Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen#	NDS 147, 1 (2018)	30-Nov-2017

$Q(\beta^-)=-986.5$ *14*; S(n)=7658.11 *7*; S(p)=8661 *4*; $Q(\alpha)=-451.1$ *12* 2017Wa10
S(2n)=13929.12 *8*, S(2p)=16266 *4* (2017Wa10).
Identification of ^{164}Dy stable isotope by F.W. Aston, Nature 133, 327 (1934) by mass spectrographic method.
Isotope shift measurement for ground state: 1999An42.
Other reactions:
2012Ny01, 2010Ny01, 2010Go09: ^{164}Dy(^{3}He,^{3}He′),E=38 MeV: measured continuum γ spectra, particle spectra, and (particle)γ-coin; deduced level density, and radiative strength functions.
2015Ba20: ^{208}Pb(^{136}Xe,X),E=85 MeV: measured prompt and delayed γ and $\gamma\gamma$-coin spectra, deduced projectile-like fragment cumulative and independent production yields.
2010So03: ^{170}Er(^{82}Se,X),E=460 MeV: measured γ, particle, and (particle)γ-coin spectra, deduced yields of complementary beam-like and target-like fragments.
Mass measurements: 2011El08, 1972Ba08.
For theoretical nuclear structure calculations, consult NSR database, for about 300 references. About 20 of these are listed in the ENSDF dataset as document records.
Additional information 1.

^{164}Dy Levels

See ^{163}Dy(n,γ),(n,n):resonances dataset for 115 neutron-resonances in the range of E(n)=1.7 to 997 eV. The corresponding excitation energies in the range of 7658.112 to 7659.107 keV are not listed here.

Cross Reference (XREF) Flags

A	^{164}Tb β^- decay (3.0 min)	G	^{163}Dy(n,γ),(n,n):resonances	M	^{164}Dy(n,n′γ)
B	^{164}Ho ε decay (28.8 min)	H	^{163}Dy(n,γ) E=res	N	^{164}Dy(p,p′),(pol p,p′)
C	Muonic atom	I	^{163}Dy(d,p)	O	^{164}Dy(d,d′)
D	^{118}Sn(^{162}Dy,^{164}Dy)	J	^{163}Dy(d,pγ)	P	Coulomb excitation
E	^{162}Dy(t,p)	K	^{164}Dy(γ,γ′)	Q	^{165}Ho(t,α)
F	^{163}Dy(n,γ) E=th	L	^{164}Dy(e,e′)		

E(level)†	J$^\pi$	T$_{1/2}$	XREF	Comments
0.0@	0+	stable	ABCDEF HIJKLMNOPQ	The rms charge radius ($<r^2>)^{1/2}$: 5.222 fm *11* (2013An02 evaluation). See also 2009An12 for trends in nuclear radii.
73.393@ *5*	2+	2.393 ns *29*	ABCDEF HIJK MNOPQ	μ=+0.684 *23* (1968Mu01,2014StZZ) Q=−2.08 *15* (1968Mu01,2016St14) μ,Q: Mossbauer effect (1968Mu01). Others: μ=+0.73 *3* (1970Be36), 1967Ku07. J$^\pi$: E2 γ to 0+. T$_{1/2}$: from 2016Pr01 evaluation, based on B(E2) measurements in Coulomb excitation: B(E2)=5.66 *6* (1974Wo01), 5.59 *12* (1974Sh12, earlier value of 5.55 *9* in 1973Gr05), 5.57 *5* (1972Er04), 5.64 *25* (1960El07), 6.1 *15* (1956Hu49, not included in the evaluation); measured mean lifetimes τ=3.460 ns *110* (1969Av01, (particle)γ(t) in Coulomb excitation); τ=3.444 ns *54* (1967Ku07) and τ=3.490 ns *90* (1959Bi10) from (pγ(t) in (p,p′γ). Other: B(E2)=5.48 *10* from muonic x-rays (1970Hi03).
242.234@ *7*	4+	201 ps *8*	A DEF HIJK MNOPQ	μ=+1.00 *12* (1997Al25,2014StZZ) μ: IPAC (1997Al25). Other: +1.48 *48* (1989Do12, transient-field

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Adopted Levels, Gammas (continued)

^{164}Dy Levels (continued)

E(level)[†]	Jπ	$T_{1/2}$	XREF	Comments
				technique). Jπ: E2 γ to 2+; M1+E2 673.743γ from 4+. $T_{1/2}$: from B(E2) and recoil-distance Doppler-shift in Coulomb excitation. β_4=−0.023 *7* (1971Su01), from cross section of first 4+ state in ^{162}Dy populated in ^{164}Dy(p,t).
501.330[@] *12*	6+	27.2 ps *8*	A D F IJ MNOPQ	μ=+1.95 *10* (1999Br43,2014StZZ) μ: transient-field technique. Others:+1.62 *30* (1997Al25), +1.68 *48* (1983Se09). Jπ: E2 γ to 4+; no γ to 0+ and 2+. $T_{1/2}$: from B(E2) and recoil-distance Doppler-shift in Coulomb excitation.
761.815[&] *7*	2+	4.6 ps *3*	AB EF HIJ MNOP	μ=+0.76 *5* (1999Br43,2014StZZ) μ: transient-field technique. Other:+0.62 *20* (1989Do12). Jπ: E2 γ to 0+. $T_{1/2}$: from B(E2) in Coulomb excitation.
828.215[&] *8*	3+		A F HIJ LM P	B(M3)↑=0.3 *+1−2* (1987Bo49) Jπ: M1+E2 γ to 4+; E2(+M1) γ to 2+; M3 excitation in (e,e′). B(M3) from (e,e′).
843.66[@] *5*	8+	7.2 ps *3*	D I M PQ	μ=+2.48 *16* (1999Br43,2014StZZ) Jπ: E2 γ to 6+; band structure. $T_{1/2}$: from B(E2), recoil-distance Doppler-shift (RDDS), and Doppler-broadened line shapes in Coulomb excitation. μ: transient-field technique. Other: +2.2 *7* (1989Do12).
915.991[&] *8*	4+		A EF HIJ MNOP	Jπ: E2 γ to 2+; γ to 6+.
976.916[a] *9*	2−		A F HIJ MN Q	Jπ: E1 γ to 3+, E1 γ to 2+; γγ(θ) from (n,γ) E=th rules out J=3.
1024.646[&] *9*	5+		A F IJ M P	Jπ: M1+E2 523.329γ to 6+ and M1+E2 782.406γ to 4+.
1039.309[a] *8*	3−		A EF HIJ MNOPQ	B(E3)↑=0.088 *6* Jπ: E1 277.488γ to 2+ gives 1−,2−,3−; 1− and 2− ruled out by 123.32γ to 4+ since it would require an unreasonably large B(M2). B(E3)↑: from Coul. ex.
1122.774[a] *9*	4−		A F H J M Q	Jπ: 98.127γ E1 to 5+, 206.78γ E1 to 4+, 294.554γ D(+Q) to 3+.
1153.568[&] *19*	6+		A F IJ M OP	Jπ: M1 131.3γ to 5+, (E2+M1) 652.231γ to 6+; band structure.
1166			O	
1225.162[a] *14*	5−		A F H J MNOPQ	Jπ: E1(+M2) 309.162γ to 4+, E2 185.86γ to 3− and 723.81γ to 6+.
1261.28[@] *21*	10+	2.29 ps *11*	D M P	μ=+3.1 *4* (1999Br43,2014StZZ) Jπ: E2 γ to 8+; band structure. $T_{1/2}$: from Doppler-broadened line shape in Coulomb excitation. μ: transient-field technique. Other:+3.5 *13* (1989Do12).
1301.91[&] *4*	7+		M P	Jπ: D+Q γ to 6+; band structure.
1350.429[a] *24*	6−		M Q	Jπ: intensity pattern in (t,α).
1393.8 *3*	(2+)		A OP	XREF: O(1397). E(level): the existence of this level is questioned by 2017Go07 in (n,n′γ). Jπ: gammas to 0+ and 4+.
1470.26[&] *14*	8+		M P	Jπ: gammas to 8+ and 6+; band structure.
1495.92[a] *6*	7−		M Q	Jπ: intensity pattern in (t,α); band member.
1588.090[b] *14*	4−		A F H J M Q	Jπ: 611.168γ E2 to 2−, 548.54γ (E2+M1) 3−.
1607.7 *4*	(4+)		A J M	XREF: M(?). E(level): the existence of this level is questioned by 2017Go07 in (n,n′γ). Jπ: possible β feeding from (5+); γ to 2+.

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Adopted Levels, Gammas (continued)

^{164}Dy Levels (continued)

E(level)[†]	J^π	$T_{1/2}$	XREF	Comments
1654.7[&] *7*	9^+		P	J^π: 811.5γ (M1+E2) to 8^+; band structure.
1654.71 *3*	0^+		E M	J^π: L(t,p)=0; 1581.31γ(θ) is isotropic.
1674.945 *20*	1^-		Hi KLM O Q	B(E1)↑<0.025 (1989Gu17) XREF: O(1668). J^π: E1 excitation in (e,e′); γ(θ,pol) in (γ,γ′).
1686.566[b] *21*	5^-		A iJ M Q	J^π: E2 647.248γ to 3^-, 563.89γ (E2+M1) to 4^-.
1716.223 *24*	2^+	1.2 ps *+15−4*	EF Hi M	J^π: $(2,3)^+$ from ARC in (n,γ); 1716.25γ E2 to 0^+. $T_{1/2}$: from Doppler broadening of second order of reflection in a curved-crystal spectrometer in (n,γ) (1998Le03). Statistical assumptions of initial recoil velocity was used in the analysis. $T_{1/2}$=0.35-5.7 ps if extreme conditions were used for the initial recoil velocity.
1725.2 *4*			A M	E(level): the existence of this level is questioned by 2017Go07 in (n,n′γ).
1738.1 *6*	$(1^+,2^+)$		Hi M	XREF: H(1740). E(level): the existence of this level is questioned by 2017Go07 in (n,n′γ). J^π: γs to 0^+ and 3^+.
1745.9[@] *5*	12^+	1.18 ps *6*	D P	$T_{1/2}$: from Doppler-broadened line shape in Coulomb excitation. J^π: E2 γ to 10^+; band structure.
1758.165 *22*	3^-		H LM O	XREF: O(1753). J^π: (E1+M2) gammas to 2^+ and 4^+; (1^-), 2^-,3^-,4^- from ARC in (n,γ).
1770.2 *3*	$(4,5,3^+)$		A	J^π: γs to 5^+ and 4^-; possible γ to 4^+.
1779.6 *4*	0^+		E H M	J^π: L(t,p)=0.
1790.1? *11*			F	
1796.68 *3*	$(2)^+$		EF H M O	XREF: F(1798)O(1791). J^π: 2^+,3^+ from ARC in (n,γ); excited in (d,d′); γ to 0^+.
1804.24 *5*	$6^{(-)}$		F M	J^π: (E2) ΔJ=2 γ to 4^-; (M1+E2) γ to 5^-.
1809.571 *24*	1^-		H M Q	J^π: 1^-,(4^-) from ARC in (n,γ); gammas to 2^+ and 0^+.
1840.66 *3*	$1^{(-)}$		F H K M	J^π: 1^+, 2^-,(3^-) from ARC in (n,γ); (M1) γ to 0^+; (γ,γ′) favors 1^-.
1846.33 *3*	2^-		Hi M	J^π: $(2,3,4)^-$ from ARC in (n,γ); J=2 from γ(θ) in (n,n′γ).
1852.87 *5*	4^+		F Hi M Q	XREF: H(1852.4). J^π: 4^+,$(1^+,2^+,3^+)$ from ARC in (n,γ); J=4 from γ(θ) in (n,n′γ).
1858.9[&] *6*	10^+		P	J^π: from band structure.
1883.55 *11*	(0^+)		M	J^π: 1810.15γ(θ) is isotropic.
1891.69 *4*	4^+		E H M O	XREF: H(1891.7)O(1886). J^π: 4^+, $(1^+,2^+,3^+)$ from ARC in (n,γ); J=4 from γ(θ) in (n,n′γ).
1909.52 *3*	3^-		e H M O	XREF: O(1906). J^π: 2^-,3^- from ARC in (n,γ); (E1(+M2)) γ to 4^+.
1914.21 *6*	(5^-)		M	J^π: (E1(+M2)) γ to 4^+ and γ to 6^+.
1921.22 *3*	2^+		eF H M	XREF: F(1921.5). J^π: $(2,3)^+$ from ARC in (n,γ); (E2) ΔJ=2 γ to 0^+.
1933.21 *6*	$(2,3)^+$		F Hi M	E(level),J^π: from ARC in (n,γ). This level is probably different from 1933.62 level due to very different spins implied from population mechanisms.
1933.63 *7*	$4^{(-)}$		A iJ M	J^π: probable allowed or first-forbidden decay from (5^+); (M1+E2) γ to 4^- and gamma to 3^+.
1940.82 *15*	(7^-)		M	J^π: (E2) γ to 5^- and γ to (6^-).
1949.78 *3*	3^-		H M	J^π: 1^+, 2^-,3^-,(4^-) from ARC in (n,γ); (M1+E2) γ to 2^- and gammas to 3^- and 4^-.
1953.0 *4*	(4^+)		A	J^π: γ to 2^+; possible β feeding from (5^+).

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Adopted Levels, Gammas (continued)

^{164}Dy Levels (continued)

E(level)[†]	J$^\pi$	T$_{1/2}$	XREF	Comments
1978.411 *24*	(4$^-$)		M	J$^\pi$: proposed in (n,n$'\gamma$) based on population.
1978.81[c] *3*	(3$^+$)		f hI M	J$^\pi$: see comments for 1979.30 level; 2$^+$,3$^+$ from ARC in (n,γ); 3$^+$ proposed in (d,p).
1979.30 *4*	(2$^+$)		f h M	J$^\pi$: (2)$^+$ for one component in (n,γ) E=res from J$^\pi$=(2,3,4)$^+$ from ARC; and γ to 0$^+$. Other component is 2$^+$,3$^+$ from ARC in (n,γ).
1985.67 *6*	(2,3)$^-$		H M	J$^\pi$: from ARC in (n,γ).
1998[e] *4*	(5)$^-$		Q	J$^\pi$: intensity pattern in (t,α). E(level): this level seems different from 1998.2 level populated in β^- decay due to different J$^\pi$ values implied from (t,α) and from decay modes in β^- decay.
1998.62 *5*	(4$^+$)		A J M	XREF: M(1996.1). J$^\pi$: γs to 2$^+$; possible β feeding from (5$^+$).
2015.2? *8*			M	E(level): the existence of this level is questioned by 2017Go07 in (n,n$'\gamma$).
2032 *4*			Q	
2041.66 *4*	(4$^-$)		M	J$^\pi$: proposed in (n,n$'\gamma$).
2049.13[d] *4*	(2)$^+$		e HI M O	XREF: I(2055)O(2046). J$^\pi$: 2$^+$,3$^+$,(4$^+$) from ARC in (n,γ); gammas to 2$^-$, 2$^+$, and 3$^+$; possible K^π=2$^+$ bandhead in (d,p).
2053.34 *9*	(3)$^+$		H M	J$^\pi$: 2$^+$,3$^+$,(4$^+$) from ARC in (n,γ); gammas to 4$^-$, and 4$^+$.
2053.61 *8*	1$^{(-)}$		e K M	J$^\pi$: 1$^{(-)}$ proposed in (γ,γ'); dipole γ to 0$^+$.
2076.4[&] *8*	11$^+$		P	J$^\pi$: ΔJ=2 to (9$^+$).
2078.04 *4*	(2,3)$^+$		E hI M	XREF: E(2074)I(2076). J$^\pi$: from ARC in (n,γ).
2078.48[c] *5*	(4)$^+$		E hI M	XREF: E(2074)I(2076). J$^\pi$: from ARC in (n,γ) and (d,p). E(level): possibly a doublet in (d,p).
2086 *4*			Q	
2099.96 *6*	3$^+$		h M	J$^\pi$: parity from ARC in (n,γ) E=res; J=3 from $\gamma(\theta)$ in (n,n$'\gamma$).
2102.01 *6*	4$^+$		h M	J$^\pi$: 1$^+$,2$^+$,3$^+$,4$^+$ from ARC in (n,γ); γ to 6$^+$.
2113.18 *8*	(2$^+$)		H M	J$^\pi$: 2$^+$,3$^+$,4$^+$,(1$^+$) from ARC in (n,γ); gammas to 0$^+$.
2118[e] *4*	(6$^-$)		Q	J$^\pi$: intensity pattern in (t,α).
2123.88[d] *5*	(3$^+$)		HI M	XREF: I(2127). J$^\pi$: 2$^+$,3$^+$,(4$^+$) from ARC in; (3$^+$) from (d,p).
2152.43 *6*	3$^+$		eF H M O	J$^\pi$: 2$^+$,3$^+$,(4$^+$) from ARC in (n,γ); J=3 from $\gamma(\theta)$ in (n,n$'\gamma$). (3$^-$) suggested in (d,d$'$).
2157.75 *15*	(4$^+$)		A e I	E(level): the existence of this level is questioned by 2017Go07 in (n,n$'\gamma$). J$^\pi$: gammas to 2$^+$ and 6$^+$.
2173.26 *6*	(4)$^+$	0.28 ps *+19−9*	A F M	E(level): 2017Go07 in (n,n$'\gamma$) suggests that there could be two different levels of close energy excited in ^{164}Tb β^- decay and in (n,γ) E=thermal and (n,n$'\gamma$) based on their observed deexcitations not in agreement with those in ^{164}Tb β^- decay. J$^\pi$: gammas to 2$^+$ and 4$^+$; E2 γ to 3$^+$; evidence of β feeding from (5$^+$). Implied [M2] γ to 2$^-$ is inconsistent. T$_{1/2}$: from Doppler broadening of second order of reflection in a curved-crystal spectrometer in (n,γ) (1997Co18). Statistical assumptions of initial recoil velocity was used in the analysis. T$_{1/2}$=0.076-0.53 ps if extreme conditions were used for the initial recoil velocity.
2194.82 *8*	(4$^+$)		A e HI M O Q	XREF: I(2190). J$^\pi$: gammas to 2$^+$ and 4$^+$; evidence of β feeding from (5$^+$). J^π=(5$^+$) assigned in (d,p) for a 2190 group.
2204.0? *11*			F	

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Adopted Levels, Gammas (continued)

^{164}Dy Levels (continued)

E(level)[†]	J^π	$T_{1/2}$	XREF	Comments
2205.78[d] *9*	(4^+)		A e HI M O	XREF: I(2213). J^π: gammas to 2^+ and 4^+; evidence of strong β feeding from (5^+).
2230.42 *9*	(2^+)		M	J^π: proposed in (n,n′γ) based on high population; γ to 0^+.
2235	(3^-)		O	J^π: (E3) excitation in (d,d′).
2242.0? *11*			F	
2247.7 *5*	(4^+)		A EF hI O Q	J^π: gammas to 2^+ and 4^+; evidence of β feeding from (5^+).
2248.14 *8*	(2^+)		F h M	J^π: γ to 0^+.
2254.6? *11*			F	
2263 *3*			HI O q	XREF: q(2268).
2270.9? *3*			F M	
2278			E O q	XREF: E(2277)q(2268).
2290.6[@] *7*	14^+	0.67 ps *6*	D P	$T_{1/2}$: from Doppler-broadened line shape in Coulomb excitation. J^π: E2 γ to 12^+.
2302.16 *11*	$(2^+,3)$		EF HI M O q	XREF: q(2311). J^π: proposed in (n,n′γ) based on population and deexcitation scheme.
2312.6? *3*			A q	XREF: q(2311).
2314.2[&] *7*	12^+		P	J^π: probable band member.
2330.01 *10*	1^-[‡]	0.065 eV *14*	K M	Γ: from (γ,γ').
2333[c] *6*	(6^+)		I	J^π: from (d,p).
2349.2 *10*			F H	
2381 *6*			E I Q	
2396.37 *20*			H M	
2411.9 *7*	$1^{(-)}$[‡]		H K	J^π: from (γ,γ').
2413[f] *3*	(6^-)		I Q	J^π: intensity pattern in (t,α).
2429.11 *14*	$(1,2^+)$		H M	J^π: γ to 0^+.
2437.2 *3*	$(1,2^+)$		H M	J^π: γ to 0^+.
2442.76 *15*			F H M	
2459.3 *22*			F H Q	
2473.25 *12*	$(1,2^+)$		HI M	J^π: γ to 0^+.
2496 *3*			H Q	
2518 *3*			H	
2520.2? *11*			F	
2531.37 *16*	1^+[‡]	11.8 fs *28*	H KLMN	B(M1)↑=0.38 *5* (1989Fr03) B(M1)↑: from (p,p′). Other: 0.43 *10* (1995Jo20) in (n,n′γ). $T_{1/2}$: from DSAM in (n,n′γ) (1995Jo20). Other: Γ=0.035 eV *6* (γ,γ').
2536.8? *11*			F	
2539.02 *13*	1^+[‡]	12.5 fs *28*	KLM	B(M1)↑=0.40 *10* (1995Jo20) $T_{1/2}$: from DSAM in (n,n′γ) (1995Jo20). Other: Γ=0.028 eV *5* (γ,γ').
2555[f] *3*	(7^-)		H Q	J^π: intensity pattern in (t,α) gives (7^-); possible band member.
2570 *3*			H	
2577.87 *15*	1^+[‡]	9.0 fs *35*	KLM	B(M1)↑=0.53 *20* (1995Jo20) $T_{1/2}$: from DSAM in (n,n′γ) (1995Jo20).
2583.22 *16*	$(1,2^+)$		HI M	J^π: γ to 0^+.
2595 *3*			H	
2604 *5*			Q	
2630 *6*			Q	
2653.7 *3*	1^+		K MN	B(M1)↑=0.34 *5* (1989Fr03) XREF: N(2666). J^π: M1 excitation in (p,p′).
2662.1 *3*	$(1,2^+)$		I M	J^π: γ to 0^+.

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Adopted Levels, Gammas (continued)

^{164}Dy Levels (continued)

E(level)†	Jπ	$T_{1/2}$	XREF	Comments
2670.49 *24*	1^{-}‡	0.055 eV *14*	K M	Γ: from (γ,γ′).
2693# *6*	(3^{+})		Q	Jπ: intensity pattern in (t,α).
2694.0 *3*	1^{+}‡	7.6 fs *21*	I K M	B(M1)↑=0.50 *10* (1995Jo20) $T_{1/2}$: from DSAM in (n,n′γ) (1995Jo20). Other: Γ=0.058 eV *8* (γ,γ′).
2711 *3*			HI	XREF: I(2693).
2722 *3*			I	
2731 *3*			H	
2738 *3*			H M	XREF: M(?).
2752.7 *5*	(4^{+})		A H	Jπ: gammas to 2^{+} and 4^{+}; evidence of β feeding from (5^{+}).
2761 *4*			I	
2786 *3*			H	
2792 *3*			H	
2801# *3*	(4^{+})		HI Q	XREF: Q(2799). Jπ: intensity pattern in (t,α).
2827.6 *10*			HI K	
2832.2?& *8*	(14^{+})		P	Jπ: probable band member.
2862.0 *7*	$1^{(+)}$‡		I K	XREF: I(2856).
2887 *3*			HI	
2887.1@ *13*	(16^{+})		D P	Jπ: probable g.s. band member.
2920# *3*	(5^{+})		HI Q	Jπ: intensity pattern in (t,α).
2946 *3*			H	
2986.0 *7*	$1^{(-)}$‡		K	
2990.1 *7*	$1^{(+)}$‡		H K	
3001.5 *4*	$(4^{+},5^{+})$		A H	Jπ: gammas to 4^{+} and 6^{+}; evidence of β feeding from (5^{+}).
3005.5 *5*	$(4^{+},5,6^{+})$		A	Jπ: gammas to 4^{+} and 6^{+}.
3014.5 *4*	$(4^{+},5)$		A I	XREF: I(3018). Jπ: gammas to 4^{+} and 6^{+}; primary γ from $(2^{-},3^{-})$; evidence of β feeding from (5^{+}).
3027.0 *10*			K	
3050 *4*			I	
3070.0 *10*			K	
3076# *3*	(6^{+})		H Q	XREF: Q(3080). Jπ: intensity pattern in (t,α).
3111.2 *3*	1^{+}‡	6.9 fs *28*	H KLMn	B(M1)↑=1.5 *3* (1984Bo43) B(M1)↑: from (e,e′). Other: 0.43 *20* (1995Jo20) in (n,n′γ). $T_{1/2}$: from DSAM in (n,n′γ) (1995Jo20). Other: Γ=0.179 eV *22* (γ,γ′).
3126 *3*			H	
3147 *4*			I	
3159.1 *3*	1^{+}‡	6.2 fs *28*	KLMn	B(M1)↑=0.40 *20* (1995Jo20) $T_{1/2}$: from DSAM in (n,n′γ) (1995Jo20).
3173.6 *3*	1^{+}‡	13.9 fs *42*	KLMn	B(M1)↑=0.19 *7* (1995Jo20) $T_{1/2}$: from DSAM in (n,n′γ) (1995Jo20). Other: Γ=0.161 eV *21* (γ,γ′).
3185.0 *10*			K	
3191 *3*			I	
3211 *4*			I	
3228.0 *7*	$1^{(-)}$‡		K	
3231.0 *10*			K	
3239# *3*	(7^{+})		I Q	XREF: Q(3250). Jπ: intensity pattern in (t,α).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{164}Dy Levels (continued)

E(level)[†]	J^π	XREF	Comments
3270.0 7	$1^{(-)}$[‡]	K	
3279.0 7	$1^{(+)}$[‡]	K	
3293.0 10		K	
3316.0 7	$1^{(+)}$[‡]	K	
3354 8		I Q	XREF: Q(3365).
3365.0 7	$1^{(+)}$[‡]	K	
3391 5		I	
3406.4[&]	(16^+)	P	
3414.0 7	$1^{(+)}$[‡]	K	
3429[#] 5	(8^+)	I Q	XREF: Q(3437). J^π: intensity pattern in (t,α).
3476 9		I Q	XREF: Q(3461).
3529.7[@] 16	(18^+)	D P	J^π: probable g.s. band member.
3603.0 10		K	
3621.0 7	1[‡]	K	
3667.0 7	1[‡]	K	
3695.0 7		K	
3704.0 7	$1^{(-)}$[‡]	K	
3718.0 7	1^+[‡]	K	
3754.0 7	$1^{(-)}$[‡]	K	
3765.0 7	$1^{(+)}$[‡]	K	
3785.0 7	$1^{(-)}$[‡]	K	
3836.0 10		K	
3853.0 10		K	
3868.0 7	$1^{(-)}$[‡]	K	
3877.0 7	1^-[‡]	K	
3914.0 7	$1^{(-)}$[‡]	K	
3987.0 7	$1^{(-)}$[‡]	K	
4037.8	(18^+)	P	J^π: ΔJ=2 to (16^+).
4213.3[@] 19	(20^+)	D P	J^π: probable g.s. band member.
4600	1^+	N	B(M1)↑=0.27 4 (1989Fr03) J^π: M1 excitation in (p,p′).
4933.0[@] 22	(22^+)	P	J^π: probable g.s. band member.
(7657.93 22)	$2^-,3^-$	F	S(n)=7658.11 7 (2017Wa10).
(7659.76 9)	$(2^-,3^-)$	H	E(level): 7660.11 7 from S(n)(^{164}Dy)+E(n), where E(n)=2 keV. J^π: dominant s-wave capture in $5/2^-$.
(7681.98 11)	$(1^+,2,3,4^+)$	H	E(level): 7682.11 7 from S(n)(^{164}Dy)+E(n), where E(n)=24 keV. J^π: s- or p-wave capture in $5/2^-$.

[†] From least-squares adjustment of Eγ values for levels populated in γ-ray studies. For others, weighted averages were taken when level energies were available from different reactions.

[‡] From (γ,γ').

[#] This level has been associated with $K^\pi=1^+$ band in (t,α) (1993Fr04), but the corresponding $K^\pi=6^+$ band has not been reported, thus the interpretation of $K^\pi=1^+$ band is considered as tentative.

[@] Band(A): $K^\pi=0^+$, g.s. band.

[&] Band(B): $K^\pi=2^+$, γ band.

[a] Band(C): $K^\pi=2^-$ octupole band. From spectroscopic factors in (t,α), the bandhead contains 47% of

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{164}Dy Levels (continued)

configuration=π3/2[411]-π7/2[523].

[b] Band(D): K^{π}=(4$^-$) band (?). Tentative band assignment in (t,α) data, where it is suggested that configuration=π1/2[411]+π7/2[523] may contribute 20%.

[c] Band(E): K^{π}=(3$^+$),ν5/2[523]+ν1/2[521]. Band assignment from (d,p).

[d] Band(F): K^{π}=(2$^+$),ν5/2[523]-ν1/2[521]. Band assignment from (d,p).

[e] Band(G): K^{π}=(5$^-$) band. According to (t,α) data, configuration=π3/2[411]+π7/2[523] may contribute 42%.

[f] Band(H): K^{π}=(6$^-$) band. According to (t,α) data, some contribution from configuration=π5/2[413]+π7/2[523].

Adopted Levels, Gammas (continued)

$\gamma(^{164}Dy)$

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡]	δ[&]	α[a]	Comments
73.393	2^+	73.392 *5*	100	0.0	0^+	E2		8.89	α(K)=2.15 *3*; α(L)=5.18 *8*; α(M)=1.245 *18* α(N)=0.279 *4*; α(O)=0.0331 *5*; α(P)=9.41×10^{-5} *14* B(E2)(W.u.)=211 *4* E_γ: from (n,γ) E=thermal. Other: 73.394 *13* from (n,n′γ). Mult.: from ce data in ^{164}Ho ε decay and (d,pγ).
242.234	4^+	168.838 *5*	100	73.393	2^+	E2		0.419	α(K)=0.262 *4*; α(L)=0.1210 *17*; α(M)=0.0286 *4* α(N)=0.00644 *9*; α(O)=0.000802 *12*; α(P)=1.200×10^{-5} *17* B(E2)(W.u.)=271 *11* E_γ: from (n,γ) E=thermal. Other: 168.837 *10* from (n,n′γ). Mult.: Q from $\gamma\gamma(\theta)$ in (n,γ) E=thermal; M2 is ruled out by RUL.
501.330	6^+	259.097 *11*	100	242.234	4^+	E2		0.1018	α(K)=0.0739 *11*; α(L)=0.0216 *3*; α(M)=0.00502 *7* α(N)=0.001137 *16*; α(O)=0.0001474 *21*; α(P)=3.74×10^{-6} *6* B(E2)(W.u.)=303 *9* E_γ: weighted average of 259.090 *15* from (n,γ) E=thermal and 259.101 *11* from (n,n′γ). Additional information 2.
761.815	2^+	519.59[b] *3*	1.75 *5*	242.234	4^+	[E2]		0.01373	B(E2)(W.u.)=0.54 *4* Additional information 3.
		688.422 *10*	100.0 *22*	73.393	2^+	E2+M1	−9.5 *+8−10*	0.00697	α(K)=0.00575 *9*; α(L)=0.000947 *14*; α(M)=0.000210 *3* α(N)=4.83×10^{-5} *7*; α(O)=6.83×10^{-6} *10*; α(P)=3.29×10^{-7} *5* B(E2)(W.u.)=7.4 *6*; B(M1)(W.u.)=8.1×10^{-5} *16* δ: from Coulomb excitation. Additional information 4.
		761.813 *10*	96.2 *21*	0.0	0^+	E2		0.00547	B(E2)(W.u.)=4.3 *3* Additional information 5.
828.215	3^+	585.985 *13*	17.7 *4*	242.234	4^+	M1+E2	+5.4 *+32−15*	0.0105 *4*	Additional information 6.
		754.817 *10*	100.0 *23*	73.393	2^+	E2(+M1)		0.0081 *25*	Mult.,δ: M1+E2 from ce data in (d,pγ), δ(E2/M1)=70 *+180−30* from $\gamma(\theta)$ in (n,n′γ). Additional information 7.
843.66	8^+	342.35 *5*	100	501.330	6^+	E2		0.0434	α(K)=0.0333 *5*; α(L)=0.00784 *11*; α(M)=0.00180 *3* α(N)=0.000409 *6*; α(O)=5.44×10^{-5} *8*; α(P)=1.775×10^{-6} *25* B(E2)(W.u.)=300 *13* Mult.: Q from $\gamma(\theta)$ in Coulomb excitation; M2 is ruled out by RUL.
915.991	4^+	154.18 *3*	0.62 *12*	761.815	2^+				E_γ: from (n,γ) E=th. Other: 154.24 *25* from (n,n′γ). Additional information 8.
		414.83 *20*	1.5 *5*	501.330	6^+				E_γ: weighted average of 415 *1* from ^{164}Tb β^- decay, 415.00 *50* from (n,γ) E=th, and 414.79 *20* from (n,n′γ). I_γ: weighted average of 1.4 *5* in (n,n′γ) and 2.3 *12* in ^{164}Tb β^- decay. Other: 62 *30* in (n,γ).
		673.743 *10*	100.0 *24*	242.234	4^+	M1+E2	+0.87 *+13−11*	0.0111 *5*	α(K)=0.0093 *5*; α(L)=0.00138 *5*; α(M)=0.000302 *11*

Adopted Levels, Gammas (continued)

$\gamma(^{164}Dy)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	δ[&]	α[a]	Comments
									α(N)=7.0×10^{-5} *3*; α(O)=1.01×10^{-5} *4*; α(P)=5.6×10^{-7} *3* Additional information 9.
915.991	4$^+$	842.610 *11*	62.8 *15*	73.393	2$^+$	E2		0.00438	Additional information 10. Mult.: from ce data in (d,pγ).
976.916	2$^-$	148.697 *10*	15.6 *12*	828.215	3$^+$	E1		0.1067	α(K)=0.0897 *13*; α(L)=0.01331 *19*; α(M)=0.00291 *4* α(N)=0.000664 *10*; α(O)=9.25×10^{-5} *13*; α(P)=4.37×10^{-6} *7* E_γ: weighted average of 148.696 *10* from (n,γ) E=th and 148.700 *19* from (n,n′γ). Additional information 11. I_γ: unweighted average of 18.5 *15* from ^{164}Tb β^- decay (3.0 m), 14.3 *23* from (n,γ) E=th, 13.1 *7* from (d,pγ), and 16.4 *6* from (n,n′γ).
		215.104 *10*	100 *3*	761.815	2$^+$	E1		0.0402	Additional information 12. Mult.: E1 from ce data in (d,pγ), D(+Q) from $\gamma\gamma(\theta)$ in (n,γ) E=th and $\gamma(\theta)$ in (n,n′γ); δ(Q/D)=−0.03 *8* from $\gamma\gamma(\theta)$ may suggest small M2 admixture. δ: Other: −0.05 *5* from (n,n′γ).
		903.49 *18*	0.67 *12*	73.393	2$^+$				E_γ: weighted average of 903.0 *5* from ^{164}Tb β^- decay and 903.55 *18* from (n,n′γ). I_γ: weighted average of 1.5 *5* from ^{164}Tb β^- decay and 0.65 *7* from (n,n′γ).
1024.646	5$^+$	196.56 *13*	3.7 *6*	828.215	3$^+$	[E2]		0.250	α(K)=0.1666 *24*; α(L)=0.0641 *10*; α(M)=0.01504 *22* α(N)=0.00340 *5*; α(O)=0.000429 *7*; α(P)=7.92×10^{-6} *12* E_γ: weighted average of 196.75 *15* from ^{164}Tb β^- decay and 196.47 *10* from (n,n′γ). I_γ: weighted average of 3.7 *19* from ^{164}Tb β^- decay and 3.7 *6* from (n,n′γ).
		523.329 *23*	13.9 *5*	501.330	6$^+$	M1+E2		0.020 *7*	Additional information 13. I_γ: weighted average of 11.1 *19* from ^{164}Tb β^- decay, 14.0 *5* from (n,n′γ), and 14.7 *15* from Coulomb excitation.
		782.406 *11*	100.0 *22*	242.234	4$^+$	E2+M1	−5.5 *+21−61*	0.00530 *23*	α(K)=0.00441 *20*; α(L)=0.000694 *25*; α(M)=0.000153 *6* α(N)=3.53×10^{-5} *13*; α(O)=5.03×10^{-6} *19*; α(P)=2.54×10^{-7} *13* δ: Others: −0.19 *6* in Coul. ex., +33 *+17−8* in (n,n′γ). Additional information 14.
1039.309	3$^-$	123.32 *1*	15.9 *9*	915.991	4$^+$				E_γ: from (n,γ) E=th. Others: 123.32 *6* in (n,n′γ), 123.22 *5* in ^{164}Tb β^- decay. I_γ: weighted average of 17.5 *18* from ^{164}Tb β^- decay, 12.7 *19* from (n,γ) E=th, and 16.1 *8* from (n,n′γ).
		211.102 *13*	60.5 *18*	828.215	3$^+$	E1		0.042	E_γ: weighted average of 211.108 *15* from (n,γ) E=th and 211.097 *13* from (n,n′γ).

$^{164}_{66}Dy_{98}$-10

$\gamma(^{164}$Dy) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡]	δ[&]	α[a]	Comments
									I_γ: weighted average of 73 *8* from ^{164}Tb β^- decay, 52 *8* from (n,γ) E=th, 56 *7* from (d,pγ), and 60.6 *17* from (n,n$'\gamma$).
									Mult.: (E1) from ce data in (d,pγ), D(+Q) from $\gamma\gamma(\theta)$ in (n,γ) E=th. δ(Q/D)=+0.29 *26* from $\gamma\gamma(\theta)$ may suggest small M2 admixture.
1039.309	3$^-$	277.488 *11*	100.0 *23*	761.815	2$^+$	E1		0.0209	Additional information 15.
		797.17 *7*	2.97 *17*	242.234	4$^+$				E_γ: weighted average of 796.7 *5* from ^{164}Tb β^- decay and 797.18 *7* from (n,n$'\gamma$).
									I_γ: from (n,n$'\gamma$). Other: 10 *4* in ^{164}Tb β^- decay.
		965.914 *16*	16.7 *5*	73.393	2$^+$	(E1(+M2))	+0.006 *+14−26*		Mult.,δ: from $\gamma(\theta)$ in (n,n$'\gamma$).
									Additional information 16.
1122.774	4$^-$	98.127 *6*	4.6 *8*	1024.646	5$^+$	E1		0.325	α(K)=0.271 *4*; α(L)=0.0422 *6*; α(M)=0.00924 *13*
									α(N)=0.00210 *3*; α(O)=0.000286 *4*; α(P)=1.246×10^{-5} *18*
									Additional information 17.
									I_γ: weighted average of 6.7 *10* in (n,n$'\gamma$), 3.9 *6* in (n,γ) E=th, and 4.5 *15* in ^{164}Tb β^-. Other: 44 *7* in (d,pγ) is discrepant.
		145.88 *2*	1.8 *3*	976.916	2$^-$				E_γ: weighted average of 145.88 *2* from (n,γ) E=th and 145.95 *20* from (n,n$'\gamma$).
									I_γ: weighted average of 1.5 *3* from (n,γ) E=th and 2.2 *4* from (n,n$'\gamma$).
		206.78 *2*	19.6 *8*	915.991	4$^+$	E1		0.0446	α(K)=0.0376 *6*; α(L)=0.00544 *8*; α(M)=0.001189 *17*
									α(N)=0.000272 *4*; α(O)=3.84×10^{-5} *6*; α(P)=1.91×10^{-6} *3*
									E_γ: weighted average of 206.80 *5* from ^{164}Tb β^- decay, 206.78 *2* from (n,γ) E=th, 207.1 *5* from (d,pγ), and 206.78 *3* from (n,n$'\gamma$).
									I_γ: weighted average of 19.3 *8* in (n,n$'\gamma$), 19 *4* in (n,γ) E=th, 23.6 *30* in ^{164}Tb β^- decay. Other: intensity is discrepant in (d,pγ), thus not included in averaging.
		294.554 *11*	100.0 *21*	828.215	3$^+$	E1			Additional information 18.
									Mult.: D+Q from $\gamma\gamma(\theta)$ in (n,γ) E=th and $\gamma(\theta)$ in (n,n$'\gamma$); polarity from level-parity change determined based on other experimental evidence. δ(Q/D)=+0.11 *+21−17* from $\gamma\gamma(\theta)$ may suggest small M2 admixture.
1153.568	6$^+$	131.3 *2*	48 *4*	1024.646	5$^+$	M1		1.101	α(K)=0.928 *14*; α(L)=0.1360 *20*; α(M)=0.0299 *5*
									α(N)=0.00691 *11*; α(O)=0.001011 *15*; α(P)=5.78×10^{-5} *9*
									E_γ: weighted average of 131.0 *5* from ^{164}Tb β^- decay and 131.4 *2* from (d,pγ). Not reported in Coul. Ex. and (n,n$'\gamma$). Poor fit, level-energy difference=128.94.
									I_γ: from (d,pγ). Other:≈100 in ^{164}Tb β^- decay.
		237.56 *10*	16.7 *16*	915.991	4$^+$				I_γ: from (n,n$'\gamma$). Other: 28 *5* from Coul. ex.
		652.231 *19*	100.0 *24*	501.330	6$^+$	(E2+M1)	−5.4 *+16−24*	0.0078	α(K)=0.00639 *9*; α(L)=0.001074 *16*; α(M)=0.000239 *4*

Adopted Levels, Gammas (continued)

$\gamma(^{164}Dy)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡	δ&	α[a]	Comments
									α(N)=5.49×10^{-5} *8*; α(O)=7.73×10^{-6} *11*; α(P)=3.64×10^{-7} *6* Additional information 19. Mult.,δ: from (n,n′γ). Other: (E2) from (d,pγ).
1153.568	6$^+$	911.34 *3*	64.4 *16*	242.234	4$^+$				Additional information 20. I_γ: weighted average of 64.9 *20* in (n,n′γ) and 64.1 *16* in Coul. ex.
1225.162	5$^-$	185.86 *5*	7.0 *16*	1039.309	3$^-$	E2		0.302	α(K)=0.197 *3*; α(L)=0.0810 *12*; α(M)=0.0191 *3* α(N)=0.00430 *6*; α(O)=0.000540 *8*; α(P)=9.25×10^{-6} *13* E_γ: from (n,γ) E=th. Others: 185.93 *25* in (n,n′γ), 185.84 *20* in ^{164}Tb β^-. Additional information 21. I_γ: weighted average of 6.3 *14* in (n,n′γ), 7.5 *25* in (n,γ) E=th, and 18 *6* in ^{164}Tb β^- decay. Other: 32 *5* in (d,pγ) is discrepant.
		200.52 *3*	10.9 *11*	1024.646	5$^+$	[E1]		0.0483	α(K)=0.0408 *6*; α(L)=0.00591 *9*; α(M)=0.001291 *18* α(N)=0.000295 *5*; α(O)=4.16×10^{-5} *6*; α(P)=2.06×10^{-6} *3* E_γ: weighted average of 200.50 *15* from ^{164}Tb β^- decay, 200.52 *3* from (n,γ) E=th, and 200.53 *9* from (n,n′γ). I_γ: weighted average of 24 *12* from ^{164}Tb β^- decay, 13 *4* from (n,γ) E=th, and 10.6 *11* from (n,n′γ).
		309.162 *23*	100.0 *25*	915.991	4$^+$	E1			E_γ: weighted average of 309.08 *5* from ^{164}Tb β^- decay, 309.12 *3* from (n,γ) E=th, 309.4 *5* from (d,pγ), and 309.180 *15* from (n,n′γ). Mult.: E1 from ce data in (d,pγ), D(+Q) from $\gamma\gamma(\theta)$ in (n,γ) E=th. δ(Q/D)=+0.12 *20* from $\gamma\gamma(\theta)$ may suggest small M2 admixture.
		723.81 *8*	9.1 *6*	501.330	6$^+$				
		982.933 *20*	49.3 *16*	242.234	4$^+$				
1261.28	10$^+$	417.6 *2*	100	843.66	8$^+$	E2		0.0246	α(K)=0.0194 *3*; α(L)=0.00403 *6*; α(M)=0.000914 *13* α(N)=0.000209 *3*; α(O)=2.83×10^{-5} *4*; α(P)=1.065×10^{-6} *15* B(E2)(W.u.)=358 *18* E_γ: weighted average of 417.5 *3* from (n,n′γ) and 417.6 *2* from Coulomb excitation. Mult.: Q from $\gamma(\theta)$ in Coulomb excitation; M2 is ruled out by RUL.
1301.91	7$^+$	277.8	35 *5*	1024.646	5$^+$				E_γ,I_γ: from Coulomb excitation only.
		800.58 *3*	100 *3*	501.330	6$^+$	D+Q	−0.21 *+8−9*		Mult.,δ: from $\gamma(\theta)$ in Coulomb excitation.
1350.429	6$^-$	325.782 *22*	100	1024.646	5$^+$				
1393.8	(2$^+$)	478.0#	30#	915.991	4$^+$				
		567# *1*	40# *10*	828.215	3$^+$				
		633.0# *5*	40# *20*	761.815	2$^+$				
		1152# *1*	86# *10*	242.234	4$^+$				
		1320.1# *15*	100# *40*	73.393	2$^+$				
		1393.0# *15*	40# *10*	0.0	0$^+$				

Adopted Levels, Gammas (continued)

γ(^{164}Dy) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$[†]	I$_\gamma$[†]	E$_f$	J$^\pi_f$	Mult.[‡]	δ[&]	α[a]	Comments
1470.26	8$^+$	316.0 *3*	100 *2*	1153.568	6$^+$				I$_\gamma$: from Coul. ex. Other: 63 *17* in (n,n′γ).
		626.86 *16*	79 *10*	843.66	8$^+$	(M1+E2)	+1.18 *5*	0.01204 *25*	I$_\gamma$: from Coulex. Other: 100 *10* in (n,n′γ).
		968.4 *5*	60 *11*	501.330	6$^+$				I$_\gamma$: from Coul. ex. Other: 20 *8* in (n,n′γ).
1495.92	7$^-$	342.35 *5*	<100	1153.568	6$^+$				
		994.62 *24*	11.9 *17*	501.330	6$^+$				
1588.090	4$^-$	363[c]		1225.162	5$^-$				E$_\gamma$: seen in β^- decay only.
		465.30 *17*	4.6 *9*	1122.774	4$^-$			0.0184	α(K)= 0.0147; α(L)=0.00288 E$_\gamma$: weighted average of 465.05 *20* from ^{164}Tb β^- decay, 466.1 *5* from (d,pγ), and 465.37 *15* from (n,n′γ). I$_\gamma$: from ^{168}Tb β^- decay. Other: 67 *10* in (d,pγ).
		548.82 *3*	38.5 *17*	1039.309	3$^-$	(E2+M1)			Additional information 22. I$_\gamma$: weighted average of 42 *3* from ^{164}Tb β^- decay, 79 *16* from (d,pγ), and 38.1 *9* from (n,n′γ). Other: ≈ 100 in (n,γ) E=th. Mult.: from $\gamma(\theta)$ in (n,n′γ).
		611.168 *13*	100.0 *21*	976.916	2$^-$	E2		0.00916	Additional information 23.
		671.2[#] *5*	4.7[#] *11*	915.991	4$^+$				
1607.7	(4$^+$)	484.7[#] *5*	12[#] *3*	1122.774	4$^-$				
		569.0[c] *3*		1039.309	3$^-$				E$_\gamma$: from (d,pγ) only.
		583.5[#] *5*	18[#] *6*	1024.646	5$^+$				
		691[#c]		915.991	4$^+$				
		779[#c] *1*	38[#] *3*	828.215	3$^+$				
		845[#] *1*	100[#] *24*	761.815	2$^+$				
1654.7	9$^+$	352.4	85 *20*	1301.91	7$^+$				E$_\gamma$,I$_\gamma$: from Coulomb excitation.
		811.5	100 *5*	843.66	8$^+$	(M1+E2)		0.0068 *21*	E$_\gamma$,I$_\gamma$,Mult.: from Coulomb excitation.
1654.71	0$^+$	892.88 *8*	20.8 *15*	761.815	2$^+$				
		1581.31 *3*	100 *4*	73.393	2$^+$				
1674.945	1$^-$	1601.530 *25*	100 *4*	73.393	2$^+$	(E1)			Mult.: from $\gamma(\theta)$ in (n,n′γ). δ(E2/M1)=0.00 *8*.
		1674.959 *31*	69.2 *28*	0.0	0$^+$	E1			Mult.: from $\gamma(\theta)$ in (n,n′γ) and γ(lin pol) in (γ,γ′).
1686.566	5$^-$	461.28 *13*	16.9 *16*	1225.162	5$^-$				E$_\gamma$: weighted average of 461.26 *13* in (n,n′γ), 461.5 *5* in ^{164}Tb β^- decay.
		563.81 *3*	65.1 *21*	1122.774	4$^-$	(E2+M1)	+22 *+126−9*		Additional information 24. Mult.,δ: from $\gamma(\theta)$ in (n,n′γ).
		647.248 *25*	100.0 *21*	1039.309	3$^-$	E2		0.00798	Additional information 25.
		770.2[#] *10*	17[#] *4*	915.991	4$^+$				
1716.223	2$^+$	954.57 *24*	3.4 *6*	761.815	2$^+$				
		1473.88[b] *13*	<13	242.234	4$^+$				
		1642.815 *25*	100 *4*	73.393	2$^+$	M1+E2	+0.75 *50*		B(M1)(W.u.)=0.0022 *+26−16*; B(E2)(W.u.)=0.22 *+34−20* Mult.,δ: from $\gamma(\theta)$ in (n,n′γ) and RUL.

$\gamma(^{164}Dy)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡]	δ[&]	α[a]	Comments
1716.223	2+	1716.25 *11*	12.9 *7*	0.0	0+	E2			B(E2)(W.u.)=0.062 +*31*−*34* Mult.: Q from $\gamma(\theta)$ in (n,n′γ), M2 ruled out by RUL.
1725.2		701.0[#] *5*	100[#] *23*	1024.646	5+				
		810[b#] *1*	<320[#]	915.991	4+				
		965[#c]		761.815	2+				
		1485.2[b#c] *15*	<90[#]	242.234	4+				
		1650.9 *11*	90 *23*	73.393	2+				E_γ: weighted average of 1652.5 *15* from ^{164}Tb β^- decay and 1650.0 *11* from (n,n′γ). I_γ: from ^{164}Tb β^- decay.
1738.1	(1+,2+)	911.7 *8*	100 *17*	828.215	3+				
		1664.2 *20*	45 *27*	73.393	2+				
		1736.4[b] *8*	<220	0.0	0+				
1745.9	12+	484.5 *5*	100	1261.28	10+	E2		0.01646	B(E2)(W.u.)=331 *17* δ: from $\gamma(\theta)$ in Coulomb excitation; M2 ruled out by RUL.
1758.165	3−	1515.94 *3*	77 *3*	242.234	4+	(E1+M2)	+0.06 *3*		Mult.,δ: from $\gamma(\theta)$ in (n,n′γ).
		1684.75 *3*	100 *4*	73.393	2+	(E1+M2)	−0.10 *3*		Mult.,δ: from $\gamma(\theta)$ in (n,n′γ).
1770.2	(4,5,3+)	647.3[#] *5*	100[#] *21*	1122.774	4−				
		744.4[#] *5*	10[#] *3*	1024.646	5+				
		856[#c] *1*	14[#] *3*	915.991	4+				
1779.6	0+	1017.8 *4*	<6.7	761.815	2+				
		1705.75[c] *4*	100 *5*	73.393	2+				
1796.68	(2)+	880.79 *12*	6.8 *9*	915.991	4+				
		1554.50 *7*	23.5 *12*	242.234	4+				
		1723.26 *3*	100 *4*	73.393	2+	(M1+E2)			Mult.,δ: δ(E2/M1)=−0.09 *4* or +3.0 *4* from $\gamma(\theta)$ in (n,n′γ).
		1796.64 *15*	11.5 *9*	0.0	0+				
1804.24	6(−)	453.8[b] *3*	<25	1350.429	6−				
		579.14 *7*	87 *6*	1225.162	5−	(M1+E2)			Mult.,δ: δ(E2/M1)<−12 from $\gamma(\theta)$ in (n,n′γ).
		681.43 *6*	100 *6*	1122.774	4−	(E2)			Mult.: from $\gamma(\theta)$ in (n,n′γ).
1809.571	1−	770.6 *6*	1.1 *6*	1039.309	3−				
		1048.0 *5*	2.4 *6*	761.815	2+				
		1736.167 *23*	100	73.393	2+				
		1809.6 *4*	3.6 *7*	0.0	0+				
1840.66	1(−)	1767.20 *4*	88 *4*	73.393	2+				
		1840.70 *4*	100 *5*	0.0	0+	D			
1846.33	2−	1772.93 *3*	100	73.393	2+	(E1(+M2))	+0.01 *9*		Mult.,δ: from $\gamma(\theta)$ in (n,n′γ).
1852.87	4+	1610.56 *8*	100 *4*	242.234	4+	(M1+E2)	+0.40 *17*		Mult.,δ: from $\gamma(\theta)$ in (n,n′γ).
		1779.50 *6*	100 *7*	73.393	2+				
1858.9	10+	389.0	100 *2*	1470.26	8+				E_γ,I_γ: from Coulomb excitation.
		597.4		1261.28	10+				E_γ: from Coulomb excitation.

$^{164}_{66}Dy_{98}$-14

$\gamma(^{164}Dy)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	δ[&]	Comments
1858.9	10^+	1015.3	16.3 4	843.66	8^+			E_γ,I_γ: from Coulomb excitation.
1883.55	(0^+)	1810.15 11	100	73.393	2^+			
1891.69	4^+	1649.45 4	100 4	242.234	4^+			
		1818.4 4	9.7 14	73.393	2^+			
1909.52	3^-	1667.26 3	100 4	242.234	4^+	(E1(+M2))	+0.01 2	Mult.,δ: from $\gamma(\theta)$ in (n,n′γ).
		1836.18[b] 6	<34	73.393	2^+			
1914.21	(5^-)	1412.88 15	43 6	501.330	6^+			
		1671.97 6	100 4	242.234	4^+	(E1(+M2))	−0.01 4	Mult.,δ: from $\gamma(\theta)$ in (n,n′γ).
1921.22	2^+	1005.6 5	2.6 9	915.991	4^+			
		1160.0 5	2.8 9	761.815	2^+			
		1847.82 3	100 5	73.393	2^+	(M1+E2)		δ: −0.38 4 or +17 +29−5 in (n,n′γ).
		1921.09 13	17.7 12	0.0	0^+	(E2)		Mult.: from $\gamma(\theta)$ in (n,n′γ).
1933.21	$(2,3)^+$	1690.94[b] 10		242.234	4^+			
		1859.81[b] 6		73.393	2^+			
1933.63	$4^{(-)}$	345.55 7	100 5	1588.090	4^-	(M1+E2)	+0.87 24	E_γ: other: 344.8 5 from ^{164}Tb β^- decay. I_γ: other: 100 20 from ^{164}Tb β^- decay. Mult.,δ: from $\gamma(\theta)$ in (n,n′γ).
		707.7 10	6 2	1225.162	5^-			E_γ,I_γ: from ^{164}Tb β^- decay.
		810.4 4	12 3	1122.774	4^-			E_γ: other: 810 1 in ^{164}Tb β^- decay. I_γ: from (n,n′γ). Other: <29 from ^{164}Tb β^- decay.
		1017.8 4	<14	915.991	4^+			E_γ: from (n,n′γ). Other: 1015.5 10 from ^{164}Tb β^- decay. I_γ: from (n,n′γ). Other: <18 from ^{164}Tb β^- decay.
		1105.6 5	10 3	828.215	3^+			E_γ: from (n,n′γ). Other: 1104.3 10 from ^{164}Tb β^- decay. I_γ: from (n,n′γ). Other: 22 4 from ^{164}Tb β^- decay.
		1690.94[bc] 10		242.234	4^+			
1940.82	(7^-)	590.4 3	71 18	1350.429	6^-			
		715.69 18	100 14	1225.162	5^-	(E2)		Mult.: from $\gamma(\theta)$ in (n,n′γ).
		787.1 4	38 12	1153.568	6^+			
1949.78	3^-	361.72[b] 10	<30	1588.090	4^-			
		827.04 9	25.2 18	1122.774	4^-			
		910.52 4	100 3	1039.309	3^-			
		972.81 4	71 3	976.916	2^-	(M1+E2)	+0.09 4	Mult.,δ: from $\gamma(\theta)$ in (n,n′γ).
1953.0	(4^+)	559.42[#] 20	60[#] 7	1393.8	(2^+)			
		827.0[#c] 5	56[#] 14	1122.774	4^-			
		1034.6[b#] 10	<43[#]	915.991	4^+			
		1123.4[#] 10	100[#] 29	828.215	3^+			
		1189.7[#] 10	21[#] 7	761.815	2^+			
		1878[#] 3	21[#] 7	73.393	2^+			
1978.411	(4^-)	1736.167[b] 23	100	242.234	4^+			
1978.81	(3^+)	1062.60[b] 15	<11	915.991	4^+			

$^{164}_{66}Dy_{98}$-15

$\gamma(^{164}$Dy) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡]	δ[&]	Comments
1978.81	(3$^+$)	1150.59 *8*	24.6 *16*	828.215	3$^+$			
		1217.00 *3*	100 *4*	761.815	2$^+$	(M1+E2)	+0.35 *4*	Mult.,δ: from $\gamma(\theta)$ in (n,n$'\gamma$).
1979.30	(2$^+$)	939.95 *17*	24.2 *27*	1039.309	3$^-$			
		1002.35 *4*	22	976.916	2$^-$			
		1905.98 *7*	100 *5*	73.393	2$^+$			
		1979.0 *5*	59	0.0	0$^+$			
1985.67	(2,3)$^-$	863.2 *3*	7.4 *12*	1122.774	4$^-$			
		946.34 *10*	24.6 *18*	1039.309	3$^-$			
		1008.58 *13*	14.2 *13*	976.916	2$^-$			
		1157.9 *7*	3.3 *12*	828.215	3$^+$			
		1223.92 *10*	100 *9*	761.815	2$^+$			
1998.62	(4$^+$)	389.9[c] *2*		1607.7	(4$^+$)			E_γ: from (d,pγ) only.
		410.53 *5*	100 *4*	1588.090	4$^-$			
		875.8 *4*	7.4 *21*	1122.774	4$^-$			
		1022.1 *4*	6.4 *19*	976.916	2$^-$			
		1083.2 *5*	7.0 *19*	915.991	4$^+$			
		1169.12[c] *24*	19.0 *26*	828.215	3$^+$			E_γ: poor fit. Level-energy difference=1170.4 *3*. This γ was not used in the least-squares fit procedure.
		1925.0 *6*	9.1 *28*	73.393	2$^+$			
2015.2?		1941.8[c] *8*		73.393	2$^+$			
2041.66	(4$^-$)	131.99 *25*	49 *11*	1909.52	3$^-$			
		453.8[b] *3*	<18	1588.090	4$^-$			
		1002.35 *4*	100	1039.309	3$^-$			
2049.13	(2)$^+$	1072.18 *13*	28.8 *24*	976.916	2$^-$			
		1220.73 *16*	20.0 *18*	828.215	3$^+$			
		1287.32 *4*	100 *4*	761.815	2$^+$			
		1975.6 *4*	10.7 *18*	73.393	2$^+$			
		2050[c] *1*		0.0	0$^+$			
2053.34	(3)$^+$	465.37 *15*	38	1588.090	4$^-$			
		1225.11 *18*	100 *22*	828.215	3$^+$			
		1291.40 *15*	38 *3*	761.815	2$^+$			
		1811.5 *5*	11.8 *25*	242.234	4$^+$			
		1979.91	50 *24*	73.393	2$^+$			
2053.61	1$^{(-)}$	1979.6 *5*	100	73.393	2$^+$			
		2053.61 *8*	72 *4*	0.0	0$^+$	D		
2076.4	11$^+$	421.7		1654.7	9$^+$			E_γ: from Coulomb excitation.
		815.1		1261.28	10$^+$			E_γ: from Coulomb excitation.
2078.04	(2,3)$^+$	319.8[b] *5*	<14	1758.165	3$^-$			
		361.72[b] *10*	<47	1716.223	2$^+$			
		1038.68 *13*	33.1 *29*	1039.309	3$^-$			
		1101.14 *4*	100 *5*	976.916	2$^-$			
		1316.0 *3*	15.2 *27*	761.815	2$^+$			

$^{164}_{66}$Dy$_{98}$-16

γ(^{164}Dy) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$[†]	I$_\gamma$[†]	E$_f$	J$^\pi_f$	Mult.[‡]	Comments
2078.04	$(2,3)^+$	2004.4[b] 10	<12	73.393	2^+		
2078.48	$(4)^+$	1054.1 5	11 5	1024.646	5^+		
		1162.48 11	86 8	915.991	4^+		
		1250.52 13	100 8	828.215	3^+		
		1836.18[b] 6	<164	242.234	4^+		
		2004.4[b] 10	<23	73.393	2^+		
2099.96	3^+	1075.0 4	16 3	1024.646	5^+		
		1184.00 6	100 5	915.991	4^+	(M1+E2)	δ: +0.33 *+13−10* or +4.9 *+38−19* in (n,n′γ).
		1271.43[b] 21	<47	828.215	3^+		
		1338.4 3	21 4	761.815	2^+		
		1857.2 3	73 5	242.234	4^+		
2102.01	4^+	1062.60[b] 15	<92	1039.309	3^-		
		1600.16 23	100 13	501.330	6^+		
		1859.81[b] 6	<1030	242.234	4^+		
		2028.8[b] 4	<64	73.393	2^+		
2113.18	(2^+)	458.4 3	22 6	1654.71	0^+		
		1196.84[c] 25	34 5	915.991	4^+		
		1285.00 10	100 6	828.215	3^+		
		1351.28 14	57 6	761.815	2^+		
		2039.83 23	40 5	73.393	2^+		
		2113.2 5	19 4	0.0	0^+		
2123.88	(3^+)	366.0 3	14.7 28	1758.165	3^-		
		1881.7 6	5.0 17	242.234	4^+		
		2050.47 5	100 5	73.393	2^+		
2152.43	3^+	311.9 4	11 4	1840.66	$1^{(-)}$		
		1236.50 14	36 3	915.991	4^+		
		1390.50 15	<44	761.815	2^+		
		1910.17 7	100 6	242.234	4^+		
		2079.04 15	<55	73.393	2^+		
2157.75	(4^+)	159.45[#] 20	44[#] 11	1998.62	(4^+)		
		386.3[#] 5	89[#] 22	1770.2	$(4,5,3^+)$		
		934.0[#] 5	49[#] 11	1225.162	5^-		
		1034.6[b#] 10	<67[#]	1122.774	4^-		
		1180.6[#] 5	89[#] 45	976.916	2^-		
		1330[b#] 2	<56[#]	828.215	3^+		
		1395.0[b#] 15	<44[#]	761.815	2^+		
		1656.7[#] 15	100[#] 33	501.330	6^+		
		1916[#] 2	22[#] 11	242.234	4^+		
		2084.0[b#] 15	<44[#]	73.393	2^+		

$^{164}_{66}$Dy$_{98}$-17

Adopted Levels, Gammas (continued)

$\gamma(^{164}Dy)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡]	α[a]	$I_{(\gamma+ce)}$	Comments
2173.26	$(4)^+$	174.4[#] *3*	12[#] *6*	1998.62	(4^+)	[M1+E2]	0.44 *6*		
		319.8[b] *6*	<13	1852.87	4^+	[M1+E2]	0.074 *2*	1	
		1050[#] *1*	12[#] *6*	1122.774	4^-	[E1]			B(E1)(W.u.)=3.9×10^{-5} *+24−34*
		1135[#] *1*	17[#] *6*	1039.309	3^-	[E1]			B(E1)(W.u.)=4.4×10^{-5} *+22−34*
		1148.5[#] *5*	100[#] *17*	1024.646	5^+				
		1196.2[#] *5*	17[#] *6*	976.916	2^-				If J^π(2173)=4^+, this transition to 977, 2^- level would be questionable from RUL, as deduced B(M2)(W.u.)=120 +60-100 is too large to be realistic.
		1257.6[#] *5*	12[#] *6*	915.991	4^+				I_γ: from ^{164}Tb β^- decay. Other: I(1258γ)/I(1411γ)=10.0 *25*/100 *8* in (n,n′γ).
		1345.24 *11*		828.215	3^+				E_γ: weighted average of 1345.29 *18* from (n,γ) E=th and 1345.22 *11* from (n,n′γ). Not observed in ^{164}Tb β^- decay. I_γ: I(1345γ)/I(1411γ)=54 *5*/100 *8* in (n,n′γ).
		1411.41 *9*	12 *6*	761.815	2^+	[E2]			B(E2)(W.u.)=0.38 *+23−33* E_γ: weighted average of 1411.0 *15* from ^{164}Tb β^- decay, 1411.30 *11* from (n,γ) E=th, and 1411.48 *9* from (n,n′γ). I_γ: from ^{164}Tb β^- decay. Intensity is discrepant in (n,γ) E=th and (n,n′γ).
		1930.88 *11*	17 *6*	242.234	4^+				E_γ: from (n,γ) E=th. Other: 1932 *3* from ^{164}Tb β^- decay. I_γ: from ^{164}Tb β^- decay.
		2100[b#]	<17[#]	73.393	2^+	[E2]			B(E2)(W.u.)<0.08
2194.82	(4^+)	37.7[#] *3*	9[#] *4*	2157.75	(4^+)				
		425[#] *1*	39[#] *9*	1770.2	$(4,5,3^+)$				
		508[#c] *1*	58[#]	1686.566	5^-				
		607[#c] *1*	37[#]	1588.090	4^-				
		802.0[#c] *5*	27[#] *9*	1393.8	(2^+)				
		969[#c] *1*	18[#]	1225.162	5^-				
		1155.2 *4*	46 *9*	1039.309	3^-				E_γ: weighted average of 1154.8 *10* from ^{164}Tb β^- decay and 1155.3 *4* from (n,n′γ). I_γ: from ^{164}Tb β^- decay. Other: 21 *4* in (n,n′γ) is discrepant.
		1169.4[#] *10*	49[#] *16*	1024.646	5^+				
		1217.2[#] *5*	40[#] *5*	976.916	2^-				
		1278.54 *18*	100 *18*	915.991	4^+				E_γ: weighted average of 1278.2 *5* from ^{164}Tb β^- decay and 1278.58 *18* from (n,n′γ). I_γ: from ^{164}Tb β^- decay. Other: 52 *5* is discrepant in (n,n′γ).
		1366.20 *23*	83 *22*	828.215	3^+				E_γ: weighted average of 1366.0 *5* from ^{164}Tb β^- decay and 1366.24 *23* from (n,n′γ). I_γ: from ^{164}Tb β^- decay. Other: 28 *5* is discrepant in (n,n′γ).
		1433.18 *10*	20	761.815	2^+				I_γ: from ^{164}Tb β^- decay. Other: 100 *7* is discrepant in (n,n′γ).

Adopted Levels, Gammas (continued)

$\gamma(^{164}Dy)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Comments
2194.82	(4+)	1952.44 *20*	20 *5*	242.234	4+	I_γ: from ^{164}Tb β^- decay. Other: 58 *5* is discrepant in (n,n′γ).
		2121.4[#] *10*	15[#]	73.393	2+	
2205.78	(4+)	519.6[b#] *5*	<4.4[#]	1686.566	5−	
		617.76 *12*	100 *7*	1588.090	4−	E_γ: weighted average of 617.82 *20* from ^{164}Tb β^- decay and 617.74 *12* from (n,n′γ). I_γ: from ^{164}Tb β^- decay.
		810[b#c] *1*	<10[#]	1393.8	(2+)	
		1166.2[#] *10*	17[#] *4*	1039.309	3−	
		1180.6[#] *5*	7[#] *4*	1024.646	5+	
		1289.8 *3*	37 *5*	915.991	4+	E_γ: weighted average of 1289.8 *5* from ^{164}Tb β^- decay and 1289.8 *3* from (n,n′γ). I_γ: weighted average of 35 *5* from ^{164}Tb β^- decay and 42 *7* from (n,n′γ).
		1377.42 *17*	43 *7*	828.215	3+	E_γ: weighted average of 1377.5 *5* from ^{164}Tb β^- decay and 1377.41 *17* from (n,n′γ). I_γ: weighted average of 44 *7* from ^{164}Tb β^- decay and 41 *7* from (n,n′γ).
		1443.90 *21*	63 *9*	761.815	2+	E_γ: weighted average of 1443.9 *5* from ^{164}Tb β^- decay and 1443.90 *21* from (n,n′γ). I_γ: weighted average of 70 *7* from ^{164}Tb β^- decay and 51 *9* from (n,n′γ).
		1963.5[#] *15*	6.1[#] *9*	242.234	4+	
		2132.5 *6*	7 *3*	73.393	2+	E_γ: weighted average of 2132.0 *10* from ^{164}Tb β^- decay and 2132.7 *6* from (n,n′γ). I_γ: from ^{164}Tb β^- decay. Other: 31 *6* in (n,n′γ) is discrepant.
2230.42	(2+)	433.4 *3*	22 *5*	1796.68	(2)+	
		1402.2 *3*	28 *5*	828.215	3+	
		1468.66 *12*	100 *6*	761.815	2+	
		2230.40 *15*	92 *8*	0.0	0+	
2247.7	(4+)	1022.0[#] *10*	<90[#]	1225.162	5−	
		1125.0[#] *10*	67[#] *17*	1122.774	4−	
		1224[#] *1*	33[#] *17*	1024.646	5+	
		1270.6[#] *10*	100[#] *33*	976.916	2−	
		1330[b#] *2*	<83[#]	915.991	4+	
		1485.2[b#] *15*	<67[#]	761.815	2+	
		2174.5[b#] *10*	<84[#]	73.393	2+	
2248.14	(2+)	356.5 *4*	21 *7*	1891.69	4+	
		1208.6 *4*	19 *4*	1039.309	3−	
		1271.43[b] *21*	<67	976.916	2−	
		1486.26 *12*	98 *7*	761.815	2+	
		2174.68 *15*	100 *7*	73.393	2+	
		2248.17 *21*	64 *6*	0.0	0+	
2270.9?		1231.56[c] *8*	100 *6*	1039.309	3−	
		2028.8[b] *4*	<34	242.234	4+	
		2197.4 *5*	23 *5*	73.393	2+	

γ(^{164}Dy) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡]	α[a]	Comments
2290.6	14+	544.7 *5*	100	1745.9	12+	E2	0.01222	B(E2)(W.u.)=326 *30* E_γ: from Coulomb excitation. Mult.: Q from $\gamma(\theta)$ in Coulomb excitation; M2 ruled out by RUL.
2302.16	(2+,3)	1386.8 *5*	16 *4*	915.991	4+			
		1473.88[b] *13*	<204	828.215	3+			
		1540.2 *4*	23 *4*	761.815	2+			
		2228.82 *20*	100 *12*	73.393	2+			
2312.6?		626.0[#] *5*	100[#]	1686.566	5−			
		724.5[#] *10*	<111[#]	1588.090	4−			
		1288[#] *1*	37[#]	1024.646	5+			
		1395.0[b#] *15*	<75[#]	915.991	4+			
		1484.5[#] *5*	81[#]	828.215	3+			
		2070.4[#] *5*	22[#]	242.234	4+			
2314.2	12+	455.6	100	1858.9	10+			E_γ: from Coulomb excitation.
		568.0		1745.9	12+			E_γ: from Coulomb excitation.
		1053.0		1261.28	10+			E_γ: from Coulomb excitation.
2330.01	1−	2256.68 *12*	100 *8*	73.393	2+	[E1]		B(E1)(W.u.)=0.0017 *4*
		2329.83 *17*	64 *5*	0.0	0+	E1		B(E1)(W.u.)=0.00099 *23* Mult.: from $\gamma(\theta$,pol) in (γ,γ').
2396.37		2322.98 *20*	100	73.393	2+			
2411.9	1(−)	2338.5[@]	249[@] *47*	73.393	2+			
		2412[@]	100[@]	0.0	0+			
2429.11	(1,2+)	2355.72 *14*	100 *4*	73.393	2+			
		2428.4 *7*	9.8 *24*	0.0	0+			
2437.2	(1,2+)	2363.6 *3*	100 *8*	73.393	2+			
		2437.6 *5*	47 *6*	0.0	0+			
2442.76		1680.8 *5*	20 *5*	761.815	2+			
		2369.41 *15*	100 *6*	73.393	2+			
2473.25	(1,2+)	2399.88 *12*	100 *7*	73.393	2+			
		2473.0 *3*	57 *6*	0.0	0+			
2531.37	1+	2457.6 *3*	32 *5*	73.393	2+			If M1, B(M1)(W.u.)=0.030 *9*.
		2531.49 *18*	100 *7*	0.0	0+	M1		B(M1)(W.u.)=0.087 *23* Mult.: from $\gamma(\theta$,pol) in (γ,γ').
2539.02	1+	2465.7 *2*	22 *3*	73.393	2+			If M1, B(M1)(W.u.)=0.021 *6*.
		2538.94 *17*	100 *9*	0.0	0+	M1		B(M1)(W.u.)=0.088 *23* Mult.: from $\gamma(\theta$,pol) in (γ,γ').
2577.87	1+	2504.5 *2*	36 *6*	73.393	2+			If M1, B(M1)(W.u.)=0.041 *18*.
		2577.8 *2*	100 *9*	0.0	0+	M1		B(M1)(W.u.)=0.10 *+6−3* Mult.: from $\gamma(\theta$,pol) in (γ,γ').
2583.22	(1,2+)	1755.19[c] *11*	74 *6*	828.215	3+			
		2509.77 *16*	100 *8*	73.393	2+			

$^{164}_{66}Dy_{98}$-20

γ(^{164}Dy) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡	Comments
2583.22	(1,2$^+$)	2584.3 *9*	16 *4*	0.0	0$^+$		
2653.7	1$^+$	1892.1 *4*	100 *16*	761.815	2$^+$		
		2580.1 *4*	59 *12*	73.393	2$^+$		
		2653.9 *10*	47 *8*	0.0	0$^+$		
2662.1	(1,2$^+$)	2662.11[bc] *25*	100	0.0	0$^+$		
2670.49	1$^-$	2597.0 *3*	100 *8*	73.393	2$^+$	[E1]	B(E1)(W.u.)=0.00095 *25*
		2670.6 *4*	63 *7*	0.0	0$^+$	E1	B(E1)(W.u.)=0.00055 *15* Mult.: from $\gamma(\theta$,pol) in (γ,γ').
2694.0	1$^+$	2620.5 *4*	47 *5*	73.393	2$^+$		If M1, B(M1)(W.u.)=0.051 *16*. I_γ: from (γ,γ').
		2694.1 *4*	100	0.0	0$^+$	M1	B(M1)(W.u.)=0.10 *3* I_γ: from (γ,γ'). Mult.: from $\gamma(\theta$,pol) in (γ,γ').
2738		2662.11[bc] *25*	100	73.393	2$^+$		
2752.7	(4$^+$)	2511.0[b#] *15*	<100[#]	242.234	4$^+$		
		2679.2[#] *5*	<3[#]	73.393	2$^+$		
2827.6		2828[@]	100[@]	0.0	0$^+$		
2832.2?	(14$^+$)	518[c]		2314.2	12$^+$		E_γ: from Coulomb excitation.
		542[c]		2290.6	14$^+$		E_γ: from Coulomb excitation.
		1086[c]		1745.9	12$^+$		E_γ: from Coulomb excitation.
2862.0	1$^{(+)}$	2788.5[@]	31[@] *5*	73.393	2$^+$		
		2862[@]	100[@]	0.0	0$^+$	(M1)	Mult.: from $\gamma(\theta$,pol) in (γ,γ').
2887.1	(16$^+$)	596.4	100	2290.6	14$^+$		E_γ: from (^{162}Dy,^{164}Dy).
2986.0	1$^{(-)}$	2912.5[@]	226[@] *40*	73.393	2$^+$		
		2986[@]	100[@]	0.0	0$^+$		
2990.1	1$^{(+)}$	2916.5[@]	70[@] *8*	73.393	2$^+$		
		2990[@]	100[@]	0.0	0$^+$		
3001.5	(4$^+$,5$^+$)	2084.0[b#] *15*	<110[#]	915.991	4$^+$		
		2174.5[b#] *15*	<138[#]	828.215	3$^+$		
		2500[#] *1*	33[#]	501.330	6$^+$		
		2759.2[#] *5*	100[#]	242.234	4$^+$		
3005.5	(4$^+$,5,6$^+$)	2504[#] *1*	67[#]	501.330	6$^+$		
		2763.3[#] *5*	100[#]	242.234	4$^+$		
3014.5	(4$^+$,5)	807.0[#] *15*	100[#] *30*	2205.78	(4$^+$)		
		856[#c] *1*	20[#] *5*	2157.75	(4$^+$)		
		1015.5[#] *10*	<45[#]	1998.62	(4$^+$)		
		1289.8[#] *5*	80[#] *30*	1725.2			
		1426.2[#] *5*	25[#] *5*	1588.090	4$^-$		

$^{164}_{66}$Dy$_{98}$-21

Adopted Levels, Gammas (continued)

$\gamma(^{164}Dy)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡]	Comments
3014.5	(4+,5)	1889[#] *3*	10[#] *5*	1122.774	4−		
		1990[#] *2*	<10[#]	1024.646	5+		
		2100[b#]	<15[#]	915.991	4+		
		2511.0[b#] *15*	<80[#]	501.330	6+		
3027.0		3027		0.0	0+		E_γ: from (γ,γ').
3070.0		3070		0.0	0+		E_γ: from (γ,γ').
3111.2	1+	3037.8 *4*	47 *5*	73.393	2+		If M1, B(M1)(W.u.)=0.036 *16*. I_γ: from (γ,γ').
		3111.0 *4*	100	0.0	0+	M1	B(M1)(W.u.)=0.07 *+5−2* I_γ: from (γ,γ'). Mult.: from $\gamma(\theta$,pol) in (γ,γ').
3159.1	1+	3085.3 *4*	50 *5*	73.393	2+		If M1, B(M1)(W.u.)=0.040 *+23−12*. I_γ: from (γ,γ').
		3159.4 *4*	100	0.0	0+	M1	B(M1)(W.u.)=0.08 *+7−3* I_γ: from (γ,γ'). Mult.: from $\gamma(\theta$,pol) in (γ,γ').
3173.6	1+	3100.1 *4*	39 *4*	73.393	2+		If M1, B(M1)(W.u.)=0.015 *5*. I_γ: from (γ,γ').
		3173.6 *4*	100	0.0	0+	M1	B(M1)(W.u.)=0.036 *11* I_γ: from (γ,γ'). Mult.: from $\gamma(\theta$,pol) in (γ,γ').
3185.0		3185		0.0	0+		E_γ: from (γ,γ').
3228.0	1(−)	3154.5[@]	186[@] *22*	73.393	2+		
		3228[@]	100[@]	0.0	0+	(E1)	Mult.: from $\gamma(\theta$,pol) in (γ,γ').
3231.0		3231[@]	100[@]	0.0	0+		
3270.0	1(−)	3196.5[@]	142[@] *19*	73.393	2+		
		3270[@]	100[@]	0.0	0+		
3279.0	1(+)	3205.5[@]	45[@] *12*	73.393	2+		
		3279[@]	100[@]	0.0	0+		
3293.0		3293		0.0	0+		E_γ: from (γ,γ').
3316.0	1(+)	3242.5[@]	82[@] *12*	73.393	2+		
		3316[@]	100[@]	0.0	0+	(M1)	
3365.0	1(+)	3291.5[@]	52[@] *46*	73.393	2+		
		3365[@]	100[@]	0.0	0+		
3406.4	(16+)	576.1[c]		2832.2?	(14+)		E_γ: from Coulomb excitation.
3414.0	1(+)	3340.5[@]	55[@] *8*	73.393	2+		
		3414[@]	100[@]	0.0	0+		
3529.7	(18+)	642.7	100	2887.1	(16+)		E_γ,I_γ: from Coulomb excitation.
3603.0		3603		0.0	0+		E_γ: from (γ,γ').

$^{164}_{66}Dy_{98}$-22

Adopted Levels, Gammas (continued)

$\gamma(^{164}Dy)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡	Comments
3621.0	1	3547.5@	188@ 36	73.393	2^+		
		3621@	100@	0.0	0^+		
3667.0	1	3593.5@	44@ 10	73.393	2^+		
		3667@	100@	0.0	0^+		
3695.0		3621.5@	44@ 7	73.393	2^+		
		3695@	100@	0.0	0^+		
3704.0	$1^{(-)}$	3630.5@	98@ 20	73.393	2^+		
		3704@	100@	0.0	0^+		
3718.0	1^+	3644.5@	27@ 6	73.393	2^+		
		3718@	100@	0.0	0^+	M1	Mult.: from $\gamma(\theta$,pol) in (γ,γ').
3754.0	$1^{(-)}$	3680.5@	137@ 22	73.393	2^+		
		3754@	100@	0.0	0^+		
3765.0	$1^{(+)}$	3691.5@	29@ 8	73.393	2^+		
		3765@	100@	0.0	0^+		
3785.0	$1^{(-)}$	3711.5@	168@ 20	73.393	2^+		
		3785@	100@	0.0	0^+	(E1)	Mult.: from $\gamma(\theta$,pol) in (γ,γ').
3836.0		3836@		0.0	0^+		
3853.0		3853@		0.0	0^+		
3868.0	$1^{(-)}$	3794.5@	184@ 26	73.393	2^+		
		3868@	100@	0.0	0^+		
3877.0	1^-	3803.5@	193@ 27	73.393	2^+		
		3877@	100@	0.0	0^+	E1	Mult.: from $\gamma(\theta$,pol) in (γ,γ').
3914.0	$1^{(-)}$	3840.5@	187@ 43	73.393	2^+		
		3914@	100@	0.0	0^+		
3987.0	$1^{(-)}$	3913.5@	173@ 36	73.393	2^+		
		3987@	100@	0.0	0^+		
4037.8	(18^+)	631.4c		3406.4	(16^+)		E_γ: from Coulomb excitation.
4213.3	(20^+)	683.6		3529.7	(18^+)		E_γ: from Coulomb excitation.
4933.0	(22^+)	719.7		4213.3	(20^+)		E_γ: from Coulomb excitation.
(7657.93)	$2^-,3^-$	5121.0		2536.8?			
		5127.2		2531.37	1^+		
		5137.6		2520.2?			
		5199 3	50	2459.3			
		5217.4		2442.76			
		5308.7		2349.2			
		5355.9	17	2302.16	$(2^+,3)$		
		5387.6		2270.9?			

$^{164}_{66}Dy_{98}$-23

γ(^{164}Dy) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Comments
(7657.93)	$2^-,3^-$	5403.2		2254.6?		
		5408.6	22	2248.14	(2^+)	
		5415.8		2242.0?		
		5453.8		2204.0?		
		5504.8		2152.43	3^+	
		5534.2		2123.88	(3^+)	
		5542.8		2113.18	(2^+)	
		5606.0		2053.34	$(3)^+$	
		5679.6	75	1978.81	(3^+)	
		5724.5	90	1933.21	$(2,3)^+$	
		5736.2	62	1921.22	2^+	
		5802.6		1852.87	4^+	
		5815.0	10	1840.66	$1^{(-)}$	
		5854.5[c]		1804.24	$6^{(-)}$	γ to $6^{(-)}$ from $2^-,3^-$ is unlikely, thus considered uncertain here.
		5861.8	100	1796.68	$(2)^+$	
		5867.7		1790.1?		
		5941.8	28	1716.223	2^+	
		6620 *4*	7.9	1039.309	3^-	
		6681.21	13	976.916	2^-	
		6830.09	56	828.215	3^+	
		6895.2	77	761.815	2^+	
		7415.80	39	242.234	4^+	
		7584 *3*	26	73.393	2^+	
(7659.76)	$(2^-,3^-)$	4534 *3*		3126		
		4546 *3*		3111.2	1^+	
		4584[c] *3*		3076	(6^+)	γ to (6^+) from $(2^-,3^-)$ is unlikely, thus considered uncertain here.
		4656 *3*		3001.5	$(4^+,5^+)$	
		4668 *3*		2990.1	$1^{(+)}$	
		4714 *3*		2946		
		4740 *3*		2920	(5^+)	
		4773 *3*		2887		
		4836 *3*		2827.6		
		4859 *3*		2801	(4^+)	
		4868 *3*		2792		
		4874 *3*		2786		
		4907 *3*		2752.7	(4^+)	
		4922 *3*		2738		
		4929 *3*		2731		
		4949 *3*		2711		
		5065 *3*		2595		
		5075 *3*		2583.22	$(1,2^+)$	
		5090 *3*		2570		
		5105[c] *3*		2555	(7^-)	γ to (7^-) from $(2^-,3^-)$ is unlikely, thus considered uncertain here.

$^{164}_{66}$Dy$_{98}$-24

Adopted Levels, Gammas (continued)

$\gamma(^{164}$Dy) (continued)

E_i(level)	E_γ†	I_γ†	E_f	J^π_f	Comments
(7659.76)	5127 *3*		2531.37	1^+	
	5142 *3*		2518		
	5164 *3*		2496		
	5188 *3*		2473.25	$(1,2^+)$	
	5200 *3*	70	2459.3		
	5216 *3*	98	2442.76		
	5222 *3*	90	2437.2	$(1,2^+)$	
	5229 *3*	70	2429.11	$(1,2^+)$	
	5248 *3*	61	2411.9	$1^{(-)}$	
	5267 *3*	60	2396.37		
	5310 *3*	190	2349.2		
	5355 *3*	150	2302.16	$(2^+,3)$	
	5397 *3*	69	2263		
	5410 *3*	81	2247.7	(4^+)	
	5452 *3*	110	2205.78	(4^+)	
	5464 *3*	70	2194.82	(4^+)	
	5507.2 *6*	87 *12*	2152.43	3^+	
	5535.8 *5*	82 *8*	2123.88	(3^+)	
	5546.7 *5*	90 *8*	2113.18	(2^+)	
	5558.0 *5*	81 *8*	2102.01	4^+	
	5581.6 *5*	84 *8*	2078.48	$(4)^+$	
	5606.2 *5*	107 *10*	2053.34	$(3)^+$	
	5610.4 *5*	106 *11*	2049.13	$(2)^+$	
	5674.2 *7*	27 *4*	1985.67	$(2,3)^-$	
	5680.9 *4*	186 *11*	1978.81	(3^+)	
	5710.1 *6*	26 *4*	1949.78	3^-	
	5726.5 *4*	105 *10*	1933.21	$(2,3)^+$	
	5738.4 *4*	84 *7*	1921.22	2^+	
	5749.7 *6*	29 *4*	1909.52	3^-	
	5767.8 *4*	80 *6*	1891.69	4^+	
	5807.1 *4*	90 *7*	1852.87	4^+	
	5813.7 *10*	18 *4*	1846.33	2^-	
	5818.7 *7*	33 *4*	1840.66	$1^{(-)}$	
	5850.4 *9*	12 *3*	1809.571	1^-	
	5863.0 *4*	117 *7*	1796.68	$(2)^+$	
	5882[c] *3*	76	1779.6	0^+	
	5901.6 *6*	21 *3*	1758.165	3^-	
	5920[c] *3*	26	1738.1	$(1^+,2^+)$	
	5943.5 *4*	118 *7*	1716.223	2^+	
	5985.0 *9*	11 *3*	1674.945	1^-	
	6071.3 *5*	23 *3*	1588.090	4^-	
	6536.4 *5*	16 *2*	1122.774	4^-	
	6620.6 *5*	17 *2*	1039.309	3^-	

From ENSDF

$^{164}_{66}$Dy$_{98}$-25

Adopted Levels, Gammas (continued)

$\gamma(^{164}Dy)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f
(7659.76)	(2^-,3^-)	6682.6 *4*	21 *3*	976.916	2^-
		6743.7 *4*	74 *5*	915.991	4^+
		6831.4 *4*	138 *7*	828.215	3^+
		6897.6 *4*	112 *8*	761.815	2^+
		7417.2 *4*	95 *10*	242.234	4^+
		7586.1 *4*	100 *5*	73.393	2^+
(7681.98)	(1^+,2,3,4^+)	5528.6 *7*	106 *14*	2152.43	3^+
		5559.1 *6*	95 *13*	2123.88	(3^+)
		5569.0 *6*	81 *12*	2113.18	(2^+)
		5581.5 *12*	54 *18*	2099.96	3^+
		5603.0 *5*	137 *14*	2078.48	$(4)^+$
		5628.5 *9*	123 *31*	2053.34	$(3)^+$
		5631.9 *8*	134 *31*	2049.13	$(2)^+$
		5696.3 *6*	80 *9*	1985.67	$(2,3)^-$
		5703.2 *4*	214 *15*	1978.81	(3^+)
		5733.0 *8*	50 *9*	1949.78	3^-
		5748.7 *6*	87 *11*	1933.21	$(2,3)^+$
		5761.1 *6*	79 *9*	1921.22	2^+
		5771.9 *6*	72 *10*	1909.52	3^-
(7681.98)	(1^+,2,3,4^+)	5790.5 *7*	52 *7*	1891.69	4^+
		5829.5 *8*	51 *8*	1852.87	4^+
		5835.8 *9*	61 *9*	1846.33	2^-
		5841.0 *11*	35 *9*	1840.66	$1^{(-)}$
		5871.7 *9*	27 *7*	1809.571	1^-
		5884.7 *5*	91 *20*	1796.68	$(2)^+$
		5923.7 *9*	77 *19*	1758.165	3^-
		5965.6 *5*	80 *7*	1716.223	2^+
		6007.5 *7*	34 *6*	1674.945	1^-
		6093.7 *6*	42 *6*	1588.090	4^-
		6455.8 *7*	24 *4*	1225.162	5^-
		6559.1 *5*	43 *4*	1122.774	4^-
		6642.9 *5*	71 *6*	1039.309	3^-
		6704.9 *5*	59 *5*	976.916	2^-
		6766.2 *5*	66 *6*	915.991	4^+
		6853.6 *4*	97 *7*	828.215	3^+
		6920.0 *4*	140 *7*	761.815	2^+
		7439.3 *4*	77 *6*	242.234	4^+
		7608.3 *4*	100 *6*	73.393	2^+

[†] From (n,n′γ), unless otherwise noted.

[‡] From ce data in (d,pγ), unless otherwise noted. The assignments are also supported by $\gamma\gamma(\theta)$ in (n,γ) E=th and $\gamma(\theta)$ in (n,n′γ) when available. Multipolarity of E1 or M1 for γ rays from levels populated in (γ,γ') are implied from $\gamma(\theta$,pol) data.

[#] From ^{164}Tb β^- decay.

[@] From (γ,γ').

[&] From $\gamma\gamma(\theta)$ in (n,γ) E=th, unless otherwise noted.

[a] Additional information 26.

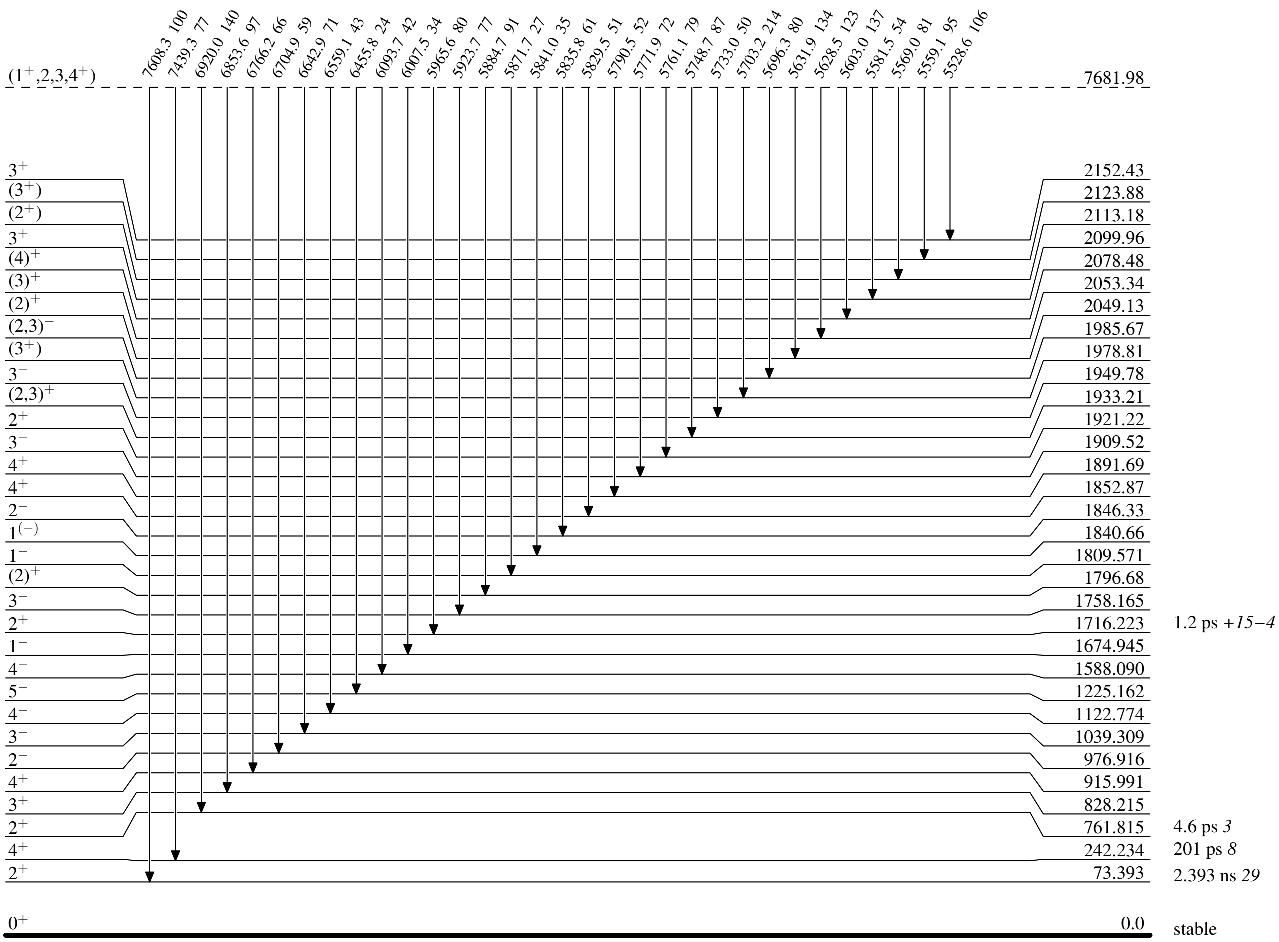
[b] Multiply placed.

[c] Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

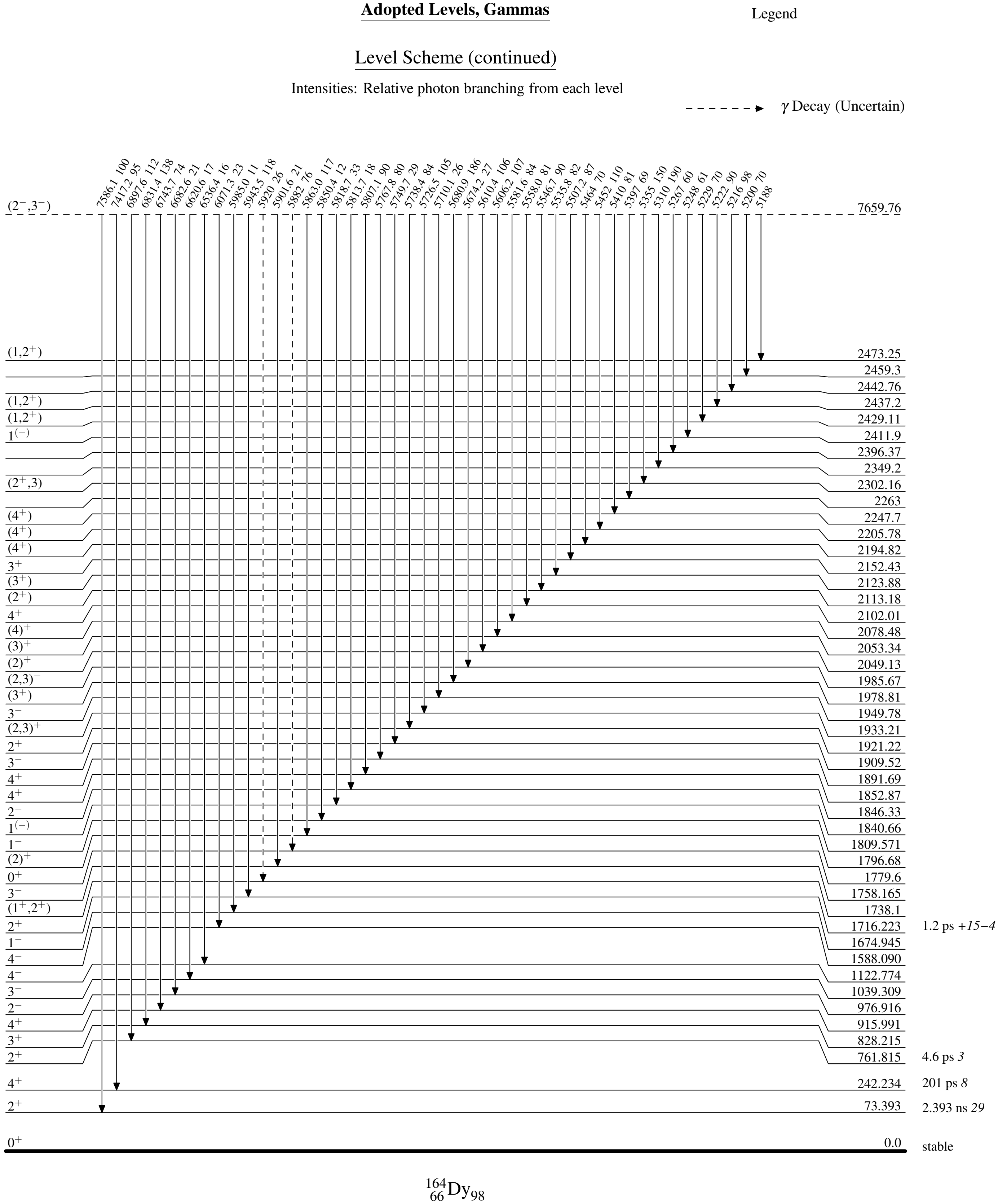


$^{164}_{66}Dy_{98}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



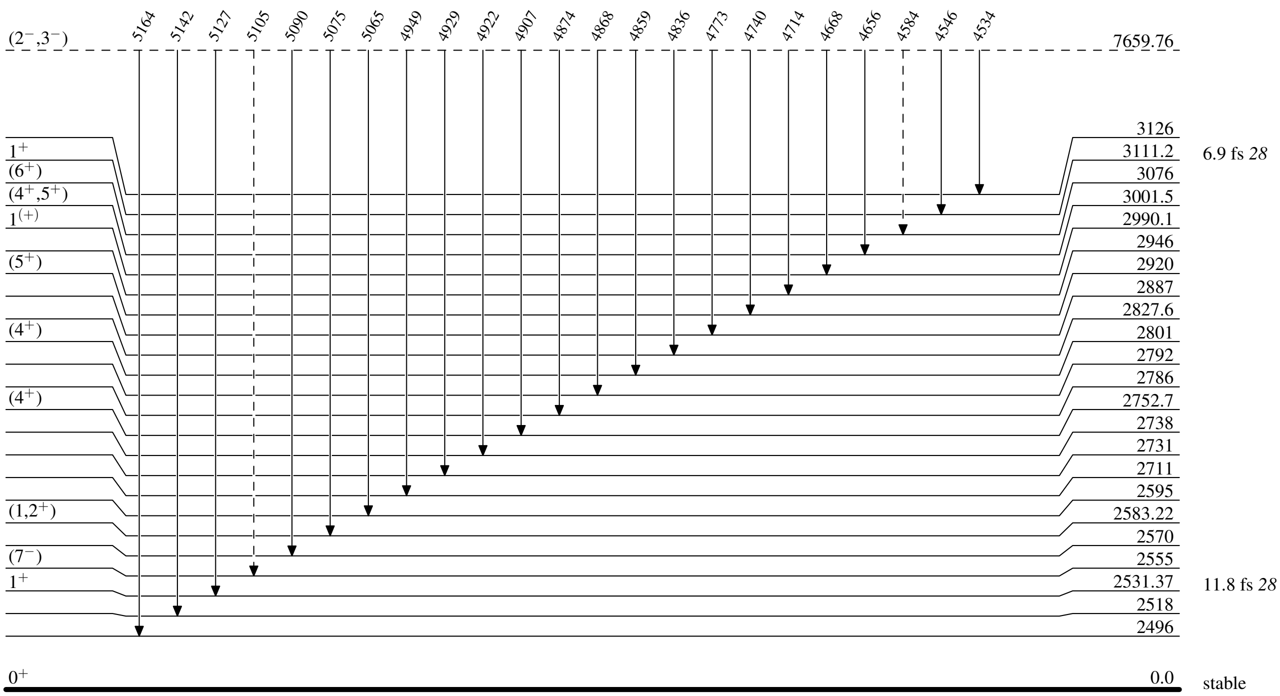
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{164}_{66}Dy_{98}$

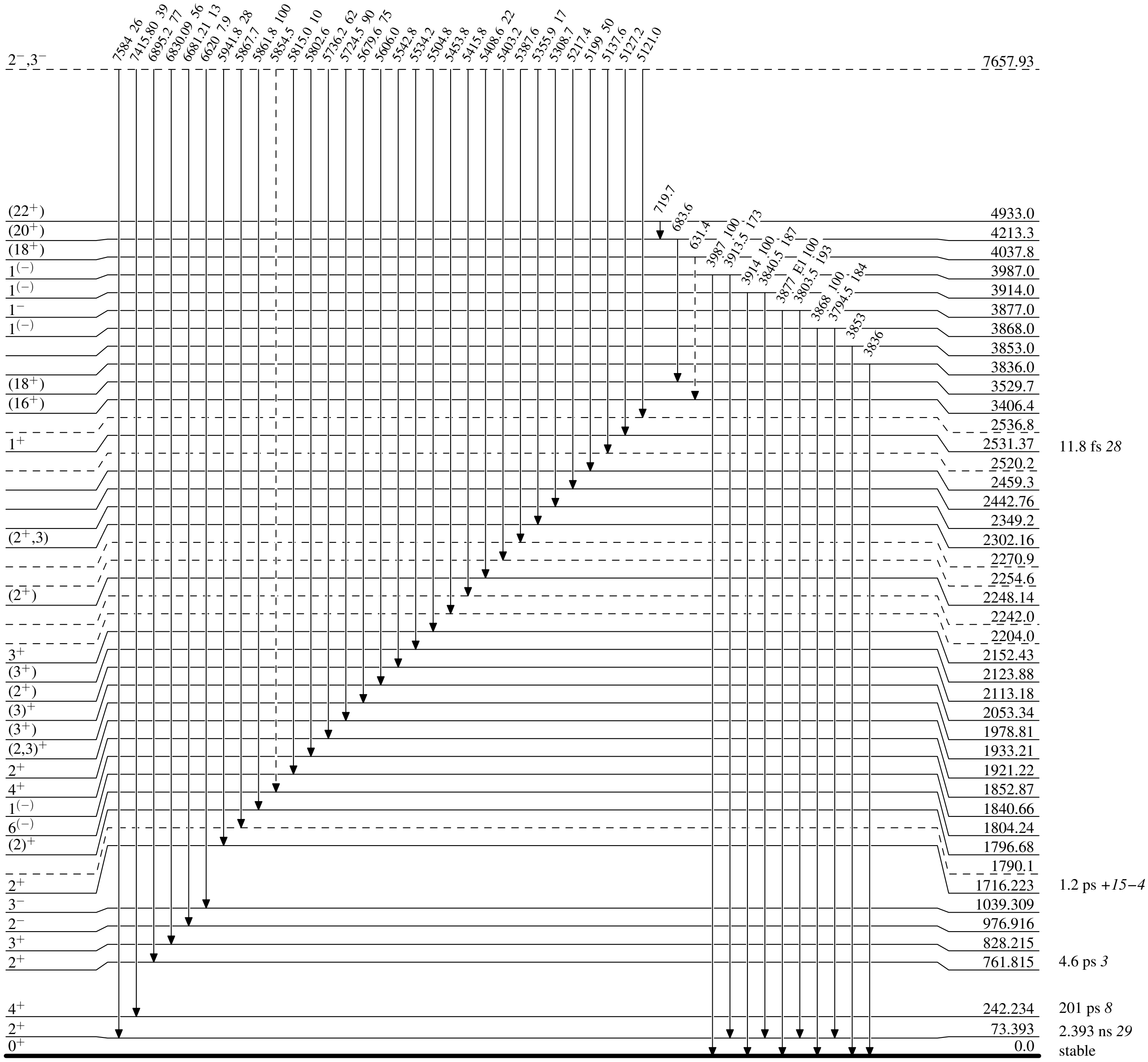
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

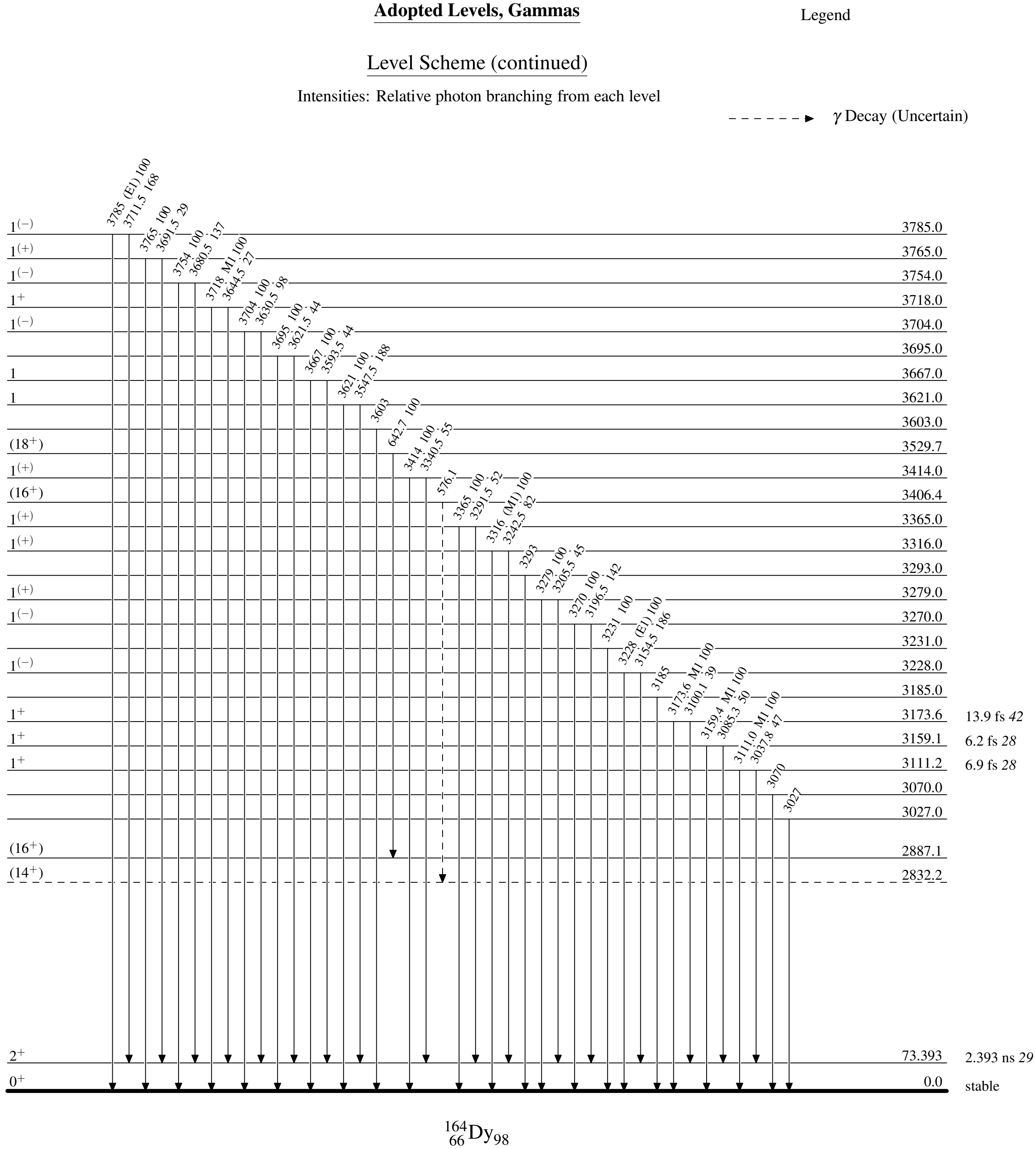


$^{164}_{66}Dy_{98}$

Adopted Levels, Gammas

Level Scheme (continued)

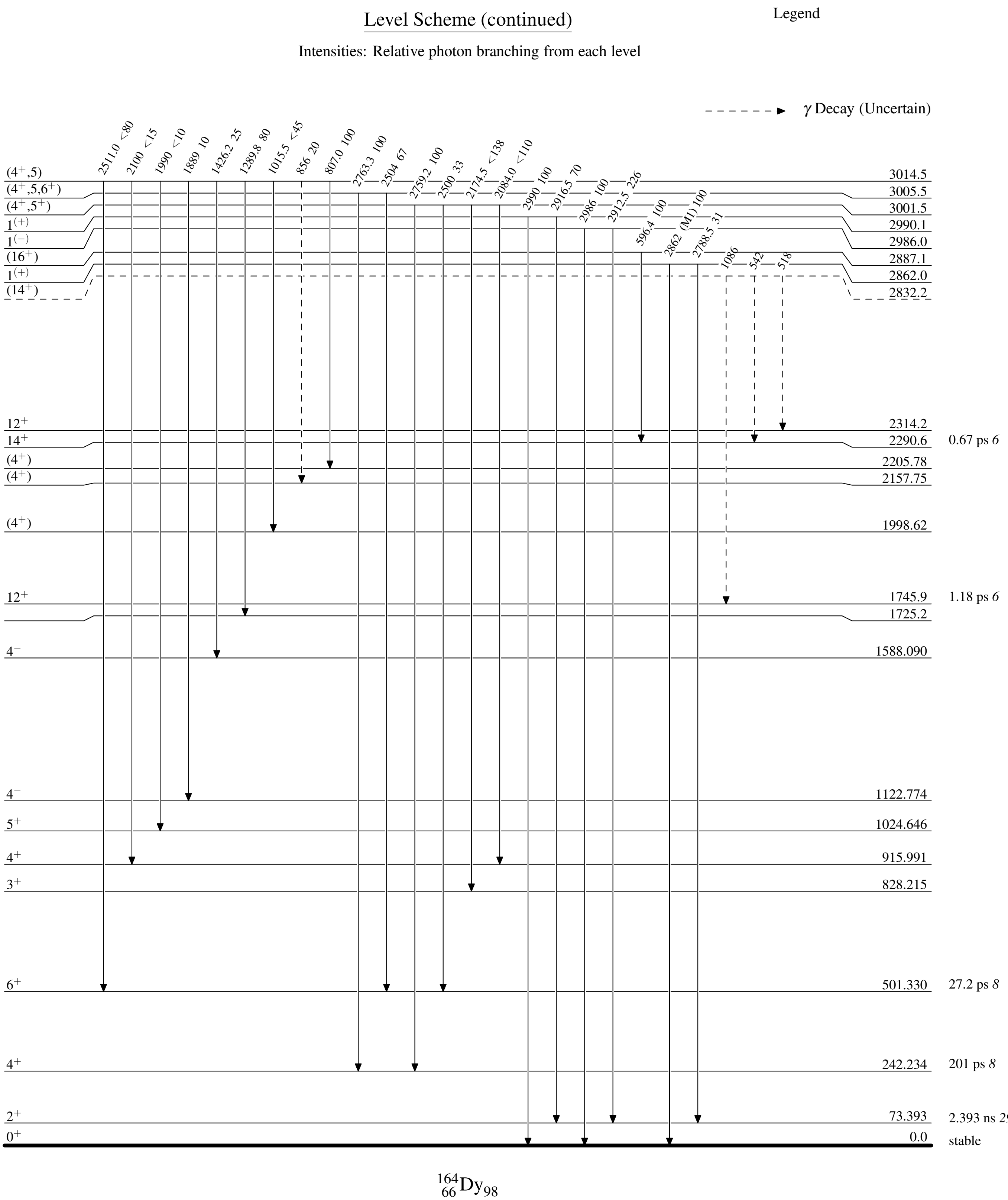
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



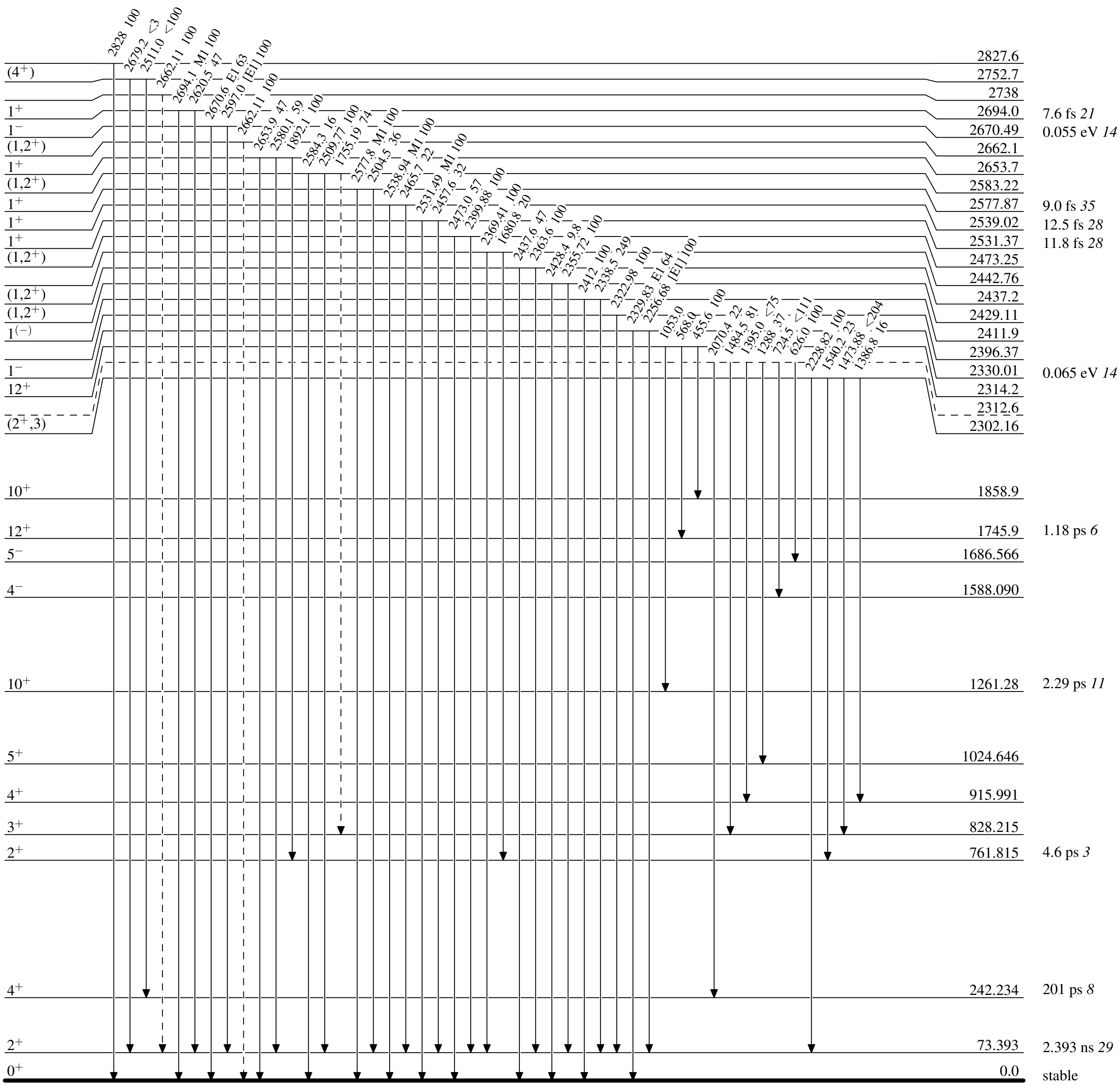
Adopted Levels, Gammas

Legend

Level Scheme (continued)

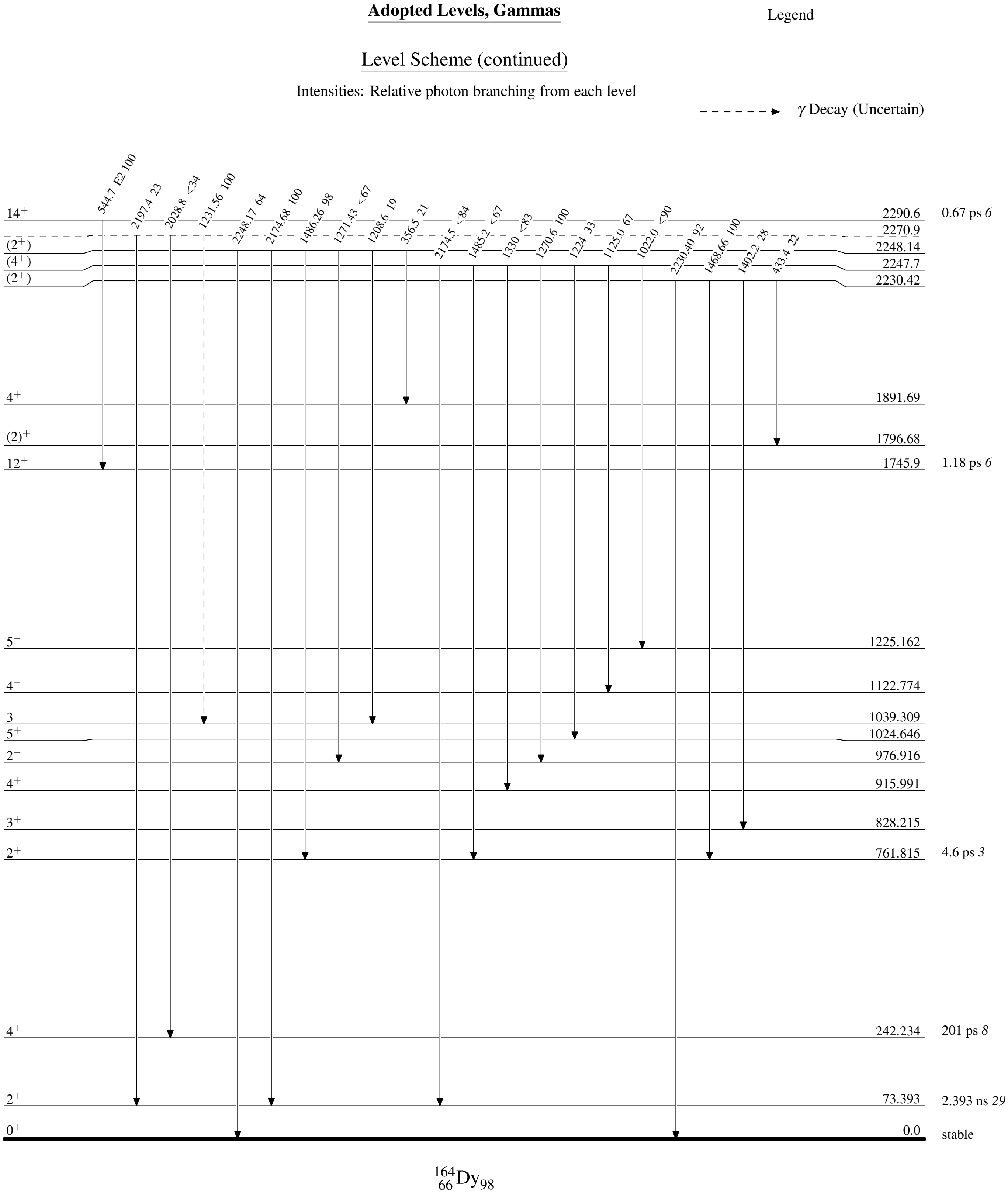
Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{164}_{66}Dy_{98}$

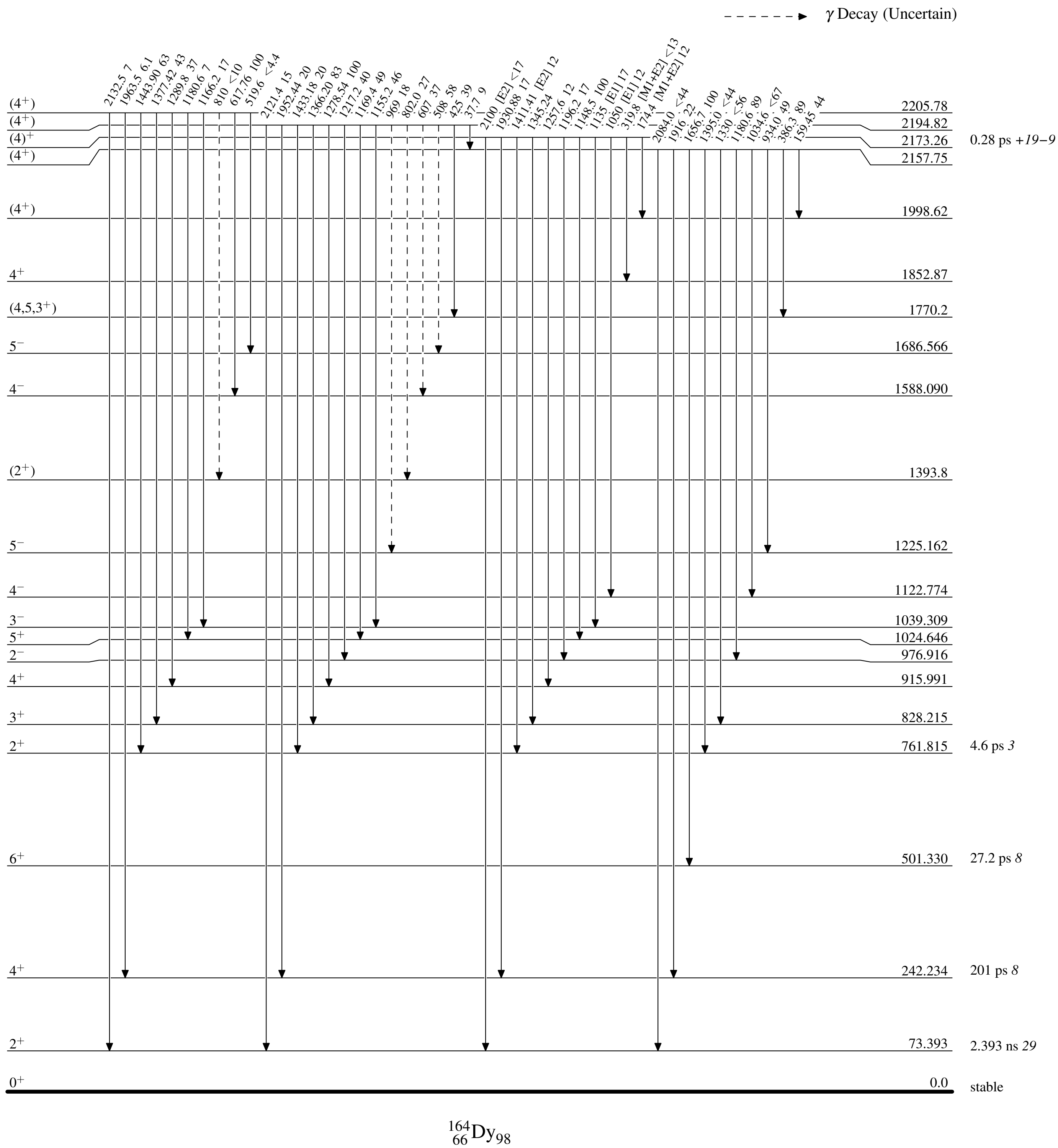
Adopted Levels, Gammas



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

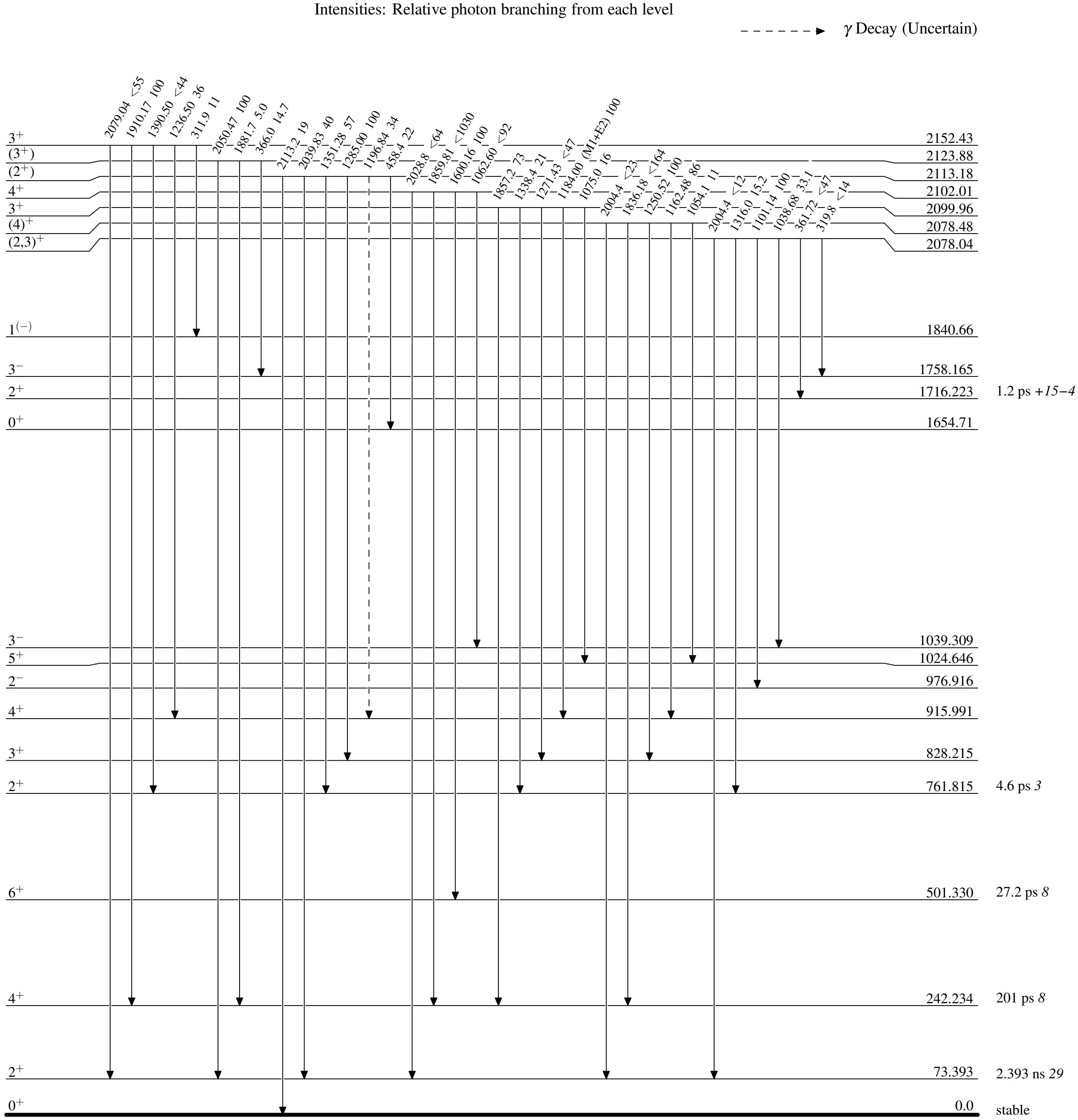


Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{164}_{66}Dy_{98}$

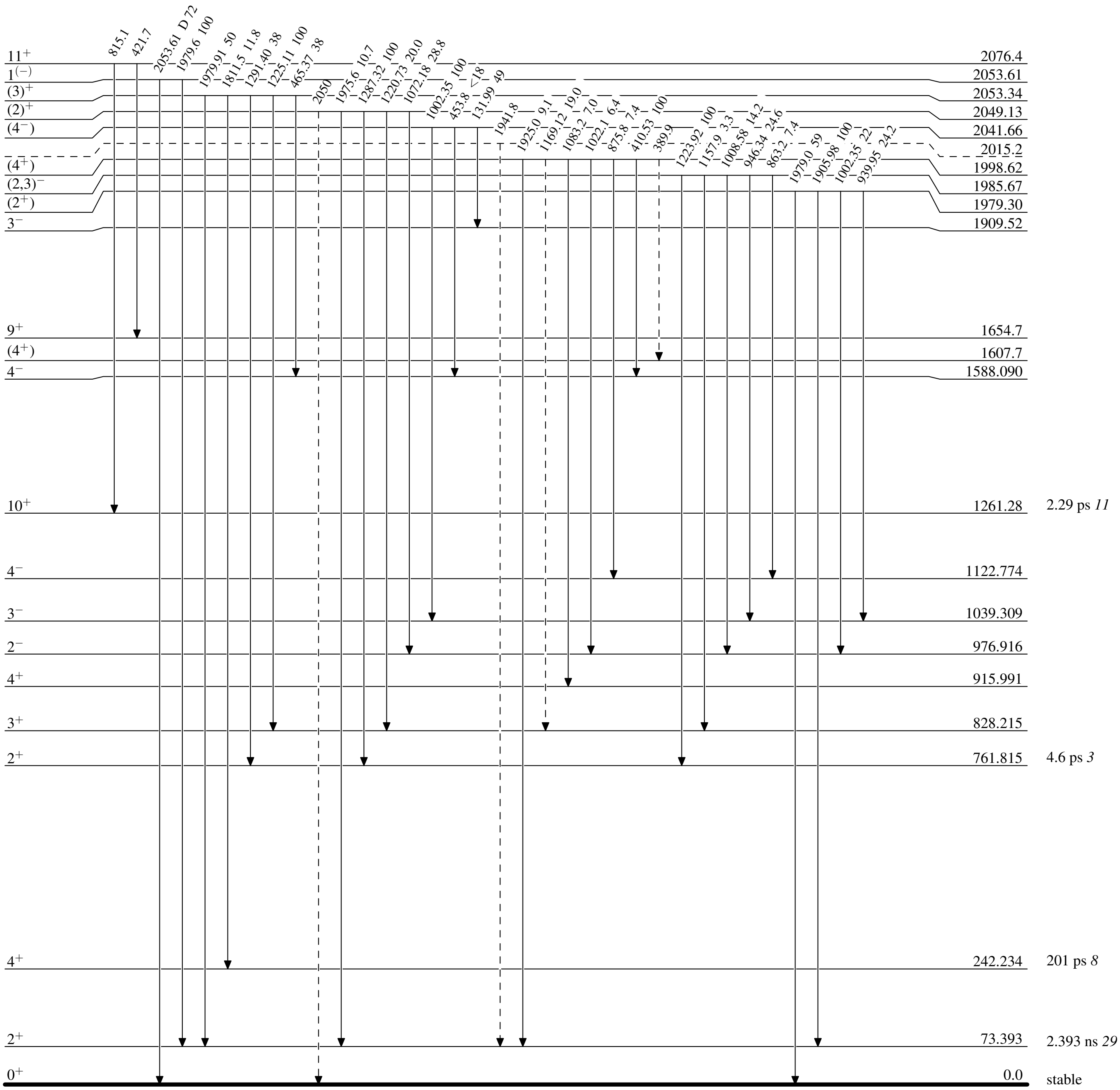
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

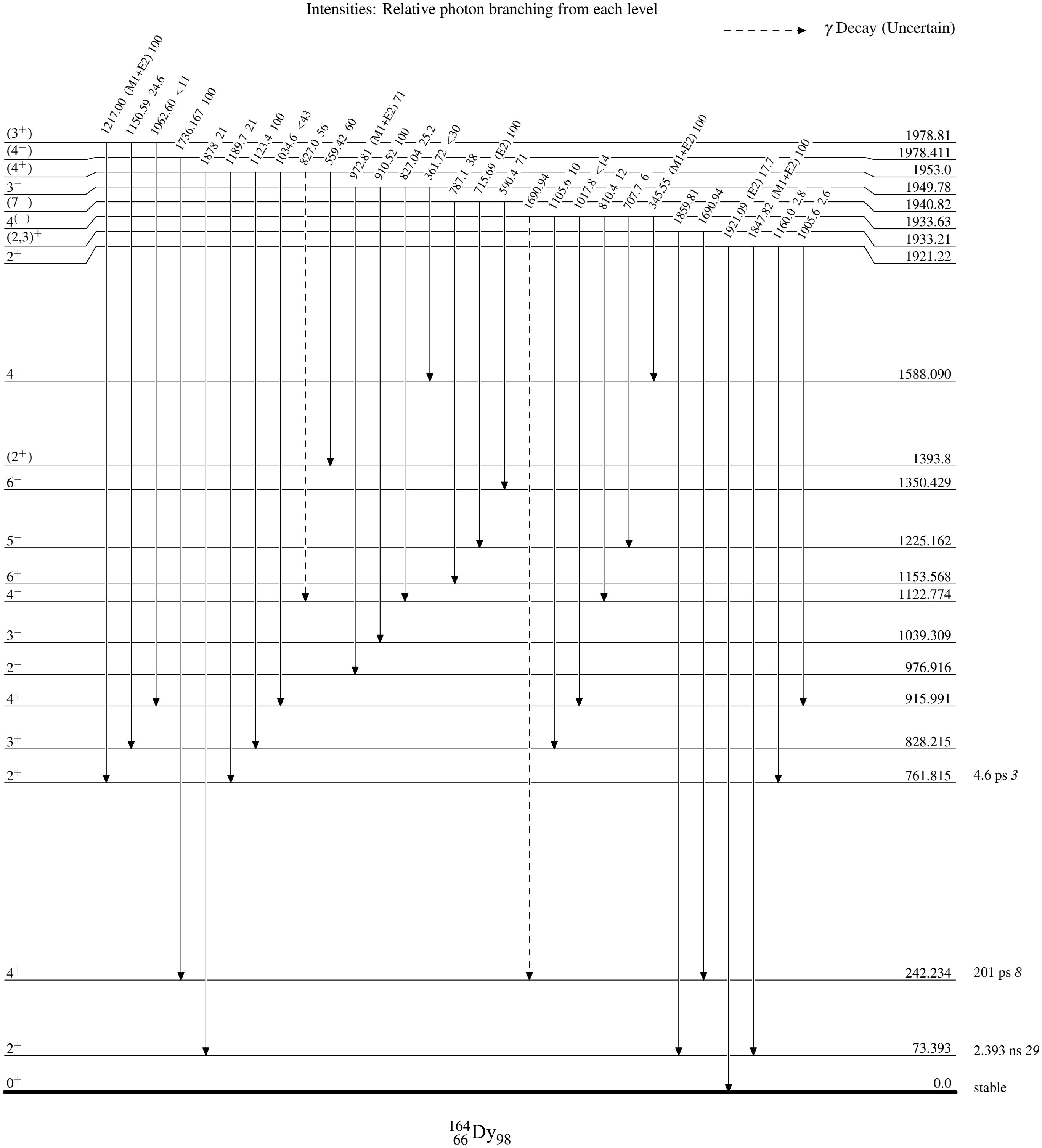


$^{164}_{66}Dy_{98}$

Adopted Levels, Gammas

Level Scheme (continued)

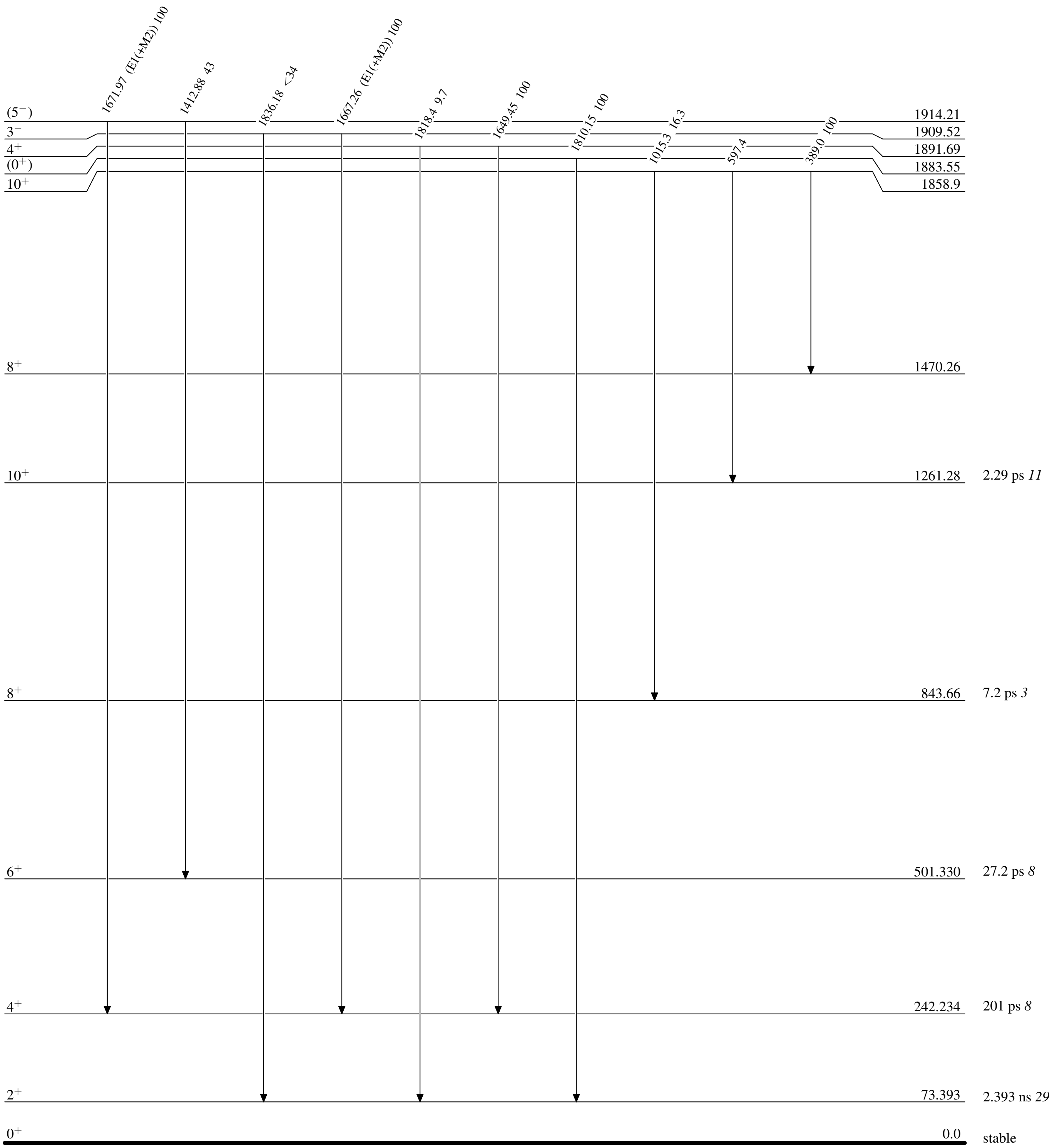
Intensities: Relative photon branching from each level



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{164}_{66}Dy_{98}$

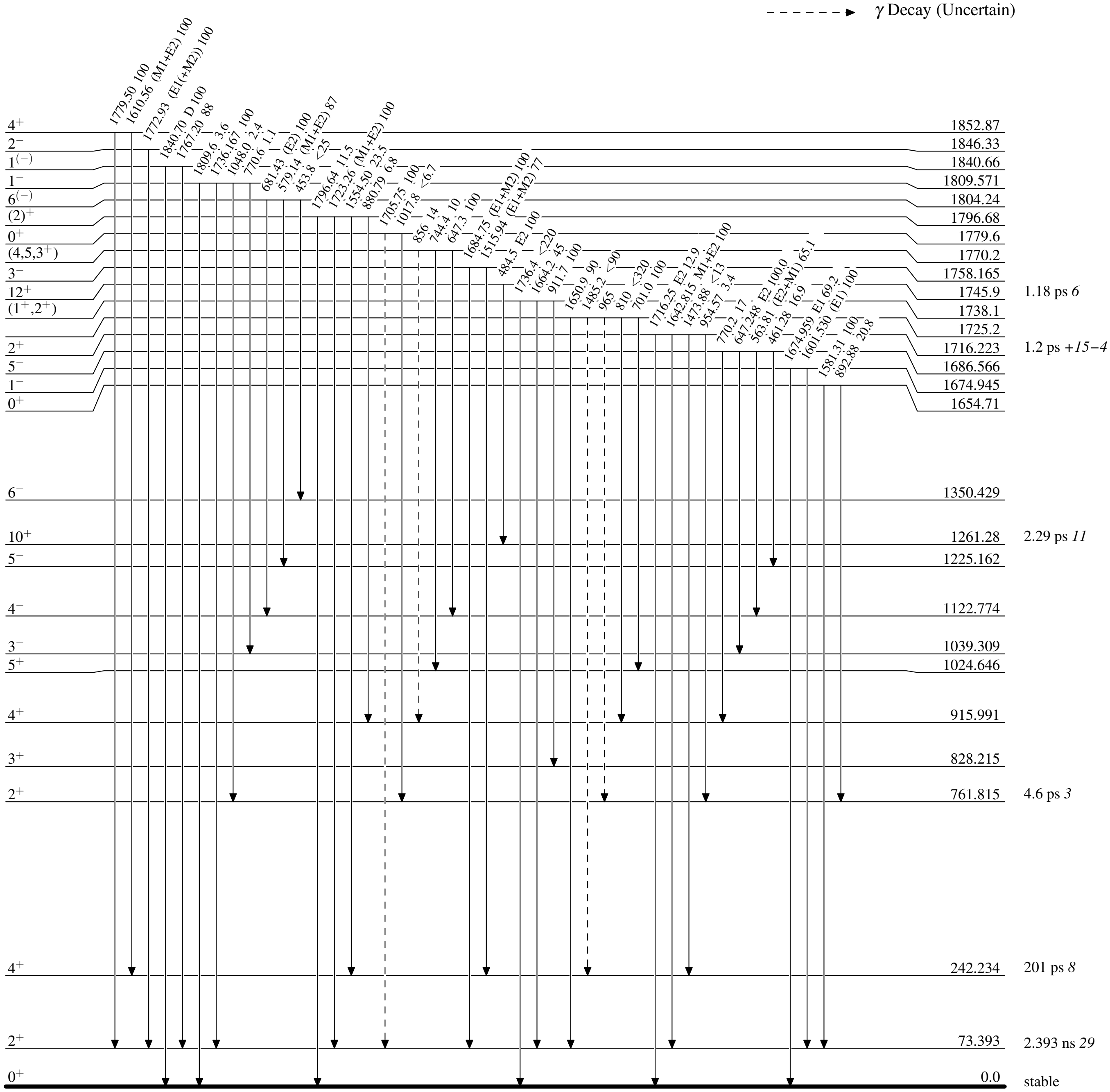
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



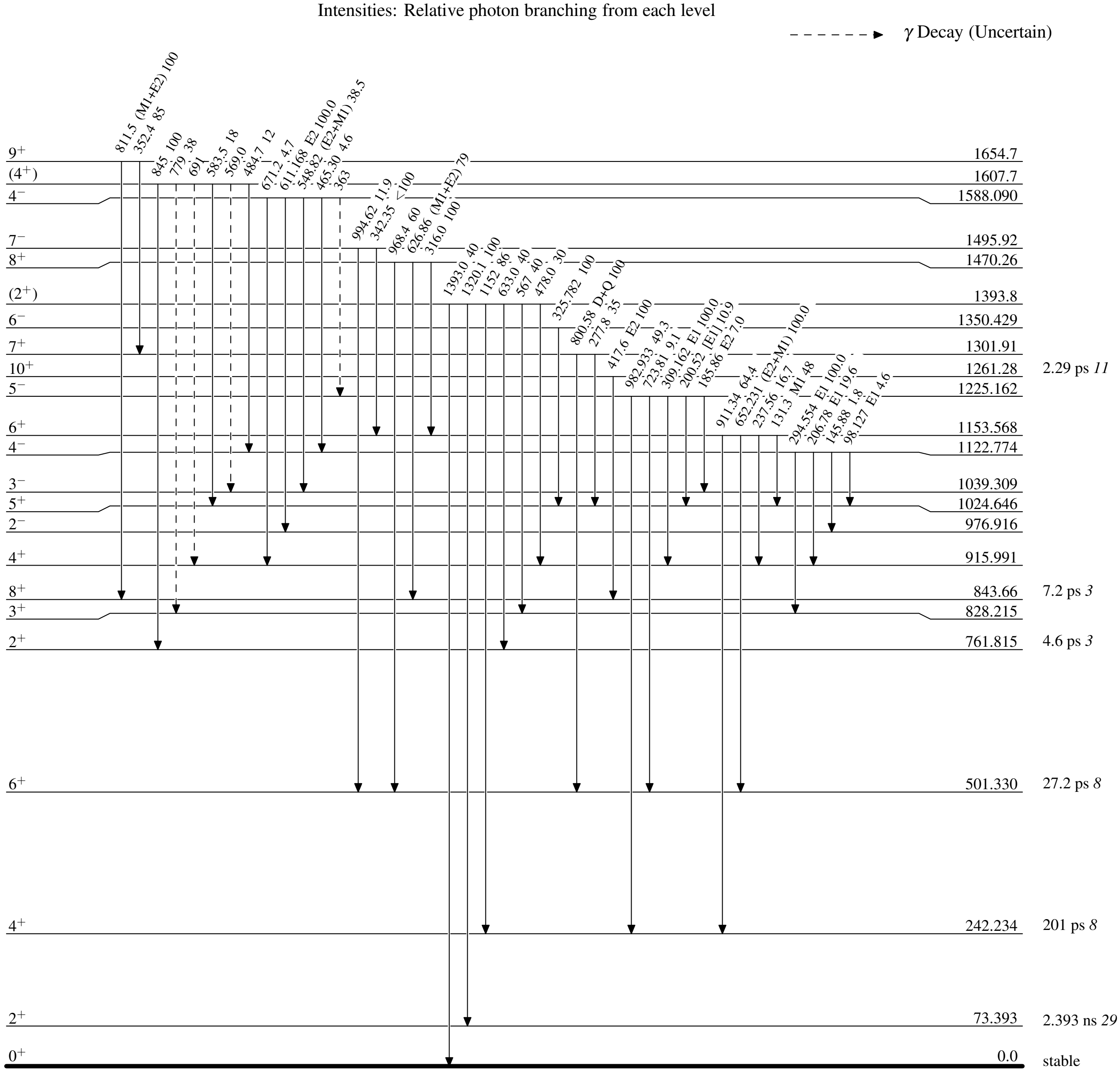
$^{164}_{66}Dy_{98}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

Legend

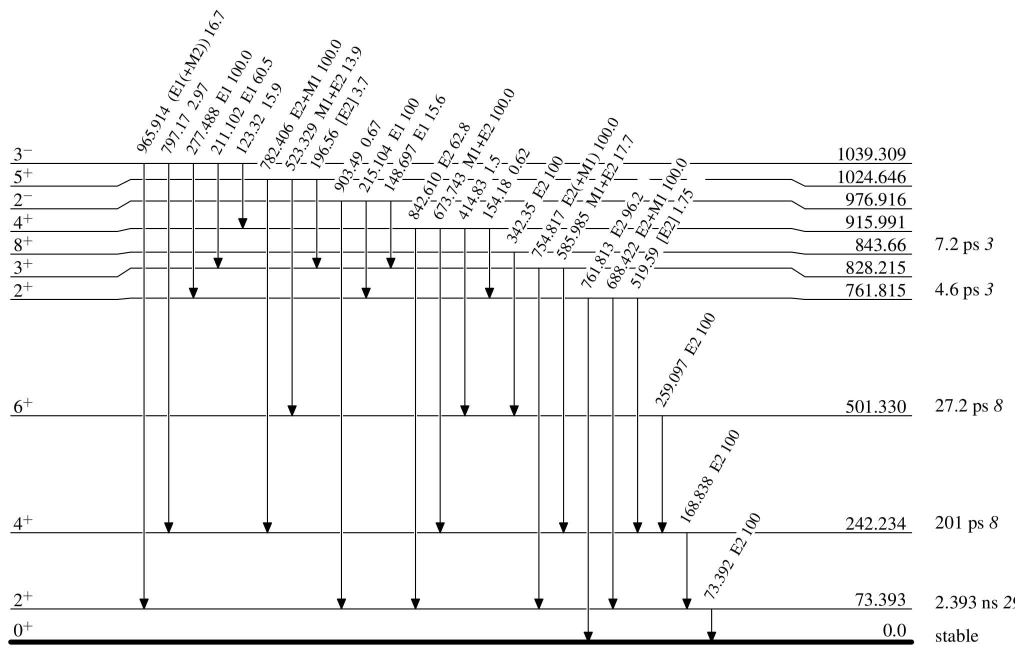


$^{164}_{66}Dy_{98}$

Adopted Levels, Gammas

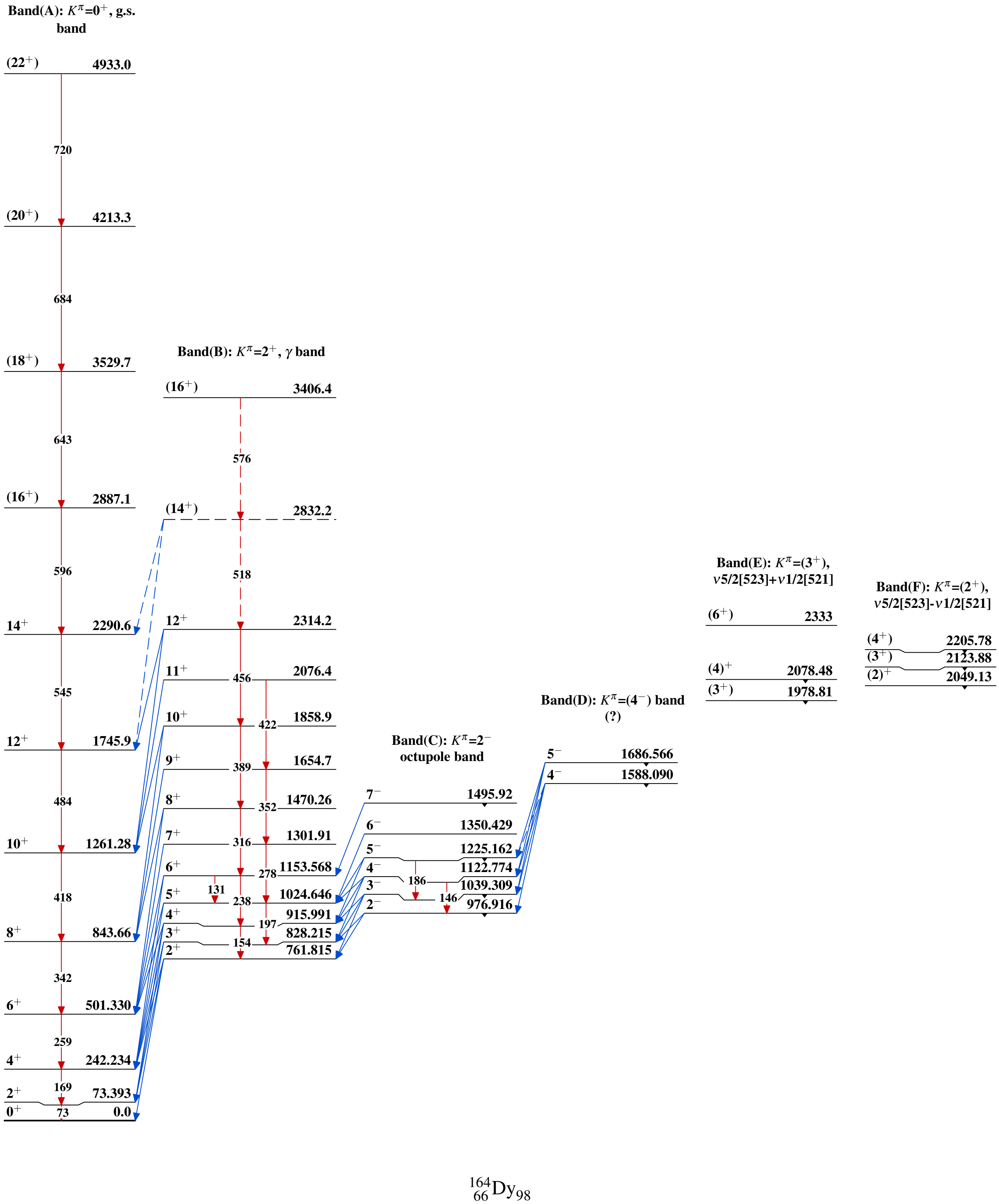
Level Scheme (continued)

Intensities: Relative photon branching from each level

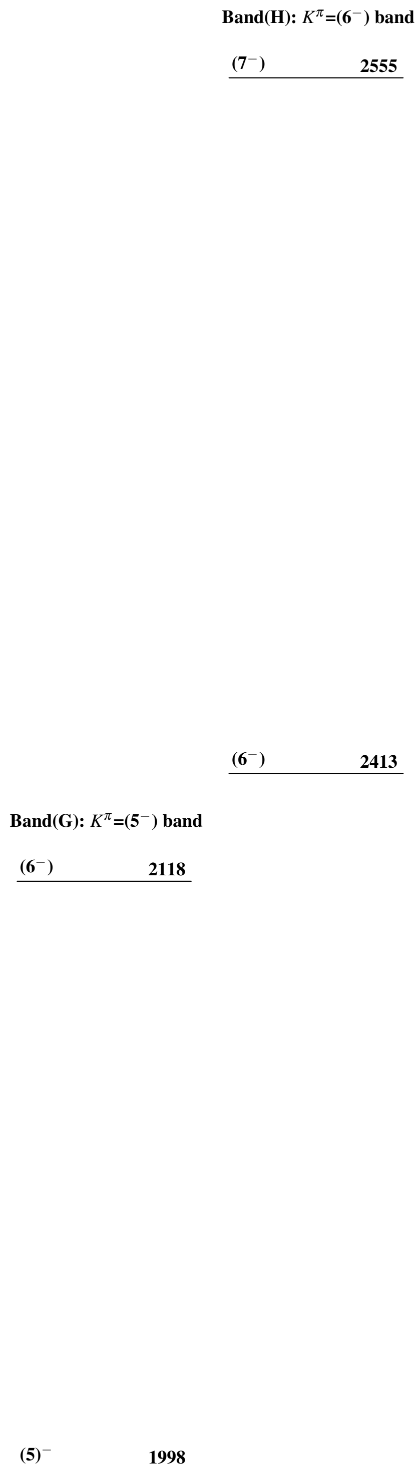


$^{164}_{66}Dy_{98}$

Adopted Levels, Gammas



Adopted Levels, Gammas (continued)



$^{164}_{66}Dy_{98}$