^{157}Ho ε decay 1984Af01,1972To05,1977AnYX

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 132, 1 (2016)	4-Dec-2015

Parent: ^{157}Ho: E=0.0; J$^{\pi}$=7/2^{-}; T$_{1/2}$=12.6 min *2*; Q(ε)=2593 *24*; %ε+%β^{+} decay=100.0

The decay scheme is that of 1984Af01, which includes several levels not in the schemes of 1972To05, 1977AnYX, and 1972Vy02. The data are from these four references.

For these studies, ^{157}Ho was produced by Dy(p,xn), ^{149}Sm(^{12}C,4n)^{157}Er followed by ε decay, and p spallation of Ta with chemical or isotope separation. γ's measured with Ge detectors, ce measured with Si(Au) detectors and magnetic spectrometers, and β+ with plastic scintillator. $\gamma\gamma$, $\gamma\beta$+, and γce coincidences and lifetimes measured.

Experimental methods:

1965GrZZ: produced by p spallation of Ta. ce spectra measured in magnetic spectrograph.

1972NeZI: abstract; no data.

1972Ki21: produced by Dy(p,xn) with isotope separation. T$_{1/2}$(61) measured by counting ce in magnetic spectrometers.

1972PaYV: progress report; no data; see 1972To05.

1972To05: produced by Dy(p,xn) with isotope separation. γ singles and $\gamma\gamma$ coincidences measured with Ge detectors, ce measured with Si(Au) detector, and β+ with plastic scintillator. Reports E$_{\gamma}$, I$_{\gamma}$, I$_{ce}$, α_K(exp), $\gamma\gamma$ coincidences, β+ endpoint from $\gamma\beta$+ coincidences, and parent T$_{1/2}$.

1972ToYX: thesis version of the material in 1972To05.

1972Vy02: produced by ^{149}Sm(^{12}C,4n)^{157}Er with E(^{12}C) = 81 MeV followed by ε decay. For some samples the Ho was chemically separated from the Er. γ singles and $\gamma\gamma$ coincidences measured with Ge detectors and ce with Si(Au) detector.

1977AnYX: produced by ^{149}Sm(^{12}C,4n)^{157}Er followed by ε decay. γ's measured with Ge detectors.

1979AbZZ: abstract of lifetime measurements.

1984Af01: produced by spallation of Ta target with 660 MeV p with isotope separation and some samples chemically separated. γ singles and $\gamma\gamma$ coincidences were measured with Ge detectors and ce singles and γ-ce coincidences measured with magnetic spectrometer.

1984GaZS: conference abstract with decay scheme drawing. Data not used.

^{157}Dy Levels

Additional information 1.

E(level)[†]	J$^{\pi}$[‡#]	T$_{1/2}$	Comments
0.0[a]	3/2^{-}		Additional information 2.
61.141[a] *13*	5/2^{-}	0.3 ns	T$_{1/2}$: From 1980Al07 (and 1979AlZO). Others: 90 ps *30* from ceγ coincidences (preliminary value of 1979AbZZ) and ≤ 0.8 ns from ce-ce coincidences (1972Ki21).
147.723[a] *9*	7/2^{-}	≤0.3 ns	T$_{1/2}$: From 1980Al07 (and 1979AlZO). Others: ≤ 50 ps from ceγ coincidences (preliminary value of 1979AbZZ).
161.99[@f] *3*	9/2^{+}		
188.035[f] *16*	5/2^{+}	1.1 ns	T$_{1/2}$: from 1980Al07.
199.34[@b]	11/2^{-}		
211.174[f] *18*	7/2^{+}		
234.652[c] *20*	(3/2)$^{+}$		
257.577[a] *18*	9/2^{-}		
273.72?[&] *7*			
341.118[d] *14*	5/2^{-}	≤0.3 ns	T$_{1/2}$: quoted by 1980Al07.
400.92[@a] *10*	11/2^{-}		
401.17[@] *7*			
405.66?[&] *5*	(5/2)$^{+}$		J$^{\pi}$: Possible E1, 121γ from 5/2^{-},7/2^{-} level in 1972To05 but placement not confirmed by 1984Af01.
419.929[d] *22*	7/2^{-}		

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^{157}Ho ε decay 1984Af01,1972To05,1977AnYX (continued)

^{157}Dy Levels (continued)

E(level)[†]	Jπ[‡#]	Comments
428.43[@] *7*		
455.91[@] *11*		E(level): Level given in 1984Af01 as 457.2, but γ energies there are not consistent with that value.
508.23 *5*	7/2⁻,5/2⁻	
518.56[d] *10*	9/2⁻	
526.92 *6*	5/2⁻,7/2⁻	
611.22[@] *7*	(7/2,9/2)⁻	
628.87[g] *7*	3/2⁻	
688.11[g] *10*	(7/2)⁻	
896.57[e] *4*	(5/2)⁻	
990.12[e] *6*	7/2⁻	
1211.13 *5*	5/2⁻,7/2⁻	
1380.24 *11*	(5/2,7/2⁻)	

[†] From least-squares fit to γ energies with questionable γ′s excluded.
[‡] From ^{157}Dy Adopted Levels.
[#] The first three members of the 3/2[532] band were originally assigned to levels at 401.1, 455, and 526 keV, but are assigned in ^{157}Dy Adopted Levels to other levels.
[@] Level reported only by 1984Af01.
[&] Level reported by 1972To05, but not confirmed by 1984Af01.
[a] Band(A): 3/2[521] band.
[b] Band(B): 11/2[505] band.
[c] Band(C): K^π=3/2⁺ band based on 3/2[402] + 3/2[651] states.
[d] Band(D): 5/2[523] band.
[e] Band(E): 5/2[512] band.
[f] Band(F): Positive-parity band with mixture of 3/2[651], 5/2[642], and 1/2[660].
[g] Band(G): K^π=3/2⁻ band, quadrupole vibration based on g.s.

ε,β⁺ radiations

E(decay)	E(level)	Iβ⁺ [#]	Iε[#]	Log *ft*	I(ε+β⁺)[†‡#]	Comments
(1213 *24*)	1380.24		1.1 *2*	5.99 *9*	1.1 *2*	εK=0.8303 *3*; εL=0.13094 *18*; εM+=0.03876 *6*
(1382 *24*)	1211.13	0.0029 *10*	4.7 *5*	5.48 *5*	4.7 *5*	av Eβ=177 *11*; εK=0.8312; εL=0.12984 *15*; εM+=0.03838 *6*
(1603 *24*)	990.12	0.015 *3*	3.3 *3*	5.77 *5*	3.3 *3*	av Eβ=275 *11*; εK=0.8294 *5*; εL=0.12836 *19*; εM+=0.03789 *6*
(1696 *24*)	896.57	0.093 *20*	12 *2*	5.26 *8*	12 *2*	av Eβ=316 *11*; εK=0.8270 *8*; εL=0.12758 *22*; εM+=0.03764 *7*
(2085 *24*)	508.23	0.24 *4*	6.0 *8*	5.74 *6*	6.2 *8*	av Eβ=487 *11*; εK=0.8025 *25*; εL=0.1225 *5*; εM+=0.03610 *13*
(2173 *24*)	419.929	0.40 *5*	7.6 *9*	5.67 *5*	8.0 *9*	av Eβ=525 *11*; εK=0.793 *3*; εL=0.1209 *5*; εM+=0.03560 *15*
2202 *50*	341.118	3.5 *4*	53 *5*	4.86 *4*	56 *5*	av Eβ=560 *11*; εK=0.783 *4*; εL=0.1192 *6*; εM+=0.03510 *17*
(2431 *24*)	161.99	0.56 *24*	5.3 *23*	5.93 *19*	5.9 *25*	av Eβ=639 *11*; εK=0.757 *4*; εL=0.1148 *7*; εM+=0.03379 *20*
(2532 *24*)	61.141	<0.8	<6	>5.9	<7	av Eβ=684 *11*; εK=0.739 *5*; εL=0.1120 *8*; εM+=0.03295 *21*

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^{157}Ho ε decay 1984Af01,1972To05,1977AnYX (continued)

ε,β^+ radiations (continued)

† Deduced from γ intensity balances with the questionable γ's omitted. Branch to ground state assumed to be 0% since transition is 2nd forbidden with expected log *ft* >11.0; and therefore, expected I(ε+β+) to ground state is < 0.0001%.

‡ There are many unplaced γ's and several have intensities of over 0.2%. Therefore, I(ε+β+) values of ≤ 1% are considered unreliable and have not been included in the data set. These values are 0.3% *9* for 188 level, 0.7% *12* for 211, 0.23% *19* for 234, 0.31% *4* for 273, 0.17% *4* for 400.9, 0.16% *13* for 401.1, 0.34% *9* for 428, 0.40% *18* for 518, 0.81% *14* for 527, 0.90% *11* for 611, 0.33% *6* for 628, and 0.86% *12* for 688. For the same reason, the negative values have been omitted; these are −2% *4* for 147 level, −0.4% *4* for 257, and −0.27% *12* for 455.

Absolute intensity per 100 decays.

γ(^{157}Dy)

Iγ normalization: calculated by evaluator to give the sum of γ transition intensities to the ground state to be 100%. This assumes that the electron-capture and β+ decay to the ground state is negligible. This condition is reasonable since this 2nd forbidden branch is expected to have log *ft* of >11.0 and a corresponding intensity of <0.0001%.

ΔE: Additional information 5.

E_γ[†]	I_γ[#@j]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	δ[ai]	α[h]	$I_{(\gamma+ce)}$[j]	Comments
14.23 *5*	47 *7*	161.99	9/2$^+$	147.723	7/2$^-$	E1		11.53 *20*		α(L)=8.99 *16*; α(M)=2.05 *4* α(N)=0.441 *8*; α(O)=0.0456 *8*; α(P)=0.001028 *17* α(M_{1-3})exp=1.35 *51*, α($M_{4,5}$)exp =0.30 *13* (1984Af01).
23.11 *5*		211.174	7/2$^+$	188.035	5/2$^+$	M1+E2		9.8×10^2 *96*	30 *6*	ce(L)/(γ+ce)=0.77 *51*; ce(M)/(γ+ce)=0.18 *23* ce(N)/(γ+ce)=0.041 *55*; ce(O)/(γ+ce)=0.0048 *65*; ce(P)/(γ+ce)=6.1×10^{-6} *68* α(L)=7.6×10^2 *74*; α(M)=1.8×10^2 *18* α(N)=40 *39*; α(O)=4.7 *45*; α(P)=0.0060 *33* α(L_2)exp ≥ 2.3, α(L_3)exp ≥ 2.7, α(M)exp ≥ 1.3 (1984Af01). I_γ: Measured value is ≤ 3. From I(γ+ce) and α=80-1980 one deduces 0.01 ≤ I_γ ≤ 0.44. Mult.: 1984Af01 give δ ≈ 0.23 and thus α ≈ 127; however, the data presented are, in fact, compatable with any E2 content from 2.5% to 100%; therefore, α can range from about 80 to 1980. $I_{(\gamma+ce)}$: Deduced by evaluator from ce data (1984Af01).
26.07 *4*		188.035	5/2$^+$	161.99	9/2$^+$	E2		1059 *17*	135 *20*	ce(L)/(γ+ce)=0.770 *9*; ce(M)/(γ+ce)=0.183 *4* ce(N)/(γ+ce)=0.0408 *9*; ce(O)/(γ+ce)=0.00476 *11*; ce(P)/(γ+ce)=1.39×10^{-6} *4* α(L)=817 *13*; α(M)=194 *4* α(N)=43.3 *7*; α(O)=5.05 *8*; α(P)=0.001477 *24* α(L_2)exp ≥ 19, α(L_3)exp ≥ 23, α(M)exp ≥ 10 (1984Af01). I_γ: Measured value is ≤ 2 (1984Af01). From Iγ(1+α)(26) and α, one deduces 0.12. Mult.: The experimental L subshell ratios would allow a large M1 content, but the J^π require pure E2. $I_{(\gamma+ce)}$: Deduced by evaluator from ce data (1984Af01).
37.36[l] *8*	≤10	199.34	11/2$^-$	161.99	9/2$^+$	(E1)[g]		0.804 *13*		α(L)=0.629 *10*; α(M)=0.1392 *22* α(N)=0.0310 *5*; α(O)=0.00387 *6*; α(P)=0.0001278 *19* α(L_1)exp ≥ 0.33 (1984Af01).
49.15 *4*	36 *9*	211.174	7/2$^+$	161.99	9/2$^+$	M1+E2	0.14 *4*	3.8 *6*		α(L)=3.0 *4*; α(M)=0.67 *10* α(N)=0.154 *22*; α(O)=0.021 *3*; α(P)=0.000976 *17* α(L_2)exp=2.2 *9* (1984Af01). I_γ: From table 2 of 1984Af01; table 1 of same article gives 13 *4*.

γ(^{157}Dy) (continued)

E_γ[†]	I_γ[#@j]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	δ[ai]	α[h]	Comments
51.7[l] *1*		199.34	11/2⁻	147.723	7/2⁻	(E2)[g]		36.3 *7*	α(L)=27.9 *5*; α(M)=6.70 *12* α(N)=1.50 *3*; α(O)=0.176 *3*; α(P)=0.000187 *3* I_γ: γ peak obscured by x-ray line. $I_{(\gamma+ce)}$: From intensity of M_2+M_3 ce line = 13 *2* (1984Af01), I(γ+ce)=73.
55.6[l]		455.91		401.17					E_γ: γ shown in decay scheme of 1984Af01, but not in γ list.
61.11 *2*	235 *24*	61.141	5/2⁻	0.0	3/2⁻	M1+E2	0.20 *2*	10.25 *16*	α(K)=8.10 *13*; α(L)=1.67 *9*; α(M)=0.377 *22* α(N)=0.086 *5*; α(O)=0.0119 *6*; α(P)=0.000509 *8* α(L)exp=2.18 (1972To02). α(K)exp=9.1 *13*, α(L_{1+2})exp=1.64 *25*, α(L_3)exp=0.30 *4* (1984Af01).
[x]67.4 *1*									I_γ: very weak (1972To05) and $<$ 3 (1984Af01).
71.1 *1*	1.6 *4*	526.92	5/2⁻,7/2⁻	455.91		M1(+E2)		8.2 *19*	α(K)=3.8 *16*; α(L)=3.4 *27*; α(M)=0.81 *64* α(N)=0.18 *15*; α(O)=0.022 *17*; α(P)=2.2×10^{-4} *12* α(L_1)exp=1.29 *65* (1984Af01).
78.89 *5*	2.3 *5*	419.929	7/2⁻	341.118	5/2⁻	M1,E2		5.7 *10*	α(K)=2.9 *11*; α(L)=2.1 *16*; α(M)=0.51 *38* α(N)=0.114 *84*; α(O)=0.0140 *96*; α(P)=1.65×10^{-4} *85* α(K)exp=4.2 *18* (1984Af01).
86.55 *2*	256 *26*	147.723	7/2⁻	61.141	5/2⁻	M1+E2	0.19 *2*	3.66	α(K)=3.00 *5*; α(L)=0.518 *16*; α(M)=0.115 *4* α(N)=0.0265 *9*; α(O)=0.00376 *11*; α(P)=0.000186 *3* α(K)exp=3.2 (1972To02). α(K)exp=2.90 *80*, α(L_{1+2})exp=0.52 *8* (1984Af01).
98.7 *1*	4 *2*	518.56	9/2⁻	419.929	7/2⁻	M1(+E2)		2.67 *19*	α(K)=1.63 *47*; α(L)=0.80 *50*; α(M)=0.19 *13* α(N)=0.043 *27*; α(O)=0.0053 *31*; α(P)=8.9×10^{-5} *42* α(L_1)exp=0.60 *35* (1984Af01).
106.48 *4*	40 *4*	341.118	5/2⁻	234.652	(3/2)⁺	E1		0.261	α(K)=0.218 *3*; α(L)=0.0336 *5*; α(M)=0.00736 *11* α(N)=0.001671 *24*; α(O)=0.000229 *4*; α(P)=1.015×10^{-5} *15* α(L)exp≤0.12 (1984Af01).
109.86 *2*	28 *3*	257.577	9/2⁻	147.723	7/2⁻	M1+E2		1.87 *5*	α(K)=1.21 *33*; α(L)=0.51 *29*; α(M)=0.120 *71* α(N)=0.027 *16*; α(O)=0.0034 *18*; α(P)=6.6×10^{-5} *30* α(K)exp=1.02 (1972To02). α(K)exp=1.75 *37* (1984Af01).
[x]121.0[c] *1*	13 *3*					E1		0.185	α(K)=0.1553 *22*; α(L)=0.0235 *4*; α(M)=0.00515 *8* α(N)=0.001172 *17*; α(O)=0.0001615 *23*; α(P)=7.36×10^{-6} *11* E1 γ ray measured and placed by 1972To05 at 406 level but not confirmed by 1984Af01. α(K)exp≤0.18 (1972To02). α(K)exp≤0.18 (1984Af01).
125.76 *5*	4.6 *8*	526.92	5/2⁻,7/2⁻	401.17		E2		1.175	α(K)=0.612 *9*; α(L)=0.434 *7*; α(M)=0.1034 *15* α(N)=0.0232 *4*; α(O)=0.00283 *4*; α(P)=2.62×10^{-5} *4* α(K)exp=0.52 *26* (1984Af01).
126.95 *4*	13 *2*	188.035	5/2⁺	61.141	5/2⁻	E1		0.1629	α(K)=0.1367 *20*; α(L)=0.0206 *3*; α(M)=0.00451 *7* α(N)=0.001027 *15*; α(O)=0.0001418 *20*; α(P)=6.52×10^{-6} *10*

γ(^{157}Dy) (continued)

E_γ[†]	I_γ[#@ j]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	α[h]	Comments
								α(K)exp=1.8, whence M1+E2 γ (1972To02, not ADOPTED). α(K)exp=0.20 *7* (1984Af01).
129.95 *2*	39 *4*	341.118	5/2⁻	211.174	7/2⁺	E1	0.1530	α(K)=0.1284 *18*; α(L)=0.0193 *3*; α(M)=0.00423 *6* α(N)=0.000963 *14*; α(O)=0.0001331 *19*; α(P)=6.15×10^{-6} *9* α(K)exp=0.13 *4* (1984Af01).
[x]131.9 *1*	4 *1*							
143.5[f] *5*	3.5 *12*	400.92	11/2⁻	257.577	9/2⁻			
147.73 *1*	90 *9*	147.723	7/2⁻	0.0	3/2⁻	(E2)	0.665	α(K)=0.387 *6*; α(L)=0.214 *3*; α(M)=0.0508 *8* α(N)=0.01143 *16*; α(O)=0.001408 *20*; α(P)=1.718×10^{-5} *24* α(K)exp=0.41 (1972To02). α(K)exp=0.38 *5* (1984Af01).
150.05 *2*	37 *4*	211.174	7/2⁺	61.141	5/2⁻	E1	0.1042	α(K)=0.0876 *13*; α(L)=0.01299 *19*; α(M)=0.00284 *4* α(N)=0.000648 *9*; α(O)=9.02×10^{-5} *13*; α(P)=4.28×10^{-6} *6* α(K)exp≤0.09 (1972To02). α(K)exp=0.063 *25* (1984Af01).
153.09 *1*	135 *14*	341.118	5/2⁻	188.035	5/2⁺	E1	0.0987	α(K)=0.0830 *12*; α(L)=0.01229 *18*; α(M)=0.00269 *4* α(N)=0.000614 *9*; α(O)=8.55×10^{-5} *12*; α(P)=4.06×10^{-6} *6* α(K)exp=0.10 (1972To02). α(K)exp=0.081 *19* (1984Af01).
162.35 *2*	62 *6*	419.929	7/2⁻	257.577	9/2⁻	M1(+E2)	0.54 *7*	α(K)=0.40 *11*; α(L)=0.109 *35*; α(M)=0.0251 *87* α(N)=0.0057 *19*; α(O)=7.5×10^{-4} *20*; α(P)=2.25×10^{-5} *92* α(K)exp=0.66 (1972To02). α(K)exp=0.53 *13* (1984Af01).
[x]163.9 *2*	16 *2*					E2+(M1)	0.53 *7*	α(K)=0.39 *11*; α(L)=0.105 *33*; α(M)=0.0242 *83* α(N)=0.0055 *18*; α(O)=7.2×10^{-4} *19*; α(P)=2.20×10^{-5} *90* α(K)exp=0.48 (1972To02). α(K)exp=0.33 *12* (1984Af01).
173.52 *2*	29 *3*	234.652	(3/2)⁺	61.141	5/2⁻	E1	0.0707	α(K)=0.0596 *9*; α(L)=0.00873 *13*; α(M)=0.00191 *3* α(N)=0.000436 *7*; α(O)=6.11×10^{-5} *9*; α(P)=2.96×10^{-6} *5* α(K)exp≤0.06 (1972To02). α(K)exp=0.12 *6* (1984Af01).
188.05 *4*	184 *18*	188.035	5/2⁺	0.0	3/2⁻	E1	0.0572	α(K)=0.0482 *7*; α(L)=0.00702 *10*; α(M)=0.001535 *22* α(N)=0.000351 *5*; α(O)=4.93×10^{-5} *7*; α(P)=2.42×10^{-6} *4* α(K)exp=0.046 (1972To02). α(K)exp=0.045 *8* (1984Af01).
193.41 *4*	320 *32*	341.118	5/2⁻	147.723	7/2⁻	M1	0.372	α(K)=0.314 *5*; α(L)=0.0457 *7*; α(M)=0.01004 *14* α(N)=0.00232 *4*; α(O)=0.000340 *5*; α(P)=1.95×10^{-5} *3* α(K)exp=0.38 (1972To02). α(K)exp=0.35 *5* (1984Af01).
196.41 *4*	29 *3*	257.577	9/2⁻	61.141	5/2⁻	E2	0.251	α(K)=0.1674 *24*; α(L)=0.0646 *9*; α(M)=0.01515 *22* α(N)=0.00342 *5*; α(O)=0.000432 *6*; α(P)=7.96×10^{-6} *12* α(K)exp=0.15 (1972To02). α(K)exp=0.13 *4* (1984Af01).

$^{157}_{66}$Dy$_{91}$-6

γ(^{157}Dy) (continued)

Eγ[†]	Iγ[#@j]	Ei(level)	J^π_i	Ef	J^π_f	Mult.[&]	α[h]	Comments
208.70 6	56 6	419.929	7/2−	211.174	7/2+	E1	0.0435	α(K)=0.0367 6; α(L)=0.00531 8; α(M)=0.001160 17 α(N)=0.000266 4; α(O)=3.74×10^{-5} 6; α(P)=1.87×10^{-6} 3 α(K)exp=0.05 (1972To02). α(K)exp=0.044 13 (1984Af01). Eγ: This is placement of 1972To05; 1977AnYX suggest alternate placement from 897 level.
210.5[f] 5	3.5 10	611.22	(7/2,9/2)−	400.92	11/2−			
[x]224.6 3	6.9 7					(E1)	0.0359	α(K)=0.0304 5; α(L)=0.00437 7; α(M)=0.000954 14 α(N)=0.000218 4; α(O)=3.09×10^{-5} 5; α(P)=1.556×10^{-6} 23 α(K)exp=0.05 (1972To02).
[x]227.4 2	12.5 12					(E1)	0.0348	α(K)=0.0294 5; α(L)=0.00423 6; α(M)=0.000923 14 α(N)=0.000211 3; α(O)=2.99×10^{-5} 5; α(P)=1.509×10^{-6} 22 α(K)exp=0.023 (1972To02).
234.61 5	45 5	234.652	(3/2)+	0.0	3/2−	E1	0.0321	α(K)=0.0271 4; α(L)=0.00389 6; α(M)=0.000850 12 α(N)=0.000195 3; α(O)=2.76×10^{-5} 4; α(P)=1.397×10^{-6} 20 α(K)exp=0.05 (1972To02). α(K)exp=0.036 14 (1984Af01).
251.5[f] 5	7 3	508.23	7/2−,5/2−	257.577	9/2−			
253.2 1	7.2 2	400.92	11/2−	147.723	7/2−			α(K)exp≤0.15, whence M1 or E1 (1972To02; however 253γ placed by 1972To02 at 527 level was relocated by 1984Af01 at 401 level). α(K)exp=0.093 42 (1984Af01).
[x]257.88 5	50 5					E1	0.0252	α(K)=0.0213 3; α(L)=0.00304 5; α(M)=0.000664 10 α(N)=0.0001521 22; α(O)=2.16×10^{-5} 3; α(P)=1.108×10^{-6} 16 α(K)exp=0.023 (1972To02 − their placement at 406 level was changed to unplecd by 1984Af01). α(K)exp=0.019 8 (1984Af01).
260.7[f] 2	2.7 9	518.56	9/2−	257.577	9/2−			
[x]267.0[b] 4	24 12							
269.3[kl] 1	8.3[k] 8	455.91		188.035	5/2+			Eγ: Very poor energy fit.
269.3[k] 1	8.3[k] 8	526.92	5/2−,7/2−	257.577	9/2−			
272.17 8	189 19	419.929	7/2−	147.723	7/2−	M1+E2	0.117 30	α(K)=0.094 30; α(L)=0.0179 3; α(M)=0.00404 14 α(N)=0.000925 23; α(O)=0.000128 6; α(P)=5.5×10^{-6} 22 α(K)exp=0.10 (1972To02). α(K)exp=0.120 26 (1984Af01).
273.8[l] 2	13.5 14	273.72?		0.0	3/2−			
279.97 1	1000 50	341.118	5/2−	61.141	5/2−	M1	0.1359	α(K)=0.1147 16; α(L)=0.01655 24; α(M)=0.00363 5 α(N)=0.000840 12; α(O)=0.0001231 18; α(P)=7.09×10^{-6} 10 α(K)exp=0.12 (1972To02). α(K)exp=0.123 13 (1984Af01). Iγ: The four references use different conventions on the uncertainty for this reference γ. The evaluator has arbitrarily assigned a 5% uncertainty.
297.00 10	35 4	508.23	7/2−,5/2−	211.174	7/2+	E1	0.01764	α(K)=0.01494 21; α(L)=0.00211 3; α(M)=0.000461 7

γ(^{157}Dy) (continued)

E_γ[†]	I_γ[#@j]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	α[h]	Comments
								α(N)=0.0001058 15; α(O)=1.509×10^{-5} 22; α(P)=7.87×10^{-7} 11 α(K)exp=0.015 (1972To02). α(K)exp≤0.027 (1984Af01).
320.2 1	80 20	508.23	7/2$^-$,5/2$^-$	188.035	5/2$^+$	E1	0.01464	α(K)=0.01241 18; α(L)=0.001747 25; α(M)=0.000381 6 α(N)=8.75×10^{-5} 13; α(O)=1.251×10^{-5} 18; α(P)=6.58×10^{-7} 10 α(K)exp≤0.014 (1972To02). α(K)exp≤0.028 (1984Af01).
340.5[f] 5	15 5	401.17		61.141	5/2$^-$			
341.16 6	770 77	341.118	5/2$^-$	0.0	3/2$^-$	M1,E2	0.062 19	α(K)=0.051 18; α(L)=0.0088 9; α(M)=0.00197 16 α(N)=0.00045 4; α(O)=6.4×10^{-5} 9; α(P)=3.0×10^{-6} 12 α(K)exp=0.068 (1972To02). α(K)exp=0.062 9 (1984Af01).
347.1 2	4 2	688.11	(7/2)$^-$	341.118	5/2$^-$			
353.80 10	9.6 10	611.22	(7/2,9/2)$^-$	257.577	9/2$^-$	E2,M1	0.056 17	α(K)=0.046 16; α(L)=0.0079 10; α(M)=0.00177 17 α(N)=0.00041 5; α(O)=5.7×10^{-5} 9; α(P)=2.7×10^{-6} 11 α(K)exp=0.042 (1972To02).
358.75 10	31 6	419.929	7/2$^-$	61.141	5/2$^-$	M1,E2	0.054 17	α(K)=0.044 15; α(L)=0.0076 10; α(M)=0.00169 18 α(N)=0.00039 5; α(O)=5.5×10^{-5} 9; α(P)=2.6×10^{-6} 11 α(K)exp=0.059 (1972To02, for pure M1). α(K)exp=0.044 18 (1984Af01).
360.54 10	26 3	508.23	7/2$^-$,5/2$^-$	147.723	7/2$^-$	M1,E2	0.053 16	α(K)=0.044 15; α(L)=0.0075 10; α(M)=0.00167 18 α(N)=0.00038 5; α(O)=5.4×10^{-5} 9; α(P)=2.6×10^{-6} 11 α(K)exp=0.058 (1972To02, for pure M1). α(K)exp=0.044 18 (1984Af01).
[x]365.1 1	5 3							
367.2 1	14 3	428.43		61.141	5/2$^-$			
377.7[dl] 1	0.3 1	896.57	(5/2)$^-$	518.56	9/2$^-$			
379.12 8	6.6 7	526.92	5/2$^-$,7/2$^-$	147.723	7/2$^-$	(M1+E0)		Mult.: Assigned M1+E0 by 1977AnYX from α_K(exp)=0.59 16 compared to α_K(M1)=0.060, but 1972To05 report this ce line contains other contributions and do not report an α_K(exp).
388.4 1	20 2	896.57	(5/2)$^-$	508.23	7/2$^-$,5/2$^-$	M1+E2	0.044 14	α(K)=0.036 13; α(L)=0.0060 9; α(M)=0.00134 18 α(N)=0.00031 5; α(O)=4.4×10^{-5} 8; α(P)=2.12×10^{-6} 85 α(K)exp=0.033 (1972To02).
394.2 1	3.0 8	628.87	3/2$^-$	234.652	(3/2)$^+$			
395.6[f] 3	2.9 7	455.91		61.141	5/2$^-$			
400.2 2	8.2 8	611.22	(7/2,9/2)$^-$	211.174	7/2$^+$	E1	0.00856	α(K)=0.00727 11; α(L)=0.001010 15; α(M)=0.000220 3 α(N)=5.06×10^{-5} 8; α(O)=7.28×10^{-6} 11; α(P)=3.91×10^{-7} 6 α(K)exp=0.052 (1972To02). α(K)exp≤0.015 (1984Af01).
401.6[f] 3	2.0 6	401.17		0.0	3/2$^-$			
[x]405.9 2	3.4 5							α(K)=0.02134; α(L)=0.00304; α(M)=0.00066; α(N+..)=0.00018 α(K)exp=0.03 (1972To02, whence M1 or E1). α(K)exp≤0.09 (1984Af01).

From ENSDF

γ(^{157}Dy) (continued)

E_γ[†]	I_γ[#@j]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	α[h]	Comments
[x]416.5 2	2.2 7							
420.0 1	12.2 12	419.929	7/2−	0.0	3/2−	E2	0.0242	α(K)=0.0191 3; α(L)=0.00395 6; α(M)=0.000897 13 α(N)=0.000205 3; α(O)=2.78×10⁻⁵ 4; α(P)=1.049×10⁻⁶ 15 α(K)exp=0.014 (1972To02).
428.2 2	7.6 15	428.43		0.0	3/2−			
430.3 2	6.4 18	688.11	(7/2)−	257.577	9/2−	(M1)	0.0437	α(K)=0.0370 6; α(L)=0.00527 8; α(M)=0.001153 17 α(N)=0.000267 4; α(O)=3.92×10⁻⁵ 6; α(P)=2.27×10⁻⁶ 4 α(K)exp=0.051 (1972To02, whence M1 (or E1)).
447.3[f] 5	4 2	508.23	7/2−,5/2−	61.141	5/2−			
[x]449.6 2	9.8 13					M1,E2	0.0296 95	α(K)=0.0245 86; α(L)=0.0039 8; α(M)=0.00087 16 α(N)=0.00020 4; α(O)=2.9×10⁻⁵ 7; α(P)=1.45×10⁻⁶ 57 α(K)exp=0.029 (1972To02).
463.3[k] 1	14.3[k] 14	611.22	(7/2,9/2)−	147.723	7/2−			Mult.: Assigned M1 which is suitable for both placements.
463.3[k] 1	14.3[k] 14	990.12	7/2−	526.92	5/2−,7/2−			Mult.: Assigned M1 which is suitable for both placements. α(K)exp=0.047 (1972To02).
466.1 2	7.4 10	526.92	5/2−,7/2−	61.141	5/2−	M1	0.0356	α(K)=0.0301 5; α(L)=0.00427 6; α(M)=0.000936 14 α(N)=0.000216 3; α(O)=3.18×10⁻⁵ 5; α(P)=1.84×10⁻⁶ 3 α(K)exp=0.045 (1972To02).
468.0 1	6.7 10	896.57	(5/2)−	428.43				
476.7 1	24.3 24	896.57	(5/2)−	419.929	7/2−	M1,E2	0.0254 82	α(K)=0.0211 74; α(L)=0.0033 7; α(M)=0.00074 15 α(N)=0.00017 4; α(O)=2.4×10⁻⁵ 6; α(P)=1.25×10⁻⁶ 49 α(K)exp=0.023 (1972To02).
508.3 2	132 13	508.23	7/2−,5/2−	0.0	3/2−	E2(+M1)	0.0215 70	α(K)=0.0179 63; α(L)=0.0028 7; α(M)=0.00062 13 α(N)=0.00014 3; α(O)=2.0×10⁻⁵ 5; α(P)=1.06×10⁻⁶ 41 α(K)exp=0.012 (1972To02).
522.8[l] 1	5.9 9	1211.13	5/2−,7/2−	688.11	(7/2)−			
527.4 6	2.0	526.92	5/2−,7/2−	0.0	3/2−			
540.5 2	5.2 9	688.11	(7/2)−	147.723	7/2−			α(K)exp=0.025 (1972To02, whence M1+E2 or E1).
550.1 2	8.2 25	611.22	(7/2,9/2)−	61.141	5/2−			α(K)exp=0.028 (1972To02, whence M1+E2 or E1).
555.5 2	130 13	896.57	(5/2)−	341.118	5/2−	M1	0.0227	α(K)=0.0193 3; α(L)=0.00272 4; α(M)=0.000594 9 α(N)=0.0001375 20; α(O)=2.02×10⁻⁵ 3; α(P)=1.174×10⁻⁶ 17 α(K)exp=0.033 (1972To02).
567.7 2	7.5 15	628.87	3/2−	61.141	5/2−			α(K)exp=0.014 (1972To02, whence E1 or E2).
570.2 1	26 5	990.12	7/2−	419.929	7/2−	M1	0.0213	α(K)=0.0180 3; α(L)=0.00254 4; α(M)=0.000556 8 α(N)=0.0001286 18; α(O)=1.89×10⁻⁵ 3; α(P)=1.099×10⁻⁶ 16 α(K)exp=0.031 (1972To02).
582.2 1	4.4 16	1211.13	5/2−,7/2−	628.87	3/2−			α(K)exp=0.011 (1972To02, no multipolarity deduced).
[x]597.5 3	6 3					(M1)	0.0189	α(K)=0.01602 23; α(L)=0.00226 4; α(M)=0.000493 7 α(N)=0.0001141 16; α(O)=1.677×10⁻⁵ 24; α(P)=9.76×10⁻⁷ 14 α(K)exp=0.017 (1972To02 no multipolarity ADOPTED).
600.4[f] 5	5.6 14	1211.13	5/2−,7/2−	611.22	(7/2,9/2)−			
[x]610.2 2	6.4 25							α(K)exp=0.047 (1972To02).

γ(^{157}Dy) (continued)

E_γ[†]	I_γ[#@j]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	α[h]	Comments
626.8[l] *3*	8 *2*	688.11	(7/2)$^-$	61.141	5/2$^-$			α(K)exp=0.022 (1972To02, no multipolariry ADOPTED). E_γ,I_γ: 1977AnYX report intensity for γ at 626.6 keV, 1972To05 assert that their peak at 627.0 is a multiplet, and 1984Af01 give $I_\gamma \le 5$ for 627.0 line. Mult.: Assigned (M1+E0) by 1977AnYX, I_γ in question.
628.2 *5*	8.0	628.87	3/2$^-$	0.0	3/2$^-$			E_γ,I_γ: From 1977AnYX. 1984Af01 do not report this γ line and 1972To05 report a complex line at 627 keV.
648.8 *4*	14 *3*	990.12	7/2$^-$	341.118	5/2$^-$	(M1)	0.01537	α(K)=0.01303 *19*; α(L)=0.00183 *3*; α(M)=0.000400 *6* α(N)=9.25×10^{-5} *13*; α(O)=1.360×10^{-5} *20*; α(P)=7.93×10^{-7} *12* α(K)exp=0.011 (1972To02).
661.9 *1*	14 *2*	896.57	(5/2)$^-$	234.652	(3/2)$^+$	E1	0.00281	α(K)=0.00240 *4*; α(L)=0.000324 *5*; α(M)=7.05×10^{-5} *10* α(N)=1.624×10^{-5} *23*; α(O)=2.36×10^{-6} *4*; α(P)=1.322×10^{-7} *19* α(K)exp≤0.0035 (1972To02).
685.4 *2*	36 *5*	896.57	(5/2)$^-$	211.174	7/2$^+$	(E1)	0.00261	α(K)=0.00223 *4*; α(L)=0.000301 *5*; α(M)=6.55×10^{-5} *10* α(N)=1.508×10^{-5} *22*; α(O)=2.19×10^{-6} *3*; α(P)=1.232×10^{-7} *18*
688.1 *2*	21 *3*	688.11	(7/2)$^-$	0.0	3/2$^-$	E2	0.00691	α(K)=0.00570 *8*; α(L)=0.000941 *14*; α(M)=0.000209 *3* α(N)=4.81×10^{-5} *7*; α(O)=6.79×10^{-6} *10*; α(P)=3.26×10^{-7} *5* α(K)exp=0.0063 (1972To02).
703.0[l] *2*	8.5 *14*	1211.13	5/2$^-$,7/2$^-$	508.23	7/2$^-$,5/2$^-$	M1,E2	0.0096 *30*	α(K)=0.0081 *27*; α(L)=0.00119 *31*; α(M)=0.00026 *7* α(N)=6.0×10^{-5} *15*; α(O)=8.8×10^{-6} *24*; α(P)=4.8×10^{-7} *17* α(K)exp=0.012 (1972To02).
708.6 *1*	60 *6*	896.57	(5/2)$^-$	188.035	5/2$^+$	E1	0.00244	α(K)=0.00208 *3*; α(L)=0.000281 *4*; α(M)=6.11×10^{-5} *9* α(N)=1.407×10^{-5} *20*; α(O)=2.05×10^{-6} *3*; α(P)=1.152×10^{-7} *17* α(K)exp=0.0016 (1972To02).
749.0 *2*	9 *3*	896.57	(5/2)$^-$	147.723	7/2$^-$	(M1)	0.01076	α(K)=0.00913 *13*; α(L)=0.001275 *18*; α(M)=0.000278 *4* α(N)=6.44×10^{-5} *9*; α(O)=9.48×10^{-6} *14*; α(P)=5.54×10^{-7} *8* α(K)exp=0.012 (1972To02).
779.0 *2*	20.4 *22*	990.12	7/2$^-$	211.174	7/2$^+$	E1	0.00202	α(K)=0.001723 *25*; α(L)=0.000231 *4*; α(M)=5.02×10^{-5} *7* α(N)=1.158×10^{-5} *17*; α(O)=1.686×10^{-6} *24*; α(P)=9.56×10^{-8} *14* α(K)exp=0.002 (1972To02).
791.0 *2*	11.2 *22*	1211.13	5/2$^-$,7/2$^-$	419.929	7/2$^-$	M1,E2	0.0072 *22*	α(K)=0.0061 *19*; α(L)=8.9×10^{-4} *23*; α(M)=0.00019 *5* α(N)=4.5×10^{-5} *12*; α(O)=6.5×10^{-6} *18*; α(P)=3.6×10^{-7} *13* α(K)exp=0.008 (1972To02).
801.7[f] *4*	2.1 *7*	990.12	7/2$^-$	188.035	5/2$^+$			
828.1 *2*	26 *3*	990.12	7/2$^-$	161.99	9/2$^+$	(E1)	0.00179	α(K)=0.001528 *22*; α(L)=0.000204 *3*; α(M)=4.44×10^{-5} *7* α(N)=1.024×10^{-5} *15*; α(O)=1.492×10^{-6} *21*; α(P)=8.49×10^{-8} *12* α(K)exp=0.002 (1972To02).
835.30 *10*	47 *5*	896.57	(5/2)$^-$	61.141	5/2$^-$	M1,E2	0.0063 *19*	α(K)=0.0054 *17*; α(L)=7.8×10^{-4} *20*; α(M)=0.00017 *5* α(N)=3.93×10^{-5} *99*; α(O)=5.7×10^{-6} *16*; α(P)=3.2×10^{-7} *11* α(K)exp=0.0057 (1972To02).
842.4 *3*	11 *3*	990.12	7/2$^-$	147.723	7/2$^-$	M1,E2	0.0062 *19*	α(K)=0.0052 *16*; α(L)=7.6×10^{-4} *20*; α(M)=0.00017 *5* α(N)=3.84×10^{-5} *97*; α(O)=5.6×10^{-6} *15*; α(P)=3.1×10^{-7} *11* α(K)exp=0.011 (1972To02).

γ(^{157}Dy) (continued)

E_γ[†]	I_γ[#@j]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	α[h]	Comments
870.1 *1*	39 *4*	1211.13	5/2⁻,7/2⁻	341.118	5/2⁻	M1	0.00744	α(K)=0.00632 *9*; α(L)=0.000878 *13*; α(M)=0.000192 *3* α(N)=4.44×10^{-5} *7*; α(O)=6.53×10^{-6} *10*; α(P)=3.82×10^{-7} *6* α(K)exp=0.0071 (1972To02).
896.6 *1*	176 *18*	896.57	(5/2)⁻	0.0	3/2⁻	M1,E2	0.0054 *16*	α(K)=0.0045 *14*; α(L)=6.5×10^{-4} *17*; α(M)=0.00014 *4* α(N)=3.3×10^{-5} *9*; α(O)=4.8×10^{-6} *13*; α(P)=2.70×10^{-7} *86* α(K)exp=0.0041 (1972To02).
928.9 *1*	26 *3*	990.12	7/2⁻	61.141	5/2⁻	M1,E2	0.0049 *14*	α(K)=0.0042 *12*; α(L)=0.00060 *15*; α(M)=0.00013 *4* α(N)=3.0×10^{-5} *8*; α(O)=4.4×10^{-6} *12*; α(P)=2.49×10^{-7} *78* α(K)exp=0.0045 (1972To02).
[x]936.4 *3*	7.0 *10*							
[x]946.2 *2*	8.6 *9*							
[x]954.9 *2*	3.8 *8*							I_γ: from 1972To05; other ≤ 1.2 (1984Af01).
[x]963.0 *2*	5.3 *10*							
[x]969.0 *2*	3.7 *7*							I_γ: from 1972To05; other: ≤ 1.5 (1984Af01).
[x]1037.2[e] *2*	5.7 *10*							
1039.0 *4*	4.1 *15*	1380.24	(5/2,7/2⁻)	341.118	5/2⁻			
[x]1043.8 *3*	2.0 *15*							
[x]1053.7 *3*	3.7 *7*							
1063.3 *3*	5.6 *10*	1211.13	5/2⁻,7/2⁻	147.723	7/2⁻			
[x]1072.6 *4*	2.6 *11*							I_γ: From 1972To05 and 1977AnYX; other: ≤ 1.5 (1984Af01).
[x]1082.1 *3*	4.9 *10*							
[x]1090.2 *3*	2.6 *6*							
1150.0 *1*	36 *4*	1211.13	5/2⁻,7/2⁻	61.141	5/2⁻	M1,E2	0.0030 *8*	α(K)=0.00258 *65*; α(L)=0.00036 *9*; α(M)=7.9×10^{-5} *18* α(N)=1.8×10^{-5} *5*; α(O)=2.7×10^{-6} *7*; α(P)=1.53×10^{-7} *42*; α(IPF)=1.70×10^{-6} *13*
[x]1158.8 *2*	2.6 *10*							
1169.9 *3*	9.8 *25*	1380.24	(5/2,7/2⁻)	211.174	7/2⁺			
[x]1172.2 *2*	3.9 *11*							
1191.9 *2*	6.7 *14*	1380.24	(5/2,7/2⁻)	188.035	5/2⁺			
[x]1202.1[d] *2*	3.2 *6*							
1211.1 *1*	103 *10*	1211.13	5/2⁻,7/2⁻	0.0	3/2⁻	M1,E2	0.0027 *7*	α(K)=0.0023 *6*; α(L)=0.00032 *8*; α(M)=7.0×10^{-5} *16* α(N)=1.6×10^{-5} *4*; α(O)=2.4×10^{-6} *6*; α(P)=1.36×10^{-7} *36*; α(IPF)=7.0×10^{-6} *6* α(K)exp=0.0024 (1972To02).
1232.6 *4*	3.5 *10*	1380.24	(5/2,7/2⁻)	147.723	7/2⁻			
[x]1239.7[d] *2*	2.8 *6*							
[x]1274.8 *3*	6.1 *14*							
[x]1298.3 *2*	3.9 *8*							I_γ: from 1972To05; other: ≤ 1.7 (1984Af01).
[x]1302.9 *2*	5.6 *14*							I_γ: from 1972To05 and 1984Af01; other: 12.8 *22* (1977AnYX).
1319.0 *3*	7.9 *15*	1380.24	(5/2,7/2⁻)	61.141	5/2⁻			
[x]1332.5[d] *2*	2.4 *5*							Additional information 3.
[x]1349.8 *3*	5.0 *14*							

From ENSDF

$^{157}_{66}Dy_{91}$-11

γ(^{157}Dy) (continued)

E_γ[†]	I_γ[#@j]	E_i(level)	J^π_i	E_f	J^π_f	Comments
[x]1358.9 *2*	3.2 *10*					
1380.2 *2*	14 *3*	1380.24	(5/2,7/2$^-$)	0.0	3/2$^-$	
[x]1395.0[d] *2*	1.8 *4*					
[x]1406.5 *2*	6.4 *21*					
[x]1460.2 *2*	14 *3*					Additional information 4.
[x]1490.9 *2*	1.9					
[x]1510.4 *2*	2.4					
[x]1521.9 *2*	1.7					
[x]1563.7[d] *2*	2.9					
[x]1763.7 *5*	2.2 *11*					
[x]1788.6 *2*	3.5 *13*					

† Average of values of 1984Af01, 1972To05, 1977AnYX, and 1972Vy02; all γ's above 75 keV are reported in at least two of these references, unless noted otherwise.

‡ Additional information 5.

\# Average of values of 1984Af01, 1972To05, 1977AnYX, and 1972Vy02.

@ Although some γ intensity values are quoted with an uncertainty of 2-3%, the general spread of the values suggests a minimum uncertainty of 10%. The evaluator has assigned this 10% value, or a larger value indicated by the measurement uncertainty or the spread in values.

& From ^{157}Dy Adopted γ radiations, but based on assignments in this ^{157}Ho ε decay from 1984Af01 and/or 1972To05 from subshell ratios or α_K(exp) values. Normalization of α_K(exp) by 1984Af01 assumes 280 γ is pure M1, while that of 1972To05 assumes 326 γ in ^{157}Tb is E1. Assignments of 1977AnYX are consistent, unless noted; these are based on ce data from 1972To05. See also 1972Vy02.

a From 1984Af01.

b γ reported only by 1972Vy02.

c γ reported only by 1972To05 and 1977AnYX suggests it is ^{159}Ho contaminant.

d γ reported only by 1972To05.

e γ reported only by 1977AnYX.

f γ reported only by 1984Af01.

g From 1979Al33 as quoted in 1984Af01.

h Additional information 6.

i If no value given it was assumed δ=1.00 for E2/M1, δ=1.00 for E3/M2 and δ=0.10 for the other multipolarities.

j For absolute intensity per 100 decays, multiply by 0.0231 *16*.

k Multiply placed with undivided intensity.

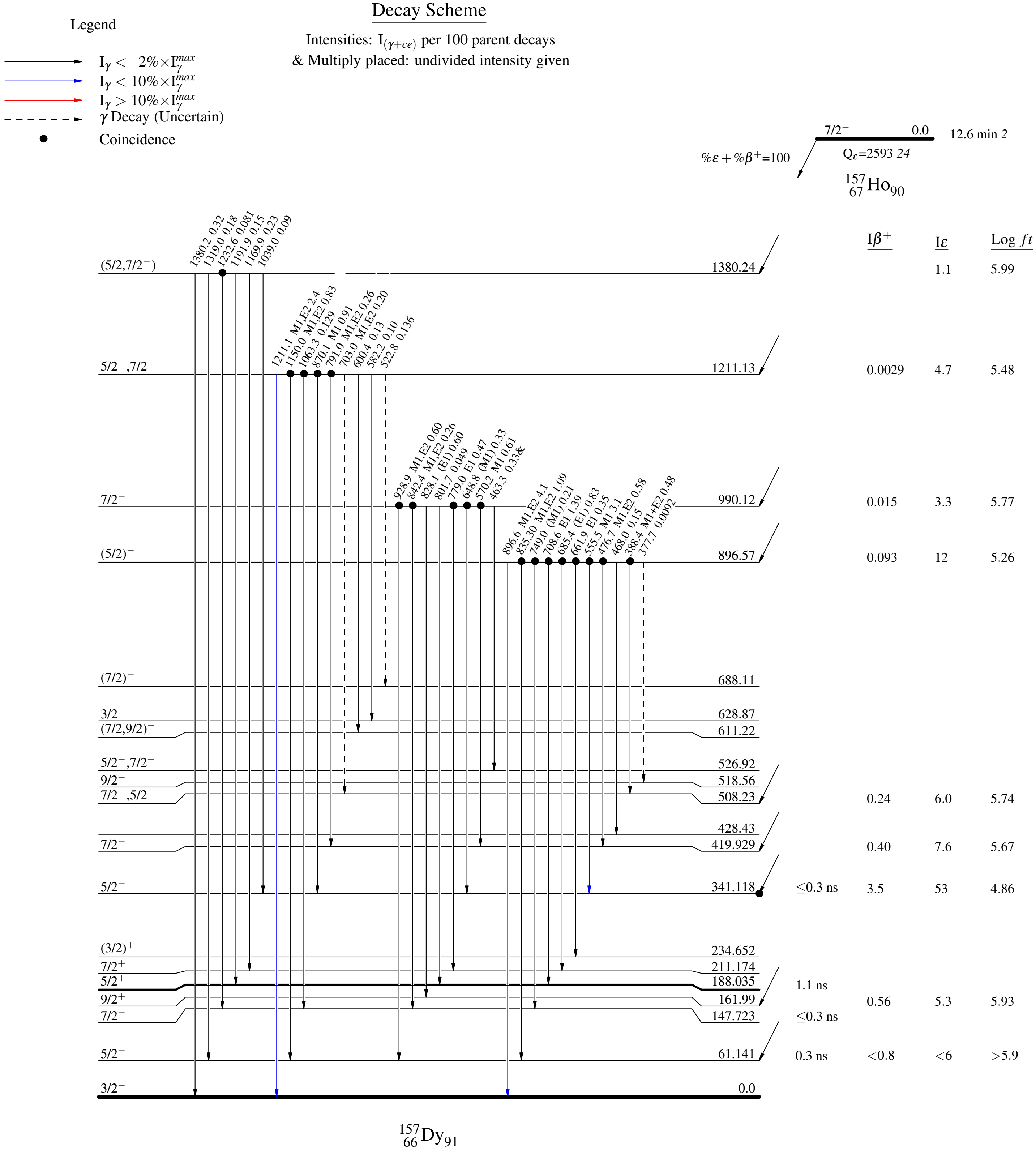
l Placement of transition in the level scheme is uncertain.

x γ ray not placed in level scheme.

^{157}Ho ε decay 1984Af01,1972To05,1977AnYX

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
& Multiply placed: undivided intensity given



^{157}Ho ε decay 1984Af01,1972To05,1977AnYX

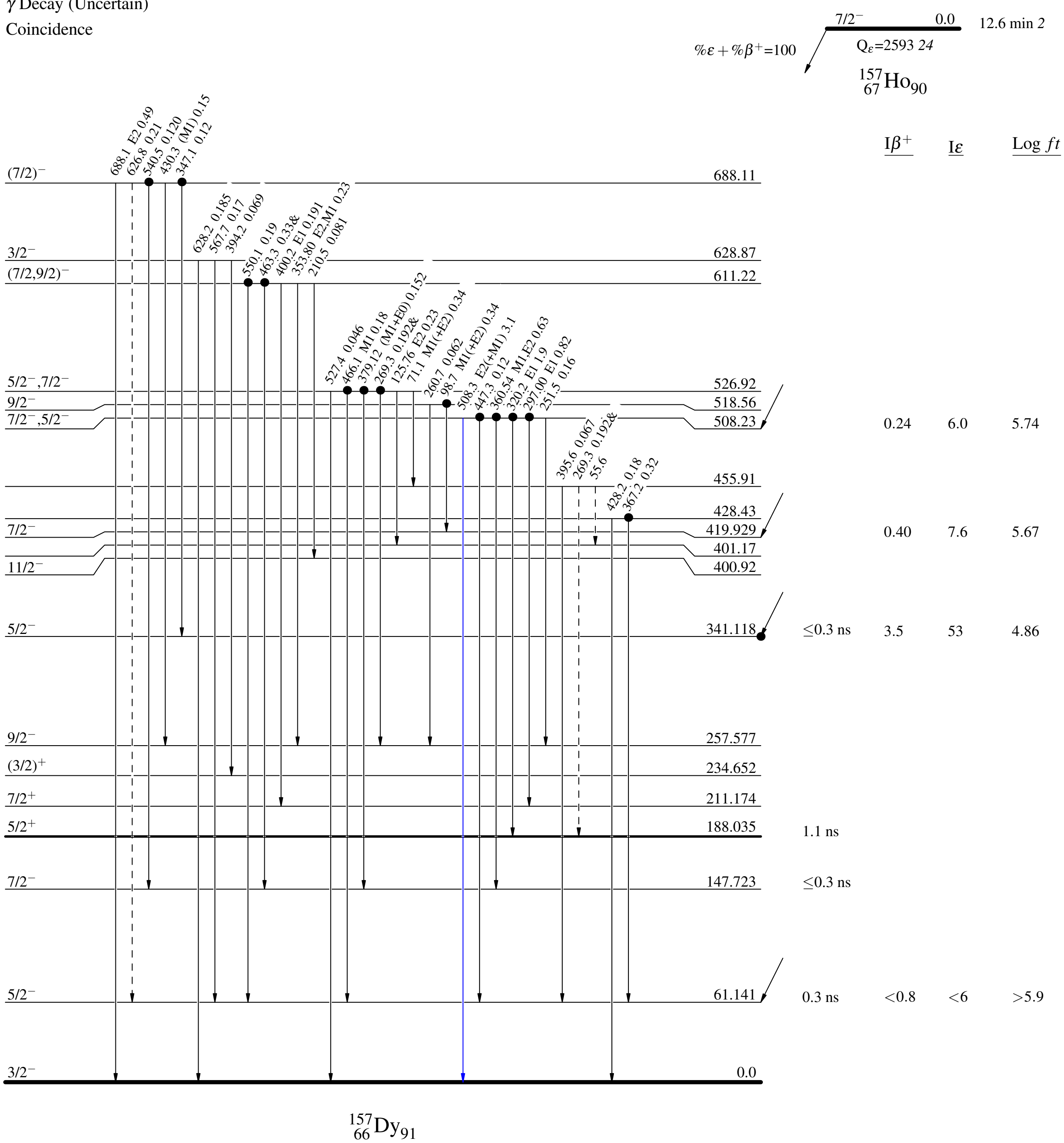
Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays

& Multiply placed: undivided intensity given

Legend

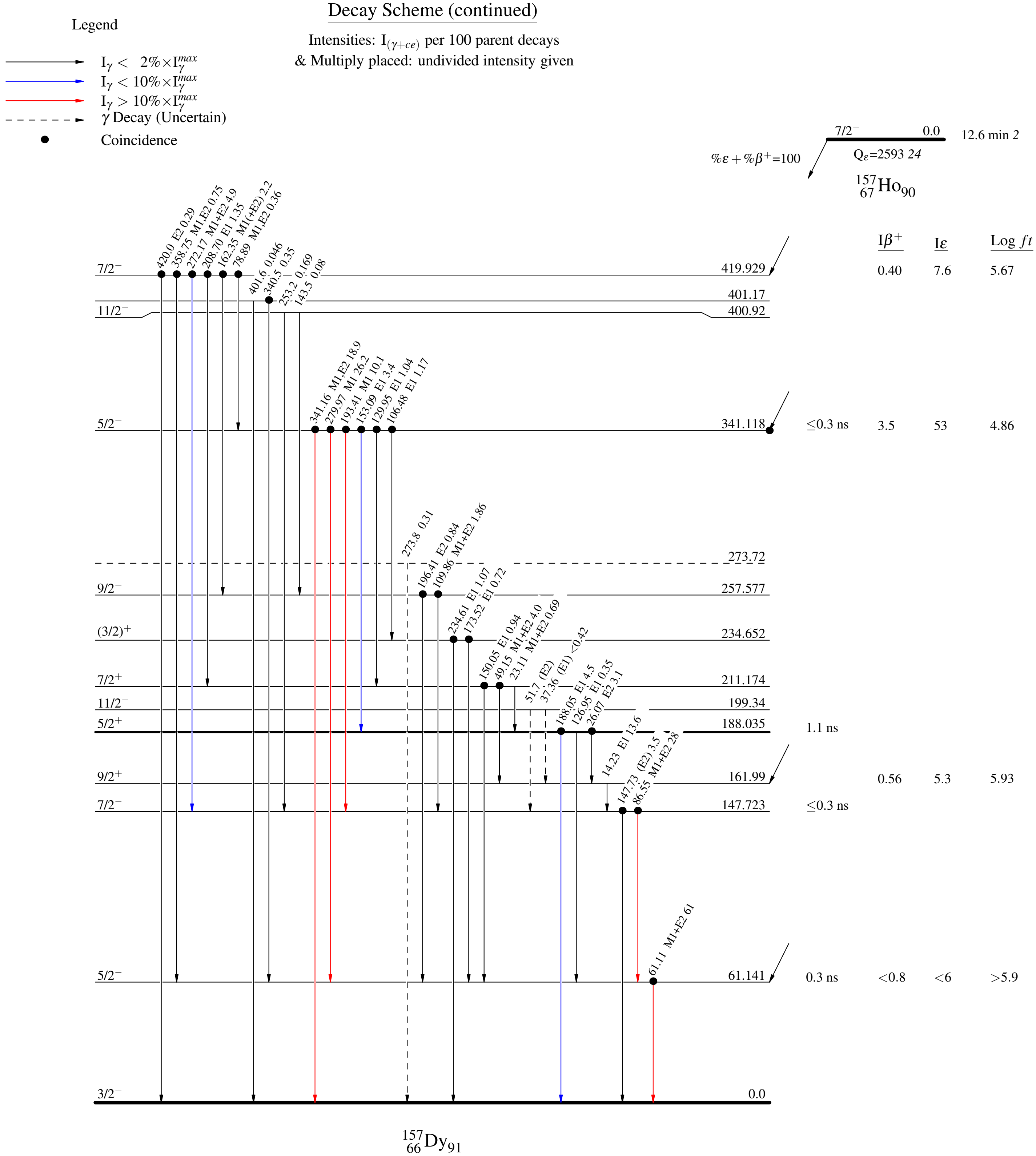
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)
- Coincidence



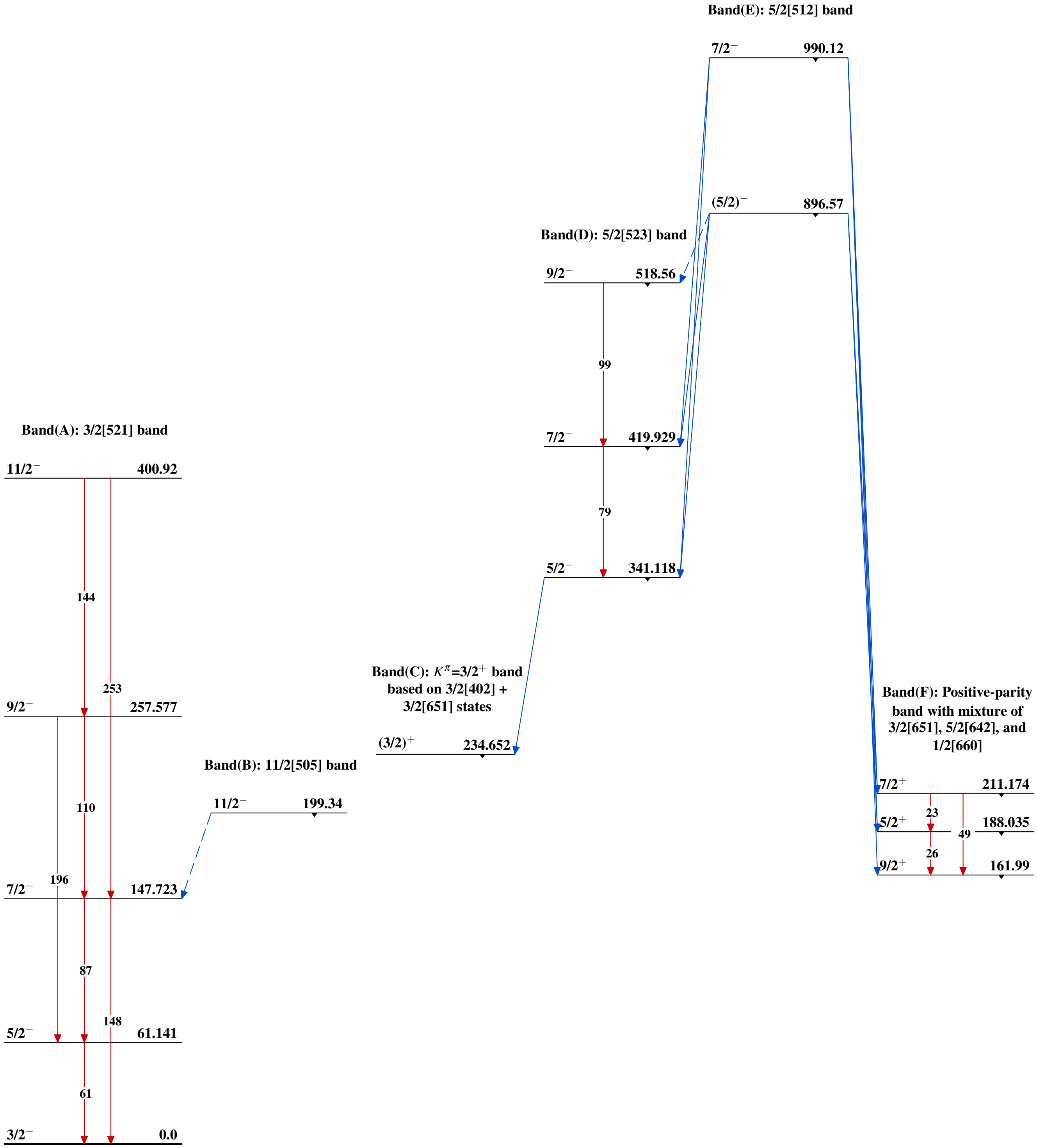
^{157}Ho ε decay 1984Af01,1972To05,1977AnYX

Decay Scheme (continued)

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
& Multiply placed: undivided intensity given



^{157}Ho ε decay 1984Af01,1972To05,1977AnYX



$^{157}_{66}Dy_{91}$

^{157}Ho ε decay 1984Af01,1972To05,1977AnYX (continued)

$^{157}_{66}Dy_{91}$