

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 200,2 (2025)	22-Aug-2022

Q(β⁻)=-4495 14; S(n)=8526 19; S(p)=1249 17; Q(α)=5093.8 26 2021Wa16
 S(2n)=18850 60, S(2p)=5400 19, Q(εp)=3296 15 (2021Wa16).

Additional information 1.

Data are primarily from ¹⁴⁴Sm(¹⁴N,4nγ), with minor additions from ¹⁵⁴Yb ε decay, ¹⁵⁴Tm α decay (8.1 s), and ¹⁵⁴Tm α decay (3.30 s).

¹⁵⁴Tm Levels

Cross Reference (XREF) Flags

- A ¹⁵⁴Yb ε decay
- B ¹⁵⁸Lu α decay
- C ¹⁴⁴Sm(¹⁴N,4nγ)

E(level) ^{†‡}	J ^π #	T _{1/2}	XREF	Comments
0	(2 ⁻)	8.1 s 3	ABC	%α=54 5; %ε+%β ⁺ = 46 5 μ=-1.14 2; Q=+0.4 9 From an evaluation of data on nuclear rms charge radii, 2014An02 report <r ² > ^{1/2} =5.076 fm 17. Δ<r ² >(¹⁶⁹ Tm- ¹⁵⁴ Tm(J=2))=1.486 fm ² 19 (2000Ba16). J ^π : 0 ⁻ , 1 ⁻ , 2 ⁻ from feeding by E1 γ from 1 ⁺ level. (2 ⁻) more likely from intense α decay branch with hindrance factor HF=2.6 5 to (2 ⁻) ⁻ g.s. of ¹⁵⁰ Ho daughter. Suggested configuration is (π d _{3/2})(ν f _{7/2}) coupled to 2 ⁻ (1997Da07). T _{1/2} : Weighted average of 7.6 s 5 (1978AfZZ) and 8.3 s 3 (1982Bo04). Other: 5 s 1 (1964Ma45). %α: From 1997To12; other: 44% 15 (1979Ho10). Eα=4956 3 (from 2013Ba31 evaluation, measured by 1997To12). μ: From 2000Ba16. This is also the value listed by 2019StZV. Q: From 2000Ba16. This is also the value listed by 2016St14. J ^π : From log ft of the ε transition from the ¹⁵⁴ Yb g.s. (J ^π =0 ⁺).
133.2 2 0+x [@]	1 ⁺ 9 ⁺	3.30 s 7	A C	J ^π : From log ft of the ε transition from the ¹⁵⁴ Yb g.s. (J ^π =0 ⁺). %α=58 5; %IT=?; %ε+%β ⁺ =42 5 μ=+5.91 5; Q=-0.2 4 Additional information 2. Δ<r ² >(¹⁶⁹ Tm- ¹⁵⁴ Tm(J=9))=1.522 fm ² 15 (2000Ba16). E(level): Although not firmly established, 1979Ho10 suggest this is an isomer, and the 8.1-s activity is the ground state. Based on α energies for decay to ¹⁵⁰ Ho isomers, 1992Po14 report this level is at 450 keV and the daughter (9 ⁺) level in ¹⁵⁰ Ho is at 370 keV. 2021Ko07 list this energy as 70 50. J ^π : From fast α decay (HF ≈ 1.5) to a level in ¹⁵⁰ Ho that is the proposed (9 ⁺) isomer. T _{1/2} : Weighted average of 2.98 s 20 (1964Ma45), 3.2 s 1 (1978AfZZ), and 3.35 s 5 (1982Bo04) from α decay. Others: 3.4 s (1984ToZT) and 3 s (1973BoVZ) from ε decay. %α: From 1997To12. Eα=5031 3 (from 2013Ba31 evaluation, measured by 1997To12). %IT: The IT decay has not been observed. μ: From 2000Ba16. This is also the value listed by 2019StZV. Q: From 2000Ba16. This is also the value listed by 2016St14.
266.10+x ^a 17 745.12+x 9 751.79+x [@] 10	(10 ⁺) 11 ⁺ 11 ⁺		C C C	J ^π : γ to 9 ⁺ level, γ from (12 ⁺) level and placement a in likely ΔJ=2 cascade. J ^π : E2 γ to 9 ⁺ level. J ^π : E2 γ to 9 ⁺ level.

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Adopted Levels, Gammas (continued)

¹⁵⁴Tm Levels (continued)

E(level) ^{†‡}	J ^π #	XREF	Comments
1035.09+x ^a 16	(12 ⁺)	C	J ^π : γ to 11 ⁺ level, γ from 14 ⁺ level and placement in a likely ΔJ=2 cascade.
1134.98+x [@] 13	13 ⁺	C	J ^π : E2 γ to 11 ⁺ level.
1323.34+x 13	13 ⁺	C	J ^π : E2 γ to 11 ⁺ level.
1674.06+x ^a 14	14 ⁺	C	J ^π : M1+E2 γ to 13 ⁺ level.
1814.81+x [@] 19	15 ⁺	C	J ^π : E2 γ to 13 ⁺ level.
2145.25+x ^a 16	16 ⁺	C	J ^π : E2 γ to 14 ⁺ level.
2424.55+x 17	15 ⁺	C	J ^π : M1+E2 γ to 16 ⁺ level and γ to 13 ⁺ level.
2453.99+x 25	16 ⁺	C	J ^π : M1+E2 γ to 15 ⁺ level.
2514.42+x 18	16 ⁺	C	J ^π : M1+E2 γ to 15 ⁺ level.
2616.74+x 20	17 ⁺	C	J ^π : M1+E2 γ to 16 ⁺ level.
2742.65+x 22	19 ⁺	C	J ^π : E2 γ to 17 ⁺ level.
			Possible isomer from 2002Fo07 in ¹⁴⁴ Sm(¹⁴ N,4nγ) dataset.
2750.37+x [@] 26	17 ⁺	C	J ^π : E2 γ to 15 ⁺ level.
2881.58+x 27		C	
3240.45+x 31		C	
3409.96+x 30	19 ⁺	C	J ^π : M1+E2 γ from 20 ⁺ level.
3420.87+x 29	20 ⁺	C	J ^π : M1+E2 γ to 19 ⁺ level.
3471.61+x [@] 34	19 ⁺	C	J ^π : E2 γ to 17 ⁺ level.
3740.45+x 30	20 ⁺	C	J ^π : M1+E2 γ to 19 ⁺ level.
4056.99+x 29	22 ⁺	C	J ^π : E2 γ to 20 ⁺ level.
4090.77+x 29		C	
4486.26+x 30	23 ⁺	C	J ^π : M1+E2 γ to 22 ⁺ level.
4498.11+x ^{&} 30	21 ⁺	C	J ^π : M1+E2 γ to 20 ⁺ level.
4667.9+x 4		C	
4865.7+x 5		C	
4996.80+x ^{&} 30	23 ⁺	C	J ^π : E2 γ to 21 ⁺ level.
5208.80+x ^{&} 32	25 ⁺	C	E(level): The ordering of the 166.9-765.5-212.0 cascade is tentative due to similar intensities of the γ rays involved. Thus the intermediate levels at 5208.8+x and 5974.2+x may be at different energies.
			J ^π : E2 γ to 23 ⁺ level.
5974.3+x 4		C	E(level): The ordering of the 166.9-765.5-212.0 cascade is tentative due to similar intensities of the γ rays involved. Thus the intermediate levels at 5208.8+x and 5974.2+x may be at different energies.
6141.2+x 4		C	

[†] Additional information 3.

[‡] For the levels above the 9⁺ level, the values are from a least-squares fit to the γ energies as given in the heavy-ion data set.

Additional information 4.

@ Seq.(A): γ cascade based on 9⁺ level.

& Seq.(B): γ cascade based on 21⁺ level.

^a Seq.(C): γ cascade based on (10⁺) level.

γ(¹⁵⁴Tm)

E _i (level)	J _i ^π	E _γ	I _γ	E _f	J _f ^π	Mult. [‡]	α [@]
133.2	1 ⁺	133.2	2	100	0	(2 ⁻)	E1 [#] 0.1562
266.10+x	(10 ⁺)	266.1	2	100	0+x	9 ⁺	
745.12+x	11 ⁺	745.1	1	100	0+x	9 ⁺	E2
751.79+x	11 ⁺	751.8	1	100	0+x	9 ⁺	E2
1035.09+x	(12 ⁺)	290.0	2	65	745.12+x	11 ⁺	
		769.0	3	100	266.10+x	(10 ⁺)	

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Adopted Levels, Gammas (continued)

$\gamma(^{154}\text{Tm})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult. [‡]	Comments
1134.98+x	13 ⁺	383.2 1	100	751.79+x	11 ⁺	E2	
1323.34+x	13 ⁺	578.2 1	100	745.12+x	11 ⁺	E2	
1674.06+x	14 ⁺	350.7 1	100	1323.34+x	13 ⁺	M1+E2	
		639.0 2	<98 [†]	1035.09+x	(12 ⁺)		
1814.81+x	15 ⁺	140.6 3		1674.06+x	14 ⁺		
		679.6 3	100	1134.98+x	13 ⁺	E2	
2145.25+x	16 ⁺	471.2 1	100	1674.06+x	14 ⁺	E2	
2424.55+x	15 ⁺	279.3 1	100	2145.25+x	16 ⁺	M1+E2	
		609.6 ^{&} 3	10	1814.81+x	15 ⁺		
		1289.9 3	25	1134.98+x	13 ⁺		
2453.99+x	16 ⁺	639.2 2	100 [†]	1814.81+x	15 ⁺	M1+E2	
2514.42+x	16 ⁺	89.9 1	100	2424.55+x	15 ⁺	M1+E2	
		699.2 3	21	1814.81+x	15 ⁺		
2616.74+x	17 ⁺	102.3 1	100	2514.42+x	16 ⁺	M1+E2	
		802.0 3	62	1814.81+x	15 ⁺		
2742.65+x	19 ⁺	125.9 1	100	2616.74+x	17 ⁺	E2	
2750.37+x	17 ⁺	296.4 2	80	2453.99+x	16 ⁺	M1+E2	
		935.6 3	100	1814.81+x	15 ⁺	E2	
2881.58+x		138.9 2	100	2742.65+x	19 ⁺		
3240.45+x		358.9 2	100	2881.58+x			
3409.96+x	19 ⁺	659.6 2	100	2750.37+x	17 ⁺	[E2]	Mult.: M1+E2 based on $\alpha(\text{K})\text{exp}$ contradicts $\Delta J=2$ transition from level scheme.
3420.87+x	20 ⁺	678.1 3	100	2742.65+x	19 ⁺	M1+E2	
3471.61+x	19 ⁺	721.3 3	100	2750.37+x	17 ⁺	E2	
3740.45+x	20 ⁺	268.9 3	100	3471.61+x	19 ⁺	M1+E2	
		330.5 2	88	3409.96+x	19 ⁺	M1+E2	
4056.99+x	22 ⁺	636.2 2	100	3420.87+x	20 ⁺	E2	
		1175.3 3	60	2881.58+x			
4090.77+x		669.6 3	22	3420.87+x	20 ⁺		
		1348.2 3	100	2742.65+x	19 ⁺		
4486.26+x	23 ⁺	395.4 2	61	4090.77+x			
		429.3 2	100	4056.99+x	22 ⁺	M1+E2	
4498.11+x	21 ⁺	757.7 2	100	3740.45+x	20 ⁺	M1+E2	
		1257.7 3	62	3240.45+x			
4667.9+x		577.1 3	100	4090.77+x			
4865.7+x		197.8 2	100	4667.9+x			
4996.80+x	23 ⁺	498.7 1	100	4498.11+x	21 ⁺	E2	
		510.4 3	64	4486.26+x	23 ⁺		
5208.80+x	25 ⁺	212.0 1	100	4996.80+x	23 ⁺	E2	
5974.3+x		765.5 2	100	5208.80+x	25 ⁺		
6141.2+x		166.9 1	100	5974.3+x		E1	

[†] See the comment on this value in the heavy-ion data set.

[‡] From conversion-electron data in $^{144}\text{Sm}(^{14}\text{N},4n\gamma)$ dataset (2002Fo07) unless otherwise mentioned.

From conversion-electron data in ^{154}Yb ϵ decay (1988Vi02).

@ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with "Frozen Orbitals" approximation based on γ -ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

& Placement of transition in the level scheme is uncertain.

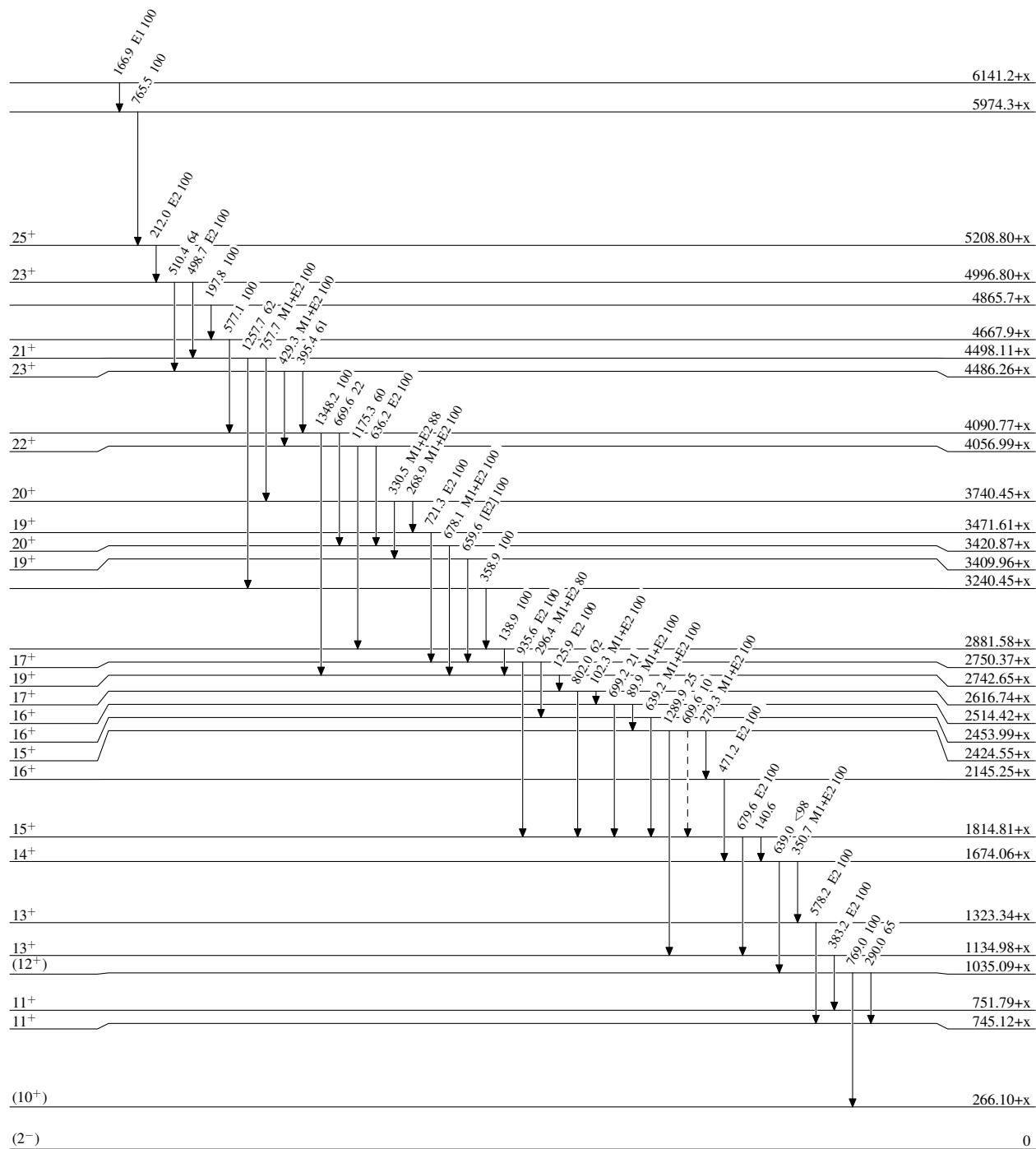
Adopted Levels, Gammas

Legend

Level Scheme

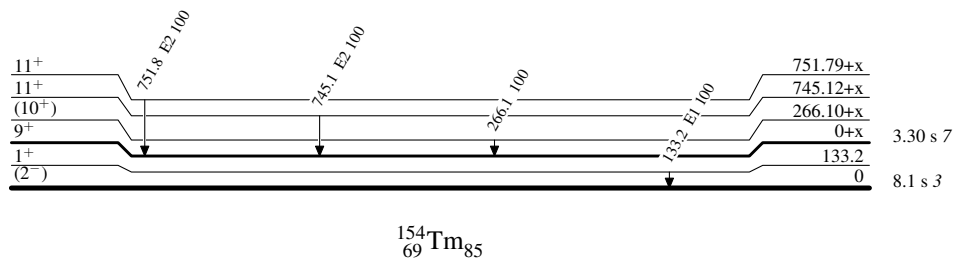
Intensities: Relative photon branching from each level

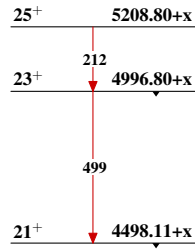
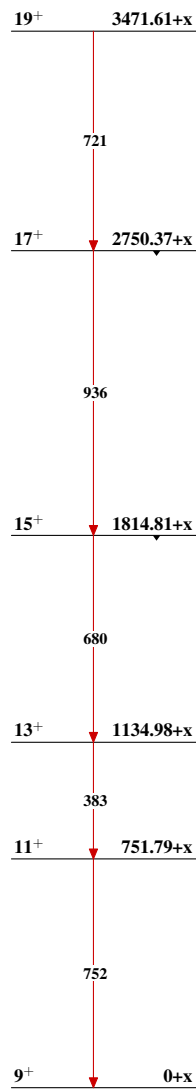
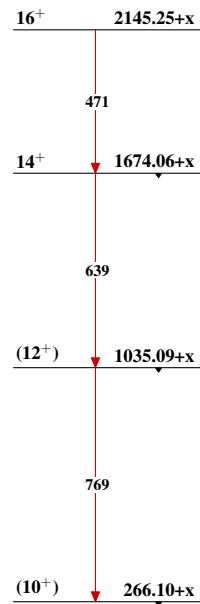
-----> γ Decay (Uncertain)



Adopted Levels, GammasLevel Scheme (continued)

Intensities: Relative photon branching from each level



Adopted Levels, GammasSeq.(B): γ cascade
based on 21^+ levelSeq.(A): γ cascade
based on 9^+ levelSeq.(C): γ cascade
based on (10^+) level $^{154}_{69}\text{Tm}_{85}$