Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, E. Browne	NDS 109,2439 (2008)	31-Jul-2008

Q(β^-)=−1385 *14*; S(n)=6534.20 *23*; S(p)=6474.4 *11*; Q(α)=5255.76 *14* 2012Wa38

Note: Current evaluation has used the following Q record −1385 146534.20 *23* 6474.4 *10* 5255.75 *14* 2003Au03.

Additional information 1.

1989Ru07: Measured isotope shifts and hyperfine structure.

2004Be51: nuclear structure calculations, microscopic study of ^{240}Pu structure using mean-field approach, discussed rotational bands, superdeformation, etc.

2008Ch15: structure calculations, octupole deformation.

See '^{239}Pu(n,X):resonances' dataset in the ENSDF database for ^{240}Pu for energies and width parameters of 993 resonances up to 2.95 keV.

^{240}Pu Levels

A second fission isomer of half-life 29 ns *4* was reported by 1970El03 in ^{239}Pu(n,γ); but not confirmed in later studies of 1973Na03 and 1970Bu02.

Cross Reference (XREF) Flags

A	^{240}Np β^- decay (61.9 min)	F	^{239}Pu(n,γ) E=thermal	K	^{240}Pu(n,n′)
B	^{240}Np β^- decay (7.22 min)	G	^{239}Pu(n,γ) E=0.3-58 eV	L	^{240}Pu(d,d′)
C	^{240}Am ε decay (50.8 h)	H	^{239}Pu(n,γ) E=2 keV	M	Coulomb excitation
D	^{244}Cm α decay (18.11 y)	I	^{239}Pu(d,p)	N	^{241}Am(^{209}Bi,^{210}Poγ)
E	^{238}U(α,2nγ)	J	^{239}Pu(d,pF)	O	^{242}Pu(p,t)

E(level)†	Jπ#	$T_{1/2}$	XREF	Comments
0.0&	0+ @	6561 y *7*	ABCDEFGHI KLMNO	%α=100; %SF=5.7×10^{-6} *2* %^{34}Si<1.3×10^{-11} <r^2>$^{1/2}$=5.84 fm *4* (2004An14 evaluation). $T_{1/2}$: weighted average (using LWM method, normalized residuals and Rajeval′s technique) of 6545 y *19* (2007Ah05,α counting and ratio of activities measured in growth of ^{240}Pu in ^{244}Cm source over 37.2 y interval, half-life of 18.11 y *3* was used for ^{244}Cm decay); 6574 y *6* (1984Be19); 6571 y *9* (1984St06); 6552.2 y *20* (1984Lu04,uncertainty increased to 0.1%); 6552.4 y *17* (1984Ru04; uncertainty increased to 0.1%); 6569 y *6* (1978Ja11); 6524 y *10* (1968Oe02, re-estimated as 6537 y *15* in a 1986 evaluation report of a Coordinated Research Program (CRP) of the International Atomic Energy Agency (IAEA)). Others: 6620 y *50* (1959Do64, re-estimated as 6610 y *55* by 1978Ja11); 6600 y *100* (1956Bu92); 6300 y *600* (1954Fa11); 6760 y *27* (1951Wa54); 6240 y *120* (1951We21); 6580 y *40* (1951In03, re-estimated as 6500 y *45* by 1978Ja11). The uncertainty on the weighted average is 4 y, it has been increased to 0.1% as recommended by the 1986 CRP of IAEA for long half-lives. The DDEP evaluation (2006BeZL) gives the same value. 1989Ho24 evaluation gives 6560 y *10*. $T_{1/2}$(SF)=1.15×10^{11} y *2*, weighted average (of first six values listed below) as adopted in the DDEP evaluation (2006BeZL); 2000Ho27 evaluation adopted 1.14×10^{11} y *1*. Original measurements: 1.15×10^{11} y *2* (1991Iv01); 1.12×10^{11} y *2* (1989Dy01); 1.17×10^{11} y *3* (1988SeZY); 1.15×10^{11} y *3* (1984An25); 1.15×10^{11} y *3* (1979BuZC); 1.176×10^{11} y *25* (1967Fi13); 1.27×10^{11} y *5* (priv. comm. to 1967Fi13); 1.45×10^{11} y *2*

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Adopted Levels, Gammas (continued)

^{240}Pu Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$	XREF	Comments
				(1963Ma50); 1.340×10^{11} y *15* (1962Wa13); 1.20×10^{11} y (1959Mi90,1954Ch74); 1.225×10^{11} y *30* (1954Ba14); 1.314×10^{11} y *26* (1953Ki72). %^{34}Si decay mode: an upper limit was deduced based on an attempt to detect ^{34}Si particles from ^{240}Pu decay as described (p222) in an article by P.B. Price and S.W. Barwick in book: Particle Emission from Nuclei (editors: D.N. Poenaru and M.S. Ivascu), p255 (1989). From the same reference 2003Au02 quote %^{34}Si<1.3×10^{-13}, which seems to be the value per decay.
42.824[&] *8*	2$^+$[@]	167 ps *6*	ABCDEFGHI KLMNO	B(E2)↑=13.33 *18* (1973Be44) Jπ: E2 γ to 0$^+$. $T_{1/2}$: as adopted by 2001Ra27 from weighted average of following six values from different methods: 1. from B(E2) in Coul. ex.: 163 ps *4* (1973Be44), 173 ps *6* (1971Fo17), 168 ps *6* (1965Fr11). 2. from γγ(t) in ^{244}Cm α decay: 164 ps *5* (1970To08), 173 ps *15* (1960Be25). 3. recoil-distance Doppler-shift method in ^{244}Cm α decay: 160 ps *20* (1964No01).
141.690[&] *15*	4$^+$[@]		ABCDEF I KLMNO	B(E4)↑=1.3 *6* (1973Be44) Jπ: E2 γ to 2$^+$.
294.319[&] *24*	6$^+$[@]		ABCDE KLMN	Jπ: ΔJ=2, E2 γ to 4$^+$.
497.37[&] *20*	8$^+$[@]		DE LMN	Jπ: ΔJ=(2) γ to 6$^+$.
597.34[a] *4*	1$^-$[@]		BCD FGH KL	Jπ: E1 γ's to 0$^+$ and 2$^+$.
648.86[a] *4*	3$^-$[@]		ABCD F LM	B(E3)↑=0.41 *6* (1974Mc15) Jπ: σ(θ) in (d,d′); γ's to 2$^+$ and 4$^+$.
742.33[a] *4*	5$^-$[@]	<2 ns	A C L	Jπ: σ(θ) in (d,d′); γ's to 4$^+$ and 6$^+$. $T_{1/2}$: from ^{240}Np β$^-$ decay (61.9 min).
747.4[&] *3*	10$^+$[@]		E MN	Jπ: ΔJ=(2) γ to 8$^+$.
860.71[b] *7*	0$^+$		B D FGHI O	Jπ: L(p,t)=0.
878.1?[a] *4*	(7$^-$)[@]		M	Jπ: possible γ to 6$^+$, possible γ from 9$^-$.
900.32[b] *4*	2$^+$		BCD F HI K O	Jπ: E2 γ to 4$^+$; γ's to 0$^+$ and 4$^+$.
938.06[c] *6*	(1$^-$)		B D FGH L	XREF: D(?). Jπ: from (n,γ) E=2 keV.
958.85[c] *6*	(2$^-$)		ABC FGH	Jπ: E1 from 1$^+$ resonance level in (n,γ) E=2 keV.
992.4[b] *5*	4$^+$		C	Jπ: γ's to 3$^-$ and 5$^-$; band assignment.
1001.94[c] *8*	(3$^-$)		A C I L O	Jπ: σ(θ) in (d,d′).
1030.55[d] *4*	(3)$^+$	1.32 ns *15*	A C F	Jπ: E2 γ's to 2$^+$ and 4$^+$; band member. $T_{1/2}$: from 1976BuZP (^{240}Am ε decay).
1037.55[c] *6*	(4$^-$)		A	Jπ: (M1+E2) γ from (5$^-$); γ to 3$^-$; band member.
1041.1[&] *3*	12$^+$[@]		E MN	Jπ: ΔJ=(2) γ to 10$^+$.
1056.8[a] *3*	(9$^-$)[@]		M	Jπ: ΔJ=1 γ's to 8$^+$ and 10$^+$.
1076.22[d] *9*	(4$^+$)		A C L	Jπ: γ's to 2$^+$ and 4$^+$; band systematics.
1089.45[e] *10*	0$^+$		B HI O	Jπ: L(p,t)=0.
1115.53[c] *6*	(5$^-$)		A L	Jπ: (M1+E2) γ from (5$^-$); γ's to 4$^+$ and 6$^+$.
1130.95[e] *9*	(2$^+$)		B H	Jπ: γ's to 0$^+$ and 4$^+$.
1136.97[f] *13*	(2$^+$)		BC HI L O	XREF: L(1135)O(1137). Jπ: σ(θ) in (d,d′), (d,p) and (p,t).
1138.3?[b] *4*	(6$^+$)		M	Jπ: possible γ to 4$^+$ and from (8$^+$); possible band member.
1161.53[c] *7*	(6$^-$)		A	Jπ: (M1+E2) γ from (5$^-$); γ to 6$^+$; band member.
1177.63[f] *8*	(3$^+$)		A C	E(level): from different set of γ rays observed in the two decays:

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Adopted Levels, Gammas (continued)

^{240}Pu Levels (continued)

E(level)†	Jπ#	$T_{1/2}$	XREF	Comments
				139.9, 147.2 and 175.4 γ rays in ^{240}Np β^- decay (61.9 min); and 1036.1 and 1135.1 γ rays in ^{240}Am ε decay (50.8 h), it appears that two different levels may be populated near 1177 keV. It should be stated, however, that the gamma-ray placements do not seem to be firmly established in ^{240}Np decay.
				Jπ: γ′s to 2^+ and 4^+; band member.
1180.5 *4*	(2^+)		H	Jπ: from (n,γ) E=2 keV.
1199 *2*			L	
1222.99 *13*	(2^+)		BC Hi L o	Jπ: γ′s to 0^+ and 2^+.
1232.46[f] *10*	(4^+)		A C i o	Jπ: γ′s to 4^+ and 6^+; band member.
1240.8[g] *3*	(2^-)		B FGH	Jπ: E1 γ from 1^+; band member.
1262.08 *24*	(3^+)		C	Jπ: γ′s to 2^+ and 4^+.
1277.6[a] *3*	(11^-)@		M	Jπ: ΔJ=(2) γ to (9^-); ΔJ=1 γ to 10^+.
1282[g] *2*	(3^-)		L	Jπ: σ(θ) in (d,d′).
1308.74[h] *5*	(5^-)	165 ns *10*	A	Jπ: (M1+E2) γ to (4^-) and (6^-). $T_{1/2}$: from ^{240}Np β^- decay (61.9 min).
1321.13? *10*	$(1,2^+)$		B	Jπ: γ to 0^+.
1323.4?[b] *4*	(8^+)		M	Jπ: possible band member.
1337.02 *24*	$(2^+,3,4^+)$		C	Jπ: γ′s to 2^+ and 4^+.
1374.8[&] *4*	14^+@		E MN	Jπ: ΔJ=2 γ to 12^+.
1379 *4*			L	
1407 *3*			L	
1410.75[i] *11*	$0^{(-)}$		B F H	Jπ: π=+ assumed by 1970Sc12 from an estimate of an upper limit of α(K)exp<2.8×10^{-2} for the 813.4γ. However, from ^{239}Pu(n,γ) reaction (1975WeZA,1972OtZZ) $J^\pi=0^-$. J=0 from γγ(θ) in ^{240}Np β^- decay (7.22 min).
1413.0	$(^+)$		H	Jπ: from (n,γ) E=2 keV.
1438.45[i] *8*	$2^{(-)}$		B GH	Jπ: 1970Sc12 assumed that this level has $J^\pi=2^+$ and is member of a two-phonon octupole vibrational band. However, from ^{239}Pu(n,γ) reaction (1975WeZA,1972OtZZ) π=−. J=2 from γγ(θ) in ^{240}Np β^- decay (7.22 min).
1488.17 *7*	$(1,2^+)$		B F H	Jπ: γ to 0^+.
1525.86[j] *8*	(0^+)		B H	Jπ: M1 γ from 1^+ resonance in (n,γ); possible band member.
1539.67 *6*	(1^-)		B H	XREF: H(1538). Jπ: E1 γ from 1^+; γ′s to 0^+ and 2^+.
1539.8[a] *4*	(13^-)@		M	Jπ: ΔJ=1 γ to 12^+; ΔJ=(2) γ to (11^-).
1557.0[b] *3*	(10^+)		M	Jπ: ΔJ=1 γ to (9^-); possible γ to (11^-).
1558.87[j] *5*	(2^+)		B H	Jπ: γ′s to 0^+ and 4^+.
1574			L	
1580 *5*			O	
1607.72 *13*	(1^-)		B H L	XREF: L(1609). Jπ: E1 γ from 1^+ resonance level is M1; γ to 0^+.
1626.77 *15*	$(1,2^+)$		B H	Jπ: γ to 0^+.
1633.37 *7*	$(1,2^+)$		B H	Jπ: γ to 0^+.
1641 *5*			L	
1675 *2*			L	
1710.43 *8*	(2^+)		B H	Jπ: γ′s to 0^+ and 4^+.
1745.7[&] *4*	16^+@		MN	Jπ: ΔJ=(2) γ to 14^+.
1752 *3*			L	
1775.27 *15*	(1^-)		B F H	Jπ: from (n,γ) E=2 keV.
1784 *3*			L	
1796.34 *13*	$(1,2^+)$		B H	Jπ: γ to 0^+.

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Adopted Levels, Gammas (continued)

^{240}Pu Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$	XREF	Comments
1808.02 *13*	(1⁻,2⁺)		B	Jπ: γ's to 0⁺ and 3⁻.
1830.3[b] *4*	(12⁺)		M	Jπ: ΔJ=1 γ to (11⁻); ΔJ=2 γ to (10⁺).
1841.8[a] *4*	(15⁻)[@]		M	Jπ: ΔJ=2 γ to (13⁻); γ to 14⁺.
1861 *3*			L	
1881.1	(0,1,2)		F	Jπ: primary γ from 1⁺.
1902 *3*			L	
1917.8 *3*	(1⁻)		B H L	XREF: L(1923). Jπ: from (n,γ) E=2 keV.
1954.51 *8*	(2⁺)		B	Jπ: γ's to 0⁺ and 4⁺.
1996.41 *17*	(1,2⁺)		B	Jπ: γ's to 0⁺.
2117.5 *10*	(1,2⁺)		B	Jπ: γ to 0⁺.
2127.4	(⁻)		H	Jπ: from (n,γ) E=2 keV.
2136.8[b] *4*	(14⁺)		M	Jπ: ΔJ=1 γ to (13⁻); ΔJ=2 γ to (12⁺).
2151.6[&] *5*	18⁺[@]		MN	Jπ: ΔJ=(2) γ to 16⁺.
2182.6[a] *4*	(17⁻)[@]		M	Jπ: ΔJ=(2) γ to (15⁻); γ to 16⁺.
2475.1[b] *4*	(16⁺)		M	Jπ: ΔJ=1 γ to (15⁻); ΔJ=2 γ to (14⁺).
2560.5[a] *5*	(19⁻)[@]		M	Jπ: ΔJ=(2) γ to (17⁻); γ to 18⁺.
2590.2[&] *5*	20⁺[@]		MN	Jπ: ΔJ=(2) γ to 18⁺.
2837.1[b] *5*	(18⁺)		M	Jπ: ΔJ=2 γ to (16⁺); γ to (17⁻).
2973.8[a] *5*	(21⁻)[@]		M	Jπ: ΔJ=(2) γ to (19⁻); γ to 20⁺.
3059.8[&] *6*	22⁺[@]		MN	Jπ: ΔJ=(2) γ to 20⁺.
3218.3[b] *5*	(20⁺)		M	Jπ: ΔJ=2 γ to (18⁺); γ to (19⁻).
3421.1[a] *6*	(23⁻)[@]		M	Jπ: ΔJ=(2) γ to (21⁻); γ to 22⁺.
3559.0[&] *6*	24⁺[@]		MN	Jπ: ΔJ=2 γ to 22⁺.
3626.6[b] *6*	(22⁺)		M	Jπ: γ's to (20⁺) and (21⁻).
3900.6[a] *6*	(25⁻)[@]		M	Jπ: ΔJ=2 γ to (23⁻); γ to 24⁺.
4063.5[b] *8*	(24⁺)		M	Jπ: γ (22⁺).
4086.3[&] *6*	26⁺[@]		M	Jπ: ΔJ=(2) γ to 24⁺.
4410.8[a] *6*	(27⁻)[@]		M	Jπ: ΔJ=2 γ to (23⁻); γ to 26⁺.
4530.9[b] *9*	(26⁺)		M	Jπ: γ (24⁺).
4639.4[&] *7*	28⁺[@]		M	Jπ: γ's to 26⁺ and 27⁻.
4950.0[a] *7*	(29⁻)[@]		M	Jπ: γ to (27⁻), possible γ to 28⁺.
5030.0[b] *10*	(28⁺)		M	Jπ: γ (26⁺).
5220.3[&] *7*	30⁺[@]		M	Jπ: γ's to 28⁺ and 29⁻.
5512.2[a] *8*	(31⁻)[@]		M	Jπ: γ to (29⁻).
5559.2[b] *12*	(30⁺)		M	Jπ: γ (28⁺).
5819.3[&] *8*	32⁺[@]		M	Jπ: γ to 30⁺.
6096.3?[a] *9*	(33⁻)[@]		M	Jπ: possible γ to (31⁻).
x[k]	(0⁺)	3.6 ns *2*	E	%SF>0 %SF: Only SF decay observed. E(level): x=2250 *200*, deduced from the level density of $K^\pi=0^+$ bandheads in ^{239}Pu(d,pF) (2001Hu12,2001Th16). Other: 2800 *200* (estimate by 1971Br39,1970Bu02,1973Na03). Fission isomer observed in ^{238}U(α,2n); ^{239}Pu(n,γ) and ^{239}Pu(d,p). $T_{1/2}$: weighted average of 3.8 ns +6−4 (1986De04); 3.5 ns 2 (1978Go10); 3.0 ns 5 (1973Li01); 2.4 ns 5 (1973Na03); 3.8 ns 3 (1971Br39,1970Bu02); 4.6 ns 6 (1970El03,1969El06), 4.4 ns 8 (1969VaZX); 7 ns *2* (1969Me11); 9 ns *4* (1969La14). Others: 1972Ga42, 1970Vi05, 1968Pa16.
20.1+x[k]	(2⁺)		E	
66.8+x[k]	(4⁺)		E	

Adopted Levels, Gammas (continued)

^{240}Pu Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$	XREF	Comments
139.9+x[k]	(6+)		E	
239.2+x[k]	(8+)		E	
364.5+x?[‡k]	(10+)		E	
516.9+x?[k]	(12+)		E	
554.7+x[o]	(1−)		E	
589.7+x[o]	(3−)		E	
769.9+x[p] *10*	(0+)		E	
785.1+x[p] *11*	(2+)		E	
806.2+x[l] *1*	(2−)		E	
825.0+x[p] *11*	(4+)		E	
825.6+x[l] *2*	(3−)		E	
836.0+x[m] *5*	(1−)		E	
846.8+x[m] *3*	(2−)		E	
851.1+x[l] *4*	(4−)		E	
866.0+x[m] *10*	(3−)		E	
882.8+x[l] *6*	(5−)		E	
891.2+x[m] *3*	(4−)		E	
892.4+x[p] *12*	(6+)		E	
918.8+x[m] *3*	(5−)		E	
920.7+x[l] *12*	(6−)		E	
936.4+x?[s]	(1−)		E	
952.5+x?[s]	(2−)		E	
960.7+x[m] *2*	(6−)		E	
966.5+x[l] *13*	(7−)		E	
970.6+x?[s]	(3−)		E	
986.8+x[p] *13*	(8+)		E	
998.3+x[m] *7*	(7−)		E	
1012.2+x?[s]	(4−)		E	
1019+x?[l]	(8−)		E	
1044.0+x?[s]	(5−)		E	
1054.9+x[m] *5*	(8−)		E	
1078+x?[l]	(9−)		E	
1104+x?[m]	(9−)		E	
1104.2+x?[p]	(10+)		E	
1109.0+x?[s]	(6−)		E	
1161.5+x?[s]	(7−)		E	
1172+x?[m]	(10−)		E	
1230.4+x?[s]	(8−)		E	
1232+x?[m]	(11−)		E	
1246.5+x?[t]	(1−)		E	
1261.0+x?[t]	(2−)		E	
1287.0+x?[t]	(3−)		E	
1300.9+x?[s]	(9−)		E	
1322.0+x?[t]	(4−)		E	
1344.5+x?[n]	(1−)		E	
1360.9+x[n] *2*	(2−)		E	
1366.5+x?[t]	(6−)		E	
1382.9+x?[s]	(10−)		E	
1386.6+x[n] *3*	(3−)		E	
1421.0+x?[t]	(6−)		E	
1421.4+x[n] *6*	(4−)		E	
1461.8+x?[s]	(11−)		E	
1465.7+x[n] *6*	(5−)		E	
1485.5+x?[t]	(7−)		E	

Adopted Levels, Gammas (continued)

^{240}Pu Levels (continued)

E(level)[†]	Jπ[#]	$T_{1/2}$	XREF	Comments
1518.7+x[n] *13*	(6⁻)		E	
1559.0+x?[t]	(8⁻)		E	
1580.5+x[n] *14*	(7⁻)		E	
1641.5+x?[t]	(9⁻)		E	
1654.7+x?[n]	(8⁻)		E	
1732+x?[n]	(9⁻)		E	
1733.5+x?[t]	(10⁻)		E	
1816+x?[n]	(10⁻)		E	
1835.0+x?[t]	(11⁻)		E	
1910.0+x?[n]	(11⁻)		E	
2011.0+x?[n]	(12⁻)		E	
2184+x[q]	(0⁺)		J	
2276+x[q]	(0⁺)		J	
2375+x[q]	(0⁺)		J	
2435+x[q]	(0⁺)		J	
2453+x[q]	(0⁺)		J	
2483+x[q]	(0⁺)		J	

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Adopted Levels, Gammas (continued)

^{240}Pu Levels (continued)

E(level)†	Jπ#	XREF	E(level)†	Jπ#	XREF	E(level)†	Jπ#	XREF
						769.9+x[p] *10*	(0+)	E
						785.1+x[p] *11*	(2+)	E
						806.2+x[l] *1*	(2−)	E
						825.0+x[p] *11*	(4+)	E
						825.6+x[l] *2*	(3−)	E
						836.0+x[m] *5*	(1−)	E
						846.8+x[m] *3*	(2−)	E
						851.1+x[l] *4*	(4−)	E
						866.0+x[m] *10*	(3−)	E
						882.8+x[l] *6*	(5−)	E
						891.2+x[m] *3*	(4−)	E
						892.4+x[p] *12*	(6+)	E
						918.8+x[m] *3*	(5−)	E
						920.7+x[l] *12*	(6−)	E
						936.4+x?[s]	(1−)	E
						952.5+x?[s]	(2−)	E
						960.7+x[m] *2*	(6−)	E
						966.5+x[l] *13*	(7−)	E
						970.6+x?[s]	(3−)	E
						986.8+x[p] *13*	(8+)	E
						998.3+x[m] *7*	(7−)	E
						1012.2+x?[s]	(4−)	E
						1019+x?[l]	(8−)	E
						1044.0+x?[s]	(5−)	E
						1054.9+x[m] *5*	(8−)	E
						1078+x?[l]	(9−)	E
						1104+x?[m]	(9−)	E
						1104.2+x?[p]	(10+)	E
						1109.0+x?[s]	(6−)	E
						1161.5+x?[s]	(7−)	E
						1172+x?[m]	(10−)	E
						1230.4+x?[s]	(8−)	E
						1232+x?[m]	(11−)	E
						1246.5+x?[t]	(1−)	E
						1261.0+x?[t]	(2−)	E
						1287.0+x?[t]	(3−)	E
						1300.9+x?[s]	(9−)	E
						1322.0+x?[t]	(4−)	E
						1344.5+x?[n]	(1−)	E
						1360.9+x[n] *2*	(2−)	E
						1366.5+x?[t]	(6−)	E
						1382.9+x?[s]	(10−)	E
						1386.6+x[n] *3*	(3−)	E
						1421.0+x?[t]	(6−)	E
						1421.4+x[n] *6*	(4−)	E
						1461.8+x?[s]	(11−)	E
						1465.7+x[n] *6*	(5−)	E
						1485.5+x?[t]	(7−)	E
						1518.7+x[n] *13*	(6−)	E
						1559.0+x?[t]	(8−)	E
						1580.5+x[n] *14*	(7−)	E
						1641.5+x?[t]	(9−)	E
						1654.7+x?[n]	(8−)	E
						1732+x?[n]	(9−)	E
						1733.5+x?[t]	(10−)	E

Adopted Levels, Gammas (continued)

^{240}Pu Levels (continued)

E(level)†	Jπ#	XREF	E(level)†	Jπ#	XREF	E(level)†	Jπ#	XREF
						1816+x?[n]	(10⁻)	E
						1835.0+x?[t]	(11⁻)	E
						1910.0+x?[n]	(11⁻)	E
						2011.0+x?[n]	(12⁻)	E
						2184+x[q]	(0⁺)	J
						2276+x[q]	(0⁺)	J
						2375+x[q]	(0⁺)	J
						2435+x[q]	(0⁺)	J
						2453+x[q]	(0⁺)	J
						2483+x[q]	(0⁺)	J
						2800+x[r]	(0⁺)	J

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{240}Pu Levels (continued)

† From least-squares fit to Eγ's.
‡ Extrapolated from moment of inertia plot for the band (2001Ga05).
# For $K^\pi=0^+$ ground-state, $K^\pi=0^-$ octupole band and $K^\pi=0^+$ band based on 860.7 level, band associations are also used as arguments for J^π assignments in addition to other arguments as listed. For SD bands, the assignments are as proposed by 2001Ga05 and 2000Pa40, with parentheses added by the evaluators due to lack of firm arguments for these assignments.
@ From fit to the bands for lower members of the bands. Above 14^+ in the g.s. band and above 5^- in $K^\pi=0^-$ band, the assignments are from Coulomb excitation work of 1998Ha08 with parentheses added by the evaluators.
& Band(A): $K^\pi=0^+$ g.s. band. A=7.16, B=−0.0038.
a Band(B): $K^\pi=0^-$ octupole band. Band from 1998Ha08 AND 2007WaZV. A=5.135, B=0.0013.
b Band(C): $K^\pi=0^+$ band. This band starts out as β vibrational band, at $\hbar\omega\approx0.2$ MeV, it is crossed by a 2-quasiparticle (possibly neutrons) excitation (2007WaZV). A=6.60, B=−0.0007.
c Band(D): $K^\pi=1^-$ band. A=6.42, B=−0.0035 for odd spin; A=5.6, B=0.0005 for even spin.
d Band(E): $K^\pi=3^+$,ν1/2[631]+ν5/2[622]. A=5.7 if B=0.
e Band(F): $K^\pi=0^+$ band.
f Band(G): $K^\pi=2^+$ band.
g Band(H): $K^\pi=2^-$ band.
h Band(I): $K^\pi=5^-$, π5/2[642]+π5/2[523].
i Band(J): $K^\pi=0^-$, π5/2[642]-π5/2[523].
j Band(K): $K^\pi=0^+$ band.
k Band(L): SD-1 Band, $K^\pi=0^+$. Band from 2000Pa40, 2001Ga05, 2001Th16. Ground-state band in the second minimum. Population intensity 13% (2001Th16).
l Band(M): SD-2 Band, $K^\pi=2^-$. Band from 2000Pa40, 2001Ga05, 2001Th16. Population intensity=41%.
m Band(N): SD-3 Band, $K^\pi=1^-$. Band from 2000Pa40, 2001Ga05, 2001Th16. Population intensity=15%.
n Band(O): SD-4 Band, $K^\pi=1^-$. Band from 2000Pa40, 2001Ga05, 2001Th16. Population intensity=20%.
o Band(P): SD-5 Band, $K^\pi=0^-$ octupole band. Band from 2000Pa40, 2001Ga05, 2001Th16. Population intensity=3%.
p Band(Q): SD-6 band, $K^\pi=0^+$ β band. Band from 2001Ga05, 2001Th16. Population intensity=1.7%.
q Band(R): $K^\pi=0^+$ SD bandheads. Bandheads attributed to 3-phonon β-vibrations (2001Hu12). X=2250 *200*.
r Band(S): $K^\pi=0^+$ SD bandheads. Bandheads attributed to 4-phonon β-vibrations. This structure may be composed of 13 separate rotational bands (2001Hu12); x=2250 *200*.
s Band(T): SD-7 band, $K^\pi=1^-$. Tentative band assignment from 2001Th16. Population intensity 1%.
t Band(U): SD-8 band, $K^\pi=1^-$. Tentative band assignment from 2001Th16. Population intensity 6%.

Adopted Levels, Gammas (continued)

$\gamma(^{240}Pu)$

A γ-ray cascade reported in Coulomb excitation (2007WaZV): 303.5-340.3-370.7-405.8-437.5-466.8 possibly belongs to ^{240}Pu.

E_i(level)	J_i^π	E_γ[‡]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ	α[h]	$I_{(\gamma+ce)}$	Comments
42.824	2^+	42.824[@] *8*	100	0.0	0^+	E2		906		B(E2)(W.u.)=287 *11* α(L)=658 *10*; α(M)=183 *3*; α(N+..)=64.1 *9* α(N)=50.4 *7*; α(O)=11.84 *17*; α(P)=1.85 *3*; α(Q)=0.00390 *6* Mult.: from ^{240}Am ε decay, ^{244}Cm α decay.
141.690	4^+	98.860[@] *13*	100	42.824	2^+	E2		16.65		α(L)=12.08 *17*; α(M)=3.38 *5*; α(N+..)=1.185 *17* α(N)=0.930 *13*; α(O)=0.219 *3*; α(P)=0.0349 *5*; α(Q)=0.0001222 *18* Mult.: from ^{240}Am ε decay.
294.319	6^+	152.630[@] *20*	100	141.690	4^+	E2		2.49		α(K)=0.196 *3*; α(L)=1.665 *24*; α(M)=0.465 *7*; α(N+..)=0.1629 *23* α(N)=0.1278 *18*; α(O)=0.0302 *5*; α(P)=0.00488 *7*; α(Q)=2.76×10^{-5} *4*
497.37	8^+	203.1 *2*	100	294.319	6^+	(E2)[d]		0.807		α(K)=0.1471 *21*; α(L)=0.480 *7*; α(M)=0.1332 *20*; α(N+..)=0.0467 *7* α(N)=0.0366 *6*; α(O)=0.00867 *13*; α(P)=0.001419 *21*; α(Q)=1.201×10^{-5} *18*
597.34	1^-	554.60 *7*	100	42.824	2^+	E1[c]		0.01179		α(K)=0.00949 *14*; α(L)=0.001734 *25*; α(M)=0.000417 *6*; α(N+..)=0.0001458 *21* α(N)=0.0001126 *16*; α(O)=2.77×10^{-5} *4*; α(P)=5.13×10^{-6} *8*; α(Q)=2.99×10^{-7} *5*
		597.40 *7*	61 *2*	0.0	0^+	E1[c]		0.01024		α(K)=0.00826 *12*; α(L)=0.001495 *21*; α(M)=0.000359 *5*; α(N+..)=0.0001256 *18* α(N)=9.70×10^{-5} *14*; α(O)=2.39×10^{-5} *4*; α(P)=4.43×10^{-6} *7*; α(Q)=2.62×10^{-7} *4*
648.86	3^-	507.20 *10*	100	141.690	4^+					
		606.10 *7*	97 *5*	42.824	2^+					
742.33	5^-	448.01[&] *6*	67 *3*	294.319	6^+	[E1]		0.0179		B(E1)(W.u.)>0.39×10^{-6} α(K)=0.01433 *20*; α(L)=0.00269 *4*; α(M)=0.000648 *9*; α(N+..)=0.000227 *4* α(N)=0.0001753 *25*; α(O)=4.31×10^{-5} *6*; α(P)=7.90×10^{-6} *11*; α(Q)=4.45×10^{-7} *7*
		600.57[&] *6*	100 *5*	141.690	4^+	[E1]		0.01013		B(E1)(W.u.)>0.24×10^{-6} α(K)=0.00818 *12*; α(L)=0.001480 *21*; α(M)=0.000355 *5*; α(N+..)=0.0001243 *18* α(N)=9.60×10^{-5} *14*; α(O)=2.37×10^{-5} *4*; α(P)=4.38×10^{-6} *7*; α(Q)=2.59×10^{-7} *4*
747.4	10^+	250.2 *2*	100	497.37	8^+	(E2)[d]		0.383		α(K)=0.1059 *15*; α(L)=0.202 *3*; α(M)=0.0556 *8*; α(N+..)=0.0195 *3* α(N)=0.01527 *22*; α(O)=0.00363 *6*; α(P)=0.000600 *9*; α(Q)=6.92×10^{-6} *10*
860.71	0^+	263.37 *7*	89 *2*	597.34	1^-	[E1]		0.0550		α(K)=0.0433 *6*; α(L)=0.00881 *13*; α(M)=0.00214 *3*;

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Adopted Levels, Gammas (continued)

γ(^{240}Pu) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[†]	E_f	J_f^π	Mult.[#]	α[h]	$I_{(\gamma+ce)}$	Comments
									α(N+..)=0.000745 *11* α(N)=0.000578 *9*; α(O)=0.0001409 *20*; α(P)=2.52×10^{-5} *4*; α(Q)=1.277×10^{-6} *18*
860.71	0$^+$	817.89 *10*	100	42.824	2$^+$	E2[c]	0.0183		α(K)=0.01302 *19*; α(L)=0.00389 *6*; α(M)=0.000990 *14*; α(N+..)=0.000348 *5* α(N)=0.000270 *4*; α(O)=6.59×10^{-5} *10*; α(P)=1.194×10^{-5} *17*; α(Q)=5.27×10^{-7} *8*
		860.7		0.0	0$^+$	E0		15 *4*	q^2_K(E0/E2)=7 *3*, X(E0/E2)=0.048 *16* (2005Ki02 evaluation). Mult.: from ^{244}Cm α decay.
878.1?	(7$^-$)	583.7[j] *4*		294.319	6$^+$				
900.32	2$^+$	251.47 *7*	73 *3*	648.86	3$^-$	[E1]	0.0610		α(K)=0.0480 *7*; α(L)=0.00983 *14*; α(M)=0.00239 *4*; α(N+..)=0.000832 *12* α(N)=0.000645 *9*; α(O)=0.0001571 *22*; α(P)=2.81×10^{-5} *4*; α(Q)=1.406×10^{-6} *20*
		302.98 *7*	85 *3*	597.34	1$^-$	[E1]	0.0405		α(K)=0.0320 *5*; α(L)=0.00637 *9*; α(M)=0.001543 *22*; α(N+..)=0.000538 *8* α(N)=0.000417 *6*; α(O)=0.0001018 *15*; α(P)=1.84×10^{-5} *3*; α(Q)=9.59×10^{-7} *14*
		758.61 *8*	100 *3*	141.690	4$^+$	E2[c]	0.0212		α(K)=0.01484 *21*; α(L)=0.00474 *7*; α(M)=0.001212 *17*; α(N+..)=0.000427 *6* α(N)=0.000331 *5*; α(O)=8.06×10^{-5} *12*; α(P)=1.453×10^{-5} *21*; α(Q)=6.09×10^{-7} *9*
		857.48 *10*	42 *2*	42.824	2$^+$	[M1,E2]	0.04 *3*		α(K)=0.034 *22*; α(L)=0.007 *4*; α(M)=0.0017 *9*; α(N+..)=0.0006 *3* α(N)=0.00047 *24*; α(O)=0.00012 *6*; α(P)=2.2×10^{-5} *12*; α(Q)=1.3×10^{-6} *9*
		900.37 *10*	14 *2*	0.0	0$^+$	[E2]	0.01512		α(K)=0.01103 *16*; α(L)=0.00305 *5*; α(M)=0.000771 *11*; α(N+..)=0.000272 *4* α(N)=0.000210 *3*; α(O)=5.14×10^{-5} *8*; α(P)=9.38×10^{-6} *14*; α(Q)=4.39×10^{-7} *7*
938.06	(1$^-$)	289.21 *10*	1.4 *3*	648.86	3$^-$				
		340.70 *10*	5.0 *5*	597.34	1$^-$				
		895.30 *10*	5 *1*	42.824	2$^+$				
		938.02 *10*	100 *4*	0.0	0$^+$				
958.85	(2$^-$)	309.99 *9*	4.3 *4*	648.86	3$^-$				
		361.55 *10*	3.5 *6*	597.34	1$^-$				
		915.98 *9*	100 *3*	42.824	2$^+$				
992.4	4$^+$	249.7[a] *10*	41 *6*	742.33	5$^-$	[E1]	0.0620 *11*		α(K)=0.0487 *8*; α(L)=0.01000 *17*; α(M)=0.00243 *5*; α(N+..)=0.000846 *15* α(N)=0.000656 *12*; α(O)=0.000160 *3*; α(P)=2.85×10^{-5} *5*; α(Q)=1.427×10^{-6} *24*
		343.7[a] *10*	100 *10*	648.86	3$^-$	[E1]	0.0309		α(K)=0.0245 *4*; α(L)=0.00479 *8*; α(M)=0.001158 *18*; α(N+..)=0.000404

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Adopted Levels, Gammas (continued)

γ(^{240}Pu) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ	α[h]	Comments
									7 α(N)=0.000313 *5*; α(O)=7.66×10^{-5} *12*; α(P)=1.390×10^{-5} *22*; α(Q)=7.44×10^{-7} *12*
992.4	4$^+$	697.8[a]	71 *16*	294.319	6$^+$				
1001.94	(3$^-$)	959.1[&] *1*	100	42.824	2$^+$				
1030.55	(3)$^+$	382.1[j] *10*	0.072 *7*	648.86	3$^-$	[E1]		0.0247	α(K)=0.0197 *3*; α(L)=0.00379 *6*; α(M)=0.000915 *14*; α(N+..)=0.000319 *5* α(N)=0.000247 *4*; α(O)=6.06×10^{-5} *10*; α(P)=1.105×10^{-5} *17*; α(Q)=6.04×10^{-7} *9*
		888.85[a] *5*	34.2 *7*	141.690	4$^+$	E2		0.01550	B(E2)(W.u.)=2.2×10^{-3} *3* α(K)=0.01127 *16*; α(L)=0.00315 *5*; α(M)=0.000797 *12*; α(N+..)=0.000281 *4* α(N)=0.000217 *3*; α(O)=5.31×10^{-5} *8*; α(P)=9.68×10^{-6} *14*; α(Q)=4.49×10^{-7} *7* Mult.: from ^{240}Am ε decay.
		987.79[a] *6*	100.0 *10*	42.824	2$^+$	E2(+M1)	>10	0.0128 *3*	B(E2)(W.u.)=3.8×10^{-3} *5* α(N)=0.000168 *3*; α(O)=4.13×10^{-5} *7*; α(P)=7.57×10^{-6} *13*; α(Q)=3.74×10^{-7} *8* Mult.: from ^{240}Am ε decay.
1037.55	(4$^-$)	295.20[&] *10*	3.2 *4*	742.33	5$^-$				
		388.70[&] *10*	6.6 *5*	648.86	3$^-$				
		895.80[&] *10*	100 *5*	141.690	4$^+$				
1041.1	12$^+$	293.8 *2*	100	747.4	10$^+$	(E2)[d]		0.226	α(K)=0.0802 *12*; α(L)=0.1063 *16*; α(M)=0.0291 *5*; α(N+..)=0.01022 *15* α(N)=0.00800 *12*; α(O)=0.00190 *3*; α(P)=0.000319 *5*; α(Q)=4.65×10^{-6} *7*
1056.8	(9$^-$)	178.4[j] *4*		878.1?	(7$^-$)				
		309.4 *3*	36 *36*	747.4	10$^+$	D[d]			
		559.2 *3*	100 *71*	497.37	8$^+$	D[d]			
1076.22	(4$^+$)	934.50[&] *10*	100 *12*	141.690	4$^+$				
		1033.50[&] *20*	40 *4*	42.824	2$^+$				
1089.45	0$^+$	1046.62 *10*	100	42.824	2$^+$				
1115.53	(5$^-$)	466.70[&] *10*	4.5 *4*	648.86	3$^-$				
		821.20[&] *10*	4.5 *4*	294.319	6$^+$				
		973.90[&] *10*	100 *5*	141.690	4$^+$				
1130.95	(2$^+$)	989.20 *10*	100 *7*	141.690	4$^+$				E_γ: poor fit. Level-energy difference=990.26.

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Adopted Levels, Gammas (continued)

γ(^{240}Pu) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[†]	E_f	J_f^π	Mult.[#]	α[h]	Comments
1130.95	(2$^+$)	1088.30 *20*	39 *4*	42.824	2$^+$			
		1131.00 *20*	75 *6*	0.0	0$^+$			
1136.97	(2$^+$)	1094.20 *20*	100 *15*	42.824	2$^+$			
		1137.0 *4*	67 *10*	0.0	0$^+$			
1138.3?	(6$^+$)	145.8[j] *4*		992.4	4$^+$			
1161.53	(6$^-$)	419.20[&] *10*	9.8 *8*	742.33	5$^-$			
		867.20[&] *10*	100 *6*	294.319	6$^+$			
1177.63	(3$^+$)	139.90[&] *10*		1037.55	(4$^-$)			
		147.2[ig] *1*		1030.55	(3)$^+$			
		175.40[&j] *10*		1001.94	(3$^-$)			
		1036.1[a] *3*	33 *4*	141.690	4$^+$			
		1135.1[a] *3*	100 *6*	42.824	2$^+$			
1222.99	(2$^+$)	1180.20 *20*	100 *8*	42.824	2$^+$			
		1223.00 *20*	80 *12*	0.0	0$^+$			
1232.46	(4$^+$)	938.20[&] *10*	100 *17*	294.319	6$^+$			
		1090.50[&] *20*	44 *9*	141.690	4$^+$			
		1190.0[a] *10*	7 *4*	42.824	2$^+$			
1240.8	(2$^-$)	1198.0 *3*	100	42.824	2$^+$			
1262.08	(3$^+$)	1120.3[a] *4*	31 *3*	141.690	4$^+$			
		1219.3[a] *3*	100 *6*	42.824	2$^+$			
1277.6	(11$^-$)	220.7 *3*	22 *11*	1056.8	(9$^-$)	(E2)[d]	0.594	α(K)=0.1299 *19*; α(L)=0.338 *6*; α(M)=0.0936 *15*; α(N+..)=0.0328 *5* α(N)=0.0257 *4*; α(O)=0.00610 *10*; α(P)=0.001003 *16*; α(Q)=9.59×10^{-6} *14*
		236.6 *3*	39 *22*	1041.1	12$^+$	[d]		
		530.1 *3*	100 *50*	747.4	10$^+$	D[d]		
1308.74	(5$^-$)	147.20[i&g] *10*	4.0 *3*	1161.53	(6$^-$)	(M1,E2)[&]	6 *3*	α(K)=4 *4*; α(L)=1.7 *3*; α(M)=0.44 *11*; α(N+..)=0.16 *4* α(N)=0.12 *3*; α(O)=0.029 *7*; α(P)=0.0051 *7*; α(Q)=0.00016 *13*
		193.30[&] *10*	22.1 *11*	1115.53	(5$^-$)	(M1,E2)[&]	2.5 *16*	α(K)=1.7 *16*; α(L)=0.62 *3*; α(M)=0.161 *5*; α(N+..)=0.0566 *15* α(N)=0.0440 *15*; α(O)=0.01067 *16*; α(P)=0.00188 *14*; α(Q)=7.E−5 *6*
		271.30[&] *10*	22.5 *11*	1037.55	(4$^-$)	(M1,E2)[&]	0.9 *7*	α(K)=0.7 *6*; α(L)=0.20 *6*; α(M)=0.050 *11*; α(N+..)=0.018 *4* α(N)=0.014 *3*; α(O)=0.0033 *8*; α(P)=0.00061 *18*; α(Q)=2.8×10^{-5} *23*
		306.80[&] *10*	1.6 *2*	1001.94	(3$^-$)	(E2)	0.197	α(K)=0.0742 *11*; α(L)=0.0899 *13*; α(M)=0.0246 *4*; α(N+..)=0.00863 *13* α(N)=0.00675 *10*; α(O)=0.001608 *23*; α(P)=0.000270 *4*; α(Q)=4.20×10^{-6} *6* Mult.: (M1+E2) from ce data, E2 required by ΔJ^π.
		566.34[&] *6*	100 *5*	742.33	5$^-$	(M1,E2)[&]	0.13 *9*	α(K)=0.10 *8*; α(L)=0.022 *11*; α(M)=0.005 *3*; α(N+..)=0.0019 *9* α(N)=0.0015 *7*; α(O)=0.00036 *18*; α(P)=7.E−5 *4*; α(Q)=4.E−6 *3*

$^{240}_{94}Pu_{146}$-13

Adopted Levels, Gammas (continued)

γ(^{240}Pu) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[†]	E_f	J_f^π	Mult.[#]	α[h]	Comments
1308.74	(5⁻)	1014.40[&] *10*	0.83 *22*	294.319	6⁺			
		1167.10[&] *10*	17.8 *11*	141.690	4⁺			
1321.13?	(1,2⁺)	1321.10[j] *10*	100	0.0	0⁺			
1323.4?	(8⁺)	185.0[j] *3*	100 *67*	1138.3?	(6⁺)			
		445.2[j] *4*		878.1?	(7⁻)			
1337.02	(2⁺,3,4⁺)	1195.5[a] *4*	100 *19*	141.690	4⁺			
		1294.1[a] *3*	35 *4*	42.824	2⁺			
1374.8	14⁺	333.7 *3*	100	1041.1	12⁺	(E2)[d]	0.1533	α(K)=0.0639 *9*; α(L)=0.0654 *10*; α(M)=0.0178 *3*; α(N+..)=0.00625 *9* α(N)=0.00488 *7*; α(O)=0.001165 *17*; α(P)=0.000197 *3*; α(Q)=3.44×10^{-6} *5*
1410.75	0(⁻)	813.41 *10*	100	597.34	1⁻			
1438.45	2(⁻)	789.59 *10*	100 *17*	648.86	3⁻			
		841.11 *10*	83 *9*	597.34	1⁻			
		1438.5	<0.6	0.0	0⁺			
1488.17	(1,2⁺)	1445.30 *10*	100 *3*	42.824	2⁺			
		1488.20 *10*	53 *3*	0.0	0⁺			
1525.86	(0⁺)	928.55 *10*	100 *13*	597.34	1⁻			
		1483.00 *10*	18 *3*	42.824	2⁺			
1539.67	(1⁻)	580.70 *20*	0.53 *15*	958.85	(2⁻)			
		890.60 *20*	1.3 *2*	648.86	3⁻			
		942.39 *10*	7.2 *7*	597.34	1⁻			
		1496.90 *10*	100 *2*	42.824	2⁺			
		1539.62 *9*	63.2 *15*	0.0	0⁺			
1539.8	(13⁻)	165.0 *3*	7 *7*	1374.8	14⁺			
		262.1 *3*	75 *36*	1277.6	(11⁻)	(Q)[d]		
		498.7 *3*	100 *64*	1041.1	12⁺	D[d]		
1557.0	(10⁺)	233.5 *3*	69 *46*	1323.4?	(8⁺)			
		279.6[j] *4*		1277.6	(11⁻)			
		500.3 *3*	100 *65*	1056.8	(9⁻)	D[d]		
1558.87	(2⁺)	910.10 *10*	100 *14*	648.86	3⁻			
		961.62 *10*	93 *5*	597.34	1⁻			
		1417.20 *10*	16 *3*	141.690	4⁺			
		1515.90 *10*	11 *4*	42.824	2⁺			
		1558.80 *10*	4.3 *14*	0.0	0⁺			
1607.72	(1⁻)	518.2 *3*	11 *4*	1089.45	0⁺			
		959.0 *2*	13 *4*	648.86	3⁻			
		1607.60 *20*	100 *9*	0.0	0⁺			
1626.77	(1,2⁺)	1584.10 *20*	100 *12*	42.824	2⁺			
		1626.60 *20*	29 *6*	0.0	0⁺			

$^{240}_{94}Pu_{146}$-14

$\gamma(^{240}Pu)$ (continued)

E_i(level)	J^π_i	E_γ‡	I_γ†	E_f	J^π_f	Mult.#
1633.37	(1,2$^+$)	496.7 *3*	6.5 *13*	1136.97	(2$^+$)	
		1036.5 *3*	1.9 *13*	597.34	1$^-$	
		1590.50 *10*	63 *3*	42.824	2$^+$	
		1633.33 *10*	100 *3*	0.0	0$^+$	
1710.43	(2$^+$)	573.40 *20*	28 *7*	1136.97	(2$^+$)	
		1061.60 *20*	100 *24*	648.86	3$^-$	
		1113.20 *20*	62 *10*	597.34	1$^-$	
		1568.60 *20*	21 *3*	141.690	4$^+$	
		1667.60 *10*	66 *10*	42.824	2$^+$	
		1711.0 *10*	7 *4*	0.0	0$^+$	
1745.7	16$^+$	371.0 *3*	100	1374.8	14$^+$	(Q)[d]
1775.27	(1$^-$)	1732.40 *20*	67 *34*	42.824	2$^+$	
		1775.30 *20*	100 *33*	0.0	0$^+$	
1796.34	(1,2$^+$)	475.0 *3*	100 *27*	1321.13?	(1,2$^+$)	
		573.40 *20*	73 *18*	1222.99	(2$^+$)	
		837.60 *20*	73 *27*	958.85	(2$^-$)	
		1796.2 *3*	27 *9*	0.0	0$^+$	
1808.02	(1$^-$,2$^+$)	1159.20 *20*	40 *13*	648.86	3$^-$	
		1210.5 *5*	100 *30*	597.34	1$^-$	
		1765.20 *20*	47 *7*	42.824	2$^+$	
		1807.9 *4*	13 *7*	0.0	0$^+$	
1830.3	(12$^+$)	273.2 *3*	100 *55*	1557.0	(10$^+$)	Q[d]
		290.6[j] *4*		1539.8	(13$^-$)	
		552.7 *4*	90 *48*	1277.6	(11$^-$)	D[d]
1841.8	(15$^-$)	302.1 *3*	100 *44*	1539.8	(13$^-$)	Q[d]
		467.1 *3*	65 *37*	1374.8	14$^+$	
1917.8	(1$^-$)	1874.9 *3*	100 *8*	42.824	2$^+$	
		1918.0 *10*	7 *3*	0.0	0$^+$	
1954.51	(2$^+$)	1305.80 *20*	100 *26*	648.86	3$^-$	
		1357.20 *20*	57 *13*	597.34	1$^-$	
		1812.80 *10*	22 *9*	141.690	4$^+$	
		1911.4 *3*	61 *4*	42.824	2$^+$	
1996.41	(1,2$^+$)	1398.5 *5*	100 *40*	597.34	1$^-$	
		1953.60 *20*	46 *10*	42.824	2$^+$	
		1996.7 *4*	20 *8*	0.0	0$^+$	
2117.5	(1,2$^+$)	2074.80[j] *20*	100 *16*	42.824	2$^+$	
		2117.5 *10*	23 *13*	0.0	0$^+$	
2136.8	(14$^+$)	295.0[j] *3*	32 *19*	1841.8	(15$^-$)	
		306.5 *3*	100 *56*	1830.3	(12$^+$)	Q[d]

$^{240}_{94}Pu_{146}$-15

Adopted Levels, Gammas (continued)

γ(^{240}Pu) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[†]	E_f	J_f^π	Mult.[#]	α[h]	Comments
2136.8	(14$^+$)	597.1 *3*	78 *46*	1539.8	(13$^-$)	D[d]		
2151.6	18$^+$	405.9 *3*	100	1745.7	16$^+$	(Q)[d]		
2182.6	(17$^-$)	340.7 *3*	100 *89*	1841.8	(15$^-$)	(Q)[d]		
		436.8 *3*	34 *42*	1745.7	16$^+$			
2475.1	(16$^+$)	292.6[j] *4*		2182.6	(17$^-$)			
		338.2 *3*	100 *92*	2136.8	(14$^+$)	Q[d]		
		633.3 *4*	31 *31*	1841.8	(15$^-$)	D[d]		
2560.5	(19$^-$)	377.9 *3*	100 *72*	2182.6	(17$^-$)	(Q)[d]		
		408.9 *3*	21 *5*	2151.6	18$^+$			
2590.2	20$^+$	438.6 *3*	100	2151.6	18$^+$	(E2)[d]	0.0726	α(K)=0.0390 *6*; α(L)=0.0247 *4*; α(M)=0.00659 *10*; α(N+..)=0.00232 *4* α(N)=0.00181 *3*; α(O)=0.000434 *7*; α(P)=7.49×10^{-5} *11*; α(Q)=1.87×10^{-6} *3*
2837.1	(18$^+$)	362.0 *3*	100 *71*	2475.1	(16$^+$)	Q[d]		
		654.6 *3*	33 *26*	2182.6	(17$^-$)			
2973.8	(21$^-$)	383.6 *3*	21 *5*	2590.2	20$^+$			
		413.3 *3*	100 *62*	2560.5	(19$^-$)	(Q)[d]		
3059.8	22$^+$	469.6 *3*	100	2590.2	20$^+$	(E2)[d]	0.0612	α(K)=0.0345 *5*; α(L)=0.0196 *3*; α(M)=0.00522 *8*; α(N+..)=0.00184 *3* α(N)=0.001430 *21*; α(O)=0.000344 *5*; α(P)=5.97×10^{-5} *9*; α(Q)=1.612×10^{-6} *23*
3218.3	(20$^+$)	381.2 *3*	100 *80*	2837.1	(18$^+$)	Q[d]		
		657.8 *3*	18 *12*	2560.5	(19$^-$)			
3421.1	(23$^-$)	361.3 *3*	21 *7*	3059.8	22$^+$			
		447.3 *3*	100 *38*	2973.8	(21$^-$)	(Q)[d]		
3559.0	24$^+$	499.2 *3*	100	3059.8	22$^+$	(E2)[d]	0.0528	α(K)=0.0310 *5*; α(L)=0.01610 *23*; α(M)=0.00426 *6*; α(N+..)=0.001498 *22* α(N)=0.001167 *17*; α(O)=0.000281 *4*; α(P)=4.90×10^{-5} *7*; α(Q)=1.417×10^{-6} *20*
3626.6	(22$^+$)	408.3 *4*		3218.3	(20$^+$)			
		652.8 *4*	100 *50*	2973.8	(21$^-$)			
3900.6	(25$^-$)	341.6 *3*	32 *14*	3559.0	24$^+$			
		479.5 *3*	100 *68*	3421.1	(23$^-$)	Q[d]		
4063.5	(24$^+$)	436.9 *5*		3626.6	(22$^+$)			
4086.3	26$^+$	185.7 *3*	11 *6*	3900.6	(25$^-$)			
		527.2 *3*	100 *17*	3559.0	24$^+$	(Q)[d]		
4410.8	(27$^-$)	324.5 *3*		4086.3	26$^+$			
		510.2 *3*	100 *74*	3900.6	(25$^-$)	Q[d]		
4530.9	(26$^+$)	467.4 *5*		4063.5	(24$^+$)			
4639.4	28$^+$	228.6 *4*	27 *15*	4410.8	(27$^-$)			
		553.1 *3*	100 *35*	4086.3	26$^+$			
4950.0	(29$^-$)	310.6[j] *4*		4639.4	28$^+$			

$^{240}_{94}Pu_{146}$-16

Adopted Levels, Gammas (continued)

γ(^{240}Pu) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[†]	E_f	J_f^π	Mult.[#]	δ	α[h]	$I_{(\gamma+ce)}$	Comments
4950.0	(29$^-$)	539.2 *3*	100 *69*	4410.8	(27$^-$)					
5030.0	(28$^+$)	499.1 *5*		4530.9	(26$^+$)					
5220.3	30$^+$	270.3 *4*		4950.0	(29$^-$)					
		580.9 *3*	100 *37*	4639.4	28$^+$					
5512.2	(31$^-$)	562.2 *3*	100	4950.0	(29$^-$)					
5559.2	(30$^+$)	529.2 *5*		5030.0	(28$^+$)					
5819.3	32$^+$	599.0 *3*	100	5220.3	30$^+$					
6096.3?	(33$^-$)	584.1[j] *4*		5512.2	(31$^-$)					
20.1+x	(2$^+$)	(20.1)		x	(0$^+$)	[E2]		2.3×10^4 *3*		α(L)=1.31×10^4 *18*; α(M)=7.5×10^3 *10*; α(N+..)=2.6×10^3 *4* α(N)=2.0×10^3 *3*; α(O)=4.8×10^2 *7*; α(P)=74 *10*; α(Q)=0.108 *13* Additional information 2.
66.8+x	(4$^+$)	46.72 *9*	100	20.1+x	(2$^+$)	(E2)		593 *10*		α(L)=431 *8*; α(M)=120.3 *21*; α(N+..)=42.0 *7* α(N)=33.0 *6*; α(O)=7.76 *13*; α(P)=1.215 *21*; α(Q)=0.00267 *5*
139.9+x	(6$^+$)	73.12 *12*	100	66.8+x	(4$^+$)	(E2)		68.9		α(L)=50.0 *8*; α(M)=14.00 *23*; α(N+..)=4.90 *8* α(N)=3.85 *7*; α(O)=0.906 *15*; α(P)=0.1430 *23*; α(Q)=0.000399 *7*
239.2+x	(8$^+$)	99.35 *13*	100	139.9+x	(6$^+$)	(E2)		16.27		α(L)=11.81 *18*; α(M)=3.31 *5*; α(N+..)=1.158 *18* α(N)=0.909 *14*; α(O)=0.214 *4*; α(P)=0.0341 *6*; α(Q)=0.0001200 *18*
364.5+x?	(10$^+$)	126[j]		239.2+x	(8$^+$)					
554.7+x	(1$^-$)	534.6	100	20.1+x	(2$^+$)					
		554.7	<750	x	(0$^+$)					I_γ: for triplet.
589.7+x	(3$^-$)	569.6	100	20.1+x	(2$^+$)					

$^{240}_{94}Pu_{146}$-17

Adopted Levels, Gammas (continued)

$\gamma(^{240}Pu)$ (continued)

E_i(level)	J^{π}_i	E_{γ}‡	I_{γ}†	E_f	J^{π}_f	Mult.#

$^{240}_{94}Pu_{146}$-18

Adopted Levels, Gammas (continued)

$\gamma(^{240}Pu)$ (continued)

E_i(level)	J^{π}_i	E_{γ} ‡	I_{γ} †	E_f	J^{π}_f	Mult.#

$^{240}_{94}Pu_{146}$-19

Adopted Levels, Gammas (continued)

γ(^{240}Pu) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[†]	E_f	J_f^π	Mult.[#]
769.9+x	(0$^+$)	769.9 *10*		x	(0$^+$)	(E0)
806.2+x	(2$^-$)	216.5 *5*	1.9	589.7+x	(3$^-$)	
		786.1 *1*	100.0 *25*	20.1+x	(2$^+$)	E1
825.6+x	(3$^-$)	(19.4)		806.2+x	(2$^-$)	
		805.4 *2*	100 *13*	20.1+x	(2$^+$)	
836.0+x	(1$^-$)	816 *1*	100 *18*	20.1+x	(2$^+$)	
		836 *1*	29 *17*	x	(0$^+$)	
846.8+x	(2$^-$)	826.7 *3*	100	20.1+x	(2$^+$)	
851.1+x	(4$^-$)	(25.5)		825.6+x	(3$^-$)	
		44.8		806.2+x	(2$^-$)	(E2)
866.0+x	(3$^-$)	799 *1*	100 *22*	66.8+x	(4$^+$)	
		846 *1*	67 *33*	20.1+x	(2$^+$)	
882.8+x	(5$^-$)	31.7		851.1+x	(4$^-$)	(E2)
		57.2		825.6+x	(3$^-$)	(E2)
891.2+x	(4$^-$)	824.4 *3*	100	66.8+x	(4$^+$)	
918.8+x	(5$^-$)	778.9 *3*	100 *25*	139.9+x	(6$^+$)	
		852.0 *5*	42 *17*	66.8+x	(4$^+$)	
920.7+x	(6$^-$)	(37.9)		882.8+x	(5$^-$)	
		(69.6)		851.1+x	(4$^-$)	
		936.4[j]	<10	x	(0$^+$)	
952.5+x?	(2$^-$)	932.4[j]	100	20.1+x	(2$^+$)	
960.7+x	(6$^-$)	820.8 *2*	100	139.9+x	(6$^+$)	
966.5+x	(7$^-$)	(45.8)		920.7+x	(6$^-$)	
		(83.7)		882.8+x	(5$^-$)	
970.6+x?	(3$^-$)	904.1[j]	100	66.8+x	(4$^+$)	
		858.7 *3*	100 *40*	139.9+x	(6$^+$)	
1012.2+x?	(4$^-$)	945.4[j]	100	66.8+x	(4$^+$)	
1044.0+x?	(5$^-$)	904.1[j]	100	139.9+x	(6$^+$)	
1054.9+x	(8$^-$)	815.7 *3*	100	239.2+x	(8$^+$)	
1109.0+x?	(6$^-$)	969.1[j]	100	139.9+x	(6$^+$)	
1161.5+x?	(7$^-$)	922.3[j]	100	239.2+x	(8$^+$)	
1230.4+x?	(8$^-$)	991.2[j]	100	239.2+x	(8$^+$)	
		1226.5[i j]		20.1+x	(2$^+$)	
		1246.5[i j]		x	(0$^+$)	
1261.0+x?	(2$^-$)	414.2[j]		846.8+x	(2$^-$)	(E0)
		1241.0[j]	25	20.1+x	(2$^+$)	
1287.0+x?	(3$^-$)	420[j]		866.0+x	(3$^-$)	(E0)
		1220.0[j]	100	66.8+x	(4$^+$)	
1300.9+x?	(9$^-$)	936.4[j]	100	364.5+x?	(10$^+$)	
1322.0+x?	(4$^-$)	403[j]	17	918.8+x	(5$^-$)	
		1255[j]	100	66.8+x	(4$^+$)	
1344.5+x?	(1$^-$)	98[j]		1246.5+x?	(1$^-$)	

$^{240}_{94}Pu_{146}$-20

Adopted Levels, Gammas (continued)

γ(^{240}Pu) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[†]	E_f	J_f^π	Mult.[#]
		408.1[j]		936.4+x?	(1⁻)	(E0)
		508.4	100	836.0+x	(1⁻)	(E0)
		1324.5[ij]	<16	20.1+x	(2⁺)	
1360.9+x	(2⁻)	408.4		952.5+x?	(2⁻)	(E0)
		514.8 *15*	67	846.8+x	(2⁻)	(E0)
		525	42	836.0+x	(1⁻)	
		535.2 *2*	100 *25*	825.6+x	(3⁻)	
		1341	<115	20.1+x	(2⁺)	
		1226.5[ij]	<500	139.9+x	(6⁺)	
1382.9+x?	(10⁻)	1018.4[j]	100	364.5+x?	(10⁺)	
1386.6+x	(3⁻)	415.7[j]		970.6+x?	(3⁻)	(E0)
		520.4 *14*	<44	866.0+x	(3⁻)	(E0)
		535.5 *3*	61 *17*	851.1+x	(4⁻)	
		1319.9	26	66.8+x	(4⁺)	
1421.0+x?	(6⁻)	1281[j]	100	139.9+x	(6⁺)	
1421.4+x	(4⁻)	409.2[j]		1012.2+x?	(4⁻)	(E0)
		529.0 *12*		891.2+x	(4⁻)	(E0)
		538.6 *2*	<43[b]	882.8+x	(5⁻)	
		1355	23	66.8+x	(4⁺)	
1461.8+x?	(11⁻)	944.9[j]	100	516.9+x?	(12⁺)	
1465.7+x	(5⁻)	543.6[f] *1*	2	918.8+x	(5⁻)	(E0)
		545 *1*	64	920.7+x	(6⁻)	
		1324.5[ij]	<22	139.9+x	(6⁺)	
1485.5+x?	(7⁻)	1246.5[ij]	100	239.2+x	(8⁺)	
1518.7+x	(6⁻)	409.7[j]		1109.0+x?	(6⁻)	(E0)
		554.3 *4*	<340[e]	966.5+x	(7⁻)	
		556.5 *1*	2	960.7+x	(6⁻)	(E0)
		1379.5	17	139.9+x	(6⁺)	
1559.0+x?	(8⁻)	1320[j]	100	239.2+x	(8⁺)	
1580.5+x	(7⁻)	418.6[j]		1161.5+x?	(7⁻)	(E0)
		581.8 *12*		998.3+x	(7⁻)	(E0)
		1341.3[j]	<115	239.2+x	(8⁺)	
1641.5+x?	(9⁻)	1276[j]	100	364.5+x?	(10⁺)	
1654.7+x?	(8⁻)	595.1[j] *18*				(E0)
		600.0[j]		1054.9+x	(8⁻)	(E0)
		1414.3[j]	40	239.2+x	(8⁺)	
1732+x?	(9⁻)	628.3[j] *13*		1104+x?	(9⁻)	(E0)
		1369[j]	30	364.5+x?	(10⁺)	
1733.5+x?	(10⁻)	1369[j]	100	364.5+x?	(10⁺)	
		1454.0[j]		364.5+x?	(10⁺)	
1835.0+x?	(11⁻)	1318[j]	100	516.9+x?	(12⁺)	

$^{240}_{94}Pu_{146}$-21

Adopted Levels, Gammas (continued)

$\gamma(^{240}Pu)$ (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[†]	E_f	J_f^π	Mult.[#]
		1393[j]		516.9+x?	(12^+)	
2011.0+x?	(12^-)	1494.0[j]	100	516.9+x?	(12^+)	

Adopted Levels, Gammas (continued)

$\gamma(^{240}Pu)$ (continued)

† Relative photon intensity, normalized to 100 for the strongest γ deexciting each level.
‡ From ^{240}Np β^- decay (7.22 min), unless otherwise noted. For γ rays from levels in the second minimum, all values are from (α,2nγ).
# For transitions from levels in the second-potential well, E0 multipolarities are mixed with M1 and E2 components, except for the 769.9 transition from 0^+ to 0^+, which has to be E0.
@ From ^{244}Cm α decay.
& From ^{240}Np β^- decay (61.9 min).
a From ^{240}Am ε decay.
b 538γ and 538.6γ are unresolved and intensities are undivided.
c From ^{240}Np β^- decay (7.22 min).
d From $\Delta J=2$, quadrupole (most likely E2) or $\Delta J=1$, dipole (most likely E1) from $\gamma(\theta)$ data in Coulomb excitation (2007WaZV).
e For doublet.
f Poor fit in the level scheme. Level-energy difference=546.9 *7*. 545.3 is quoted in 2001Th16.
g Placement from 1177 level proposed by the evaluators. 1982Pa23, in ^{240}Np β^- decay (61.9 min), proposed placement from only the 1309 keV level. The $\Delta K=4$ involved for a transition from 1309-keV level to 1161-keV level suggests placement by 1982Pa23 is less likely.
h Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
i Multiply placed.
j Placement of transition in the level scheme is uncertain.

$^{240}_{94}Pu_{146}$-23

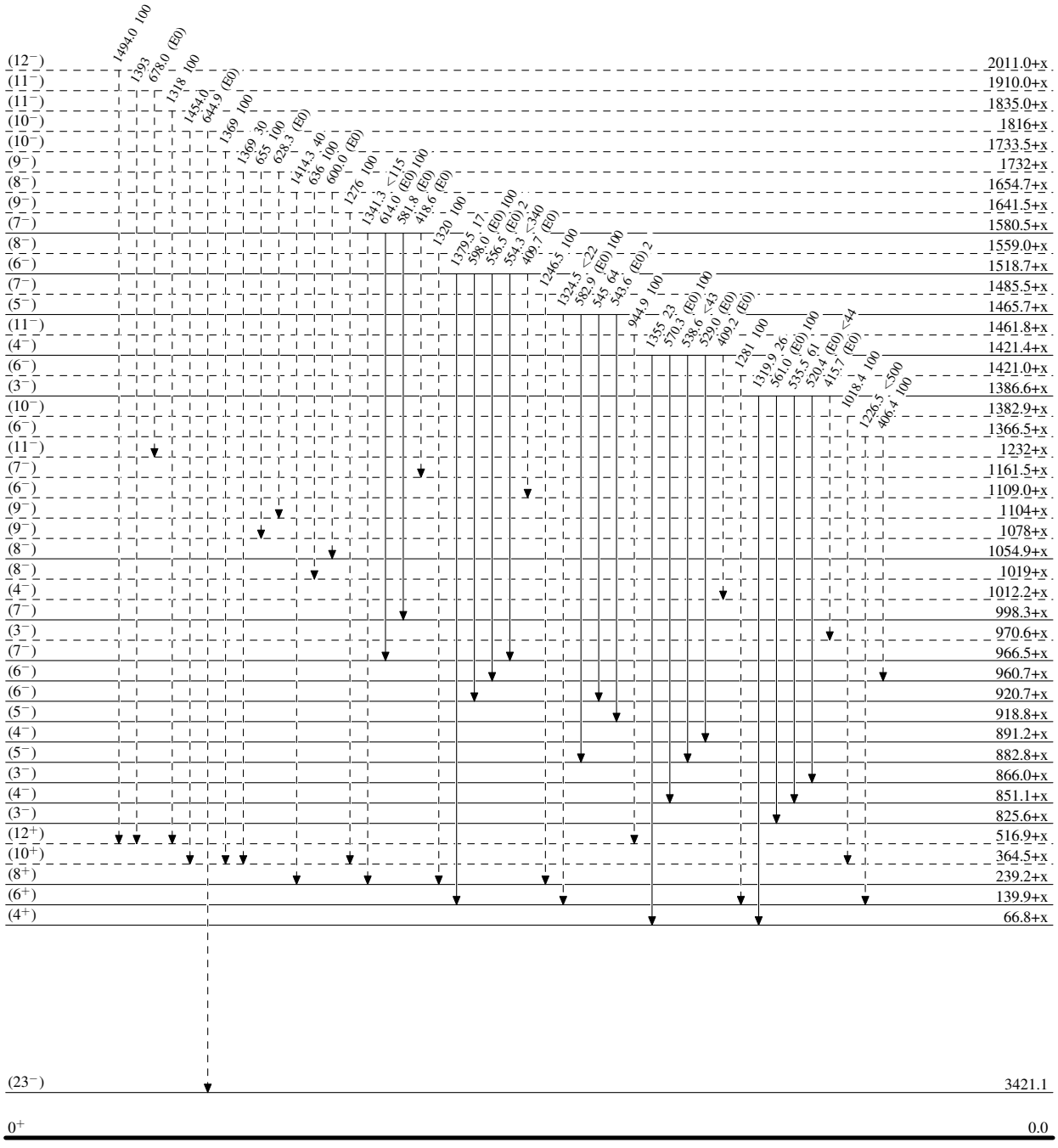
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



6561 y 7

$^{240}_{94}Pu_{146}$

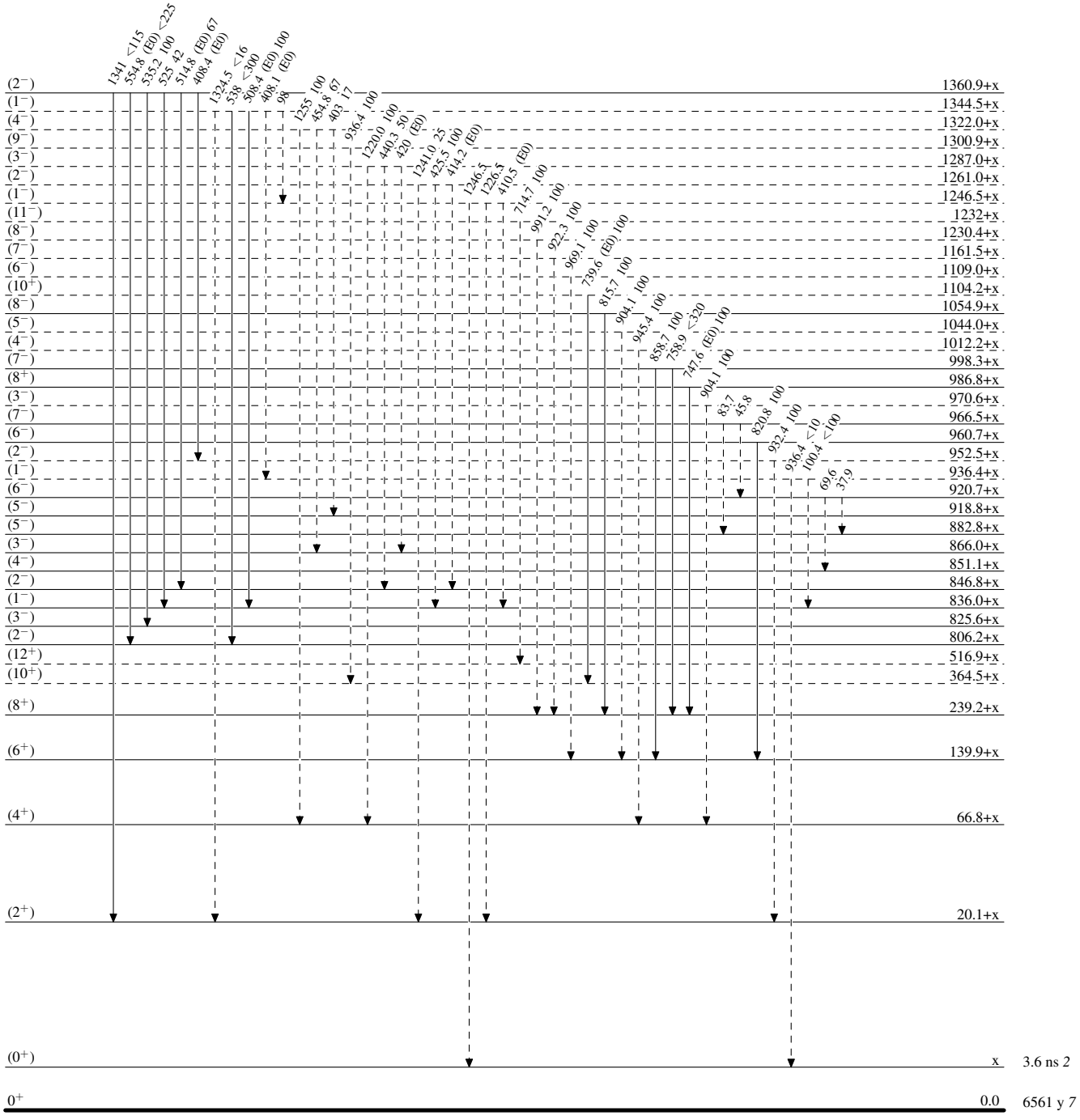
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{240}_{94}Pu_{146}$

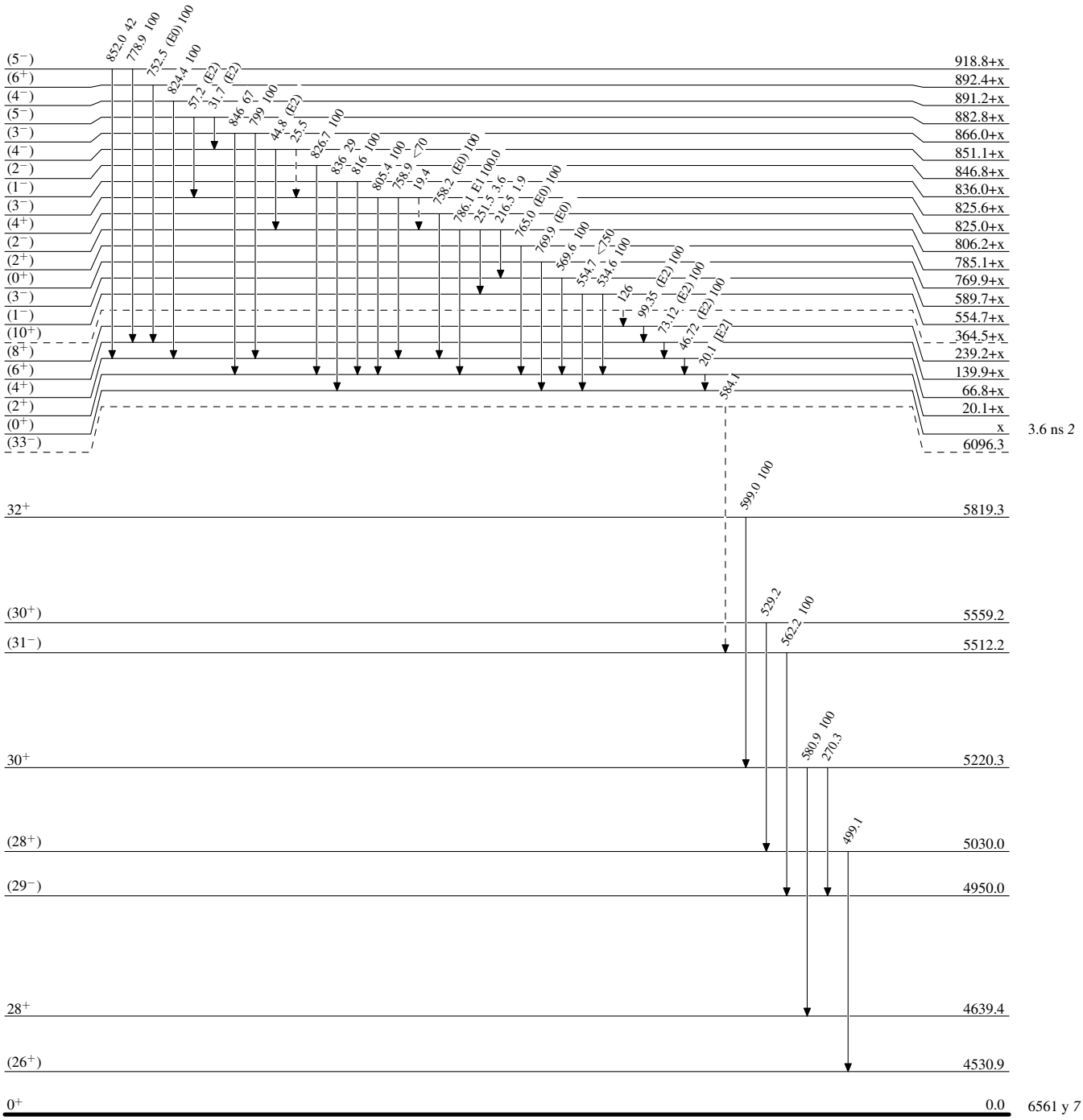
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{240}_{94}Pu_{146}$

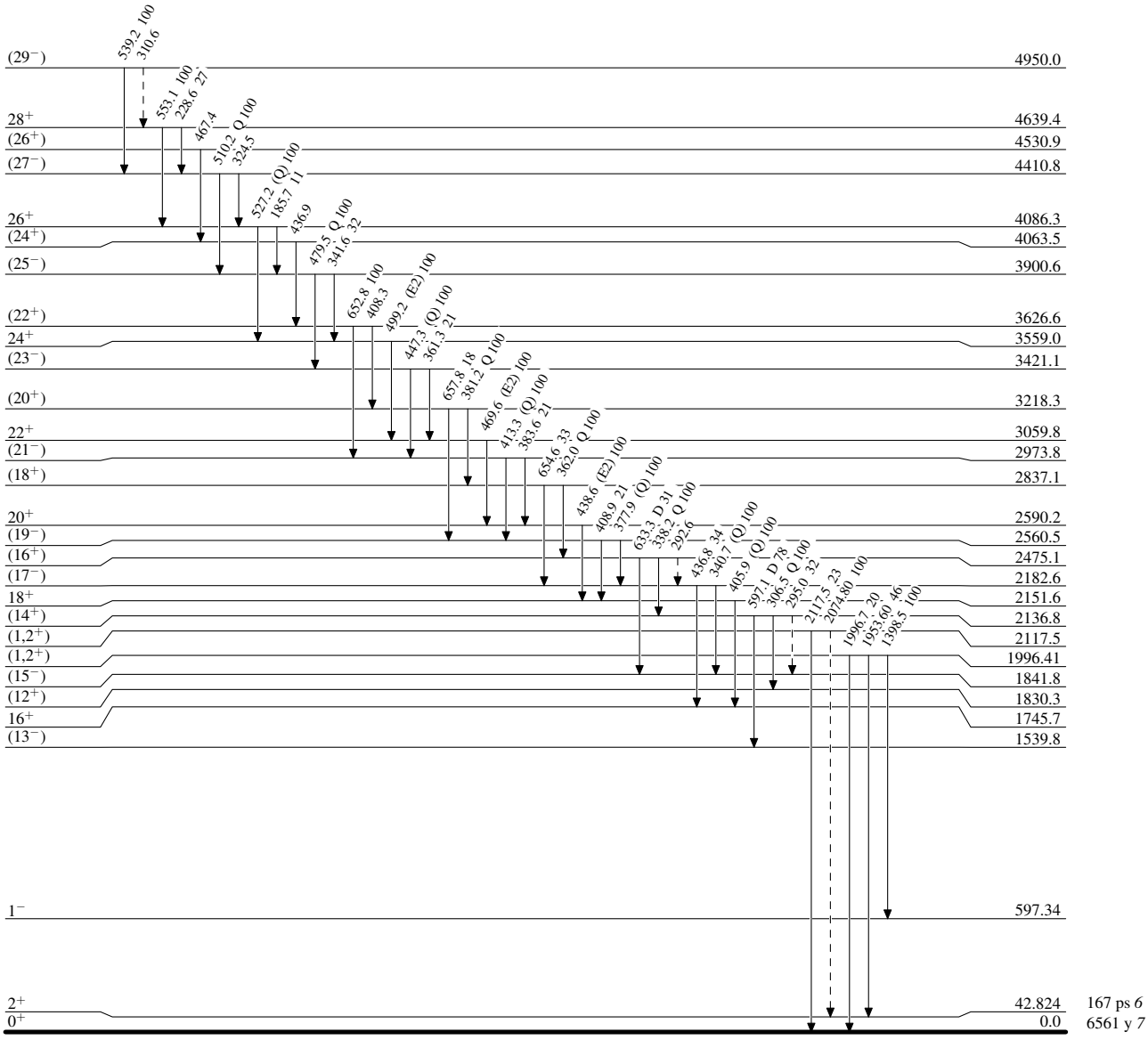
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{240}_{94}Pu_{146}$

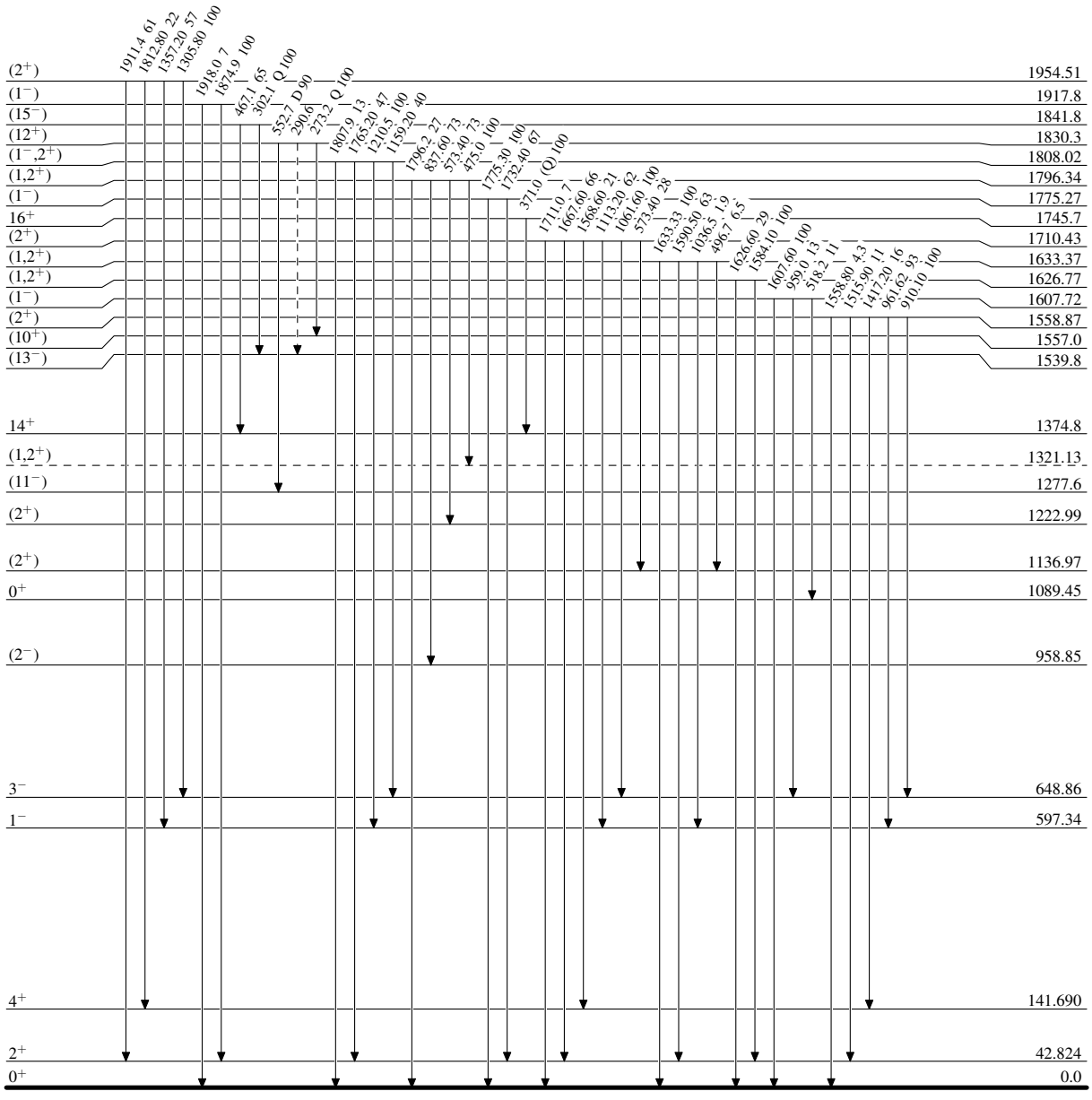
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{240}_{94}Pu_{146}$

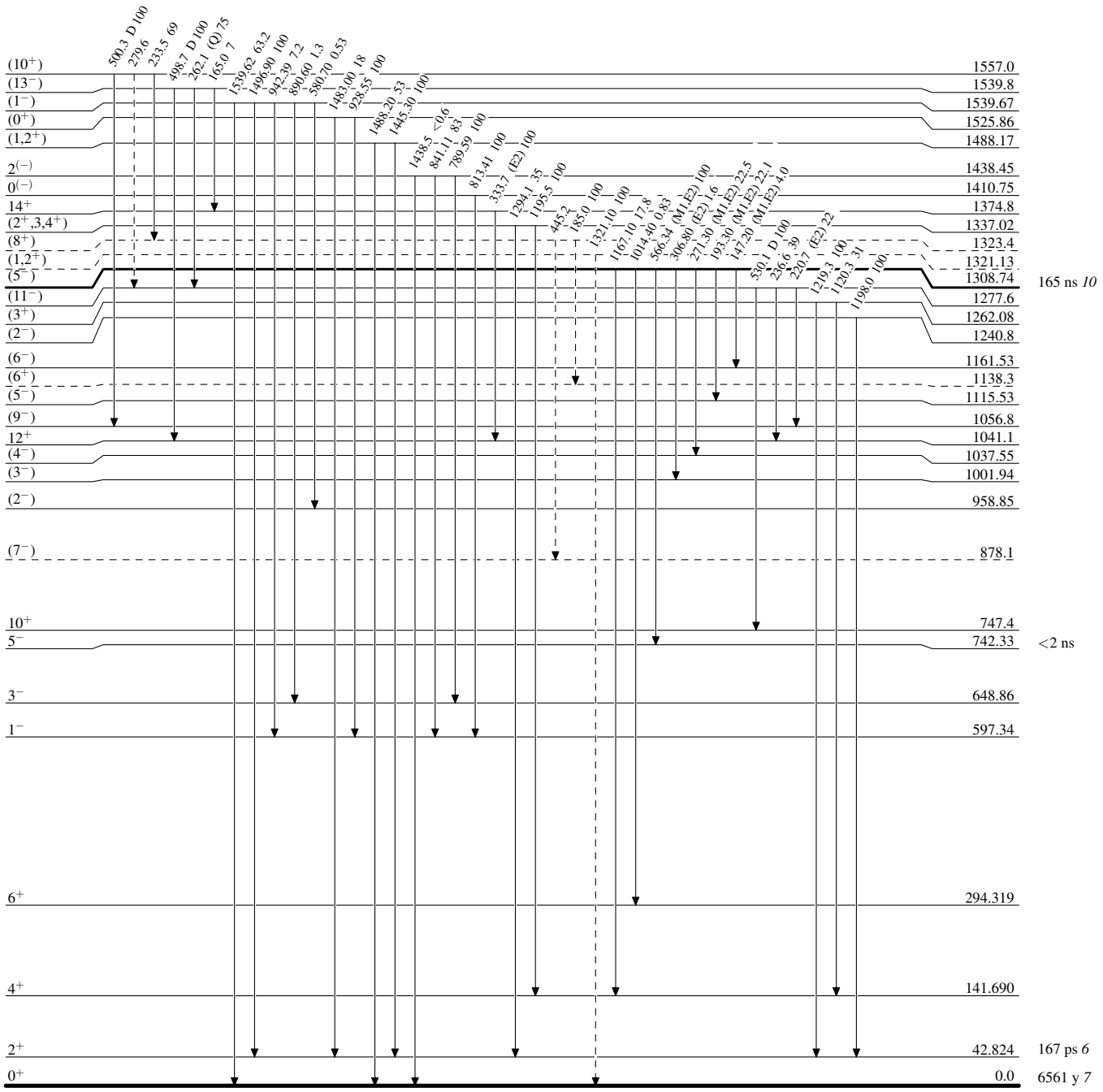
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{240}_{94}Pu_{146}$

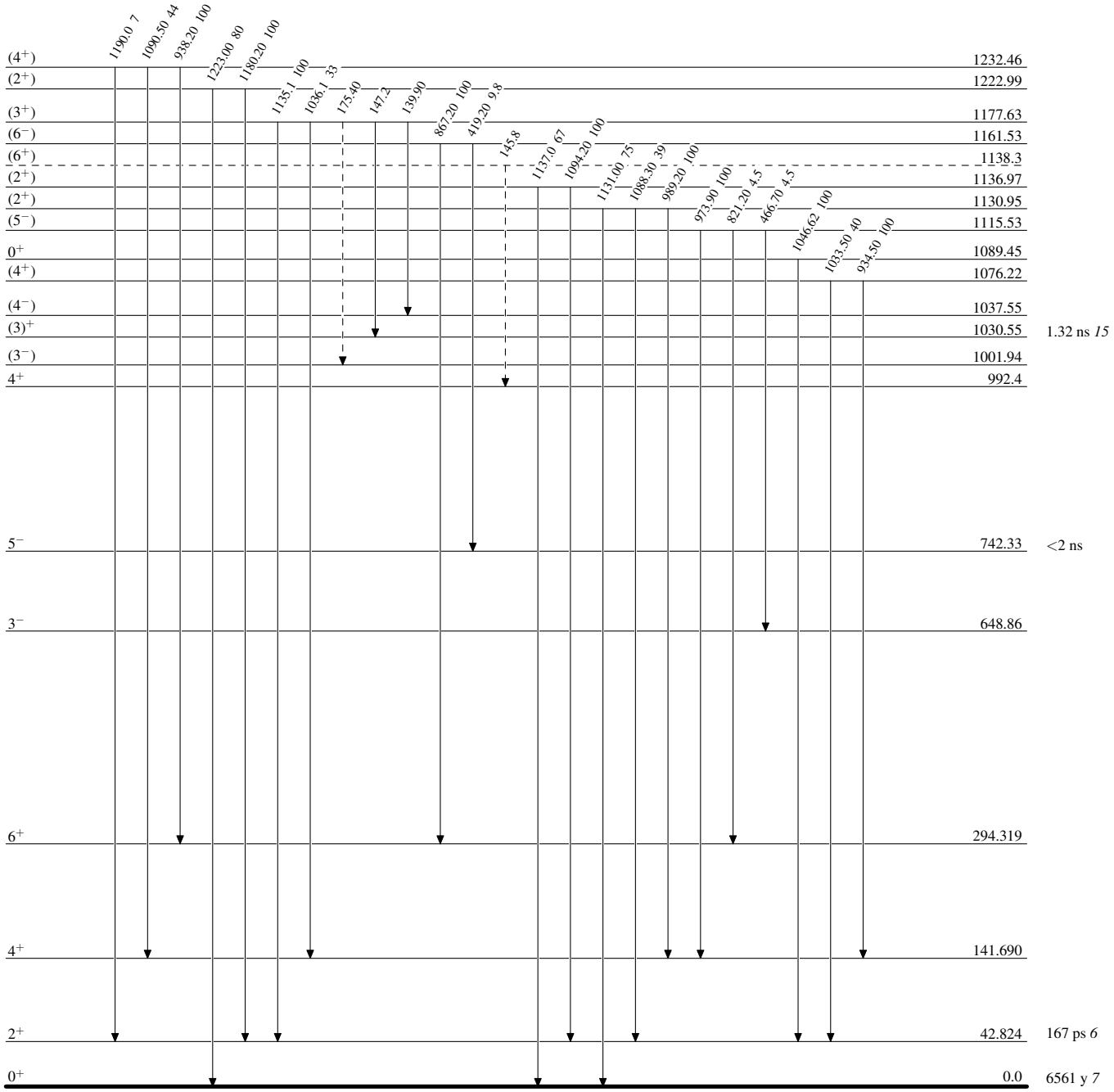
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{240}_{94}Pu_{146}$

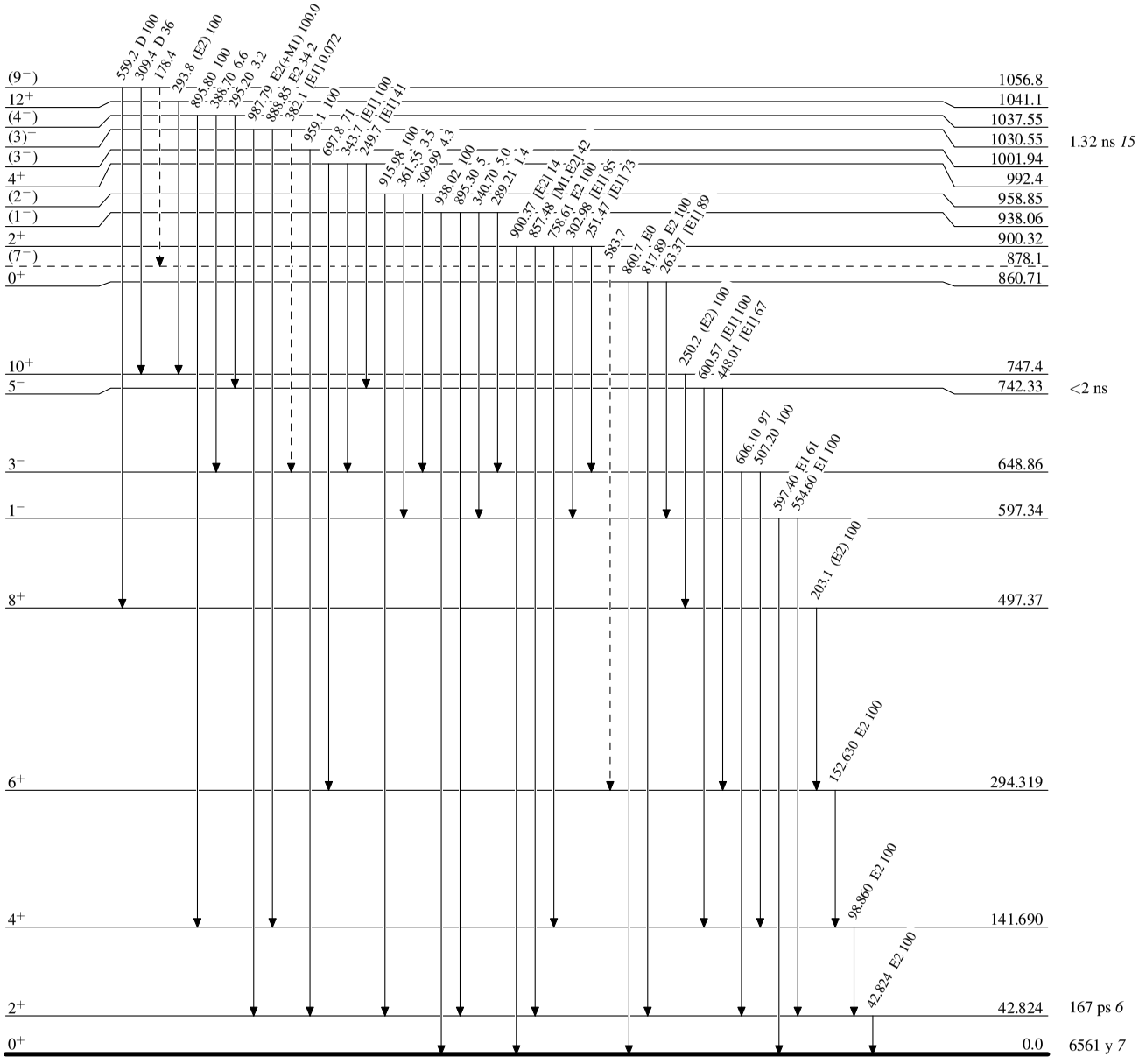
Adopted Levels, Gammas

Legend

Level Scheme (continued)

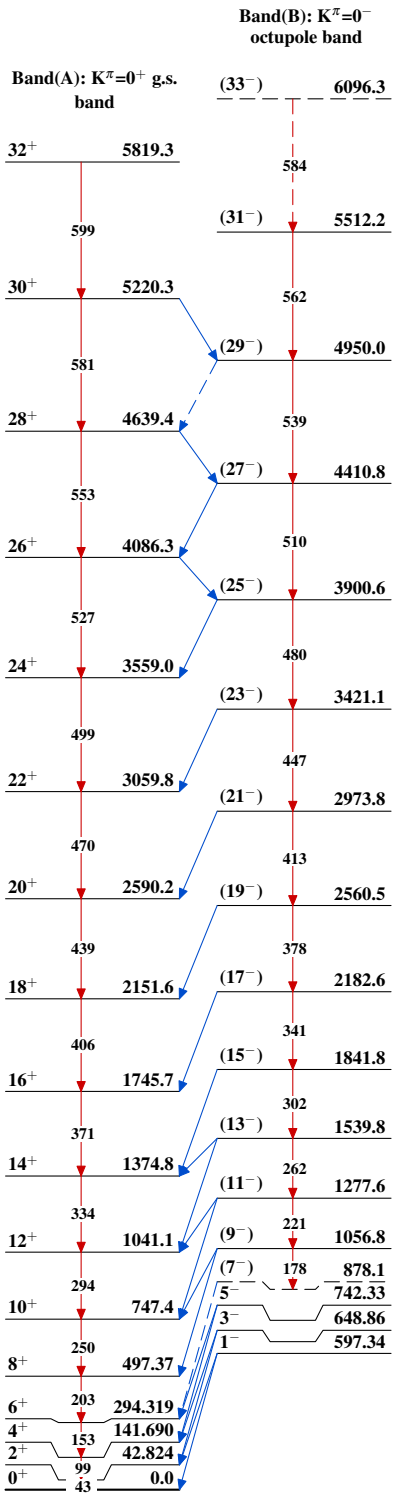
Intensities: Relative photon branching from each level

γ Decay (Uncertain)



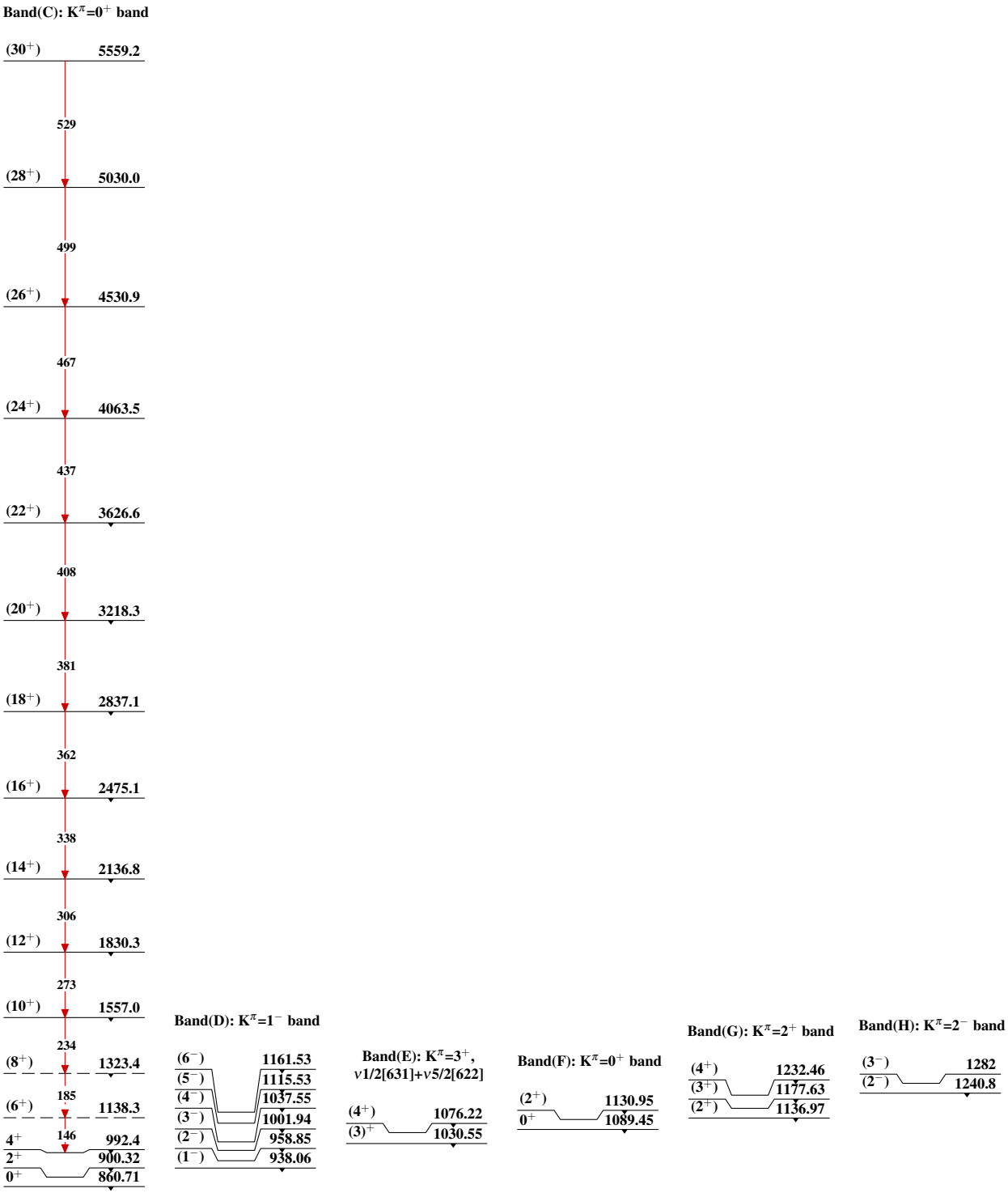
$^{240}_{94}Pu_{146}$

Adopted Levels, Gammas



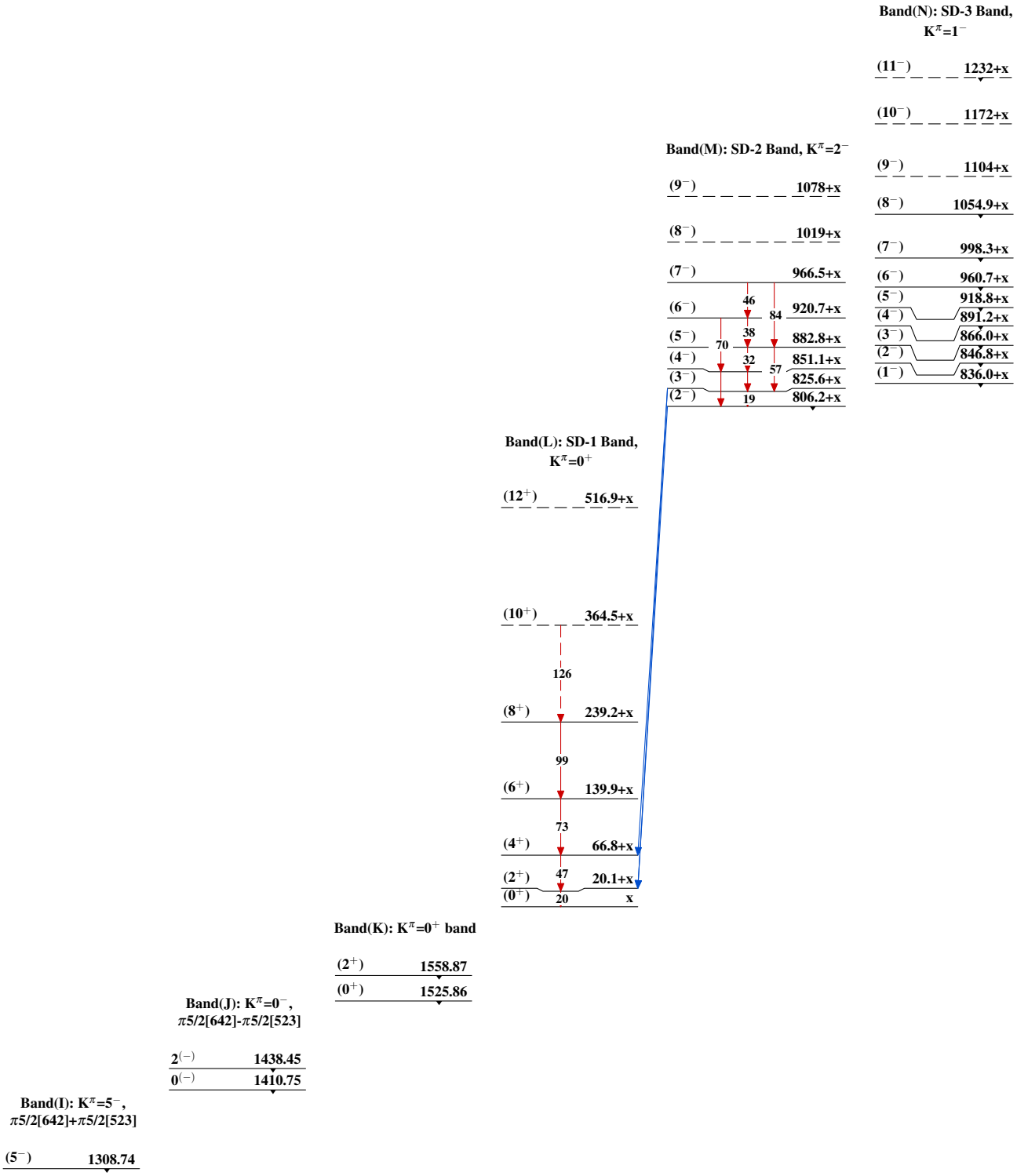
$^{240}_{94}Pu_{146}$

Adopted Levels, Gammas (continued)



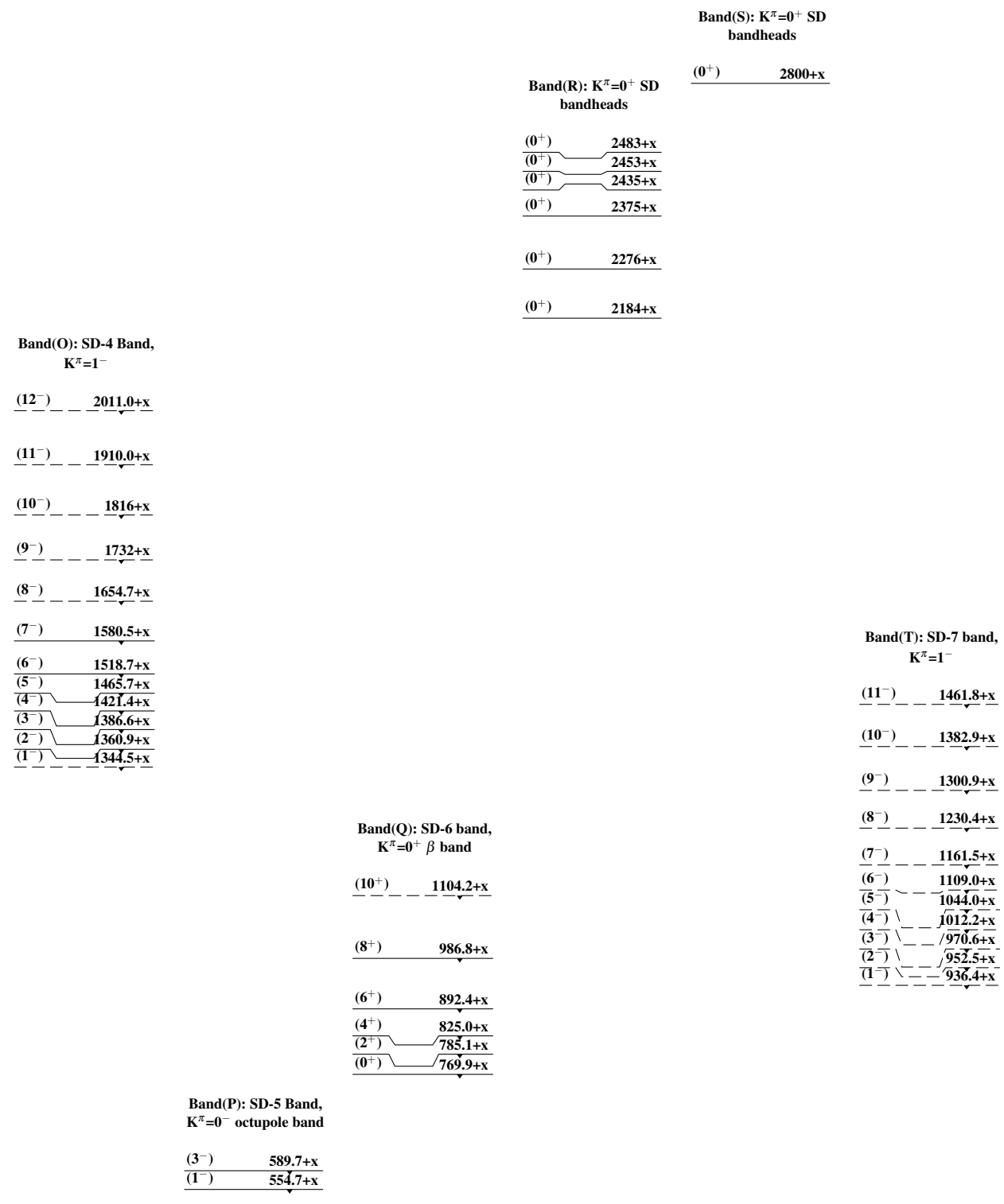
$^{240}_{94}Pu_{146}$

Adopted Levels, Gammas (continued)



$^{240}_{94}Pu_{146}$

Adopted Levels, Gammas (continued)



$^{240}_{94}Pu_{146}$

Adopted Levels, Gammas (continued)

Band(U): SD-8 band, $K^{\pi}=1^{-}$

(11^{-}) 1835.0+x

(10^{-}) 1733.5+x

(9^{-}) 1641.5+x

(8^{-}) 1559.0+x

(7^{-}) 1485.5+x

(6^{-}) 1421.0+x

(6^{-}) 1366.5+x

(4^{-}) 1322.0+x

(3^{-}) 1287.0+x

(2^{-}) 1261.0+x

(1^{-}) 1246.5+x

$^{240}_{94}Pu_{146}$