Coulomb excitation 1995Wi18

History

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

1995Wi18: (^{58}Ni,^{58}Ni′γ) E=250 MeV. Measured Eγ, Iγ, γγ, γ(θ) using an array of 18 Compton-suppressed Ge detectors and 52 NaI elements of the spin spectrometer at Oak Ridge for γ rays and an array of six silicon detectors for scattered ^{58}Ni particles.
1999Br43: (^{58}Ni,^{58}Ni′γ) E=217 MeV. Measured g factors of g.s. band members up to 10^+ and 2^+ γ bandhead using transient field technique.
2001Wu05,1998Wu04: ^{118}Sn(^{164}Dy,^{164}Dy′) E=790 MeV. Transitions in the g.s. band seen up to 16^+.
1997Al25: (^{58}Ni,^{58}Ni′γ) E=220 MeV. Measured g factors of 4^+ and 6^+ g.s. band members using perturbed γγ(θ) (IPAC) technique.
1989Do12: (^{58}Ni,^{58}Ni′) E=160, 220 MeV.
1983Se09: (^{208}Pb,^{208}Pb′) E=4.7 MeV/nucleon.
1981Mc06: (α,α′) E=13.5 MeV.
1978Sa03: (^{40}Ar,^{40}Ar′) E=152.6 MeV.
1977Ke06: (^{56}Fe,^{56}Fe′) E=232 MeV; (^{84}Kr,^{84}Kr′) E=348 MeV.
1977Si15: (^{32}S,^{32}S′) E=120, 121, 140 MeV.
1977Wo03: (α,α′) E=11.4-12 MeV.
1974Ba81: (α,α′) E=11.0-12.5 MeV.
1974Oe01: (α,α′) E=14.5 MeV; (^{16}O,^{16}O′) E=60 MeV.
1974Sh12: (α,α′) E=8-17 MeV.
1974Sa03: (^{20}Ne,^{20}Ne′) E=72 MeV; (^{35}Cl,^{35}Cl′) E=125 MeV.
1974Wo01: (α,α′) E=12 MeV.
1972Er04: (α,α′) E=10-13 MeV.
1969Av01: (^{16}O,^{16}O′) E=30 MeV. Measured lifetime by delayed coin.
1965Yo04: (^{16}O,^{16}O′) E=43.5 MeV.
1964De07: (^{16}O,^{16}O′) E=34.9, 41.6 MeV.
1960El07: (p,p′),(d,d′) E=4.5 MeV.
Others: 1958Ch36, 1957He26, 1956Hu49.
Additional information 1.

^{164}Dy Levels

E(level)†	Jπ‡	$T_{1/2}$	Comments
0.0#	0^+		
73.39# *2*	2^+	2.40 ns *3*	B(E2)=5.59 *3* from weighted average of 5.64 *25* (1960El07); 5.48 *10* (1970Hi03, muonic x rays); 5.57 *5* (1972Er04); 5.55 *9* (1973Gr05); 5.59 *10* (1974Sh12); 5.66 *6* (1974Wo01). $T_{1/2}$: from B(E2). Other: from pγ(t), $T_{1/2}$=2.40 ns *8* (1969Av01). In Adopted Levels, Gammas dataset, value is 2.393 ns *29* (from 2016Pr01 evaluation).
242.23# *2*	4^+	201 ps *8*	$T_{1/2}$: from weighted average of mean lifetime τ=265 ps *29* (from B(E2)(2^+ to 4^+)=2.83 *31*, 1974Sa03); 294 ps *9* (Doppler-shift recoil-distance, 1977Si15); 286 ps *15* (Doppler-shift recoil distance, 1978Sa03). g-factor=0.25 *3* (1997Al25), 0.37 *12* (1989Do12).
501.32# *2*	6^+	27.2 ps *8*	g-factor=0.325 *17* (1999Br43), 0.27 *5* (1997Al25), +0.28 *8* (1983Se09,1989Do12). $T_{1/2}$: from weighted average of mean lifetime τ=44.4 ps *24* (from B(E2)(4^+ to 6^+)=2.06 *11*, 1974Sa03); 37.7 ps *14* (Doppler-shift recoil-distance, 1977Si15); 39.0 ps *19* (Doppler-shift recoil distance, 1978Sa03).
761.8@ *2*	2^+	4.6 ps *3*	Jπ: multiple Coulomb-excitation yield shows Jπ=2^+, K=2 (1974Oe01). $T_{1/2}$: from B(E2)=0.114 *6* (1981Mc06). Others B(E2) measurements: 0.122 *5* (1977Wo03); 0.101 *9* (1974Oe01); 0.121 *5* (1974Ba81); 0.13 *2* (1965Yo04). g-factor=0.38 *3* (1999Br43), 0.31 *10* (1989Do12).
828.2@ *2*	3^+		
843.67# *8*	8^+	7.2 ps *3*	g-factor=0.310 *20* (1999Br43), 0.27 *9* (1989Do12).

Continued on next page (footnotes at end of table)

Coulomb excitation 1995Wi18 (continued)

^{164}Dy Levels (continued)

E(level)[†]	J^{π}[‡]	$T_{1/2}$	Comments
			$T_{1/2}$: from weighted average of mean lifetime τ=11.7 ps *7* (from B(E2)(6^+ to 8^+)=1.86 *11*, 1974Sa03); 8.9 ps *11* (Doppler-broadened line shape, 1977Ke06); 9.8 ps *7* (Doppler-shift recoil distance, 1977Si15); 10.4 ps *7* (Doppler-shift recoil distance, 1978Sa03).
916.2[@] *2*	4^+		J^{π}: multiple Coulomb-excitation yield shows $J^{\pi}=4^+$, K=2 (1974Oe01).
1025.6[@]	5^+		
1039.3[&] *2*	3^-		J^{π}: assignment based on $\gamma(\theta)$ measurement of 1981Mc06. B(E3)=0.088 *6* (1981Mc06).
1154.8[@] *8*	$(6)^+$		J^{π}: multiple Coulomb-excitation yield shows $J^{\pi}=6^+$, K=2 (1974Oe01).
1225.2[&] *2*	$(5)^-$		J^{π}: multiple Coulomb-excitation yield shows $J^{\pi}=5^-$ (1974Oe01).
1261.3[#] *3*	10^+	2.29 ps *11*	g-factor=0.31 *4* (1999Br43), 0.35 *13* (1989Do12). $T_{1/2}$: from weighted average of mean lifetime τ=3.37 ps *21* (in single measurements) and 3.23 ps *20* (in particle-γ coin) (Doppler-broadened line shape (1977Ke06)). Others: τ=3.2 ps *4* (from B(E2)(8^+ to 10^+)=2.44 *32*, (1974Sa03)), 3.7 ps *8* (recoil distance Doppler-shift (1978Sa03)).
1303.2[@]	(7^+)		
1394?	(2^+)		B(E2)<0.0035 and tentatively assigned $J^{\pi}=2^+$ (1981Mc06). $T_{1/2}$>2 ps from upper limit on B(E2).
1470.8[@]	(8^+)		
1656.0[@]	(9^+)		
1745.8[#] *6*	12^+	1.18 ps *6*	$T_{1/2}$: from weighted average of mean lifetime τ=1.64 ps *10* in single measurements and 1.77 ps *11* in particle-γ coin (Doppler-broadened line shape, 1977Ke06)). Others: τ=1.3 ps *7* (from B(E2)(10^+ to 12^+)=2.7 *14*, 1974Sa03); 1.6 ps *8* (recoil-distance Doppler-shift, 1978Sa03).
1859.8[@]	(10^+)		
2076.4[@]	(11^+)		
2290.5[#] *15*	14^+	0.67 ps *6*	$T_{1/2}$: from weighted average of mean life=0.95 ps *6* (in singles measurements) and 1.1 ps *2* (in particle-γ coin) (Doppler-broadened line shape (1977Ke06)).
2315.4[@]	(12^+)		
2833?[@]	(14^+)		
2888.9[#]	(16^+)		
3406.5[@]	(16^+)		
3528.7[#]	(18^+)		
4037.8[@]	(18^+)		
4212.3[#]	(20^+)		
4932.0[#]	(22^+)		

[†] From Eγ data.
[‡] From Adopted Levels.
[#] Band(A): g.s. band.
[@] Band(B): $K^{\pi}=2^+$ γ band.
[&] Band(C): $K^{\pi}=2^-$ band.

$\gamma(^{164}Dy)$

A_2 and A_4 values are from $\gamma(\theta)$ data in 1995Wi18.

E_γ [‡]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [†]	α [@]	Comments
73.392 *5*		73.39	2^+	0.0	0^+	E2	8.89	α(K)=2.15 *3*; α(L)=5.15 *8*; α(M)=1.236 *18* α(N)=0.277 *4*; α(O)=0.0328 *5*; α(P)=9.38×10^{-5} *14* E_γ: from Adopted Gammas.
154.5		916.2	4^+	761.8	2^+			
169.1	100 *2*	242.23	4^+	73.39	2^+	E2	0.417	A_2=+0.08 *3*; A_4=+0.15 *5* α(K)=0.261 *4*; α(L)=0.1202 *17*; α(M)=0.0284 *4* α(N)=0.00639 *9*; α(O)=0.000797 *12*; α(P)=1.195×10^{-5} *17*
211.1		1039.3	3^-	828.2	3^+			
237.8	1.8 *3*	1154.8	$(6)^+$	916.2	4^+			A_2=+0.14 *28*; A_4=+0.08 *54*
259.3	132 *2*	501.32	6^+	242.23	4^+	E2	0.1016	A_2=+0.16 *3*; A_4=+0.07 *5* α(K)=0.0737 *11*; α(L)=0.0216 *3*; α(M)=0.00500 *7* α(N)=0.001134 *16*; α(O)=0.0001470 *21*; α(P)=3.73×10^{-6} *6*
277.5		1039.3	3^-	761.8	2^+			
277.8	0.15 *2*	1303.2	(7^+)	1025.6	5^+			I_γ: Iγ(277.8γ)/Iγ(801.3γ)=0.36 *3* (2001Wu05).
309.1		1225.2	$(5)^-$	916.2	4^+			
316.1	4.8 *1*	1470.8	(8^+)	1154.8	$(6)^+$			A_2=+0.10 *5*; A_4=+0.27 *8*
342.35 *7*	118 *1*	843.67	8^+	501.32	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* A_2=+0.22 *2*; A_4=+0.01 *3* E_γ: from 1974Sa03. Other: 342.2 *5* (1977Ke06), 342.6 (1995Wi18).
352.4	0.17 *4*	1656.0	(9^+)	1303.2	(7^+)			I_γ: Iγ(352.4γ)/Iγ(811.5γ)=84 *18* (2001Wu05).
389.0	4.9 *1*	1859.8	(10^+)	1470.8	(8^+)			A_2=+0.16 *4*; A_4=+0.14 *7*
417.6 *2*	67 *1*	1261.3	10^+	843.67	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* A_2=+0.29 *2*; A_4=−0.05 *3* E_γ: from 1974Sa03, other: 417.9 *5* (1977Ke06,1995Wi18).
421.7		2076.4	(11^+)	1656.0	(9^+)			
455.6	2.7 *1*	2315.4	(12^+)	1859.8	(10^+)			A_2=−0.05 *4*; A_4=+0.14 *8*
484.5 *5*	23.7 *3*	1745.8	12^+	1261.3	10^+	E2	0.01646	A_2=+0.35 *2*; A_4=−0.06 *4* E_γ: from 1977Ke06. Other: 484 *1* (1974Sa03).
518 [&]		2833?	(14^+)	2315.4	(12^+)			
519.6		761.8	2^+	242.23	4^+	[E2]	0.01372	Iγ(519.6γ)/Iγ(688.4γ)=0.027 *4* (1981Mc06).
523.1	0.081 *8*	1025.6	5^+	501.32	6^+			I_γ: Iγ(783.0γ)/Iγ(523.1γ)=6.83 *61* (2001Wu05).
542 [&]		2833?	(14^+)	2290.5	14^+			
544.7 *5*	5.6 *1*	2290.5	14^+	1745.8	12^+	E2	0.01217	A_2=+0.35 *2*; A_4=−0.10 *4* E_γ: from 1977Ke06.
568.0		2315.4	(12^+)	1745.8	12^+			
576.1 [#]		3406.5	(16^+)	2833?	(14^+)			

$^{164}_{66}Dy_{98}$-3

Coulomb excitation 1995Wi18 (continued)

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

E_γ ‡	I_γ ‡	E_i(level)	J^π_i	E_f	J^π_f	Mult.†	δ ‡	α @	Comments
585.3	0.12 *1*	828.2	3^+	242.23	4^+				I_γ: deduced from $I\gamma(755.2\gamma)/I\gamma(585.3\gamma)$=5.67 *44* in 2001Wu05.
597.2	1.89 *11*	2888.9	(16^+)	2290.5	14^+				A_2=+0.08 *4*; A_4=−0.07 *7*
597.4		1859.8	(10^+)	1261.3	10^+				
626.3	3.8 *5*	1470.8	(8^+)	843.67	8^+	(M1+E2)	+1.18 *5*	0.01204 *25*	A_2=−0.13 *4*; A_4=−0.10 *5*
631.4#		4037.8	(18^+)	3406.5	(16^+)				
642.7	0.20 *2*	3528.7	(18^+)	2888.9	(16^+)				A_2=+0.17 *18*; A_4=−0.03 *35*
652.8	6.4 *1*	1154.8	$(6)^+$	501.32	6^+				A_2=−0.09 *2*; A_4=−0.10 *4* I_γ: see comment with 911.8γ.
674.3	5.5 *1*	916.2	4^+	242.23	4^+	(M1+E2)	−6.6 *+8−11*		A_2=−0.09 *2*; A_4=−0.10 *4* I_γ: see comment with 843.2γ.
683.6#		4212.3	(20^+)	3528.7	(18^+)				
688.9	5.8 *1*	761.8	2^+	73.39	2^+	E2+M1	−9.5 *+8−10*	0.00696	α(K)=0.00575 *9*; α(L)=0.000945 *14*; α(M)=0.000210 *3* α(N)=4.82×10^{-5} *7*; α(O)=6.82×10^{-6} *10*; α(P)=3.29×10^{-7} *5* A_2=0.00 *2*; A_4=−0.14 *4* I_γ: see comments with 519.6γ and 761.8γ. δ: from 1995Wi18.
719.7#		4932.0	(22^+)	4212.3	(20^+)				
755.2	0.66 *2*	828.2	3^+	73.39	2^+	(M1+E2)	−0.29 *5*	0.01015 *20*	A_2=+0.10 *6*; A_4=+0.16 *11*
762.4	5.6 *1*	761.8	2^+	0.0	0^+	E2			A_2=+0.32 *2*; A_4=−0.32 *4* I_γ: $I\gamma(761.8\gamma)/I\gamma(688.4\gamma)$=0.91 *10* (1981Mc06), 0.90 *5* (1974Oe01), 0.83 *18* (1965Yo04).
783.0	0.55 *2*	1025.6	5^+	242.23	4^+	(M1+E2)	−0.19 *6*		A_2=+0.14 *6*; A_4=−0.20 *11*
796.9		1039.3	3^-	242.23	4^+				
801.3	0.43 *2*	1303.2	(7^+)	501.32	6^+	(M1+E2)	−0.21 *+8−9*		A_2=+0.18 *7*; A_4=−0.22 *13*
811.5	0.20 *1*	1656.0	(9^+)	843.67	8^+	(M1+E2)			A_2=+0.05 *13*; A_4=+0.41 *24* δ: −0.32 *+15−21* or −9.5 *+60−∞*.
815.1		2076.4	(11^+)	1261.3	10^+				
843.4	3.4 *1*	916.2	4^+	73.39	2^+				A_2=+0.31 *3*; A_4=−0.13 *5* I_γ: $I\gamma(843.2\gamma)/I\gamma(673.7\gamma)$=0.62 *6* (1974Oe01).
912.1	4.1 *1*	1154.8	$(6)^+$	242.23	4^+				A_2=+0.22 *3*; A_4=−0.01 *5* I_γ: $I\gamma(911.3\gamma)/I\gamma(653.8\gamma)$=0.83 *14* (1974Oe01).
965.9		1039.3	3^-	73.39	2^+				
968.9	2.9 *5*	1470.8	(8^+)	501.32	6^+				A_2=+0.18 *3*; A_4=+0.07 *5*
^{x}981	0.52 *2*								A_2=−0.58 *7*; A_4=+0.61 *14*
982.9		1225.2	$(5)^-$	242.23	4^+				
^{x}988	0.66 *2*								A_2=−0.28 *7*; A_4=−0.09 *13*
1015.3	0.80 *2*	1859.8	(10^+)	843.67	8^+				A_2=+0.30 *6*; A_4=−0.33 *11* E_γ: from figure 3, Eγ=1015 in table 1 (1995Wi18).
1053.0		2315.4	(12^+)	1261.3	10^+				
1086&		2833?	(14^+)	1745.8	12^+				

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

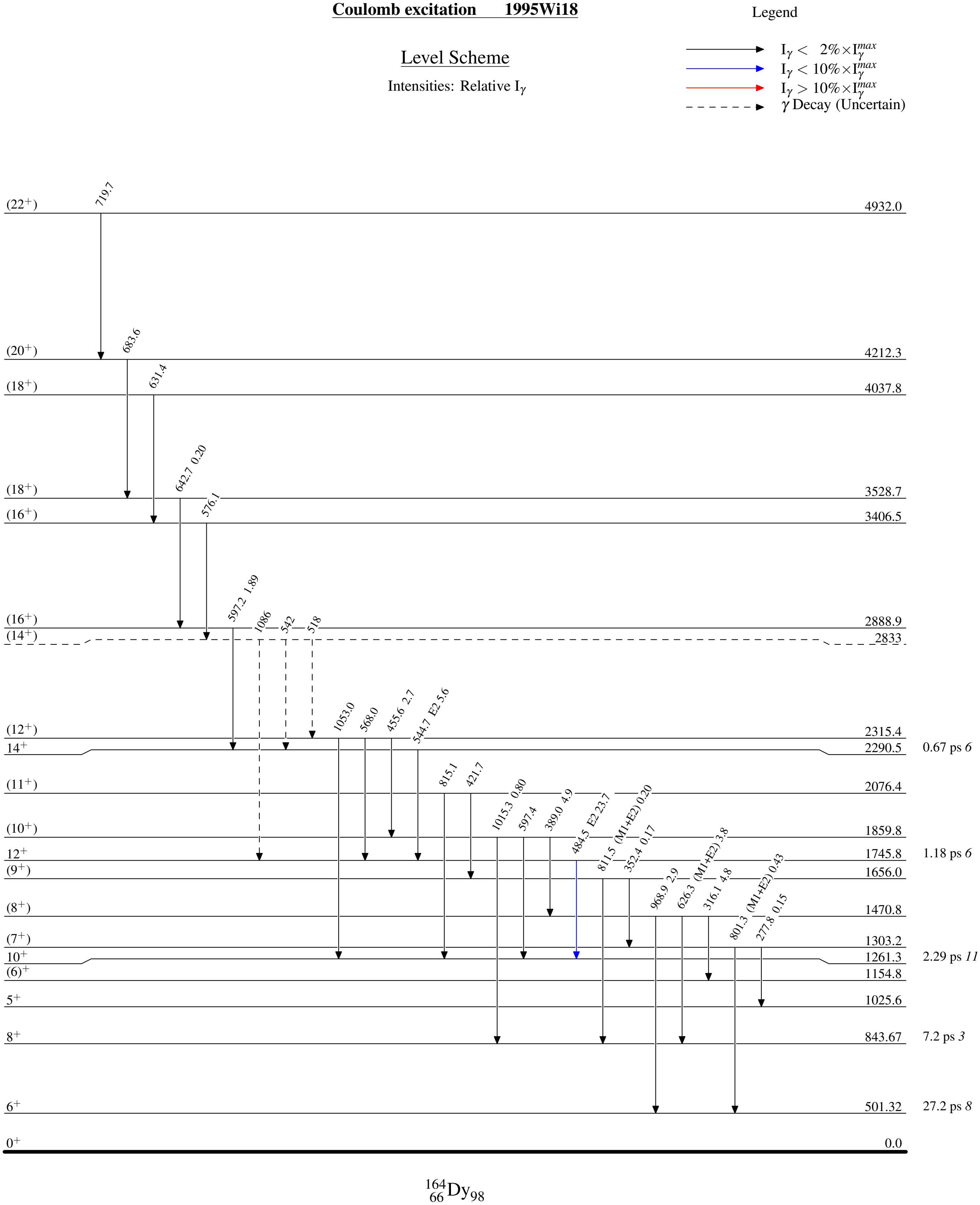
† From Adopted Gammas.
‡ From 1995Wi18 unless otherwise stated.
# From 2001Wu05.
@ Additional information 2.
& Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

$^{164}_{66}Dy_{98}$-5

Coulomb excitation 1995Wi18

Level Scheme

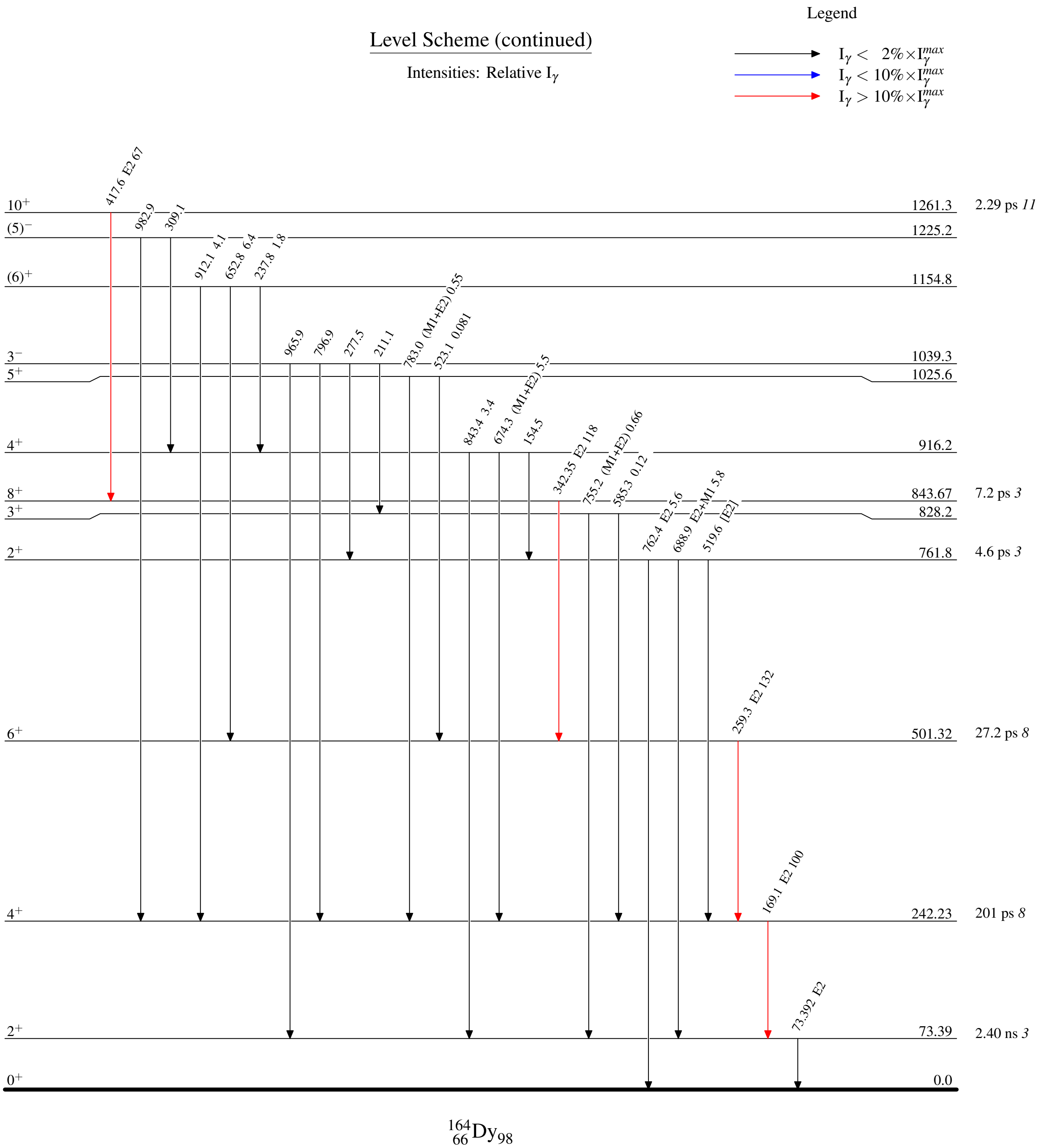
Intensities: Relative I_γ



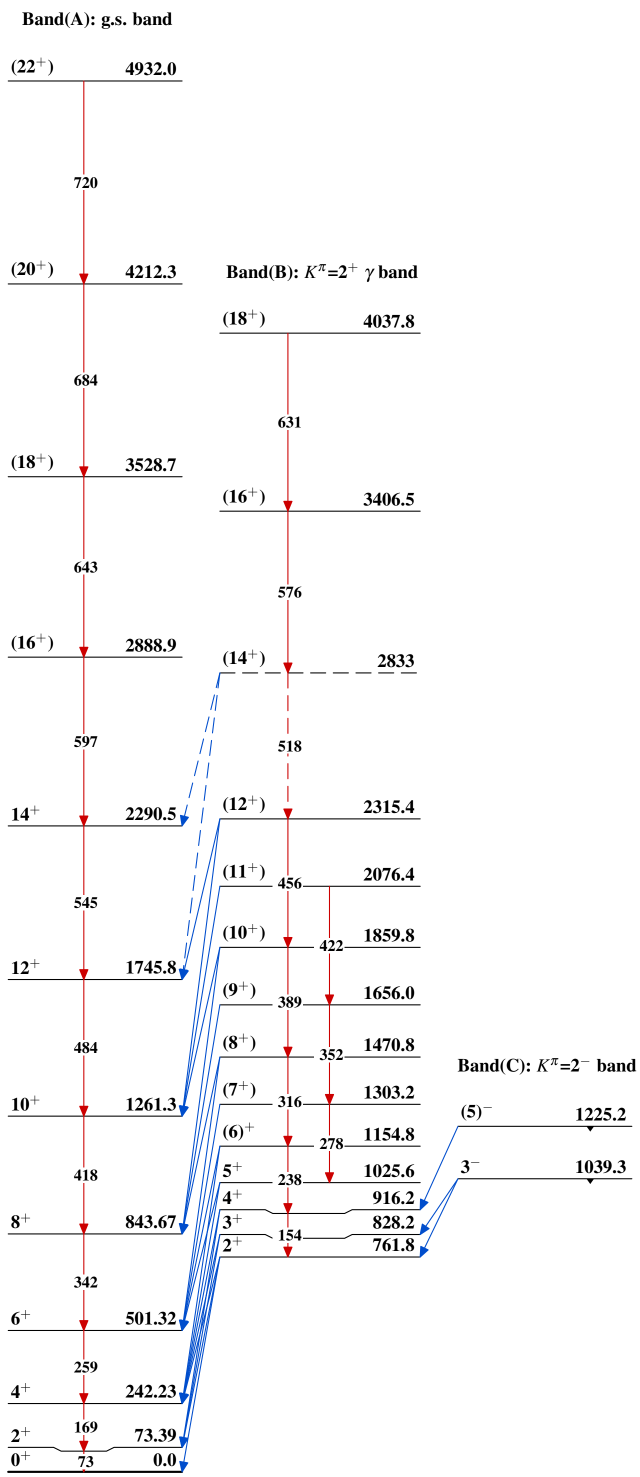
Coulomb excitation 1995Wi18

Level Scheme (continued)

Intensities: Relative I_γ



Coulomb excitation 1995Wi18



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