Adopted Levels, Gammas

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Janos Timar and Zoltan Elekes, Balraj Singh	NDS 121, 143 (2014)	31-May-2014

Q(β^-)=−5040 *40*; S(n)=10770 *60*; S(p)=3235 *22*; Q(α)=338 *23* 2012Wa38
S(2n)=19570 *30*, S(2p)=9662 *22* (2012Wa38).
1963Pr02: ^{129}La produced and identified in bombardment of indium foils by ^{16}O beam followed by chemical separation and half-life measurement.
Later decay studies: 1963Ya05, 1963La03, 1979Br05, 1998Ko66.

^{129}La Levels

The band configurations are based on comparison with cranked-shell model analysis (1995Ku29).

Cross Reference (XREF) Flags

- A ^{129}La IT decay (0.56 s)
- B ^{129}Ce ε decay (3.5 min)
- C ^{51}V(^{82}Se,4nγ),^{100}Mo(^{34}S,p4nγ)
- D ^{119}Sn(^{14}N,4nγ)

E(level)†	Jπ#	$T_{1/2}$@	XREF	Comments
0.0[f]	(3/2$^+$)	11.6 min *2*	ABCD	%ε+%β^+=100 Jπ: see comment for 172.3 level. $T_{1/2}$: from 1979Br05. Other: 10.0 min *5* (1963Ya05), 7.2 min *5* (1963Pr02), ≈20 min (1963La03).
68.18[g] *5*	(5/2$^+$)		ABCD	Jπ: see comment for 172.3 level.
172.33[&] *20*	(11/2$^-$)	0.56 s *5*	A CD	%IT=100 Jπ: observation of a decoupled band based on 172.3 level, E3-M1 γ cascade to g.s., available orbits for the odd proton; and systematics of structures based on $h_{11/2}$ proton orbital in this mass region give most probable assignment of 11/2$^-$ -> 5/2$^+$ -> 3/2$^+$ cascade for 172, 68 and g.s. Theoretical model calculations (2001Sh07,1987Al21,1985Ha34) support these assignments. However, all the assignments are given in parentheses here since a direct measurement of any of these spins is not yet available. $T_{1/2}$: from decay curves for 68.9γ and 104.8γ (1969Al05).
216.30 *23*	(1/2$^+$ to 9/2$^+$)		B	Jπ: γ to (5/2$^+$).
239.62 *8*	(5/2$^+$)		B D	Jπ: M1 γ to (5/2$^+$).
248.45[f] *8*	(7/2$^+$)		BCD	Jπ: M1 γ to (5/2$^+$) and (E2) γ to (3/2$^+$) in strongly coupled band.
270.92 *13*	(1/2 to 7/2$^+$)		B	Jπ: γ to 3/2$^+$.
398.48 *9*	(3/2$^+$,5/2$^+$,7/2$^+$)		B	Jπ: M1,E2 γ to (3/2$^+$).
440.25 *11*	(7/2$^+$)		B D	Jπ: M1 γ to (5/2$^+$); population of the level in HI reaction favors 7/2 over the lower spins.
442.08[&] *18*	(15/2$^-$)	90 ps *4*	CD	$T_{1/2}$: from Doppler-shift recoil-distance method in (^{14}N,4nγ) (1975Bu08). Jπ: ΔJ=2, E2 in-band γ to (11/2$^-$).
446.33[g] *11*	(9/2$^+$)		BCD	Jπ: ΔJ=1, M1 γ to (7/2$^+$) and ΔJ=2, Q γ to (5/2$^+$) in-band transitions.
464.02 *12*	(5/2$^+$,7/2$^+$)		B	Jπ: ΔJ=1, M1(+E2) γ to (7/2$^+$); M1,E2 γ to (5/2$^+$); γ to (3/2$^+$).
472.21 *14*	(1/2$^+$ to 7/2$^+$)		B	Jπ: gammas to (3/2$^+$) and (5/2$^+$).
556.00? *20*	(1/2 to 7/2$^+$)		B	Jπ: γ to (3/2$^+$).
587.64 *14*	(1/2$^+$ to 7/2$^+$)		B	Jπ: gammas to (3/2$^+$) and (5/2$^+$).
619.61 *13*	(3/2$^+$ to 9/2$^+$)		B	Jπ: gammas to (5/2$^+$) and (7/2$^+$).
645.53 *12*	(9/2$^+$)		B D	Jπ: (M1+E2) γ to (9/2$^+$); γ to (5/2$^+$); γ from (13/2$^+$); population in

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Adopted Levels, Gammas (continued)

^{129}La Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$[@]	XREF	Comments
				heavy-ion reaction favors $(9/2^+)$ over $(7/2^+)$.
652.5 *3*	(1/2 to 9/2$^+$)		B	
696.56[f] *15*	(11/2$^+$)		CD	Jπ: in-band dipole γ to $(9/2^+)$ and γ to $(7/2^+)$.
706.43 *12*	(5/2$^+$ to 9/2$^+$)		B	
782.3 *3*	(5/2$^+$ to 9/2$^+$)		B	
796.21 *12*	(3/2$^+$ to 7/2$^+$)		B	
832.32 *15*	(3/2$^+$ to 9/2$^+$)		B	
916.64[&] *21*	(19/2$^-$)	6.0 ps *9*	CD	$T_{1/2}$: from Doppler-shift recoil-distance method in (^{14}N,4nγ) (1975Bu08). Jπ: ΔJ=2, E2 in-band γ to $(15/2^-)$.
928.93 *16*	(7/2$^+$ to 11/2$^+$)		B D	Jπ: gammas to $(7/2^+)$ and $(11/2^+)$.
934.93 *18*	(1/2 to 9/2$^+$)		B	
966.34 *14*	(1/2 to 7/2$^+$)		B	
992.41 *16*	(11/2$^+$)		D	Jπ: ΔJ=1, (M1+E2) to $(9/2^+)$; population in heavy-ion reaction favors $(11/2^+)$ over $7/2^+$.
1015.26 *15*	(1/2 to 7/2$^+$)		B	
1021.79[g] *16*	(13/2$^+$)		CD	Jπ: ΔJ=1, (M1+E2) in-band γ to $(11/2^+)$ and ΔJ=2, Q in-band γ to $(9/2^+)$.
1120.18[c] *20*	(13/2$^-$)		D	Jπ: gammas to $(11/2^-)$ and $(15/2^-)$; γ from $(17/2^-)$ in probably E2.
1120.5? *3*			D	E(level): existence of this level is not discussed in 1995Ku29. Evaluators find that it is possible that the 1098.7 keV γ may feed the 1120.3 keV $(13/2^-)$ level, in which case this level may not exist.
1234.19 *21*	(13/2$^+$)		D	Jπ: γ to $(9/2^+)$ and γ from $(17/2^+)$.
1275.09 *22*	(15/2 to 19/2$^-$)		D	Jπ: γ to $(15/2^-)$.
1304.94[a] *23*	(17/2$^-$)		D	Jπ: ΔJ=1, M1+E2 γ to $(15/2^-)$; ΔJ=1, D γ to $(19/2^-)$.
1315.78[f] *20*	(15/2$^+$)		CD	Jπ: in-band ΔJ=2, Q γ to $(11/2^+)$.
1328.8 *4*	(15/2 to 19/2$^-$)		D	Jπ: γ to $(15/2^-)$.
1524.31 *22*	(11/2$^+$ to 15/2$^+$)		D	Jπ: gammas to $(13/2^+)$ and $(7/2^+$:$11/2^+)$.
1558.03[&] *23*	(23/2$^-$)	≥1.2 ps	CD	Jπ: in-band ΔJ=2, (E2) γ to $(19/2^-)$.
1586.62[c] *23*	(17/2$^-$)		D	Jπ: ΔJ=1, M1+E2 γ to $(19/2^-)$; γ to $(15/2^-)$.
1651.1 *4*	(15/2 to 19/2$^-$)		D	Jπ: γ to $(15/2^-)$.
1654.17 *22*	(13/2$^+$)		D	Jπ: ΔJ=1, D+Q γ to $(11/2^+)$; γ to $(13/2^+)$.
1724.96 *19*	(15/2$^+$)		CD	Jπ: ΔJ=0, D+Q γ to $(15/2^-)$; γ to $(11/2^+)$.
1753.2? *4*			D	E(level): existence of this level is not discussed in 1995Ku29. The 1311.1γ may depopulate the 1753.4,17/2$^+$ level, in which case this level may not exist.
1753.4 *3*	(17/2$^+$)		D	Jπ: in-band ΔJ=2, Q γ to $(13/2^+)$.
1803.0 *3*			D	
1851.24[b] *23*	(19/2$^-$)		D	Jπ: strong ΔJ=2, Q γ to $(15/2^-)$; ΔJ=(0),(D) γ to $(19/2^-)$.
1949.58[a] *23*	(21/2$^-$)		CD	Jπ: ΔJ=1, M1+E2 γ to $(19/2^-)$; γ to $(23/2^-)$.
1951.5 *4*	(23/2 to 27/2$^-$)		D	Jπ: γ to $(23/2^-)$.
1956.5 *4*	(9/2$^+$ to 17/2$^+$)		D	
1972.2 *3*	(15/2$^-$,17/2,19/2$^-$)		D	Jπ: gammas to $(15/2^-)$ and $(19/2^-)$.
1985.0[d] *3*	(19/2$^+$)		CD	Jπ: ΔJ=2,Q or ΔJ=0, D gammas to $(15/2^+)$ and $(19/2^-)$.
2003.8 *4*	(15/2 to 19/2$^-$)		D	Jπ: γ to $(15/2^-)$.
2069.9[f] *3*	(19/2$^+$)		CD	Jπ: in-band ΔJ=2, Q γ to $(15/2^+)$.
2118.2 *4*	(15/2$^-$ to 23/2$^-$)		D	Jπ: γ to $(15/2^-)$.
2169.8 *3*	(19/2)		D	Jπ: ΔJ=1, d γ to $(17/2^-)$.
2206.4 *4*	(19/2 to 23/2$^-$)		D	Jπ: γ to $(19/2^-)$.
2218.90 *18*	(15/2$^+$)		CD	Jπ: ΔJ=1, M1+E2 γ to $(13/2^+)$; γ to $(15/2^-)$.
2221.5[c] *3*	(21/2$^-$)		D	Jπ: ΔJ=1, M1+E2 γ to $(23/2^-)$; γ to $(17/2^-)$.
2242.7 *2*	(17/2$^+$)		CD	Jπ: ΔJ=1, M1+E2 γ to $(15/2^+)$; Q γ to $(13/2^+)$.
2242.7+x[h] *10*	(17/2$^+$)		CD	Jπ: no definite decay path from this level to the known-energy levels

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Adopted Levels, Gammas (continued)

^{129}La Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$[@]	XREF	Comments
				could be identified. It populates mainly (15/2⁻), (15/2⁺) and (17/2⁺) levels. Positive parity derived from the assumed configuration based on no signature splitting.
2277.9 *4*	(19/2 to 23/2⁻)		D	Jπ: γ to (19/2⁻).
2290.9 *3*	(19/2 to 23/2⁻)		D	Jπ: γ to (19/2⁻).
2297.6+x[i] *3*	(19/2⁺)		CD	Jπ: in-band γ to (17/2⁺).
2298.1 *3*	(15/2 to 19/2⁻)		D	Jπ: γ to (15/2⁻).
2343.2[&] *3*	(27/2⁻)	0.82 ps *20*	CD	Jπ: in-band ΔJ=2, E2 γ to (23/2⁻).
2351.8[j] *3*	(19/2⁺)		CD	Jπ: ΔJ=0, D γ to (19/2⁻); parity from the band configuration.
2408.3+x[h] *4*	(21/2⁺)		CD	Jπ: in-band ΔJ=1, M1+E2 γ to (19/2⁺).
2431.2[d] *3*	(23/2⁺)		CD	Jπ: ΔJ=2, Q or ΔJ=0, D gammas to (19/2⁺) and (23/2⁻).
2452.8 *3*	(19/2 to 23/2⁻)		D	Jπ: γ to (19/2⁻).
2453.7 *4*	(23/2 to 27/2⁻)		D	Jπ: γ to (23/2⁻).
2462.6 *5*	(19/2 to 23/2⁻)		D	Jπ: γ to (19/2⁻).
2474.76[b] *24*	(23/2⁻)		D	Jπ: in-band ΔJ=2, Q γ to (19/2⁻).
2478.0[e] *3*	(21/2⁺)		CD	Jπ: gammas to (17/2⁺) and (23/2⁻); member of positive-parity band.
2490.0 *4*	(19/2 to 23/2⁻)		D	Jπ: γ to (19/2⁻).
2520.3 *3*	(23/2 to 27/2⁻)		D	Jπ: γ to (23/2⁻).
2568.4[k] *3*	(21/2⁺)		CD	Jπ: in-band ΔJ=1, (M1+E2) γ to (19/2⁺).
2572.7+x[i] *5*	(23/2⁺)		CD	Jπ: in-band ΔJ=1, (M1+E2) γ to (21/2⁺).
2598.8 *3*	(17/2 to 21/2⁺)		D	Jπ: γ to (17/2⁺).
2681.3 *3*	(17/2 to 21/2⁺)		D	Jπ: γ to (17/2⁺).
2705.1 *3*	(23/2 to 27/2⁻)		D	Jπ: γ to (23/2⁻).
2729.5 *3*	(23/2 to 27/2⁻)		D	Jπ: γ to (23/2⁻).
2767.6 *4*	(17/2 to 21/2⁺)		D	Jπ: γ to (17/2⁺).
2783.8 *3*	(23/2,25/2)		D	Jπ: gammas to (23/2⁻) and (23/2⁺).
2789.7 *3*	(23/2⁺)		D	Jπ: ΔJ=1, (M1+E2) γ from (25/2⁺); γ to (21/2⁻).
2794.1+x[h] *5*	(25/2⁺)		CD	Jπ: in-band ΔJ=1, M1+E2 γ to (23/2⁺); in-band γ to (21/2⁺).
2803.0 *3*	(19/2 to 23/2⁻)		D	Jπ: γ to (19/2⁻).
2822.6[j] *3*	(23/2⁺)		CD	Jπ: in-band ΔJ=1, (M1+E2) γ to (21/2⁺).
2841.0[f] *3*	(23/2⁺)		CD	Jπ: in-band ΔJ=2 γ to (19/2⁺).
2864.1 *4*	(23/2 to 27/2⁻)		D	Jπ: γ to (23/2⁻).
2909.7[e] *3*	(25/2⁺)		CD	Jπ: ΔJ=1, M1+E2 γ to (23/2⁺); γ to (27/2⁻).
2911.1 *3*	(19/2 to 23/2⁻)		D	Jπ: γ to (19/2⁻).
2943.1 *4*	(19/2 to 23/2⁺)		D	Jπ: γ to (19/2⁺).
2955.2[c] *4*	(25/2⁻)		D	Jπ: γ to (21/2⁻); band member.
2955.7? *3*			D	The 612.5 keV γ may depopulate the 2955.4 keV (25/2⁻) level, in which case 2955.7 level may not exist.
3017.7[d] *3*	(27/2⁺)		CD	Jπ: ΔJ=2, Q or ΔJ=0, D gammas to 23/2⁺ and 27/2⁻; positive-parity band member.
3043.8 *4*	(23/2 to 27/2⁻)		D	Jπ: γ to (23/2⁻).
3071.0+x[i] *5*	(27/2⁺)		CD	Jπ: in-band (M1+E2) γ to (25/2⁺); in-band γ to (23/2⁺).
3096.0[k] *3*	(25/2⁺)		CD	Jπ: in-band (M1+E2) γ to (23/2⁺).
3124.4 *4*	(19/2 to 23/2⁻)		D	Jπ: γ to (19/2⁻).
3215.3[b] *3*	(27/2⁻)		D	Jπ: ΔJ=2, Q γ to (23/2⁻); band member.
3253.5[&] *4*	(31/2⁻)	0.40 ps *8*	CD	Jπ: ΔJ=2, E2 γ to (27/2⁻); band member.
3286.8 *4*	(19/2 to 23/2⁻)		D	Jπ: γ to (19/2⁻).
3309.8 *4*	(27/2 to 31/2⁻)		D	Jπ: γ to (27/2⁻).
3375.9 *3*	(27/2 to 31/2⁻)		D	Jπ: γ to (27/2⁻).
3382.8 *3*	(27/2 to 31/2⁻)		D	Jπ: γ to (27/2⁻).
3394.0+x[h] *5*	(29/2⁺)		CD	Jπ: in-band ΔJ=1, M1+E2 γ to (27/2⁺); in-band γ to (25/2⁺).
3411.2 *3*	(25/2 to 29/2⁺)		D	Jπ: γ to (25/2⁺).

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Adopted Levels, Gammas (continued)

^{129}La Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$[@]	XREF	Comments
3420.6[j] 4	(27/2$^+$)		CD	Jπ: ΔJ=1, (M1+E2) in-band γ to (25/2$^+$).
3474.7[‡] 3	(23/2$^-$,25/2,27/2$^+$)		D	Jπ: gammas to (23/2$^+$) and (27/2$^-$).
3476.8[e] 3	(29/2$^+$)		CD	Jπ: ΔJ=1, D γ to (27/2$^+$); γ to 25/2$^+$; band member.
3482.3 3	(27/2 to 31/2$^-$)		D	Jπ: γ to (27/2$^-$).
3523.1 3	(27/2 to 31/2$^-$)		D	Jπ: γ to (27/2$^-$).
3531.2 4	(19/2 to 23/2$^-$)		D	Jπ: γ to (19/2$^-$).
3636.6 4	(23/2$^-$ to 31/2$^-$)		D	Jπ: γ to (27/2$^-$).
3694.9 3	(23/2$^-$,25/2,27/2$^+$)		D	Jπ: gammas to (27/2$^-$) and (23/2$^+$).
3697.1 4	(23/2 to 27/2$^+$)		D	Jπ: γ to (23/2$^+$).
3712.1 4	(27/2 to 31/2$^-$)		D	Jπ: γ to (27/2$^-$).
3731.7[d] 4	(31/2$^+$)		D	Jπ: in-band ΔJ=2, Q γ to (27/2$^+$).
3759.4+x[i] 5	(31/2$^+$)		CD	Jπ: in-band ΔJ=1, M1+E2 γ to (29/2$^+$); γ to (27/2$^+$).
3760.2[c] 5	(29/2$^-$)		D	Jπ: γ to (25/2$^-$); band member.
3783.5[k] 4	(29/2$^+$)		CD	Jπ: in-band ΔJ=1, M1+E2 γ to (27/2$^+$); in-band γ to (25/2$^+$).
3857.8 4	(27/2 to 31/2$^-$)		D	Jπ: γ to (27/2$^-$).
3952.0 4	(27/2 to 31/2$^-$)		D	Jπ: γ to (27/2$^-$).
3998.1 5	(31/2,33/2,35/2$^-$)		D	Jπ: γ to (31/2$^-$).
4000.3[‡] 4	(27/2$^-$,29/2,31/2$^-$)		D	Jπ: gammas to (27/2$^-$) and (31/2$^-$).
4042.7[‡b] 3	(31/2$^-$)		D	Jπ: γ to (27/2$^-$) in ΔJ=2 band.
4159.1+x[h] 6	(33/2$^+$)		CD	Jπ: in-band ΔJ=1, (M1+E2) γ to (31/2$^+$); γ to (29/2$^+$).
4176.7[j] 4	(31/2$^+$)		CD	Jπ: in-band ΔJ=1, M1+E2 γ to (29/2$^+$).
4198.8[e] 4	(33/2$^+$)		CD	Jπ: in-band ΔJ=2, Q γ to (29/2$^+$); ΔJ=1, (M1+E2) γ to (31/2$^+$).
4266.8[&] 5	(35/2$^-$)	0.50 ps 12	CD	Jπ: ΔJ=2, E2 γ to (31/2$^-$); band member.
4296.9 5	(31/2 to 35/2$^-$)		D	Jπ: γ to (31/2$^-$).
4555.0[d] 5	(35/2$^+$)		CD	Jπ: ΔJ=2, Q γ to (31/2$^+$); band member.
4598.3+x[i] 6	(35/2$^+$)		CD	Jπ: in-band gammas to (33/2$^+$) and (31/2$^+$).
4602.3[k] 4	(33/2$^+$)		CD	Jπ: in-band gammas to (31/2$^+$) and (29/2$^+$).
4907.1[b] 4	(35/2$^-$)		D	Jπ: γ to (31/2$^-$); band member.
5046.6[j] 6	(35/2$^+$)		C	Jπ: in-band gammas to (33/2$^+$) and (31/2$^+$).
5060.9+x[h] 6	(37/2$^+$)		CD	Jπ: in-band gammas to (35/2$^+$) and (33/2$^+$).
5081.9[e] 7	(37/2$^+$)		CD	Jπ: ΔJ=2, Q γ to (33/2$^+$); band member.
5360.8[&] 8	(39/2$^-$)	0.37 ps 10	CD	Jπ: ΔJ=2, E2 γ to (35/2$^-$); band member.
5476.7[d] 6	(39/2$^+$)		CD	Jπ: ΔJ=2, Q γ to (35/2$^+$); band member.
5507.0[k] 6	(37/2$^+$)		C	Jπ: in-band gammas to (35/2$^+$) and (33/2$^+$).
5564.2+x[i] 7	(39/2$^+$)		C	Jπ: in-band gammas to (37/2$^+$) and (35/2$^+$).
5934.2[j] 7	(39/2$^+$)		C	Jπ: in-band gammas to (37/2$^+$) and (39/2$^+$).
6064.9[e] 12	(41/2$^+$)		C	Jπ: in-band γ to 37/2$^+$; band member.
6092.5+x[h] 8	(41/2$^+$)		C	Jπ: in-band gammas to (39/2$^+$) and (37/2$^+$).
6338.2?[k] 8	(41/2$^+$)		C	Jπ: in-band gammas to (39/2$^+$) and (37/2$^+$).
6488.0[d] 8	(43/2$^+$)		C	Jπ: in-band ΔJ=2, Q γ to (39/2$^+$).
6515.5[&] 10	(43/2$^-$)		C	Jπ: in-band ΔJ=2, Q γ to (39/2$^-$).
6638.5+x[i] 9	(43/2$^+$)		C	Jπ: in-band gammas to (41/2$^+$) and (39/2$^+$).
6757.2?[j] 8	(43/2$^+$)		C	Jπ: in-band gammas to (41/2$^+$) and (39/2$^+$).
7133.9[e] 16	(45/2$^+$)		C	Jπ: in-band γ to (41/2$^+$); band member.
7565.4[d] 9	(47/2$^+$)		C	Jπ: in-band ΔJ=2, Q γ to (43/2$^+$).
7674.5[&] 14	(47/2$^-$)		C	Jπ: γ to (43/2$^-$); band member.
8242.9[e] 19	(49/2$^+$)		C	Jπ: γ to (45/2$^+$); band member.
8657.7[d] 10	(51/2$^+$)		C	Jπ: in-band ΔJ=2, Q γ to (47/2$^+$).
8856.5[&] 17	(51/2$^-$)		C	Jπ: γ to (47/2$^-$); band member.

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Adopted Levels, Gammas (continued)

^{129}La Levels (continued)

E(level)[†]	J$^{\pi}$[#]	XREF	Comments
9425.9[e] *19*	(53/2$^+$)	C	J$^{\pi}$: γ to (49/2$^+$); band member.
9772.9[d] *13*	(55/2$^+$)	C	J$^{\pi}$: γ to 51/2$^+$; band member.
10085.5[&] *20*	(55/2$^-$)	C	J$^{\pi}$: γ to (51/2$^-$); band member.
10952.9[d] *16*	(59/2$^+$)	C	J$^{\pi}$: γ to (55/2$^+$); band member.
11380.5[&] *22*	(59/2$^-$)	C	J$^{\pi}$: γ to (55/2$^-$); band member.
12196.9[d] *19*	(63/2$^+$)	C	J$^{\pi}$: γ to (59/2$^+$); band member.
13502.9[d] *21*	(67/2$^+$)	C	J$^{\pi}$: γ to (63/2$^+$); band member.
14920.9[d] *24*	(71/2$^+$)	C	J$^{\pi}$: γ to (67/2$^+$); band member.
16478[d] *3*	(75/2$^+$)	C	J$^{\pi}$: γ to (71/2$^+$); band member.

[†] From least-squares fit to adopted Eγ values.

[‡] In 1995Ku29 two different levels are assumed to be depopulated by the two γ rays from this level, which is probably incorrect. They are within the experimental uncertainties, thus evaluators adopt only one level.

[#] From γ decay to levels with known J$^{\pi}$ assuming E1, M1 or E2 transitions, unless otherwise noted. For the first three levels 3/2$^+$, 5/2$^+$ and 11/2$^-$ spin-parity values are adopted on the basis of the measured M1 and E3 multipolarities of the linking γ rays (1969Al05) in agreement with the level systematics and the theoretical expectations. The spin-parities of the higher-lying levels are determined relative to these spin-parities. For levels populated in high-spin studies, ascending order of spins with excitation energy is assumed based on yrast pattern of population.

[@] from DSAM (2008Sa36), unless otherwise noted.

[&] Band(A): π1/2[550],α=−1/2.

[a] Band(b): π1/2[550],α=+1/2.

[b] Band(c): π3/2[541],α=−1/2.

[c] Band(d): π3/2[541],α=+1/2.

[d] Band(B): π3/2[422]⊗$\pi h^2_{11/2}$,α=−1/2.

[e] Band(C): π3/2[422]⊗$\pi h^2_{11/2}$,α=+1/2.

[f] Band(D): π(3/2[422]+1/2[420]),α=−1/2. Strongly coupled one-quasiproton band with admixture of of 3/2[422] and 1/2[420] proton configurations.

[g] Band(E): π(3/2[422]+1/2[420]),α=+1/2. Strongly coupled one-quasiproton band with admixture of of 3/2[422] and 1/2[420] proton configurations.

[h] Band(F): π1/2[550]⊗ν7/2[523]⊗ν5/2[402],α=−1/2.

[i] Band(G): π1/2[550]⊗ν7/2[523]⊗ν5/2[402],α=+1/2.

[j] Band(H): π1/2[550]⊗ν7/2[523]⊗ν5/2[402],α=−1/2.

[k] Band(I): π1/2[550]⊗ν7/2[523]⊗ν5/2[402],α=+1/2.

Adopted Levels, Gammas (continued)

γ(^{129}La)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[&]	Comments
68.18	(5/2$^+$)	68.20 *6*	100	0.0	(3/2$^+$)	M1[#]	3.25	α(K)=2.78 *4*; α(L)=0.378 *6*; α(M)=0.0786 *12* α(N)=0.01728 *25*; α(O)=0.00281 *4*; α(P)=0.000217 *3* Mult.: also from α(L)exp In 1969Al05.
172.33	(11/2$^-$)	104.0 *3*	100	68.18	(5/2$^+$)	E3	20.8 *5*	α(K)=5.24 *9*; α(L)=12.1 *3*; α(M)=2.79 *6* α(N)=0.591 *13*; α(O)=0.0817 *18*; α(P)=0.000262 *5* B(E3)(W.u.)=0.76 *8* E_γ: from 1973Le09. ΔEγ estimated by the evaluators. Mult.: from α(L)exp (1969Al05).
216.30	(1/2$^+$ to 9/2$^+$)	148.2 *3*	100	68.18	(5/2$^+$)			
239.62	(5/2$^+$)	171.5 *1*	100.0 *7*	68.18	(5/2$^+$)	M1[#]	0.238	α(K)=0.203 *3*; α(L)=0.0273 *4*; α(M)=0.00567 *8* α(N)=0.001247 *18*; α(O)=0.000203 *3*; α(P)=1.582×10^{-5} *23*
		239.5 *2*	6.9 *3*	0.0	(3/2$^+$)			
248.45	(7/2$^+$)	180.4 *1*	100.0 *20*	68.18	(5/2$^+$)	M1[#]	0.207	α(K)=0.1771 *25*; α(L)=0.0237 *4*; α(M)=0.00493 *7* α(N)=0.001084 *16*; α(O)=0.0001764 *25*; α(P)=1.376×10^{-5} *20*
		248.5 *2*	17 *3*	0.0	(3/2$^+$)	(E2)[#]	0.0862	α(K)=0.0683 *10*; α(L)=0.01415 *21*; α(M)=0.00303 *5* α(N)=0.000653 *10*; α(O)=9.88×10^{-5} *15*; α(P)=4.42×10^{-6} *7*
270.92	(1/2 to 7/2$^+$)	271.0 *2*	100	0.0	(3/2$^+$)			
398.48	(3/2$^+$,5/2$^+$,7/2$^+$)	127.6 *3*	7.0 *23*	270.92	(1/2 to 7/2$^+$)			
		158.9 *1*	51.2 *23*	239.62	(5/2$^+$)	M1,E2[#]	0.34 *5*	α(K)=0.269 *18*; α(L)=0.058 *25*; α(M)=0.013 *6* α(N)=0.0027 *12*; α(O)=0.00041 *16*; α(P)=1.83×10^{-5} *13*
		330.3 *2*	100 *5*	68.18	(5/2$^+$)	M1,E2[#]	0.038 *4*	α(K)=0.032 *4*; α(L)=0.00485 *23*; α(M)=0.00102 *6* α(N)=0.000222 *11*; α(O)=3.52×10^{-5} *9*; α(P)=2.3×10^{-6} *4*
		398.5 *2*	84 *5*	0.0	(3/2$^+$)	M1,E2[#]	0.023 *3*	α(K)=0.019 *3*; α(L)=0.00277 *9*; α(M)=0.000580 *14* α(N)=0.000127 *4*; α(O)=2.02×10^{-5} *10*; α(P)=1.4×10^{-6} *3*
440.25	(7/2$^+$)	191.8 *2*	2.8 *14*	248.45	(7/2$^+$)			
		201.0 *5*	11.0 *20*	239.62	(5/2$^+$)			
		372.2 *2*	100 *8*	68.18	(5/2$^+$)	M1[#]	0.0302	α(K)=0.0259 *4*; α(L)=0.00340 *5*; α(M)=0.000704 *10* α(N)=0.0001549 *22*; α(O)=2.53×10^{-5} *4*; α(P)=1.99×10^{-6} *3*
		440.1 *2*	61 *3*	0.0	(3/2$^+$)	(E2)[#]	0.0147	α(K)=0.01226 *18*; α(L)=0.00196 *3*; α(M)=0.000413 *6* α(N)=8.98×10^{-5} *13*; α(O)=1.408×10^{-5} *20*; α(P)=8.60×10^{-7} *12*
442.08	(15/2$^-$)	269.7 *3*	100	172.33	(11/2$^-$)	E2	0.0660	α(K)=0.0528 *8*; α(L)=0.01044 *16*; α(M)=0.00223 *4* α(N)=0.000481 *7*; α(O)=7.32×10^{-5} *11*; α(P)=3.47×10^{-6} *5* B(E2)(W.u.)=107 *5*
446.33	(9/2$^+$)	197.9 *2*	69 *3*	248.45	(7/2$^+$)	M1[#]	0.1608	α(K)=0.1376 *20*; α(L)=0.0184 *3*; α(M)=0.00382 *6* α(N)=0.000840 *12*; α(O)=0.0001367 *20*; α(P)=1.068×10^{-5} *16* Mult.: also DCO (1992He03).
		378.1 *2*	100 *12*	68.18	(5/2$^+$)	Q		Mult.: from DCO (1992He03).
464.02	(5/2$^+$,7/2$^+$)	215.6 *2*	24 *6*	248.45	(7/2$^+$)	M1(+E2)[#]	0.133 *6*	α(K)=0.1082 *18*; α(L)=0.019 *5*; α(M)=0.0041 *12* α(N)=0.00089 *23*; α(O)=0.00014 *3*; α(P)=7.6×10^{-6} *9*

$^{129}_{57}La_{72}$-6

Adopted Levels, Gammas (continued)

γ(^{129}La) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[&]	Comments
464.02	(5/2$^+$,7/2$^+$)	395.8 *2*	100 *3*	68.18	(5/2$^+$)	M1,E2[#]	0.023 *3*	α(K)=0.019 *3*; α(L)=0.00283 *9*; α(M)=0.000591 *13* α(N)=0.000129 *4*; α(O)=2.06×10^{-5} *10*; α(P)=1.4×10^{-6} *3*
		464.0 *2*	21 *3*	0.0	(3/2$^+$)			
472.21	(1/2$^+$ to 7/2$^+$)	256.0 *3*	100 *15*	216.30	(1/2$^+$ to 9/2$^+$)			
		404.0 *2*	62 *8*	68.18	(5/2$^+$)			
		472.2 *2*	77 *8*	0.0	(3/2$^+$)			
556.00?	(1/2 to 7/2$^+$)	556.0 *2*	100	0.0	(3/2$^+$)			
587.64	(1/2$^+$ to 7/2$^+$)	519.5 *2*	100 *4*	68.18	(5/2$^+$)			
		587.6 *2*	92 *8*	0.0	(3/2$^+$)			
619.61	(3/2$^+$ to 9/2$^+$)	179.1 *4*	66 *31*	440.25	(7/2$^+$)			
		221.5 *3*	47 *13*	398.48	(3/2$^+$,5/2$^+$,7/2$^+$)			
		348.5 *3*	34 *6*	270.92	(1/2 to 7/2$^+$)			
		370.7 *5*	19 *9*	248.45	(7/2$^+$)			
		380.1 *2*	59 *13*	239.62	(5/2$^+$)			
		551.3 *3*	100 *19*	68.18	(5/2$^+$)			
645.53	(9/2$^+$)	199.5 *3*	21 *7*	446.33	(9/2$^+$)	(M1+E2)	0.168 *12*	α(K)=0.136 *3*; α(L)=0.025 *8*; α(M)=0.0054 *17* α(N)=0.0012 *4*; α(O)=0.00018 *5*; α(P)=9.5×10^{-6} *10*
		397.3 *3*	73 *13*	248.45	(7/2$^+$)			
		405.7 *2*	100 *9*	239.62	(5/2$^+$)			
		577.3 *2*	88 *10*	68.18	(5/2$^+$)			
652.5	(1/2 to 9/2$^+$)	254.0 *5*	100 *25*	398.48	(3/2$^+$,5/2$^+$,7/2$^+$)			
		414 *1*	25 *13*	239.62	(5/2$^+$)			
		584.0 *5*	75 *25*	68.18	(5/2$^+$)			
696.56	(11/2$^+$)	250.2 *3*	32 *6*	446.33	(9/2$^+$)	D[@]		
		448.2 *3*	100 *9*	248.45	(7/2$^+$)			
706.43	(5/2$^+$ to 9/2$^+$)	242.5 *5*	28 *7*	464.02	(5/2$^+$,7/2$^+$)			
		260.0 *2*	7.0 *23*	446.33	(9/2$^+$)			
		308.1 *3*	37 *12*	398.48	(3/2$^+$,5/2$^+$,7/2$^+$)			
		458.5 *5*	23 *7*	248.45	(7/2$^+$)			
		466.7 *2*	100 *5*	239.62	(5/2$^+$)			
		638.3 *2*	14.0 *23*	68.18	(5/2$^+$)			
782.3	(5/2$^+$ to 9/2$^+$)	318.0 *5*	100 *22*	464.02	(5/2$^+$,7/2$^+$)			
		336.0 *5*	100 *22*	446.33	(9/2$^+$)			
		342 *1*	22 *11*	440.25	(7/2$^+$)			
		543.1 *5*	33 *11*	239.62	(5/2$^+$)			
796.21	(3/2$^+$ to 7/2$^+$)	548.0 *2*	17 *6*	248.45	(7/2$^+$)			
		728.0 *2*	94 *11*	68.18	(5/2$^+$)			
		796.0 *2*	100 *11*	0.0	(3/2$^+$)			
832.32	(3/2$^+$ to 9/2$^+$)	584.0 *2*	100 *6*	248.45	(7/2$^+$)			
		764.0 *2*	63 *19*	68.18	(5/2$^+$)			
916.64	(19/2$^-$)	474.3 *3*	100	442.08	(15/2$^-$)	E2	0.01193	B(E2)(W.u.)=100 *15* α(K)=0.00997 *14*; α(L)=0.001556 *22*; α(M)=0.000327 *5* α(N)=7.12×10^{-5} *10*; α(O)=1.120×10^{-5} *16*; α(P)=7.04×10^{-7} *10*

$^{129}_{57}La_{72}$-7

Adopted Levels, Gammas (continued)

γ(^{129}La) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	δ	α[&]	Comments
928.93	(7/2$^+$ to 11/2$^+$)	232.4 *3*	23 *4*	696.56	(11/2$^+$)				
		482.6 *2*	75 *13*	446.33	(9/2$^+$)				
		680.5 *3*	100 *50*	248.45	(7/2$^+$)				
934.93	(1/2 to 9/2$^+$)	536.6 *3*	1.0×10^2 *3*	398.48	(3/2$^+$,5/2$^+$,7/2$^+$)				
		664.0 *3*	24 *6*	270.92	(1/2 to 7/2$^+$)				
		866.6 *3*	24 *12*	68.18	(5/2$^+$)				
966.34	(1/2 to 7/2$^+$)	897.9 *2*	100 *22*	68.18	(5/2$^+$)				
		966.6 *2*	100 *11*	0.0	(3/2$^+$)				
992.41	(11/2$^+$)	546.1 *3*	100 *9*	446.33	(9/2$^+$)	(M1+E2)		0.0098 *17*	α=0.0098 *17*; α(K)=0.0084 *16*; α(L)=0.00115 *13*; α(M)=0.00024 *3* α(N)=5.2×10^{-5} *6*; α(O)=8.5×10^{-6} *11*; α(P)=6.2×10^{-7} *14*
		552.4 *3*	71 *14*	440.25	(7/2$^+$)				
		743.9 *3*	27 *10*	248.45	(7/2$^+$)				
1015.26	(1/2 to 7/2$^+$)	616.7 *2*	100 *23*	398.48	(3/2$^+$,5/2$^+$,7/2$^+$)				
		744.5 *2*	54 *8*	270.92	(1/2 to 7/2$^+$)				
		1015.1 *3*	15 *8*	0.0	(3/2$^+$)				
1021.79	(13/2$^+$)	325.3 *3*	16 *4*	696.56	(11/2$^+$)	(M1+E2)		0.0422 *6*	
		575.4 *3*	100 *10*	446.33	(9/2$^+$)	Q			
1120.18	(13/2$^-$)	678.2 *3*	100 *10*	442.08	(15/2$^-$)				
		947.8 *2*	30 *8*	172.33	(11/2$^-$)				
1120.5?		678.4[a] *2*	100	442.08	(15/2$^-$)				
1234.19	(13/2$^+$)	537.7 *3*	9 *4*	696.56	(11/2$^+$)				
		588.6 *3*	100 *10*	645.53	(9/2$^+$)				
1275.09	(15/2 to 19/2$^-$)	833.0 *2*		442.08	(15/2$^-$)				
1304.94	(17/2$^-$)	388.4 *2*	22 *5*	916.64	(19/2$^-$)	D			
		862.9 *3*	100 *10*	442.08	(15/2$^-$)	M1+E2	−0.91 *+8−9*		
1315.78	(15/2$^+$)	294.1 *3*	6.5 *15*	1021.79	(13/2$^+$)				
		619.0 *3*	100 *9*	696.56	(11/2$^+$)	Q			
1328.8	(15/2 to 19/2$^-$)	886.7 *3*		442.08	(15/2$^-$)				
1524.31	(11/2$^+$ to 15/2$^+$)	502.5 *3*	29 *9*	1021.79	(13/2$^+$)				
		595.4 *3*	100 *11*	928.93	(7/2$^+$ to 11/2$^+$)				
1558.03	(23/2$^-$)	641.4 *3*	100	916.64	(19/2$^-$)	(E2)			B(E2)(W.u.)<1.1×10^2
1586.62	(17/2$^-$)	466.5 *3*	12 *3*	1120.18	(13/2$^-$)				
		670.1 *3*	100 *9*	916.64	(19/2$^-$)	M1+E2	+0.5 *+2−1*		
		1144.5 *3*	14 *3*	442.08	(15/2$^-$)				
1651.1	(15/2 to 19/2$^-$)	1209.0 *3*		442.08	(15/2$^-$)				
1654.17	(13/2$^+$)	632.4 *2*	55 *13*	1021.79	(13/2$^+$)				
		661.7 *3*	100 *11*	992.41	(11/2$^+$)	D+Q	+0.3 *2*		
1724.96	(15/2$^+$)	703.1 *2*	10 *3*	1021.79	(13/2$^+$)				
		732.7 *3*	23 *5*	992.41	(11/2$^+$)				
		1282.8 *3*	100 *10*	442.08	(15/2$^-$)	D+Q	+0.3 *2*		
1753.2?		1311.1 *3*		442.08	(15/2$^-$)				

Adopted Levels, Gammas (continued)

γ(^{129}La) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	δ
1753.4	(17/2$^+$)	731.6 *3*		1021.79	(13/2$^+$)	Q	
1803.0		810.7 *3*		992.41	(11/2$^+$)		
1851.24	(19/2$^-$)	264.8 *3*	22 *5*	1586.62	(17/2$^-$)		
		546.4 *3*	78 *19*	1304.94	(17/2$^-$)		
		934.5 *3*	79 *18*	916.64	(19/2$^-$)	(D)	
		1409.2 *3*	100 *12*	442.08	(15/2$^-$)	Q	
1949.58	(21/2$^-$)	391.5 *3*	21 *8*	1558.03	(23/2$^-$)		
		644.7 *3*	41 *13*	1304.94	(17/2$^-$)		
		1033.0 *2*	100 *12*	916.64	(19/2$^-$)	M1+E2	−0.7 *+2−8*
1951.5	(23/2 to 27/2$^-$)	393.5 *3*		1558.03	(23/2$^-$)		
1956.5	(9/2$^+$ to 17/2$^+$)	722.3 *3*		1234.19	(13/2$^+$)		
1972.2	(15/2$^-$,17/2,19/2$^-$)	667.3 *3*		1304.94	(17/2$^-$)		
		1055.5 *3*		916.64	(19/2$^-$)		
		1530.2 *3*		442.08	(15/2$^-$)		
1985.0	(19/2$^+$)	669.0 *5*	46 *12*	1315.78	(15/2$^+$)		
		1067.8 *5*	100 *16*	916.64	(19/2$^-$)		
2003.8	(15/2 to 19/2$^-$)	1561.7 *3*		442.08	(15/2$^-$)		
2069.9	(19/2$^+$)	754.0 *3*	100	1315.78	(15/2$^+$)	Q[@]	
2118.2	(15/2$^-$ to 23/2$^-$)	1201.6 *3*	100	916.64	(19/2$^-$)		
2169.8	(19/2)	864.9 *3*	100	1304.94	(17/2$^-$)	D	
2206.4	(19/2 to 23/2$^-$)	1289.8 *3*	100	916.64	(19/2$^-$)		
2218.90	(15/2$^+$)	903.2 *3*		1315.78	(15/2$^+$)		
		1098.7 *2*		1120.18	(13/2$^-$)		
		1197.0 *3*	100 *18*	1021.79	(13/2$^+$)	M1+E2	+0.21 *+7−4*
		1522.4 *2*	45 *18*	696.56	(11/2$^+$)		
		1776.7 *3*	40 *18*	442.08	(15/2$^-$)		
2221.5	(21/2$^-$)	370.3 *3*	21 *5*	1851.24	(19/2$^-$)		
		634.8 *3*	100 *10*	1586.62	(17/2$^-$)		
		663.4 *3*	58 *12*	1558.03	(23/2$^-$)	M1+E2	+0.8 *+12−4*
		1304.8 *5*		916.64	(19/2$^-$)		
2242.7	(17/2$^+$)	439.8 *3*		1803.0			
		517.7 *3*		1724.96	(15/2$^+$)		
		718.4 *3*		1524.31	(11/2$^+$ to 15/2$^+$)		
		926.9 *3*		1315.78	(15/2$^+$)	M1+E2	−0.3 *+2−3*
		967.6 *2*		1275.09	(15/2 to 19/2$^-$)		
		1008.5 *3*		1234.19	(13/2$^+$)		
		1221.0 *3*		1021.79	(13/2$^+$)	Q	
		1326.0 *3*		916.64	(19/2$^-$)		
		1800.5 *3*		442.08	(15/2$^-$)		
2277.9	(19/2 to 23/2$^-$)	1361.3 *3*	100	916.64	(19/2$^-$)		
2290.9	(19/2 to 23/2$^-$)	1374.3 *2*		916.64	(19/2$^-$)		
2297.6+x	(19/2$^+$)	55.9 *3*	100	2242.7+x	(17/2$^+$)		
2298.1	(15/2 to 19/2$^-$)	544.4 *3*		1753.4	(17/2$^+$)		

$^{129}_{57}La_{72}$-9

Adopted Levels, Gammas (continued)

γ(^{129}La) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[&]	Comments
2298.1	(15/2 to 19/2$^-$)	1856.2 *3*		442.08	(15/2$^-$)			
2343.2	(27/2$^-$)	785.3 *3*	100	1558.03	(23/2$^-$)	E2		B(E2)(W.u.)=60 *15*
2351.8	(19/2$^+$)	1435.2 *3*	100	916.64	(19/2$^-$)	(D)		
2408.3+x	(21/2$^+$)	110.7 *3*	100	2297.6+x	(19/2$^+$)	M1+E2[@]	0.857 *15*	
2431.2	(23/2$^+$)	445.8 *3*	62 *8*	1985.0	(19/2$^+$)	(Q)[@]		
		873.1 *3*	100 *12*	1558.03	(23/2$^-$)	(D)[@]		
2452.8	(19/2 to 23/2$^-$)	1536.2 *2*	100	916.64	(19/2$^-$)			
2453.7	(23/2 to 27/2$^-$)	895.7 *3*	100	1558.03	(23/2$^-$)			
2462.6	(19/2 to 23/2$^-$)	1546.0 *4*		916.64	(19/2$^-$)			
2474.76	(23/2$^-$)	525.2 *2*	54 *12*	1949.58	(21/2$^-$)			
		623.7 *3*	100 *10*	1851.24	(19/2$^-$)			
		916.9 *2*	29 *8*	1558.03	(23/2$^-$)			
		1557.8 *3*	81 *18*	916.64	(19/2$^-$)	Q		
2478.0	(21/2$^+$)	493.1 *3*	28 *6*	1985.0	(19/2$^+$)			
		724.8 *3*		1753.4	(17/2$^+$)			
		919.7 *3*	100 *9*	1558.03	(23/2$^-$)			
2490.0	(19/2 to 23/2$^-$)	1573.4 *3*	100	916.64	(19/2$^-$)			
2520.3	(23/2 to 27/2$^-$)	962.3 *2*	100	1558.03	(23/2$^-$)			
2568.4	(21/2$^+$)	216.6 *3*	100	2351.8	(19/2$^+$)	(M1+E2)[@]	0.127 *2*	
		398.7 *3*		2169.8	(19/2)			
2572.7+x	(23/2$^+$)	164.5 *3*	100	2408.3+x	(21/2$^+$)	(M1+E2)[@]	0.273 *5*	
2598.8	(17/2 to 21/2$^+$)	845.4 *2*		1753.4	(17/2$^+$)			
2681.3	(17/2 to 21/2$^+$)	927.9 *2*	100	1753.4	(17/2$^+$)			
2705.1	(23/2 to 27/2$^-$)	1147.1 *2*	100	1558.03	(23/2$^-$)			
2729.5	(23/2 to 27/2$^-$)	1171.5 *2*	100	1558.03	(23/2$^-$)			
2767.6	(17/2 to 21/2$^+$)	1014.2 *3*	100	1753.4	(17/2$^+$)			
2783.8	(23/2,25/2)	352.5 *3*	93 *20*	2431.2	(23/2$^+$)			
		1225.9 *3*	100 *12*	1558.03	(23/2$^-$)			
2789.7	(23/2$^+$)	840.2 *3*	97 *25*	1949.58	(21/2$^-$)			
		1231.4 *3*	100 *13*	1558.03	(23/2$^-$)			
2794.1+x	(25/2$^+$)	221.5 *3*	100 *7*	2572.7+x	(23/2$^+$)	M1+E2[@]	0.119 *2*	
		385.7 *3*	5.0 *10*	2408.3+x	(21/2$^+$)			
2803.0	(19/2 to 23/2$^-$)	1886.3 *2*		916.64	(19/2$^-$)			
2822.6	(23/2$^+$)	254.3 *3*	100 *10*	2568.4	(21/2$^+$)	(M1+E2)[@]	0.0817 *12*	
		1264.6 *3*	62 *15*	1558.03	(23/2$^-$)			
2841.0	(23/2$^+$)	771.0 *3*	100	2069.9	(19/2$^+$)	Q[@]		
2864.1	(23/2 to 27/2$^-$)	1306.1 *3*		1558.03	(23/2$^-$)			
2909.7	(25/2$^+$)	431.7 *3*	26 *5*	2478.0	(21/2$^+$)			
		478.3 *3*	100 *9*	2431.2	(23/2$^+$)	M1+E2[@]	0.0154	
		566.5 *2*		2343.2	(27/2$^-$)			
2911.1	(19/2 to 23/2$^-$)	1994.4 *2*		916.64	(19/2$^-$)			

$^{129}_{57}La_{72}$-10

Adopted Levels, Gammas (continued)

γ(^{129}La) (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.‡	α&	Comments
2943.1	(19/2 to 23/2$^+$)	873.2 *3*	100	2069.9	(19/2$^+$)			
2955.2	(25/2$^-$)	733.7 *3*	100	2221.5	(21/2$^-$)			
2955.7?		612.5 *2*	100	2343.2	(27/2$^-$)			
3017.7	(27/2$^+$)	586.2 *3*	100 *9*	2431.2	(23/2$^+$)	Q		
		674.5 *3*	25 *5*	2343.2	(27/2$^-$)	(D)		
3043.8	(23/2 to 27/2$^-$)	1485.8 *3*		1558.03	(23/2$^-$)			
3071.0+x	(27/2$^+$)	277.0 *3*	100 *9*	2794.1+x	(25/2$^+$)	(M1+E2)@	0.0648 *10*	
		498.3 *3*	12.1 *14*	2572.7+x	(23/2$^+$)			
3096.0	(25/2$^+$)	273.5 *3*	74 *16*	2822.6	(23/2$^+$)	(M1+E2)@	0.0671 *10*	
		306.2 *3*	100 *16*	2789.7	(23/2$^+$)	(M1+E2)@	0.0496 *7*	
3124.4	(19/2 to 23/2$^-$)	2207.7 *3*	100	916.64	(19/2$^-$)			
3215.3	(27/2$^-$)	740.9 *3*	100 *11*	2474.76	(23/2$^-$)			
		1657.3 *3*	47 *12*	1558.03	(23/2$^-$)	Q		
3253.5	(31/2$^-$)	910.5 *3*	100	2343.2	(27/2$^-$)	E2@		B(E2)(W.u.)=58 *12*
3286.8	(19/2 to 23/2$^-$)	2370.1 *3*	100	916.64	(19/2$^-$)			
3309.8	(27/2 to 31/2$^-$)	966.6 *3*	100	2343.2	(27/2$^-$)			
3375.9	(27/2 to 31/2$^-$)	1032.7 *2*	100	2343.2	(27/2$^-$)			
3382.8	(27/2 to 31/2$^-$)	1039.6 *2*	100	2343.2	(27/2$^-$)			
3394.0+x	(29/2$^+$)	323.0 *3*	100 *7*	3071.0+x	(27/2$^+$)	M1+E2@	0.0431 *7*	
		599.8 *3*	27 *4*	2794.1+x	(25/2$^+$)			
3411.2	(25/2 to 29/2$^+$)	501.5 *2*		2909.7	(25/2$^+$)			
		627.5 *3*		2783.8	(23/2,25/2)			
3420.6	(27/2$^+$)	325.1 *3*	100	3096.0	(25/2$^+$)	(M1+E2)@	0.0423 *6*	α(K)=0.033 *4*; α(L)=0.0051 *3*; α(M)=0.00107 *7* α(N)=0.000233 *13*; α(O)=3.69×10^{-5} *11*; α(P)=2.4×10^{-6} *5*
3474.7	(23/2$^-$,25/2,27/2$^+$)	633.8 *3*		2841.0	(23/2$^+$)			
		1131.4 *2*		2343.2	(27/2$^-$)			
3476.8	(29/2$^+$)	459.0 *3*	100 *19*	3017.7	(27/2$^+$)	D@		
		566.9 *3*	85 *22*	2909.7	(25/2$^+$)			
3482.3	(27/2 to 31/2$^-$)	1139.1 *2*	100	2343.2	(27/2$^-$)			
3523.1	(27/2 to 31/2$^-$)	1179.9 *2*	100	2343.2	(27/2$^-$)			
3531.2	(19/2 to 23/2$^-$)	2614.5 *3*	100	916.64	(19/2$^-$)			
3636.6	(23/2$^-$ to 31/2$^-$)	1293.4 *3*	100	2343.2	(27/2$^-$)			
3694.9	(23/2$^-$,25/2,27/2$^+$)	853.8 *2*		2841.0	(23/2$^+$)			
		1351.9 *3*		2343.2	(27/2$^-$)			
3697.1	(23/2 to 27/2$^+$)	856.1 *3*		2841.0	(23/2$^+$)			
3712.1	(27/2 to 31/2$^-$)	1368.9 *3*	100	2343.2	(27/2$^-$)			
3731.7	(31/2$^+$)	714.0 *3*	100	3017.7	(27/2$^+$)	Q@		
3759.4+x	(31/2$^+$)	365.5 *3*	100 *7*	3394.0+x	(29/2$^+$)	M1+E2@	0.0311 *5*	
		688.4 *3*	44 *5*	3071.0+x	(27/2$^+$)			
3760.2	(29/2$^-$)	805.0 *3*		2955.2	(25/2$^-$)			
3783.5	(29/2$^+$)	362.5 *3*	100 *18*	3420.6	(27/2$^+$)	M1+E2@	0.0318 *5*	

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Adopted Levels, Gammas (continued)

γ(^{129}La) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[&]	Comments
3783.5	(29/2$^+$)	687.3 *2*	96 *18*	3096.0	(25/2$^+$)			
3857.8	(27/2 to 31/2$^-$)	1514.6 *3*		2343.2	(27/2$^-$)			
3952.0	(27/2 to 31/2$^-$)	1608.8 *3*		2343.2	(27/2$^-$)			
3998.1	(31/2,33/2,35/2$^-$)	744.5 *3*		3253.5	(31/2$^-$)			
4000.3	(27/2$^-$,29/2,31/2$^-$)	746.9 *3*		3253.5	(31/2$^-$)			
		1656.9 *3*		2343.2	(27/2$^-$)			
4042.7	(31/2$^-$)	565.8 *2*		3476.8	(29/2$^+$)			
		827.7 *3*		3215.3	(27/2$^-$)			
4159.1+x	(33/2$^+$)	399.9 *3*	100 *8*	3759.4+x	(31/2$^+$)	(M1+E2)[@]	0.0247 *4*	
		765.2 *3*	59 *8*	3394.0+x	(29/2$^+$)			
4176.7	(31/2$^+$)	392.5 *3*	100 *16*	3783.5	(29/2$^+$)	M1+E2[@]	0.0259 *4*	
		756.4 *2*	76 *16*	3420.6	(27/2$^+$)			
4198.8	(33/2$^+$)	467.0 *3*	33 *8*	3731.7	(31/2$^+$)	(M1+E2)[@]	0.0166 *3*	
		722.1 *3*	100 *17*	3476.8	(29/2$^+$)	Q[@]		
4266.8	(35/2$^-$)	1013.2 *3*	100	3253.5	(31/2$^-$)	E2[@]		B(E2)(W.u.)=27 *7*
4296.9	(31/2 to 35/2$^-$)	1043.3 *3*		3253.5	(31/2$^-$)			
4555.0	(35/2$^+$)	823.3 *3*	100	3731.7	(31/2$^+$)	Q		
4598.3+x	(35/2$^+$)	439.4 *3*	100 *9*	4159.1+x	(33/2$^+$)			
		838.6 *3*	72 *11*	3759.4+x	(31/2$^+$)			
4602.3	(33/2$^+$)	425.7 *2*	100 *23*	4176.7	(31/2$^+$)			
		818.7 *3*	89 *17*	3783.5	(29/2$^+$)			
4907.1	(35/2$^-$)	864.4 *3*	100	4042.7	(31/2$^-$)			
5046.6	(35/2$^+$)	444.6 *6*	100 *19*	4602.3	(33/2$^+$)			
		869.5 *8*	100 *19*	4176.7	(31/2$^+$)			
5060.9+x	(37/2$^+$)	462.5 *4*	79 *9*	4598.3+x	(35/2$^+$)			
		901.6 *5*	100 *15*	4159.1+x	(33/2$^+$)			
5081.9	(37/2$^+$)	883.1 *6*	100	4198.8	(33/2$^+$)	Q[@]		
5360.8	(39/2$^-$)	1094.0 *6*	100	4266.8	(35/2$^-$)	E2[@]		B(E2)(W.u.)=25 *7*
5476.7	(39/2$^+$)	921.7 *3*	100	4555.0	(35/2$^+$)	Q[@]		
5507.0	(37/2$^+$)	460.6 *6*	78 *17*	5046.6	(35/2$^+$)			
		904.5 *7*	100 *23*	4602.3	(33/2$^+$)			
5564.2+x	(39/2$^+$)	502.9 *5*	69 *12*	5060.9+x	(37/2$^+$)			
		966.1 *4*	100 *20*	4598.3+x	(35/2$^+$)			
5934.2	(39/2$^+$)	427.4 *6*	87 *20*	5507.0	(37/2$^+$)			
		887.5 *7*	100 *20*	5046.6	(35/2$^+$)			
6064.9	(41/2$^+$)	983	100	5081.9	(37/2$^+$)			
6092.5+x	(41/2$^+$)	528.0 *6*	100 *23*	5564.2+x	(39/2$^+$)			
		1032.1 *7*	8.×10^1 *3*	5060.9+x	(37/2$^+$)			
6338.2?	(41/2$^+$)	404.0 *6*	100 *17*	5934.2	(39/2$^+$)			
		831[a]		5507.0	(37/2$^+$)			
6488.0	(43/2$^+$)	1011.3 *5*	100	5476.7	(39/2$^+$)	Q[@]		

$^{129}_{57}La_{72}$-12

Adopted Levels, Gammas (continued)

γ(^{129}La) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]
6515.5	(43/2$^-$)	1154.7 *6*	100	5360.8	(39/2$^-$)	Q[@]
6638.5+x	(43/2$^+$)	546.1 *6*	100 *25*	6092.5+x	(41/2$^+$)	
		1074.1 *9*	90 *40*	5564.2+x	(39/2$^+$)	
6757.2?	(43/2$^+$)	418.9 *6*	100 *17*	6338.2?	(41/2$^+$)	
		823.0[a] *3*		5934.2	(39/2$^+$)	
7133.9	(45/2$^+$)	1069		6064.9	(41/2$^+$)	
7565.4	(47/2$^+$)	1077.4 *5*	100	6488.0	(43/2$^+$)	Q[@]
7674.5	(47/2$^-$)	1159		6515.5	(43/2$^-$)	
8242.9	(49/2$^+$)	1109		7133.9	(45/2$^+$)	
8657.7	(51/2$^+$)	1092.2 *5*	100	7565.4	(47/2$^+$)	Q[@]
8856.5	(51/2$^-$)	1182	100	7674.5	(47/2$^-$)	
9425.9	(53/2$^+$)	1183		8242.9	(49/2$^+$)	
9772.9	(55/2$^+$)	1115.2 *7*	100	8657.7	(51/2$^+$)	
10085.5	(55/2$^-$)	1229		8856.5	(51/2$^-$)	
10952.9	(59/2$^+$)	1180		9772.9	(55/2$^+$)	
11380.5	(59/2$^-$)	1295		10085.5	(55/2$^-$)	
12196.9	(63/2$^+$)	1244		10952.9	(59/2$^+$)	
13502.9	(67/2$^+$)	1306		12196.9	(63/2$^+$)	
14920.9	(71/2$^+$)	1418		13502.9	(67/2$^+$)	
16478	(75/2$^+$)	1557		14920.9	(71/2$^+$)	

[†] From weighted averages of available values in 1997Gi08, 2001Xi01 and 1995Ku29. In other cases, values are taken from 1992He03 or 2000Wa28.

[‡] From $\gamma(\theta)$ and $\gamma\gamma(\theta)$ data in high-spin experiments (1995Ku29), unless otherwise stated. For levels of known half-lives, RUL used to distinguish between E2, M2 and higher multipolarity transitions.

[#] From α(K)exp, α(L)exp and/or K/L ratios (1997Gi08).

[@] From DCO ratio in 1992He03 and RUL for E2 and M2 transitions.

[&] δ(E2/M1)=0.3 assumed when not given for transitions from high-spin (J>13/2) levels.

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

$^{129}_{57}La_{72}$-13

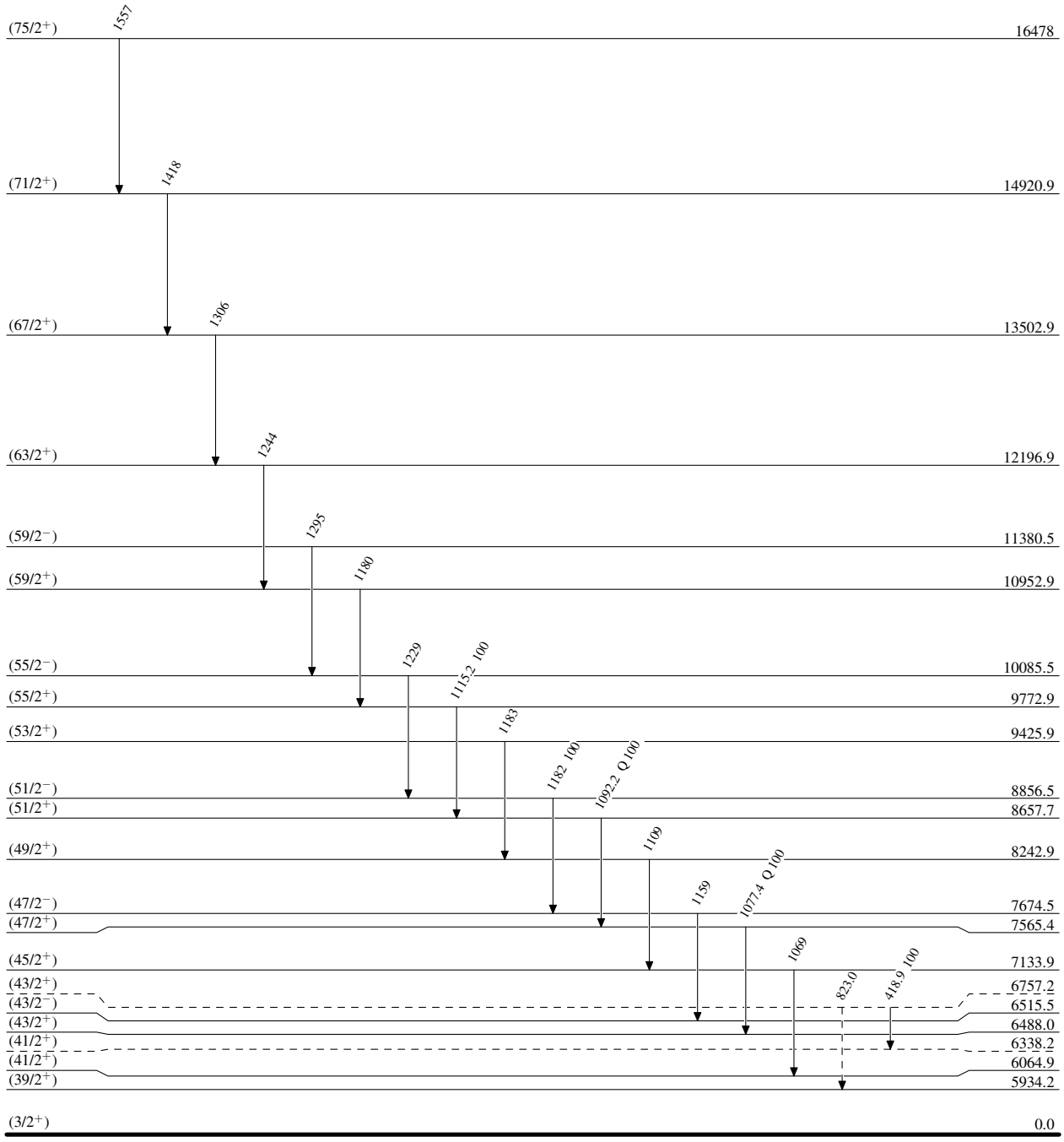
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{129}_{57}La_{72}$

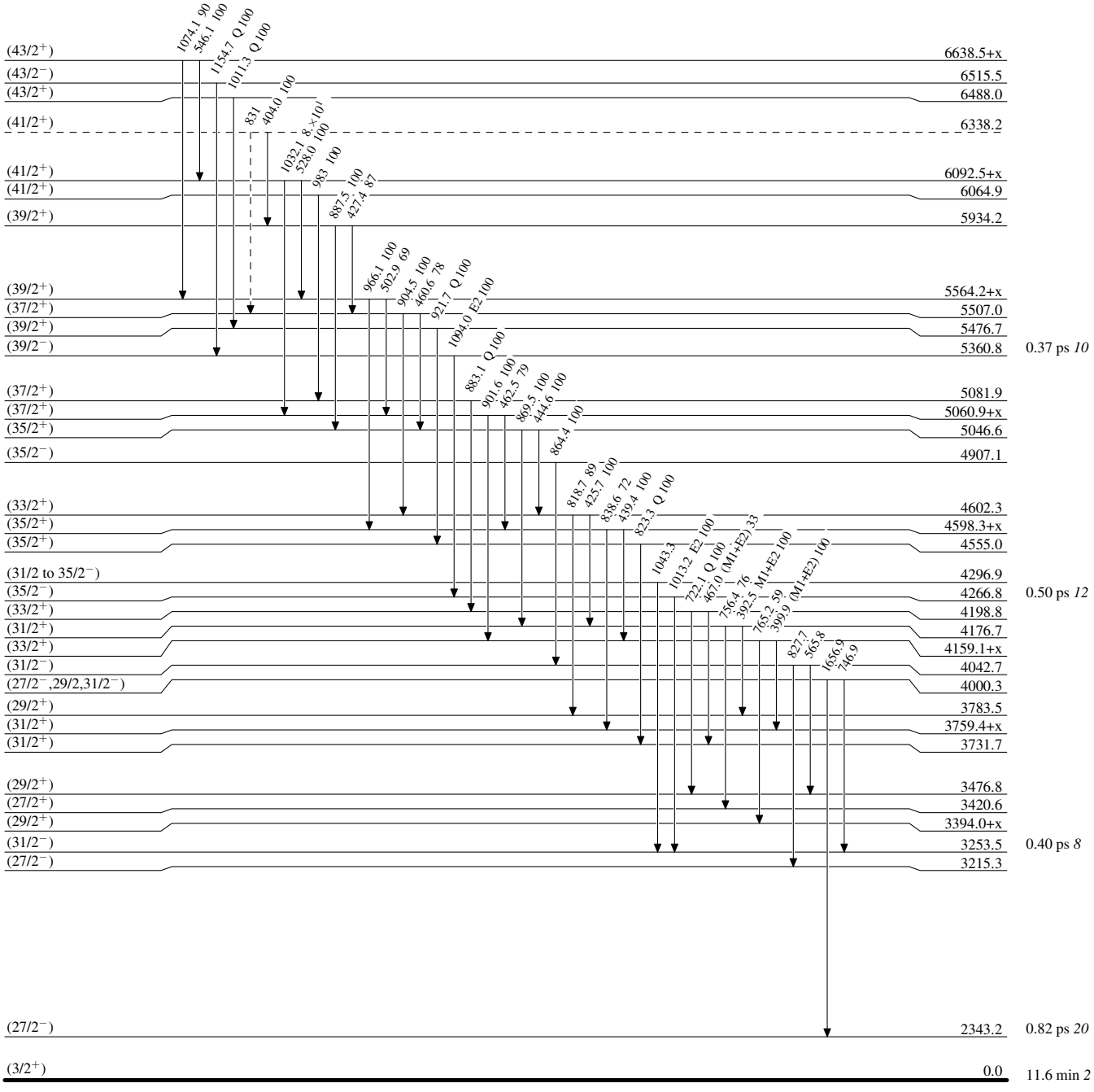
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

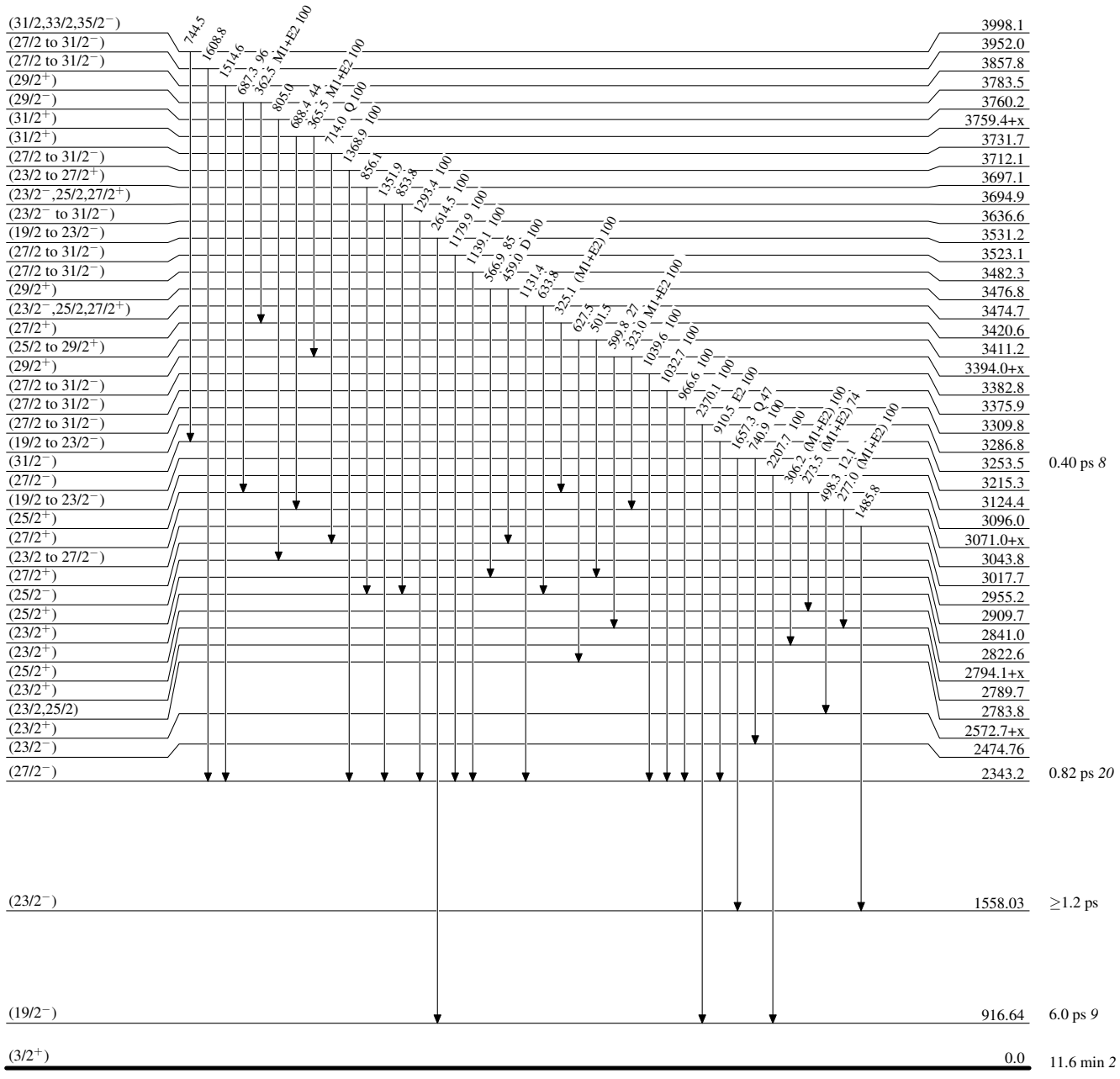


$^{129}_{57}La_{72}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

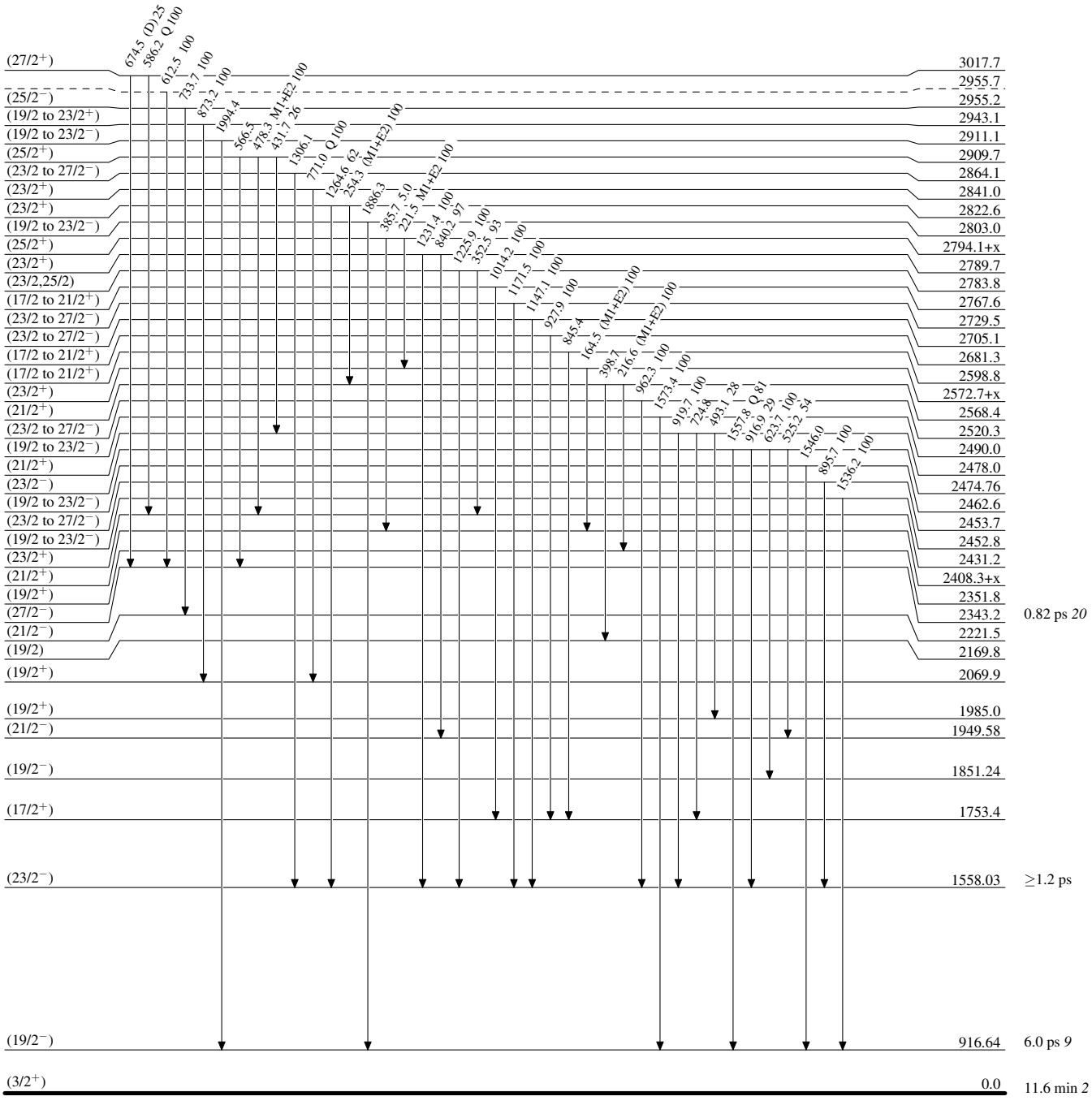


$^{129}_{57}La_{72}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

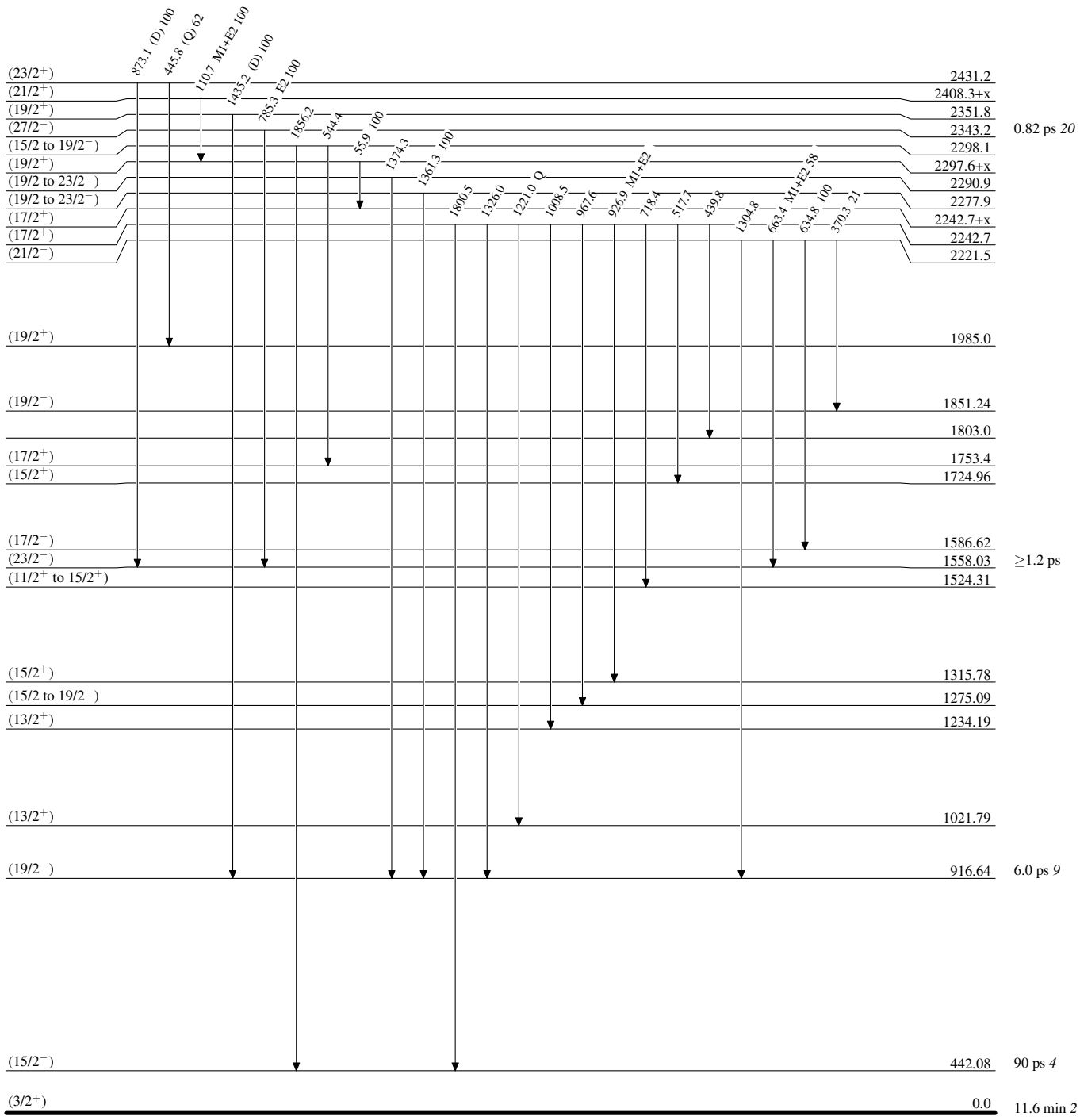


$^{129}_{57}La_{72}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

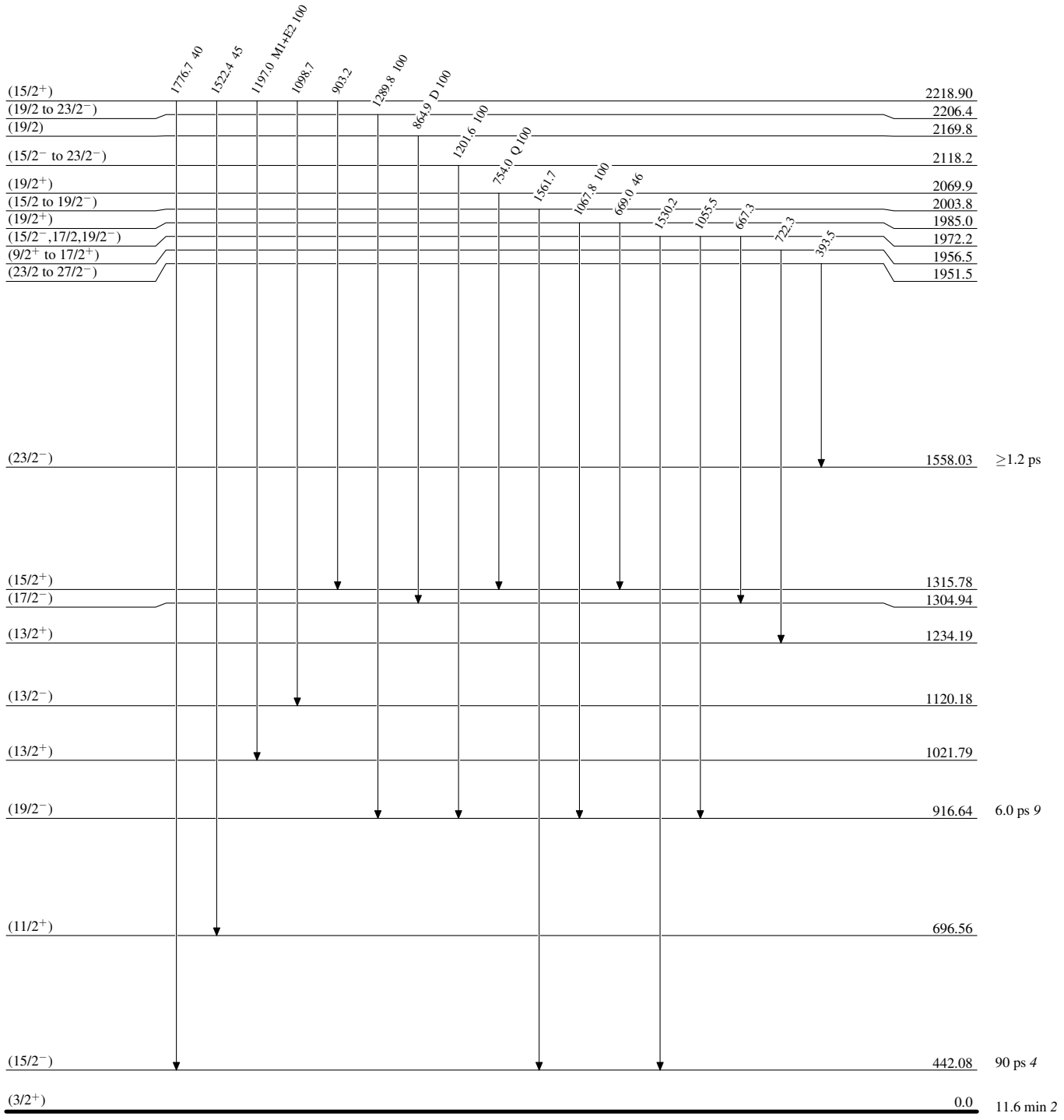


$^{129}_{57}La_{72}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



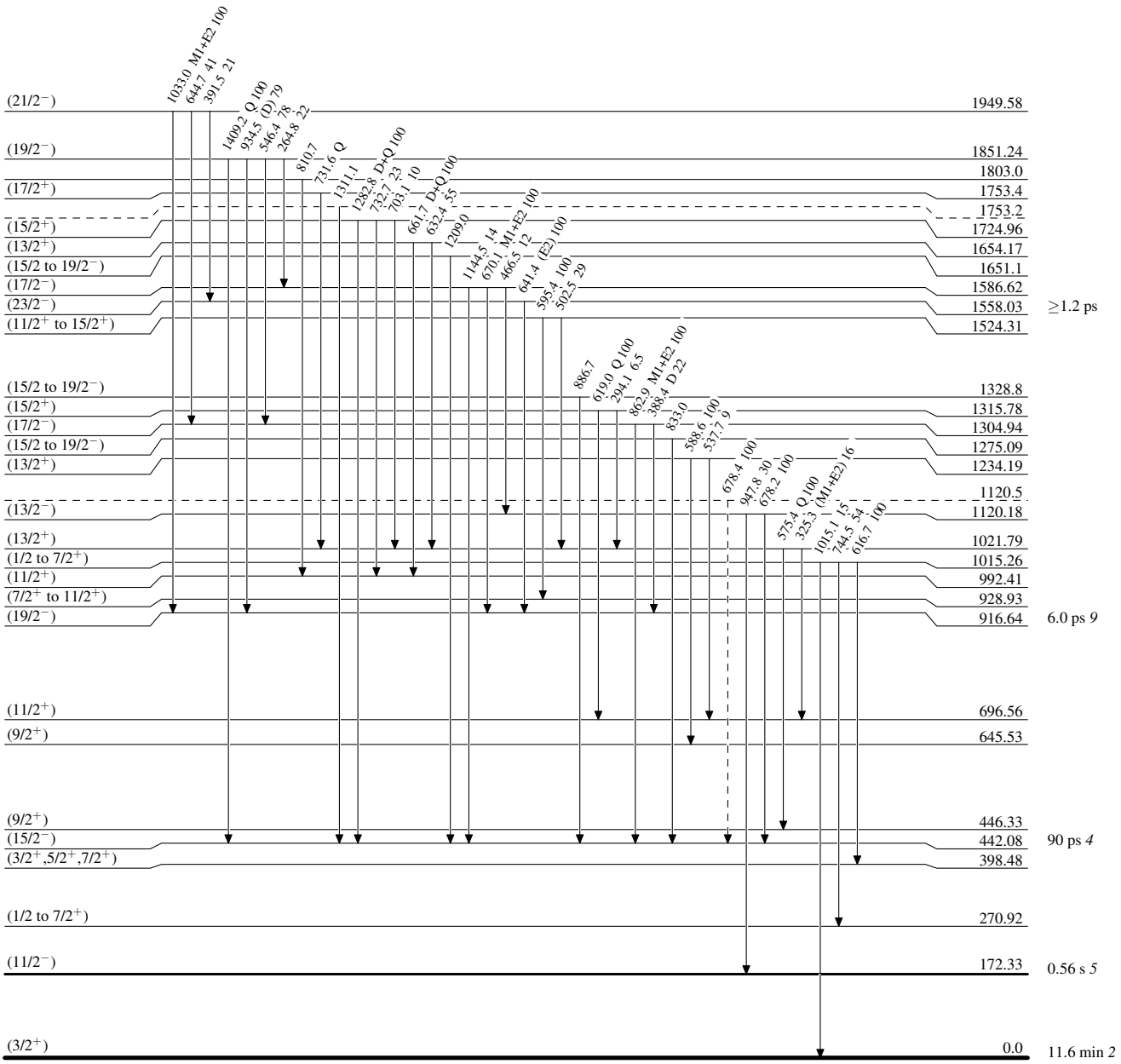
$^{129}_{57}La_{72}$

Adopted Levels, Gammas Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

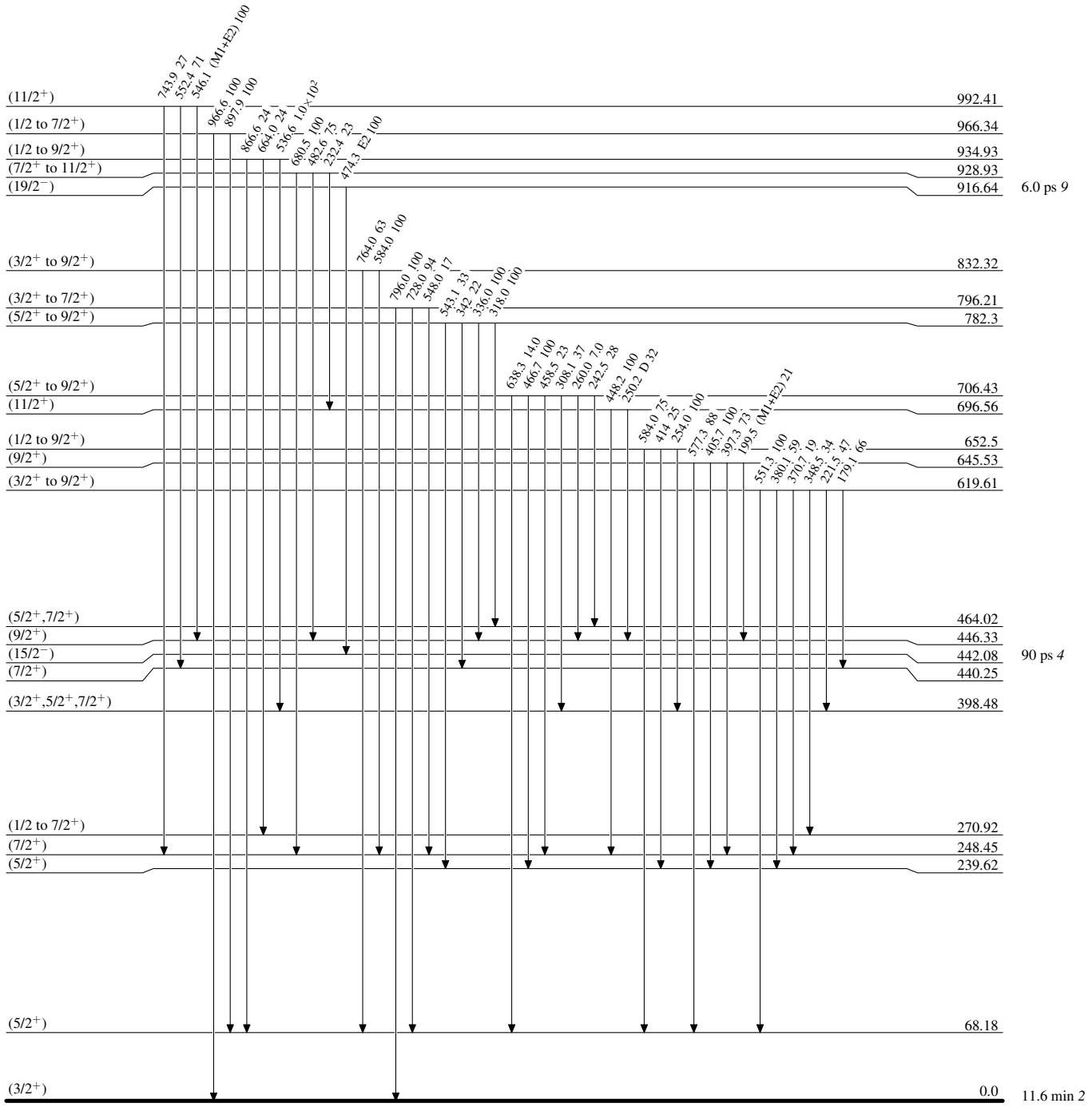


$^{129}_{57}La_{72}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

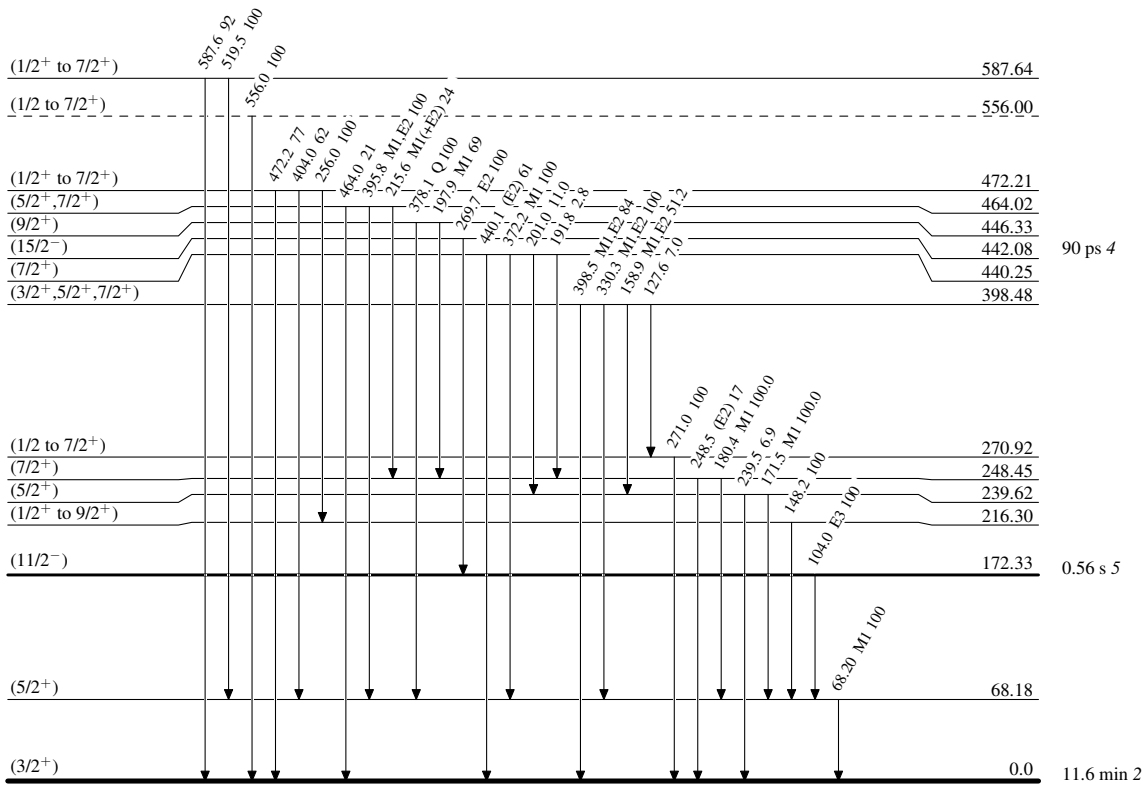


$^{129}_{57}La_{72}$

Adopted Levels, Gammas

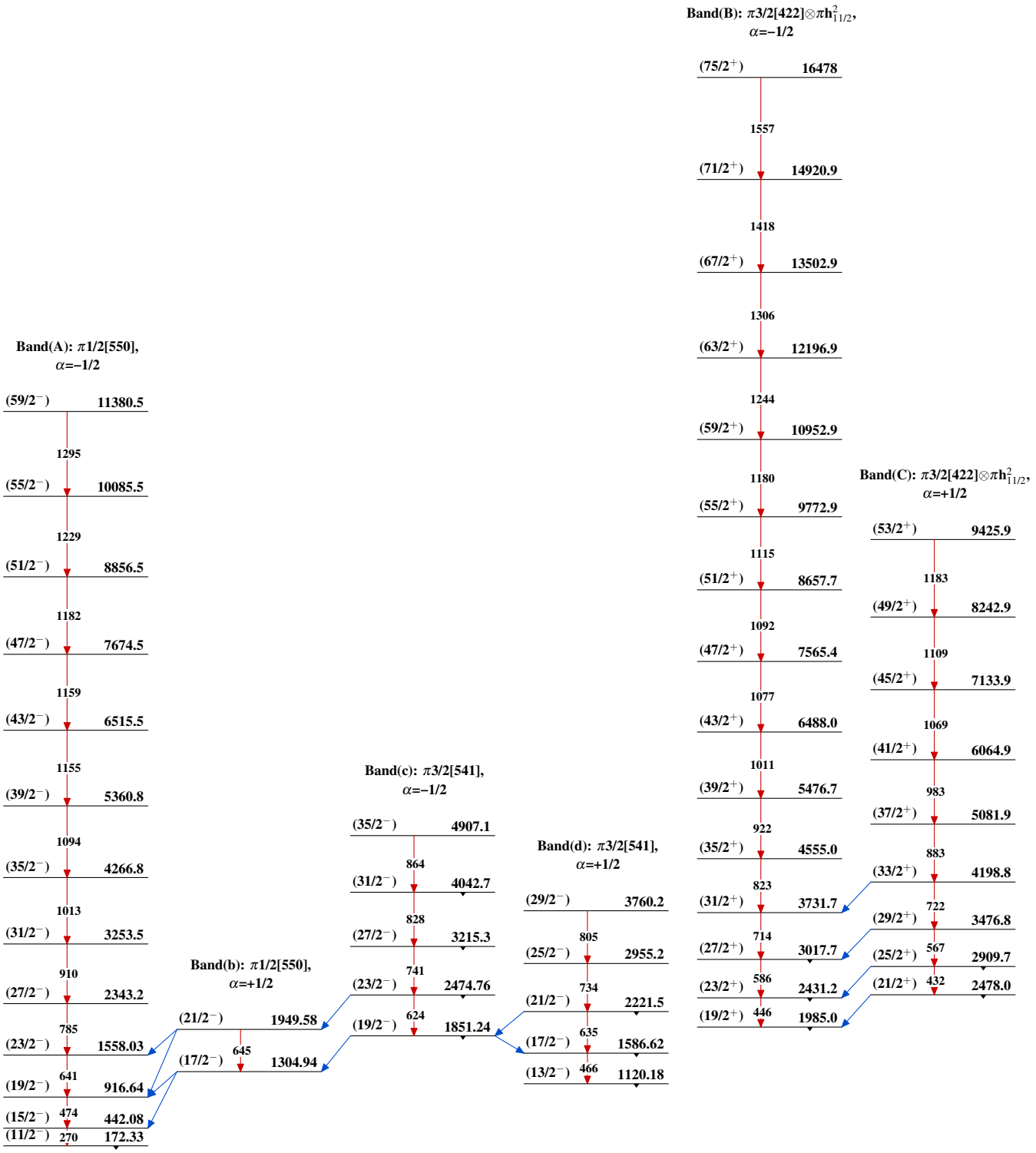
Level Scheme (continued)

Intensities: Relative photon branching from each level



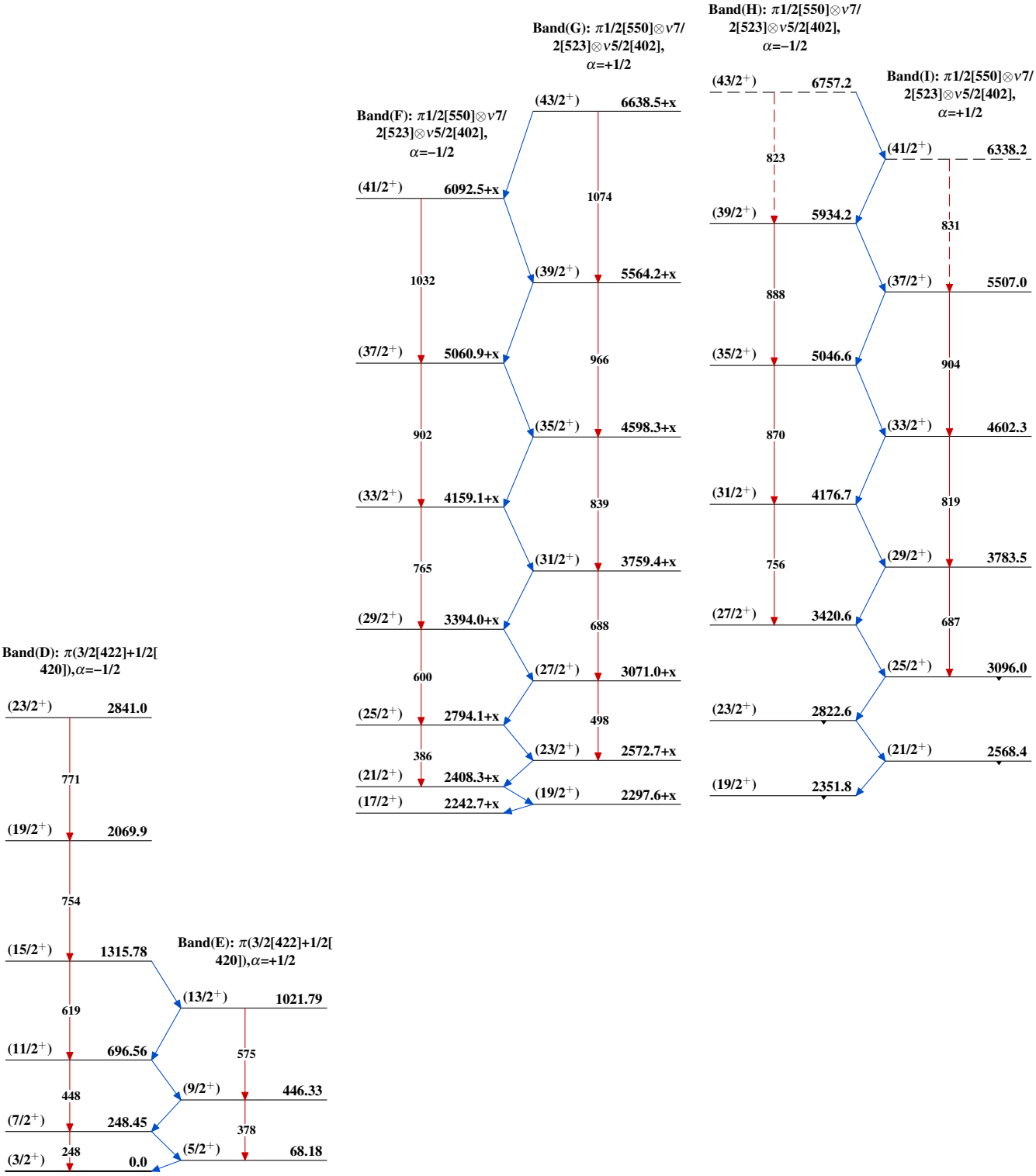
$^{129}_{57}La_{72}$

Adopted Levels, Gammas



$^{129}_{57}La_{72}$

Adopted Levels, Gammas (continued)



$^{129}_{57}La_{72}$