Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev, S. Juutinen, D. J. Hartley	NDS 150, 1 (2018)	1-Feb-2018

Q(β^-)=−10621 *15*; S(n)=10900 *12*; S(p)=2660 *13*; Q(α)=6109 *3* 2017Wa10
Additional information 1.

^{188}Pb Levels

Cross Reference (XREF) Flags

- A ^{192}Po α decay
- B ^{164}Er(^{28}Si,4nγ)
- C ^{156}Gd(^{36}Ar,4nγ)
- D ^{108}Pd(^{83}Kr,3nγ)

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]	XREF	Comments
0	0$^+$	25.5 s *1*	ABCD	%ε+%β$^+$=91.5 *5*; %α=8.5 *5* %α: Weighted average of 8.0 *6* (2003Va16), 9.3 *8* (1999An22) and 8.5 *13* (1996Bi17). Others: 3-10 (1992Wa14,1994Wa13) and 22 *7* (1981To02). T$_{1/2}$: weighted average of 25.5 s *1* (1993Wa03,1992Wa14), 22 s *2* (1981To02,1984To09), 24.5 s *15* (1973Ho01), 26 s *2* (1974Le02), 23.6 s *45* (1972Ga27). Other: 1967Es05 quotes a value of 26 s, but without uncertainty. $\Delta\langle r^2\rangle$(^{188}Pb,^{208}Pb)=−0.930 fm^2 *10* (2007De09,2009Se13).
591.0 *20*	0$^+$		A C	E(level): From ce data in ^{156}Gd(^{36}Ar,4nγ) (1999Le61). Others: 588 keV *9* (2003Va16), 591 keV *10* (1999An22) and 569 keV *31* (1996Bi17) from Qα and Eα. Note the discrepant value of 568 keV *8* (1998Al27). J$^\pi$: E0 transition to g.s. This state is interpreted as an oblate 0$^+$.
723.6[@] *3*	2$^+$	5.9 ps *24*	BCD	J$^\pi$: 723.9γ E2 to 0$^+$; band assignment. T$_{1/2}$: Other: 9 ps *5* (2003De24).
725? *2*	0$^+$		C	E(level): From ce data ^{156}Gd(^{36}Ar,4nγ) (1999Le61). Not observed in ^{192}Po α decay (2003Va16). J$^\pi$: E0 transition to g.s. A candidate for a prolate 0$^+$ intruder state.
952.5[&] *3*	2$^+$		C	J$^\pi$: 228.7γ E0+E2 to 2$^+$, 952.5γ to 0$^+$; band assignment.
1063.8[@] *4*	4$^+$	11.0 ps *7*	BCD	J$^\pi$: 340.2γ E2 to 2$^+$; band assignment. T$_{1/2}$: Other: 11 ps *6* (2003De24).
1195.1 *6*	(3,4$^+$)		B	J$^\pi$: 471.5γ to 2$^+$; absence of γ to 0$^+$.
1218.9[h] *8*	(1$^-$)		C	J$^\pi$: 1219γ to 0$^+$; band assignment; systematics of similar structures in neighboring nuclei.
1314.9[&] *4*	4$^+$		C	J$^\pi$: 250.8γ E0+E2 to 4$^+$, 362.4γ E2 to 2$^+$; band assignment.
1411.3[g] *4*	4$^+$		C	J$^\pi$: 458.8γ (E2) to 2$^+$, 376.6γ M1+E2 from 5$^+$.
1433.5[@] *4*	6$^+$	2.8 ps *4*	BCD	J$^\pi$: 369.7γ E2 to 4$^+$; band assignment.
1516.9[h] *4*	(3$^-$)		C	J$^\pi$: 793.1γ (E1) to 2$^+$, 298γ to (1$^-$); band assignment.
1786.3[&] *4*	6$^+$		BC	J$^\pi$: 352.6γ E0+E2 to 6$^+$, 471.5γ E2 to 4$^+$; band assignment.
1788.0[g] *4*	5$^+$		C	J$^\pi$: 429.2γ from 7$^+$, 354.8γ to 6$^+$; band assignment.
1867.3[@] *4*	8$^+$	1.7 ps *3*	BCD	J$^\pi$: 433.8γ E2 to 6$^+$; band assignment.
1956.1[h] *4*	(5$^-$)		BC	J$^\pi$: 439.1γ E2 to (3$^-$), 892.4γ (E1) to 4$^+$; band assignment.
2138.0 *5*	(6$^+$)		C	J$^\pi$: 726.7γ to 4$^+$.
2210.5[e] *4*	(5$^-$)		C	J$^\pi$: 1146.6γ to 4$^+$, 305.5γ from 7$^-$; band assignment.
2217.1[g] *4*	7$^+$		BC	J$^\pi$: 783.7γ M1+E2 to 6$^+$; band assignment.
2299.2[&] *4*	8$^+$		BC	J$^\pi$: 431.7γ E0+E2 to 8$^+$, 513.0γ E2 to 6$^+$; band assignment.
2366.3[@] *5*	10$^+$		BC	J$^\pi$: 499.0γ E2 to 8$^+$; band assignment.
2448.5 *4*	(6$^-$)		C	J$^\pi$: 129γ E2 from 8$^-$, 660.5γ to 5$^+$.

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Adopted Levels, Gammas (continued)

^{188}Pb Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	XREF	Comments
2464.7 *8*			C	E(level): From 1999Le61 in ^{156}Gd(^{36}Ar,4nγ).
2474.1[h] *4*	(7⁻)		BC	Jπ: 518.0γ E2 to (5⁻), 606.8γ to 8⁺; band assignment.
2516.1[e] *4*	(7⁻)		C	Jπ: 648.7γ to 8⁺; band assignment.
2577.2[a] *4*	8⁻	800 ns *20*	BC	μ=−0.297 *24* Jπ: 278.2γ E1 to 8⁺, 360.2γ E1 to 7⁺, 129γ E2 to (6⁻). μ: From g=−0.037 *3* using TDPAD (2010Io01) in ^{164}Er(^{28}Si,4nγ). $T_{1/2}$: Weighted average of 797 ns *21* from sum of 723γ, 340γ, 370γ, 434γ and 360γ(t) in 2000By02, 830 ns *210* from 370γ(t) in 1999Dr10 and 820 ns *60* from γ(t) in 2010Io01. configuration: K^π=8⁻, ν(7/2⁻[514],9/2⁺[624]) at prolate deformation. Based on the measured g factor and systematics of similar structures in neighboring nuclei. An average of g_K-g_R=−0.182 *18* from in-band branching ratios (2004Dr04).
2663.4 *5*	(8)		C	Jπ: 189.3γ to 7⁻.
2701.6[c] *5*	11⁻	26 ns *3*	BC	Jπ: 335.4γ E1 to 10⁺. $T_{1/2}$: Weighted average of 26 ns *4* from 335.4γ(t) in 1999Dr10 and 27 ns *5* from γ(t) in 2010Io01. μ=+11.33 *33*; from g=+1.03 *3* using TDPAD (2010Io01) in ^{164}Er(^{28}Si,4nγ). configuration: K^π=11⁻, π(9/2⁻[505]⊗13/2⁺[606]) at oblate deformation. Based on the measured g factor and systematics of similar structures in neighboring nuclei. g_K-g_R ≈ +0.2 from in-band branching ratios (2004Dr04) is inconsistent with g factor for the 8⁻ state (2010Io01).
2702.6[g] *4*	(9⁺)		C	Jπ: 485.5γ to 7⁺, 835.3γ to 8⁺; band assignment.
2709.8[d] *5*	12⁺	97 ns *8*	BC	Jπ: E2 343.5γ to 10⁺. $T_{1/2}$: Weighted average of 94 ns *14* from 343.5γ(t) (1999Dr10) and 99 ns *10* from γ(t) (2010Io01) in ^{164}Er(^{28}Si,4nγ). μ=−2.148 *72*; from g=−0.179 *6* using TDPAD (2010Io01) in ^{164}Er(^{28}Si,4nγ). configuration: $\nu(i_{13/2})^{-2}$ at spherical shape.
2725.1[h] *5*	(9⁻)		C	Jπ: 251.2γ to 7⁻, 425.8γ to 8⁺.
2752.2[b] *5*	9⁻		C	Jπ: 174.9γ M1+E2 to 8⁻; band assignment.
2778.0[f] *5*	(8⁻)		C	Jπ: 329.4γ to (6⁻), 561.0γ to 7⁺; band assignment.
2833.4[&] *5*	10⁺		C	Jπ: 534.2γ E2 to 8⁺; band assignment.
2853.8[e] *4*	(9⁻)		C	Jπ: 487.5γ to 10⁺, 986.5γ to 8⁺; band assignment.
2923.8[@] *5*	12⁺		C	Jπ: 557.5γ E2 to 10⁺; band assignment.
2945.3[a] *5*	10⁻		C	Jπ: 193.0γ M1+E2 to 9⁻, 368.1γ E2 to 8⁻; band assignment.
3147.0[b] *5*	11⁻		C	Jπ: 201.6γ to 10⁻, 394.9γ to 9⁻; band assignment.
3165.7[f] *6*	(10⁻)		C	Jπ: 387.7γ to (8⁻); band assignment.
3183.4 *5*	11⁻		C	Jπ: 238.2γ M1+E2 to 10⁻, 431.2γ (E2) to 9⁻.
3229.2[c] *5*	12⁻		C	Jπ: 527.5γ M1+E2 to 11⁻; band assignment.
3240.7[g] *5*	(11⁺)		C	Jπ: 538.1γ to (9⁺); band assignment.
3241.9[e] *5*	(11⁻)		C	Jπ: 318.4γ to 12⁺, 388.1γ to (9⁻), 875.7γ to 10⁺: band assignment.
3389.6[&] *6*	12⁺		C	Jπ: 556.2γ to 10⁺; band assignment.
3399.4[a] *5*	12⁻		C	Jπ: 252.2γ to 11⁻, 454.1γ to 10⁻; band assignment.
3529.8[@] *5*	14⁺		C	Jπ: 606.0γ E2 to 12⁺; band assignment.
3617.1[c] *5*	13⁻		C	Jπ: 387.7γ M1+E2 to 12⁻, 915.5γ E2 to 11⁻; band assignment.
3649.9[b] *5*	13⁻		C	Jπ: 250.5γ M1+E2 to 12⁻, 466.4γ to 11⁻; band assignment.
3680.2[e] *5*	(13⁻)		C	Jπ: 451.0γ M1+E2 to 12⁻, 978.6γ E2 to 11⁻; band assignment.
3699.7[d] *5*	14⁺		C	Jπ: 989.9γ E2 to 12⁺.
3754.5 *6*	(13⁻)		C	Jπ: 571.8γ to 11⁻.
3802.5[g] *6*	(13⁺)		C	Jπ: 561.8γ to (11⁺); band assignment.
3821.3 *11*	(12)		C	Jπ: 1455γ to 10⁺.
3843.9 *6*	(13⁻)		C	Jπ: 614.7γ (M1) to 12⁻.

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Adopted Levels, Gammas (continued)

^{188}Pb Levels (continued)

E(level)†	Jπ‡	$T_{1/2}$#	XREF	Comments
3930.4[a] 6	14⁻		C	Jπ: 280.7γ to 13⁻, 530.9γ to 12⁻; band assignment.
3983.4[&] 7	(14⁺)		C	Jπ: 593.8γ to 12⁺; band assignment.
3983.8 6	(13)		C	Jπ: 754.6γ to 12⁻.
4096.4[c] 5	15⁻		C	Jπ: 479.2γ E2 to 13⁻, 566.6γ to 14⁺.
4136.2 6	(13)		C	Jπ: 907.0γ to 12⁻.
4163.4[@] 6	16⁺		C	Jπ: 633.6γ E2 to 14⁺; band assignment.
4211.9[b] 6	15⁻		C	Jπ: 562.0γ to 13⁻; band assignment.
4244.9[d] 6	15⁺		C	Jπ: 545.2γ (M1) to 14⁺, 267γ M1+E2 from 16⁺.
4250.4 6	(15⁻)		C	Jπ: 570.2γ (E2) to 13⁻.
4294.3 12	(13)		C	Jπ: 473.0γ to (12).
4389.8? 10			C	E(level): 546γ to (13⁻); level not shown in level scheme (figures 1 and 2) of 2004Dr04.
4409.0 6	(14⁻)		C	Jπ: 791.9γ to 13⁻.
4512.4[d] 6	16⁺		C	Jπ: 267.5γ M1+E2 to 15⁺, 982.6γ and 812.8γ to 14⁺.
4533.0[a] 6	16⁻		C	Jπ: 602.6γ to 14⁻; band assignment.
4565.6[c] 6	17⁻		C	Jπ: 469.2γ E2 to 15⁻.
4780.0 7	(17)		C	Jπ: 616.6γ to 16⁺.
4783.4 7	(19⁻)	0.44 μs 6	C	Jπ: 217.8γ (E2) to 17⁻. $T_{1/2}$: from γγγ(t) (2004Dr04). configuration: π(9/2⁻[505],13/2⁺[606])⊗ν(7/2⁺[633],9/2⁺[624]).
4868.2[@] 7	(18⁺)		C	Jπ: 704.8γ to 16⁺; band assignment.
5084.2[c] 7	(18⁻)		C	Jπ: 518.6γ (M1) to 17⁻.
5128.4 8	(20⁻)		C	Jπ: 345.0γ to (19⁻).
5435.0 12	(19)		C	Jπ: 655γ to (17).
5725.4 8	(21⁻)		C	Jπ: 597.0γ to (20⁻).

† From least-squares fit to Eγ, unless otherwise stated.

‡ Based on the deduced transition multipolarities, systematics, band assignment, and relative population in (HI,xnγ). Most of the assignments are adopted from 2004Dr04 (^{156}Gd(^{36}Ar,4nγ)).

\# From 2006Gr16 (also 2008Gr04) in ^{108}Pd(^{83}Kr,3nγ), using the differential-decay curve method, unless otherwise stated.

@ Band(A): K^π=0⁺, prolate-deformed yrast band.

& Band(B): K^π=0⁺, oblate-deformed band.

a Band(C): K^π=8⁻, ν(7/2⁻[514],9/2⁺[624]) (prolate), α=0.

b Band(c): K^π=8⁻, ν(7/2⁻[514],9/2⁺[624]) (prolate), α=1.

c Band(D): K^π=11⁻, π(9/2⁻[505],13/2⁺[606]) oblate-deformed band.

d Seq.(H): γ cascade based on Jπ=12⁺ $\nu(i_{13/2})^{-2}$ (spherical).

e Band(E): (5⁻) band, possible $\nu(p_{3/2},i_{13/2})$ configuration.

f Band(e): (6⁻) band, possible $\nu(p_{3/2},i_{13/2})$ configuration.

g Band(F): possible γ band, α=1.

h Band(G): possible Kπ=1⁻ octupole band.

Adopted Levels, Gammas (continued)

$\gamma(^{188}Pb)$

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.†	α‡	Comments
591.0	0^+	591 *2*		0	0^+	E0		E_γ: Transition energy from measured E(ce)(K). No $E\gamma$ has been observed. Mult.: from K:L = 5:1 from ce data in $^{156}Gd(^{36}Ar,4n\gamma)$ (1999Le61).
723.6	2^+	723.5 *5*	100	0	0^+	E2	0.01280	B(E2)(W.u.)=7 *3* α(K)=0.00981 *14*; α(L)=0.00227 *4*; α(M)=0.000550 *8* α(N)=0.0001393 *20*; α(O)=2.69×10^{-5} *4*; α(P)=2.39×10^{-6} *4* Mult.: DCO=0.96 *7* from $^{156}Gd(^{36}Ar,4n\gamma)$.
725?	0^+	725@ *2*		0	0^+	E0		E_γ: Transition energy from the measured E(ce)(K). Note that the energy overlaps with the much stronger 723.9γ, E2 2^+ to 0^+ transition. Mult.: K:L = 5.4:1.0 from ce data in $^{156}Gd(^{36}Ar,4n\gamma)$ (1999Le61). The measured large α(K)exp=0.044 *5* for the doublet 725γ indicate E0 component. A 767 keV *12* E0 transition was reported in ^{192}Po α decay (1998Al27), but the population of this state was questioned in the later ^{192}Po α decay work (2003Va16).
952.5	2^+	228.7 *3*	9.4 *7*	723.6	2^+	E0+E2	2.9 *5*	Mult.: A_2=−0.33 *15*, α(exp)=2.9 *5* from $^{156}Gd(^{36}Ar,4n\gamma)$; E0 component inferred from large α(exp) and A_2 implies large E2 component. An M1 admixture should be expected, if K ≠ 0 for the initial and final states. α: From α(exp) in 2004Dr04 ($^{156}Gd(^{36}Ar,4n\gamma)$).
		952.5 *3*	100 *3*	0	0^+			
1063.8	4^+	340.2 *3*	100	723.6	2^+	E2	0.0802	B(E2)(W.u.)=163 *11* α(K)=0.0486 *7*; α(L)=0.0237 *4*; α(M)=0.00605 *9* α(N)=0.001530 *22*; α(O)=0.000283 *4*; α(P)=1.84×10^{-5} *3* Mult.: A_2=+0.24 *4*, DCO=0.96 *7*, α(K)exp=0.065 *20* from $^{156}Gd(^{36}Ar,4n\gamma)$.
1195.1	$(3,4^+)$	471.5 *5*	100	723.6	2^+			E_γ: From $^{164}Er(^{28}Si,4n\gamma)$.
1218.9	(1^-)	1219 *1*	100	0	0^+			
1314.9	4^+	250.8 *3*	11.7 *10*	1063.8	4^+	E0+E2	2.4 *3*	Mult.: A_2=−0.31 *18*, α(exp)=2.4 *3*; E0 component inferred from large α(exp) and A_2 implies large E2 component. An M1 admixture should be expected, if K ≠ 0 for the initial and final states. α: From α(exp) in 2004Dr04 ($^{156}Gd(^{36}Ar,4n\gamma)$).
		362.4 *3*	100 *3*	952.5	2^+	E2	0.0672	α(K)=0.0421 *6*; α(L)=0.0189 *3*; α(M)=0.00480 *7* α(N)=0.001215 *18*; α(O)=0.000226 *4*; α(P)=1.517×10^{-5} *22* Mult.: A_2=+0.16 *14*. E_γ: 360.2γ and 362.4γ form a doublet structure.
		591.5 *3*	99 *4*	723.6	2^+	E2	0.0199	α(K)=0.01466 *21*; α(L)=0.00394 *6*; α(M)=0.000967 *14* α(N)=0.000245 *4*; α(O)=4.67×10^{-5} *7*; α(P)=3.90×10^{-6} *6* Mult.: A_2=+0.39 *10*.
1411.3	4^+	458.8 *3*	100	952.5	2^+	(E2)	0.0362	α(K)=0.0250 *4*; α(L)=0.00852 *12*; α(M)=0.00213 *3* α(N)=0.000539 *8*; α(O)=0.0001014 *15*; α(P)=7.62×10^{-6} *11* Mult.: A_2=+0.23 *14*.

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Adopted Levels, Gammas (continued)

$\gamma(^{188}Pb)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.†	α‡	Comments
1433.5	6+	369.7 *3*	100	1063.8	4+	E2	0.0637	B(E2)(W.u.)=4.3×10[2] *7* α(K)=0.0402 *6*; α(L)=0.0176 *3*; α(M)=0.00447 *7* α(N)=0.001131 *17*; α(O)=0.000210 *3*; α(P)=1.427×10[−5] *21* Mult.: A2=+0.26 *4*, DCO=1.06 *10* (1993He05).
1516.9	(3−)	298 *1*	34 *9*	1218.9	(1−)			
		793.1 *3*	100 *14*	723.6	2+	(E1)	0.00383	α(K)=0.00319 *5*; α(L)=0.000494 *7*; α(M)=0.0001142 *16* α(N)=2.89×10[−5] *4*; α(O)=5.71×10[−6] *8*; α(P)=5.81×10[−7] *9* Mult.: A2=−0.2 *3*.
1786.3	6+	352.6 *3*	6.3 *11*	1433.5	6+	E0+E2	1.3 *3*	Mult.: α(exp)=1.3 *3*; E0 component inferred from large α(exp). An M1 admixture should be expected, if K ≠ 0 for the initial and final states. α: From α(exp) in 2004Dr04 ([156]Gd([36]Ar,4nγ)).
		471.5 *3*	100 *2*	1314.9	4+	E2	0.0339	α(K)=0.0235 *4*; α(L)=0.00781 *11*; α(M)=0.00195 *3* α(N)=0.000493 *7*; α(O)=9.29×10[−5] *14*; α(P)=7.07×10[−6] *10* Mult.: A2=+0.24 *10*. Eγ: 471.5γ and 472.9γ from 1788 form a doublet structure.
		723 *1*	14 *4*	1063.8	4+			
1788.0	5+	354.8 *3*	24 *7*	1433.5	6+			
		376.6 *3*	100 *14*	1411.3	4+	M1+E2	0.230	α(K)=0.188 *3*; α(L)=0.0320 *5*; α(M)=0.00748 *11* α(N)=0.00190 *3*; α(O)=0.000379 *6*; α(P)=4.06×10[−5] *6* Mult.: A2=+1.0 *4*.
		472.9 *3*	99 *4*	1314.9	4+			Eγ: 471.5γ from 1786.4 and 472.9γ form a doublet structure.
		724	≈14	1063.8	4+			
1867.3	8+	433.8 *3*	100	1433.5	6+	E2	0.0417	B(E2)(W.u.)=3.3×10[2] *6* α(K)=0.0282 *4*; α(L)=0.01022 *15*; α(M)=0.00257 *4* α(N)=0.000649 *10*; α(O)=0.0001217 *18*; α(P)=8.92×10[−6] *13* Mult.: A2=+0.26 *4*, DCO=1.07 *9* (1993He05).
1956.1	(5−)	439.1 *3*	54 *5*	1516.9	(3−)	E2	0.0405	α(K)=0.0274 *4*; α(L)=0.00982 *14*; α(M)=0.00246 *4* α(N)=0.000623 *9*; α(O)=0.0001169 *17*; α(P)=8.62×10[−6] *13* Mult.: A2=+0.29 *20*.
		892.4 *3*	100 *8*	1063.8	4+	(E1)	0.00308	α(K)=0.00257 *4*; α(L)=0.000394 *6*; α(M)=9.09×10[−5] *13* α(N)=2.30×10[−5] *4*; α(O)=4.55×10[−6] *7*; α(P)=4.67×10[−7] *7* Mult.: A2=−0.11 *16*.
2138.0	(6+)	726.7 *3*	100	1411.3	4+			
2210.5	(5−)	1146.6 *3*	100	1063.8	4+			
2217.1	7+	429.2 *3*	100 *11*	1788.0	5+			Eγ: 429.2γ and 430.6γ form a doublet structure.
		430.6 *3*	21 *3*	1786.3	6+			Eγ: 429.2γ and 430.6γ form a doublet structure.
		783.7 *3*	56 *6*	1433.5	6+	M1+E2	0.0333	α(K)=0.0274 *4*; α(L)=0.00455 *7*; α(M)=0.001061 *15* α(N)=0.000270 *4*; α(O)=5.38×10[−5] *8*; α(P)=5.78×10[−6] *9* Mult.: A2=+1.0 *2*.
2299.2	8+	431.7 *3*	19 *3*	1867.3	8+	E0+E2	≈0.3	Mult.: α(exp)≈0.3; E0 component inferred from large α(exp). An M1 admixture should be

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Adopted Levels, Gammas (continued)

$\gamma(^{188}Pb)$ (continued)

E_i(level)	J^{π}_i	E_γ†	I_γ†	E_f	J^{π}_f	Mult.†	α‡	Comments
								expected,if K ≠ 0 for the initial and final states. α: From α(exp) in 2004Dr04 ($^{156}Gd(^{36}Ar,4n\gamma)$).
2299.2	8+	513.0 *3*	100 *3*	1786.3	6+	E2	0.0276	α(K)=0.0197 *3*; α(L)=0.00600 *9*; α(M)=0.001489 *21* α(N)=0.000377 *6*; α(O)=7.13×10^{-5} *10*; α(P)=5.63×10^{-6} *8* Mult.: A_2=+0.21 *9*.
		866 *1*	9 *3*	1433.5	6+			
2366.3	10+	499.0 *3*	100	1867.3	8+	E2	0.0295	α(K)=0.0209 *3*; α(L)=0.00653 *10*; α(M)=0.001624 *23* α(N)=0.000411 *6*; α(O)=7.77×10^{-5} *11*; α(P)=6.06×10^{-6} *9* Mult.: A_2=+0.26 *4*, DCO=1.10 *11* (1993He05).
2448.5	(6−)	660.5 *3*	100 *17*	1788.0	5+			
		1015 *1*	35 *5*	1433.5	6+			
2464.7		1031 *1*		1433.5	6+			E_γ: From 1999Le61 in $^{156}Gd(^{36}Ar,4n\gamma)$.
		1401 *1*		1063.8	4+			E_γ: From 1999Le61 in $^{156}Gd(^{36}Ar,4n\gamma)$.
2474.1	(7−)	518.0 *3*	100 *5*	1956.1	(5−)	E2	0.0270	α(K)=0.0193 *3*; α(L)=0.00583 *9*; α(M)=0.001444 *21* α(N)=0.000366 *6*; α(O)=6.93×10^{-5} *10*; α(P)=5.48×10^{-6} *8* Mult.: A_2=+0.33 *13*.
		606.8 *3*	≈6.7	1867.3	8+			
		688 *1*	≈3.3	1786.3	6+			
		1040 *1*	≈20	1433.5	6+			
2516.1	(7−)	305.5 *3*	≈14	2210.5	(5−)			
		648.7 *3*	100 *19*	1867.3	8+			
2577.2	8−	103.0 *3*	13.5 *20*	2474.1	(7−)	M1	8.60 *14*	B(M1)(W.u.)=9.3×10^{-7} *15* α(K)=7.00 *12*; α(L)=1.221 *20*; α(M)=0.286 *5* α(N)=0.0728 *12*; α(O)=0.01450 *24*; α(P)=0.00155 *3* Mult.: α(exp)=8 *2*.
		129 *1*	14.2 *20*	2448.5	(6−)	E2	2.20 *8*	α(K)=0.413 *8*; α(L)=1.33 *6*; α(M)=0.352 *14* α(N)=0.089 *4*; α(O)=0.0159 *7*; α(P)=0.000671 *25* B(E2)(W.u.)=0.0120 *20* Mult.: α(exp)=2.0 *13*.
		278.2 *3*	47.3 *20*	2299.2	8+	E1	0.0352	B(E1)(W.u.)=1.54×10^{-9} *12* α(K)=0.0288 *4*; α(L)=0.00491 *7*; α(M)=0.001147 *17* α(N)=0.000289 *5*; α(O)=5.60×10^{-5} *8*; α(P)=5.14×10^{-6} *8* Mult.: α(exp)=0.08 *5*.
		360.2 *3*	100 *3*	2217.1	7+	E1	0.0195	B(E1)(W.u.)=1.50×10^{-9} *11* α(K)=0.01599 *23*; α(L)=0.00265 *4*; α(M)=0.000618 *9* α(N)=0.0001559 *22*; α(O)=3.04×10^{-5} *5*; α(P)=2.88×10^{-6} *4* Mult.: α(exp)<0.05. E_γ: 360.2γ and 362.4γ form a doublet structure.
		709.9 *3*	41.2 *20*	1867.3	8+	[E1]	0.00474	B(E1)(W.u.)=8.1×10^{-11} *7* α(K)=0.00394 *6*; α(L)=0.000614 *9*; α(M)=0.0001421 *20* α(N)=3.59×10^{-5} *5*; α(O)=7.09×10^{-6} *10*; α(P)=7.16×10^{-7} *10*
2663.4	(8)	189.3 *3*	100	2474.1	(7−)			
2701.6	11−	335.4 *3*	100	2366.3	10+	E1	0.0229	B(E1)(W.u.)=2.05×10^{-7} *24* α(K)=0.0188 *3*; α(L)=0.00314 *5*; α(M)=0.000731 *11* α(N)=0.000184 *3*; α(O)=3.59×10^{-5} *5*; α(P)=3.37×10^{-6} *5* Mult.: A_2=−0.16 *8*.

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Adopted Levels, Gammas (continued)

$\gamma(^{188}Pb)$ (continued)

E_i(level)	J_i^π	E_γ [†]	I_γ [†]	E_f	J_f^π	Mult. [†]	α [‡]	Comments
2702.6	(9+)	485.5 *3*	100 *5*	2217.1	7+			
		835.3 *3*	100 *17*	1867.3	8+			
2709.8	12+	343.5 *3*	100	2366.3	10+	E2	0.0780	B(E2)(W.u.)=0.0177 *15* α(K)=0.0475 *7*; α(L)=0.0229 *4*; α(M)=0.00584 *9* α(N)=0.001477 *22*; α(O)=0.000273 *4*; α(P)=1.79×10^{-5} *3* Mult.: A_2=+0.18 *11*.
2725.1	(9−)	251.2 *3*	100 *30*	2474.1	(7−)			
		425.8 *3*	40 *10*	2299.2	8+			
2752.2	9−	174.9 *3*	100	2577.2	8−	M1+E2	1.91	α(K)=1.557 *23*; α(L)=0.268 *4*; α(M)=0.0629 *10* α(N)=0.01599 *24*; α(O)=0.00319 *5*; α(P)=0.000341 *5* Mult.: A_2=−0.63 *18*.
2778.0	(8−)	329.4 *3*	62 *9*	2448.5	(6−)			
		561.0 *3*	100 *8*	2217.1	7+			
2833.4	10+	534.2 *3*	100	2299.2	8+	E2	0.0251	α(K)=0.0181 *3*; α(L)=0.00531 *8*; α(M)=0.001313 *19* α(N)=0.000332 *5*; α(O)=6.31×10^{-5} *9*; α(P)=5.06×10^{-6} *8* Mult.: A_2=+0.31 *5*.
2853.8	(9−)	337.6 *3*	17.0 *24*	2516.1	(7−)			
		380.4[@] *3*	≈20	2474.1	(7−)			
		487.5 *3*	100 *12*	2366.3	10+			
		986.5 *3*	38 *4*	1867.3	8+			
2923.8	12+	557.5 *3*	100	2366.3	10+	E2		Mult.: A_2=+0.37 *6*, DCO=1.22 *16* (1993He05).
2945.3	10−	193.0 *3*	100 *10*	2752.2	9−	M1+E2	1.447 *22*	α(K)=1.181 *18*; α(L)=0.203 *3*; α(M)=0.0476 *7* α(N)=0.01211 *18*; α(O)=0.00241 *4*; α(P)=0.000258 *4* Mult.: A_2=−0.72 *17*.
		368.1 *3*	67 *14*	2577.2	8−	E2	0.0644	α(K)=0.0406 *6*; α(L)=0.0179 *3*; α(M)=0.00454 *7* α(N)=0.001149 *17*; α(O)=0.000213 *3*; α(P)=1.446×10^{-5} *21* Mult.: A_2=+0.29 *20*.
3147.0	11−	201.6 *3*	100 *18*	2945.3	10−			
		394.9 *3*	86 *18*	2752.2	9−			
3165.7	(10−)	387.7[#] *3*	100[#]	2778.0	(8−)			
3183.4	11−	238.2 *3*	84 *16*	2945.3	10−	M1+E2	0.805	α(K)=0.657 *10*; α(L)=0.1127 *17*; α(M)=0.0264 *4* α(N)=0.00671 *10*; α(O)=0.001338 *20*; α(P)=0.0001430 *21* Mult.: A_2=−0.8 *3*.
		431.2 *3*	100 *20*	2752.2	9−	(E2)	0.0424	α(K)=0.0286 *4*; α(L)=0.01043 *15*; α(M)=0.00262 *4* α(N)=0.000662 *10*; α(O)=0.0001242 *18*; α(P)=9.07×10^{-6} *13* Mult.: A_2≈+0.3.
3229.2	12−	527.5 *3*	100	2701.6	11−	M1+E2	0.0937	α(K)=0.0768 *11*; α(L)=0.01292 *19*; α(M)=0.00302 *5* α(N)=0.000767 *11*; α(O)=0.0001530 *22*; α(P)=1.640×10^{-5} *24* Mult.: A_2=−0.63 *5*.
3240.7	(11+)	538.1 *3*	100	2702.6	(9+)			
3241.9	(11−)	318.4 *3*	18 *4*	2923.8	12+			
		388.1 *3*	100 *10*	2853.8	(9−)			
		875.7 *3*	37 *7*	2366.3	10+			
3389.6	12+	556.2 *3*	100	2833.4	10+			

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Adopted Levels, Gammas (continued)

$\gamma(^{188}Pb)$ (continued)

E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π	Mult.†	α‡	Comments
3399.4	12⁻	252.2 *3*	37 *9*	3147.0	11⁻			
		454.1 *3*	100 *14*	2945.3	10⁻			
3529.8	14⁺	606.0 *3*	100	2923.8	12⁺	E2	0.0188	α(K)=0.01396 *20*; α(L)=0.00368 *6*; α(M)=0.000902 *13* α(N)=0.000228 *4*; α(O)=4.36×10⁻⁵ *7*; α(P)=3.67×10⁻⁶ *6* Mult.: A_2=+0.22 *10*, DCO=1.07 *22* (1993He05).
3617.1	13⁻	387.7# *3*	59# *3*	3229.2	12⁻	M1+E2	0.213	α(K)=0.1742 *25*; α(L)=0.0296 *5*; α(M)=0.00691 *10* α(N)=0.001757 *25*; α(O)=0.000350 *5*; α(P)=3.75×10⁻⁵ *6* Mult.: A_2=−0.42 *9*.
		915.5 *3*	100 *5*	2701.6	11⁻	E2	0.00792	α(K)=0.00626 *9*; α(L)=0.001267 *18*; α(M)=0.000303 *5* α(N)=7.68×10⁻⁵ *11*; α(O)=1.496×10⁻⁵ *21*; α(P)=1.417×10⁻⁶ *20* Mult.: A_2=+0.22 *9*.
3649.9	13⁻	250.5 *3*	57 *14*	3399.4	12⁻	M1+E2	0.700	α(K)=0.572 *9*; α(L)=0.0980 *15*; α(M)=0.0230 *4* α(N)=0.00583 *9*; α(O)=0.001163 *17*; α(P)=0.0001243 *18* Mult.: A_2=−0.5 *3*.
		466.4 *3*	100 *14*	3183.4	11⁻			
		503.0 *3*	86 *19*	3147.0	11⁻			
3680.2	(13⁻)	438.4 *3*	100 *12*	3241.9	(11⁻)			
		451.0 *3*	53 *3*	3229.2	12⁻	M1+E2	0.1420	α(K)=0.1163 *17*; α(L)=0.0197 *3*; α(M)=0.00460 *7* α(N)=0.001168 *17*; α(O)=0.000233 *4*; α(P)=2.49×10⁻⁵ *4* Mult.: A_2=−0.48 *12*.
		756.2 *3*	23 *5*	2923.8	12⁺			
		978.6 *3*	41 *3*	2701.6	11⁻	E2	0.00695	α(K)=0.00552 *8*; α(L)=0.001085 *16*; α(M)=0.000259 *4* α(N)=6.55×10⁻⁵ *10*; α(O)=1.279×10⁻⁵ *18*; α(P)=1.229×10⁻⁶ *18* Mult.: A_2=+0.31 *20*.
3699.7	14⁺	776 *1*	26 *5*	2923.8	12⁺			
		989.9 *3*	100 *5*	2709.8	12⁺	E2	0.00679	α(K)=0.00541 *8*; α(L)=0.001057 *15*; α(M)=0.000252 *4* α(N)=6.38×10⁻⁵ *9*; α(O)=1.246×10⁻⁵ *18*; α(P)=1.199×10⁻⁶ *17* Mult.: A_2=+0.32 *12*.
3754.5	(13⁻)	571.1 *3*	100	3183.4	11⁻			
3802.5	(13⁺)	561.8 *3*	100	3240.7	(11⁺)			
3821.3	(12)	1455 *1*	100	2366.3	10⁺			
3843.9	(13⁻)	614.7 *3*	100	3229.2	12⁻	(M1)	0.0627	α(K)=0.0514 *8*; α(L)=0.00861 *13*; α(M)=0.00201 *3* α(N)=0.000511 *8*; α(O)=0.0001019 *15*; α(P)=1.094×10⁻⁵ *16* Mult.: A_2=−0.4 *2*.
3930.4	14⁻	280.7 *3*	≈33	3649.9	13⁻			
		530.9 *3*	100 *24*	3399.4	12⁻			
3983.4	(14⁺)	593.8 *3*	100	3389.6	12⁺			
3983.8	(13)	754.6 *3*	100	3229.2	12⁻			
4096.4	15⁻	416.3 *3*	62 *7*	3680.2	(13⁻)	E2	0.0464	α(K)=0.0308 *5*; α(L)=0.01172 *17*; α(M)=0.00295 *5*

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Adopted Levels, Gammas (continued)

$\gamma(^{188}Pb)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.†	α‡	Comments
								α(N)=0.000746 *11*; α(O)=0.0001396 *20*; α(P)=1.004×10^{-5} *15* Mult.: A_2=+0.31 *16*.
4096.4	15^-	479.2 *3*	100 *4*	3617.1	13^-	E2	0.0326	α(K)=0.0227 *4*; α(L)=0.00742 *11*; α(M)=0.00185 *3* α(N)=0.000468 *7*; α(O)=8.82×10^{-5} *13*; α(P)=6.76×10^{-6} *10* Mult.: A_2=+0.26 *9*.
		566.6 *3*	13.2 *25*	3529.8	14^+			
4136.2	(13)	907.0 *3*	100	3229.2	12^-			
4163.4	16^+	633.6 *3*	100	3529.8	14^+	E2	0.01705	α(K)=0.01276 *18*; α(L)=0.00325 *5*; α(M)=0.000793 *12* α(N)=0.000201 *3*; α(O)=3.85×10^{-5} *6*; α(P)=3.29×10^{-6} *5* Mult.: A_2=+0.36 *16*.
4211.9	15^-	562.0 *3*	100	3649.9	13^-			
4244.9	15^+	545.2 *3*	76 *6*	3699.7	14^+	(M1)	0.0859	α(K)=0.0704 *10*; α(L)=0.01184 *17*; α(M)=0.00277 *4* α(N)=0.000703 *10*; α(O)=0.0001402 *20*; α(P)=1.503×10^{-5} *22* Mult.: A_2=−0.13 *19*.
		715.2 *3*	100 *11*	3529.8	14^+			
4250.4	(15^-)	570.2 *3*	100	3680.2	(13^-)	(E2)	0.0216	α(K)=0.01580 *23*; α(L)=0.00438 *7*; α(M)=0.001078 *16* α(N)=0.000273 *4*; α(O)=5.20×10^{-5} *8*; α(P)=4.28×10^{-6} *6* Mult.: A_2=+0.2 *3*.
4294.3	(13)	473.0 *3*	100	3821.3	(12)			
4389.8?		546@	100	3843.9	(13^-)			
4409.0	(14^-)	791.9 *3*	100	3617.1	13^-			
4512.4	16^+	267.5 *3*	100 *21*	4244.9	15^+	M1+E2	0.584	α(K)=0.477 *7*; α(L)=0.0817 *12*; α(M)=0.0191 *3* α(N)=0.00486 *7*; α(O)=0.000969 *14*; α(P)=0.0001036 *15* Mult.: A_2=−0.39 *20*.
		812.8 *3*	28 *8*	3699.7	14^+			
		982.6 *3*	29 *8*	3529.8	14^+			
4533.0	16^-	602.6 *3*	100	3930.4	14^-			
4565.6	17^-	469.2 *3*	100	4096.4	15^-	E2	0.0343	α(K)=0.0238 *4*; α(L)=0.00793 *12*; α(M)=0.00198 *3* α(N)=0.000501 *7*; α(O)=9.43×10^{-5} *14*; α(P)=7.16×10^{-6} *11* Mult.: A_2=+0.16 *10*.
4780.0	(17)	616.6 *3*	100	4163.4	16^+			
4783.4	(19^-)	217.8 *3*	100	4565.6	17^-	(E2)	0.319	B(E2)(W.u.)=0.031 *5* α(K)=0.1381 *20*; α(L)=0.1354 *21*; α(M)=0.0353 *6* α(N)=0.00891 *14*; α(O)=0.001616 *25*; α(P)=8.44×10^{-5} *13* Mult.: A_2=+0.3 *3*, α(exp)=0.23 or 0.51.
4868.2	(18^+)	704.8 *3*	100	4163.4	16^+			
5084.2	(18^-)	518.6 *3*	100	4565.6	17^-	(M1)	0.0980	α(K)=0.0804 *12*; α(L)=0.01352 *19*; α(M)=0.00316 *5* α(N)=0.000803 *12*; α(O)=0.0001602 *23*; α(P)=1.717×10^{-5} *25* Mult.: A_2=−0.21 *16*.
5128.4	(20^-)	345.0 *3*	100	4783.4	(19^-)			
5435.0	(19)	655 *1*	100	4780.0	(17)			
5725.4	(21^-)	597.0 *3*	100	5128.4	(20^-)			

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Adopted Levels, Gammas (continued)

$\gamma(^{188}Pb)$ (continued)

† From $^{156}Gd(^{36}Ar,4n\gamma)$, unless otherwise stated. Mult. deduced using $\gamma(\theta)$, $\gamma\gamma(\theta)$(DCO) and ce data.
‡ Additional information 2.
# Multiply placed with intensity suitably divided.
@ Placement of transition in the level scheme is uncertain.

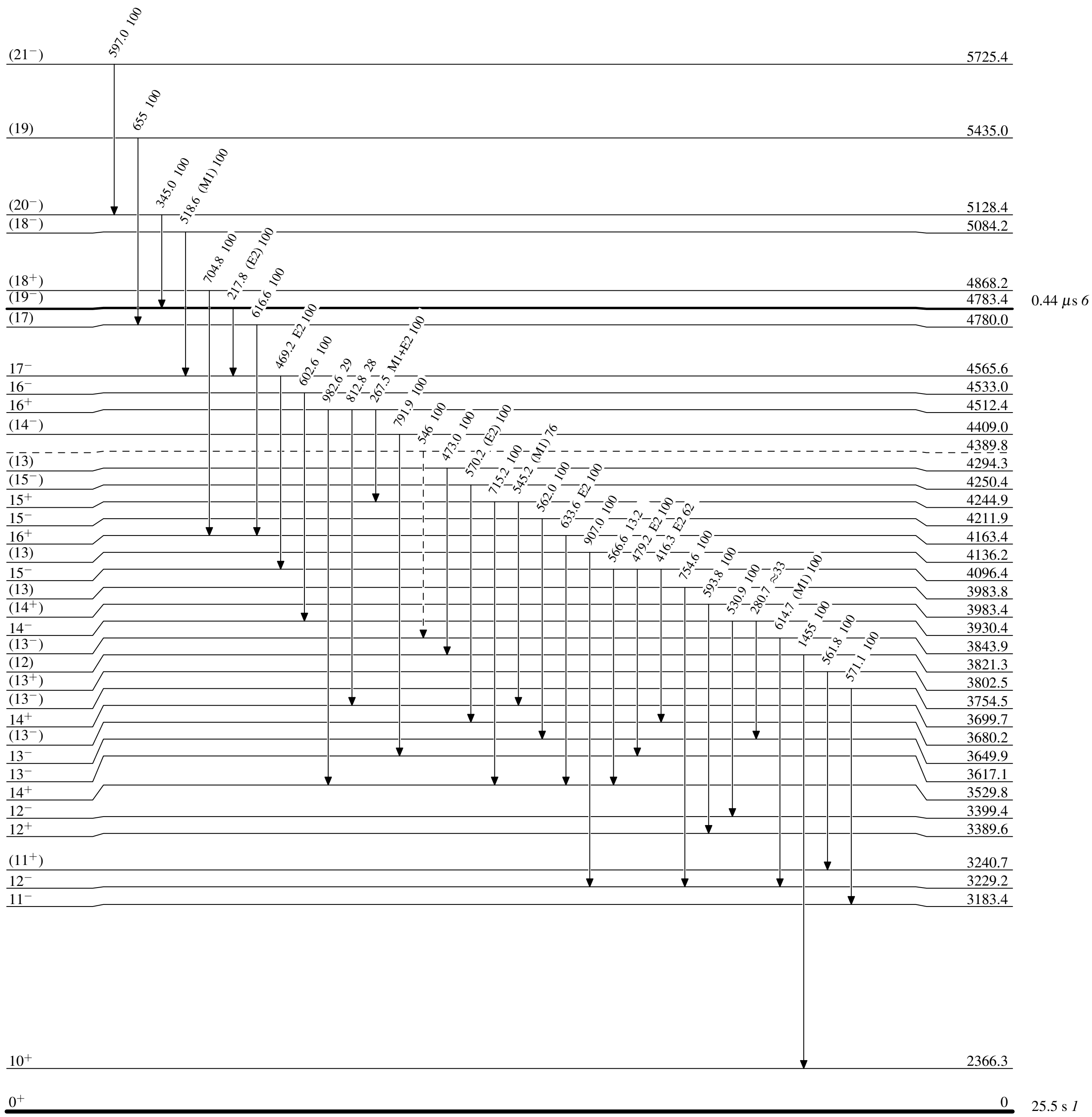
Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

Legend

γ Decay (Uncertain)



$^{188}_{82}Pb_{106}$

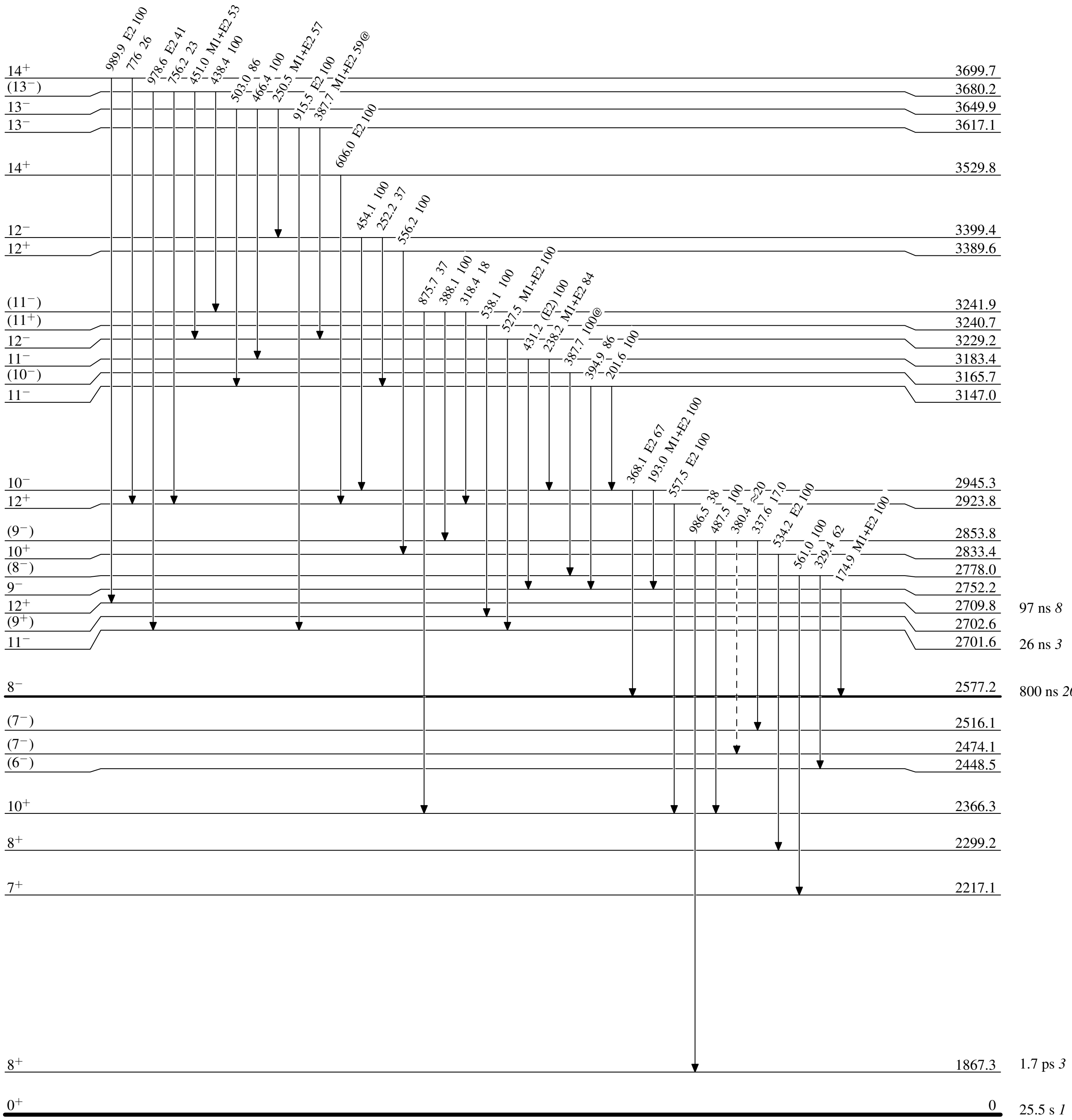
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

γ Decay (Uncertain)

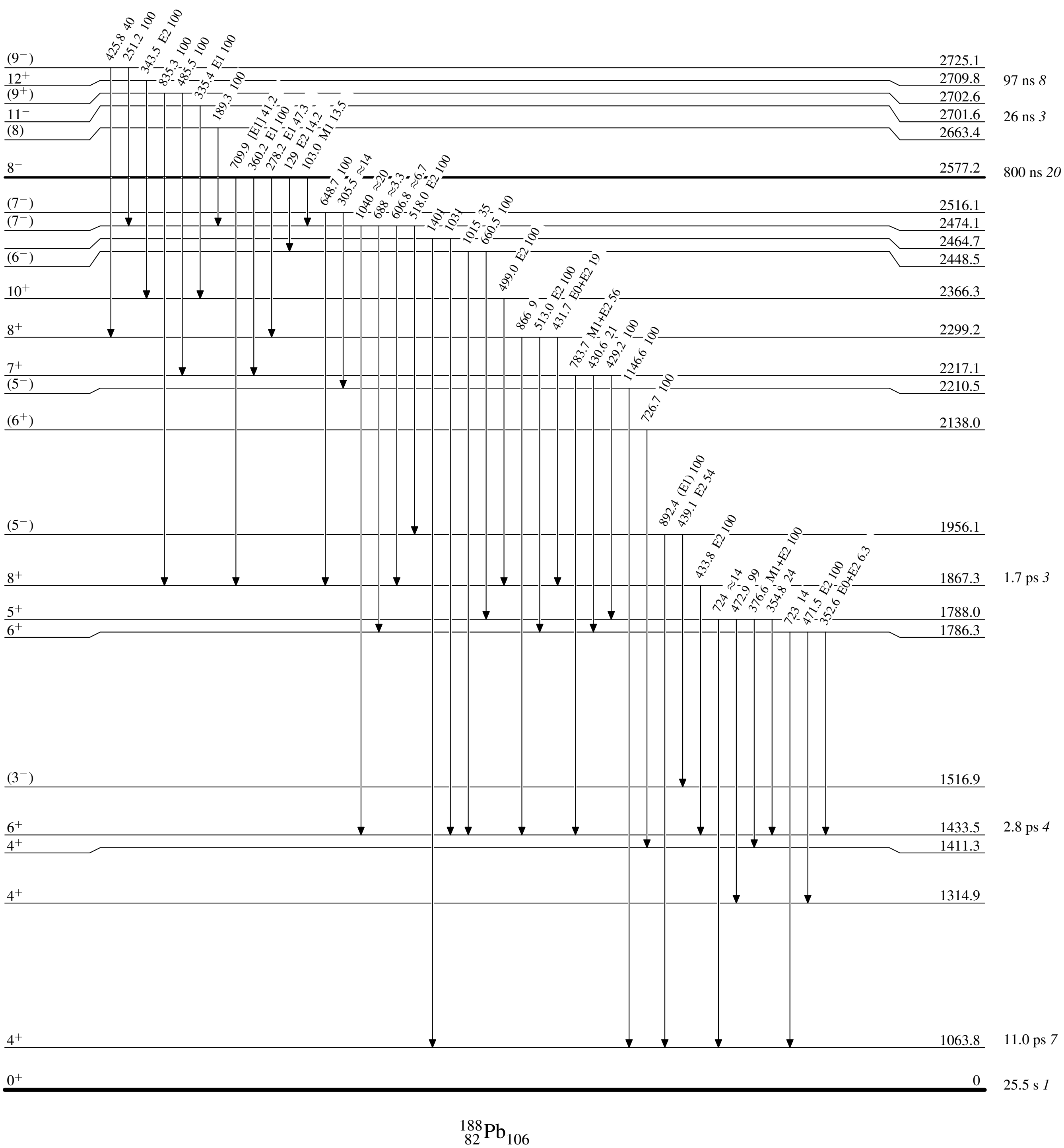


$^{188}_{82}Pb_{106}$

Adopted Levels, Gammas

Level Scheme (continued)

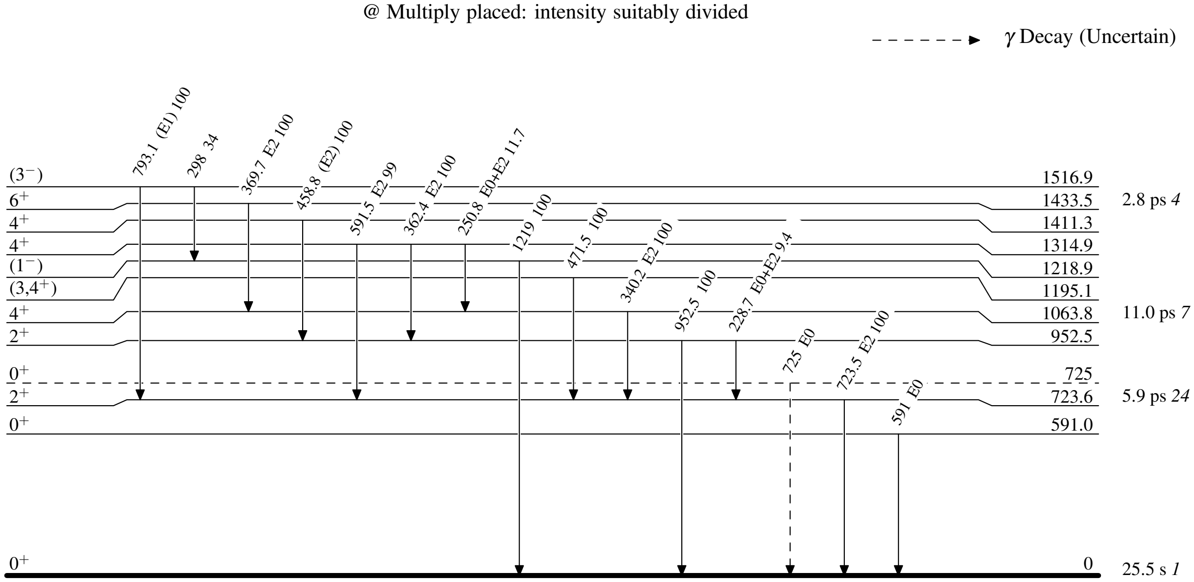
Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided



Adopted Levels, Gammas

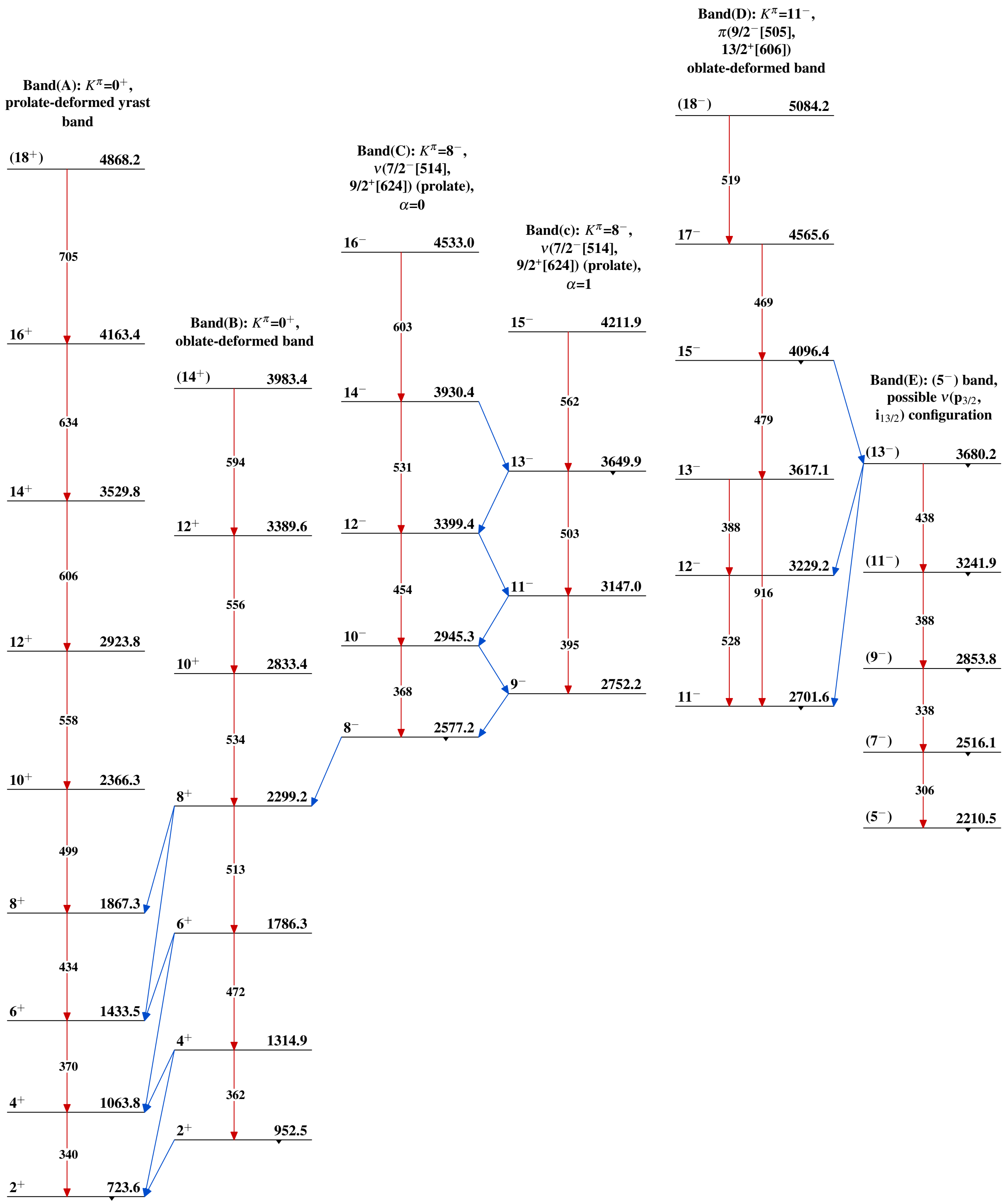
Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided



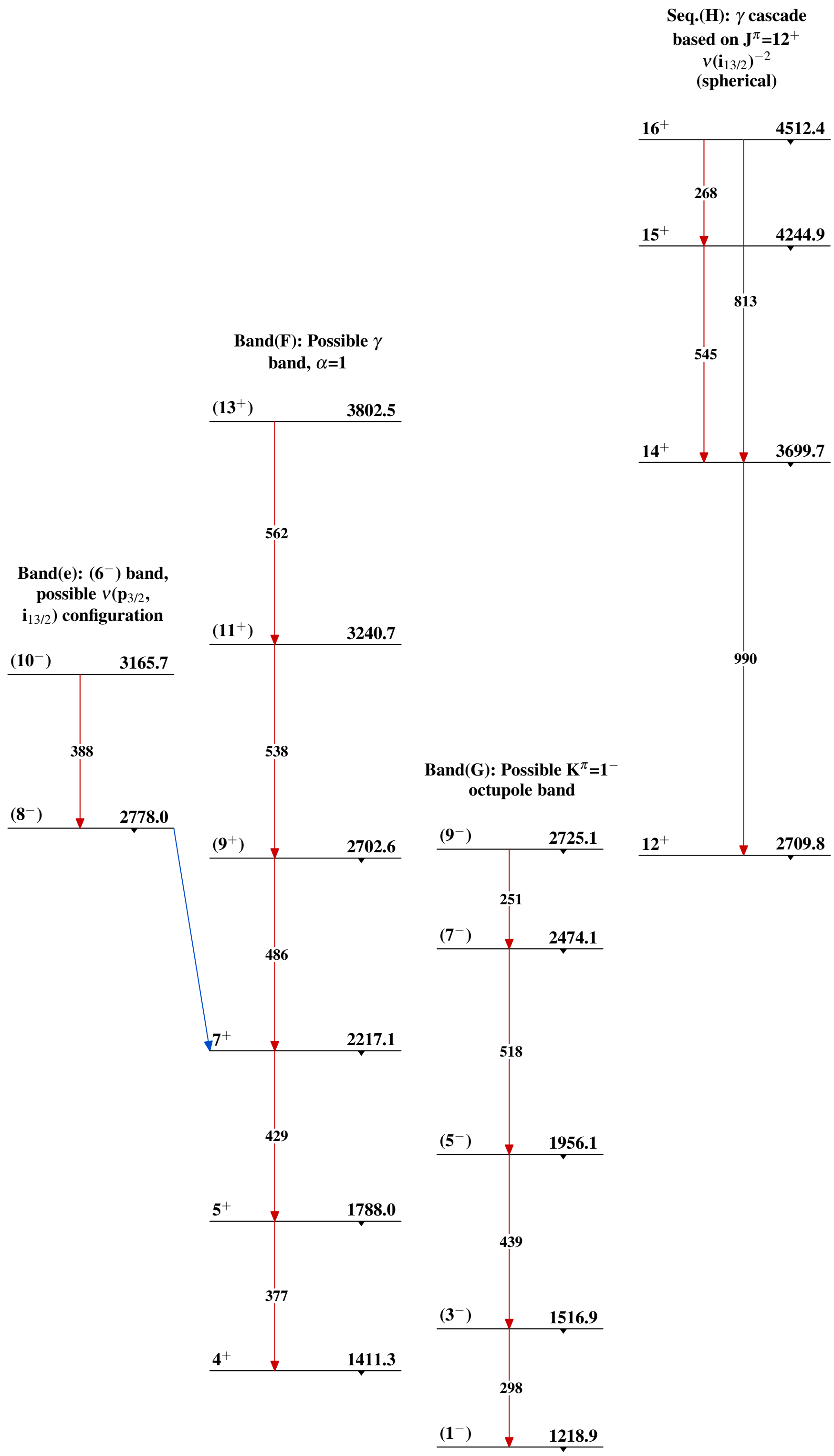
$^{188}_{82}Pb_{106}$

Adopted Levels, Gammas



$^{188}_{82}Pb_{106}$

Adopted Levels, Gammas (continued)



$^{188}_{82}Pb_{106}$