Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. Morse	NDS 197,259 (2024).	26-Sep-2023

Q(β^-)=678 *19*; S(n)=6117 *19*; S(p)=8441 *11*; Q(α)=3344 *15* 2021Wa16
S(2n)=10567 *10*, S(2p)=15305 *20* (2021Wa16).

^{230}Ra Levels

Cross Reference (XREF) Flags

A ^{230}Fr β^- decay
B ^{232}Th(^{136}Xe,Xγ)

E(level)[@]	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0[†]	0$^+$	93 min *2*	AB	%β^-=100 No β-delayed fission observed (%β^-F<3×10^{-4}%) (1990Me13,1993MeZW). T$_{1/2}$: from 1978Gi07. Other measured values: 60 min (1952Je06), 45.5 min *15* (tentative assignment to ^{230}Ra, 1975Ra03). δ<r^2>(^{214}Ra,^{230}Ra)=+1.9435 fm^2 *2*(stat) *975*(syst) (2018Ly01).
57.44[†] *7*	2$^+$		AB	J$^\pi$: γ ray to the 0$^+$ g.s.; systematics of 2$^+$ states in even-even nuclei in the region.
186.56[†] *8*	(4$^+$)		AB	J$^\pi$: γ ray to the 2$^+$ state; energy fit to the g.s. rotational band.
379.03[†] *12*	(6$^+$)		AB	J$^\pi$: γ ray to the (4$^+$) state; no γ ray to lower-spin levels; energy fit to the g.s. rotational band.
626.33[†] *23*	(8$^+$)		B	J$^\pi$: γ ray to (6$^+$); rotational-band assignment.
711.01[‡] *7*	(1$^-$)		A	J$^\pi$: γ rays to 0$^+$ and 2$^+$ states; systematics of 1$^-$ octupole-vibrational states.
734.83[#] *7*	(2$^+$)		A	J$^\pi$: γ rays to 0$^+$ and (4$^+$) levels.
768.34[‡] *8*	(3$^-$)		A	J$^\pi$: γ rays to the 2$^+$ and (4$^+$) states; level's energy spacing from the 1$^-$ octupole-vibrational state.
785.83[#] *10*	(3$^+$)		A	J$^\pi$: γ rays to 2$^+$ and (4$^+$) states; energy difference from the 2$^+$ γ-vibrational state.
849.80[#] *12*	(4$^+$)		A	J$^\pi$: γ rays to the (2$^+$) and (4$^+$) states; energy fit to the band.
879.96[‡] *24*	(5$^-$)		A	J$^\pi$: γ ray to the (4$^+$) state; band assignment.
893.04 *12*			A	
919.9[†] *3*	(10$^+$)		B	J$^\pi$: γ ray to (8$^+$); rotational-band assignment.
932.15[#] *19*	(5$^+$)		A	J$^\pi$: γ rays to the (4$^+$) and (6$^+$) levels; energy fit to the γ-vibrational band.
1034.17 *12*	(2$^+$)		A	J$^\pi$: γ rays to the 0$^+$ and (4$^+$) states.
1144.47 *14*	(4$^+$)		A	J$^\pi$: γ rays to the 2$^+$ and (6$^+$) states.
1158.50 *16*			A	
1189.01 *19*			A	
1211.80 *19*			A	
1252.1[†] *6*	(12$^+$)		B	J$^\pi$: γ ray to (10$^+$); rotational-band assignment.
1281.10 *22*			A	
1341.16 *22*			A	
1467.0 *3*			A	
1522.36 *18*			A	
1616.2[†] *8*	(14$^+$)		B	J$^\pi$: γ ray to (12$^+$); rotational-band assignment.
1897.23 *12*			A	
2005.02 *13*			A	
2006.2[†] *9*	(16$^+$)		B	J$^\pi$: γ ray to (14$^+$); rotational-band assignment.
2043.40 *18*			A	
2418.2?[†] *10*	(18$^+$)		B	J$^\pi$: γ ray to (16$^+$); rotational-band assignment.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{230}Ra Levels (continued)

† Band(A): K=0$^+$ g.s. rotational band.
‡ Band(B): K=0$^-$ octupole-vibrational band.
# Band(C): K=2$^+$ γ-vibrational band.
@ Determined from least-squares fit to γ-ray energies.

$\gamma(^{230}Ra)$

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Comments
57.44	2$^+$	57.4 *1*	100	0.0	0$^+$	
186.56	(4$^+$)	129.16 *12*	100	57.44	2$^+$	E_γ: Weighted average of 129.1 keV *1* (1986KuZL) and 129.4 keV *2* (1999Co02).
379.03	(6$^+$)	192.46 *9*	100	186.56	(4$^+$)	E_γ: Weighted average of 192.5 keV *1* (1986KuZL) and 192.3 keV *2* (1999Co02).
626.33	(8$^+$)	247.3 *2*	100	379.03	(6$^+$)	
711.01	(1$^-$)	653.4 *1*	96 *7*	57.44	2$^+$	
		711.0‡ *1*	100‡ *25*	0.0	0$^+$	
734.83	(2$^+$)	548.0 *3*	4.9 *5*	186.56	(4$^+$)	
		677.4 *1*	100 *7*	57.44	2$^+$	
		734.9 *1*	89 *7*	0.0	0$^+$	
768.34	(3$^-$)	57.1‡ *1*	0.15‡ *5*	711.01	(1$^-$)	
		581.9 *1*	13.4 *10*	186.56	(4$^+$)	
		711.0‡ *1*	100‡ *10*	57.44	2$^+$	
785.83	(3$^+$)	599.3 *1*	26.2 *19*	186.56	(4$^+$)	
		728.4 *1*	100 *6*	57.44	2$^+$	
849.80	(4$^+$)	663.2 *1*	100 *7*	186.56	(4$^+$)	
		792.4 *2*	62 *5*	57.44	2$^+$	
879.96	(5$^-$)	500.8	<5	379.03	(6$^+$)	
		693.3	100	186.56	(4$^+$)	
893.04		706.5 *1*	100 *7*	186.56	(4$^+$)	
		835.5 *3*	72 *8*	57.44	2$^+$	
919.9	(10$^+$)	293.6 *2*	100	626.33	(8$^+$)	
932.15	(5$^+$)	553.2 *2*	30 *3*	379.03	(6$^+$)	
		745.4 *3*	100 *15*	186.56	(4$^+$)	
1034.17	(2$^+$)	266.5 *2*	28 *4*	768.34	(3$^-$)	
		323.1 *2*	43 *4*	711.01	(1$^-$)	
		847.2 *3*	72 *9*	186.56	(4$^+$)	
		976.3 *3*	100 *10*	57.44	2$^+$	
		1033.8 *5*	37 *6*	0.0	0$^+$	
1144.47	(4$^+$)	264.5 *2*	55 *6*	879.96	(5$^-$)	
		375.8 *2*	89 *9*	768.34	(3$^-$)	
		765.5 *3*	63 *8*	379.03	(6$^+$)	
		958.0 *2*	100 *11*	186.56	(4$^+$)	
		1086.9 *5*	46 *8*	57.44	2$^+$	
1158.50		971.8 *2*	100 *10*	186.56	(4$^+$)	
		1101.2 *2*	93 *8*	57.44	2$^+$	
1189.01		338.9 *3*	7.4 *15*	849.80	(4$^+$)	
		1002.2 *3*	100 *10*	186.56	(4$^+$)	
1211.80		832.4 *3*	51 *5*	379.03	(6$^+$)	
		1025.4 *2*	100 *10*	186.56	(4$^+$)	
1252.1	(12$^+$)	332.2 *5*	100	919.9	(10$^+$)	
1281.10		1094.8 *3*	100 *10*	186.56	(4$^+$)	
		1223.4 *3*	78 *8*	57.44	2$^+$	
1341.16		1154.6 *2*	100	186.56	(4$^+$)	
1467.0		587.0 *2*	100	879.96	(5$^-$)	
1522.36		333.1 *2*	40 *4*	1189.01		

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{230}Ra) (continued)

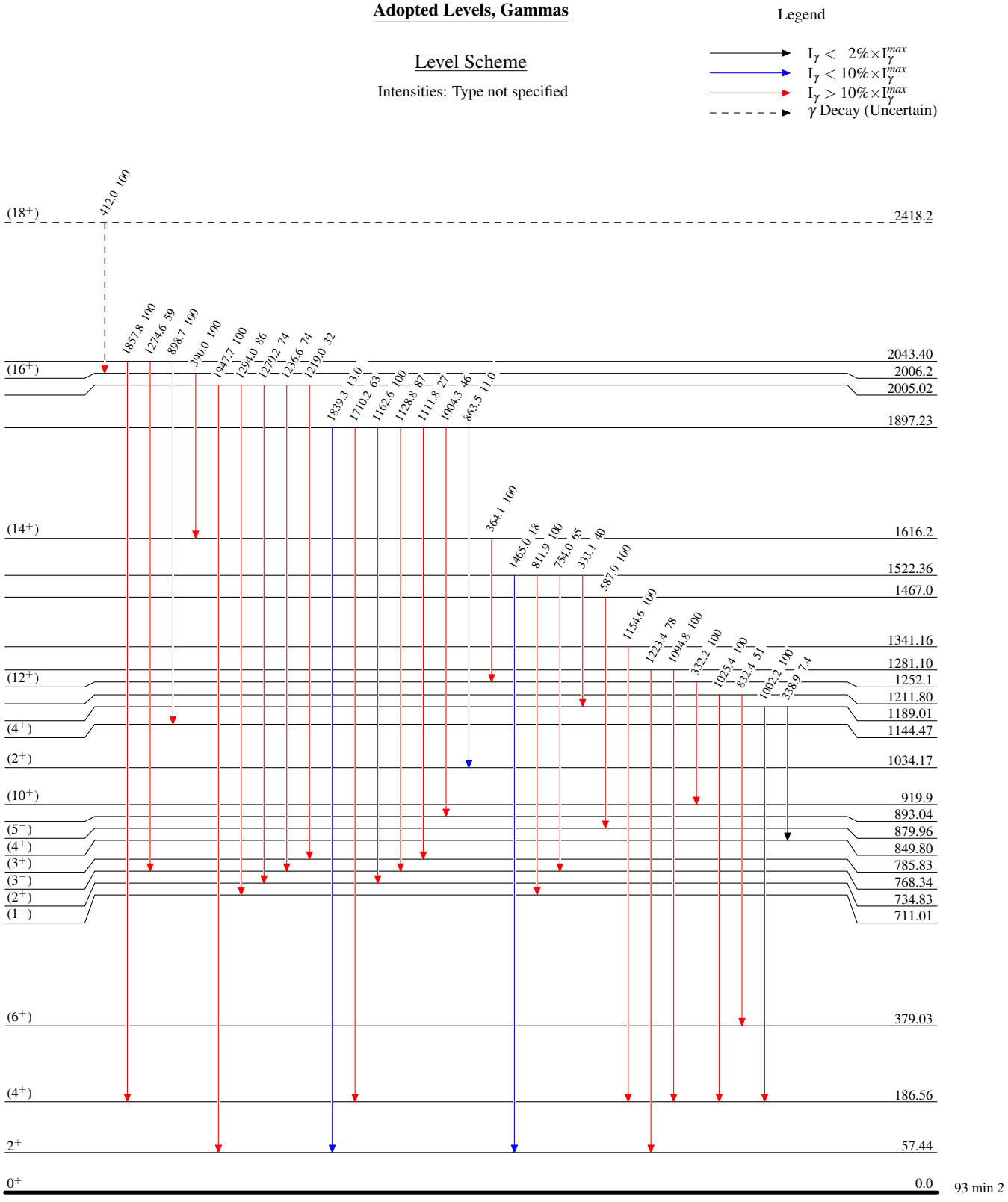
E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π
1522.36		754.0 *3*	65 *16*	768.34	(3^-)
		811.9 *3*	100 *10*	711.01	(1^-)
		1465.0 *5*	18 *5*	57.44	2^+
1616.2	(14^+)	364.1 *5*	100	1252.1	(12^+)
1897.23		863.5 *3*	11.0 *12*	1034.17	(2^+)
		1004.3 *3*	46 *5*	893.04	
		1111.8 *3*	27 *3*	785.83	(3^+)
		1128.8 *2*	87 *6*	768.34	(3^-)
		1162.6 *2*	100 *7*	734.83	(2^+)
		1710.2 *2*	63 *7*	186.56	(4^+)
		1839.3 *5*	13.0 *20*	57.44	2^+
2005.02		1219.0 *5*	32 *4*	785.83	(3^+)
		1236.6 *3*	74 *7*	768.34	(3^-)
		1270.2 *2*	74 *7*	734.83	(2^+)
		1294.0 *2*	86 *9*	711.01	(1^-)
		1947.7 *3*	100 *10*	57.44	2^+
2006.2	(16^+)	390.0 *5*	100	1616.2	(14^+)
2043.40		898.7 *2*	100 *10*	1144.47	(4^+)
		1274.6 *3*	59 *9*	768.34	(3^-)
		1857.8 *3*	100 *10*	186.56	(4^+)
2418.2?	(18^+)	412.0# *5*	100	2006.2	(16^+)

† From ^{230}Fr β^- decay (1987Ku04), unless otherwise specified.
‡ Multiply placed with intensity suitably divided.
# Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Type not specified



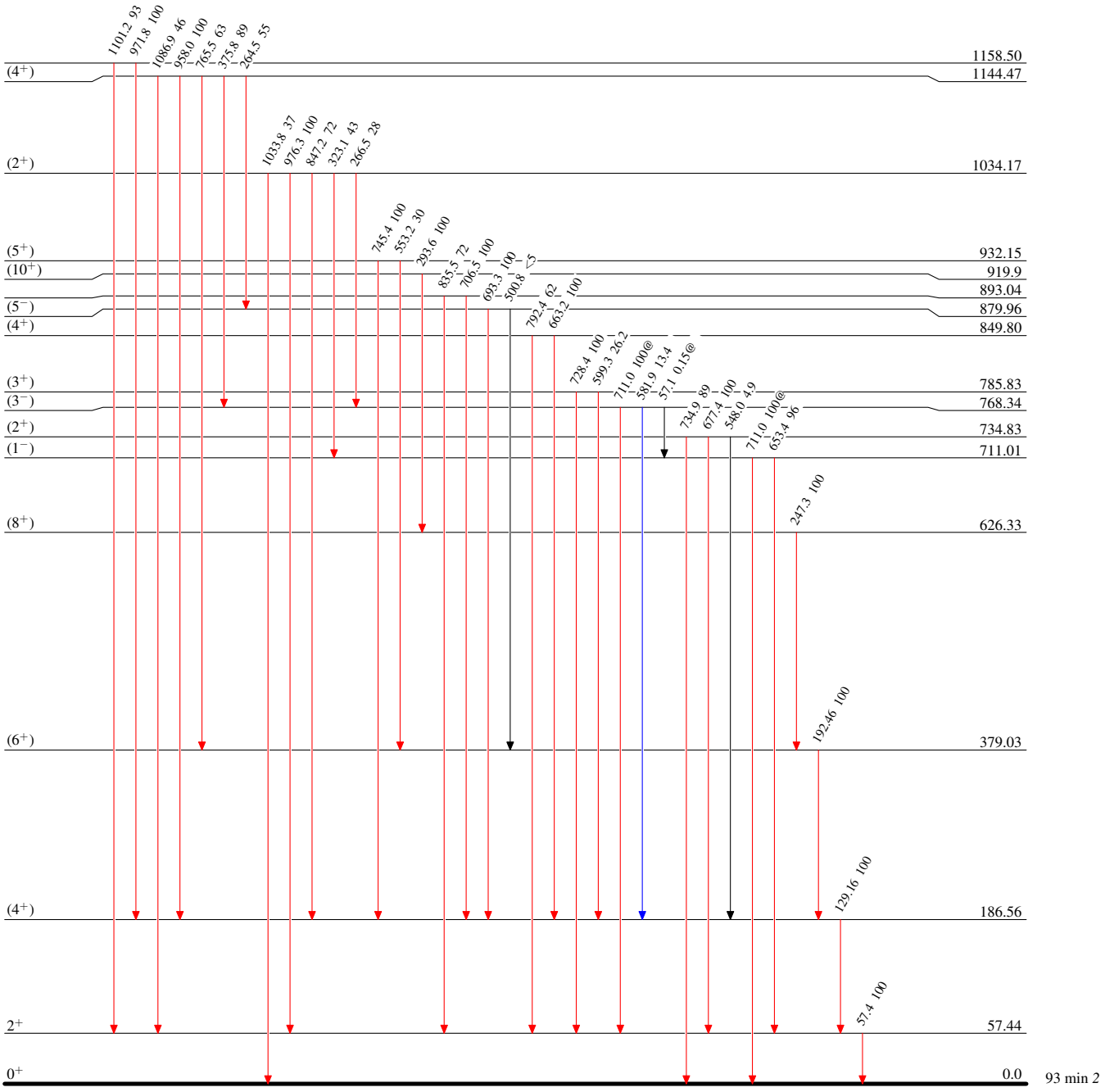
$^{230}_{88}Ra_{142}$

Adopted Levels, Gammas

Level Scheme (continued)

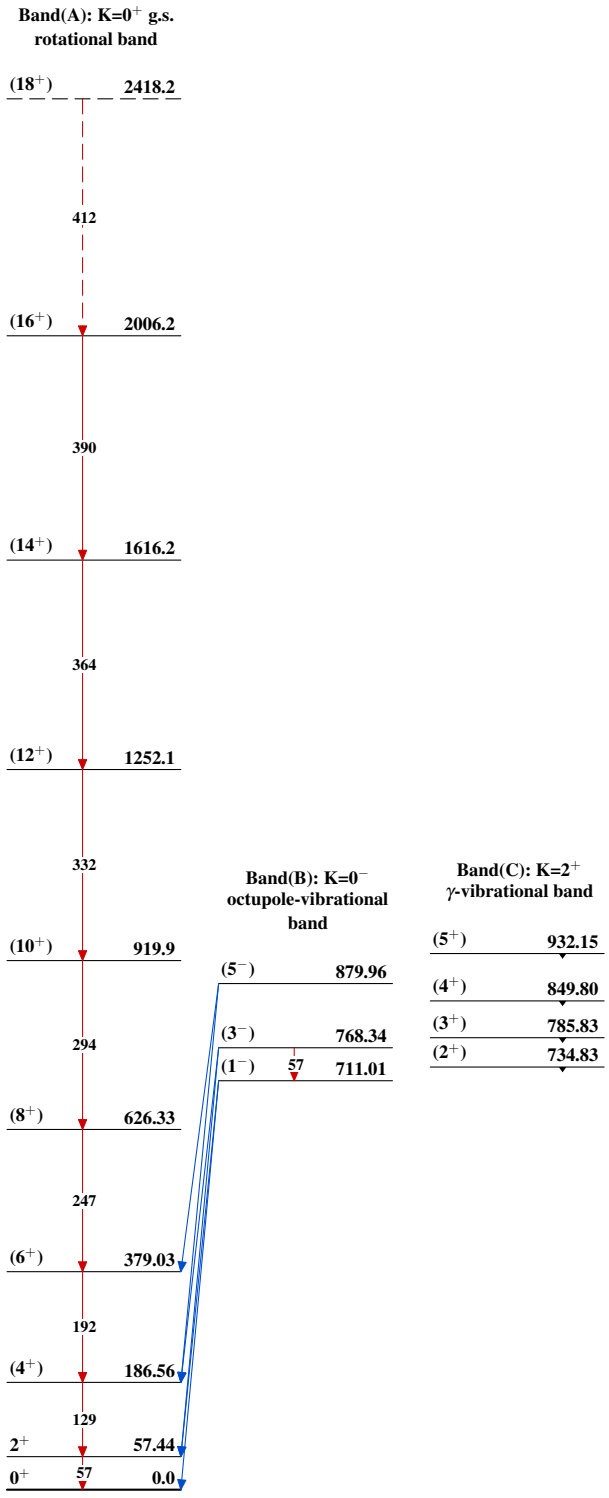
Intensities: Type not specified
@ Multiply placed: intensity suitably divided

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



$^{230}_{88}Ra_{142}$

Adopted Levels, Gammas



$^{230}_{88}Ra_{142}$