^{144}Sm(^{6}Li,4nγ) 1997Co23

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov, A. Rodionov and G. Shulyak	NDS 136, 163 (2016)	14-Jul-2016

1997Co23: ^{144}Sm(^{6}Li,4nγ), E=50 MeV (an array of five HPGe detectors each with anti-Compton shield and an in-beam electron spectrometer); measured Eγ, Iγ, ce, $\gamma\gamma$, (ce)γ coin, $\gamma\gamma(\theta)$(DCO). ^{146}Tb; deduced levels, J^{π}.

The level scheme of ^{146}Tb was established up to ≈5 MeV on the basis of $\gamma\gamma$ coincidence measurements. Multiplet configurations were assigned to the levels from shell model calculations (1997Co23).

^{146}Tb Levels

E(level)†	Jπ‡	$T_{1/2}$#	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0+x@	5⁻	24.1 s *5*	2188.3+x[c] *4*	12⁻	3691.6+x *6*	
18.8+x[a] *3*	6⁻		2577.8+x[c] *5*	13⁻	4114.7+x[e] *6*	18⁻
156.70+x[a] *20*	6⁻		3085.2+x[d] *5*	(13)⁻	4140.4+x *6*	
361.9+x[a] *3*	7⁻		3149.6+x[d] *5*	(13)⁻	4217.1+x *6*	17⁺
779.6+x[b] *3*	10⁺		3284.1+x[d] *5*	14⁻	4579.3+x[e] *6*	19⁻
804.6+x[b] *4*	8⁺		3367.7+x[d] *5*	15⁻	4690.0+x *6*	
1370.2+x[b] *4*	11⁺		3461.7+x[d] *5*	(14)⁻	5074.6+x& *6*	(19)
2147.2+x[c] *4*	11⁻		3487.6+x[d] *6*	16⁻		
2170.6+x[c] *4*	10⁻		3584.5+x[e] *6*	17⁻		

† From a least-squares fit to Eγ's, assuming by evaluators ΔEγ=0.2 keV for each γ ray, except as noted; normalized χ^2=0.18.

‡ From ce measurement (1997Co23).

From Iγ(t) (1993Al03).

@ The value is not known exactly. It is supposed as 150 keV *100* higher g.s. (from systematics, 2012Au07).

& Configuration=$\pi h^3_{11/2}\nu h^{-1}_{11/2}$ was stated of in text of 1997Co23. But $\pi h^3_{11/2}j^{-2}_0\nu h^{-1}_{11/2}$ shown at fig. 1 apparently is a misprint.

[a] Member of configuration: $\pi h_{11/2}\nu s_{1/2}$ or $\pi h_{11/2}\nu d^{-1}_{3/2}$.

[b] Member of configuration: $\pi h_{11/2}\nu h^{-1}_{11/2}$.

[c] Member of configuration: $\pi h^2_{11/2}\nu h^{-1}_{11/2}\otimes 3^-$ (^{146}Gd).

[d] Member of configuration: $\pi h^2_{11/2}\pi d^{-1}_{5/2}\nu h^{-1}_{11/2}$.

[e] Member of configuration: $\pi h^2_{11/2}\pi g^{-1}_{7/2}\nu h^{-1}_{11/2}$.

γ(^{146}Tb)

Eγ†	Iγ‡	Ei(level)	J^{π}_i	E_f	J^{π}_f	Mult.#	α[b]	I(γ+ce)@	Comments
(18.7 *10*)	2.6 *6*	18.8+x	6⁻	0.0+x	5⁻	[M1]	48 *9*	129[a]	ce(L)/(γ+ce)=0.77 *9*; ce(M)/(γ+ce)=0.17 *4* ce(N)/(γ+ce)=0.039 *10*; ce(O)/(γ+ce)=0.0059 *15*; ce(P)/(γ+ce)=0.00039 *10* α(L)=37 *7*; α(M)=8.2 *15* α(N)=1.9 *4*; α(O)=0.29 *6*; α(P)=0.019 *4*
41.1[c]		2188.3+x	12⁻	2147.2+x	11⁻			≤1	
83.6	9.6 *21*	3367.7+x	15⁻	3284.1+x	14⁻	M1	3.68	43	ce(K)/(γ+ce)=0.662 *5*; ce(L)/(γ+ce)=0.0968 *17*; ce(M)/(γ+ce)=0.0212 *4* ce(N)/(γ+ce)=0.00489 *9*; ce(O)/(γ+ce)=0.000753 *14*; ce(P)/(γ+ce)=4.94×10^{-5} *9*

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^{144}Sm(^{6}Li,4nγ) 1997Co23 (continued)

$\gamma(^{146}Tb)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[b]	$I_{(\gamma+ce)}$[@]	Comments
									α(K)=3.10 *5*; α(L)=0.453 *7*; α(M)=0.0990 *14* α(N)=0.0229 *4*; α(O)=0.00352 *5*; α(P)=0.000231 *4*
96.9	4.7 *3*	3584.5+x	17$^-$	3487.6+x	16$^-$	M1	2.40	16	ce(K)/(γ+ce)=0.595 *5*; ce(L)/(γ+ce)=0.0868 *14*; ce(M)/(γ+ce)=0.0190 *4* ce(N)/(γ+ce)=0.00439 *8*; ce(O)/(γ+ce)=0.000675 *12*; ce(P)/(γ+ce)=4.44×10^{-5} *8* α(K)=2.03 *3*; α(L)=0.296 *5*; α(M)=0.0646 *9* α(N)=0.01493 *21*; α(O)=0.00230 *4*; α(P)=0.0001510 *22*
119.8	14.1 *4*	3487.6+x	16$^-$	3367.7+x	15$^-$	M1	1.311	32	ce(K)/(γ+ce)=0.478 *4*; ce(L)/(γ+ce)=0.0696 *11*; ce(M)/(γ+ce)=0.01520 *25* ce(N)/(γ+ce)=0.00351 *6*; ce(O)/(γ+ce)=0.000541 *9*; ce(P)/(γ+ce)=3.56×10^{-5} *6* α(K)=1.105 *16*; α(L)=0.1608 *23*; α(M)=0.0351 *5* α(N)=0.00812 *12*; α(O)=0.001251 *18*; α(P)=8.23×10^{-5} *12*
138.0[&] *5*	3.2 *5*	156.70+x	6$^-$	18.8+x	6$^-$	M1	0.878 *16*	6	ce(K)/(γ+ce)=0.394 *5*; ce(L)/(γ+ce)=0.0572 *11*; ce(M)/(γ+ce)=0.01250 *24* ce(N)/(γ+ce)=0.00289 *6*; ce(O)/(γ+ce)=0.000445 *9*; ce(P)/(γ+ce)=2.93×10^{-5} *6* α(K)=0.741 *13*; α(L)=0.1075 *19*; α(M)=0.0235 *4* α(N)=0.00543 *10*; α(O)=0.000836 *15*; α(P)=5.51×10^{-5} *10*
156.7[&] *2*	8.1 *6*	156.70+x	6$^-$	0.0+x	5$^-$	M1	0.614	13	ce(K)/(γ+ce)=0.321 *4*; ce(L)/(γ+ce)=0.0465 *7*; ce(M)/(γ+ce)=0.01016 *16* ce(N)/(γ+ce)=0.00235 *4*; ce(O)/(γ+ce)=0.000362 *6*; ce(P)/(γ+ce)=2.39×10^{-5} *4* α(K)=0.518 *8*; α(L)=0.0751 *11*; α(M)=0.01640 *24* α(N)=0.00379 *6*; α(O)=0.000584 *9*; α(P)=3.85×10^{-5} *6*
177.6	6.3 *7*	3461.7+x	(14)$^-$	3284.1+x	14$^-$	M1	0.433	9	ce(K)/(γ+ce)=0.255 *3*; ce(L)/(γ+ce)=0.0369 *6*; ce(M)/(γ+ce)=0.00805 *12* ce(N)/(γ+ce)=0.00186 *3*; ce(O)/(γ+ce)=0.000287 *5*; ce(P)/(γ+ce)=1.89×10^{-5} *3* α(K)=0.366 *6*; α(L)=0.0528 *8*; α(M)=0.01154 *17* α(N)=0.00267 *4*; α(O)=0.000411 *6*; α(P)=2.71×10^{-5} *4*
199.0		3284.1+x	14$^-$	3085.2+x	(13)$^-$			3.5	
203.9		3691.6+x		3487.6+x	16$^-$			≤1	
205.2[&] *2*	7.0 *7*	361.9+x	7$^-$	156.70+x	6$^-$	M1	0.291	9	ce(K)/(γ+ce)=0.1902 *23*;

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^{144}Sm(^{6}Li,4nγ) 1997Co23 (continued)

$\gamma(^{146}Tb)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[b]	$I_{(\gamma+ce)}$[@]	Comments
									ce(L)/(γ+ce)=0.0274 *4*; ce(M)/(γ+ce)=0.00598 *9* ce(N)/(γ+ce)=0.001383 *21*; ce(O)/(γ+ce)=0.000213 *4*; ce(P)/(γ+ce)=1.410×10^{-5} *21* α(K)=0.245 *4*; α(L)=0.0354 *5*; α(M)=0.00772 *11* α(N)=0.00178 *3*; α(O)=0.000275 *4*; α(P)=1.82×10^{-5} *3*
323.9		3691.6+x		3367.7+x	15$^-$			7	
343.1[&] *1*	114.7 *11*	361.9+x	7$^-$	18.8+x	6$^-$	M1	0.0728	123	ce(K)/(γ+ce)=0.0574 *8*; ce(L)/(γ+ce)=0.00816 *12*; ce(M)/(γ+ce)=0.001778 *25* ce(N)/(γ+ce)=0.000411 *6*; ce(O)/(γ+ce)=6.35×10^{-5} *9*; ce(P)/(γ+ce)=4.23×10^{-6} *6* α(K)=0.0616 *9*; α(L)=0.00875 *13*; α(M)=0.00191 *3* α(N)=0.000441 *7*; α(O)=6.81×10^{-5} *10*; α(P)=4.53×10^{-6} *7*
384.7		5074.6+x	(19)	4690.0+x				≤1	
389.5	53.2 *10*	2577.8+x	13$^-$	2188.3+x	12$^-$	M1	0.0522	56	ce(K)/(γ+ce)=0.0420 *6*; ce(L)/(γ+ce)=0.00594 *9*; ce(M)/(γ+ce)=0.001295 *19* ce(N)/(γ+ce)=0.000299 *5*; ce(O)/(γ+ce)=4.62×10^{-5} *7*; ce(P)/(γ+ce)=3.08×10^{-6} *5* α(K)=0.0442 *7*; α(L)=0.00625 *9*; α(M)=0.001362 *19* α(N)=0.000315 *5*; α(O)=4.87×10^{-5} *7*; α(P)=3.25×10^{-6} *5*
417.7[&] *1*	100.0 *9*	779.6+x	10$^+$	361.9+x	7$^-$	E3	0.0757	108	ce(K)/(γ+ce)=0.0477 *7*; ce(L)/(γ+ce)=0.01752 *25*; ce(M)/(γ+ce)=0.00411 *6* ce(N)/(γ+ce)=0.000934 *14*; ce(O)/(γ+ce)=0.0001290 *19*; ce(P)/(γ+ce)=3.42×10^{-6} *5* α(K)=0.0513 *8*; α(L)=0.0188 *3*; α(M)=0.00442 *7* α(N)=0.001005 *15*; α(O)=0.0001387 *20*; α(P)=3.67×10^{-6} *6*
442.7	14.9 *10*	804.6+x	8$^+$	361.9+x	7$^-$	E1	0.00649	15	ce(K)/(γ+ce)=0.00549 *8*; ce(L)/(γ+ce)=0.000752 *11*; ce(M)/(γ+ce)=0.0001630 *23* ce(N)/(γ+ce)=3.75×10^{-5} *6*; ce(O)/(γ+ce)=5.69×10^{-6} *8*; ce(P)/(γ+ce)=3.57×10^{-7} *5* α(K)=0.00552 *8*; α(L)=0.000757 *11*; α(M)=0.0001640 *23* α(N)=3.77×10^{-5} *6*; α(O)=5.73×10^{-6} *8*; α(P)=3.59×10^{-7} *5*
464.6		4579.3+x	19$^-$	4114.7+x	18$^-$	M1	0.0331	≤1	ce(K)/(γ+ce)=0.0272 *4*; ce(L)/(γ+ce)=0.00382 *6*;

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^{144}Sm(^{6}Li,4nγ) 1997Co23 (continued)

$\gamma(^{146}Tb)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[b]	$I_{(\gamma+ce)}$[@]	Comments
									ce(M)/(γ+ce)=0.000831 *12* ce(N)/(γ+ce)=0.000192 *3*; ce(O)/(γ+ce)=2.97×10^{-5} *5*; ce(P)/(γ+ce)=1.99×10^{-6} *3* α(K)=0.0281 *4*; α(L)=0.00394 *6*; α(M)=0.000859 *12* α(N)=0.000199 *3*; α(O)=3.07×10^{-5} *5*; α(P)=2.05×10^{-6} *3*
525.5		4217.1+x	17$^+$	3691.6+x				≤1	
530.1		4114.7+x	18$^-$	3584.5+x	17$^-$	M1	0.0236	9	ce(K)/(γ+ce)=0.0196 *3*; ce(L)/(γ+ce)=0.00274 *4*; ce(M)/(γ+ce)=0.000596 *9* ce(N)/(γ+ce)=0.0001379 *20*; ce(O)/(γ+ce)=2.13×10^{-5} *3*; ce(P)/(γ+ce)=1.429×10^{-6} *20* α(K)=0.0200 *3*; α(L)=0.00281 *4*; α(M)=0.000610 *9* α(N)=0.0001412 *20*; α(O)=2.18×10^{-5} *3*; α(P)=1.463×10^{-6} *21*
549.6		4690.0+x		4140.4+x				≤1	
571.8	8.8 *10*	3149.6+x	(13)$^-$	2577.8+x	13$^-$	(M1)	0.0195	9	ce(K)/(γ+ce)=0.01624 *23*; ce(L)/(γ+ce)=0.00227 *4*; ce(M)/(γ+ce)=0.000493 *7* ce(N)/(γ+ce)=0.0001140 *16*; ce(O)/(γ+ce)=1.763×10^{-5} *25*; ce(P)/(γ+ce)=1.184×10^{-6} *17* α(K)=0.01656 *24*; α(L)=0.00231 *4*; α(M)=0.000503 *7* α(N)=0.0001163 *17*; α(O)=1.80×10^{-5} *3*; α(P)=1.207×10^{-6} *17*
590.6	106.0 *10*	1370.2+x	11$^+$	779.6+x	10$^+$	M1	0.0180	108	ce(K)/(γ+ce)=0.01500 *21*; ce(L)/(γ+ce)=0.00209 *3*; ce(M)/(γ+ce)=0.000455 *7* ce(N)/(γ+ce)=0.0001052 *15*; ce(O)/(γ+ce)=1.626×10^{-5} *23*; ce(P)/(γ+ce)=1.092×10^{-6} *16* α(K)=0.01527 *22*; α(L)=0.00213 *3*; α(M)=0.000463 *7* α(N)=0.0001071 *15*; α(O)=1.655×10^{-5} *24*; α(P)=1.112×10^{-6} *16*
652.8		4140.4+x		3487.6+x	16$^-$			≤1	
706.3		3284.1+x	14$^-$	2577.8+x	13$^-$	M1	0.01151	44	ce(K)/(γ+ce)=0.00967 *14*; ce(L)/(γ+ce)=0.001340 *19*; ce(M)/(γ+ce)=0.000291 *4* ce(N)/(γ+ce)=6.73×10^{-5} *10*; ce(O)/(γ+ce)=1.042×10^{-5} *15*; ce(P)/(γ+ce)=7.02×10^{-7} *10* α(K)=0.00978 *14*; α(L)=0.001355 *19*; α(M)=0.000295 *5* α(N)=6.81×10^{-5} *10*; α(O)=1.054×10^{-5} *15*; α(P)=7.10×10^{-7} *10*
729.5	5 *1*	4217.1+x	17$^+$	3487.6+x	16$^-$	E1	0.00220	5	ce(K)/(γ+ce)=0.00188 *3*; ce(L)/(γ+ce)=0.000250 *4*; ce(M)/(γ+ce)=5.41×10^{-5} *8*

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^{144}Sm(^{6}Li,4nγ) 1997Co23 (continued)

$\gamma(^{146}Tb)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[b]	$I_{(\gamma+ce)}$[@]	Comments
									ce(N)/(γ+ce)=1.247×10^{-5} *18*; ce(O)/(γ+ce)=1.91×10^{-6} *3*; ce(P)/(γ+ce)=1.245×10^{-7} *18* α(K)=0.00188 *3*; α(L)=0.000251 *4*; α(M)=5.42×10^{-5} *8* α(N)=1.250×10^{-5} *18*; α(O)=1.92×10^{-6} *3*; α(P)=1.248×10^{-7} *18*
777.0	11 *1*	2147.2+x	11$^-$	1370.2+x	11$^+$	E1	0.00194	11	ce(K)/(γ+ce)=0.001653 *24*; ce(L)/(γ+ce)=0.000220 *3*; ce(M)/(γ+ce)=4.76×10^{-5} *7* ce(N)/(γ+ce)=1.096×10^{-5} *16*; ce(O)/(γ+ce)=1.681×10^{-6} *24*; ce(P)/(γ+ce)=1.100×10^{-7} *16* α(K)=0.001657 *24*; α(L)=0.000221 *3*; α(M)=4.76×10^{-5} *7* α(N)=1.098×10^{-5} *16*; α(O)=1.684×10^{-6} *24*; α(P)=1.102×10^{-7} *16*
800.4	12.0 *12*	2170.6+x	10$^-$	1370.2+x	11$^+$	E1	0.00183	12	ce(K)/(γ+ce)=0.001559 *22*; ce(L)/(γ+ce)=0.000207 *3*; ce(M)/(γ+ce)=4.48×10^{-5} *7* ce(N)/(γ+ce)=1.032×10^{-5} *15*; ce(O)/(γ+ce)=1.583×10^{-6} *23*; ce(P)/(γ+ce)=1.038×10^{-7} *15* α(K)=0.001562 *22*; α(L)=0.000208 *3*; α(M)=4.49×10^{-5} *7* α(N)=1.034×10^{-5} *15*; α(O)=1.586×10^{-6} *23*; α(P)=1.040×10^{-7} *15*
818.1	57.8 *10*	2188.3+x	12$^-$	1370.2+x	11$^+$	E1	1.75×10^{-3}	58	ce(K)/(γ+ce)=0.001494 *21*; ce(L)/(γ+ce)=0.000198 *3*; ce(M)/(γ+ce)=4.29×10^{-5} *6* ce(N)/(γ+ce)=9.88×10^{-6} *14*; ce(O)/(γ+ce)=1.516×10^{-6} *22*; ce(P)/(γ+ce)=9.95×10^{-8} *14* α(K)=0.001496 *21*; α(L)=0.000199 *3*; α(M)=4.29×10^{-5} *6* α(N)=9.89×10^{-6} *14*; α(O)=1.518×10^{-6} *22*; α(P)=9.97×10^{-8} *14*
896.9	4.5 *10*	3085.2+x	(13)$^-$	2188.3+x	12$^-$	(M1)	0.00641	4.5	ce(K)/(γ+ce)=0.00542 *8*; ce(L)/(γ+ce)=0.000745 *11*; ce(M)/(γ+ce)=0.0001617 *23* ce(N)/(γ+ce)=3.74×10^{-5} *6*; ce(O)/(γ+ce)=5.79×10^{-6} *9*; ce(P)/(γ+ce)=3.92×10^{-7} *6* α(K)=0.00545 *8*; α(L)=0.000749 *11*; α(M)=0.0001627 *23* α(N)=3.76×10^{-5} *6*;

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^{144}Sm(^{6}Li,4nγ) 1997Co23 (continued)

$\gamma(^{146}Tb)$ (continued)

E_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	$I_{(\gamma+ce)}$ [@]	Comments
						α(O)=5.83×10^{-6} *9*; α(P)=3.94×10^{-7} *6*
959.8	5074.6+x	(19)	4114.7+x	18$^-$	≤1	
1105.6	4690.0+x		3584.5+x	17$^-$	≤1	

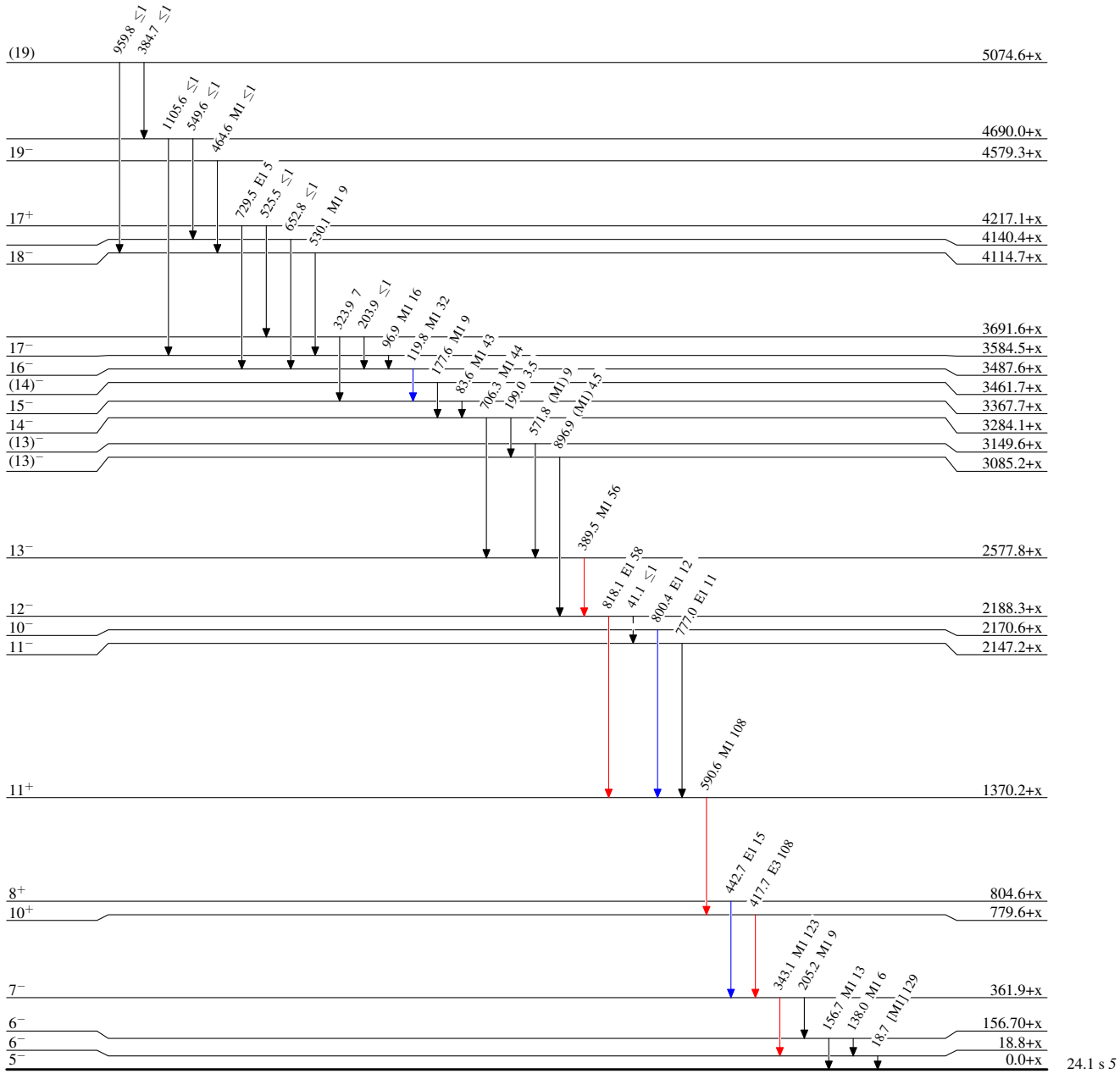
† From 1997Co23, except as noted.
‡ Calculated by the evaluators from I(γ+ce) and α.
# Derived from conversion data by 1997Co23, no details were given.
@ Obtained in relative units from fig. 1 of 1997Co23 by the evaluators, systematic error ΔI(γ+ce)≈1 is estimated for each transition intensity.
& Not observed in 1997Co23, taken from 1989Br22.
a from intensity balance at the level.
b Additional information 1.
c Placement of transition in the level scheme is uncertain.

^{144}Sm(^{6}Li,4nγ) 1997Co23

Level Scheme

Intensities: Relative $I_{(\gamma+ce)}$

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)



$^{146}_{65}Tb_{81}$