(HI,xnγ)

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Sukhjeet Singh, A. K. Jain, Jagdish K. Tuli	NDS 112,2851 (2011)	31-Mar-2011

^{208}Pb(^{18}O,4nγ), ^{208}Pb(^{17}O,3nγ) pulsed beams, E≈95 MeV (1983Wa20).
^{208}Pb(^{18}O,4nγ), E=88-96 MeV (1985Bo32).
^{208}Pb(^{18}O,4nγ), E=95 MeV (1987KoZF).
^{208}Pb(^{18}O,4nγ) E=94 MeV (1988ScZN,1988HaZJ).
^{208}Pb(^{18}O,4n) E=95 MeV (1996Bu53,1997Jo15).
^{208}Pb(^{18}O,4n) E=95 MeV (1995Sm06).
γγ, γ(θ): 1983Wa20, 1985Bo32.
From the experimental B(E1)/B(E2) ratios which were calculated from the γ intensities, the octupole deformation of 0.25 was inferred by 1986Sc18. Numerous theoretical calculations have been done for the deformation parameters of the ground state and high-spin states. See the Adopted Levels for the references. See 1996Bu53 and 1997Jo15 for study of yrast transition upto 12^+ using using sacred array for conversion electron spectroscopy. See also 1997Ju03, 1996Bu26.
1995Sm06 observed shape transition at spin (24^+). These results are consistent with the theoretical predictions of 1987Na10.

^{222}Th Levels

E(level)	Jπ‡	$T_{1/2}$†	E(level)	Jπ‡	E(level)	Jπ‡
0.0#	0^+		1461.1#	10^+	3340.7@	19^-
183.3#	2^+	240 ps *20*	1622.6@	11^-	3596.0#	20^+
439.8#	4^+	46 ps *6*	1850.7#	12^+	3835.5@	21^-
467.0@	3^-		2015.5@	13^-	4077.6#	22^+
651.0@	5^-		2259.7#	14^+	4349.5@	23^-
750.0#	6^+	≤45 ps	2431.9@	15^-	4577.9#	24^+
923.5@	7^-		2687.8#	16^+	4882.5?@	(25^-)
1093.5#	8^+		2873.0@	17^-	5097.9?#	(26^+)
1255.3@	9^-		3133.5#	18^+		

† Measured by 1985Bo32 by recoil shadow method.
‡ From 1983Wa20, 1985Bo32 and 1988HaZJ.
# Band(A): K=0 g.s. band.
@ Band(B): K=0 octupole vibrational band.

γ(^{222}Th)

E_γ†	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	α[a]	$I_{(\gamma+ce)}$‡
99.1	750.0	6^+	651.0	5^-	(E1)	0.122	33.0
x131.2@					E1	0.261	7& *1*
x144.9@					E1	0.206	7& *1*
160.9	1622.6	11^-	1461.1	10^+	E1	0.160	29
161.2	1255.3	9^-	1093.5	8^+	E1	0.160	50
164.6	2015.5	13^-	1850.7	12^+	E1	0.152	22.1
170.4	1093.5	8^+	923.5	7^-	E1	0.140	59.4
172.0	2431.9	15^-	2259.7	14^+	(E1)	0.137	14.5
173.3	923.5	7^-	750.0	6^+	E1	0.134	68.6
183.3	183.3	2^+	0.0	0^+	E2	0.931	100
185.0	2873.0	17^-	2687.8	16^+	(E1)	0.115	7.9
x199.6@					E1	0.096	4& *1*

Continued on next page (footnotes at end of table)

(HI,xnγ) (continued)

γ(^{222}Th) (continued)

E_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[a]	$I_{(\gamma+ce)}$[‡]	
206.4	1461.1	10^+	1255.3	9^-	E1	0.088	47	
207.5	3340.7	19^-	3133.5	18^+	[E1]	0.087	5	
211.2	651.0	5^-	439.8	4^+	E1	0.0836	65.7	
217[b]	5097.9?	(26^+)	4882.5?	(25^-)				
228	4577.9	24^+	4349.5	23^-	[E1]	0.0700	≈1	
228.5	1850.7	12^+	1622.6	11^-	E1	0.0700	23	
x231.8[@]					E1	0.0674	4[&]	*1*
239.2	3835.5	21^-	3596.0	20^+	[E1]	0.0627	3	
243	4077.6	22^+	3835.5	21^-	[E1]	0.0604	2	
244.3	2259.7	14^+	2015.5	13^-	E1	0.0597	17	
x251.0[@]					E2	0.304	23[&]	*2*
255	3596.0	20^+	3340.7	19^-	[E1]	0.0541	4	
256.1	2687.8	16^+	2431.9	15^-	E1	0.0536	10	
256.5	439.8	4^+	183.3	2^+	E2	0.283	118	
260.2	3133.5	18^+	2873.0	17^-	[E1]	0.0517	7.8	
272.5	923.5	7^-	651.0	5^-	(E2)	0.232	6.0	
273	4349.5	23^-	4077.6	22^+	[E1]	0.0464	≈1	
283.7	467.0	3^-	183.3	2^+			5.0	
x295.5[@]							5[&]	*1*
304[b]	4882.5?	(25^-)	4577.9	24^+				
310.2	750.0	6^+	439.8	4^+	E2	0.155	46.1	
x321.9[@]					E2	0.139	6[&]	*1*
331.8	1255.3	9^-	923.5	7^-	E2	0.127	15.9	
343.5	1093.5	8^+	750.0	6^+	E2	0.115	15.6	
367.3	1622.6	11^-	1255.3	9^-	E2	0.095	12.5	
367.6	1461.1	10^+	1093.5	8^+	E2	0.095	8.6	
389.6	1850.7	12^+	1461.1	10^+	E2	0.0813	6.1	
392.9	2015.5	13^-	1622.6	11^-	E2	0.0795	10.5	
409.0	2259.7	14^+	1850.7	12^+	E2	0.0715	2.6	
416.4	2431.9	15^-	2015.5	13^-	E2	0.0683	10.7	
x423.3[@]					E2	0.0654	8[&]	*1*
428.1	2687.8	16^+	2259.7	14^+	E2	0.0636	6.0	
441.1	2873.0	17^-	2431.9	15^-	E2	0.0589	6.6	
445.7	3133.5	18^+	2687.8	16^+	[E2]	0.0574	2.2	
462.5	3596.0	20^+	3133.5	18^+	E2	0.0524	1.6	
467.7	3340.7	19^-	2873.0	17^-	[E2]	0.0510	2.7	
481.6	4077.6	22^+	3596.0	20^+	[E2]	0.0474	1.3	
x485.8[@]					E2	0.0465	3[&]	*1*
494.8	3835.5	21^-	3340.7	19^-	[E2]	0.0445	1.1	
500.3	4577.9	24^+	4077.6	22^+	[E2]	0.0431	0.9	
514	4349.5	23^-	3835.5	21^-	[E2]	0.0404		
520.0	5097.9?	(26^+)	4577.9	24^+	[E2]	0.0393	0.7	
533.3	4882.5?	(25^-)	4349.5	23^-	[E2]	0.0371	0.8	

[†] Excellent agreement among the energies measured by 1983Wa20, 1985Bo32 and 1988HaZJ. Eγ′s of 1988HaZJ are given, except for those transitions not placed on the level scheme. See also 1984Bu38 and 1987KoZF.

[‡] Relative transition intensities, as shown by 1988HaZJ on their level scheme, are given, except where noted. The intensities are normalized to I(γ+ce)(183.3γ)=100.

[#] From ce work of 1985Bo32 and γ(θ) measurements of 1983Wa20. Multipolarities in square brackets are from the level scheme.

[@] From 1985Bo32. In the authors′ later work, 1988HaZJ, although some additional γ′s with lower intensities were placed on the

Continued on next page (footnotes at end of table)

(HI,xnγ) (continued)

$\gamma(^{222}Th)$ (continued)

level scheme, these unplaced γ's are not mentioned. It is not clear whether or not their assignments to the ^{222}Th level scheme should be considered questionable.

[&] From 1985Bo32.

[a] 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.

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

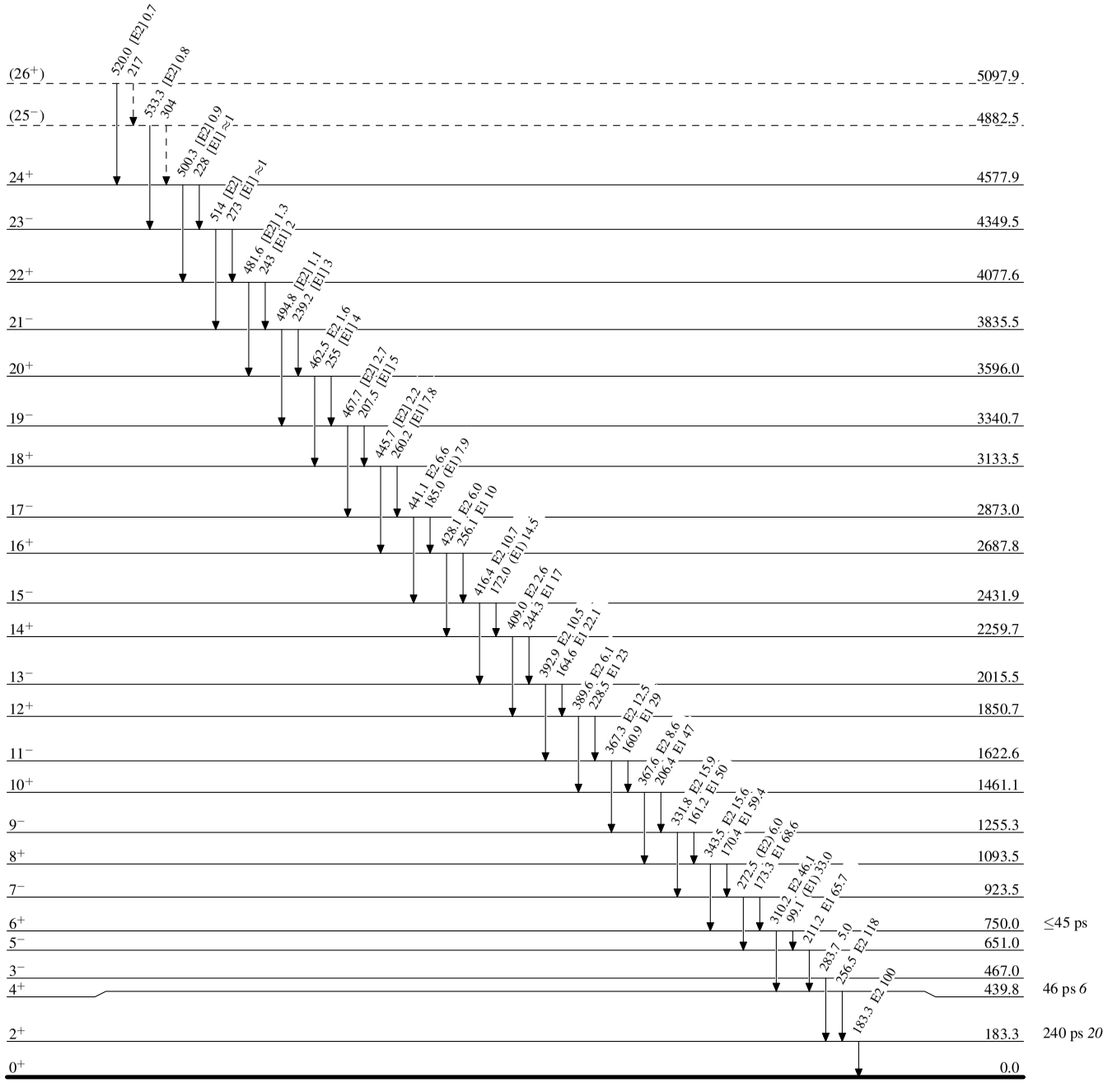
[x] γ ray not placed in level scheme.

(HI,xnγ)

Legend

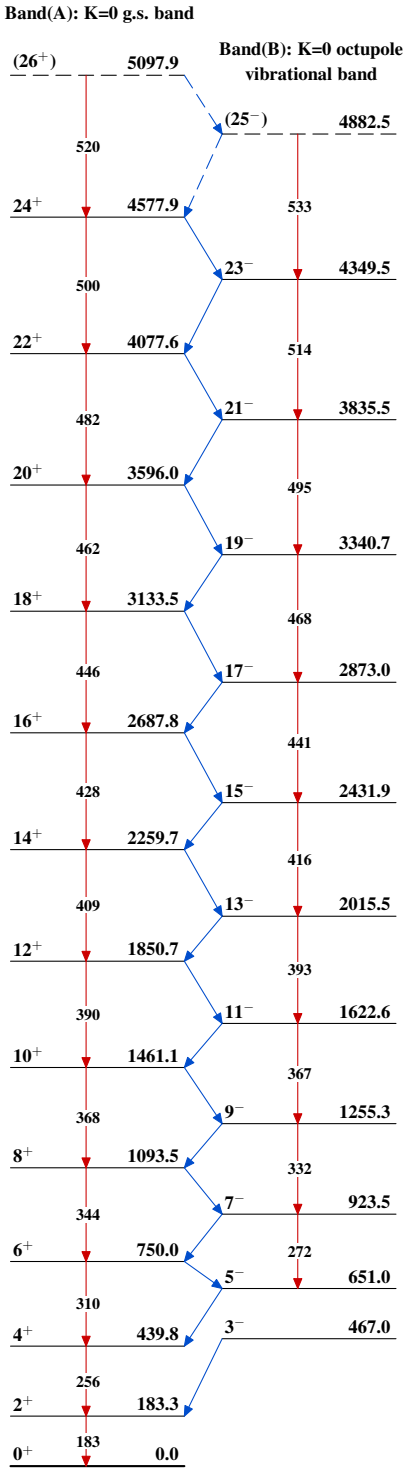
Level Scheme

γ Decay (Uncertain)



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

(HI,xnγ)



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