

Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 170, 1 (2020)	16-Aug-2020

$Q(\beta^-)=-8840$ SY; $S(n)=9010$ SY; $S(p)=2780$ SY; $Q(\alpha)=4110$ SY [2017Wa10](#)

$Q(\epsilon p)=6000$ 200 ([2017Wa10](#),syst).

Uncertainties in [2017Wa10](#) for these systematic values are $\Delta Q(\beta^-)=250$, $\Delta S(n)=250$, $\Delta S(p)=200$, and $\Delta Q(\alpha)=200$ keV.

 ^{153}Yb LevelsCross Reference (XREF) Flags

- A ^{153}Yb IT decay (15 μs)
 B ^{153}Lu ϵ decay
 C ^{157}Hf α decay

E(level) [†]	$J^{\pi\ddagger\#}$	$T_{1/2}$ [@]	XREF	Comments
0.0 ^b	(7/2 ⁻)	4.2 s 2	ABC	$\% \alpha=10$ calc; $\% \epsilon+\% \beta^+=90$ calc $\mu=-1.05$ 3; $Q=-1.5$ 6 Configuration is mainly $\nu f_{7/2}$. Proton emission following $\epsilon+\beta^+$ decay of ^{153}Yb is reported in 0.008% 2 of the decays (1988Wi05). $T_{1/2}$: Weighted average of 4.0 s 5 (1977Ha48), 4.5 s 1 (1988Ba02), 4.0 s 5 (1988Wi05), 3.9 s 1 (1989Ko02); Other: 3.9 s 5 (1988WiZN), can be related with 1988Wi05 which give a reduced- $\chi^2 \approx 6$. $\% \alpha$: From gross beta decay, 2019Mo01 calculated $T_{1/2}(\epsilon+\beta^+) = 4.67$ s which indicates $T_{1/2}(\alpha)=42.40$ s. μ, Q : from 2002BaZX , photoionization spectroscopy in a laser-ion source.
567.03 15	(9/2 ⁻)	≈6 ns	AB	Configuration is mainly $\nu h_{9/2}$.
1201.68 14	(13/2 ⁺)		AB	
1459.28 ^b 16	(9/2 ⁻)		A	
1490.72 ^b 16	(11/2 ⁻)		AB	
1762.55 15	(11/2 ⁺)		A	Configuration= $\nu f_{7/2} \otimes 3^-$.
2030.21 ^{&} 17	(13/2 ⁺)		A	Possible mixture of configuration= $\nu f_{7/2} \otimes 3^-$.
2137.45 ^{&} 18	(15/2 ⁺)		A	
2152.9 ^b 3	(15/2 ⁻)		A	
2246.96 ^{&} 19	(17/2 ⁺)		A	
2481.37 ^b 24	(19/2 ⁻)		A	
2504.55 ^a 22	(19/2 ⁺)		A	
2527.4 ^a 3	(21/2 ⁺)		A	
2578.2 ^b 3	(23/2 ⁻)		A	
2578.2+x ^b	(27/2 ⁻)	15 μs 1	A	Additional information 1.

[†] From least-squares fits to γ -ray energies.

[‡] Tentative assignments based primarily on systematics in lighter N=83 above ^{147}Gd (and N=82) isotones, assigned configurations, and measured multiplicities, including g.s. and the highest lying 15 μs isomeric state (see IT decay dataset, [1993Mc03](#)).

[#] See [1993Mc03](#) for detailed discussion of configurations.

[@] Measured in the IT decay dataset unless otherwise noted.

[&] Member of configuration= $\nu f_{7/2} \otimes 5^-$.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

¹⁵³Yb Levels (continued)

^a Member of configuration= $\nu f_{7/2} \otimes 7^-$.

^b Band(A): configuration= $(\pi h_{11/2}^n)(\nu f_{7/2})$. Seniority quantum number=3 for excited states, 0 for g.s.

E _i (level)	J _i ^π	E _γ	I _γ	E _f	J _f ^π	γ(¹⁵³ Yb)		Comments
						Mult. [†]	α [‡]	
567.03	(9/2 ⁻)	567.7 2	100	0.0	(7/2 ⁻)			
1201.68	(13/2 ⁺)	635.1 2	16.8 8	567.03	(9/2 ⁻)	[M2]	0.0633	B(M2)(W.u.)≈0.25 α(K)=0.0520 8; α(L)=0.00871 13; α(M)=0.00198 3 α(N)=0.000465 7; α(O)=6.62×10 ⁻⁵ 10; α(P)=3.45×10 ⁻⁶ 5
		1201.4 2	100 5	0.0	(7/2 ⁻)	[E3]	0.00534	B(E3)(W.u.)≈34 α(K)=0.00434 6; α(L)=0.000773 11; α(M)=0.0001764 25 α(N)=4.12×10 ⁻⁵ 6; α(O)=5.71×10 ⁻⁶ 8; α(P)=2.60×10 ⁻⁷ 4; α(IPF)=1.393×10 ⁻⁶ 21
1459.28	(9/2 ⁻)	1459.0 2	100	0.0	(7/2 ⁻)			
1490.72	(11/2 ⁻)	1490.6 2	100	0.0	(7/2 ⁻)			
1762.55	(11/2 ⁺)	271.7 4	14 2	1490.72	(11/2 ⁻)			
		303.0 2	100 9	1459.28	(9/2 ⁻)			
		561.0 2	93 9	1201.68	(13/2 ⁺)			
		1196.0 3	50 5	567.03	(9/2 ⁻)			
2030.21	(13/2 ⁺)	267.7 2	63 3	1762.55	(11/2 ⁺)	M1	0.214	α(K)=0.179 3; α(L)=0.0270 4; α(M)=0.00603 9 α(N)=0.001417 20; α(O)=0.000203 3; α(P)=1.086×10 ⁻⁵ 16
		539.4 2	100 5	1490.72	(11/2 ⁻)			
2137.45	(15/2 ⁺)	107.2 2	14.2 8	2030.21	(13/2 ⁺)	M1	2.77	α(K)=2.31 4; α(L)=0.354 6; α(M)=0.0792 12 α(N)=0.0186 3; α(O)=0.00266 4; α(P)=0.0001414 22
		935.8 2	100 5	1201.68	(13/2 ⁺)			
2152.9	(15/2 ⁻)	951.2 3	100	1201.68	(13/2 ⁺)			
2246.96	(17/2 ⁺)	109.5 2	16.1 8	2137.45	(15/2 ⁺)	M1	2.60	α(K)=2.18 4; α(L)=0.333 5; α(M)=0.0745 12 α(N)=0.0175 3; α(O)=0.00250 4; α(P)=0.0001330 20
		1045.3 2	100 5	1201.68	(13/2 ⁺)			
2481.37	(19/2 ⁻)	234.4 2	100 5	2246.96	(17/2 ⁺)	(E1)	0.0369	α(K)=0.0309 5; α(L)=0.00464 7; α(M)=0.001035 15 α(N)=0.000240 4; α(O)=3.30×10 ⁻⁵ 5; α(P)=1.529×10 ⁻⁶ 22
		328.4 3	7.5 9	2152.9	(15/2 ⁻)			
2504.55	(19/2 ⁺)	257.6 2	100 5	2246.96	(17/2 ⁺)	M1,E2	0.178 60	α(K)=0.140 60; α(L)=0.0295 7; α(M)=0.00681 15 α(N)=0.001584 25; α(O)=0.000211 15; α(P)=8.0×10 ⁻⁶ 41
		367.1 2	62 3	2137.45	(15/2 ⁺)			
2527.4	(21/2 ⁺)	(23)		2504.55	(19/2 ⁺)			E _γ : γ not observed, but required by γγ coincidences.
		280.5 3		2246.96	(17/2 ⁺)			
2578.2	(23/2 ⁻)	50.8 2	100 11	2527.4	(21/2 ⁺)	E1	0.391 7	α(L)=0.305 6; α(M)=0.0687 13 α(N)=0.0156 3; α(O)=0.00193 4; α(P)=6.32×10 ⁻⁵ 11
		96.8 2	6.6 5	2481.37	(19/2 ⁻)	(E2)	3.64 6	α(K)=1.091 16; α(L)=1.94 4; α(M)=0.480 9 α(N)=0.1094 19; α(O)=0.01255 22;

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) $\gamma(^{153}\text{Yb})$ (continued)

<u>$E_i(\text{level})$</u>	<u>J_i^π</u>	<u>E_γ</u>	<u>I_γ</u>	<u>E_f</u>	<u>J_f^π</u>	<u>Comments</u>
2578.2+x	(27/2 ⁻)	(x)	100	2578.2	(23/2 ⁻)	$\alpha(\text{P})=4.66 \times 10^{-5} \text{ } ^7$ Mult.: intensity balance implies M1,E2 but ΔJ^π requires E2. Unobserved γ ray expected to decay from the 15 μs isomer. Of all known levels of this nucleus, the only one with $\Delta J \leq 2$ relative to the isomer is 2578.2, therefore assumed to be the final level (other decay patterns not excluded if new γ 's could be discovered).

† From intensity balance deduced from total internal conversion coefficients in IT decay.

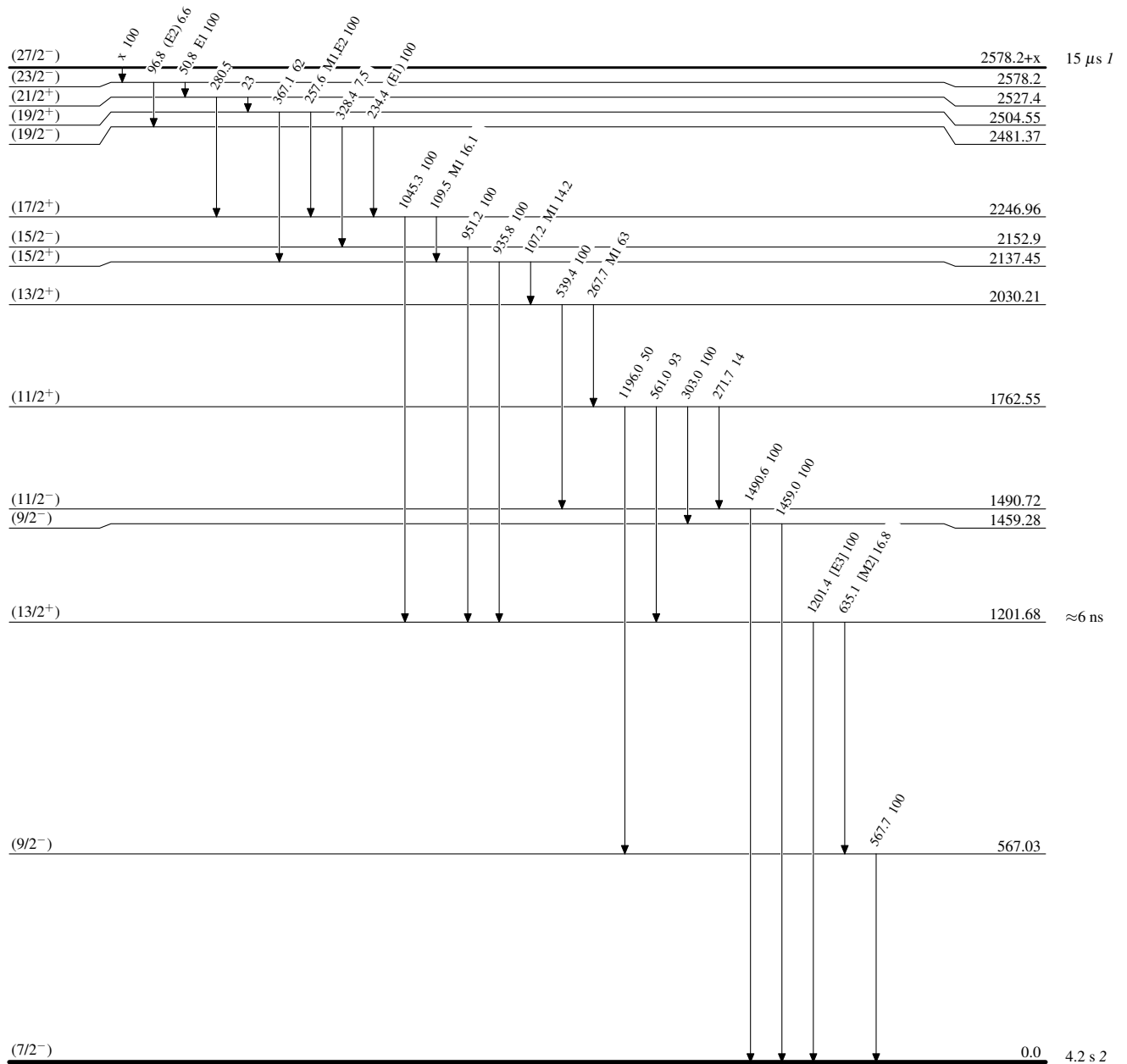
‡ [Additional information 2.](#)

Adopted Levels, Gammas

Legend

Level Scheme

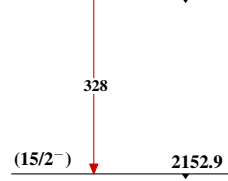
Intensities: Relative photon branching from each level

-----> γ Decay (Uncertain)

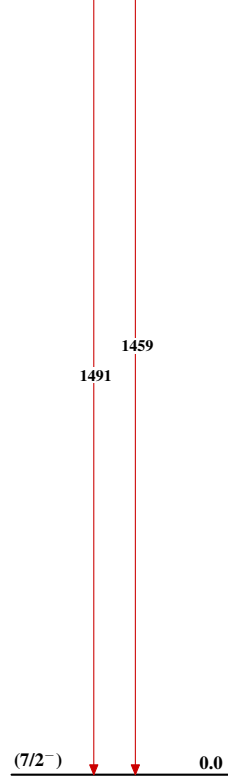
Adopted Levels, Gammas

Band(A): Configuration= $(\pi h_{1/2}^3)(\nu f_{7/2})$

(27/2 ⁻)	2578.2+x
(23/2 ⁻)	2578.2
(19/2 ⁻)	2481.37



(11/2 ⁻)	1490.72
(9/2 ⁻)	1459.28

 $^{153}_{70}\text{Yb}_{83}$