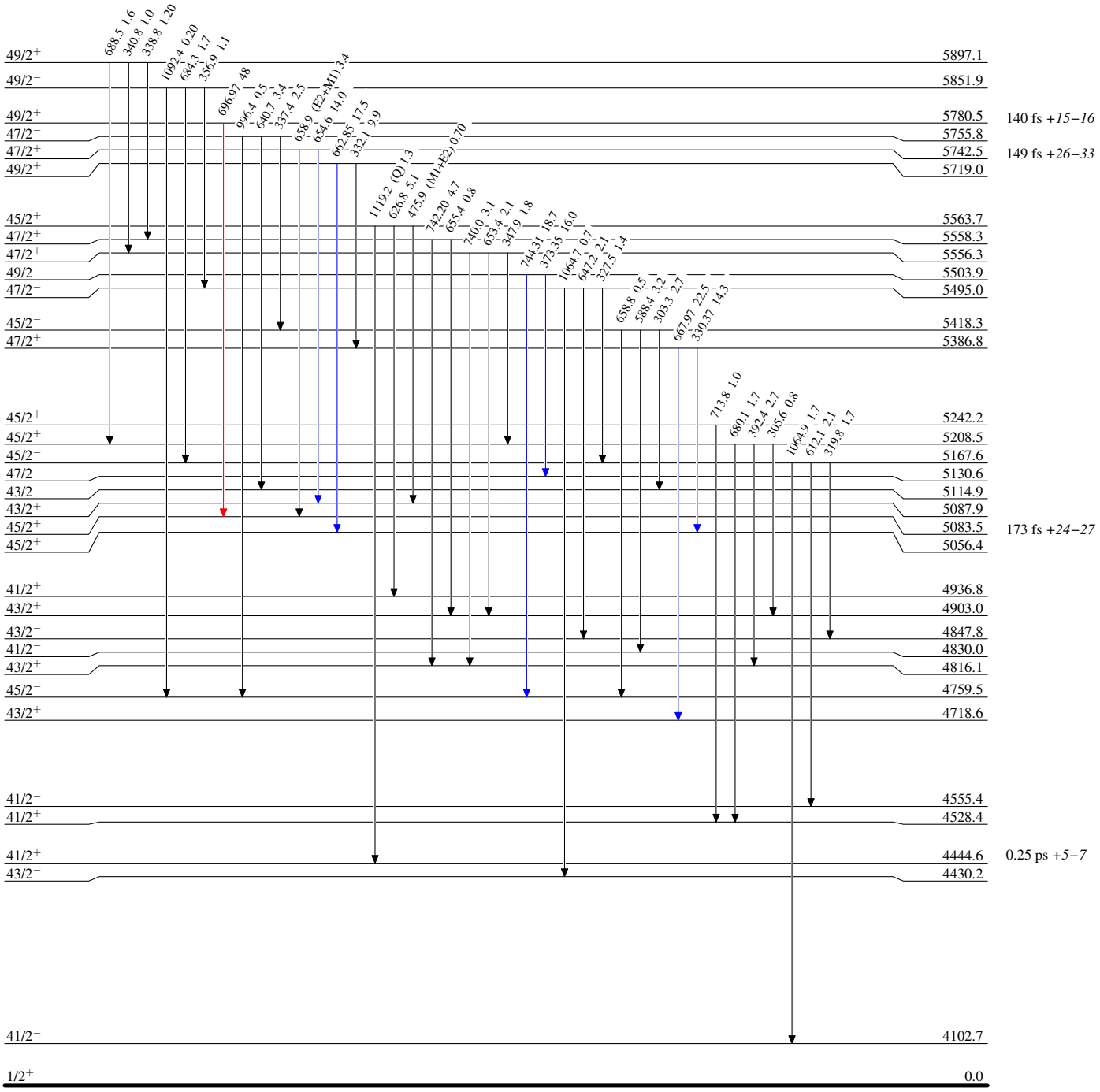
$^{163}_{71}Lu_{92}$

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



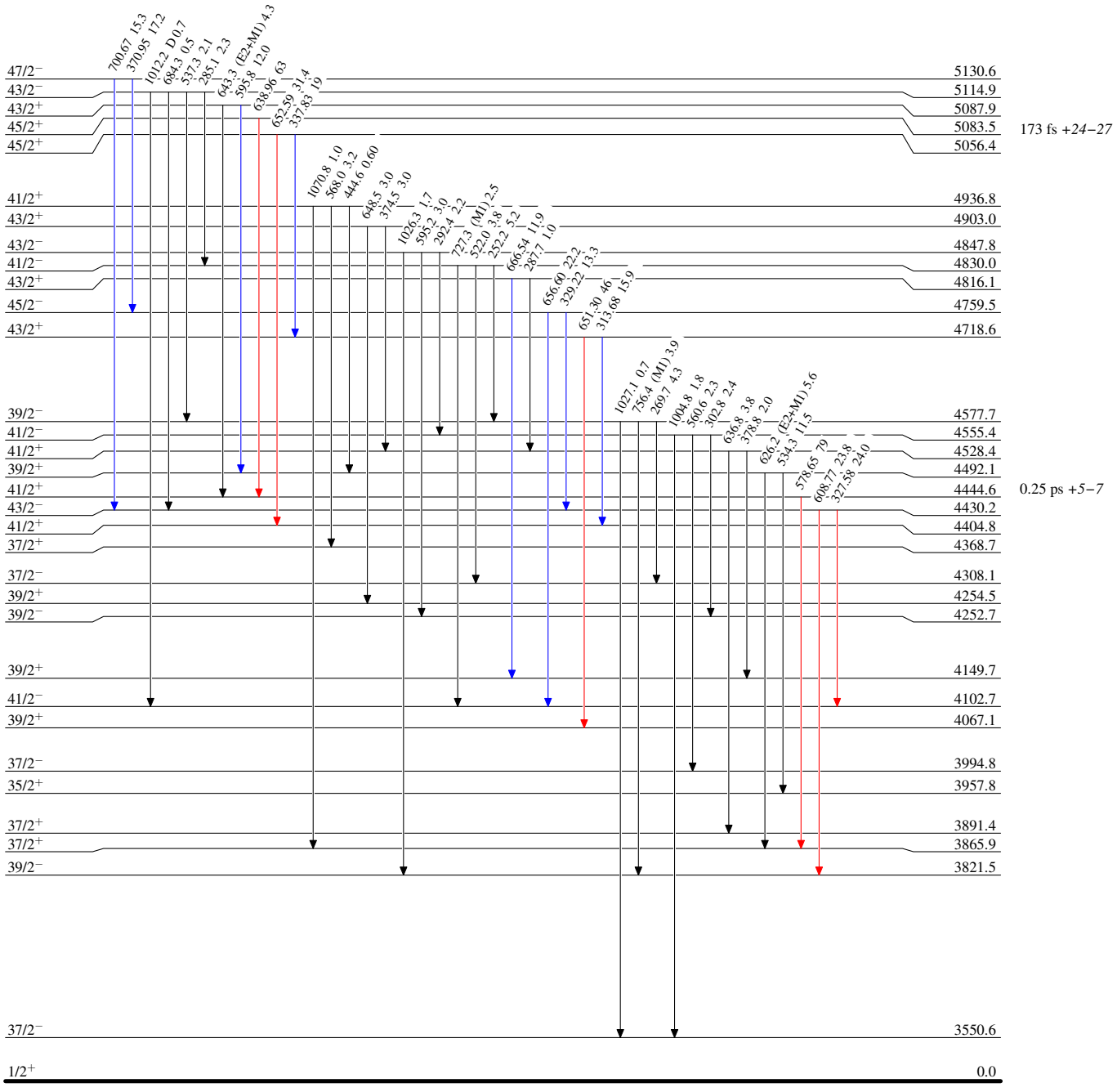
$^{163}_{71}Lu_{92}$

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



$^{163}_{71}Lu_{92}$

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05

Level Scheme (continued)

Intensities: Relative I_γ

@ Multiply placed: intensity suitably divided

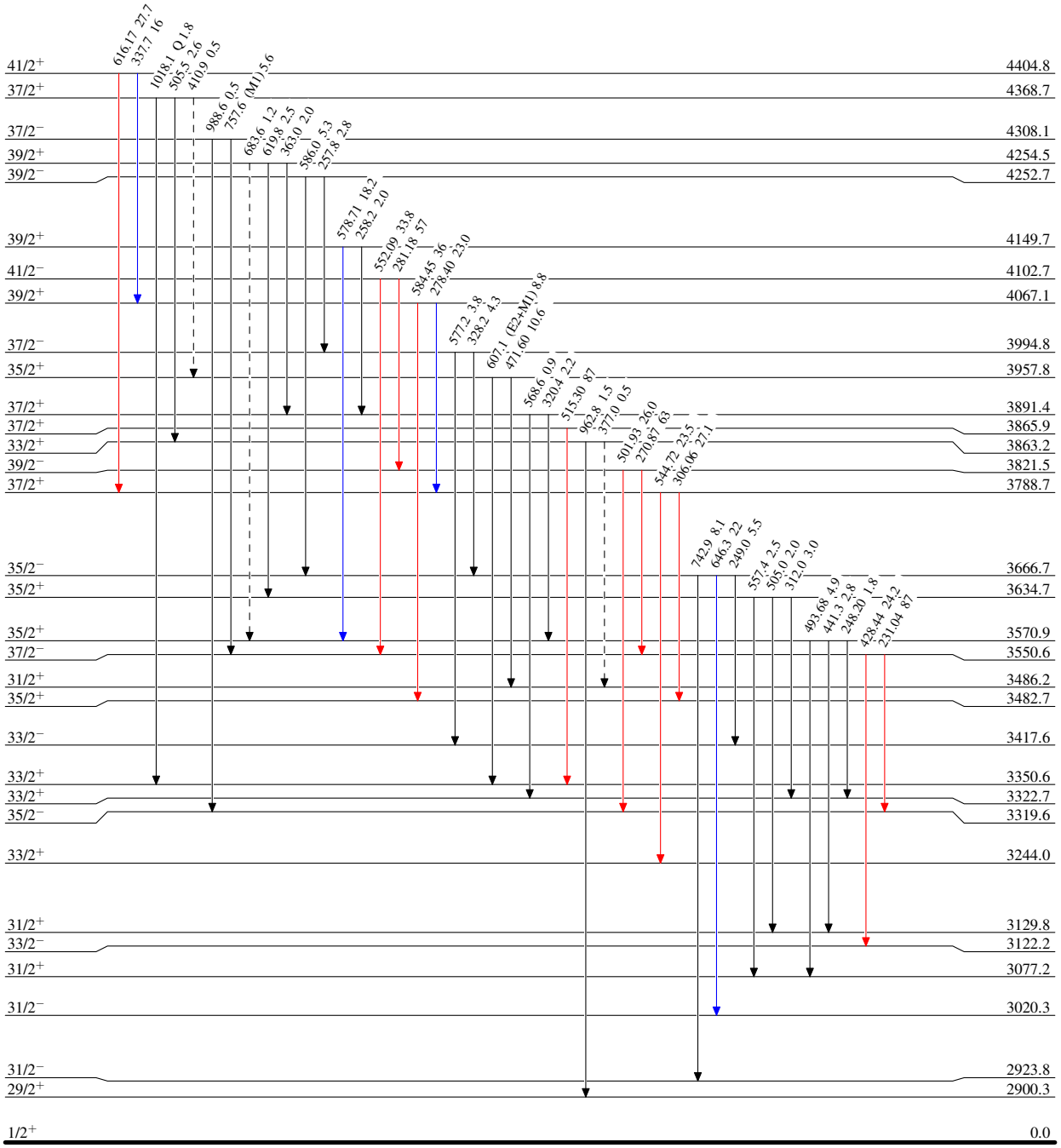
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



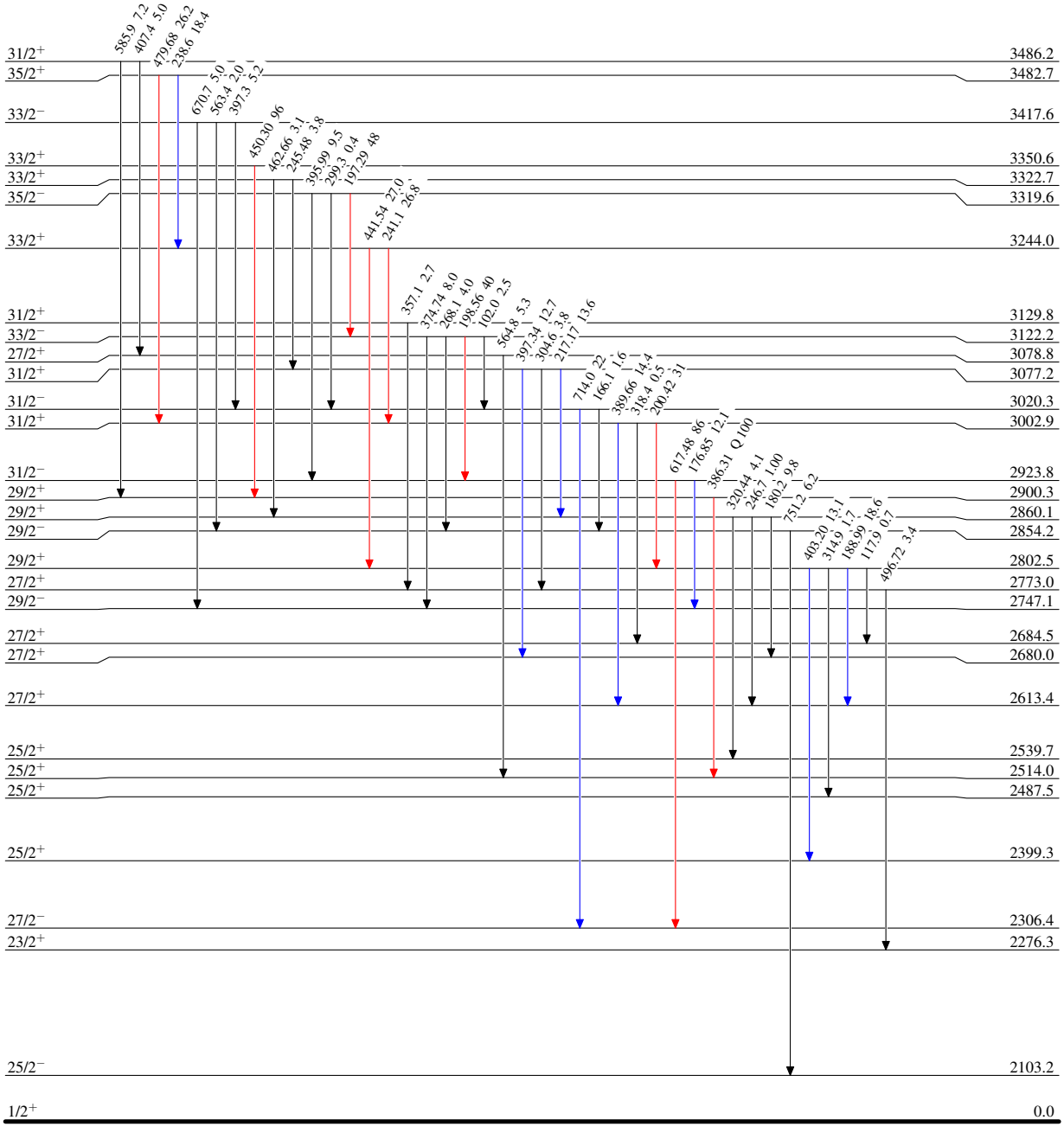
$^{163}_{71}Lu_{92}$

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



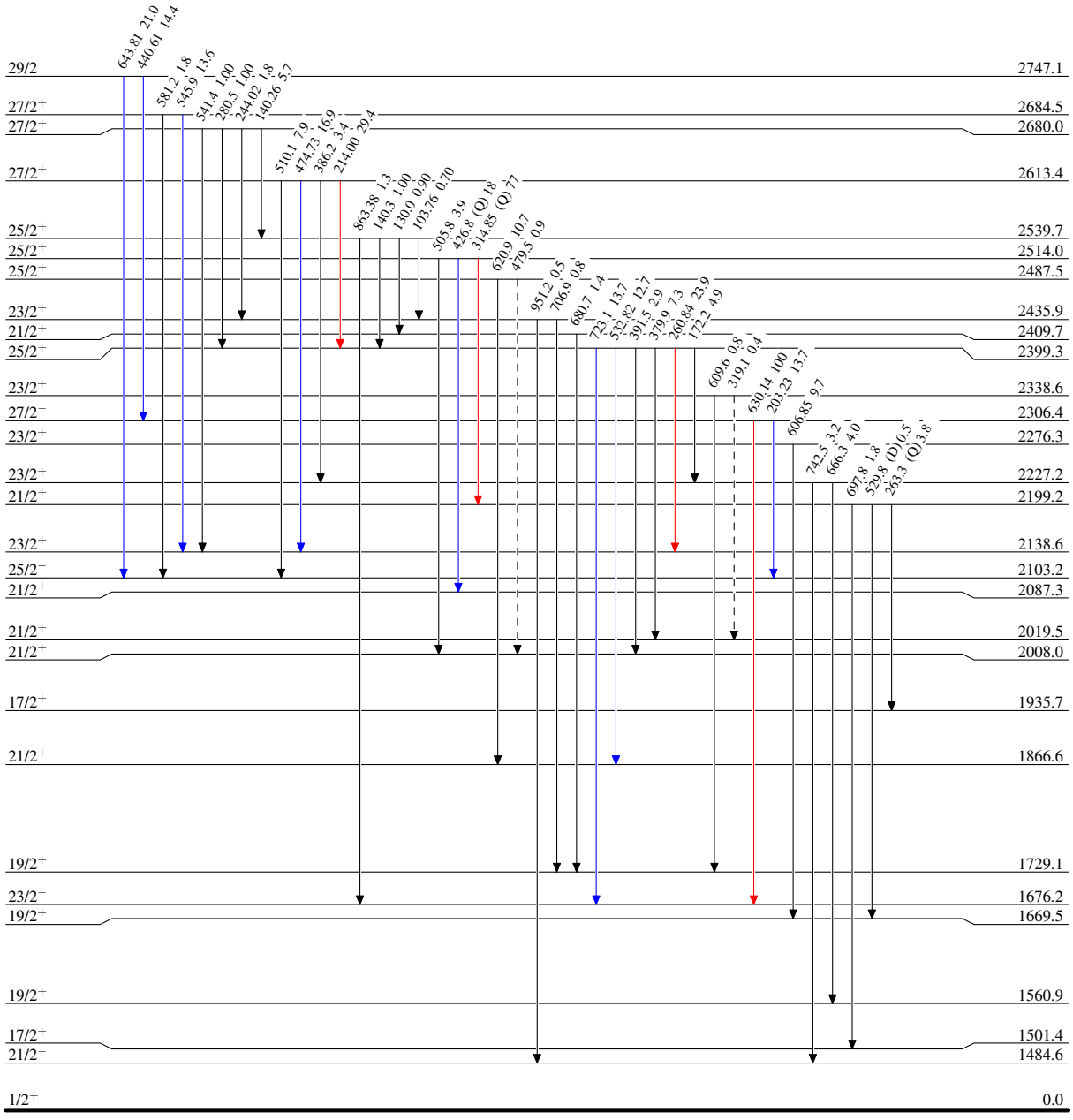
$^{163}_{71}Lu_{92}$

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



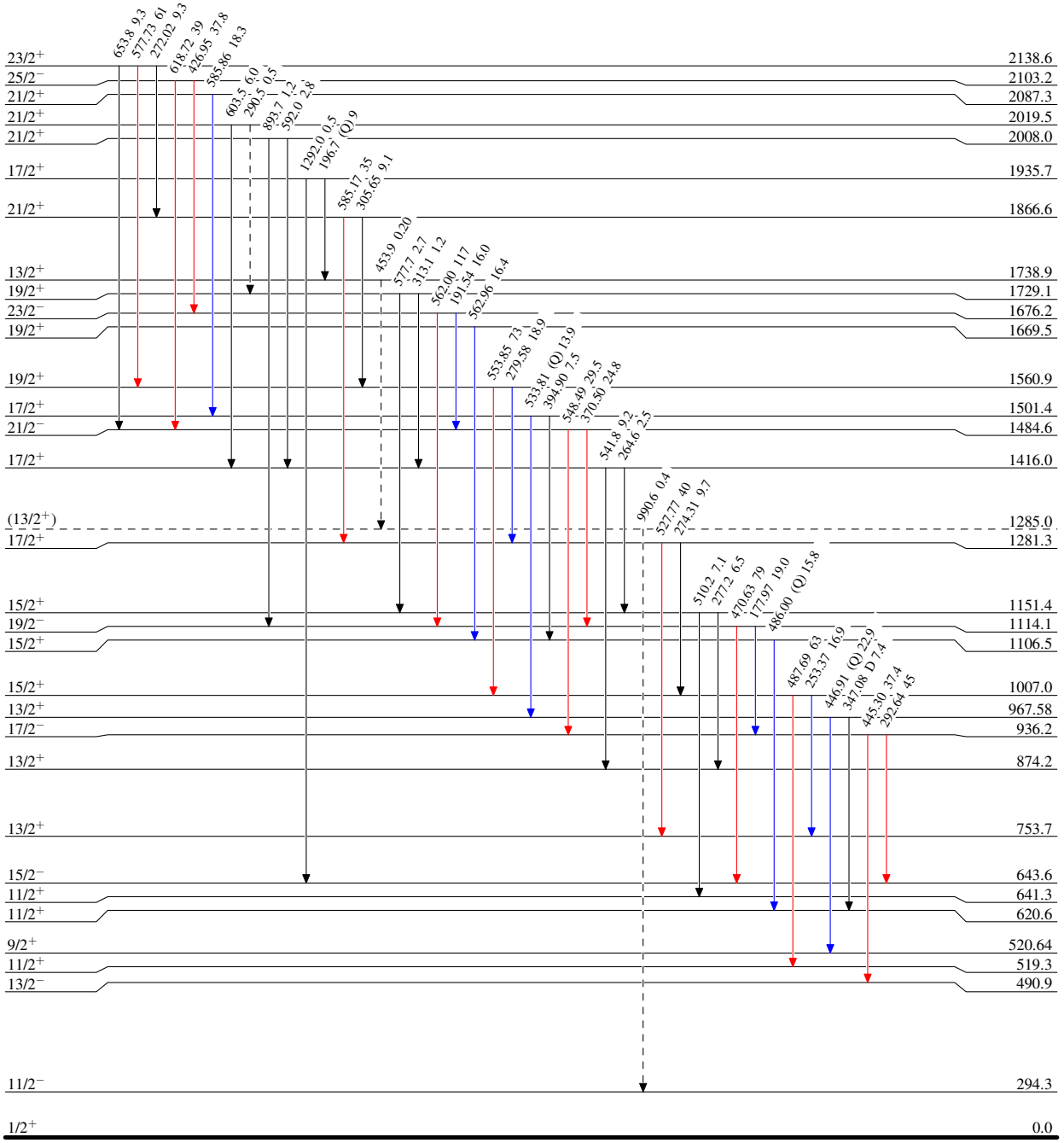
$^{163}_{71}Lu_{92}$

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



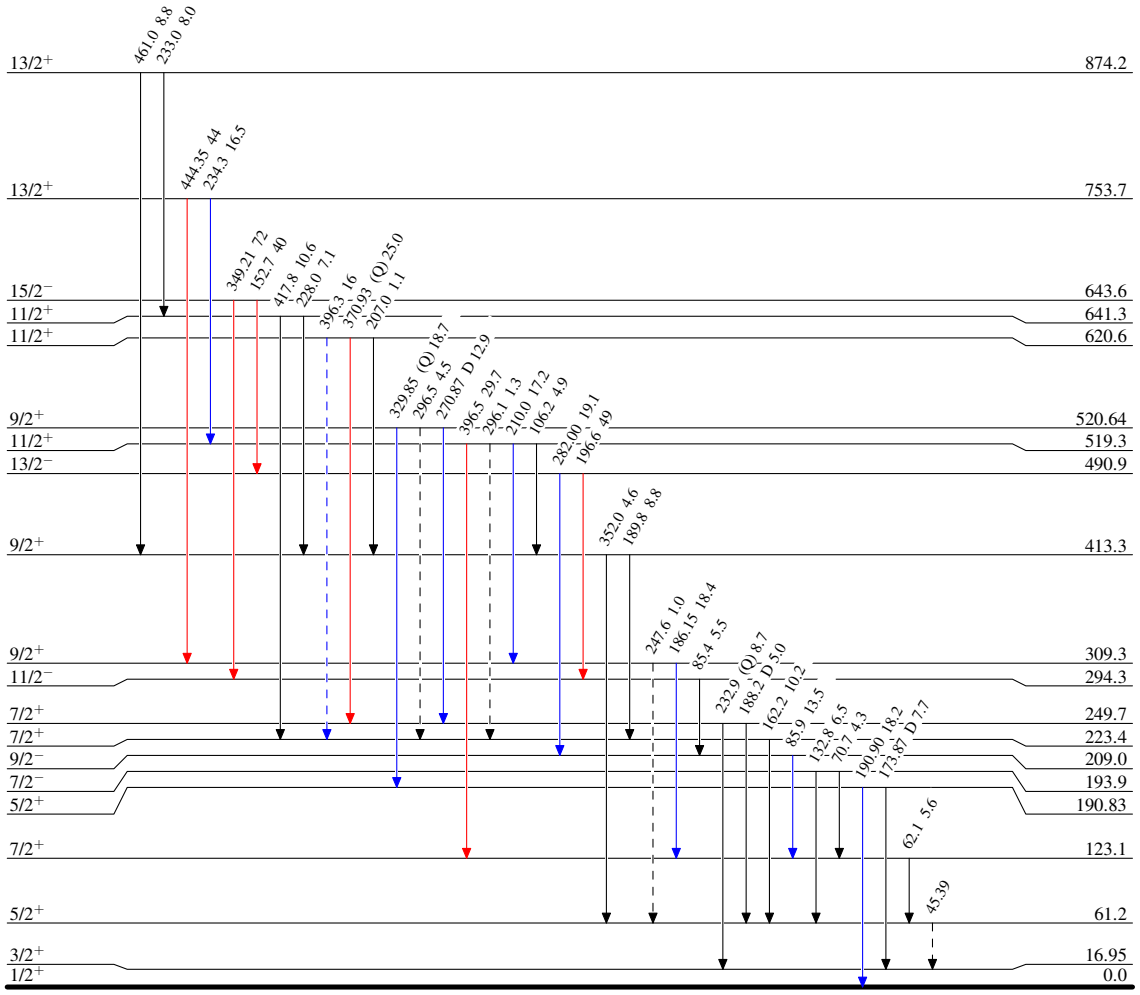
$^{163}_{71}Lu_{92}$

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05

Level Scheme (continued)

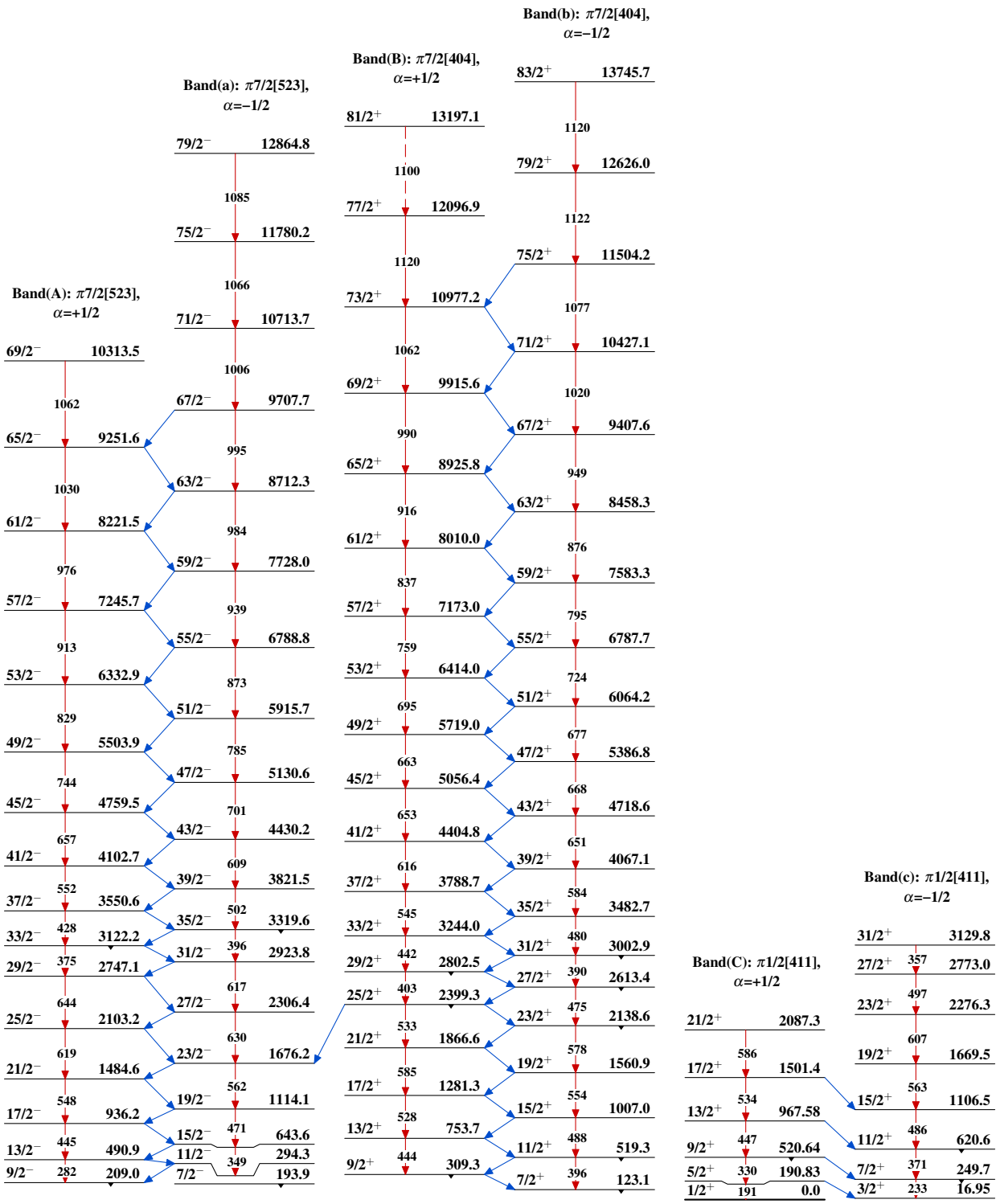
Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)



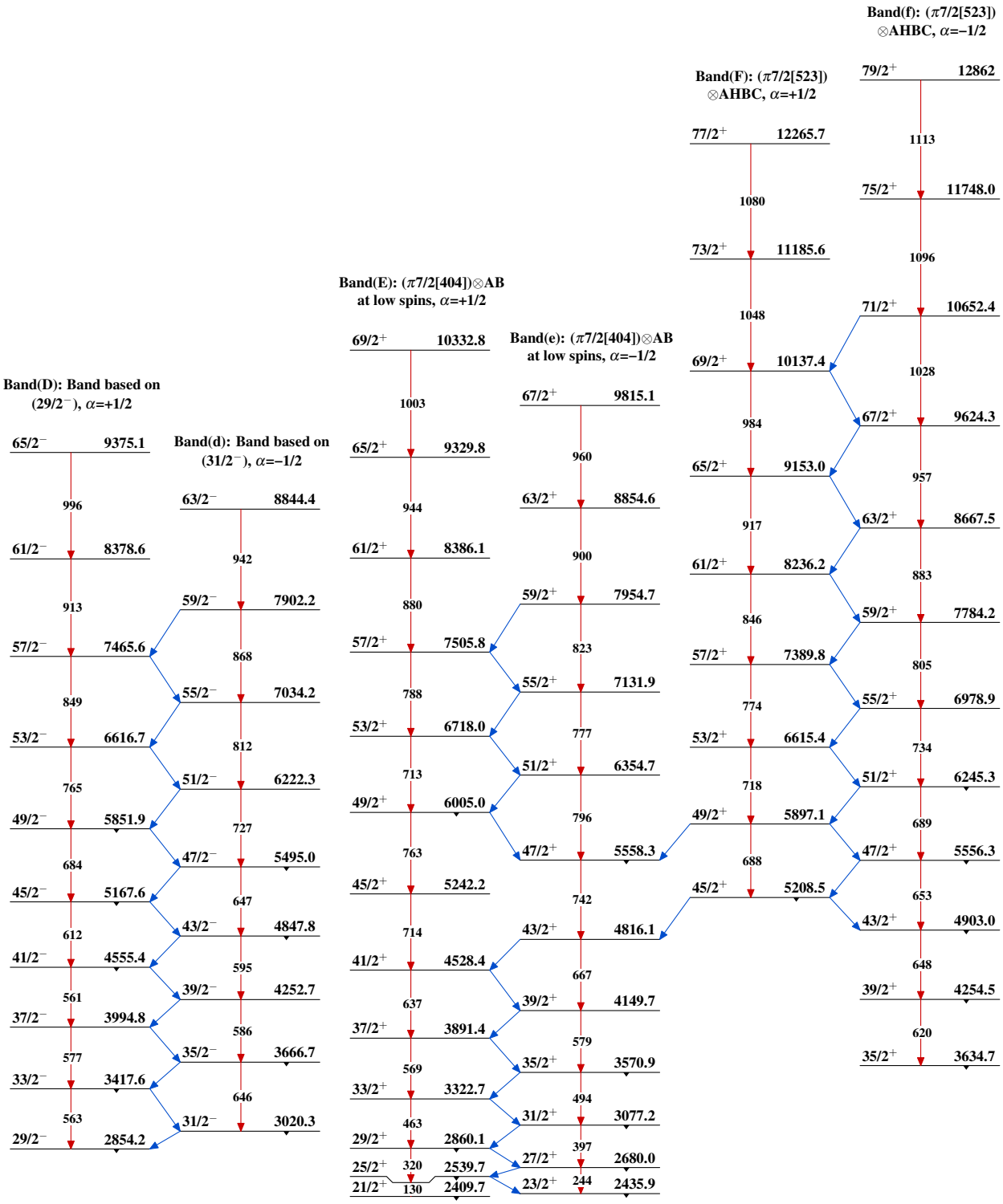
$^{163}_{71}Lu_{92}$

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05



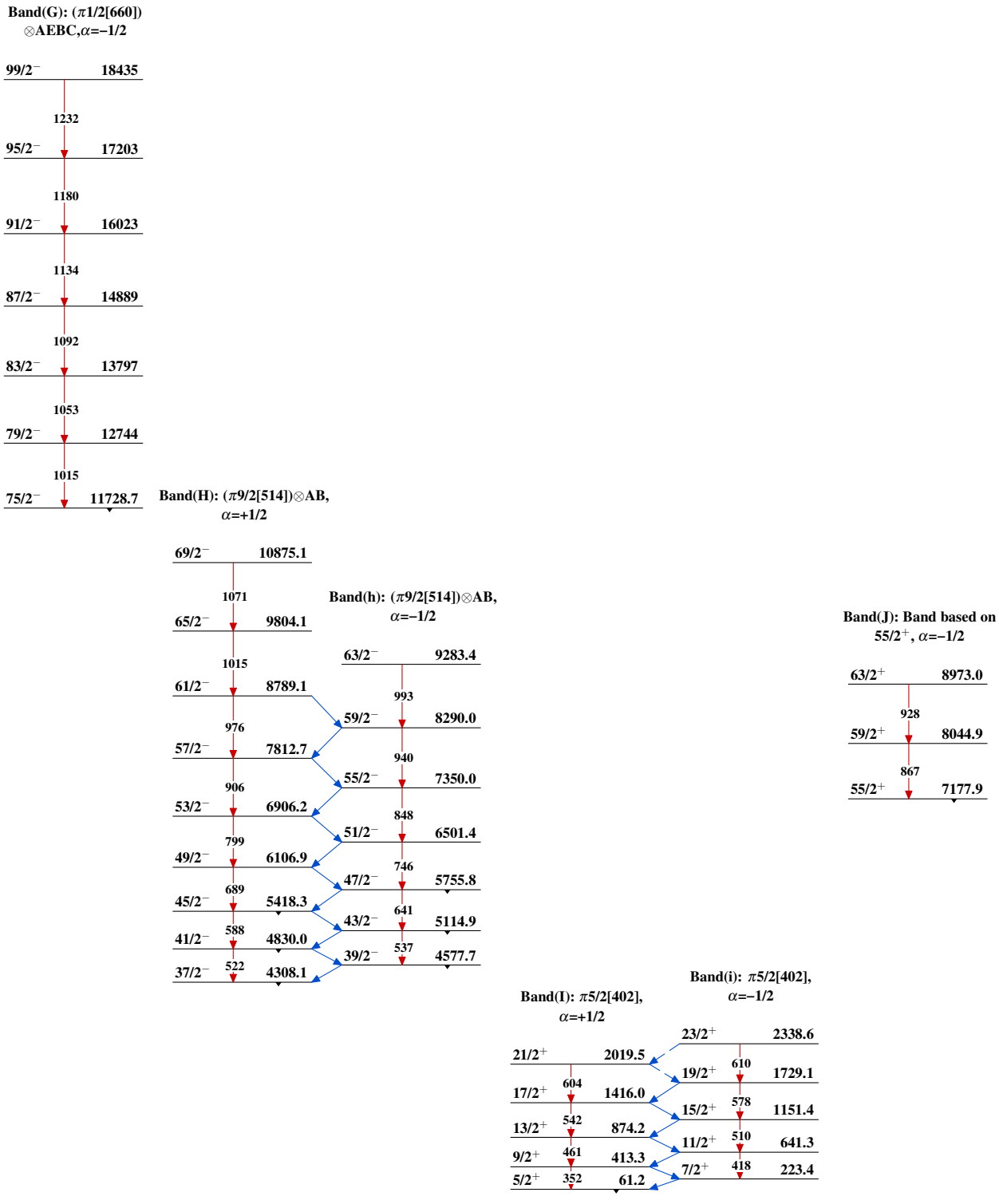
$^{163}_{71}Lu_{92}$

$^{139}La(^{29}Si,5n\gamma)$ 2004Je03,2002Je05 (continued)



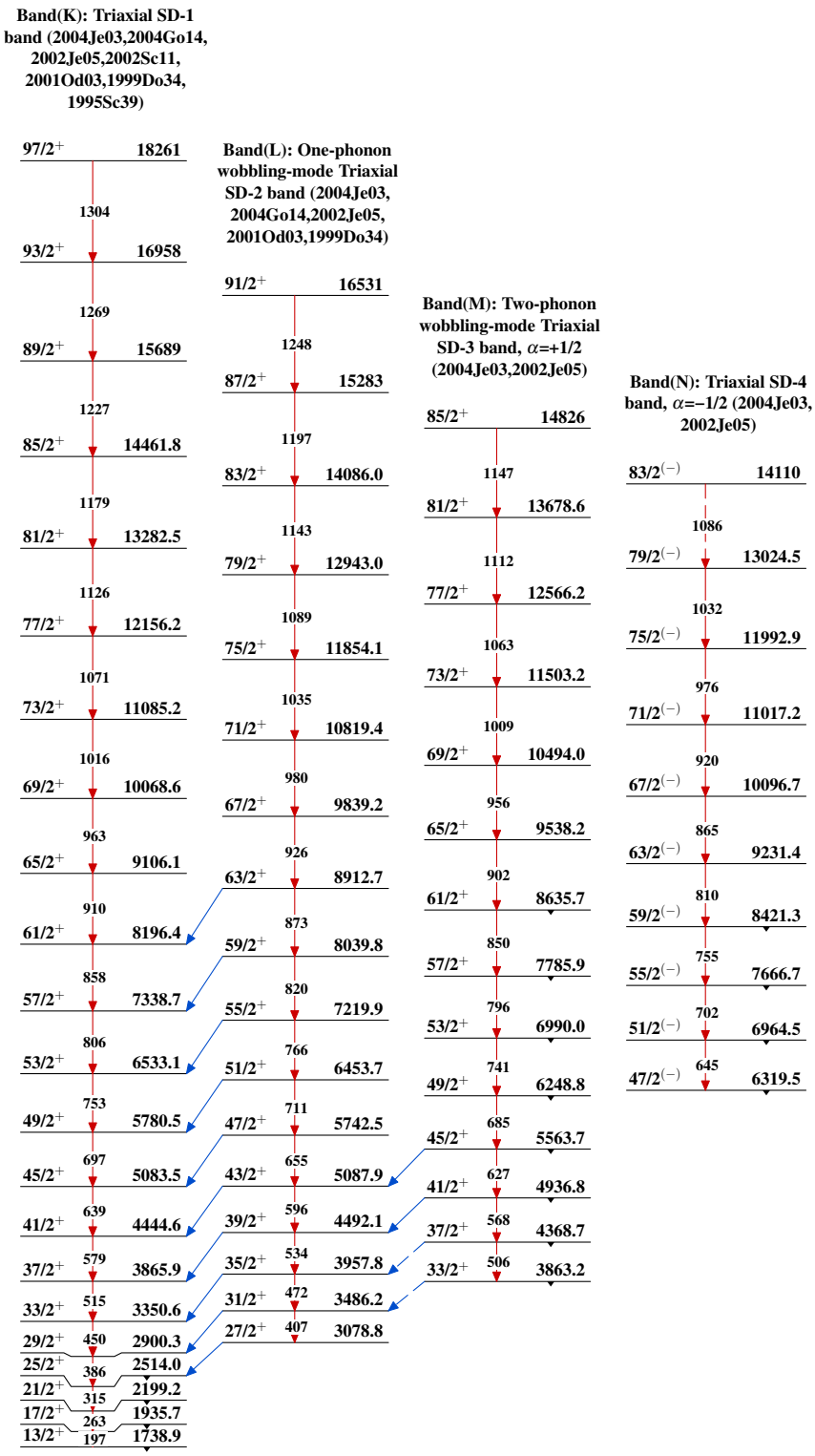
$^{163}_{71}Lu_{92}$

^{139}La(^{29}Si,5nγ) 2004Je03,2002Je05 (continued)



$^{163}_{71}Lu_{92}$

$^{139}La(^{29}Si,5n\gamma)$ 2004Je03,2002Je05 (continued)



$^{163}_{71}Lu_{92}$