^{146}Dy ε decay 1987Zu02

History

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

Parent: ^{146}Dy: E=0.0; J$^{\pi}$=0^{+}; T$_{1/2}$=33.2 s *7*; Q(ε)=5210 *50*; %ε+%β^{+} decay=100.0

1987Zu02,1988ZuZZ: ^{146}Dy ε decay [from Gd(^{3}He,xn), E=280 MeV]; measured Eγ, Iγ(t), E(X-ray), I(X-ray)(t), γγ, γ(X-ray) coin, I(ce). ^{146}Tb; deduced levels, J^{π}, γ multipolarities, configuration, log *ft*. Mass-separator, tape transport system, Ge detectors, magnetic selector and Si(Li) detector.

1982No08: ^{146}Dy ε decay [from ^{90}Zr(^{58}Ni,2p), E=233-250 MeV]; measured Eγ, Iγ(t), γγ coin, T$_{1/2}$. ^{146}Tb; deduced levels, J^{π}.

The level scheme of ^{146}Tb contains 97% of the observed ^{146}Dy ε decay γ ray intensity (1987Zu02).

Others: 1981Al23, 1993Al03.

^{146}Tb Levels

E(level)[†]	J$^{\pi}$[@]	T$_{1/2}$[#]	E(level)[†]	J$^{\pi}$[@]	E(level)[†]	J$^{\pi}$[@]
0.0[‡]	1^{+}	8 s *4*	574.95 *24*		1696.1 *3*	
241.09 *10*	(1^{+})		618.4 *3*	(1^{+})	1726.96 *14*	1^{+}
280.19 *12*	+		653.15 *18*	+	1737.40 *15*	1^{+}
338.15 *13*	(3)$^{+}$		660.31 *13*	+	1923.8 *3*	
354.85 *11*	1^{+}		664.83 *23*		2082.01 *15*	1^{+}
384.65 *12*	+		682.14 *17*	(1^{+})	2156.80 *14*	1^{+}
397.99 *23*			920.0 *3*	(1^{+})		
565.91 *13*			1162.3 *4*			

† From a least-squares fit to Eγ′s; normalized χ^2=0.2.

‡ Configuration: $\pi d^{-1}_{5/2} \nu d^{-1}_{3/2}$ (1987Zu02).

From Iγ(t) 1982No08.

@ From 1988ZuZZ.

ε,β^{+} radiations

E(decay)	E(level)	Iβ^{+} †	Iε†	Log *ft*	I(ε+β^{+})†	Comments
(3.05×10^{3} *5*)	2156.80	4.1 *4*	11.0 *8*	4.42 *4*	15.2 *10*	av Eβ=917 *23*; εK=0.613 *13*; εL=0.0915 *20*; εM+=0.0267 *6*
(3.13×10^{3} *5*)	2082.01	3.5 *3*	8.4 *6*	4.56 *4*	12.0 *7*	av Eβ=951 *23*; εK=0.594 *13*; εL=0.0886 *20*; εM+=0.0259 *6*
(3.29×10^{3} *5*)	1923.8	0.30 *3*	0.57 *6*	5.77 *6*	0.88 *9*	av Eβ=1022 *23*; εK=0.554 *13*; εL=0.0824 *20*; εM+=0.0241 *6*
(3.47×10^{3} *5*)	1737.40	3.4 *2*	5.1 *3*	4.87 *4*	8.6 *5*	av Eβ=1107 *23*; εK=0.507 *13*; εL=0.0753 *19*; εM+=0.0220 *6*
(3.48×10^{3} *5*)	1726.96	7.4 *4*	11.2 *6*	4.53 *4*	18.7 *8*	av Eβ=1112 *23*; εK=0.504 *13*; εL=0.0750 *19*; εM+=0.0219 *6*
(3.51×10^{3} *5*)	1696.1	0.71 *8*	1.04 *12*	5.57 *6*	1.76 *18*	av Eβ=1126 *23*; εK=0.497 *13*; εL=0.0738 *19*; εM+=0.0215 *6*
(4.05×10^{3} *5*)	1162.3	0.40 *5*	0.33 *4*	6.20 *6*	0.73 *8*	av Eβ=1370 *23*; εK=0.376 *11*; εL=0.0556 *16*; εM+=0.0162 *5*
(4.29×10^{3} *5*)	920.0	0.51 *6*	0.33 *4*	6.25 *6*	0.84 *9*	av Eβ=1482 *24*; εK=0.329 *10*; εL=0.0486 *14*; εM+=0.0142 *4*
(4.53×10^{3} *5*)	682.14	0.97 *16*	0.51 *8*	6.10 *8*	1.46 *22*	av Eβ=1592 *24*; εK=0.288 *8*; εL=0.0426 *12*; εM+=0.0124 *4*
(4.55×10^{3} *5*)	664.83	0.7 *3*	0.37 *14*	6.24 *16*	1.1 *4*	av Eβ=1600 *24*; εK=0.286 *8*; εL=0.0422 *12*; εM+=0.0123 *4*

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^{146}Dy ε decay 1987Zu02 (continued)

ϵ,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ †	Iε†	Log *ft*	I(ε+β^+)†	Comments
(4.55×10^3 *5*)	660.31	0.5 *3*	0.3 *2*	6.4 *3*	0.8 *4*	av Eβ=1602 *24*; εK=0.285 *8*; εL=0.0421 *12*; εM+=0.0123 *4*
(4.56×10^3 *5*)	653.15	≤0.14	≤0.071	≥7.0	≤0.2	av Eβ=1605 *24*; εK=0.284 *8*; εL=0.0419 *12*; εM+=0.0122 *4*
(4.59×10^3 *5*)	618.4	1.04 *11*	0.51 *6*	6.11 *6*	1.57 *16*	av Eβ=1621 *24*; εK=0.278 *8*; εL=0.0411 *12*; εM+=0.0120 *4*
(4.64×10^3 *5*)	574.95	0.49 *6*	0.24 *3*	6.46 *6*	0.74 *8*	av Eβ=1642 *24*; εK=0.272 *8*; εL=0.0401 *12*; εM+=0.0117 *4*
(4.64×10^3 *5*)	565.91	0.9 *4*	0.42 *19*	6.21 *21*	1.3 *6*	av Eβ=1646 *24*; εK=0.270 *8*; εL=0.0399 *12*; εM+=0.0116 *4*
(4.81×10^3 *5*)	397.99	0.88 *9*	0.36 *4*	6.30 *5*	1.25 *13*	av Eβ=1724 *24*; εK=0.247 *7*; εL=0.0364 *11*; εM+=0.0106 *3*
(4.83×10^3 *5*)	384.65	1.1 *8*	0.5 *3*	6.2 *3*	1.6 *10*	av Eβ=1730 *24*; εK=0.245 *7*; εL=0.0361 *10*; εM+=0.0105 *3*
(4.86×10^3 *5*)	354.85	3.1 *4*	1.3 *2*	5.77 *7*	4.4 *6*	av Eβ=1744 *24*; εK=0.241 *7*; εL=0.0355 *10*; εM+=0.0104 *3*
(4.87×10^3 *5*)	338.15	0.9 *7*	0.4 *3*	6.3 *4*	1.3 *9*	av Eβ=1752 *24*; εK=0.239 *7*; εL=0.0352 *10*; εM+=0.0103 *3*
(4.93×10^3 *5*)	280.19	1.4 *14*	0.6 *6*	6.1 *5*	2.0 *18*	av Eβ=1779 *24*; εK=0.231 *7*; εL=0.0341 *10*; εM+=0.0100 *3*
(4.97×10^3 *5*)	241.09	2.4 *10*	0.9 *4*	5.94 *19*	3.3 *13*	av Eβ=1797 *24*; εK=0.227 *7*; εL=0.0334 *10*; εM+=0.0097 *3*
(5.21×10^3 *5*)	0.0	16 *5*	5.0 *14*	5.24 *13*	21 *5*	av Eβ=1910 *24*; εK=0.199 *6*; εL=0.0293 *8*; εM+=0.00855 *24* I(ε+β^+): 21% *5* was estimated by 1987Zu02 from measurements of I(X-rays).

† Absolute intensity per 100 decays.

γ(^{146}Tb)

I(γ+ce) normalization: from I(γ+ce) per 100 decays of ^{146}Dy (1987Zu02).

E_γ †	E_i(level)	J^π_i	E_f	J^π_f	Mult.‡	α#	$I_{(\gamma+ce)}$ †@	Comments
74.7 *2*	354.85	1$^+$	280.19	$^+$	M1	5.09 *9*	1.64	ce(K)/(γ+ce)=0.704 *6*; ce(L)/(γ+ce)=0.1032 *21*; ce(M)/(γ+ce)=0.0225 *5* ce(N)/(γ+ce)=0.00521 *11*; ce(O)/(γ+ce)=0.000802 *17*; ce(P)/(γ+ce)=5.26×10^{-5} *11* α(K)=4.29 *7*; α(L)=0.628 *10*; α(M)=0.1373 *22* α(N)=0.0317 *5*; α(O)=0.00488 *8*; α(P)=0.000320 *6*
113.7 *2*	354.85	1$^+$	241.09	(1$^+$)			1.07	
117.8 *2*	397.99		280.19	$^+$			1.25	
143.5 *2*	384.65	$^+$	241.09	(1$^+$)			0.42	
236.8 *2*	574.95		338.15	(3)$^+$			0.74	
241.1 *2*	241.09	(1$^+$)	0.0	1$^+$	M1	0.187	12.60	ce(K)/(γ+ce)=0.1332 *17*; ce(L)/(γ+ce)=0.0191 *3*; ce(M)/(γ+ce)=0.00417 *6* ce(N)/(γ+ce)=0.000964 *14*; ce(O)/(γ+ce)=0.0001487 *22*; ce(P)/(γ+ce)=9.85×10^{-6} *15* α(K)=0.1581 *23*; α(L)=0.0227 *4*; α(M)=0.00495 *7* α(N)=0.001145 *17*; α(O)=0.000177 *3*; α(P)=1.170×10^{-5} *17*

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^{146}Dy ε decay 1987Zu02 (continued)

γ(^{146}Tb) (continued)

E_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	α [#]	$I_{(\gamma+ce)}$ [†@]	Comments
268.4 *2*	653.15	+	384.65	+	M1	0.1400	1.51	ce(K)/(γ+ce)=0.1038 *14*; ce(L)/(γ+ce)=0.01486 *21*; ce(M)/(γ+ce)=0.00324 *5* ce(N)/(γ+ce)=0.000749 *11*; ce(O)/(γ+ce)=0.0001156 *17*; ce(P)/(γ+ce)=7.67×10^{-6} *11* α(K)=0.1184 *17*; α(L)=0.01694 *24*; α(M)=0.00369 *6* α(N)=0.000854 *12*; α(O)=0.0001318 *19*; α(P)=8.74×10^{-6} *13*
280.2 *2*	280.19	+	0.0	1$^+$	M1	0.1247	16.57	ce(K)/(γ+ce)=0.0938 *12*; ce(L)/(γ+ce)=0.01340 *19*; ce(M)/(γ+ce)=0.00292 *5* ce(N)/(γ+ce)=0.000676 *10*; ce(O)/(γ+ce)=0.0001043 *15*; ce(P)/(γ+ce)=6.92×10^{-6} *10* α(K)=0.1055 *15*; α(L)=0.01507 *22*; α(M)=0.00329 *5* α(N)=0.000760 *11*; α(O)=0.0001173 *17*; α(P)=7.79×10^{-6} *11* I_γ: 53% *15* in 1982No08.
285.7 *2*	565.91		280.19	+			0.50	
305.5 *2*	660.31	+	354.85	1$^+$			0.44	
322.1 *2*	660.31	+	338.15	(3)$^+$	M1	0.0860	1.54	ce(K)/(γ+ce)=0.0670 *9*; ce(L)/(γ+ce)=0.00954 *14*; ce(M)/(γ+ce)=0.00208 *3* ce(N)/(γ+ce)=0.000481 *7*; ce(O)/(γ+ce)=7.42×10^{-5} *11*; ce(P)/(γ+ce)=4.94×10^{-6} *7* α(K)=0.0728 *11*; α(L)=0.01036 *15*; α(M)=0.00226 *4* α(N)=0.000522 *8*; α(O)=8.06×10^{-5} *12*; α(P)=5.36×10^{-6} *8*
324.8 *2*	565.91		241.09	(1$^+$)			1.76	
338.1 *2*	338.15	(3)$^+$	0.0	1$^+$	E2	0.0435	8.01	ce(K)/(γ+ce)=0.0322 *5*; ce(L)/(γ+ce)=0.00737 *11*; ce(M)/(γ+ce)=0.001674 *24* ce(N)/(γ+ce)=0.000381 *6*; ce(O)/(γ+ce)=5.40×10^{-5} *8*; ce(P)/(γ+ce)=2.05×10^{-6} *3* α(K)=0.0336 *5*; α(L)=0.00769 *11*; α(M)=0.001747 *25* α(N)=0.000397 *6*; α(O)=5.64×10^{-5} *8*; α(P)=2.14×10^{-6} *3* I_γ: 5% *1* in 1982No08.
354.9 *2*	354.85	1$^+$	0.0	1$^+$	M1	0.0666	4.87	ce(K)/(γ+ce)=0.0529 *7*; ce(L)/(γ+ce)=0.00750 *11*; ce(M)/(γ+ce)=0.001634 *23* ce(N)/(γ+ce)=0.000378 *6*; ce(O)/(γ+ce)=5.83×10^{-5} *9*; ce(P)/(γ+ce)=3.89×10^{-6} *6* α(K)=0.0564 *8*; α(L)=0.00800 *12*; α(M)=0.001743 *25* α(N)=0.000403 *6*; α(O)=6.22×10^{-5} *9*; α(P)=4.15×10^{-6} *6*
384.6 *2*	384.65	+	0.0	1$^+$	M1	0.0540	8.81	ce(K)/(γ+ce)=0.0434 *6*; ce(L)/(γ+ce)=0.00614 *9*; ce(M)/(γ+ce)=0.001337 *19* ce(N)/(γ+ce)=0.000309 *5*; ce(O)/(γ+ce)=4.77×10^{-5} *7*; ce(P)/(γ+ce)=3.18×10^{-6} *5* α(K)=0.0457 *7*; α(L)=0.00647 *9*; α(M)=0.001409 *20* α(N)=0.000326 *5*; α(O)=5.03×10^{-5} *7*; α(P)=3.36×10^{-6} *5*
419.3 *2*	660.31	+	241.09	(1$^+$)			0.95	
441.1 *2*	682.14	(1$^+$)	241.09	(1$^+$)			1.17	
565.9 *3*	565.91		0.0	1$^+$			3.37	
618.4 *3*	618.4	(1$^+$)	0.0	1$^+$			1.57	
660.3 *3*	660.31	+	0.0	1$^+$			1.09	

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^{146}Dy ε decay 1987Zu02 (continued)

γ(^{146}Tb) (continued)

E_γ †	E_i(level)	J_i^π	E_f	J_f^π	$I_{(\gamma+ce)}$ †@
664.9 3	664.83		0.0	1$^+$	2.80
682.1 3	682.14	(1$^+$)	0.0	1$^+$	1.42
882.1 3	1162.3		280.19	$^+$	0.73
920.0 3	920.0	(1$^+$)	0.0	1$^+$	0.84
1062.2 3	1726.96	1$^+$	664.83		1.67
1066.8 3	1726.96	1$^+$	660.31	$^+$	3.27
1073.4 3	1726.96	1$^+$	653.15	$^+$	0.95
1084.4 3	1737.40	1$^+$	653.15	$^+$	0.66
1161.2 3	1726.96	1$^+$	565.91		3.81
1171.2 3	1737.40	1$^+$	565.91		0.51
1342.3 3	1726.96	1$^+$	384.65	$^+$	2.49
1352.8 3	1737.40	1$^+$	384.65	$^+$	2.64
1372.2 3	1726.96	1$^+$	354.85	1$^+$	1.32
1388.8 3	1726.96	1$^+$	338.15	(3)$^+$	2.27
1399.3 3	1737.40	1$^+$	338.15	(3)$^+$	0.73
1446.7 3	1726.96	1$^+$	280.19	$^+$	2.93
1474.7 3	2156.80	1$^+$	682.14	(1$^+$)	1.13
1496.3 3	1737.40	1$^+$	241.09	(1$^+$)	0.67
1696.1 3	1696.1		0.0	1$^+$	1.76
1727.1 3	2082.01	1$^+$	354.85	1$^+$	0.70
1737.4 3	1737.40	1$^+$	0.0	1$^+$	3.37
1743.8 3	2082.01	1$^+$	338.15	(3)$^+$	1.39
1772.1 3	2156.80	1$^+$	384.65	$^+$	1.03
1801.8 3	2082.01	1$^+$	280.19	$^+$	5.87
1801.8 3	2156.80	1$^+$	354.85	1$^+$	0.73
1841.0 3	2082.01	1$^+$	241.09	(1$^+$)	1.39
1876.7 3	2156.80	1$^+$	280.19	$^+$	1.61
1915.7 3	2156.80	1$^+$	241.09	(1$^+$)	1.87
1923.8 3	1923.8		0.0	1$^+$	0.88
2082.0 3	2082.01	1$^+$	0.0	1$^+$	2.64
2156.8 3	2156.80	1$^+$	0.0	1$^+$	8.80

† Taken from fig. 1 of 1987Zu02; $\Delta E\gamma$=0.2, if $E\gamma \leq 500$ keV, and $\Delta E\gamma$=0.3, if $E\gamma > 500$ keV (1987Zu02). Transition intensity is given per 100 ^{146}Dy decays, $\Delta(I(\gamma+ce))'$s are not stated in 1987Zu02; for intensity balance calculations evaluators assume this to be equal 10% for all the transitions.

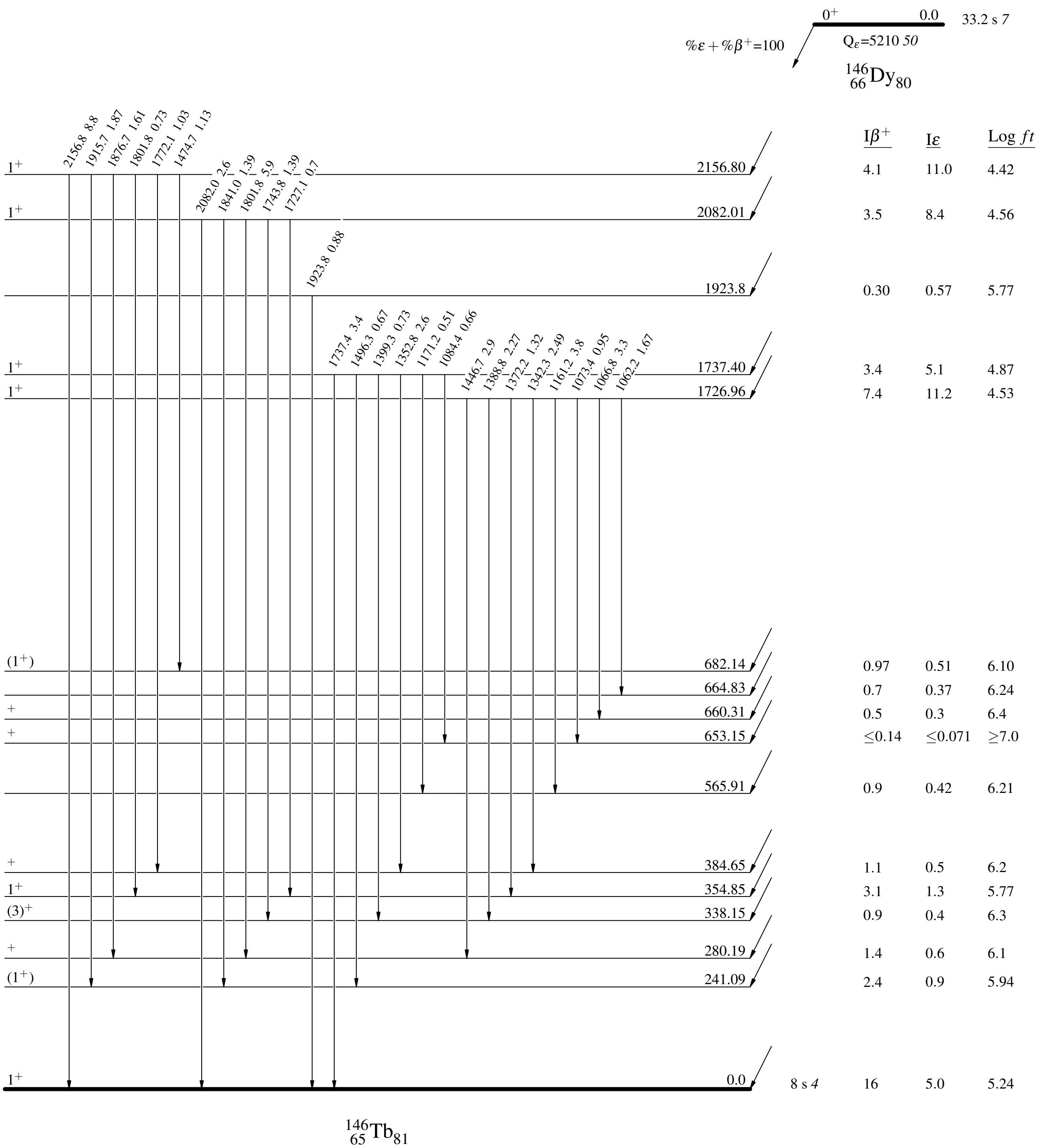
‡ From 1987Zu02 (α(K)exp values were measured but not given).

Additional information 1.

@ Absolute intensity per 100 decays.

^{146}Dy ε decay 1987Zu02

Decay Scheme



^{146}Dy ε decay 1987Zu02

Decay Scheme (continued)