^{208}Pb(^{18}O,4nγ) 1995Sm06,1983Wa20,1988HaZJ

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, M. S. Basunia, Jun Chen et al. ,	NDS 192,315 (2023)	25-Sep-2023

This dataset prepared by B. Singh and P. Dimitriou.

1995Sm06: ^{208}Pb(^{18}O,4n),E(^{18}O)=95 MeV. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma(\theta)$ using Eurogam phase I array of 40 Ge detectors at the tandem Van de Graaff accelerator of the Nuclear Structure Facility, Daresbury Laboratory. Authors stated that spin-parity assignments up to 20$^+$ were supported by $\gamma\gamma(\theta)$ data. Authors also reported shape transition at spin (24$^+$), consistent with theoretical predictions by 1987Na10.

1983Wa20: ^{208}Pb(^{18}O,4nγ), ^{208}Pb(^{17}O,3nγ),E≈95 MeV, pulsed beams. Measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma(\theta)$, excitation functions, multiplicities using four Ge(Li) detectors for $\gamma\gamma$-coin, and two Ge(Li) detectors and two NaI(T1) detectors for $\gamma(\theta)$ measurements at the Australian National University 14UD tandem accelerator.

1985Bo32, 1988ScZF (also 1988HaZJ): ^{208}Pb(^{18}O,4nγ), E(^{18}O)=88-96 MeV, with the main measurements at 95 MeV. Measured Eγ, Iγ, (recoils)γ-coin, $\gamma\gamma$-coin, (recoils)(ce)-coin, and level half-lives by recoil-shadow method at the MP-Tandem accelerator at the Max-Planck Institut fur Kernphysik in Heidelberg using a magnetic solenoid spectrometer and a Si(Li) detector for conversion electrons and two Ge detectors for γ rays. Production σ for ^{222}Th was also measured.

1987KoZF: ^{208}Pb(^{18}O,4nγ),E(^{18}O)=95 MeV. Measured Eγ, Iγ, $\gamma\gamma$-coin using an array of 12 Ge detectors with BaF_2 anti-Compton suppressors, two planar Ge detectors and BaF_2 4π crystal ball (Chateau de Cristal) at the MP tandem accelerator at CRN, Strasbourg. Deduced g.s. band up to 18$^+$ and octupole band up to 21$^-$.

1997Jo15 (also 1996Bu26, 1997Ju03 conference articles): ^{208}Pb(^{18}O,4nγ),E(^{18}O)=95 MeV. Measured conversion electrons, E(ce), I(ce), (ce)(ce)-coin for transitions from levels up to 12$^+$ in the g.s. band and up to 11$^-$ in the octupole band using SACRED array with a solenoidal spectrometer at the University of Jyvaskyla K-130 cyclotron facility.

From the experimental B(E1)/B(E2) ratios, deduced from the γ intensities, the octupole deformation of 0.25 was inferred by 1986Sc18. Several theoretical calculations have been reported for the deformation parameters of the ground state and high-spin states. For references, consult the NSR database at www.nndc.bnl.gov/nsr/.

^{222}Th Levels

B(E1)/B(E2) values are listed in b^{-1} units.

E(level)[†]	J$^\pi$[@]	T$_{1/2}$[#]	Comments
0.0[&]	0$^+$		
182.9[&] *2*	2$^+$	240 ps *20*	Deduced β_2=0.15 *5* (1985Bo32) from level half-life.
439.2[&] *3*	4$^+$	46 ps *6*	
466.6[a] *6*	3$^-$		E(level): level from 1988ScZF.
650.4[a] *4*	5$^-$		
749.3[&] *4*	6$^+$	<51 ps	T$_{1/2}$: <45 ps *6* (1985Bo32). B(E1)/B(E2)=0.00016 *3* (1983Wa20), 0.00011 *2* (1985Bo32).
922.6[a] *4*	7$^-$		B(E1)/B(E2)=0.00018 *7* (1983Wa20), 0.00011 *3* (1985Bo32).
1092.8[&] *5*	8$^+$		B(E1)/B(E2)=0.00015 *3* (1983Wa20), 0.00025 *5* (1985Bo32).
1254.2[a] *5*	9$^-$		B(E1)/B(E2)=0.00014 *3* (1983Wa20), 0.00014 *3* (1985Bo32).
1460.8[&] *5*	10$^+$		B(E1)/B(E2)=0.00029 *16* (1983Wa20), 0.00026 *6* (1985Bo32).
1477.2[‡] *11*			
1502.4[‡] *11*			
1541.4[‡] *11*			
1593.3[‡] *11*			
1622.0[a] *5*	11$^-$		B(E1)/B(E2)=0.00021 *6* (1983Wa20), 0.00026 *7* (1985Bo32).
1682.6[‡] *11*			
1774.6[‡] *11*			
1850.6[&] *5*	12$^+$		B(E1)/B(E2)=0.00022 *11* (1983Wa20), 0.00019 *3* (1985Bo32).

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^{208}Pb(^{18}O,4nγ) 1995Sm06,1983Wa20,1988HaZJ (continued)

^{222}Th Levels (continued)

E(level)[†]	Jπ[@]	Comments
1906.2[‡] *11*		
1926.2[‡] *11*		
1935.2[‡] *11*		
2015.1[a] *6*	13⁻	B(E1)/B(E2)=0.00019 *5* (1983Wa20), 0.00026 *5* (1985Bo32).
2035.8[‡] *11*		
2259.7[&] *6*	14⁺	B(E1)/B(E2)=0.00009 *3* (1983Wa20), 0.00022 *4* (1985Bo32).
2304.8[‡] *11*		
2312.6[‡] *12*		
2404.0[‡] *11*		
2431.7[a] *6*	15⁻	B(E1)/B(E2)=0.00020 *6* (1983Wa20), 0.00034 *8* (1985Bo32).
2688.0[&] *6*	16⁺	B(E1)/B(E2)=0.00008 *3* (1983Wa20).
2873.1[a] *6*	17⁻	B(E1)/B(E2)=0.00022 *8* (1983Wa20).
3133.9[&] *6*	18⁺	
3340.9[a] *7*	19⁻	
3596.8[&] *7*	20⁺	
3836.0[a] *7*	21⁻	
4078.6[&] *7*	22⁺	
4348.5[a] *7*	23⁻	
4579.2[&] *7*	(24⁺)	
4882.1?[a] *8*	(25⁻)	
5099.2?[&] *9*	(26⁺)	

[†] From least-squares fit to Eγ data, assuming ΔEγ=0.5 keV when Eγ stated to nearest tenth of a keV, and ΔEγ=1 keV, when stated to nearest keV.
[‡] From 1988ScZF. This level is not included in the Adopted Levels, Gammas dataset, as not much information is available in 1988ScZF.
[#] Measured by 1985Bo32 by recoil shadow method for conversion electrons.
[@] As proposed by 1995Sm06. Others: 1988HaZJ, 1985Bo32, 1983Wa20.
[&] Band(A): K^π=0 g.s. band. Reflection-asymmetric configuration remains yrast up to 24⁺ (1995Sm06).
[a] Band(B): K^π=0⁻ octupole vibrational band. Reflection-asymmetric configuration remains yrast up to 24⁺ (1995Sm06).

γ(^{222}Th)

Iγ(28°)/Iγ(90°), γ(θ) asymmetry ratios read by evaluators from Fig. 8 in 1983Wa20, from which it appears that the asymmetry ratio is ≈0.95 for ΔJ=1, dipole transitions, and ≈1.3 for ΔJ=2, quadrupole transitions.
Iγ(154°)/Iγ(85°), γ(θ) asymmetry ratios are from Tables III and III.2 in 1988ScZF. From the listed values, it appears that the asymmetry ratio is ≈1.0 for ΔJ=1, dipole transitions, and ≈1.4 for ΔJ=2, quadrupole transitions.

E_γ[†]	I_γ[#]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[@]	α[b]	$I_{(\gamma+ce)}$[‡]	Comments
98.7 *3*	33 *3*	749.3	6⁺	650.4	5⁻	(E1)	0.1215 *20*	37 *4*	Iγ(28°)/Iγ(90°)=0.92 *9* (1983Wa20). Mult.: ΔJ=1, dipole from γ(θ); (E1) from transition-intensity balance at the 749 level, and interband transition. Eγ=99.1, Iγ=30 *4*, I(γ+ce)=34 (1983Wa20). Eγ=99.1, I(γ+ce)=17 *2* (1985Bo32). Eγ=99 (1987KoZF). Eγ=99.0, I(γ+ce)=33.0 *40* (1988ScZF).

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^{208}Pb(^{18}O,4nγ) 1995Sm06,1983Wa20,1988HaZJ (continued)

γ(^{222}Th) (continued)

Eγ[†]	Iγ[#]	Ei(level)	J_i^π	E_f	J_f^π	Mult.[@]	α[b]	I(γ+ce)[‡]	Comments
[x]131.1[&]	11.0 19					(E1)[&]	0.258 4	13.9[&] 13	Same Eγ, I(γ+ce) listed in 1988ScZF. Iγ(154°)/Iγ(85°)=1.03 15 (1988ScZF).
[x]135.6								3.3 13	Eγ,I(γ+ce): from 1988ScZF. Iγ(154°)/Iγ(85°)=1.10 66 (1988ScZF).
[x]144.7[&]						E1[&]	0.2032 28	27.1[&] 22	α(L)exp=0.08 3 (1985Bo32) Same Eγ, I(γ+ce) listed in 1988ScZF. Iγ(154°)/Iγ(85°)=1.04 12 (1988ScZF).
[x]148.8								6.3 5	Eγ,I(γ+ce): From 1985Bo32. Same Eγ, I(γ+ce) listed in 1988ScZF. Iγ(154°)/Iγ(85°)=1.30 21 (1988ScZF).
161.1 3	30 6	1622.0	11⁻	1460.8	10⁺	E1	0.1577 23	35 7	α(L)exp<0.037 (1985Bo32) α(L)exp for 161.1γ+161.2γ. Eγ=161, Iγ=30 4, I(γ+ce)=30 (1983Wa20). Eγ=160.9, I(γ+ce)=20, 53 4 for doublet (1985Bo32). Eγ=161 (1987KoZF). Eγ=160.9, I(γ+ce)=28.4 17 (1988ScZF).
161.2 3	57 6	1254.2	9⁻	1092.8	8⁺	E1	0.1575 23	66 7	α(L)exp<0.037 (1985Bo32) α(L)exp for 161.1γ+161.2γ. Iγ(28°)/Iγ(90°)=0.90 6 (1983Wa20); Iγ(154°)/Iγ(85°)=1.03 10 (1988ScZF). Eγ=161.3, Iγ=40 4, I(γ+ce)=40 (1983Wa20). Eγ=161.5, I(γ+ce)=33, 53 4 for doublet (1985Bo32). Eγ=161 (1987KoZF). Eγ=161.2, I(γ+ce)=49.1 29 (1988ScZF).
164.4 3	33 7	2015.1	13⁻	1850.6	12⁺	(E1)	0.1503 22	38 8	Iγ(154°)/Iγ(85°)=0.80 3 (1988ScZF). Mult.: ΔJ=1, dipole from γ(θ); (E1) from transition-intensity balance considerations at the 749 level, and interband transition. Eγ=164.7, Iγ=15 3, I(γ+ce)=15 (1983Wa20). Eγ=164.7, I(γ+ce)=15 2 (1985Bo32). Eγ=165 (1987KoZF). Eγ=164.6, I(γ+ce)=22.2 23 (1988ScZF).
170.1 3	68 7	1092.8	8⁺	922.6	7⁻	E1	0.1385 20	77 8	α(L)exp<0.098 (1985Bo32) Iγ(28°)/Iγ(90°)=1.0 8 (1983Wa20); Iγ(154°)/Iγ(85°)=1.00 10 (1988ScZF). Eγ=170.5, Iγ=44 6, I(γ+ce)=45 (1983Wa20). Eγ=170.3, I(γ+ce)=33 3 (1985Bo32). Eγ=171 (1987KoZF). Eγ=170.4, I(γ+ce)=58.5 32 (1988ScZF).
171.7 3	19 4	2431.7	15⁻	2259.7	14⁺	[E1]	0.1355 20	22 5	Eγ=172.2, Iγ=18 4, I(γ+ce)=18 (1983Wa20). Eγ=172.3, I(γ+ce)=11, 54 5 for

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^{208}Pb(^{18}O,4nγ) 1995Sm06,1983Wa20,1988HaZJ (continued)

γ(^{222}Th) (continued)

Eγ[†]	Iγ[#]	Ei(level)	J^π_i	Ef	J^π_f	Mult.[@]	α[b]	I(γ+ce)[‡]	Comments
									doublet (1985Bo32). Eγ=172 (1987KoZF). Eγ=172.0, I(γ+ce)=14.3 *9* (1988ScZF).
173.1 *3*	60 *6*	922.6	7⁻	749.3	6⁺	E1	0.1329 *19*	68 *7*	α(K)exp<0.164 (1985Bo32) Iγ(28°)/Iγ(90°)=0.83 *6* (1983Wa20); Iγ(154°)/Iγ(85°)=1.01 *8* (1988ScZF). Eγ=173.5, Iγ=64 *4*, I(γ+ce)=65 (1983Wa20). Eγ=174 (1987KoZF). Eγ=173.3, I(γ+ce)=67.5 *41* (1988ScZF).
182.9 *2*	91 *9*	182.9	2⁺	0.0	0⁺	E2	0.920 *14*	174 *18*	α(K)exp=0.18 *6* (1985Bo32) Iγ(28°)/Iγ(90°)=1.20 *7* (1983Wa20); Iγ(154°)/Iγ(85°)=1.21 *10* (1988ScZF). Eγ=183.2, I(γ+ce)=140 (1983Wa20). Eγ=183.3, I(γ+ce)=100 (1985Bo32). Eγ=183 (1987KoZF). Eγ=183.2, I(γ+ce)=100 (1988ScZF).
185.1 *3*	19 *4*	2873.1	17⁻	2688.0	16⁺	(E1)	0.1133 *16*	21 *4*	Iγ(28°)/Iγ(90°)=0.90 *15* (1983Wa20); Iγ(154°)/Iγ(85°)=0.96 *17* (1988ScZF). Mult.: ΔJ=1, dipole from γ(θ); (E1) from transition-intensity balance at the 749 level, and interband transition. Eγ=185.4, Iγ=11 *3*, I(γ+ce)=11 (1983Wa20). Eγ=185 (1987KoZF). Eγ=185.0, I(γ+ce)=7.8 *9* (1988ScZF).
[x]199.6[&]	3.7 *9*					[E1][&]	0.0948 *13*	4[&] *1*	
206.4 *3*	62 *6*	1460.8	10⁺	1254.2	9⁻	E1	0.0876 *13*	67 *7*	α(K)exp<0.052 (1985Bo32) Iγ(28°)/Iγ(90°)=0.90 *10* (1983Wa20); Iγ(154°)/Iγ(85°)=0.92 *6* (1988ScZF). Eγ=207.0, Iγ=45 *4*, I(γ+ce)=45 (1983Wa20). Eγ=206.4, I(γ+ce)=31 *3* (1985Bo32). Eγ=207 (1987KoZF). Eγ=206.4, I(γ+ce)=47.1 *23* (1988ScZF).
206.9 *3*	21 *4*	3340.9	19⁻	3133.9	18⁺	[E1]	0.0871 *13*	23 *5*	Eγ=(201) (1987KoZF). Eγ=207.5, I(γ+ce)=5.0 *3* (1988ScZF).
211.1 *3*	67 *7*	650.4	5⁻	439.2	4⁺	E1	0.0831 *12*	73 *7*	α(K)exp=0.05 *2* (1985Bo32) Iγ(28°)/Iγ(90°)=1.10 *6* (1983Wa20); Iγ(154°)/Iγ(85°)=1.07 *9* (1988ScZF). Eγ=211.4, I(γ+ce)=66 (1983Wa20). Eγ=211.3, I(γ+ce)=39 *3* (1985Bo32). Eγ=211 (1987KoZF). Eγ=211.2, I(γ+ce)=64.4 *50* (1988ScZF).

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^{208}Pb(^{18}O,4nγ) 1995Sm06,1983Wa20,1988HaZJ (continued)

γ(^{222}Th) (continued)

E_γ[†]	I_γ[#]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[@]	α[b]	$I_{(\gamma+ce)}$[‡]	Comments
217[c]		5099.2?	(26$^+$)	4882.1?	(25$^-$)				E_γ: from 1988ScZF.
228.5 *3*	36 *7*	1850.6	12$^+$	1622.0	11$^-$	E1	0.0691 *10*	38 *8*	α(K)exp=0.043 *14* (1985Bo32) Iγ(28°)/Iγ(90°)=0.83 *11* (1983Wa20); Iγ(154°)/Iγ(85°)=0.99 *10* (1988ScZF). Eγ=228.9, Iγ=23 *4*, I(γ+ce)=23 (1983Wa20). Eγ=228.6, I(γ+ce)=20 *2* (1985Bo32). Eγ=229 (1987KoZF). Eγ=228.5, I(γ+ce)=23.3 *11* (1988ScZF).
230.7 *3*	5.6 *17*	4579.2	(24$^+$)	4348.5	23$^-$	[E1]	0.0676 *10*	6 *2*	Eγ=228, I(γ+ce)≈1 (1988ScZF).
^{x}231.8[&]	3.7 *9*					[E1][&]	0.0668 *9*	4[&] *1*	
239.2 *3*	10 *3*	3836.0	21$^-$	3596.8	20$^+$	[E1]	0.0622 *9*	11 *3*	Iγ(154°)/Iγ(85°)=1.17 *25* (1988ScZF); γ(θ) not quite consistent ΔJ=1, dipole. Eγ=239.2, I(γ+ce)=3.6 *10* (1988ScZF).
242.3 *3*	14 *4*	4078.6	22$^+$	3836.0	21$^-$	[E1]	0.0603 *9*	15 *5*	Eγ=243, I(γ+ce)≈2 (1988ScZF).
244.6 *3*	27 *5*	2259.7	14$^+$	2015.1	13$^-$	E1	0.0590 *8*	29 *6*	α(K)exp<0.058 (1985Bo32) Iγ(28°)/Iγ(90°)=0.87 *15* (1983Wa20); Iγ(154°)/Iγ(85°)=1.03 *13* (1988ScZF). Eγ=244.5, Iγ=14 *3*, I(γ+ce)=14 (1983Wa20). Eγ=244.6, I(γ+ce)=15 *1* (1985Bo32). Eγ=245 (1987KoZF). Eγ=244.3, I(γ+ce)=16.4 *13* (1988ScZF, doublet).
^{x}251.0[&]	17.7 *15*					[E2][&]	0.298 *4*	23[&] *2*	Eγ=251.0, I(γ+ce)=15.4 *23* (1988ScZF). Iγ(154°)/Iγ(85°)=1.07 *21* (1988ScZF).
256.0 *3*	18 *5*	3596.8	20$^+$	3340.9	19$^-$	[E1]	0.0532 *8*	19 *6*	Eγ=255, I(γ+ce)≈4 (1988ScZF).
256.2 *3*	18 *5*	2688.0	16$^+$	2431.7	15$^-$	[E1]	0.0531 *8*	19 *6*	Eγ=257, Iγ=10 *3*, I(γ+ce)≈10 (1983Wa20). Eγ=257 (1987KoZF). Eγ=256.1, I(γ+ce)=10.0 *10* (1988ScZF).
256.3 *2*	100 *10*	439.2	4$^+$	182.9	2$^+$	E2	0.278 *4*	128 *13*	α(K)exp=0.07 *3* (1985Bo32) Iγ(28°)/Iγ(90°)=1.28 *5* (1983Wa20); Iγ(154°)/Iγ(85°)=1.24 *13* (1988ScZF). Eγ=256.6, I(γ+ce)=125 (1983Wa20). Eγ=256.5, I(γ+ce)=106 *8* (1985Bo32). Eγ=257 (1987KoZF). Eγ=256.5, I(γ+ce)=118.0 *40* (1988ScZF).
260.6 *3*	19 *4*	3133.9	18$^+$	2873.1	17$^-$	(E1)	0.0511 *7*	20 *4*	Iγ(154°)/Iγ(85°)=0.60 *20*

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^{208}Pb(^{18}O,4nγ) 1995Sm06,1983Wa20,1988HaZJ (continued)

γ(^{222}Th) (continued)

E_γ[†]	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[@]	α[b]	$I_{(\gamma+ce)}$[‡]	Comments
									(1988ScZF). Mult.: from $\gamma(\theta)$ and ΔJ^π. Eγ=260 (1987KoZF). Eγ=260.2, I(γ+ce)=8.1 *23* (1988ScZF).
[x]260.9[&]	8.7 *18*					[E1,E2][&]	0.15 *10*	10[&] *2*	Mult.: [E1] or [E2]. $I_{(\gamma+ce)}$: 8 *1* if E1, 12 *1* if E2.
269.8 *3*	4.8 *14*	4348.5	23$^-$	4078.6	22$^+$	[E1]	0.0472 *7*	5.0 *15*	Eγ=273, I(γ+ce)≈1 (1988ScZF).
272.4 *3*	0.81 *24*	922.6	7$^-$	650.4	5$^-$	(E2)	0.2280 *33*	1.0 *3*	Iγ(154°)/Iγ(85°)=1.57 *15* (1988ScZF). Eγ=272.8, Iγ=38.3, I(γ+ce)≈10 (1983Wa20). Eγ=272.5, I(γ+ce)=9 *1* (1985Bo32). Eγ=273 (1987KoZF). Eγ=272.5, I(γ+ce)=5.9 *8* (1988ScZF).
283.7	4.7 *15*	466.6	3$^-$	182.9	2$^+$	[E1]	0.0421 *7*	4.9 *15*	E_γ,$I_{(\gamma+ce)}$: from 1988ScZF.
[x]295.5[&]	5.9 *14*					[E1,E2][&]	0.11 *7*	6.5[&] *15*	Mult.: [E1] or [E2]. $I_{(\gamma+ce)}$: 5 *1* if E1, 8 *1* if E2.
304[c]		4882.1?	(25$^-$)	4579.2	(24$^+$)				E_γ: from 1988ScZF.
310.2 *3*	41 *4*	749.3	6$^+$	439.2	4$^+$	E2	0.1524 *22*	47 *5*	α(K)exp=0.044 *14* (1985Bo32) Iγ(28°)/Iγ(90°)=1.32 *10* (1983Wa20); Iγ(154°)/Iγ(85°)=1.40 *14* (1988ScZF). Eγ=310.5, Iγ=44 *5*, I(γ+ce)=51 (1983Wa20). Eγ=310.2, I(γ+ce)=35 *3* (1985Bo32). Eγ=311 (1987KoZF). Eγ=310.2, I(γ+ce)=45.7 *34* (1988ScZF).
[x]321.9[&]	5.3 *9*					E2[&]	0.1366 *19*	6[&] *1*	α(K)exp=0.09 *3* (1985Bo32)
331.6 *3*	13 *4*	1254.2	9$^-$	922.6	7$^-$	E2	0.1252 *18*	15 *5*	α(K)exp=0.09 *3* (1985Bo32) Iγ(154°)/Iγ(85°)=1.55 *14* (1988ScZF). Eγ=332.0, Iγ=21 *4*, I(γ+ce)=24 (1983Wa20). Eγ=331.8, I(γ+ce)=16 *1* (1985Bo32). Eγ=332 (1987KoZF). Eγ=331.8, I(γ+ce)=15.7 *21* (1988ScZF).
343.6 *3*	12 *4*	1092.8	8$^+$	749.3	6$^+$	E2	0.1131 *16*	13 *4*	α(K)exp=0.07 *2* (1985Bo32) Iγ(28°)/Iγ(90°)=1.35 30 (1983Wa20); Iγ(154°)/Iγ(85°)=1.10 *11* (1988ScZF). Eγ=343.7, Iγ=23 *4*, I(γ+ce)=26 (1983Wa20). Eγ=343.5, I(γ+ce)=9 *1* (1985Bo32). Eγ=344 (1987KoZF).

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^{208}Pb(^{18}O,4nγ) 1995Sm06,1983Wa20,1988HaZJ (continued)

γ(^{222}Th) (continued)

E_γ [†]	I_γ [#]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [@]	α [b]	$I_{(\gamma+ce)}$ [‡]	Comments
									Eγ=343.5, I(γ+ce)=15.6 *30* (1988ScZF).
367.8 *3*	16 *5*	1622.0	11⁻	1254.2	9⁻	E2	0.0934 *13*	18 *6*	α(L)exp=0.03 *1* (1985Bo32) α(L)exp could be for 368.1γ+367.8γ. Iγ(154°)/Iγ(85°)=1.52 *17* (1988ScZF). Eγ=368.3, Iγ=18 *5*, I(γ+ce)=20 (1983Wa20). Eγ=367.3, I(γ+ce)=9, 16 for doublet (1985Bo32). Eγ=368 (1987KoZF). Eγ=367.3, I(γ+ce)=12.1 *30* (1988ScZF).
368.1 *3*	9 *3*	1460.8	10⁺	1092.8	8⁺	E2	0.0932 *13*	10 *3*	α(L)exp=0.03 *1* (1985Bo32) α(L)exp could be for 368.1γ+367.8γ. Iγ(28°)/Iγ(90°)=1.50 *20* (1983Wa20). Eγ=368, Iγ=9 *5*, I(γ+ce)=10 (1983Wa20). Eγ=367.9, I(γ+ce)=7, 16 for doublet (1985Bo32). Eγ=368 (1987KoZF). Eγ=367.6, I(γ+ce)=8.0 *25* (1988ScZF).
389.8 *3*	4.6 *14*	1850.6	12⁺	1460.8	10⁺	(E2)	0.0798 *11*	5.0 *15*	Iγ(154°)/Iγ(85°)=1.49 *24* (1988ScZF). Eγ=390, Iγ=6 *3*, I(γ+ce)≈6 (1983Wa20). Eγ=389.5, I(γ+ce)=9 *1* (1985Bo32). Eγ=390 (1987KoZF). Eγ=389.4, I(γ+ce)=6.1 *7* (1988ScZF).
393.2 *3*	15 *5*	2015.1	13⁻	1622.0	11⁻	(E2)	0.0780 *11*	16 *5*	Iγ(154°)/Iγ(85°)=1.52 *15* (1988ScZF). Eγ=393.2, Iγ=13 *3*, I(γ+ce)=14 (1983Wa20). Eγ=393.6, I(γ+ce)=7, 16 for doublet (1985Bo32). Eγ=393 (1987KoZF). Eγ=392.9, I(γ+ce)=10.4 *12* (1988ScZF).
409.2 *3*	2.8 *10*	2259.7	14⁺	1850.6	12⁺	(E2)	0.0702 *10*	3 *1*	Iγ(154°)/Iγ(85°)=1.83 *17* (1988ScZF). Eγ=409.2, Iγ=9 *3*, I(γ+ce)=10 (1983Wa20). Eγ=409.2, I(γ+ce)=4 *1* (1985Bo32). Eγ=409 (1987KoZF). Eγ=409.0, I(γ+ce)=2.6 *6* (1988ScZF).
416.6 *3*	9 *3*	2431.7	15⁻	2015.1	13⁻	(E2)	0.0670 *9*	10 *3*	Iγ(154°)/Iγ(85°)=1.64 *13* (1988ScZF). Eγ=416.7, Iγ=17 *3*, I(γ+ce)=18 (1983Wa20). Eγ=416.9, I(γ+ce)=6 *1* (1985Bo32). Eγ=417 (1987KoZF). Eγ=416.4, I(γ+ce)=10.6 *17* (1988ScZF).
[x]423.3 [&]	7.5 *9*					[E2] [&]	0.0643 *9*	8 [&] *1*	Eγ=422.6, I(γ+ce)=11.1 *41* (1988ScZF, assignment to a nuclide unknown). Iγ(154°)/Iγ(85°)=2.51 *28* (1988ScZF).
428.5 *3*	4.7 *14*	2688.0	16⁺	2259.7	14⁺	(E2)	0.0624 *9*	5.0 *15*	Iγ(154°)/Iγ(85°)=1.62 *16* (1988ScZF). Eγ=429, Iγ=8 *3*, I(γ+ce)≈8 (1983Wa20). Eγ=429.1, I(γ+ce)=8 *1* (1985Bo32).

Continued on next page (footnotes at end of table)

^{208}Pb(^{18}O,4nγ) 1995Sm06,1983Wa20,1988HaZJ (continued)

γ(^{222}Th) (continued)

E_γ[†]	I_γ[#]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[@]	α[b]	$I_{(\gamma+ce)}$[‡]	Comments
									Eγ=429 (1987KoZF). Eγ=428.1, I(γ+ce)=5.9 *9* (1988ScZF).
441.3 *3*	6.6 *20*	2873.1	17⁻	2431.7	15⁻	(E2)	0.0579 *8*	7 *2*	Iγ(154°)/Iγ(85°)=1.00 *15* (1988ScZF). Eγ=441, Iγ=10 *3*, I(γ+ce)=11 (1983Wa20). Eγ=441.0, I(γ+ce)=11 *1*, possible doublet (1985Bo32). Eγ=441 (1987KoZF). Eγ=441.1, I(γ+ce)=6.6 *8* (1988ScZF).
446.0 *3*	7.6 *23*	3133.9	18⁺	2688.0	16⁺	[E2]	0.0564 *8*	8 *2*	Iγ(154°)/Iγ(85°)=0.65 *19* (1988ScZF); γ(θ) inconsistent with expected ΔJ=2, quadrupole. Eγ=441.0, I(γ+ce)=11 *1*, possible doublet (1985Bo32). Eγ=445 (1987KoZF). Eγ=445.7, I(γ+ce)=2.3 *9* (1988ScZF).
462[a]		2312.6		1850.6	12⁺			2[a]	
462.8 *3*	6.7 *20*	3596.8	20⁺	3133.9	18⁺	(E2)	0.0514 *7*	7 *2*	Iγ(154°)/Iγ(85°)=1.20 *19* (1988ScZF). Eγ=463.9, I(γ+ce)=4 *1* (1985Bo32). Eγ=462.5, I(γ+ce)=2.3 *3* (1988ScZF).
468.0 *3*	8.6 *26*	3340.9	19⁻	2873.1	17⁻	(E2)	0.0500 *7*	9 *3*	Iγ(154°)/Iγ(85°)=1.61 *15* (1988ScZF). Eγ=462 (1987KoZF). Eγ=467.7, I(γ+ce)=2.6 *4* (1988ScZF).
482.0 *3*	2.9 *9*	4078.6	22⁺	3596.8	20⁺	(E2)	0.0466 *7*	3 *1*	Iγ(154°)/Iγ(85°)=1.04 *20* (1988ScZF). Eγ=481.6, I(γ+ce)=1.3 *3* (1988ScZF).
ˣ485.8[&]	2.9 *10*					[E2][&]	0.0457 *6*	3[&] *1*	
494.9 *3*	2.9 *9*	3836.0	21⁻	3340.9	19⁻	(E2)	0.0437 *6*	3 *1*	Iγ(154°)/Iγ(85°)=1.41 *20* (1988ScZF). Eγ=(481) (1987KoZF). Eγ=494.8, I(γ+ce)=1.1 *3* (1988ScZF).
500.7 *3*	1.9 *6*	4579.2	(24⁺)	4078.6	22⁺	(E2)	0.0425 *6*	2.0 *7*	Iγ(154°)/Iγ(85°)=1.12 *20* (1988ScZF). Eγ=500.3, I(γ+ce)=0.9 *2* (1988ScZF).
512.6 *3*	2.9 *9*	4348.5	23⁻	3836.0	21⁻	[E2]	0.0402 *6*	3 *1*	Eγ=514 (1988ScZF).
520.0	0.7 *2*	5099.2?	(26⁺)	4579.2	(24⁺)	[E2]	0.0389 *6*	0.7 *2*	E_γ,$I_{(\gamma+ce)}$: from 1988ScZF.
533.3	0.8 *2*	4882.1?	(25⁻)	4348.5	23⁻	[E2]	0.0367 *5*	0.8 *2*	E_γ,$I_{(\gamma+ce)}$: from 1988ScZF. Other: Eγ=515.0, Iγ=3 *1* (1995Sm06, tentative γ).
575[a]		2035.8		1460.8	10⁺			3[a]	
652[a]		1906.2		1254.2	9⁻			1[a]	
672[a]		1926.2		1254.2	9⁻			1[a]	
681[a]		1935.2		1254.2	9⁻				
760[a]		1682.6		922.6	7⁻				
782[a]		2404.0		1622.0	11⁻				
844[a]		1593.3		749.3	6⁺			6[a]	
844[a]		2304.8		1460.8	10⁺			2[a]	
852[a]		1502.4		650.4	5⁻			5[a]	
852[a]		1774.6		922.6	7⁻			2[a]	

Continued on next page (footnotes at end of table)

^{208}Pb(^{18}O,4nγ) 1995Sm06,1983Wa20,1988HaZJ (continued)

γ(^{222}Th) (continued)

E_γ [†]	E_i(level)	J^π_i	E_f	J^π_f	$I_{(\gamma+ce)}$ [‡]
891[a]	1541.4		650.4	5^-	5[a]
1038[a]	1477.2		439.2	4^+	2[a]

[†] From 1995Sm06, except where noted. Authors stated that uncertainty varied from 0.2 for the most intense transition to 0.4 keV for transitions between the highest spin states. Evaluators assign 0.2 keV for the first two strong γ rays, and 0.3 keV for all the other Eγ values.

[‡] From 1995Sm06, except where noted. Stated uncertainties are 10% to 30%. Evaluators assign 10% for I(γ+ce)>50, 20% for I(γ+ce)>20-50, and 30% for I(γ+ce)<20.

[#] Deduced by evaluators from the I(γ+ce) values and α for assigned or assumed multipolarities.

[@] From ce data in 1985Bo32 and $\gamma(\theta)$ measurements of 1983Wa20. When only the $\gamma(\theta)$ data are available, tentative (E1) or (E2) are assigned based partly on the observation of strong low-energy γ transitions, as large conversion coefficients for M1 would hinder observation in γ-ray spectra, and for placed transitions, also based on long cascades of inter- and intra-band transitions in the two (reflection-asymmetric) bands of opposite parities Multipolarities in square brackets are assumed assignments from ΔJ^π.

[&] From 1985Bo32.

[a] From 1988ScZF. This γ is not included in the Adopted Levels, Gammas dataset.

[b] 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.

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

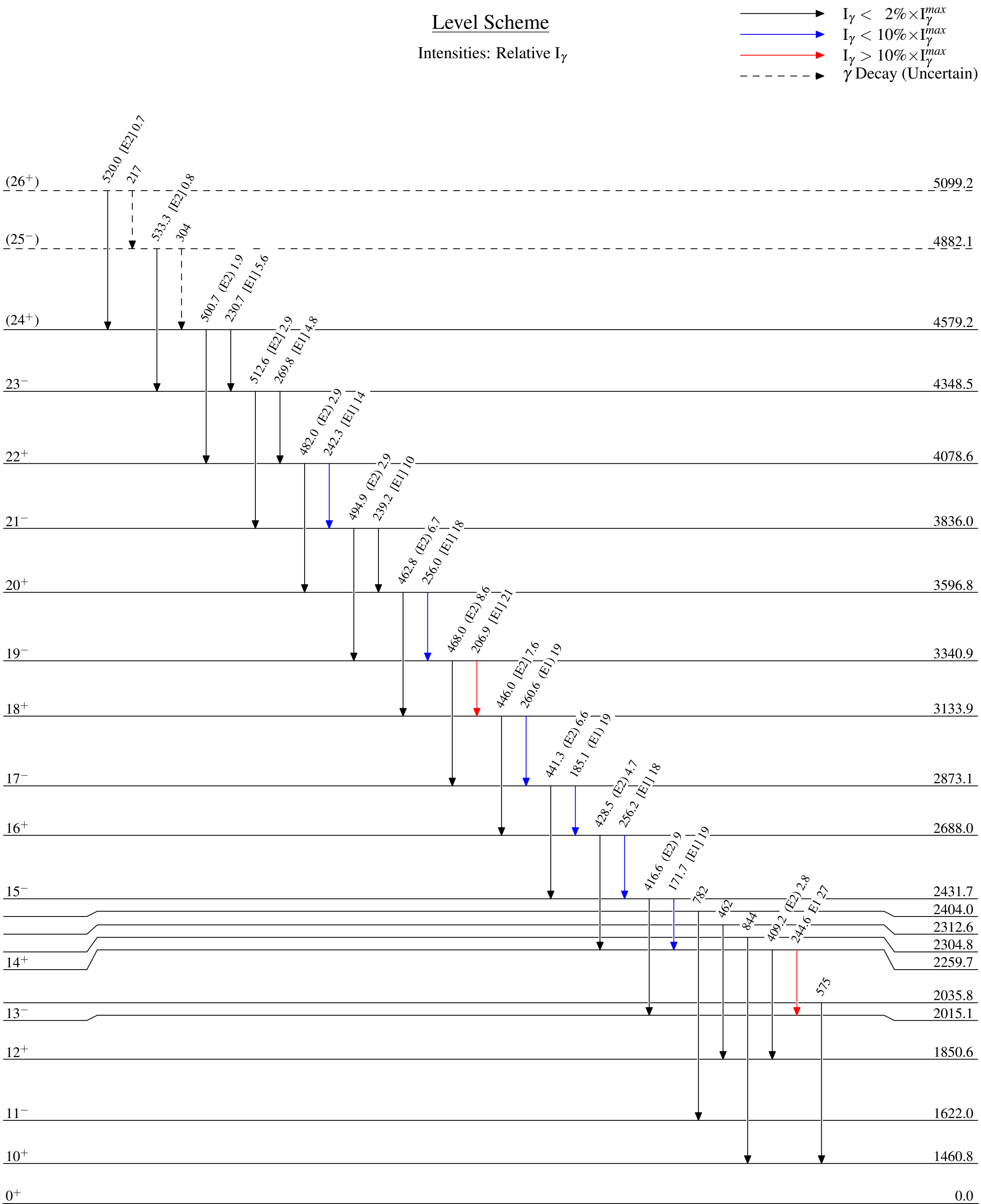
[x] γ ray not placed in level scheme.

$^{208}Pb(^{18}O,4n\gamma)$ 1995Sm06,1983Wa20,1988HaZJ

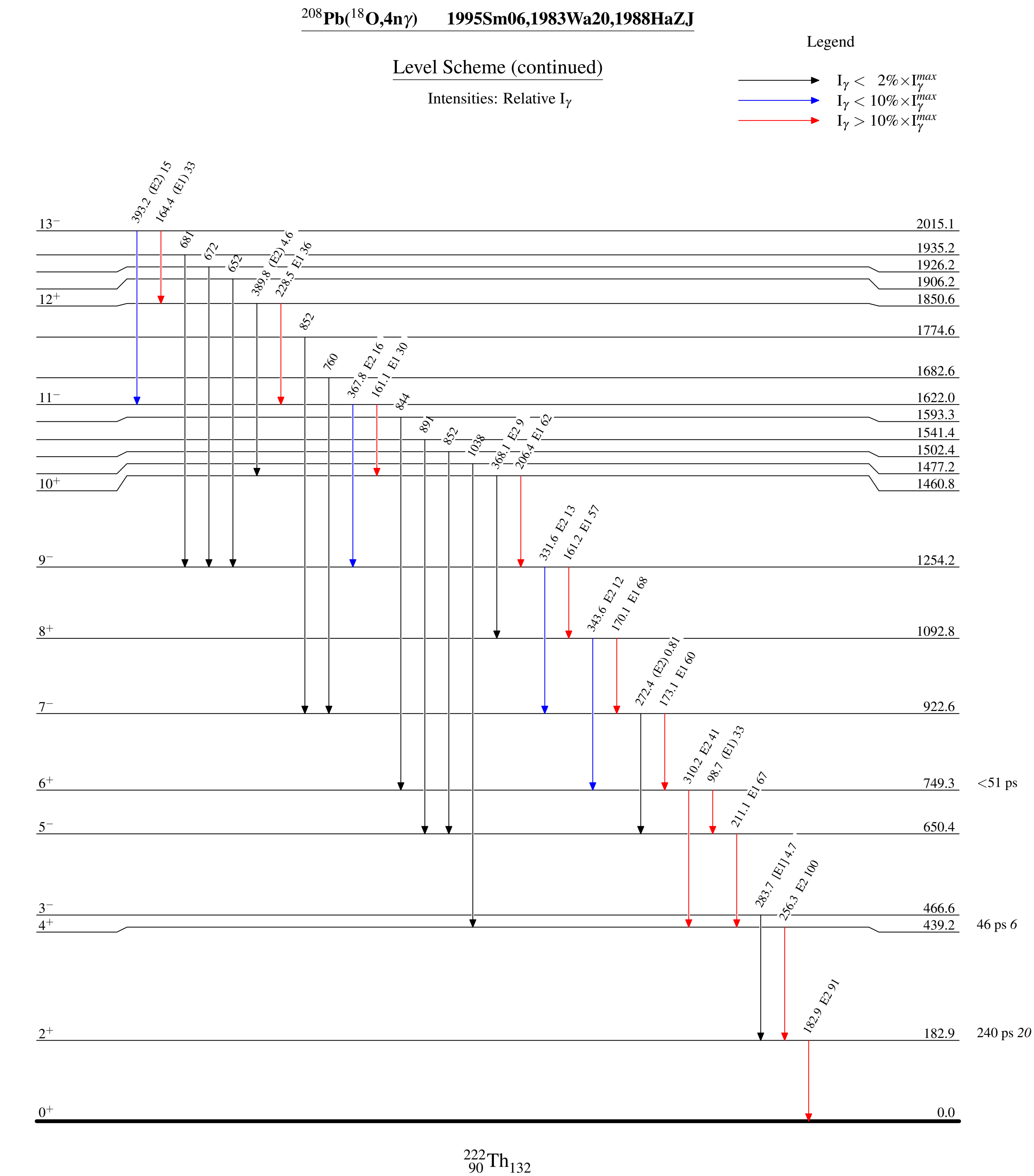
Legend

Level Scheme

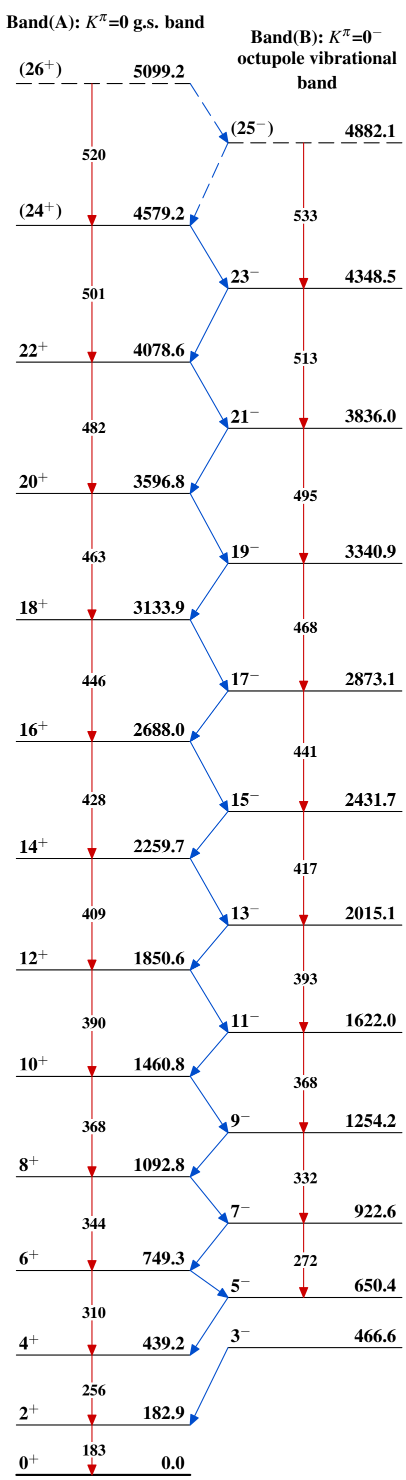
Intensities: Relative I_γ



$^{222}_{90}Th_{132}$


^{208}Pb(^{18}O,4nγ) 1995Sm06,1983Wa20,1988HaZJ
Level Scheme (continued)
Intensities: Relative Iγ
Legend
Iγ < 2%×Iγ max
Iγ < 10%×Iγ max
Iγ > 10%×Iγ max
13− 2015.1
1935.2
1926.2
1906.2
12+ 1850.6
1774.6
1682.6
11− 1622.0
1593.3
1541.4
1502.4
1477.2
10+ 1460.8
9− 1254.2
8+ 1092.8
7− 922.6
6+ 749.3 <51 ps
5− 650.4
3− 466.6
4+ 439.2 46 ps 6
2+ 182.9 240 ps 20
0+ 0.0
393.2 (E2) 15
164.4 (E1) 33
681
672
652
389.8 (E2) 4.6
228.5 E1 36
852
760
367.8 E2 16
161.1 E1 30
844
891
852
1038
368.1 E2 9
206.4 E1 62
331.6 E2 13
161.2 E1 57
343.6 E2 12
170.1 E1 68
272.4 (E2) 0.81
173.1 E1 60
310.2 E2 41
98.7 (E1) 33
211.1 E1 67
283.7 [E1] 4.7
256.3 E2 100
182.9 E2 91
$^{222}_{90}$Th$_{132}$

$^{208}Pb(^{18}O,4n\gamma)$ 1995Sm06,1983Wa20,1988HaZJ



$^{222}_{90}Th_{132}$