^{159}Tb(n,γ) E=th 1974Ke01,1989Du03

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 176, 1 (2021)	1-May-2021

Additional information 1.

J^π(^{159}Tb)=3/2$^+$, which indicates that the ^{160}Tb states formed by thermal-neutron capture can have J^π=1$^+$ and 2$^+$. The 2$^+$ component has been found to dominate at thermal-neutron energies (1970Bo32).

1974Ke01: E(n)=thermal. For primary capture gammas, measured Eγ, Iγ using a pair spectrometer. For secondary gammas, measured Eγ, Iγ, E(ce), Ice, $\gamma\gamma$ using a curved-crystal spectrometer, Ge(Li) detectors, anti-Compton spectrometer and β spectrometer. Simultaneous irradiations of Tb with suitable calibration materials provided Eγ and absolute Iγ values.

1989Du03, using a calibrated Si(Li) detector having a volume of 1 cm^3, a surface area of 2 cm^2 and an energy resolution of 300 eV at 17 keV and 350 eV at 30 keV, measure Eγ and more precise (than those of 1974Ke01) Iγ values for several γ rays below 40 keV.

The level scheme shown in the drawings is from 1974Ke01. Secondary transitions whose placements are confirmed by $\gamma\gamma$ measurements are denoted by a dot placed at the level being depopulated by the transition.

Studies of two-step γ-ray cascades in the decay of states populated in the neutron-capture process have been published. These studies elucidate the occurrence of the intermediate levels excited in the decay of these states, as well as the structure of the excited states up to the neutron binding energy. Some of these recent studies are as follows (the first three are from the same group): 1995Bo20, 1995Va42, 1999Bo14, 2011Kr04 (deduced M1 scissor vibrational mode).

Other measurements: 1959Dr75, 1963Gi06, 1964Pa21, 1968Ro06, 1968Gr32, 1969Ro32, 1970Bo32, 1970Or05, 1973He15.

2011Kr04: ^{159}Tb(n,γ), E=th,

^{160}Tb Levels

E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]
0.0[e]	3^-	318.357[d] *4*	(3^+)	660.087 *6*		1006.8 *7*	
63.6855[a] *20*	1^-[&]	322.297[a] *8*	5^-	664.669 *18*	$(1^+,2^-)$	1021.6? *15*	
64.1096[f] *20*	4^+	354.736[g] *11*	(5^-)	678.2 *3*		1039.5? *15*	
78.8665[e] *15*	4^-	377.761[d] *6*	(4^+)	684.398 *10*		1051.7 *8*	
79.0924[b] *24*	$(0)^-$	381.285 *6*	1^-	692.5 *3*		1056.2 *5*	
105.5760[a] *22*	2^-[&]	421.433 *5*	2^-	712.8 *10*		1068.1 *4*	
126.483[f] *6*	5^+	478.225 *6*	(1^+)	729.9 *6*		1086.0 *3*	
133.2214[b] *25*	$(1)^-$	478.559 *7*	$(1^+,2^+)$	763.4 *4*		1103.9 *7*	
138.7354[c] *23*	$(1)^+$	480.257 *6*	$(3)^-$	765.471 *22*		1115.8 *4*	
139.4741[b] *24*	$(2)^-$	484.317 *9*	1,2	767.967 *25*		1124.8 *4*	
156.4446[a] *24*	3^-	503.543 *7*	$(1^+,2,3^-)$	791.1 *20*		1129.4 *3*	
167.7537[c] *25*	$(2)^+$	511.791 *12*		813.85 *30*		1136.9 *3*	
168.7? *12*		515.0 *2*	2^-	823.2 *5*		1146.5 *3*	
176.833 *3*	5^-	520.267 *7*	(2^+)	850.9 *5*		1150.0 *4*	
200.405[c] *4*	$(3)^+$	532.733 *9*	$(1^-,2,3^-)$	858.8 *6*		1155.9 *5*	
222.629[d] *3*	(0^+)	552.967 *10*	$(2^-,3^+)$	862.9 *5*		1170.5 *4*	
232.780[d] *3*	$(1)^+$	571.555 *14*	(1)	880.2? *10*		1175.1 *4*	
236.977[b] *4*	3^-	576.924 *9*		913.9 *3*		1190.9 *4*	
244.160[a] *3*	4^-	589.005 *11*	$(1^-,2)$	952.8 *5*		6375.21[#] *13*	(2^+)[@]
257.541[g] *5*	(4^-)	592.741 *11*		960.0 *6*			
265.229[c] *4*	(4^+)	598.668 *11*		976.1 *7*			
268.818[d] *3*	2^+	620.7 *2*		1001.9 *5*			

[†] From least-squares fit to Eγ's from Adopted Levels, Gammas dataset including all datasets with measured Eγ values.

[‡] From Adopted Levels, unless noted otherwise.

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^{159}Tb(n,γ) E=th 1974Ke01,1989Du03 (continued)

^{160}Tb Levels (continued)

[#] From 2021Wa16.
[@] Assignment based upon observation by 1970Bo32 that, of the two possible capture-state spins (1$^+$,2$^+$), the J^π=2$^+$ component is dominant. Comparison of the calculated and measured population of levels in the capture process also supports this conclusion.
[&] From γ(θ) following n-capture on polarized Tb nuclei (1970Bo32).
[a] Band(A): K$^\pi$=1$^-$ band member.
[b] Band(B): K$^\pi$=0$^-$ band member.
[c] Band(C): K$^\pi$=1$^+$ band member.
[d] Band(D): K$^\pi$=0$^+$ band member.
[e] Band(E): K$^\pi$=3$^-$ band member.
[f] Band(F): K$^\pi$=4$^+$ band member.
[g] Band(G): K$^\pi$=4$^-$ band member.

γ(^{160}Tb)

Iγ normalization: 1974Ke01 determine absolute Iγ values based upon measured capture-γ intensities for gold mixed with the Tb target, assuming a value of 22 barns *2* for the thermal-neutron capture cross section of Tb, together with a value of 98.8 barns *3* for the capture cross section of gold and a value of 163.8 photons per 1000 n captures for transitions above 6100 keV. However, a subsequent evaluation (1984MuZY) gives a value of 20.7 barns *4* (after conversion, by the evaluator, of the 1984MuZY 2200 meter/second value to a Maxwellian spectrum-averaged value) for the Tb cross section; and this is the value used by 1989Du03 to obtain their absolute Iγ values. To put these two sets of Iγ values on a common basis, these latter values have been decreased by a scale factor of 1.06 (the ratio of the two Tb cross-section values). 1989Du03 indicate that their Iγ data are subject to an additional, systematic error of 7% from the absolute intensity calibration. 1974Ke01 state that their Iγ data are subject to a similar systematic error, but with a value of 12%. Using the later value of the Tb capture cross section, the evaluator deduces that this latter error can be reduced to 7%, essentially the same as that reported by 1989Du03. This is the value adopted here.

E_γ[†]	I_γ[†g]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]
15.413[‡] *6*	2.49[‡] *10*	79.0924	(0)$^-$	63.6855	1$^-$	(M1)
[x]22.95 *5*	7.5 *4*					
29.025[#] *3*	7.5[#] *3*	167.7537	(2)$^+$	138.7354	(1)$^+$	M1
[x]31.85[#] *3*	0.32[#] *6*					
32.652[#] *4*	6.6[#] *3*	200.405	(3)$^+$	167.7537	(2)$^+$	M1
33.159[#] *1*	7.7[#] *3*	138.7354	(1)$^+$	105.5760	2$^-$	E1
[x]36.12[#] *3*	0.31[#] *9*					
[x]40.3 *4*	5.2 *23*					
41.8903[#] *10*	22.3[#] *8*	105.5760	2$^-$	63.6855	1$^-$	M1
50.8687 *10*	21. *4*	156.4446	3$^-$	105.5760	2$^-$	D
54.1287 *10*	21. *4*	133.2214	(1)$^-$	79.0924	(0)$^-$	M1
[x]56.280 *10*	1.4 *7*					
59.6430 *10*	36. *7*	138.7354	(1)$^+$	79.0924	(0)$^-$	E1
62.370 *12*	2.9 *15*	126.483	5$^+$	64.1096	4$^+$	M1
63.6859 *20*	51. *10*	63.6855	1$^-$	0.0	3$^-$	E2
64.1097 *20*	41. *8*	64.1096	4$^+$	0.0	3$^-$	E1
64.8237 *15*	4.7 *12*	265.229	(4$^+$)	200.405	(3)$^+$	(E2)
68.402 *12*	2.1 *6*	268.818	2$^+$	200.405	(3)$^+$	
75.0503 *20*	108. *22*	138.7354	(1)$^+$	63.6855	1$^-$	E1
75.7895 *15*	5.0 *12*	139.4741	(2)$^-$	63.6855	1$^-$	(M1,E2)
[x]77.999 *8*	1.2 *6*					
78.140 *8*	1.2 *6*	322.297	5$^-$	244.160	4$^-$	
78.8664 *15*	6.7 *8*	78.8665	4$^-$	0.0	3$^-$	M1,E2
83.894 *6*	2.3 *7*	222.629	(0$^+$)	138.7354	(1)$^+$	

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^{159}Tb(n,γ) E=th 1974Ke01,1989Du03 (continued)

γ(^{160}Tb) (continued)

Eγ[†]	Iγ[†g]	Ei(level)	J^{π}_i	E_f	J^{π}_f	Mult.[&]
87.7156 *10*	7.4 *7*	244.160	4⁻	156.4446	3⁻	
[x]89.168 *15*	0.9 *5*					
89.408 *2*	4.4 *7*	222.629	(0⁺)	133.2214	(1)⁻	
92.765 *10*	1.8 *5*	156.4446	3⁻	63.6855	1⁻	
93.308 *3*	10.3 *8*	232.780	(1)⁺	139.4741	(2)⁻	
94.043 *3*	1.8 *4*	232.780	(1)⁺	138.7354	(1)⁺	
94.832 *5*	2.8 *6*	200.405	(3)⁺	105.5760	2⁻	
[x]95.197 *15*	0.57 *17*					
97.196 *12*	0.83 *25*	354.736	(5⁻)	257.541	(4⁻)	
97.506 *3*	25.8 *21*	236.977	3⁻	139.4741	(2)⁻	M1,E2
97.967 *3*	2.7 *5*	176.833	5⁻	78.8665	4⁻	
101.066 *3*	2.8 *6*	268.818	2⁺	167.7537	(2)⁺	
104.0651 *20*	5.2 *6*	167.7537	(2)⁺	63.6855	1⁻	
[x]108.398 *15*	0.83 *25*					
108.940 *6*	1.4 *4*	377.761	(4⁺)	268.818	2⁺	
112.374 *3*	4.4 *5*	268.818	2⁺	156.4446	3⁻	
[x]114.147 *8*	1.1 *3*					
117.956 *5*	0.9 *3*	318.357	(3⁺)	200.405	(3)⁺	
[x]121.791 *25*	0.8 *4*					
[x]124.575 *5*	2.6 *4*					
131.057 *5*	2.4 *4*	257.541	(4⁻)	126.483	5⁺	
131.399 *5*	1.2 *3*	236.977	3⁻	105.5760	2⁻	
[x]133.644 *20*	0.8 *4*					
135.595 *4*	21.2 *17*	268.818	2⁺	133.2214	(1)⁻	E1
[x]137.484 *20*	0.6 *3*					
138.545 *20*	0.8 *3*	244.160	4⁻	105.5760	2⁻	
[x]139.410 *20*	0.8 *4*					
[x]140.679 *12*	3.1 *3*					
140.795 *12*	5.9 *5*	377.761	(4⁺)	236.977	3⁻	
[x]141.537 *6*	2.3 *2*					
150.600 *5*	7.7 *6*	318.357	(3⁺)	167.7537	(2)⁺	
153.685 *4*	25.2 *25*	232.780	(1)⁺	79.0924	(0)⁻	(E1)[a]
158.941 *5*	5.5 *4*	222.629	(0⁺)	63.6855	1⁻	
[x]159.237 *15*	0.79 *12*					
[x]159.346 *15*	0.61 *15*					
163.242 *5*	5.1 *4*	268.818	2⁺	105.5760	2⁻	
165.843 *15*	0.57 *14*	322.297	5⁻	156.4446	3⁻	
[x]175.191 *8*	0.89 *9*					
176.833 *6*	2.8 *2*	176.833	5⁻	0.0	3⁻	
[x]177.530 *15*	0.42 *8*					
[x]178.464 *12*	1.0 *1*					
178.673 *8*	1.7 *1*	257.541	(4⁻)	78.8665	4⁻	
178.876 *6*	14.7 *12*	318.357	(3⁺)	139.4741	(2)⁻	
179.830 *12*	0.80 *8*	660.087		480.257	(3)⁻	
[x]181.192 *20*	0.54 *8*					
181.868 *6*	2.5 *2*	660.087		478.225	(1⁺)	
[x]184.270 *15*	0.61 *9*					
184.463 *6*	5.0 *4*	421.433	2⁻	236.977	3⁻	
185.188 *8*	3.3 *3*	503.543	(1⁺,2,3⁻)	318.357	(3⁺)	
[x]186.023 *15*	0.41 *10*					
[x]186.625 *8*	0.86 *9*					
[x]188.208 *15*	1.04 *8*					
193.434 *6*	18.0 *14*	257.541	(4⁻)	64.1096	4⁺	
[x]194.505 *25*	0.40 *12*					
[x]198.416 *15*	0.63 *8*					
[x]199.129 *12*	2.4 *3*					

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^{159}Tb(n,γ) E=th 1974Ke01,1989Du03 (continued)

γ(^{160}Tb) (continued)

E$_\gamma$ †	I$_\gamma$ †g	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$
x199.208 12	2.55 25				
x203.969 8	2.0 2				
205.123 20	0.44 9	268.818	2+	63.6855	1−
209.740 8	1.9 2	478.559	(1+,2+)	268.818	2+
211.420 20	0.47 7	480.257	(3)−	268.818	2+
x212.51 3	0.44 9				
213.51 3	0.50 7	381.285	1−	167.7537	(2)+
x214.568 15	0.57 7				
215.021 25	0.54 11	480.257	(3)−	265.229	(4+)
215.47 3	0.40 12	484.317	1,2	268.818	2+
x218.40 3	0.60 9				
x219.49 3	0.79 12				
221.02 3	0.60 7	421.433	2−	200.405	(3)+
x225.10 3	0.59 9				
228.26 3	0.87 9	354.736	(5−)	126.483	5+
234.72 3	0.67 7	503.543	(1+,2,3−)	268.818	2+
236.111 12	1.03 8	480.257	(3)−	244.160	4−
238.637 15	0.60 9	660.087		421.433	2−
x239.33 3	0.43 22				
241.812 15	1.02 8	381.285	1−	139.4741	(2)−
242.558 15	0.64 10	381.285	1−	138.7354	(1)+
242.977 15	4.1 3	511.791		268.818	2+
243.264 15	5.6 4	480.257	(3)−	236.977	3−
248.052 10	13.7 11	381.285	1−	133.2214	(1)−
x248.34 3	1.15 17				
x253.34 3	0.52 8				
x254.336 12	2.95 24				
255.051 15	1.14 9	520.267	(2+)	265.229	(4+)
255.944 12	1.83 15	478.559	(1+,2+)	222.629	(0+)
257.538 15	0.85 7	257.541	(4−)	0.0	3−
258.566 12	1.17 9	576.924		318.357	(3+)
x260.12 4	0.36 11				
262.98 4	0.71 11	684.398		421.433	2−
x264.43 4	0.40 8				
264.986 12	1.20 10	421.433	2−	156.4446	3−
x269.502 15	0.60 6				
x270.410 20	0.75 8				
270.759 12	4.4 4	503.543	(1+,2,3−)	232.780	(1)+
x271.06 4	0.62 9				
x271.95 5	0.40 6				
x272.636 12	2.0 2				
274.368 20	0.73 7	592.741		318.357	(3+)
275.719 10	5.6 4	381.285	1−	105.5760	2−
277.837 15	1.37 14	478.225	(1+)	200.405	(3)+
278.134 25	0.86 17	478.559	(1+,2+)	200.405	(3)+
x278.337 12	2.05 16				
278.806 15	2.16 17	660.087		381.285	1−
x279.042 12	2.4 2				
279.79 6	0.37 12	480.257	(3)−	200.405	(3)+
282.66 4	0.53 11	421.433	2−	138.7354	(1)+
283.275 20	1.8 1	520.267	(2+)	236.977	3−
x283.566 25	1.00 15				
284.155 15	3.3 3	552.967	(2−,3+)	268.818	2+
x284.85 3	0.72 14				
x286.78 8	0.37 9				
287.736 20	1.01 10	552.967	(2−,3+)	265.229	(4+)

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^{159}Tb(n,γ) E=th 1974Ke01,1989Du03 (continued)

γ(^{160}Tb) (continued)

E_γ [†]	I_γ [†g]	E_i(level)	J^π_i	E_f	J^π_f
288.185 15	5.4 4	421.433	2⁻	133.2214	(1)⁻
[x]290.480 15	1.9 2				
290.619 20	1.4 2	354.736	(5⁻)	64.1096	4⁺
295.762 15	2.45 20	532.733	(1⁻,2,3⁻)	236.977	3⁻
[x]298.19 5	0.97 12				
[x]300.067 25	0.70 8				
302.741 20	2.6 2	571.555	(1)	268.818	2⁺
303.130 20	1.47 12	684.398		381.285	1⁻
308.132 20	2.23 18	576.924		268.818	2⁺
308.83 3	0.53 8	552.967	(2⁻,3⁺)	244.160	4⁻
310.472 8	6.1 5	478.225	(1⁺)	167.7537	(2)⁺
310.78 3	0.68 14	478.559	(1⁺,2⁺)	167.7537	(2)⁺
[x]311.345 15	1.76 11				
312.536 25	0.61 7	480.257	(3)⁻	167.7537	(2)⁺
315.853 20	2.3 3	421.433	2⁻	105.5760	2⁻
316.58 2	0.95 8	484.317	1,2	167.7537	(2)⁺
317.604 12	5.0 4	381.285	1⁻	63.6855	1⁻
319.866 10	6.0 5	520.267	(2⁺)	200.405	(3)⁺
320.16[h] 3	0.61[h] 12	552.967	(2⁻,3⁺)	232.780	(1)⁺
320.16[h] 3	0.61[h] 12	589.005	(1⁻,2)	268.818	2⁺
323.802 20	0.76 8	480.257	(3)⁻	156.4446	3⁻
[x]328.446 25	1.07 9				
[x]330.612 15	2.1 2				
[x]332.99 3	0.83 10				
339.492 10	14.4 12	478.225	(1⁺)	138.7354	(1)⁺
339.82 4	1.4 2	478.559	(1⁺,2⁺)	138.7354	(1)⁺
340.793 15	2.8 2	480.257	(3)⁻	139.4741	(2)⁻
[x]341.03 4	1.1 2				
341.709 15	3.1 2	660.087		318.357	(3⁺)
[x]342.08 3	0.9 2				
344.85 6	0.36 7	484.317	1,2	139.4741	(2)⁻
[x]345.375 15	5.1 4				
345.583 25	1.44 14	484.317	1,2	138.7354	(1)⁺
347.06 3	0.70 7	480.257	(3)⁻	133.2214	(1)⁻
348.924 20	3.1 2	571.555	(1)	222.629	(0⁺)
351.095 15	7.3 6	484.317	1,2	133.2214	(1)⁻
352.02 3	0.69 8	589.005	(1⁻,2)	236.977	3⁻
352.513 12	6.8 5	520.267	(2⁺)	167.7537	(2)⁺
[x]353.92 4	0.69 8				
[x]354.538 15	2.84 23				
356.233 12	5.1 4	589.005	(1⁻,2)	232.780	(1)⁺
357.739 12	11.1 9	421.433	2⁻	63.6855	1⁻
[x]359.64 4	0.5 1				
359.956 20	1.54 12	592.741		232.780	(1)⁺
[x]361.15 4	0.76 11				
361.711 15	3.45 3	598.668		236.977	3⁻
[x]362.41 3	1.7 3				
[x]363.40 4	0.51 8				
363.805 20	4.4 4	520.267	(2⁺)	156.4446	3⁻
364.98 5	0.40 8	532.733	(1⁻,2,3⁻)	167.7537	(2)⁺
[x]369.838 25	1.8 1				
370.34 4	0.84 8	503.543	(1⁺,2,3⁻)	133.2214	(1)⁻
372.964 25	2.55 20	478.559	(1⁺,2⁺)	105.5760	2⁻
373.03 4	2.6 2	511.791		138.7354	(1)⁺
374.662 20	4.05 32	480.257	(3)⁻	105.5760	2⁻

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^{159}Tb(n,γ) E=th 1974Ke01,1989Du03 (continued)

γ(^{160}Tb) (continued)

E_γ[†]	I_γ[†g]	E_i(level)	J^π_i	E_f	J^π_f
[x]376.20[d] 3	4.8 4				
376.49[b] 4	1.37 21	576.924		200.405	(3)$^+$
378.713 25	6.4 5	484.317	1,2	105.5760	2$^-$
[x]379.85 4	0.68 7				
[x]381.75 4	0.81 10				
[x]382.186 20	2.5 2				
[x]382.63 4	1.18 9				
[x]384.63 4	1.33 11				
[x]385.08 5	0.66 10				
[x]390.76 3	1.1 1				
[x]392.15 8	0.72 18				
[x]393.03 3	1.65 13				
[x]393.85 8	0.75 11				
396.40 12	0.58 12	552.967	(2$^-$,3$^+$)	156.4446	3$^-$
398.31 8	0.85 13	598.668		200.405	(3)$^+$
399.499 20	3.5 3	532.733	(1$^-$,2,3$^-$)	133.2214	(1)$^-$
[x]402.643 20	2.6 2				
403.77 4	0.97 12	571.555	(1)	167.7537	(2)$^+$
[x]404.647 15	4.8 4				
406.18 4	0.93 14	511.791		105.5760	2$^-$
[x]409.015 15	4.7 4				
[x]410.875 20	3.7 3				
413.49 3	2.3 2	552.967	(2$^-$,3$^+$)	139.4741	(2)$^-$
[x]414.06 5	0.92 9				
414.872 20	4.6 4	478.559	(1$^+$,2$^+$)	63.6855	1$^-$
[x]418.00 4	0.84 8				
[x]419.01 5	0.65 8				
420.645 20	4.2 3	484.317	1,2	63.6855	1$^-$
[x]421.80 5	0.58 7				
[x]425.93[c] 3	1.6 1				
427.168 15	6.1 5	532.733	(1$^-$,2,3$^-$)	105.5760	2$^-$
430.85 4	0.79 9	598.668		167.7537	(2)$^+$
432.10 6	0.57 11	571.555	(1)	139.4741	(2)$^-$
[x]434.25 8	0.47 12				
437.442[b] 15	4.0 3	576.924		139.4741	(2)$^-$
[x]439.96 5	1.04 20				
[x]440.50 3	1.26 13				
[x]441.29 6	0.75 15				
[x]441.80 3	1.8 2				
442.205 25	2.6 2	598.668		156.4446	3$^-$
[x]444.15 5	0.79 12				
[x]444.77 3	1.6 1				
447.387 20	4.6 4	552.967	(2$^-$,3$^+$)	105.5760	2$^-$
448.113 25	1.9 2	511.791		63.6855	1$^-$
[x]449.05 5	0.80 10				
451.610 12	11.6 9	684.398		232.780	(1)$^+$
453.269 25	2.6 2	592.741		139.4741	(2)$^-$
[x]454.90 4	1.4 2				
455.75 4	1.15 12	589.005	(1$^-$,2)	133.2214	(1)$^-$
[x]457.41 5	0.90 11				
[x]459.04 6	1.2 2				
459.536 20	2.7 2	592.741		133.2214	(1)$^-$
[x]460.14 3	2.3 2				
464.24 3	8.2 7	664.669	(1$^+$,2$^-$)	200.405	(3)$^+$
[x]464.457 20	6.1 30				

Continued on next page (footnotes at end of table)

^{159}Tb(n,γ) E=th 1974Ke01,1989Du03 (continued)

γ(^{160}Tb) (continued)

E_γ[†]	I_γ[†g]	E_i(level)	J^π_i	E_f	J^π_f
[x]468.51 4	2.0 2				
[x]476.721 20	4.1 5				
[x]480.09 6	2.2 11				
[x]481.25 3	4.8 5				
[x]484.11 4	2.2 6				
[x]484.45 8	1.6 5				
[x]487.29 8	1.2 2				
[x]491.06 4	1.44 14				
492.53 15	1.0 2	571.555	(1)	79.0924	(0)$^-$
496.91 3	1.65 17	664.669	(1$^+$,2$^-$)	167.7537	(2)$^+$
[x]498.49 12	1.2 4				
[x]499.526 25	2.7 2				
[x]501.10 12	0.9 3				
[x]515.27 4	3.2 5				
519.779 25	2.9 2	598.668		78.8665	4$^-$
521.25 6	2.0 2	765.471		244.160	4$^-$
525.21 4	2.8 4	664.669	(1$^+$,2$^-$)	139.4741	(2)$^-$
[x]525.671 25	8.0 6				
526.00 6	2.2 11	664.669	(1$^+$,2$^-$)	138.7354	(1)$^+$
[x]527.37 4	2.8 2				
529.06 6	2.0 2	592.741		63.6855	1$^-$
530.95 8	1.3 3	767.967		236.977	3$^-$
532.702[h] 25	5.2[h] 4	532.733	(1$^-$,2,3$^-$)	0.0	3$^-$
532.702[h] 25	5.2[h] 4	765.471		232.780	(1)$^+$
[x]533.43 6	1.5 2				
[x]538.27 6	1.3 2				
[x]541.48 3	5.8 5				
542.78 8	1.2 2	765.471		222.629	(0$^+$)
544.95 6	1.76 21	684.398		139.4741	(2)$^-$
545.63 6	1.94 23	684.398		138.7354	(1)$^+$
[x]548.42 6	1.94 16				
[x]549.50 8	1.15 17				
[x]552.33 6	2.1 2				
554.58 8	1.3 2	660.087		105.5760	2$^-$
[x]557.29 10	0.93 23				
[x]559.50 8	1.6 2				
[x]560.89 8	1.4 3				
[x]563.19 8	1.2 2				
[x]572.86 8	1.4 2				
[x]578.95 10	0.7 2				
[x]580.96 10	0.7 2				
[x]582.76 8	1.05 21				
585.60 8	2.3 3	664.669	(1$^+$,2$^-$)	79.0924	(0)$^-$
[x]590.68 5	3.4 3				
[x]591.51 4	5.3 4				
[x]593.37 4	3.2 3				
[x]595.57 6	2.4 3				
598.70 8	1.83 22	598.668		0.0	3$^-$
600.20 3	7.6 6	767.967		167.7537	(2)$^+$
611.60 8	1.9 2	767.967		156.4446	3$^-$
626.10 20	1.4 3	765.471		139.4741	(2)$^-$
[x]628.64 4	5.4 4				
632.34 15	1.3 3	765.471		133.2214	(1)$^-$
634.77 6	2.6 3	767.967		133.2214	(1)$^-$
[x]638.79 20	1.4 4				
[x]649.52 8	2.5 3				

Continued on next page (footnotes at end of table)

^{159}Tb(n,γ) E=th 1974Ke01,1989Du03 (continued)

γ(^{160}Tb) (continued)

$E_γ$†	$I_γ$^{†g}	E_i(level)
^{x}655.82 *6*	3.9 *3*	
^{x}662.34$^{@}$ *20*	1.2$^{@}$ *3*	
^{x}664.44 *6*	4.4 *4*	
^{x}666.50 *10*	2.6 *3*	
^{x}675.08 *15*	1.3 *4*	
^{x}679.51 *12*	1.6 *3*	
^{x}683.45 *8*	3.2 *4*	
^{x}684.91 *6*	4.9 *4*	
^{x}687.97 *15*	1.7 *3*	
^{x}689.03 *12*	2.0 *4*	
^{x}693.42 *15*	1.5 *4*	
^{x}699.28 *15*	1.5 *4*	
^{x}704.82 *15*	2.1 *4*	
^{x}708.05 *8*	5.5 *6*	
^{x}709.31 *25*	2.9 *15*	
^{x}712.15 *12*	2.2 *3*	
^{x}715.0 *3*	1.1 *6*	
^{x}718.96$^{@}$ *12*	2.0$^{@}$ *3*	
^{x}722.43 *20*	1.3 *4*	
^{x}724.40 *12*	2.4 *4*	
^{x}752.87 *25*	2.4 *4*	
^{x}766.71 *8*	6.0 *6*	
^{x}771.77 *12*	3.2 *4*	
^{x}780.63$^{@}$ *15*	2.0$^{@}$ *3*	
^{x}792.02$^{@}$ *25*	1.0$^{@}$ *3*	
^{x}795.63 *15*	3.9 *5*	
^{x}817.7$^{@}$ *4*	2.8$^{@}$ *8*	
^{x}826.27$^{@}$ *15*	1.3$^{@}$ *2*	
^{x}832.26 *20*	3.3 *7*	
^{x}834.95 *15*	4.4 *7*	
^{x}836.86$^{@}$ *15*	2.5$^{@}$ *4*	
^{x}841.62$^{@}$ *20*	1.2$^{@}$ *4*	
^{x}843.94$^{@}$ *25*	1.2$^{@}$ *4*	
^{x}848.6$^{@}$ *3*	1.7$^{@}$ *5*	
^{x}851.04$^{@}$ *6*	7.0$^{@}$ *5*	
^{x}858.88$^{@}$ *20*	1.3$^{@}$ *3*	
^{x}864.99$^{@}$ *18*	1.7$^{@}$ *3*	
^{x}871.15$^{@}$ *25*	1.4$^{@}$ *3*	
^{x}874.78$^{@}$ *12*	2.6$^{@}$ *3*	
^{x}888.08 *25*	1.1 *2*	
^{x}899.90 *25*	1.3 *2*	
^{x}904.62 *13*	1.9 *2*	
^{x}912.53 *16*	1.9 *2*	
^{x}915.17 *16*	3.2 *4*	
^{x}917.42 *22*	1.70 *25*	
^{x}920.60 *25*	2.75 *25*	
^{x}926.95 *20*	1.2 *3*	
^{x}930.6 *4*	0.7 *2*	
^{x}934.6 *4*	0.7 *2*	
^{x}944.07 *12*	4.8 *8*	
^{x}945.42 *20*	2.7 *6*	
^{x}951.59 *10*	2.20 *25*	
^{x}971.4 *3*	0.70 *25*	

$E_γ$†	$I_γ$^{†g}	E_i(level)	$J^π_i$	E_f
^{x}974.70 *25*	1.9 *4*			
^{x}976.76 *15*	2.7 *4*			
^{x}988.7 *3*	1.10 *25*			
^{x}991.40 *25*	2.70 *25*			
^{x}993.5 *6*	0.8 *4*			
^{x}995.5 *5*	0.8 *4*			
^{x}998.70 *25*	1.1 *3*			
^{x}1001.00 *12*	3.5 *3*			
^{x}1003.71 *24*	1.60 *25*			
^{x}1006.50 *15*	2.6 *4*			
^{x}1018.7 *3*	1.0 *3*			
^{x}1021.75 *15*	1.6 *3*			
^{x}1025.64 *12*	1.80 *25*			
^{x}1033.2 *5*	0.7 *3*			
^{x}1035.3 *4*	1.0 *3*			
^{x}1040.8 *5*	0.70 *25*			
^{x}1043.20 *20*	1.70 *25*			
^{x}1050.3 *4*	3.0 *8*			
^{x}1052.0 *6*	1.3 *8*			
^{x}1058.9 *3*	1.10 *25*			
^{x}1061.15 *15*	2.50 *25*			
^{x}1064.22 *20*	1.5 *4*			
^{x}1068.20 *10*	3.6 *3*			
^{x}1073.95 *9*	3.2 *2*			
^{x}1076.80 *20*	1.05 *20*			
^{x}1085.85 *17*	2.3 *4*			
^{x}1088.6 *3*	1.6 *5*			
^{x}1091.25 *20*	2.2 *6*			
^{x}1107.48 *16*	2.9 *3*			
^{x}1119.25 *20*	2.4 *4*			
^{x}1129.0 *5*	0.67 *20*			
^{x}1150.9 *5*	0.6 *2*			
^{x}1155.95 *18*	1.5 *2*			
^{x}1159.66 *22*	1.2 *2*			
^{x}1164.7 *3*	0.9 *4*			
^{x}1169.2 *4*	0.9 *4*			
^{x}1175.6 *5*	1.3 *3*			
^{x}1184.5 *2*	2.10 *25*			
^{x}1186.70 *10*	4.1 *3*			
^{x}1193.30 *25*	1.05 *25*			
^{x}1211.4 *4*	0.70 *25*			
^{x}1220.15 *22*	1.40 *20*			
^{x}1228.8 *4*	1.20 *25*			
5184.1 *5*	0.90 *15*	6375.21	(2^{+})	1190.9
5199.9 *5*	1.16 *20*	6375.21	(2^{+})	1175.1
5204.5 *5*	1.40 *20*	6375.21	(2^{+})	1170.5
5219.1 *6*	0.60 *15*	6375.21	(2^{+})	1155.9
5225.0 *5*	1.4 *4*	6375.21	(2^{+})	1150.0
5228.5 *4*	2.6 *5*	6375.21	(2^{+})	1146.5
5238.1 *4*	0.94 *15*	6375.21	(2^{+})	1136.9
5245.6 *4*	3.16 *20*	6375.21	(2^{+})	1129.4
5250.2 *5*	2.22 *20*	6375.21	(2^{+})	1124.8
5259.2 *5*	0.78 *10*	6375.21	(2^{+})	1115.8

Continued on next page (footnotes at end of table)

^{159}Tb(n,γ) E=th 1974Ke01,1989Du03 (continued)

γ(^{160}Tb) (continued)

E_γ [†]	I_γ [†g]	E_i(level)	J^π_i	E_f	J^π_f
5271.1 *8*	0.44 *10*	6375.21	(2$^+$)	1103.9	
5289.0 *4*	1.70 *10*	6375.21	(2$^+$)	1086.0	
5306.9 *5*	0.66 *10*	6375.21	(2$^+$)	1068.1	
5318.8 *6*	0.55 *10*	6375.21	(2$^+$)	1056.2	
5323.3 *8*	0.44 *10*	6375.21	(2$^+$)	1051.7	
5335.5[e] *15*	0.10 *10*	6375.21	(2$^+$)	1039.5?	
5353.4[e] *15*	0.10 *5*	6375.21	(2$^+$)	1021.6?	
5368.2 *8*	0.55 *10*	6375.21	(2$^+$)	1006.8	
5373.1 *6*	0.83 *10*	6375.21	(2$^+$)	1001.9	
5398.9 *8*	0.33 *10*	6375.21	(2$^+$)	976.1	
5415.0 *7*	0.50 *10*	6375.21	(2$^+$)	960.0	
5422.2 *6*	0.50 *10*	6375.21	(2$^+$)	952.8	
5461.1 *4*	1.50 *10*	6375.21	(2$^+$)	913.9	
5494.8[e] *10*	0.28 *5*	6375.21	(2$^+$)	880.2?	
5512.1 *6*	0.72 *20*	6375.21	(2$^+$)	862.9	
5516.2 *7*	0.66 *20*	6375.21	(2$^+$)	858.8	
5524.1 *4*	1.90 *10*	6375.21	(2$^+$)	850.9	
5551.8 *4*	1.00 *10*	6375.21	(2$^+$)	823.2	
5561.2 *4*	0.33 *10*	6375.21	(2$^+$)	813.85	
5583.9 *20*	0.10 *5*	6375.21	(2$^+$)	791.1	
5606.9 *4*	1.82 *15*	6375.21	(2$^+$)	767.967	
5611.6 *5*	0.89 *10*	6375.21	(2$^+$)	763.4	
5645.1 *7*	0.10 *5*	6375.21	(2$^+$)	729.9	
5662.2 *10*	0.28 *10*	6375.21	(2$^+$)	712.8	
5682.5 *4*	0.83 *10*	6375.21	(2$^+$)	692.5	
5696.8 *4*	1.20 *10*	6375.21	(2$^+$)	678.2	
5710.3 *4*	1.00 *10*	6375.21	(2$^+$)	664.669	(1$^+$,2$^-$)
5754.3 *4*	1.77 *10*	6375.21	(2$^+$)	620.7	
5776.4 *4*	6.05 *15*	6375.21	(2$^+$)	598.668	
5782.9 *4*	1.33 *10*	6375.21	(2$^+$)	592.741	
5804.5 *5*	0.60 *10*	6375.21	(2$^+$)	571.555	(1)
5821.8 *5*	0.55 *10*	6375.21	(2$^+$)	552.967	(2$^-$,3$^+$)
5842.3 *4*	3.05 *10*	6375.21	(2$^+$)	532.733	(1$^-$,2,3$^-$)
5860.0 *4*	1.77 *10*	6375.21	(2$^+$)	515.0	2$^-$
5890.6 *4*	8.0 *3*	6375.21	(2$^+$)	484.317	1,2
5895.8 *4*	1.6 *3*	6375.21	(2$^+$)	478.559	(1$^+$,2$^+$)
5953.5 *4*	4.60 *20*	6375.21	(2$^+$)	421.433	2$^-$
5993.7 *4*	5.40 *15*	6375.21	(2$^+$)	381.285	1$^-$
6105.9 *10*	0.33 *15*	6375.21	(2$^+$)	268.818	2$^+$
6110.1 *8*	0.40 *15*	6375.21	(2$^+$)	265.229	(4$^+$)
6138.1 *4*	5.60 *15*	6375.21	(2$^+$)	236.977	3$^-$
6206.3[e] *12*	0.13 *5*	6375.21	(2$^+$)	167.7537	(2)$^+$
6218.6 *4*	9.40 *20*	6375.21	(2$^+$)	156.4446	3$^-$
6235.5 *4*	1.44 *10*	6375.21	(2$^+$)	139.4741	(2)$^-$
6241.9 *4*	2.20 *10*	6375.21	(2$^+$)	133.2214	(1)$^-$
6269.4 *4*	2.05 *10*	6375.21	(2$^+$)	105.5760	2$^-$
6295.8 *6*	0.24 *5*	6375.21	(2$^+$)	78.8665	4$^-$
6311.4[f] *5*	2.00 *10*	6375.21	(2$^+$)	63.6855	1$^-$
6375.9 *10*	0.22 *5*	6375.21	(2$^+$)	0.0	3$^-$

[†] From 1974Ke01, except where noted otherwise. Transitions of Eγ<875 keV were measured with a curved-crystal spectrometer, except as indicated. All transitions of Eγ>875 keV were measured with Ge(Li) spectrometers. The errors in the Eγ values from

Continued on next page (footnotes at end of table)

^{159}Tb(n,γ) E=th 1974Ke01,1989Du03 (continued)

γ(^{160}Tb) (continued)

the curved-crystal measurements are also subject to a systematic error due to the energy calibration. This is reported (1974Ke01) to be 20 ppm, and is not included in the ΔE values listed here.

‡ From 1989Du03. 1974Ke01 report only the L1 line from this transition.

\# From 1989Du03.

@ Measured with a Ge(Li) spectrometer.

& Listed assignments are from 1974Ke01 and are based upon their Ice and Iγ measurements.

[a] α(K)exp allows E1 or E2. $\Delta\pi$=yes, from the level scheme.

[b] 1974Ke01 show this γ as unplaced in their tabulation of γ data, but show it as deexciting the 576.9 level in their level scheme.

[c] 1974Ke01 indicate that this γ deexcites the 576.9 level. However, the final-state energy implied by this placement lies in a region where there are no ^{160}Tb levels reported.

[d] In their tabulation of γ-ray data, 1974Ke01 indicate that this γ deexcites the 576.9 level. However, in their level scheme, the 376.49 γ is shown as this deexciting transition.

[e] The final state populated by this primary γ is said to be doubtful (1974Ke01).

[f] 1974Ke01 state that this γ may contain an impurity (iodine) component.

[g] For intensity per 100 neutron captures, multiply by 0.106 *7*.

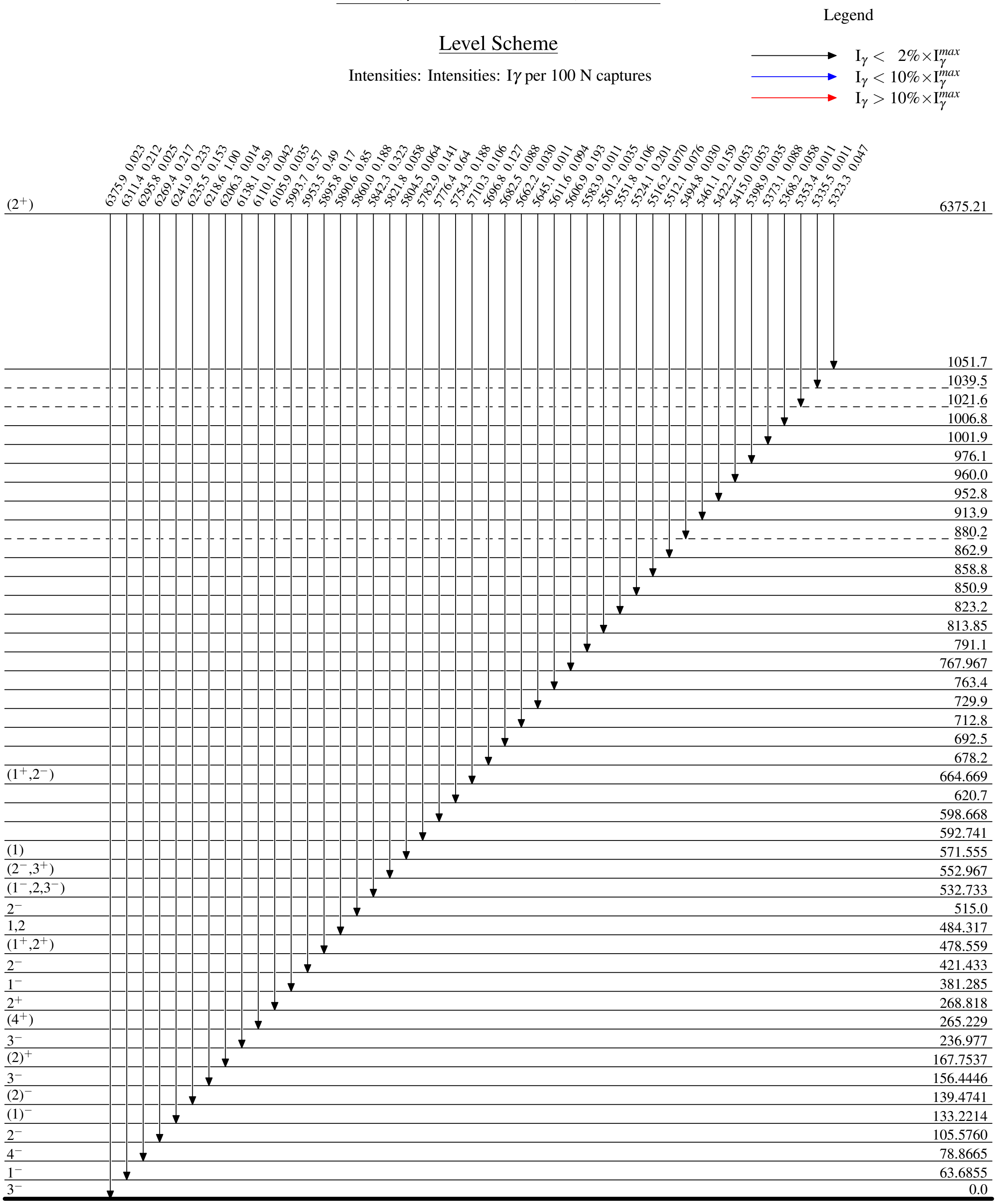
[h] Multiply placed with undivided intensity.

[x] γ ray not placed in level scheme.

^{159}Tb(n,γ) E=th 1974Ke01,1989Du03

Level Scheme

Intensities: Intensities: Iγ per 100 N captures



$^{160}_{65}Tb_{95}$

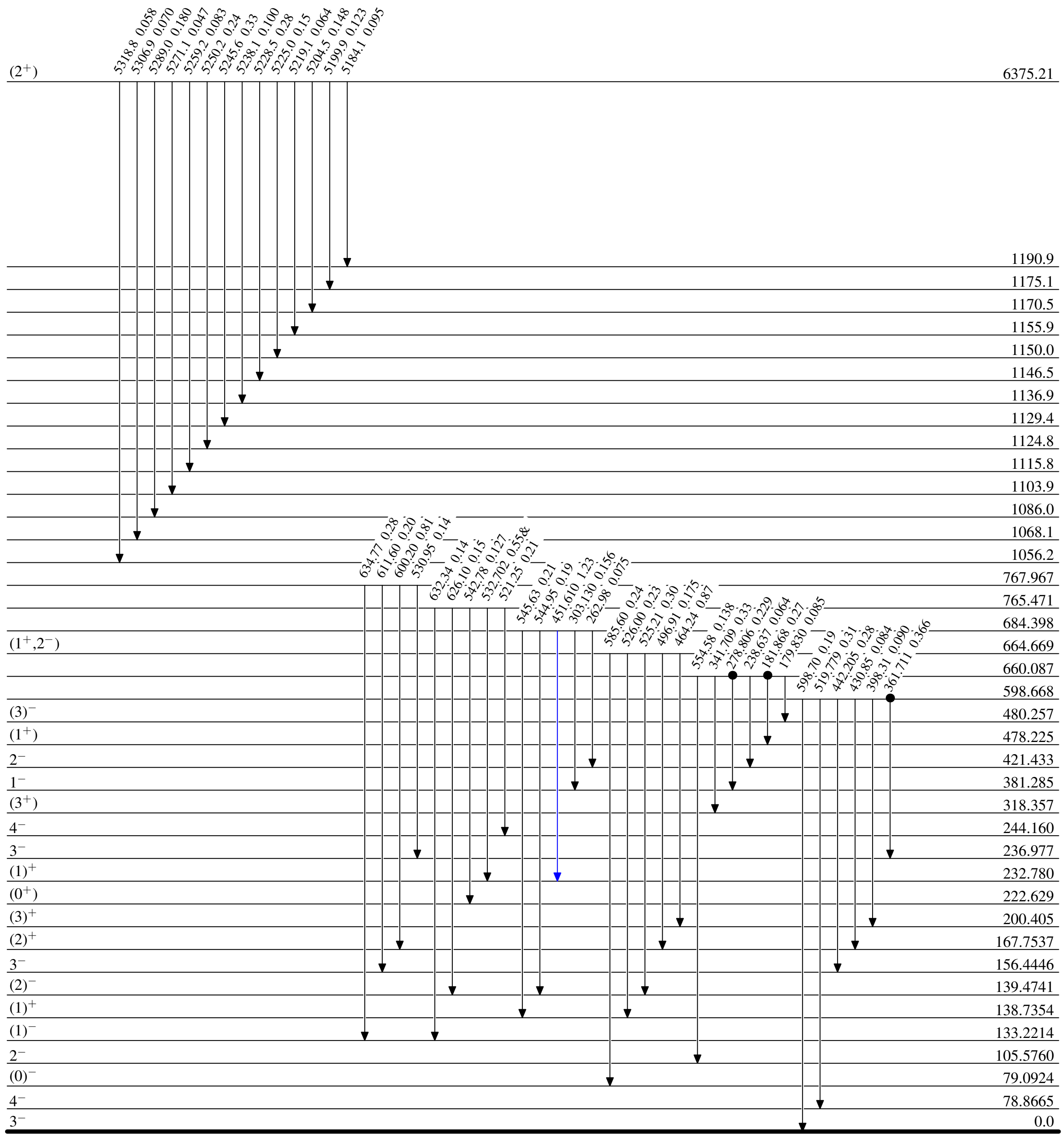
^{159}Tb(n,γ) E=th 1974Ke01,1989Du03

Level Scheme (continued)

Intensities: Intensities: Iγ per 100 N captures
& Multiply placed: undivided intensity given

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- ● Coincidence



$^{160}_{65}Tb_{95}$

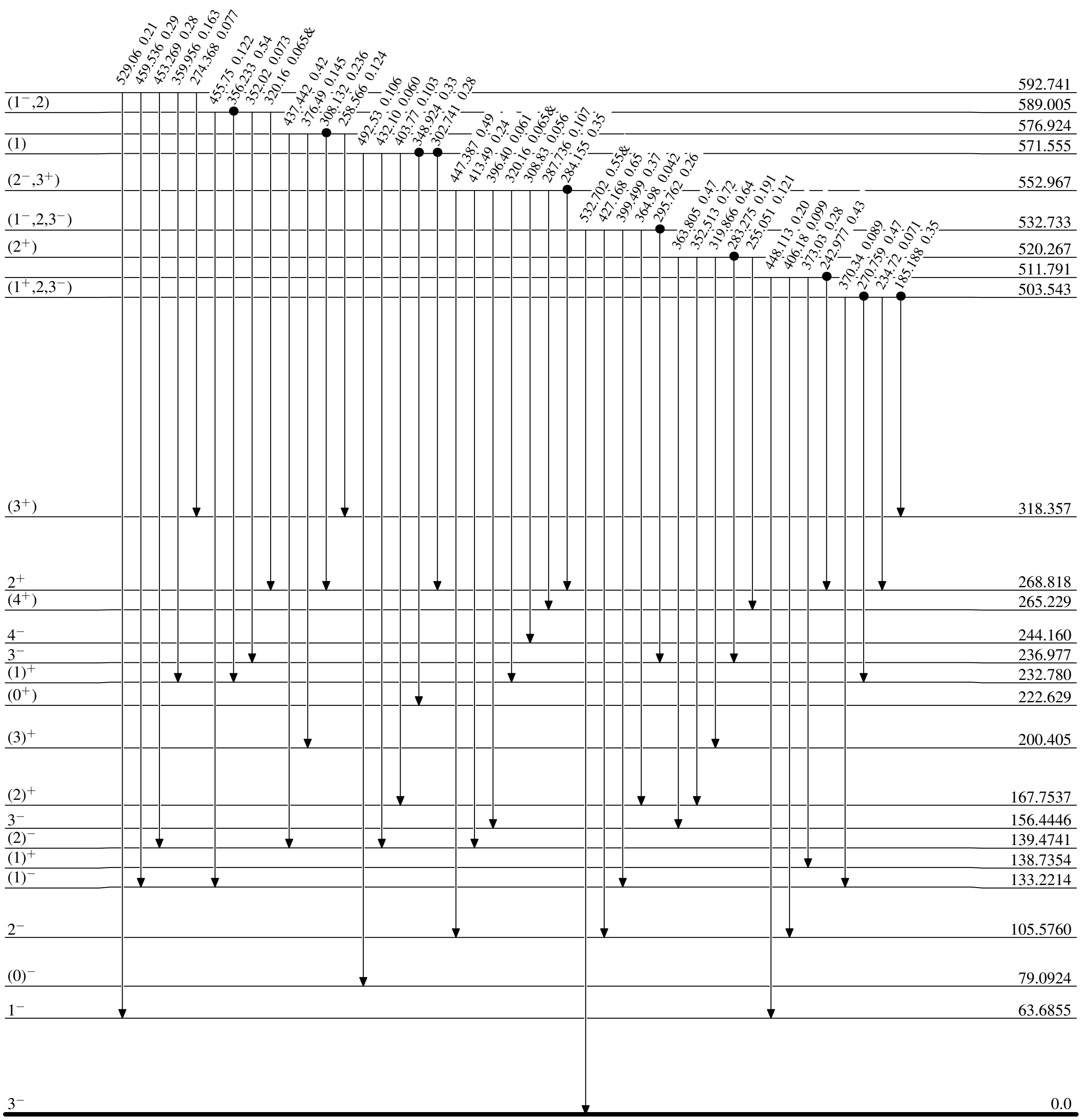
^{159}Tb(n,γ) E=th 1974Ke01,1989Du03

Level Scheme (continued)

Intensities: Intensities: Iγ per 100 N captures
& Multiply placed: undivided intensity given

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- ● Coincidence



$^{160}_{65}Tb_{95}$

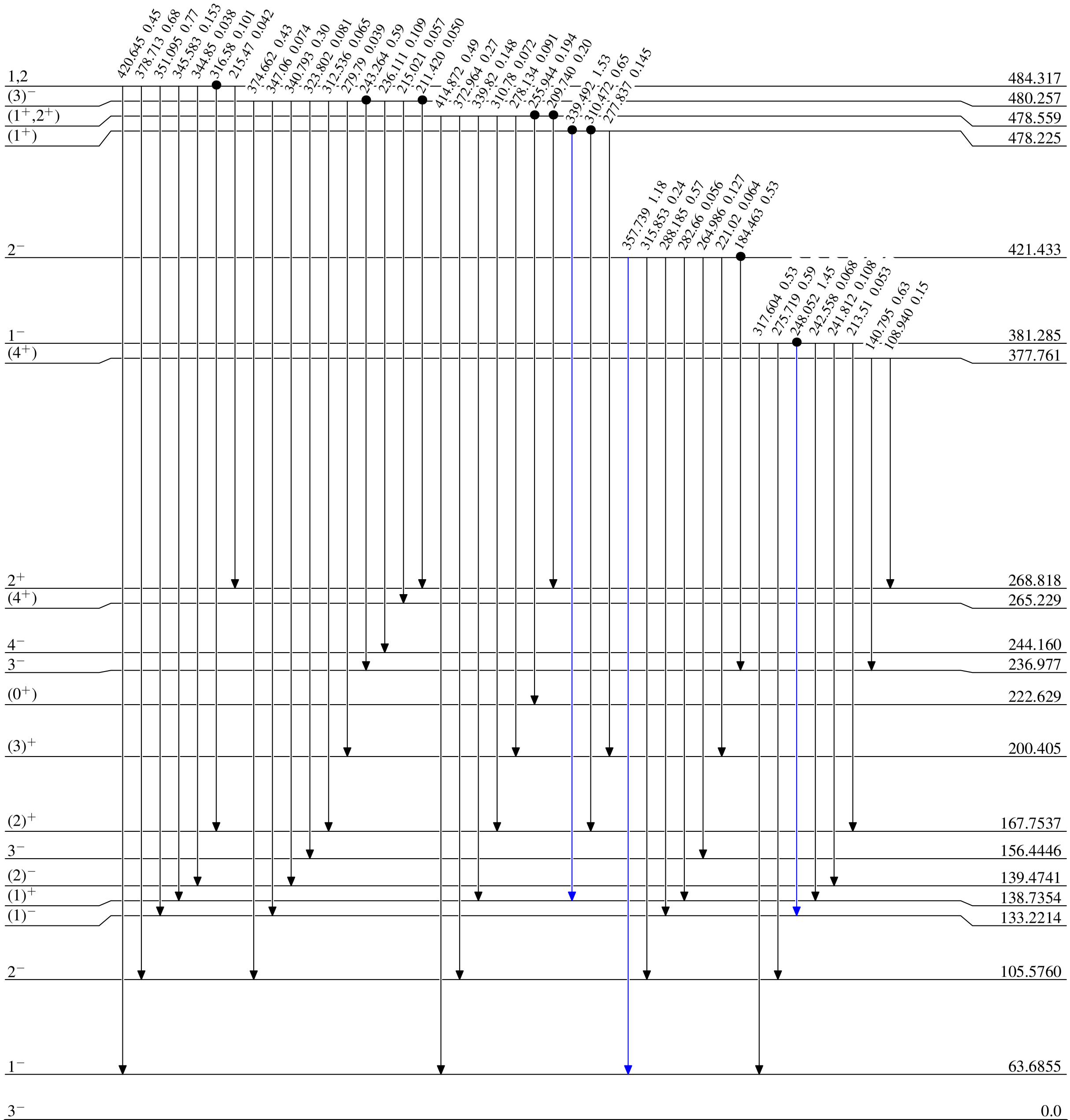
^{159}Tb(n,γ) E=th 1974Ke01,1989Du03

Level Scheme (continued)

Intensities: Intensities: Iγ per 100 N captures
& Multiply placed: undivided intensity given

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- ● Coincidence



$^{160}_{65}Tb_{95}$

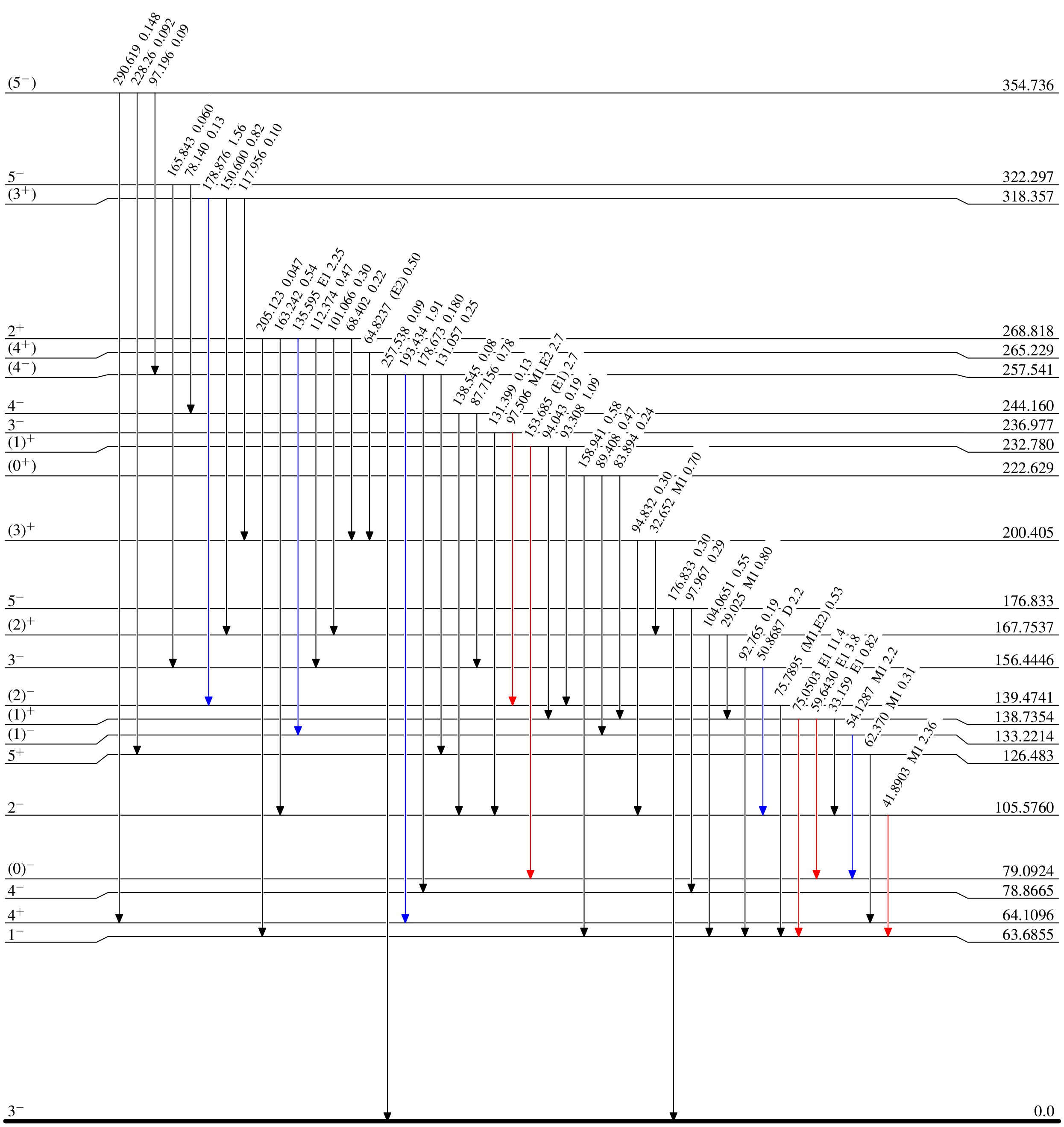
^{159}Tb(n,γ) E=th 1974Ke01,1989Du03

Level Scheme (continued)

Intensities: Intensities: Iγ per 100 N captures
& Multiply placed: undivided intensity given

Legend

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$

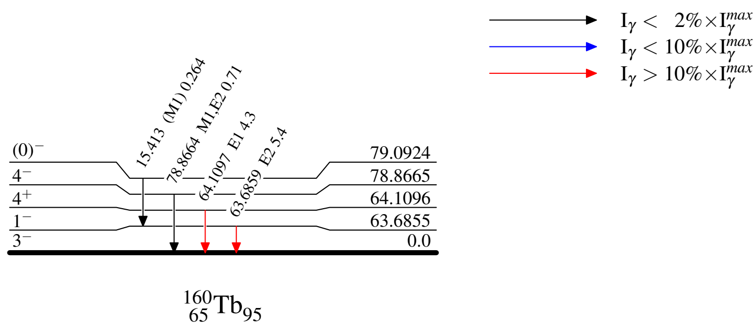


$^{160}_{65}Tb_{95}$

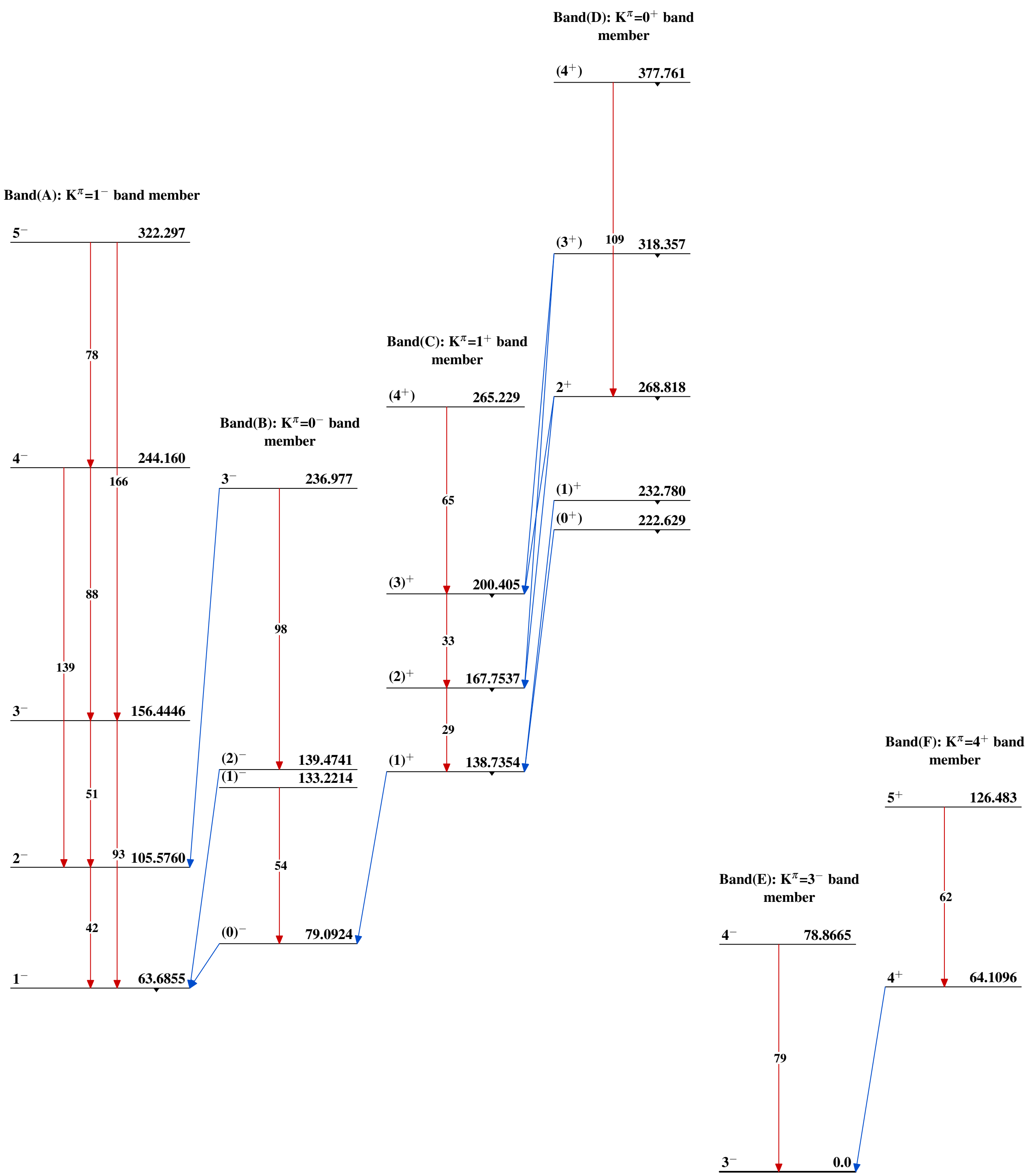
$^{159}Tb(n,\gamma)$ E=th 1974Ke01,1989Du03

Level Scheme (continued)

Intensities: Intensities: Iγ per 100 N captures
& Multiply placed: undivided intensity given



$^{159}Tb(n,\gamma)$ E=th 1974Ke01,1989Du03



$^{160}_{65}Tb_{95}$

^{159}Tb(n,γ) E=th 1974Ke01,1989Du03 (continued)