

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen [#]		NDS 147, 1 (2018)	30-Nov-2017

$Q(\beta^-)=-2820$ 30; $S(n)=7920$ 40; $S(p)=2630$ 30; $Q(\alpha)=3230$ 40 [2017Wa10](#)

$S(2n)=17950$ 80, $S(2p)=7740$ 40, $Q(\epsilon p)=797$ 28 ([2017Wa10](#)).

Identification and production of ¹⁶⁴Lu by [1977Hu02](#) using the ¹⁵⁵Gd(¹⁴N,5n) reaction at E=79 MeV.

Mass measurement: [2000Ra23](#).

For theoretical nuclear structure calculations, consult NSR database, for about 10 references. These are listed in the ENSDF dataset as document records.

[Additional information 1](#).

¹⁶⁴Lu Levels

The following bands have not been included here: Band #4 (691.7-662.8-616.9-551.3-462.1 cascade) proposed by [1996Wa25](#) only; and band C (584.4-553.9-519.7-472.1-411.4-344.4 cascade) proposed by [1996Ju01](#) only. Further experimental work is needed to confirm their existence.

Cross Reference (XREF) Flags

A	¹⁶⁴ Hf ϵ decay (111 s)	D	¹³⁹ La(³⁰ Si,5n γ),(²⁹ Si,4n γ)
B	¹²¹ Sb(⁴⁸ Ca,5n γ)	E	¹⁴⁶ Nd(²³ Na,5n γ), ¹⁴⁹ Sm(¹⁹ F,4n γ)
C	¹³⁹ La(²⁹ Si,4n γ)	F	¹⁵⁰ Sm(¹⁹ F,5n γ)

E(level) [†]	J π^{\ddagger}	T _{1/2}	XREF	Comments
0.0	1 ⁽⁻⁾	3.14 min 3	A	$\% \epsilon + \% \beta^+ = 100$ $\mu = +0.0591$ 11 (1998Ge13,2014StZZ) $Q = +0.608$ 7 (1998Ge13,2016St14) The rms charge radius ($\langle r^2 \rangle$) ^{1/2} : 5.268 fm 31 (2013An02 evaluation). See also 2009An12 for trends in nuclear radii. $\Delta \langle r^2 \rangle$ (¹⁷⁰ Lu- ¹⁶⁴ Lu) = -0.721 fm ² (1998Ge13 , laser spectroscopy). Calibration uncertainty (1998Ge13) is 10%. J π : spin from laser spectroscopy (1998Ge13). Parity from probable configuration = $\pi 1/2[411] \nu 3/2[521]$ (1998Ge13), although, $\mu(\text{theory}) = -0.8$ (1998Ge13) for this configuration disagrees with the measured value, both in sign and magnitude. μ, Q : laser spectroscopy (1998Ge13). T _{1/2} : weighted average of 3.12 min 3 (1984Ad09), 3.15 min 8 (1983Ge08 , also 1981RaZH), and 3.17 min 3 (1977Hu02). Others: 1976ErZY , 3.1 min (1969NeZW).
31.3 3	≤ 3		A	J π : γ to 1.
126.3? 4			A	E(level): tentative level based on the observation of 126-157 cascade in coin with 313.7 γ , but the relative-ordering of the 157-126 cascade is not established.
153.3 3	≤ 3		A	J π : γ to 1.
199.4 4			A	
283.4 3			A	
597.2 4			A	
807.6 5			A	
827.4 5			A	
0+x ^a	(7 ⁻)		B	Additional information 2 .
11.2+x [@] 14	(7 ⁺)		B	
25.9+x [#] 13	(8 ⁺)		BCDEF	
26.0+x ^b 17	(8 ⁺)		B	

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Adopted Levels, Gammas (continued) ^{164}Lu Levels (continued)

E(level) [†]	J ^π [‡]	XREF	Comments
45.0+x ^{&} 15	(8 ⁻)	BC	
127.0+x ^a 10	(9 ⁻)	BC	
130.0+x [@] 13	(9 ⁺)	BCDE	
185.4+x ^c 16	(9 ⁺)	B E	
199.5+x ^{&} 13	(10 ⁻)	BCDEF	E(level): 1996Wa25 proposed that this level deexcited by the following γ rays: 184.3, 171.7, 161.5, 142.2 and 101.0; the last two forming a cascade. The γ rays at 162.4, 172.3 and 184.8 were suggested by 1996Ju01 as below (10 ⁻) while 82.3 and 142.9 gammas as below (11 ⁻) member of this band.
270.9+x [#] 13	(10 ⁺)	BCDEF	
292.6+x ^a 13	(11 ⁻)	BCDEF	
297.4+x ^b 15	(10 ⁺)	B	
439.1+x [@] 13	(11 ⁺)	BCDEF	
458.1+x ^{&} 13	(12 ⁻)	BCDEF	
542.9+x ^c 16	(11 ⁺)	B E	
620.2+x ^a 13	(13 ⁻)	BCDEF	
649.5+x [#] 13	(12 ⁺)	BCDEF	
698.6+x ^b 15	(12 ⁺)	B DEF	
857.2+x ^{&} 13	(14 ⁻)	BCDEF	
874.3+x [@] 13	(13 ⁺)	BCDEF	
1013.9+x ^c 16	(13 ⁺)	B E	
1083.4+x ^a 13	(15 ⁻)	BCDEF	
1141.2+x [#] 13	(14 ⁺)	BCDEF	
1204.3+x ^b 15	(14 ⁺)	B DEF	
1368.1+x ^{&} 13	(16 ⁻)	BCDEF	
1408.3+x [@] 13	(15 ⁺)	BCDEF	
1572.3+x ^d 16	(14 ⁺)	B	
1573.7+x ^c 17	(15 ⁺)	B E	
1652.0+x ^a 13	(17 ⁻)	BCDEF	
1715.8+x [#] 13	(16 ⁺)	BCDEF	
1789.6+x ^b 15	(16 ⁺)	B DEF	
1847.8+x ^e 14	(15 ⁺)	B	
1964.8+x ^{&} 13	(18 ⁻)	BCDEF	
2013.7+x [@] 13	(17 ⁺)	BCDEF	
2036.0+x ^h 15	(13 ⁺)	BC	
2048.0+x ^d 13	(16 ⁺)	B DE	
2161.5+x ^f 15	(14 ⁻)	BC	
2192.5+x ^c 18	(17 ⁺)	B E	
2232.9+x ^e 13	(17 ⁺)	B DE	
2296.5+x ^a 13	(19 ⁻)	BCDEF	
2340.1+x [#] 13	(18 ⁺)	BCDEF	
2389.3+x ^h 14	(15 ⁺)	BC	
2422.4+x ^b 15	(18 ⁺)	B DEF	
2439.3+x ^d 13	(18 ⁺)	B DE	
2535.2+x ^f 13	(16 ⁻)	BC	
2621.3+x ^{&} 13	(20 ⁻)	BCDEF	
2647.0+x [@] 13	(19 ⁺)	BCDEF	
2661.5+x ^e 13	(19 ⁺)	DE	

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Adopted Levels, Gammas (continued) ^{164}Lu Levels (continued)

E(level) [†]	J ^π [‡]	XREF	E(level) [†]	J ^π [‡]	XREF
2812.2+x ^h 15	(17 ⁺)	BC	5833.9+x ^h 21	(27 ⁺)	BC
2844.1+x ^c 18	(19 ⁺)	B E	5952.0+x ^a 13	(29 ⁻)	CDE
2899.3+x ^d 13	(20 ⁺)	DE	6050.5+x ^f 22	(28 ⁻)	BC
2944.9+x [#] 13	(20 ⁺)	CDEF	6106.6+x ^e 14	(29 ⁺)	E
2971.4+x ^f 15	(18 ⁻)	BC	6221.1+x [@] 14	(29 ⁺)	CDE
2985.0+x ^a 13	(21 ⁻)	CDEF	6343.8+x ^{&} 13	(30 ⁻)	CDE
3071.4+x ^b 15	(20 ⁺)	B DEF	6435.6+x ^g 24	(28 ⁺)	BC
3153.9+x ^g 14	(18 ⁺)	BC	6539.3+x ^d 14	(30 ⁺)	E
3166.5+x ^e 13	(21 ⁺)	DE	6610.1+x ^h 22	(29 ⁺)	BC
3171.0+x 14	(18 ⁺)	B	6701.5+x [#] 17	(30 ⁺)	C E
3183.4+x 14	(18 ⁺)	B	6835.8+x ^a 13	(31 ⁻)	C E
3234.2+x [@] 13	(21 ⁺)	CDE	6840.3+x ^f 24	(30 ⁻)	BC
3296.2+x ^h 17	(19 ⁺)	BC	6979.4+x ^e 14	(31 ⁺)	E
3308.2+x ^{&} 13	(22 ⁻)	CDEF	7181.7+x [@] 15	(31 ⁺)	C E
3450.3+x ^d 13	(22 ⁺)	DE	7254.2+x ^{&} 14	(32 ⁻)	C E
3468.1+x ^f 17	(20 ⁻)	BC	7259+x ^g 3	(30 ⁺)	BC
3513.6+x ^c 19	(21 ⁺)	E	7437.3+x ^d 14	(32 ⁺)	E
3544.9+x [#] 13	(22 ⁺)	CDEF	7441.7+x ^h 24	(31 ⁺)	BC
3685.4+x ^a 13	(23 ⁻)	CDEF	7678.6+x [#] 20	(32 ⁺)	C
3719.1+x ^g 14	(20 ⁺)	BC	7688+x ^f 3	(32 ⁻)	BC
3744.1+x ^b 16	(22 ⁺)	DE	7796.2+x ^a 14	(33 ⁻)	C E
3772.3+x ^e 13	(23 ⁺)	DE	7897.7+x ^e 15	(33 ⁺)	E
3842.7+x ^h 19	(21 ⁺)	BC	8134.2+x [@] 16	(33 ⁺)	C E
3862.6+x [@] 13	(23 ⁺)	CDE	8141+x ^g 3	(32 ⁺)	BC
4005.4+x ^{&} 13	(24 ⁻)	CDEF	8229.2+x ^{&} 14	(34 ⁻)	C E
4025.7+x ^f 19	(22 ⁻)	BC	8327+x ^h 3	(33 ⁺)	BC
4110.0+x ^d 13	(24 ⁺)	DE	8389.7+x ^d 15	(34 ⁺)	E
4208.6+x [#] 13	(24 ⁺)	CDE	8593+x ^f 3	(34 ⁻)	BC
4318.7+x ^g 16	(22 ⁺)	BC	8829.2+x ^a 17	(35 ⁻)	C E
4393.8+x ^a 13	(25 ⁻)	CDEF	8867.2+x ^e 16	(35 ⁺)	E
4448.8+x ^h 19	(23 ⁺)	BC	9078+x ^g 3	(34 ⁺)	BC
4478.6+x ^e 13	(25 ⁺)	DE	9124.2+x [@] 19	(35 ⁺)	C E
4563.1+x [@] 13	(25 ⁺)	CDE	9264.2+x ^{&} 18	(36 ⁻)	C E
4642.4+x ^f 19	(24 ⁻)	BC	9268+x ^h 3	(35 ⁺)	BC
4728.2+x ^{&} 13	(26 ⁻)	CDEF	9401.7+x ^d 18	(36 ⁺)	E
4870.9+x ^d 13	(26 ⁺)	DE	9557+x ^f 3	(36 ⁻)	BC
4946.3+x [#] 13	(26 ⁺)	CDE	9885.2+x ^e 19	(37 ⁺)	E
4966.4+x ^g 19	(24 ⁺)	BC	9933.2+x ^a 20	(37 ⁻)	C E
5113.2+x ^h 20	(25 ⁺)	BC	10069+x ^g 3	(36 ⁺)	BC
5141.5+x ^a 13	(27 ⁻)	CDEF	10263+x ^h 3	(37 ⁺)	BC
5269.5+x ^e 14	(27 ⁺)	DE	10352.2+x ^{&} 20	(38 ⁻)	C E
5317.2+x ^f 21	(26 ⁻)	BC	10466.7+x ^d 21	(38 ⁺)	E
5342.0+x [@] 14	(27 ⁺)	CDE	10581+x ^f 4	(38 ⁻)	BC
5502.9+x ^{&} 13	(28 ⁻)	CDEF	10954.2+x ^e 21	(39 ⁺)	E
5671.2+x ^g 21	(26 ⁺)	BC	11095.2+x ^a 22	(39 ⁻)	C
5688.9+x ^d 14	(28 ⁺)	DE	11111+x ^g 4	(38 ⁺)	BC
5779.5+x [#] 14	(28 ⁺)	C E	11313+x ^h 4	(39 ⁺)	BC

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Adopted Levels, Gammas (continued) ^{164}Lu Levels (continued)

E(level) [†]	J ^π [‡]	XREF	Comments
11476.2+x ^{&} 23	(40 ⁻)	C	
11664+x ^f 4	(40 ⁻)	BC	
12199+x ^g 4	(40 ⁺)	BC	
12282.2+x ^a ? 25	(41 ⁻)	C	
12417+x ^h 4	(41 ⁺)	BC	
12795+x ⁱ 4	(42 ⁻)	B	
12799+x ^f 4	(42 ⁻)	BC	
12826+x 4	(42 ⁻)	B	E(level): this level is linked to triaxial SD-1 band.
13332+x ^g 4	(42 ⁺)	BC	
13577+x ^h 4	(43 ⁺)	C E	
13946+x ⁱ 4	(44 ⁻)	B	
14019+x ^f 4	(44 ⁻)	B	
14504+x ^g 4	(44 ⁺)	BC	
14788+x ^h 4	(45 ⁺)	BC	
15154+x ⁱ 4	(46 ⁻)	B	
15275+x ^f 4	(46 ⁻)	B	
15713+x ^g 4	(46 ⁺)	B	
16065+x ^h 4	(47 ⁺)	B	
16418+x ⁱ 4	(48 ⁻)	B	
16586+x ^f 4	(48 ⁻)	B	
16921+x ^g 4	(48 ⁺)	B	
17381+x ^h 4	(49 ⁺)	B	
17736+x ⁱ 4	(50 ⁻)	B	
17958+x ^f 4	(50 ⁻)	B	
18169+x ^g 4	(50 ⁺)	B	
19112+x ⁱ 4	(52 ⁻)	B	
y ^j	J1	C	Additional information 3.
633.0+y ^j 10	J1+2	C	
1324.0+y ^j 15	J1+4	C	
2071.0+y ^j 18	J1+6	C	
2874.0+y ^j 20	J1+8	C	
3733.0+y ^j 23	J1+10	C	
4646.0+y ^j 25	J1+12	C	
5612+y ^j 3	J1+14	C	
6617+y ^j 3	J1+16	C	
z ^k	J2	C	Additional information 4.
546.0+z ^k 10	J2+2	C	
1151.0+z ^k 15	J2+4	C	
1815.0+z ^k 18	J2+6	C	
2542.0+z ^k 20	J2+8	C	
3328.0+z ^k 23	J2+10	C	
4174.0+z ^k 25	J2+12	C	
5080+z ^k 3	J2+14	C	
6045+z ^k 3	J2+16	C	
7068+z ^k 3	J2+18	C	
8150+z ^k 4	J2+20	C	
9284+z ^k 4	J2+22	C	
u ^l	J3	C	Additional information 5.

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Adopted Levels, Gammas (continued) ^{164}Lu Levels (continued)

E(level) [†]	J ^π [‡]	XREF	Comments
511.0+u ^l 10	J3+2	C	
1080.0+u ^l 15	J3+4	C	
1708.0+u ^l 18	J3+6	C	
2393.0+u ^l 20	J3+8	C	
3134.0+u ^l 23	J3+10	C	
3928.0+u ^l 25	J3+12	C	
4775+u ^l 3	J3+14	C	
5676+u ^l 3	J3+16	C	
6632+u ^l 3	J3+18	C	
7643+u ^l 4	J3+20	C	
8713+u ^l 4	J3+22	C	
v ^m	J4	C	Additional information 6.
752.0+v ^m 10	J4+2	C	
1563.0+v ^m 15	J4+4	C	
2429.0+v ^m 18	J4+6	C	
3352.0+v ^m 20	J4+8	C	
4332.0+v ^m 23	J4+10	C	
5374.0+v ^m 25	J4+12	C	
w ⁿ	J5	C	Additional information 7.
732.0+w ⁿ 10	J5+2	C	
1526.0+w ⁿ 15	J5+4	C	
2382.0+w ⁿ 18	J5+6	C	
3300.0+w ⁿ 20	J5+8	C	
4276.0+w ⁿ 23	J5+10	C	

[†] From least-squares fit to E γ data, assuming $\Delta(E\gamma)=1$ keV when not stated.

[‡] For levels, populated in in-beam γ -ray studies, the assignments are based on multipolarities, and ΔJ values deduced from $\gamma\gamma(\theta)$ (DCO) data, and band associations. The DCO data are from [1997Ca29](#), [1996Wa25](#) and [1996Ju01](#) in various reactions. The assignments here are mainly from [2007Br09](#), [1999To08](#) and [1997Ca29](#). Earlier high-spin papers are [1996Wa25](#) and [1996Ju01](#) where most bands were not connected.

Band(A): $\pi g_{7/2} \otimes v i_{13/2}$, $\alpha=0$.

@ Band(a): $\pi g_{7/2} \otimes v i_{13/2}$, $\alpha=1$.

& Band(B): $\pi h_{11/2} \otimes v i_{13/2}$, $\alpha=0$. Nilsson orbitals involved may be $\pi 9/2[514]$ or $\pi 7/2[523]$ and $v 5/2[642]$.

^a Band(b): $\pi h_{11/2} \otimes v i_{13/2}$, $\alpha=1$. Nilsson orbitals involved may be $\pi 9/2[514]$ or $\pi 7/2[523]$ and $v 5/2[642]$.

^b Band(C): Band based on 8^+ , $\alpha=0$.

^c Band(c): Band based on 8^+ , $\alpha=1$.

^d Band(D): band based on (14^+) , $\alpha=0$. Configuration= $\pi 7/2[404] \otimes v i_{13/2} \otimes v i_{13/2}^2$ or $\pi 7/2[523] \otimes v 11/2[505]$.

^e Band(d): band based on (14^+) , $\alpha=1$. Configuration= $\pi 7/2[404] \otimes v i_{13/2} \otimes v i_{13/2}^2$ or $\pi 7/2[523] \otimes v 11/2[505]$.

^f Band(E): SD-1 (triaxial) band. Band assignment from [1999To08](#), [2002Sc11](#), [2007Br09](#). Configuration= $\pi i_{13/2} \otimes v h_{9/2}$.

Q(transition)=7.4 +25-13 ([2002Sc47](#)), 7.1 +5-6 ([2002Sc11](#), same group as [2002Sc47](#)), from lifetime (DSAM) measurements.

^g Band(F): SD-2 (triaxial) band. Band assignment from [1999To08](#), [2007Br09](#).

^h Band(G): SD-3 (triaxial) band. Band assignment from [1999To08](#), [2007Br09](#). Configuration= $\pi i_{13/2} \otimes v i_{13/2}$. Positive parity is assigned based on possible E1 character of 1532 γ .

ⁱ Band(H): SD-4 (triaxial) band. The band assignment from [2007Br09](#). This band feeds into the SD-1 band.

^j Band(I): SD-5 (triaxial) band. Band assignment from [1999To08](#).

^k Band(J): SD-6 (triaxial) band. Band assignment from [1999To08](#).

^l Band(K): SD-7 (triaxial) band. Band assignment from [1999To08](#).

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Adopted Levels, Gammas (continued) ^{164}Lu Levels (continued)^m Band(L): SD-8 (triaxial) band. Band assignment from 1999To08.ⁿ Band(M): SD-9 (triaxial) band. Band assignment from 1999To08.

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	$\gamma(^{164}\text{Lu})$		Comments
						Mult. [‡]		
31.3	≤ 3	31.4 4	100	0.0	1 ⁽⁻⁾			
126.3?		126.3 [#] 4	100	0.0	1 ⁽⁻⁾			
153.3	≤ 3	122.1 3	211 20	31.3	≤ 3			
		153.3 3	100 8	0.0	1 ⁽⁻⁾			
199.4		46.2 4	100	153.3	≤ 3			
283.4		84.3 4	<9.6	199.4				
		130.0 3	100 9	153.3	≤ 3			
		157.3 [#] 3	20 10	126.3?				
		252.0 3	54 7	31.3	≤ 3			
597.2		313.7 4	100 19	283.4				
		397.9 4	7.8 13	199.4				
		444.0 4	3.9 7	153.3	≤ 3			
807.6		608.2 5	100 20	199.4				
		654.3 5	90 20	153.3	≤ 3			
827.4		627.9 5	78 22	199.4				
		674.2 5	100 28	153.3	≤ 3			
127.0+x	(9 ⁻)	82		45.0+x (8 ⁻)				
		127.0		0+x (7 ⁻)				
130.0+x	(9 ⁺)	104.0 3	100 20	25.9+x (8 ⁺)	D			
		118.8 5	44 19	11.2+x (7 ⁺)	(E2)			E_γ : from $^{146}\text{Nd}(^{23}\text{Na},5n\gamma)$,... (1996Wa25). Other: 119.7 in $^{121}\text{Sb}(^{48}\text{Ca},5n\gamma)$ (2007Br09). Evaluators assume that 118.8 and 119.7 correspond to the same transition. Mult.: $\Delta J=2$, quadrupole from DCO ratio, RUL suggests E2 assuming the 130+x level is not isomeric.
185.4+x	(9 ⁺)	159.3 5	100	26.0+x (8 ⁺)				
199.5+x	(10 ⁻)	72.6		127.0+x (9 ⁻)				
270.9+x	(10 ⁺)	140.9 1	100	130.0+x (9 ⁺)	D			
		245.1 3	21 5	25.9+x (8 ⁺)				
292.6+x	(11 ⁻)	93.1 1	100	199.5+x (10 ⁻)	D			
		165.5		127.0+x (9 ⁻)				
297.4+x	(10 ⁺)	111.9		185.4+x (9 ⁺)				
		271.9		26.0+x (8 ⁺)				
439.1+x	(11 ⁺)	168.2 1	100	270.9+x (10 ⁺)	D			
		309.2 2	56 7	130.0+x (9 ⁺)	(Q)			
458.1+x	(12 ⁻)	165.5 1	100	292.6+x (11 ⁻)	D			
		258.6 2	16 2	199.5+x (10 ⁻)				
542.9+x	(11 ⁺)	245.7		297.4+x (10 ⁺)				
		357.5 5	100	185.4+x (9 ⁺)				
620.2+x	(13 ⁻)	162.1 1	100	458.1+x (12 ⁻)	D			
		327.6 1	33 7	292.6+x (11 ⁻)	Q			
649.5+x	(12 ⁺)	210.3 1	100	439.1+x (11 ⁺)	D			
		378.6 1	83 13	270.9+x (10 ⁺)	Q			
698.6+x	(12 ⁺)	155.6		542.9+x (11 ⁺)				
		401.2 3	100	297.4+x (10 ⁺)	Q			
857.2+x	(14 ⁻)	237.0 1	100	620.2+x (13 ⁻)	D			
		399.1 1	50 8	458.1+x (12 ⁻)	Q			
874.3+x	(13 ⁺)	224.7 1	84 11	649.5+x (12 ⁺)	D			
		435.2 1	100	439.1+x (11 ⁺)	Q			
1013.9+x	(13 ⁺)	315.3		698.6+x (12 ⁺)				

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Adopted Levels, Gammas (continued) $\gamma(^{164}\text{Lu})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult. ‡
1013.9+x	(13 ⁺)	470.9 5	100	542.9+x	(11 ⁺)	
1083.4+x	(15 ⁻)	226.3 1	100 10	857.2+x	(14 ⁻)	D
		463.2 1	100	620.2+x	(13 ⁻)	Q
1141.2+x	(14 ⁺)	267.0 2	53 8	874.3+x	(13 ⁺)	D
		491.7 1	100	649.5+x	(12 ⁺)	Q
1204.3+x	(14 ⁺)	190.5		1013.9+x	(13 ⁺)	
		505.7 3	100	698.6+x	(12 ⁺)	(Q)
1368.1+x	(16 ⁻)	284.6 1	100	1083.4+x	(15 ⁻)	D
		510.9 1	91 11	857.2+x	(14 ⁻)	Q
1408.3+x	(15 ⁺)	267.0 2	42 12	1141.2+x	(14 ⁺)	D
		534.0 1	100	874.3+x	(13 ⁺)	Q
1573.7+x	(15 ⁺)	559.8 5	100	1013.9+x	(13 ⁺)	
1652.0+x	(17 ⁻)	283.9 1	62 12	1368.1+x	(16 ⁻)	D
		568.6 1	100	1083.4+x	(15 ⁻)	Q
1715.8+x	(16 ⁺)	307.8 2	34 9	1408.3+x	(15 ⁺)	D
		574.6 1	100	1141.2+x	(14 ⁺)	Q
1789.6+x	(16 ⁺)	585.3 3	100	1204.3+x	(14 ⁺)	Q
1847.8+x	(15 ⁺)	990.8		857.2+x	(14 ⁻)	
1964.8+x	(18 ⁻)	312.7 1	67 9	1652.0+x	(17 ⁻)	D
		596.7 1	100	1368.1+x	(16 ⁻)	Q
2013.7+x	(17 ⁺)	298.0 3	16 5	1715.8+x	(16 ⁺)	D
		605.4 1	100	1408.3+x	(15 ⁺)	(Q)
2036.0+x	(13 ⁺)	1387		649.5+x	(12 ⁺)	
2048.0+x	(16 ⁺)	200.5		1847.8+x	(15 ⁺)	
		475.7		1572.3+x	(14 ⁺)	
		964.6 2	100	1083.4+x	(15 ⁻)	D
2161.5+x	(14 ⁻)	1541		620.2+x	(13 ⁻)	
2192.5+x	(17 ⁺)	618.8 5	100	1573.7+x	(15 ⁺)	
2232.9+x	(17 ⁺)	184.9 3	54	2048.0+x	(16 ⁺)	
		385.0		1847.8+x	(15 ⁺)	
		864.9 3	100	1368.1+x	(16 ⁻)	D
2296.5+x	(19 ⁻)	331.8 1	40 6	1964.8+x	(18 ⁻)	D
		644.5 1	100	1652.0+x	(17 ⁻)	Q
2340.1+x	(18 ⁺)	326.3 3	14 3	2013.7+x	(17 ⁺)	D
		624.3 1	100	1715.8+x	(16 ⁺)	Q
2389.3+x	(15 ⁺)	353.7		2036.0+x	(13 ⁺)	
		1021.1		1368.1+x	(16 ⁻)	
		1306		1083.4+x	(15 ⁻)	
		1532		857.2+x	(14 ⁻)	
2422.4+x	(18 ⁺)	632.8 5	100	1789.6+x	(16 ⁺)	Q
2439.3+x	(18 ⁺)	206.4 3	100	2232.9+x	(17 ⁺)	
		391.6 3	45 8	2048.0+x	(16 ⁺)	
2535.2+x	(16 ⁻)	373.4		2161.5+x	(14 ⁻)	
		522 [#]		2013.7+x	(17 ⁺)	
		570 [#]		1964.8+x	(18 ⁻)	
		820 [#]		1715.8+x	(16 ⁺)	
		882.7		1652.0+x	(17 ⁻)	
		1127.8		1408.3+x	(15 ⁺)	
		1167.1		1368.1+x	(16 ⁻)	
		1452		1083.4+x	(15 ⁻)	
		1678		857.2+x	(14 ⁻)	
2621.3+x	(20 ⁻)	324.8 1	59 10	2296.5+x	(19 ⁻)	D
		656.5 1	100	1964.8+x	(18 ⁻)	Q
2647.0+x	(19 ⁺)	307.1 3	32 7	2340.1+x	(18 ⁺)	D
		633.2 1	100	2013.7+x	(17 ⁺)	Q

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Adopted Levels, Gammas (continued) $\gamma(^{164}\text{Lu})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult. [‡]
2661.5+x	(19 ⁺)	222.5 3 428.6 3	66 38	2439.3+x 2232.9+x	(18 ⁺) (17 ⁺)	(D)
2812.2+x	(17 ⁺)	647.8 2 423.4 847	100	2013.7+x 2389.3+x 1964.8+x	(17 ⁺) (15 ⁺) (18 ⁻)	Q
2844.1+x	(19 ⁺)	651.6 5	100	2192.5+x	(17 ⁺)	
2899.3+x	(20 ⁺)	237.9 3 252.0 3	100	2661.5+x 2647.0+x	(19 ⁺) (19 ⁺)	D
2944.9+x	(20 ⁺)	460.1 3 297.8 3	80 15 100	2439.3+x 2647.0+x	(18 ⁺) (19 ⁺)	(Q) D
2971.4+x	(18 ⁻)	605.0 3 436.5 1006.2	90 30	2340.1+x 2535.2+x 1964.8+x	(18 ⁺) (16 ⁻) (18 ⁻)	Q
2985.0+x	(21 ⁻)	363.7 1 688.4 1	50 10 100	2621.3+x 2296.5+x	(20 ⁻) (19 ⁻)	D Q
3071.4+x	(20 ⁺)	648.9 5	100	2422.4+x	(18 ⁺)	Q
3153.9+x	(18 ⁺)	1188 1364 1440		1964.8+x 1789.6+x 1715.8+x	(18 ⁻) (16 ⁺) (16 ⁺)	
3166.5+x	(21 ⁺)	267.2 3 505.0 3	100 94 15	2899.3+x 2661.5+x	(20 ⁺) (19 ⁺)	D Q
3171.0+x	(18 ⁺)	1123 1519		2048.0+x 1652.0+x	(16 ⁺) (17 ⁻)	
3183.4+x	(18 ⁺)	1219 1394 1531		1964.8+x 1789.6+x 1652.0+x	(18 ⁻) (16 ⁺) (17 ⁻)	
3234.2+x	(21 ⁺)	289.2 3 587.2 3	91 25 100	2944.9+x 2647.0+x	(20 ⁺) (19 ⁺)	D Q
3296.2+x	(19 ⁺)	484.1		2812.2+x	(17 ⁺)	
3308.2+x	(22 ⁻)	323.0 1 687.0 1	42 10 100	2985.0+x 2621.3+x	(21 ⁻) (20 ⁻)	D Q
3450.3+x	(22 ⁺)	283.9 3 550.9 3	100 67 10	3166.5+x 2899.3+x	(21 ⁺) (20 ⁺)	D Q
3468.1+x	(20 ⁻)	496.6		2971.4+x	(18 ⁻)	
3513.6+x?	(21 ⁺)	669.5 [#] 5	100	2844.1+x	(19 ⁺)	
3544.9+x	(22 ⁺)	310.6 3 600.0 3	66 13 100	3234.2+x 2944.9+x	(21 ⁺) (20 ⁺)	Q
3685.4+x	(23 ⁻)	377.3 2 700.5 1	45 8 100	3308.2+x 2985.0+x	(22 ⁻) (21 ⁻)	D Q
3719.1+x	(20 ⁺)	536 548 565.6 1097 1297		3183.4+x 3171.0+x 3153.9+x 2621.3+x 2422.4+x	(18 ⁺) (18 ⁺) (18 ⁺) (20 ⁻) (18 ⁺)	
3744.1+x?	(22 ⁺)	672.7 [#] 3	100	3071.4+x	(20 ⁺)	
3772.3+x	(23 ⁺)	322.0 3 605.9 3	71 15 100	3450.3+x 3166.5+x	(22 ⁺) (21 ⁺)	D Q
3842.7+x	(21 ⁺)	546.6		3296.2+x	(19 ⁺)	
3862.6+x	(23 ⁺)	317.7 3 628.3 3	34 8 100	3544.9+x 3234.2+x	(22 ⁺) (21 ⁺)	D (Q)
4005.4+x	(24 ⁻)	320.1 1 697.0 1	52 8 100	3685.4+x 3308.2+x	(23 ⁻) (22 ⁻)	D Q
4025.7+x	(22 ⁻)	557.5		3468.1+x	(20 ⁻)	
4110.0+x	(24 ⁺)	337.9 3 659.7 3	59 10 100	3772.3+x 3450.3+x	(23 ⁺) (22 ⁺)	(D) Q

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) $\gamma(^{164}\text{Lu})$ (continued)

<u>$E_i(\text{level})$</u>	<u>J_i^π</u>	<u>E_γ^\dagger</u>	<u>I_γ^\dagger</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Mult.‡</u>
4208.6+x	(24 ⁺)	346.1 3	20 5	3862.6+x	(23 ⁺)	
		663.8 2	100	3544.9+x	(22 ⁺)	
4318.7+x	(22 ⁺)	600.0		3719.1+x	(20 ⁺)	
		1247		3071.4+x	(20 ⁺)	
4393.8+x	(25 ⁻)	388.3 2	66 13	4005.4+x	(24 ⁻)	D
		708.4 1	100	3685.4+x	(23 ⁻)	Q
4448.8+x	(23 ⁺)	606.2		3842.7+x	(21 ⁺)	
4478.6+x	(25 ⁺)	368.5 3	40 10	4110.0+x	(24 ⁺)	D
		706.1 3	100	3772.3+x	(23 ⁺)	
4563.1+x	(25 ⁺)	354.7 3	23 4	4208.6+x	(24 ⁺)	
		700.5 2	100	3862.6+x	(23 ⁺)	Q
4642.4+x	(24 ⁻)	616.6		4025.7+x	(22 ⁻)	
4728.2+x	(26 ⁻)	334.3 2	62 15	4393.8+x	(25 ⁻)	D
		722.9 2	100	4005.4+x	(24 ⁻)	Q
4870.9+x	(26 ⁺)	392.3 3	50 10	4478.6+x	(25 ⁺)	D
		761.1 3	100	4110.0+x	(24 ⁺)	(Q)
4946.3+x	(26 ⁺)	383.3 3	28 5	4563.1+x	(25 ⁺)	
		737.6 2	100	4208.6+x	(24 ⁺)	
4966.4+x	(24 ⁺)	647.7		4318.7+x	(22 ⁺)	
5113.2+x	(25 ⁺)	471		4642.4+x	(24 ⁻)	
		664.5		4448.8+x	(23 ⁺)	
5141.5+x	(27 ⁻)	413.2 3	91 25	4728.2+x	(26 ⁻)	D
		747.8 2	100	4393.8+x	(25 ⁻)	Q
5269.5+x	(27 ⁺)	398.8 3	31 8	4870.9+x	(26 ⁺)	
		790.6 3	100	4478.6+x	(25 ⁺)	
5317.2+x	(26 ⁻)	674.6		4642.4+x	(24 ⁻)	
5342.0+x	(27 ⁺)	395 1	42 19	4946.3+x	(26 ⁺)	
		779.0 2	100 19	4563.1+x	(25 ⁺)	
5502.9+x	(28 ⁻)	361.5 3	59 21	5141.5+x	(27 ⁻)	D
		774.6 2	100	4728.2+x	(26 ⁻)	Q
5671.2+x	(26 ⁺)	704.8		4966.4+x	(24 ⁺)	
5688.9+x	(28 ⁺)	419.3 3	36 7	5269.5+x	(27 ⁺)	
		818.3 3	100	4870.9+x	(26 ⁺)	
5779.5+x	(28 ⁺)	438		5342.0+x	(27 ⁺)	
		833.1 5		4946.3+x	(26 ⁺)	
5833.9+x	(27 ⁺)	517		5317.2+x	(26 ⁻)	
		720.9		5113.2+x	(25 ⁺)	
5952.0+x	(29 ⁻)	449.0 3	71 25	5502.9+x	(28 ⁻)	
		810.6 3	100	5141.5+x	(27 ⁻)	
6050.5+x	(28 ⁻)	732.7		5317.2+x	(26 ⁻)	
6106.6+x	(29 ⁺)	417.9 5	18 4	5688.9+x	(28 ⁺)	
		836.6 5	100 20	5269.5+x	(27 ⁺)	(Q)
6221.1+x	(29 ⁺)	879.1 5	100	5342.0+x	(27 ⁺)	
6343.8+x	(30 ⁻)	391.8 5	24 5	5952.0+x	(29 ⁻)	
		840.9 3	100 9	5502.9+x	(28 ⁻)	
6435.6+x	(28 ⁺)	764.4		5671.2+x	(26 ⁺)	
6539.3+x	(30 ⁺)	432.6 5	37 10	6106.6+x	(29 ⁺)	
		850.5 5	100 20	5688.9+x	(28 ⁺)	(Q)
6610.1+x	(29 ⁺)	559		6050.5+x	(28 ⁻)	
		776.8		5833.9+x	(27 ⁺)	
6701.5+x	(30 ⁺)	922 1	100	5779.5+x	(28 ⁺)	
6835.8+x	(31 ⁻)	492.0 5	62 25	6343.8+x	(30 ⁻)	
		883.8 5	100 22	5952.0+x	(29 ⁻)	
6840.3+x	(30 ⁻)	789.8		6050.5+x	(28 ⁻)	
6979.4+x	(31 ⁺)	440.1 5	42 17	6539.3+x	(30 ⁺)	
		872.9 5	100 25	6106.6+x	(29 ⁺)	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) $\gamma(^{164}\text{Lu})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π
7181.7+x	(31 ⁺)	960.6 5	100	6221.1+x	(29 ⁺)
7254.2+x	(32 ⁻)	418.3 5	29 11	6835.8+x	(31 ⁻)
		910.4 5	100 21	6343.8+x	(30 ⁻)
7259+x	(30 ⁺)	823.3		6435.6+x	(28 ⁺)
7437.3+x	(32 ⁺)	457.9 5	32 16	6979.4+x	(31 ⁺)
		897.9 5	100 24	6539.3+x	(30 ⁺)
7441.7+x	(31 ⁺)	831.6		6610.1+x	(29 ⁺)
7678.6+x	(32 ⁺)	977		6701.5+x	(30 ⁺)
7688+x	(32 ⁻)	847.4		6840.3+x	(30 ⁻)
7796.2+x	(33 ⁻)	542		7254.2+x	(32 ⁻)
		960.6 5		6835.8+x	(31 ⁻)
7897.7+x	(33 ⁺)	460.5 5	56 25	7437.3+x	(32 ⁺)
		918.3 5	100 31	6979.4+x	(31 ⁺)
8134.2+x	(33 ⁺)	952.4 5	100	7181.7+x	(31 ⁺)
8141+x	(32 ⁺)	881.6		7259+x	(30 ⁺)
8229.2+x	(34 ⁻)	434		7796.2+x	(33 ⁻)
		974.7 5		7254.2+x	(32 ⁻)
8327+x	(33 ⁺)	885.8		7441.7+x	(31 ⁺)
8389.7+x	(34 ⁺)	952.4 5	100	7437.3+x	(32 ⁺)
8593+x	(34 ⁻)	905.4		7688+x	(32 ⁻)
8829.2+x	(35 ⁻)	600 [#]		8229.2+x	(34 ⁻)
		1033		7796.2+x	(33 ⁻)
8867.2+x	(35 ⁺)	969.5 5	100	7897.7+x	(33 ⁺)
9078+x	(34 ⁺)	937.1		8141+x	(32 ⁺)
9124.2+x	(35 ⁺)	990		8134.2+x	(33 ⁺)
9264.2+x	(36 ⁻)	435 [#]		8829.2+x	(35 ⁻)
		1035		8229.2+x	(34 ⁻)
9268+x	(35 ⁺)	940.2		8327+x	(33 ⁺)
9401.7+x	(36 ⁺)	1012 1	100	8389.7+x	(34 ⁺)
9557+x	(36 ⁻)	964.0		8593+x	(34 ⁻)
9885.2+x	(37 ⁺)	1018 1	100	8867.2+x	(35 ⁺)
9933.2+x	(37 ⁻)	1104		8829.2+x	(35 ⁻)
10069+x	(36 ⁺)	991.1		9078+x	(34 ⁺)
10263+x	(37 ⁺)	995.0		9268+x	(35 ⁺)
10352.2+x	(38 ⁻)	1088		9264.2+x	(36 ⁻)
10466.7+x	(38 ⁺)	1065 1	100	9401.7+x	(36 ⁺)
10581+x	(38 ⁻)	1023.7		9557+x	(36 ⁻)
10954.2+x	(39 ⁺)	1069 1	100	9885.2+x	(37 ⁺)
11095.2+x	(39 ⁻)	1162		9933.2+x	(37 ⁻)
11111+x	(38 ⁺)	1042.2		10069+x	(36 ⁺)
11313+x	(39 ⁺)	1050.2		10263+x	(37 ⁺)
11476.2+x	(40 ⁻)	1124		10352.2+x	(38 ⁻)
11664+x	(40 ⁻)	1083.2		10581+x	(38 ⁻)
12199+x	(40 ⁺)	1088.5		11111+x	(38 ⁺)
12282.2+x?	(41 ⁻)	1187 [#]		11095.2+x	(39 ⁻)
12417+x	(41 ⁺)	1104.4		11313+x	(39 ⁺)
12795+x	(42 ⁻)	1131		11664+x	(40 ⁻)
12799+x	(42 ⁻)	1135.2		11664+x	(40 ⁻)
12826+x	(42 ⁻)	1162		11664+x	(40 ⁻)
13332+x	(42 ⁺)	1132.1		12199+x	(40 ⁺)
13577+x	(43 ⁺)	1159.9		12417+x	(41 ⁺)
13946+x	(44 ⁻)	1120		12826+x	(42 ⁻)
		1147 [#]		12799+x	(42 ⁻)
		1151		12795+x	(42 ⁻)
14019+x	(44 ⁻)	1193		12826+x	(42 ⁻)

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) $\gamma(^{164}\text{Lu})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\dagger	E_f	J_f^π	$E_i(\text{level})$	J_i^π	E_γ^\dagger	E_f	J_f^π
14019+x	(44 ⁻)	1219	12799+x	(42 ⁻)	4174.0+z	J2+12	846	3328.0+z	J2+10
		1224 [#]	12795+x	(42 ⁻)	5080+z	J2+14	906	4174.0+z	J2+12
14504+x	(44 ⁺)	1172	13332+x	(42 ⁺)	6045+z	J2+16	965	5080+z	J2+14
14788+x	(45 ⁺)	1211.0	13577+x	(43 ⁺)	7068+z	J2+18	1023	6045+z	J2+16
15154+x	(46 ⁻)	1208	13946+x	(44 ⁻)	8150+z	J2+20	1082	7068+z	J2+18
15275+x	(46 ⁻)	1256	14019+x	(44 ⁻)	9284+z	J2+22	1134	8150+z	J2+20
15713+x	(46 ⁺)	1209	14504+x	(44 ⁺)	511.0+u	J3+2	511	u	J3
16065+x?	(47 ⁺)	1277 [#]	14788+x	(45 ⁺)	1080.0+u	J3+4	569	511.0+u	J3+2
16418+x	(48 ⁻)	1264	15154+x	(46 ⁻)	1708.0+u	J3+6	628	1080.0+u	J3+4
16586+x	(48 ⁻)	1311	15275+x	(46 ⁻)	2393.0+u	J3+8	685	1708.0+u	J3+6
16921+x	(48 ⁺)	1208	15713+x	(46 ⁺)	3134.0+u	J3+10	741	2393.0+u	J3+8
17381+x?	(49 ⁺)	1316 [#]	16065+x?	(47 ⁺)	3928.0+u	J3+12	794	3134.0+u	J3+10
17736+x	(50 ⁻)	1318	16418+x	(48 ⁻)	4775+u	J3+14	847	3928.0+u	J3+12
17958+x	(50 ⁻)	1372	16586+x	(48 ⁻)	5676+u	J3+16	901	4775+u	J3+14
18169+x?	(50 ⁺)	1248 [#]	16921+x	(48 ⁺)	6632+u	J3+18	956	5676+u	J3+16
19112+x?	(52 ⁻)	1376 [#]	17736+x	(50 ⁻)	7643+u	J3+20	1011	6632+u	J3+18
633.0+y	J1+2	633	y	J1	8713+u	J3+22	1070	7643+u	J3+20
1324.0+y	J1+4	691	633.0+y	J1+2	752.0+v	J4+2	752	v	J4
2071.0+y	J1+6	747	1324.0+y	J1+4	1563.0+v	J4+4	811	752.0+v	J4+2
2874.0+y	J1+8	803	2071.0+y	J1+6	2429.0+v	J4+6	866	1563.0+v	J4+4
3733.0+y	J1+10	859	2874.0+y	J1+8	3352.0+v	J4+8	923	2429.0+v	J4+6
4646.0+y	J1+12	913	3733.0+y	J1+10	4332.0+v	J4+10	980	3352.0+v	J4+8
5612+y	J1+14	966	4646.0+y	J1+12	5374.0+v	J4+12	1042	4332.0+v	J4+10
6617+y	J1+16	1005	5612+y	J1+14	732.0+w	J5+2	732	w	J5
546.0+z	J2+2	546	z	J2	1526.0+w	J5+4	794	732.0+w	J5+2
1151.0+z	J2+4	605	546.0+z	J2+2	2382.0+w	J5+6	856	1526.0+w	J5+4
1815.0+z	J2+6	664	1151.0+z	J2+4	3300.0+w	J5+8	918	2382.0+w	J5+6
2542.0+z	J2+8	727	1815.0+z	J2+6	4276.0+w	J5+10	976	3300.0+w	J5+8
3328.0+z	J2+10	786	2542.0+z	J2+8					

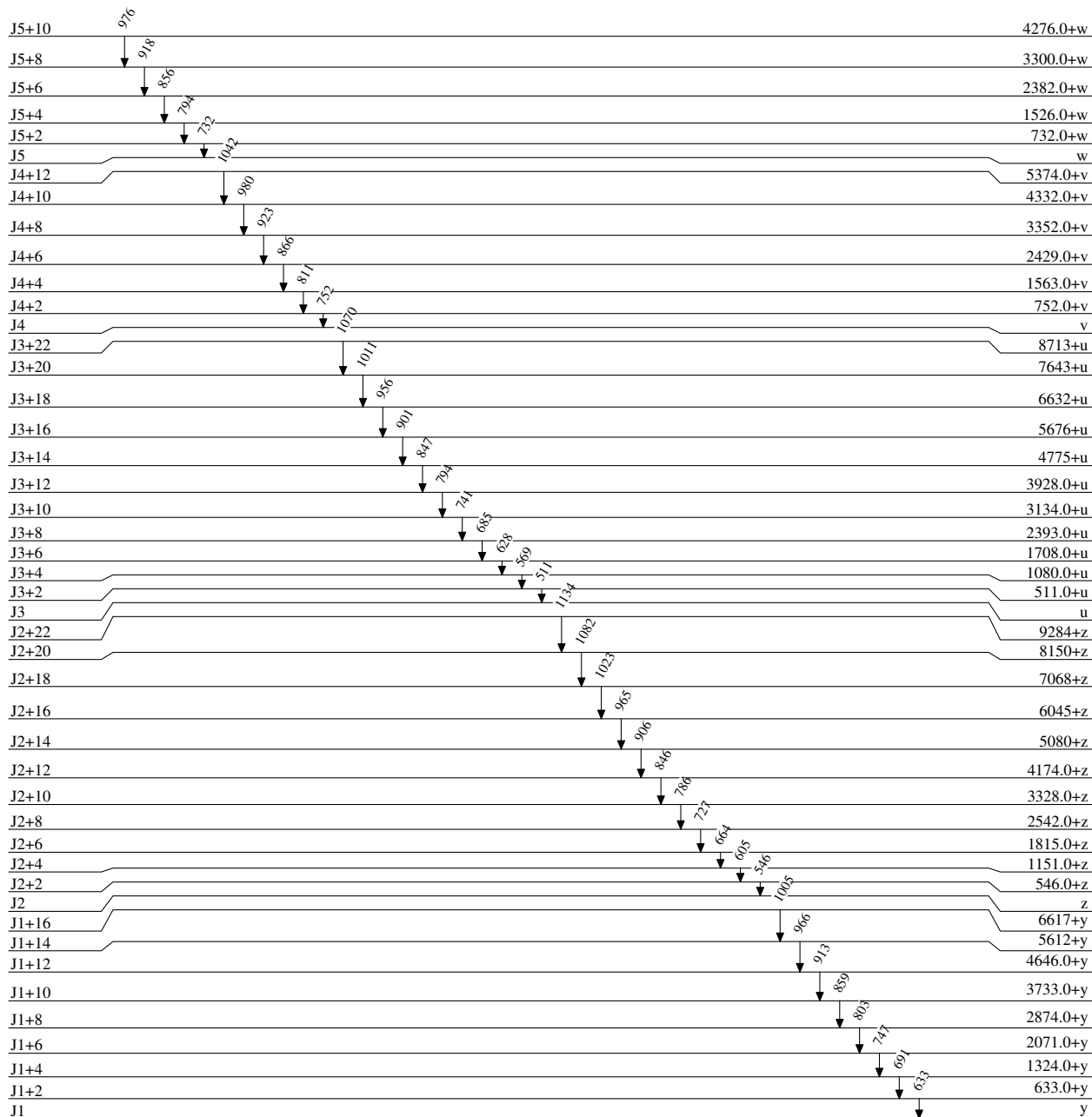
[†] Weighted averages of all available data of comparable precision from in-beam γ -ray data, when a level is populated in more than one reaction.

[‡] $\Delta J=1$, dipole, and $\Delta J=2$, quadrupole transitions from DCO ratio in several reactions: ($^{14}\text{F},4n\gamma$); ($^{19}\text{F},5n\gamma$); ($^{23}\text{Na},5n\gamma$); ($^{29}\text{Si},4n\gamma$); ($^{30}\text{Si},5n\gamma$) ([1997Ca29](#),[1996Wa25](#),[1996Ju01](#)). Assignment of mult=Q indicates $\Delta J=2$, quadrupole (most likely E2) and mult=D indicates $\Delta J=1$, dipole or dipole+quadrupole. It should be noted that DCO ratios (as listed in reaction datasets) for $\Delta J=1$ transitions are generally larger than expected for pure dipole, indicating quadrupole (most likely E2) admixture in most of these transitions, as also expected from band structures.

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

Adopted Levels, GammasLevel Scheme

Intensities: Relative photon branching from each level



1(-)

0.0

3.14 min 3

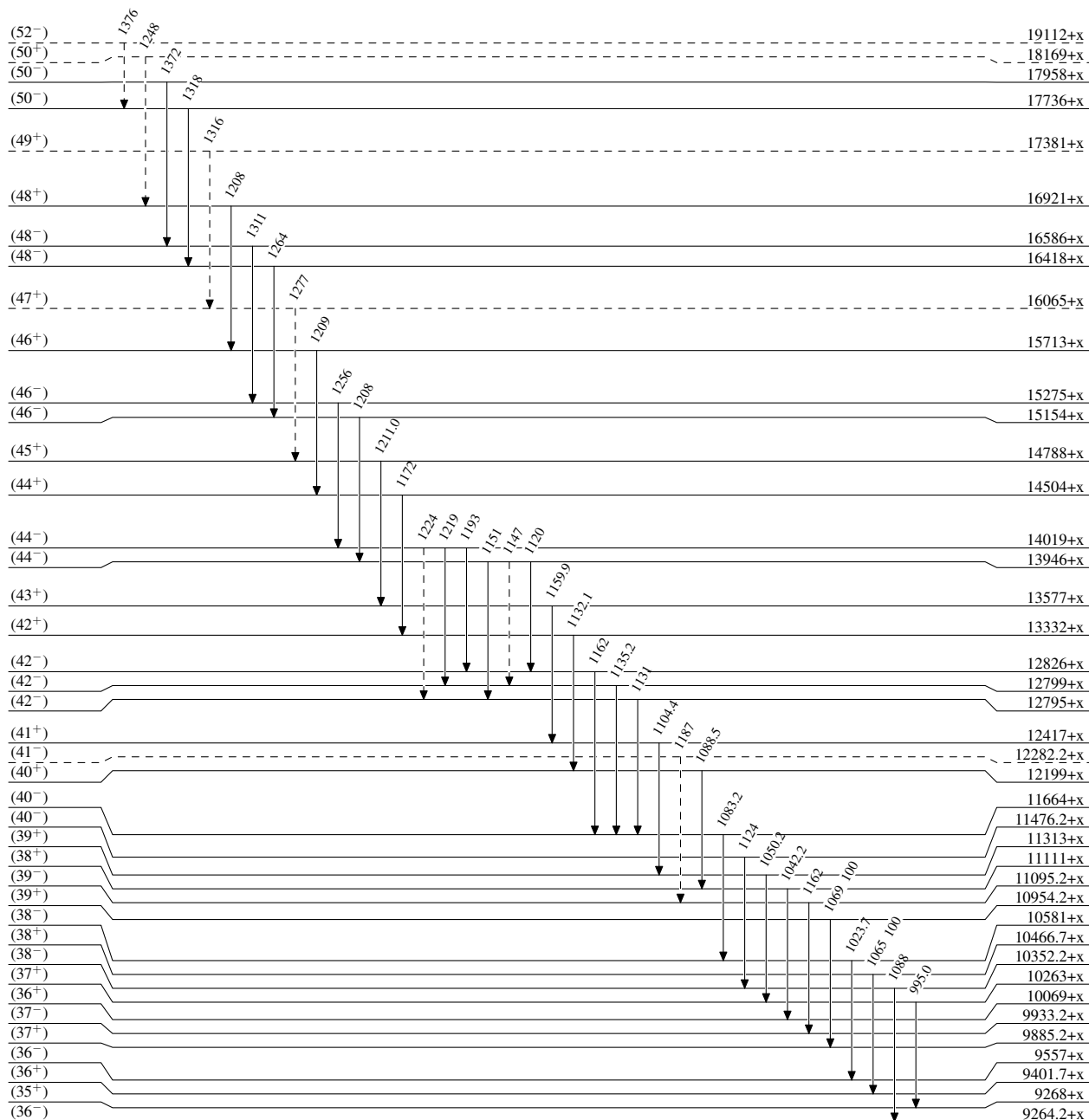
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----> γ Decay (Uncertain)



1(-)

0.0

3.14 min 3

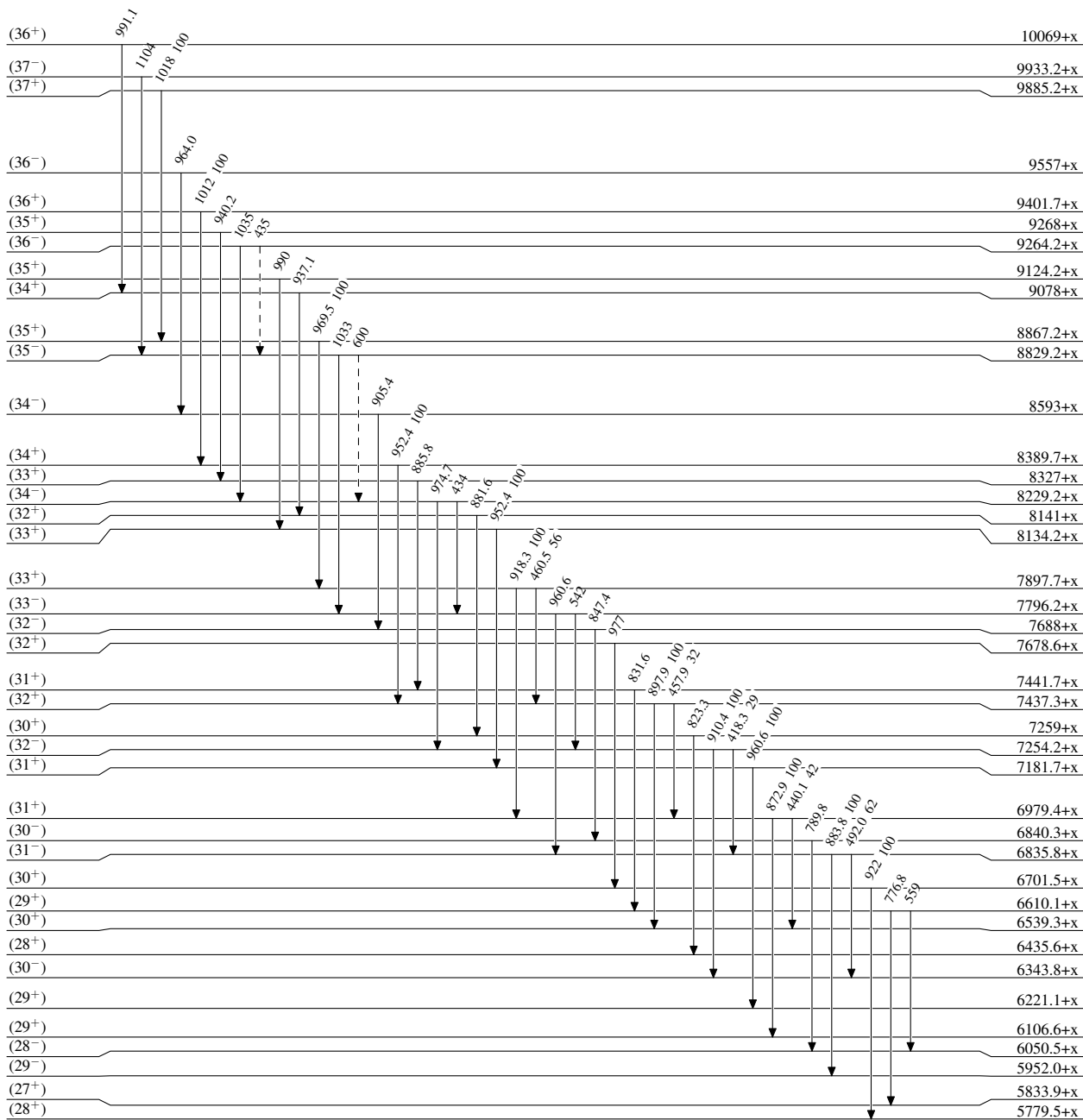
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----> γ Decay (Uncertain)

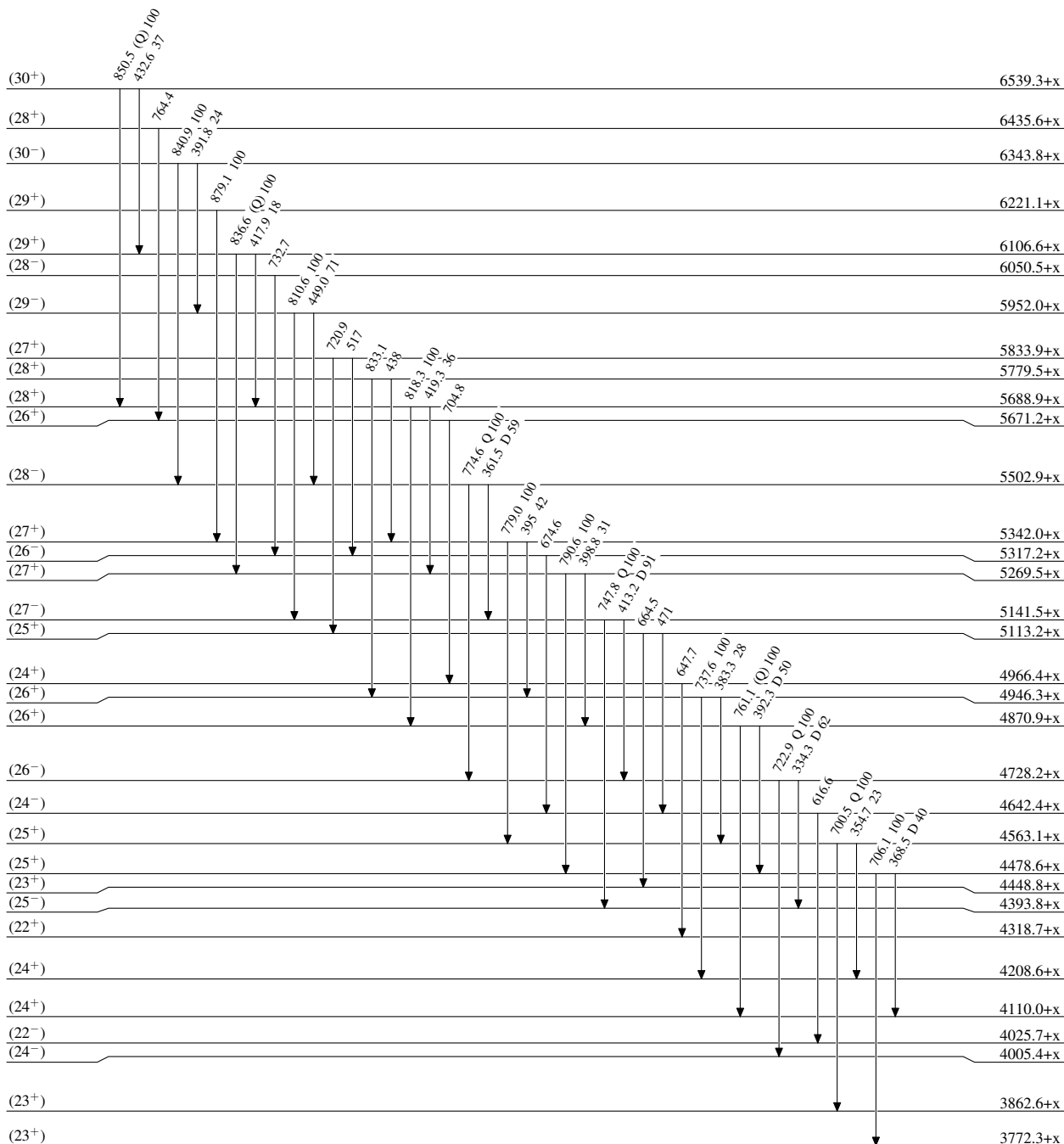


1(-) 0.0

3.14 min 3

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

Intensities: Relative photon branching from each level



1(-)

0.0

3.14 min 3

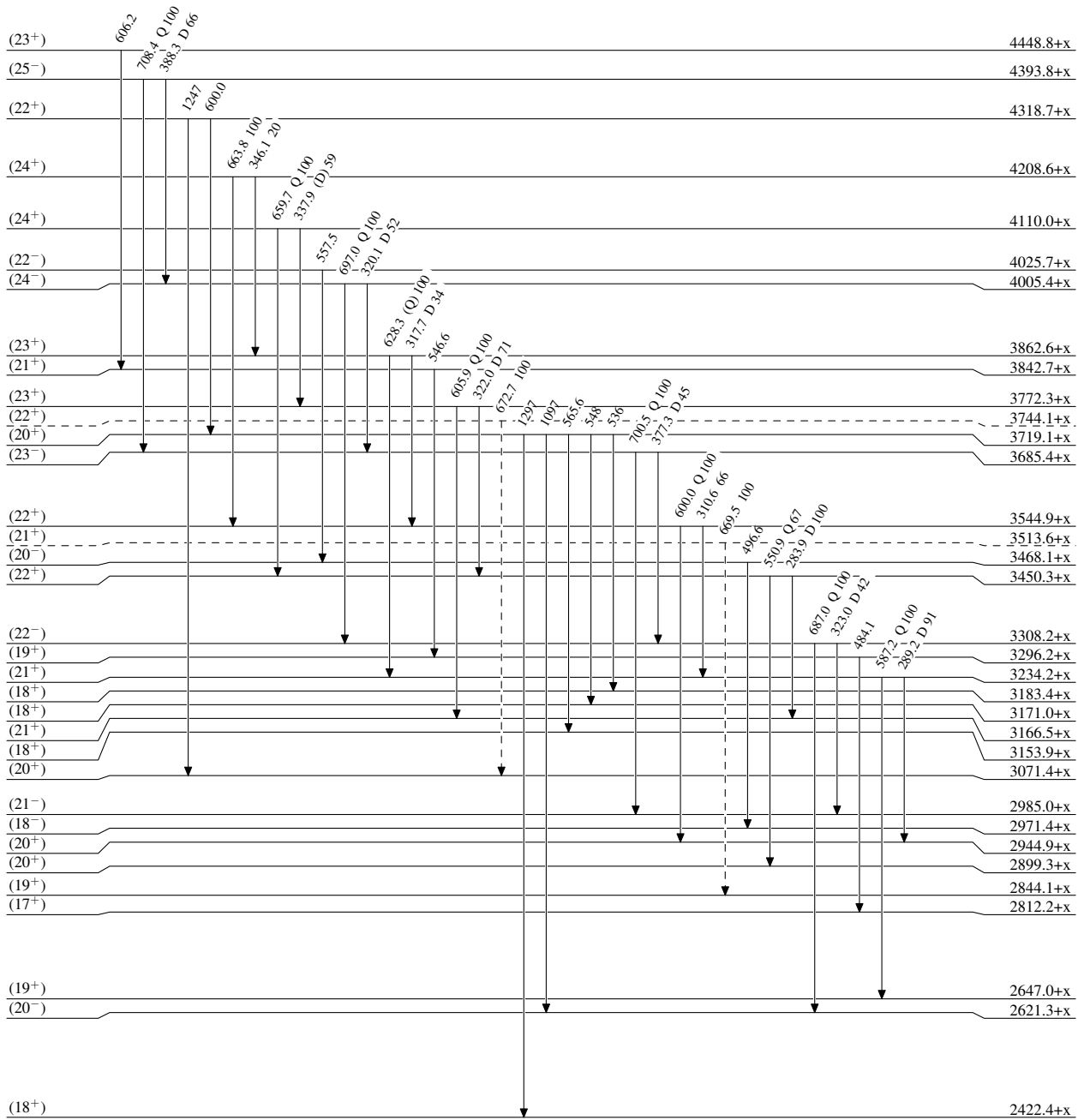
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)



1(-) 0.0 3.14 min 3

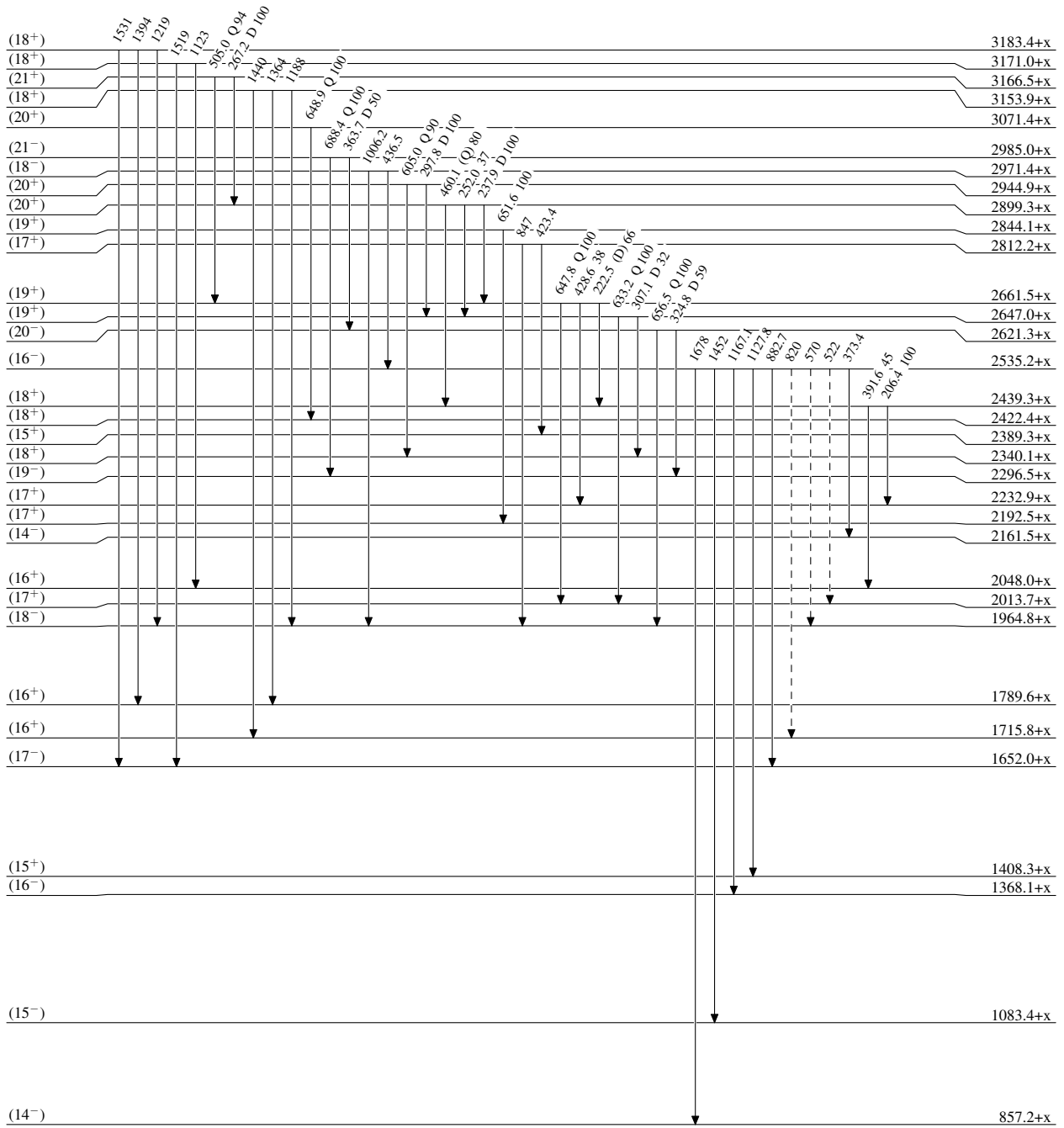
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

-----> γ Decay (Uncertain)



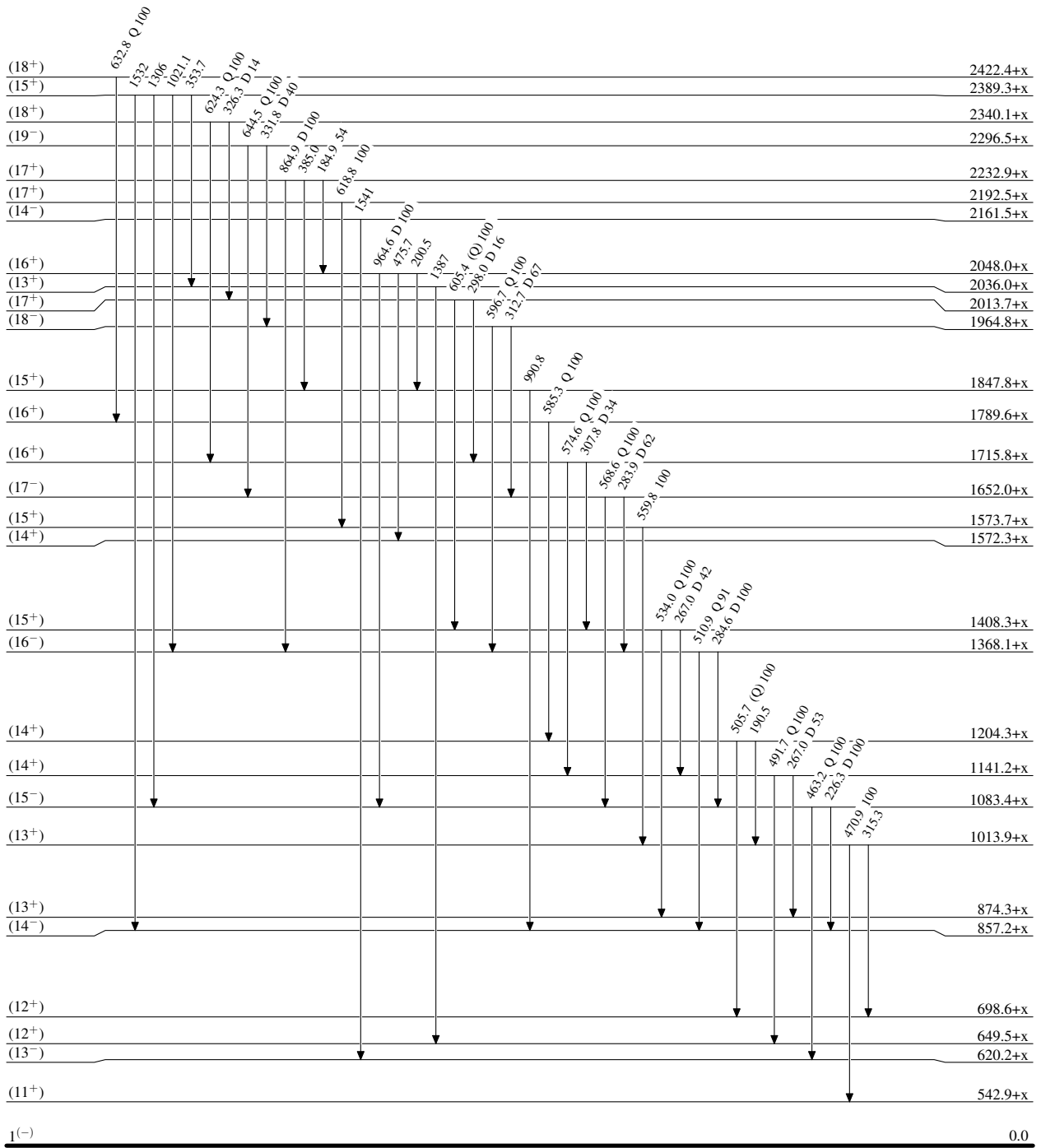
1(-) 0.0

3.14 min 3

Adopted Levels, Gammas

Level Scheme (continued)

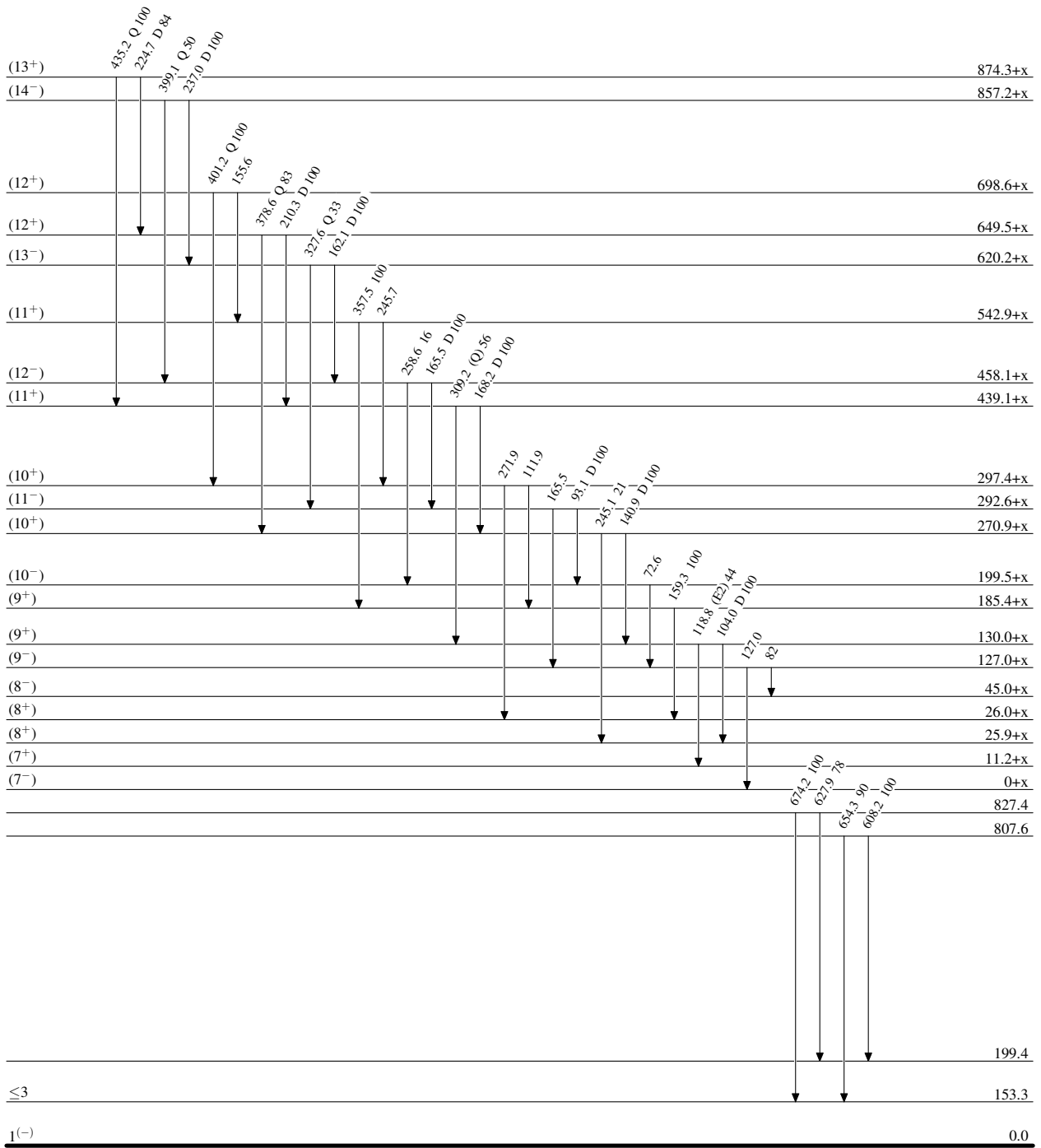
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



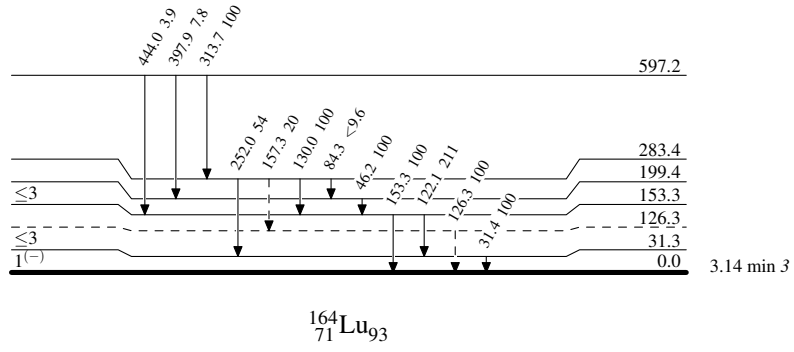
3.14 min 3

Adopted Levels, Gammas

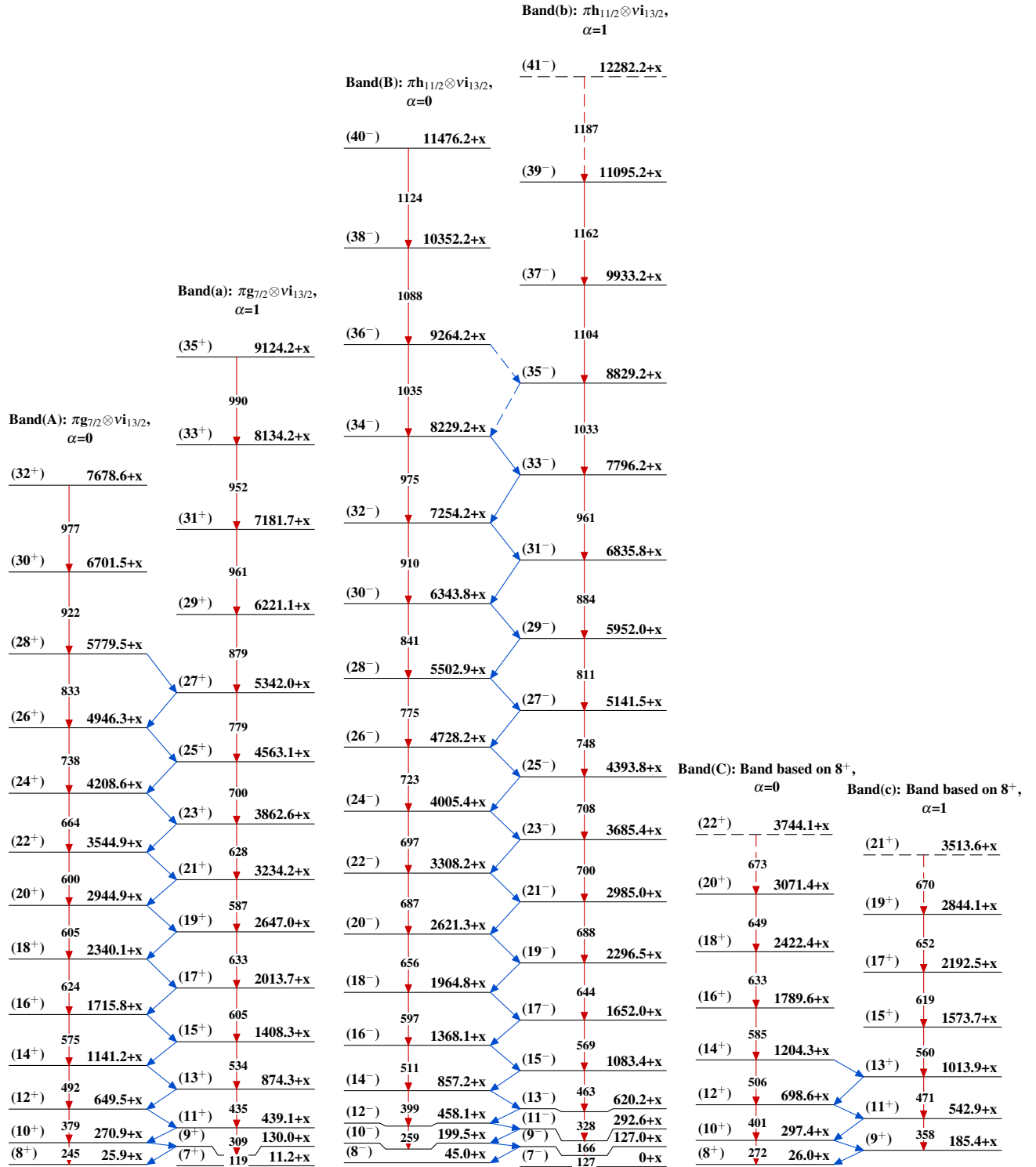
Legend

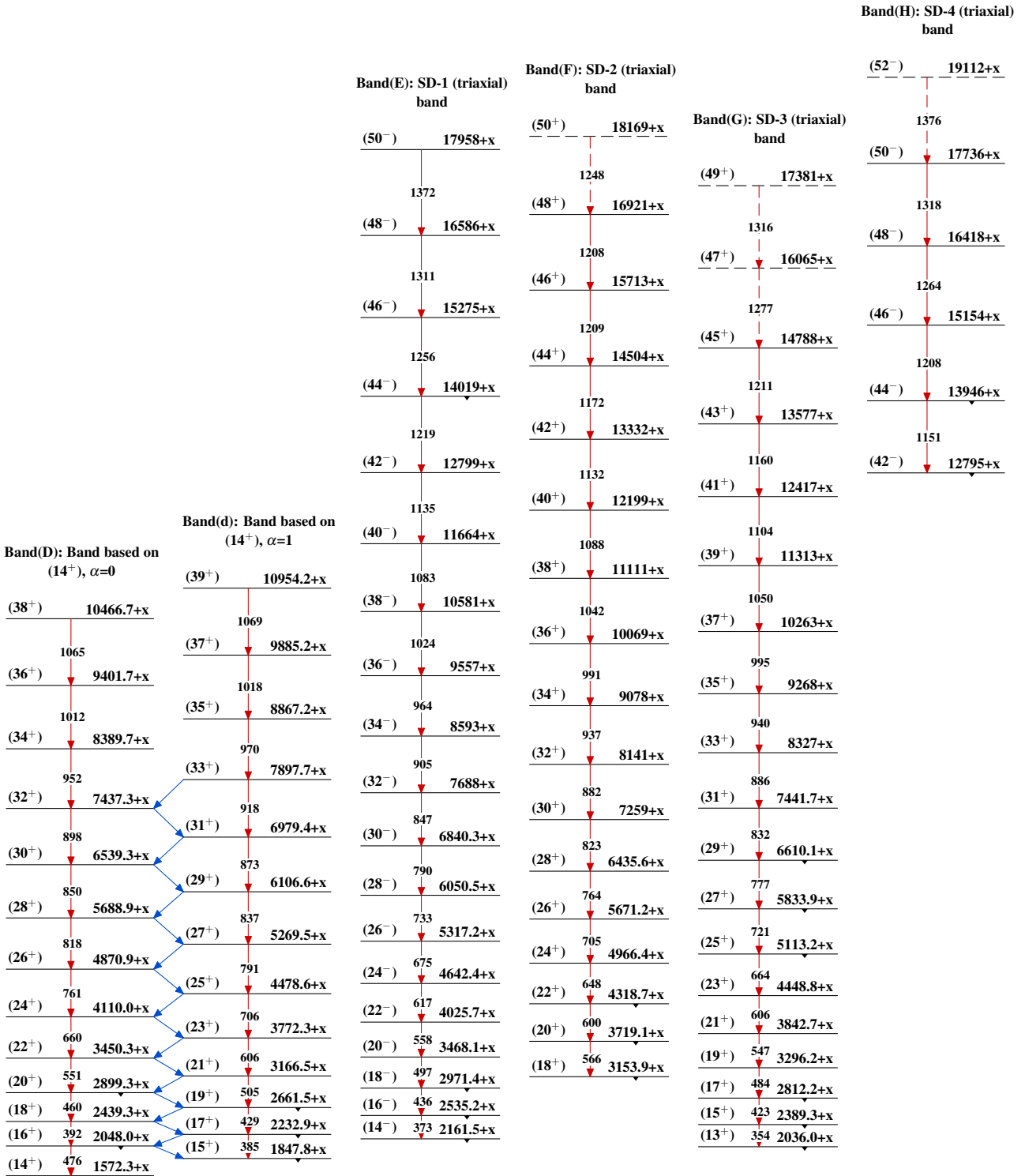
Level Scheme (continued)

Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)

Adopted Levels, Gammas



Adopted Levels, Gammas (continued)

Adopted Levels, Gammas (continued)

			Band(M): SD-9 (triaxial) band	
			J5+10	4276.0+w
			J5+8	976 3300.0+w
			J5+6	918 2382.0+w
		Band(L): SD-8 (triaxial) band	J5+4	856 1526.0+w
			J5+2	794 732.0+w
			J5	732 w
			J4+12	5374.0+v
			J4+10	1042 4332.0+v
			J4+8	980 3352.0+v
			J4+6	923 2429.0+v
			J4+4	866 1563.0+v
			J4+2	811 752.0+v
			J4	752 v
		Band(K): SD-7 (triaxial) band		
			J3+22	8713+u
			J3+20	1070 7643+u
			J3+18	1011 6632+u
			J3+16	956 5676+u
			J3+14	901 4775+u
			J3+12	847 3928.0+u
			J3+10	794 3134.0+u
			J3+8	741 2393.0+u
			J3+6	685 1708.0+u
			J3+4	628 1080.0+u
			J3+2	569 511.0+u
			J3	511 u
		Band(J): SD-6 (triaxial) band		
			J2+22	9284+z
			J2+20	1134 8150+z
			J2+18	1082 7068+z
			J2+16	1023 6045+z
			J2+14	965 5080+z
			J2+12	906 4174.0+z
			J2+10	846 3328.0+z
			J2+8	786 2542.0+z
			J2+6	727 1815.0+z
			J2+4	664 1151.0+z
			J2+2	605 546.0+z
			J2	546 z
		Band(I): SD-5 (triaxial) band		
			J1+16	6617+y
			J1+14	1005 5612+y
			J1+12	966 4646.0+y
			J1+10	913 3733.0+y
			J1+8	859 2874.0+y
			J1+6	803 2071.0+y
			J1+4	747 1324.0+y
			J1+2	691 633.0+y
			J1	633 y