Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen, Balraj Singh	NDS 164, 1 (2020)	15-Feb-2020

Q(β^-)=1793 *7*; S(n)=7279 *5*; S(p)=6176 *3*; Q(α)=−2488 *4* 2017Wa10
S(2n)=16753 *6*, S(2p)=15407 *3* (2017Wa10).
Other reactions:
^{90}Zr(^{18}O,^{10}B): E=90 MeV. Measured Q, differential cross-section.
^{98}Mo(p,n) GDR: 1987Ku13, 1986Mo10, 1985Ra11, 1980St26, 1976Ma07, 1975Gr01, 1974Po11, 1969Hi02.
Additional information 1.
^{96}Mo(^{14}N,^{12}C) and ^{97}Mo(^{14}N,^{13}C) E=97 MeV, measured Q value (1976Mi13).
^{96}Mo(^{32}S,^{30}P),E=180 MeV: 1995He17. Measured $\sigma(\theta)$.
Theory references: consult the NSR database (www.nndc.bnl.gov/nsr/) for 12 primary references, 8 dealing with nuclear structure calculations and 5 with decay modes and half-lives.

^{98}Tc Levels

Cross Reference (XREF) Flags

A	^{94}Zr(^{7}Li,3nγ)	E	^{97}Mo(α,t)	I	^{99}Tc(p,d)
B	^{96}Zr(^{6}Li,4nγ)	F	^{98}Mo(p,n)	J	^{99}Tc(d,t)
C	^{97}Mo(p,n) IAR	G	^{98}Mo(p,nγ)	K	^{99}Ru(γ,pγ)
D	^{97}Mo(^{3}He,d)	H	^{98}Mo(^{3}He,t)		

E(level)[†]	J$^{\pi}$[#]	$T_{1/2}$[&]	XREF	Comments
0.0	(6)$^+$[@]	4.2×10^6 y *3*	AB DEFGHIJK	%β^-=100 No ε decay has been detected (1993Ko64). J$^{\pi}$: (2J+1) intensity rule in (p,d) and L(^{3}He,t)=6 from 0$^+$ suggest J$^{\pi}$=5$^+$, 6$^+$ for g.s. and 21.8 level. J$^{\pi}$=6$^+$ is preferred for g.s. due to log *ft*=14 to a 4$^+$ state in ^{98}Ru. This would imply 5$^+$ for 21.8 level. $T_{1/2}$: from 1966GoZZ (also 1973Ok05 priv. comm.). Others: 6.5×10^6 y or 9×10^6 y (1993Ko64), 1.5×10^6 y *7* (1956Ok15), ≈10×10^4 y (1955Ka26).
21.80 *9*	(5)$^+$[@]	2.4 ns *6*	AB DE GHIJK	J$^{\pi}$: see comment for g.s.
65.41 *12*	(4)$^+$[@]	<1.4 ns	DEFGHIJK	J$^{\pi}$: (2J+1) rule in (p,d) with L(p,d)=2 suggests J$^{\pi}$=3$^+$,4$^+$; but (M1) 43.6γ to (5)$^+$ favors 4$^+$. L(^{3}He,t)=2 from 0$^+$ (giving 1$^+$,2$^+$,3$^+$) disagrees with 4$^+$.
73.35 *16*	(2 to 5)$^-$		FG Jk	J$^{\pi}$: M1+E2 117.0γ from (3,4)$^-$. $T_{1/2}$: see comment for 90.8 level.
81.68 *13*	(4)$^+$	<1.4 ns	DE GHIJ	J$^{\pi}$: L(p,d)=L(d,t)=2 from 9/2$^+$; L(^{3}He,d)=4 from 5/2$^+$; 59.8γ to 21.8, (5)$^+$ level not E2 from RUL, although J$^{\pi}$=3$^+$ is suggested from 2J+1 intensity rule; 56.7γ from (3)$^-$.
90.77 *16*	(2,3)$^-$	14.7 μs *5*	FG k	%IT=100 J$^{\pi}$: 47.9γ from (3)$^-$ and M1+E2 99.5γ from (3,4)$^-$. No γ ray from this level has been reported to either the g.s., (6)$^+$ or the 21.8, (5)$^+$ level. It is likely that this level decays through a highly converted transition to the 65.4, (4)$^+$ level. $T_{1/2}$: from γ(t) of 43.6γ-21.8γ cascade. Weighted average of 14.8 μs *5*, 14.4 μs *5* ((γ,pγ),1978Ba18) 14.6 μs *7* ((p,nγ),1976We06), 15.5 μs *8* ((p,nγ),1961Sc11). This half-life is assumed to correspond to the 90.8 level. The present data, however, do not exclude this to belong to 73.3 level.
106.43[a] *6*	(7)$^+$[@]		AB DEFGHIJ	J$^{\pi}$: 106.5γ D to (6)$^+$; L(p,d)=L(d,t)=2 from 9/2$^+$. See additional argument in footnote.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{98}Tc Levels (continued)

E(level)†	Jπ#	$T_{1/2}$&	XREF	Comments
138.59 *15*	$(3)^-$	8.2 ns *3*	DEFGH	Jπ: L(^{3}He,d)=1 from $5/2^+$; L(^{3}He,t)=(3,1) from 0^+; Possible configuration=$\pi 2p_{1/2}\otimes\nu 2d^{-1}_{5/2}$.
142.0 *10*	(2 to 7)$^+$		IJ	Jπ: L(p,d)=2 from $9/2^+$.
152.07 *13*	$(3,4,5)^+$	<1.4 ns	G	Jπ: M1 86.7γ to $(4)^+$.
190.28 *16*	$(3,4)^-$	<1.4 ns	D FG	Jπ: strong excitation in (p,nγ) suggests J≤4; E1(+M2) 233.8γ from $4^+,5^+$ (424 level).
203.74 *14*	$(4)^+$	<1.4 ns	DEFGHIJ	XREF: F(?). Jπ: L(p,d)=L(d,t)=0+2 from $9/2^+$; 138.3γ M1 to $(4)^+$; 148.0γ E1(+M2) from $(3)^-$. But L(^{3}He,t)=2 from 0^+ is inconsistent.
268.11 *15*	$4^+,5^+$		DEFG IJ	Jπ: L(p,d)=0+2 from $9/2^+$; 202.7γ M1(+E2) to $(4)^+$.
306.18 *15*	$(3,4,5)^+$		FGHIJ	XREF: F(311)G(?)H(313). Jπ: 240.8γ M1 to $(4)^+$.
321.92 *16*	$(2,3,4)^-$		FG	Jπ: 183.3γ M1 to $(3)^-$.
328.53 *13*	$(3,4,5)^+$		DEFGHIJ	Jπ: 263.0γ M1 to $(4)^+$; L(^{3}He,t)=4 from 0^+.
346.93 *12*	$(6,7)^+$		A E IJ	Jπ: 240.5γ D to $(7)^+$; L(p,d)=L(d,t)=2 from $9/2^+$.
351.33 *15*	$(3)^-$		D FGH	Jπ: 212.7γ M1(+E2) to $(3)^-$; L(^{3}He,d)=1 from $5/2^+$. Configuration=$\pi 2p_{1/2}\otimes\nu 2d^{-1}_{5/2}$. Strongly populated state is expected to be the 3^- (1976Ma16).
375.08? *17*	$(3,4,5)^+$		G	Jπ: 309.7γ M1 to $(4)^+$.
390.13 *16*	$(3)^+$@		DEFGHIJ	Jπ: L(p,d)=L(d,t)=2 from $9/2^+$. 2J+1 rule in (p,d) suggests 2^+ but M1(+E2) 186.4γ to $(4)^+$ favors 3^+.
424.12 *22*	$4^+,5^+$		D FGHIJ	Jπ: L(p,d)=L(d,t)=0+2 from $9/2^+$; L(^{3}He,d)=2 from $5/2^+$.
441.02 *5*	$(7)^+$		AB	Jπ: 441.0γ M1(+E2) to $(6)^+$, 419.2γ E2 to $(5)^+$.
447.0 *3*	$^+$		G I	XREF: G(?). Jπ: L(p,d)=4(+2) from $9/2^+$.
457.89 *16*	$(2,3,4)^-$		D FG J	XREF: D(454)F(458)J(456). Jπ: 319.0γ M1 to $(3)^-$, 106.7γ M1+E2 to $(3)^-$. But L(d,t)=0 from $9/2^+$ is inconsistent.
484.35 *18*	(2 to 5)$^-$		FG	Jπ: 294.1γ M1(+E2) to $(3,4)^-$ and 345.8γ to $(3)^-$.
502.14 *25*			G	
537.5 *20*	(2 to 7)$^+$		IJ	Jπ: L(p,d)=L(d,t)=2 from $9/2^+$.
543.45 *18*	(1 to 5)$^-$		D FG	Jπ: 221.6γ M1(+E2) to $(2,3,4)^-$; 404.6γ to $(3)^-$; L=(1) from $5/2^+$ target for a weak peak in (^{3}He,d) disfavors J=5.
568 *4*	(2 to 7)$^{(+)}$		I	Jπ: L(p,d)=(2) from $9/2^+$.
609.5 *15*	$4^+,5^+$		IJ	Jπ: L(p,d)=L(d,t)=0+2 from $9/2^+$.
622.31 *20*	$(2,3,4)^-$		G	Jπ: 432.0γ M1(+E2) to $(3,4)^-$ and 483.7γ M1(+E2) to $(3)^-$.
624.5 *25*	$(4^+,5^+)$		IJ	Jπ: L(p,d)=(2+0) from $9/2^+$.
639.5 *25*	(2 to 7)$^+$		IJ	Jπ: L(p,d)=L(d,t)=2 from $9/2^+$.
652.72? *16*			GH	
665.80 *19*	$(2,3,4)^+$		G	Jπ: 275.7γ M1+E2 to $(3)^+$.
670.23 *23*			A	
688.2 *8*	$(4,5)^+$		G IJ	Jπ: L(p,d)=2(+0) from $9/2^+$ and 366.5γ to $(2,3,4)^-$.
707.5 *10*	$4^+,5^+$		IJ	E(level): this level may be the same as 713.6, although the energy difference is much larger than the quoted uncertainty. Jπ: L(d,t)=0+2 from $9/2^+$.
713.67 *18*	$(4,5)^+$		GH	XREF: H(720). Jπ: L(p,d)=0+2 for a level at 715 *5*.
747.0 *20*	$4^+,5^+$		IJ	Jπ: L(p,d)=L(d,t)=0+2 from $9/2^+$.
764.34 *14*	$(8)^+$		AB	Jπ: 323.3γ M1(+E2) to $(7)^+$, excitation function in (^{7}Li,3nγ).
766.0 *20*	$(4^+,5^+)$		IJ	Jπ: L(p,d)=(2+0) from $9/2^+$.
799.5 *15*	$4^+,5^+$		IJ	Jπ: L(p,d)=L(d,t)=0+2 from $9/2^+$.
863.5 *15*	(2 to 7)$^+$		IJ	Jπ: L(p,d)=L(d,t)=2 from $9/2^+$.
888.5 *15*	$4^+,5^+$		HIJ	XREF: H(877). Jπ: L(p,d)=L(d,t)=0+2 from $9/2^+$.
923.5 *25*	(2 to 7)$^+$		IJ	Jπ: L(p,d)=2 from $9/2^+$.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{98}Tc Levels (continued)

E(level)[†]	Jπ[#]	XREF	Comments
951.5 *25*	4+,5+	IJ	Jπ: L(p,d)=0+2 from 9/2+.
988? *4*		I	
1018.5 *3*	(7,8,9)+	AB IJ	XREF: I(1015)J(1027). Jπ: L(p,d)=4 from 9/2+ and 912.0γ to (7)+; 71.9γ from (8)−.
1048 *4*	(2 to 7)+	IJ	XREF: J(1058). Jπ: L(p,d)=L(d,t)=2 from 9/2+.
1057.5 *25*	+	IJ	XREF: J(1073). Jπ: L(p,d)=4 from 9/2+.
1090.65[c] *14*	(8)−	AB	Jπ: 984.3γ and 649.6γ E1 to (7)+ and 325.8γ E1 to (8+); band assignment.
1102.85[a] *17*	(9)+	AB IJ	XREF: I(1099.5)J(1108). Jπ: L(p,d)=4 from 9/2+; 996.5γ (E2) to (7)+; band assignment.
1126.5 *10*	(2 to 7)+	IJ	XREF: J(1134). Jπ: L(p,d)=L(d,t)=2 from 9/2+.
1157.5 *10*	(2 to 7)+	IJ	XREF: J(1164). Jπ: L(p,d)=2 from 9/2+.
1166.34[d] *16*	(9)−	AB	Jπ: 402.0γ E1 to (8)+ and band assignment.
1201.5 *10*	+	IJ	Jπ: L(p,d)=4 from 9/2+.
1207.81[b] *15*	(9)+	AB IJ	XREF: I(1201.5)J(1202). Jπ: 766.6γ and 1101.6γ to (7)+, 433.4γ to (8)+; L(p,d)=4 from 9/2+; band assignment.
1212.0 *25*	(2 to 7)+	IJ	XREF: J(1220). Jπ: L(p,d)=L(d,t)=2 from 9/2+.
1254.3 *3*	4+,5+	A IJ	XREF: I(1252.5)J(1257). Jπ: L(p,d)=0+2 from 9/2+.
1275 *4*	4+,5+	IJ	XREF: J(1280). Jπ: L(p,d)=L(d,t)=0+2 from 9/2+.
1296 *4*	4+,5+	IJ	XREF: J(1300). Jπ: L(p,d)=0+2 from 9/2+.
1310.5 *30*	4+,5+	IJ	XREF: J(1314). Jπ: L(p,d)=L(d,t)=0+2 from 9/2+.
1338.0 *20*	4+,5+	I	Jπ: L(p,d)=0+2 from 9/2+.
1354 *4*	(4,5)+	I	Jπ: L(p,d)=2(+0) from 9/2+.
1373? *5*		I	
1388 *4*	(2 to 7)(+)	I	Jπ: L(p,d)=(2) from 9/2+.
1399.5 *30*	(2 to 7)+	I	Jπ: L(p,d)=2 from 9/2+.
1441 *6*	(2 to 7)+	I	Jπ: L(p,d)=2 from 9/2+.
1470.5 *15*	(4,5)+	I	Jπ: L(p,d)=2(+0) from 9/2+.
1486.5 *30*	(2 to 7)+	I	Jπ: L(p,d)=2 from 9/2+.
1549.73[b] *17*	(10+)	AB	Jπ: 341.9γ, D to (9)+; band assignment.
1582.44[c] *17*	(10)−	AB	Jπ: 416.1γ M1(+E2) to (9)−; band assignment.
1851.39[d] *19*	(11)−	AB	Jπ: 268.9γ M1(+E2) to (10)−, 685.3γ (E2) to (9)−; band assignment.
1920.3[e] *4*	(10−)	AB	XREF: A(?). Jπ: 754.1γ to (9)−, 829.9γ to (8)−; band assignment.
1962.7[b] *11*	(11+)	B	Jπ: possible band member.
1995.7[a] *4*	(11+)	AB	Jπ: ΔJ=(2) (E2) 892.7γ to (9)+; band assignment.
2303.83[c] *25*	(12)−	AB	Jπ: M1(+E2) 452.5γ to (11)− and band assignment.
2368.0[f] *4*	(11−)	AB	XREF: A(?). Jπ: 786.4γ to (10)− and band assignment.
2481.6[b] *5*	(12+)	AB	Jπ: 932.1γ to (10+) and band assignment.
2670.5[e] *7*	(12−)	B	Jπ: possible band member.
2677.3[d] *3*	(13)−	AB	Jπ: 373.5γ M1(+E2) to (12)−; band assignment.
2810.4[b] *6*	(13+)	AB	Jπ: 328.8γ to (12+) and band assignment.
3055.3[a] *7*	(13+)	AB	Jπ: 1059.6γ to (11+); band assignment.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{98}Tc Levels (continued)

E(level)[†]	J$^\pi$[#]	XREF	Comments
3129.5[c] *4*	(14$^-$)	AB	J$^\pi$: 452.0γ to (12)$^-$ and band assignment.
3265.6[f] *9*	(13$^-$)	B	J$^\pi$: 897.5γ to (11$^-$) and band assignment.
3724.3[d] *8*	(15$^-$)	B	J$^\pi$: 1047.3γ to (13$^-$) and band assignment.
9656[‡]	(0$^+$)	C	J$^\pi$: analog of 0$^+$, g.s. in ^{98}Mo.
10416[‡]	(0$^+$)	C	J$^\pi$: analog of 0$^+$, 735 in ^{98}Mo.
10476[‡]	(2$^+$)	C	J$^\pi$: analog of 2$^+$, 787 in ^{98}Mo.
11106[‡]	(2$^+$)	C	J$^\pi$: analog of 2$^+$, 1432 in ^{98}Mo.
11433[‡]	(2$^+$)	C	J$^\pi$: analog of 2$^+$, 1759 in ^{98}Mo.
11896[‡]		C	
11996[‡]		C	
12216[‡]		C	
12326[‡]		C	
12433[‡]		C	
12616[‡]		C	
12656[‡]		C	

† From least-squares fit to γ-ray energies if available and from transfer reactions (p,d) or (d,t) for others, unless otherwise noted.
‡ IAR from ^{97}Mo(p,n) reaction.
# L(p,d)=2 and L(d,t)=2, both from 9/2$^+$ target give J=2 to 7, π=+. In heavy-ion γ-ray reactions, ascending spins are assumed as the excitation energy rises, consistent with yrast pattern of population of levels.
@ Configuration=$\pi 1g^{3}_{9/2}\otimes\nu 2d^{-1}_{5/2}$. Multiplet (J=2 to 7, π=+) indicated by L(p,d)=2 (from 9/2$^+$) and L(^{3}He,d)=4 (from 5/2$^+$). Individual spin assignments are based on (2J+1)-intensity rule in (p,d) (1977Em02), with exceptions noted.
& From γ(t) in (p,nγ), unless otherwise stated.
a Band(A): Band based on 7$^+$.
b Band(B): ΔJ=1 band based on (9$^+$).
c Band(C): $\pi g_{9/2}\otimes\nu h_{11/2}$,$\alpha$=0.
d Band(c): $\pi g_{9/2}\otimes\nu h_{11/2}$,$\alpha$=1.
e Band(D): $\pi g_{9/2}\otimes\nu h_{11/2}$,$\alpha$=0. Possible chiral doublet partner of band based on 8$^-$.
f Band(d): $\pi g_{9/2}\otimes\nu h_{11/2}$,$\alpha$=1. Possible chiral doublet partner of band based on 8$^-$.

$\gamma(^{98}Tc)$

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.#	δ#	α@	Comments
21.80	(5)$^+$	21.8 *1*	100	0.0	(6)$^+$	(M1)		3.0	B(M1)(W.u.)=0.22 +*8*−*5* Mult.,δ: δ(E2/M1)=0.255 *18* from γ+ce intensity balance of 21.8γ and 43.5γ in (γ,pγ), assuming mult(43.5γ)=M1 and using theoretical conversion coefficients from BrIcc code. But this value would require a large half-life of >0.2 μs for the 21.8 level (lower limit is obtained at RUL=300 for B(E2)(W.u.)), contradicting to the short-lived nature of the 21.8-keV transition as stated in 1978Ba18 and to the measured value of 2.4 ns from $\gamma(\theta)$ in (p,nγ). RUL=300 for B(E2)(W.u.) of 21.8γ would limit δ(E2/M1) to <0.026 assuming $T_{1/2}$(21.8)<1 ns. 1978Ba18 have suggested mult=E1+1% M2, which, however, results in an unreasonably large B(M2)(W.u.). From these considerations, evaluators have assigned mult=M1.
65.41	(4)$^+$	43.60 *10*	100	21.80	(5)$^+$	(M1)		3.01	α(K)=2.63 *4*; α(L)=0.319 *5*; α(M)=0.0580 *9* α(N)=0.00918 *15*; α(O)=0.000595 *10* E_γ: weighted average of 43.62 *10* from (p,nγ) and 43.5 *2* from (γ,pγ).
81.68	(4)$^+$	59.8 *1*	100	21.80	(5)$^+$	[M1]			Mult.: not pure E2 (or <10% E2) from RUL.
106.43	(7)$^+$	106.46 *6*	100	0.0	(6)$^+$	(M1)		0.234	α(K)=0.205 *3*; α(L)=0.0245 *4*; α(M)=0.00445 *7* α(N)=0.000707 *10*; α(O)=4.64×10^{-5} *7* E_γ: from (^{7}Li,3nγ). Other: 106.4 *5* from (p,nγ). Mult.: D from γ anisotropy in (^{7}Li,3nγ).
138.59	(3)$^-$	47.86 *10*	100	90.77	(2,3)$^-$	[M1+E2]		10 *8*	α(K)=7 *5*; α(L)=3 *3*; α(M)=0.5 *5* α(N)=0.07 *7*; α(O)=0.0011 *7* If M1, B(M1)(W.u.)=0.0080. If E2, B(E2)(W.u.)=550. Mult.: from RUL of 300 for B(E2)(W.u.), mult(48γ) cannot be pure E2.
		56.70 *10*	4.6	81.68	(4)$^+$	[E1]		0.678	B(E1)(W.u.)=1.9×10^{-6} *14*
		65.17 *10*	2.5	73.35	(2 to 5)$^-$	[M1,E2]		3.4 *25*	α(K)=2.5 *18*; α(L)=0.7 *6*; α(M)=0.13 *12* α(N)=0.019 *16*; α(O)=0.0005 *3* If M1, B(M1)(W.u.)=8×10^{-5}. If E2, B(E2)(W.u.)=2.9.
152.07	(3,4,5)$^+$	86.66 *3*	100	65.41	(4)$^+$	M1(+E2)	<0.16	0.438 *22*	α(K)=0.380 *17*; α(L)=0.048 *5*; α(M)=0.0087 *8* α(N)=0.00137 *12*; α(O)=8.5×10^{-5} *3*
190.28	(3,4)$^-$	51.79 *10*	270	138.59	(3)$^-$	[M1,E2]		8 *6*	α(K)=5 *4*; α(L)=1.9 *18*; α(M)=0.4 *4* α(N)=0.05 *5*; α(O)=0.0009 *6* If M1, B(M1)(W.u.)>0.029. If E2, B(E2)(W.u.)>2500. Mult.: from RUL of 300 for B(E2)(W.u.), mult(52γ) cannot be pure E2.
		99.48 *8*	100 *8*	90.77	(2,3)$^-$	M1(+E2)	<0.15	0.294 *12*	α(K)=0.256 *10*; α(L)=0.0316 *21*; α(M)=0.0058 *4* α(N)=0.00091 *6*; α(O)=5.74×10^{-5} *17*
		116.95 *5*	50 *5*	73.35	(2 to 5)$^-$	M1+E2	1.2 +*15*−*6*	0.49 *18*	α(K)=0.41 *14*; α(L)=0.07 *3*; α(M)=0.013 *6* α(N)=0.0020 *8*; α(O)=7.8×10^{-5} *24*

γ(^{98}Tc) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[#]	δ[#]	α[@]	Comments
203.74	(4)$^+$	65.17[a] 10		138.59	(3)$^-$	[E1]		0.456	α(K)=0.398 6; α(L)=0.0478 7; α(M)=0.00858 13 α(N)=0.001325 20; α(O)=7.34×10^{-5} 11
		122.36 15	84 8	81.68	(4)$^+$	M1+E2	0.33 7	0.203 18	α(K)=0.174 15; α(L)=0.024 3; α(M)=0.0043 6 α(N)=0.00067 8; α(O)=3.75×10^{-5} 25
		138.42 11	100 8	65.41	(4)$^+$	M1		0.1137	α(K)=0.0994 14; α(L)=0.01182 17; α(M)=0.00215 3 α(N)=0.000341 5; α(O)=2.25×10^{-5} 4
268.11	4$^+$,5$^+$	202.70 8	100	65.41	(4)$^+$	M1(+E2)	<0.43	0.045 5	α(K)=0.040 4; α(L)=0.0048 7; α(M)=0.00088 12 α(N)=0.000139 18; α(O)=8.7×10^{-6} 7
306.18	(3,4,5)$^+$	240.77 9	100	65.41	(4)$^+$	M1		0.0261	α(K)=0.0229 4; α(L)=0.00267 4; α(M)=0.000485 7 α(N)=7.72×10^{-5} 11; α(O)=5.14×10^{-6} 8
321.92	(2,3,4)$^-$	131.66 5	9 1	190.28	(3,4)$^-$				
		183.33 11	100 8	138.59	(3)$^-$	M1		0.0534	α(K)=0.0467 7; α(L)=0.00551 8; α(M)=0.000999 14 α(N)=0.0001589 23; α(O)=1.053×10^{-5} 15
328.53	(3,4,5)$^+$	246.86 23	11 4	81.68	(4)$^+$				
		262.96 13	100 8	65.41	(4)$^+$	M1		0.0208	α(N)=6.13×10^{-5} 9; α(O)=4.09×10^{-6} 6 α(K)=0.0182 3; α(L)=0.00213 3; α(M)=0.000386 6
		306.85 12	13 3	21.80	(5)$^+$				
346.93	(6,7)$^+$	240.5 1	100	106.43	(7)$^+$	(M1)		0.0262	α(K)=0.0229 4; α(L)=0.00268 4; α(M)=0.000486 7 α(N)=7.74×10^{-5} 11; α(O)=5.16×10^{-6} 8 E_γ,Mult.: from (^{7}Li,3nγ), with mult=D from γ anisotropy.
351.33	(3)$^-$	147.95 13	<10	203.74	(4)$^+$	E1(+M2)	<0.27	0.065 23	α(K)=0.057 20; α(L)=0.007 3; α(M)=0.0013 6 α(N)=0.00021 9; α(O)=1.3×10^{-5} 5 δ(M2/E1)<0.3.
		212.67 9	100 9	138.59	(3)$^-$	M1(+E2)	0.24 +11−20	0.039 3	α(K)=0.0337 23; α(L)=0.0041 4; α(M)=0.00074 7 α(N)=0.000117 10; α(O)=7.5×10^{-6} 4
375.08?	(3,4,5)$^+$	309.66 12	100	65.41	(4)$^+$	M1		0.01373	α(K)=0.01204 17; α(L)=0.001397 20; α(M)=0.000253 4 α(N)=4.03×10^{-5} 6; α(O)=2.70×10^{-6} 4
390.13	(3)$^+$	186.39 7	100	203.74	(4)$^+$	M1(+E2)	<0.4	0.057 6	α(K)=0.049 5; α(L)=0.0061 8; α(M)=0.00110 15 α(N)=0.000174 22; α(O)=1.09×10^{-5} 9
424.12	4$^+$,5$^+$	73.1[a] 4	≤56	351.33	(3)$^-$				
		233.84 15	100 9	190.28	(3,4)$^-$	E1(+M2)	<0.14	0.0129 14	α(K)=0.0113 12; α(L)=0.00132 16; α(M)=0.00024 3 α(N)=3.8×10^{-5} 5; α(O)=2.4×10^{-6} 3
441.02	(7)$^+$	334.6 1	8.5 10	106.43	(7)$^+$	D			E_γ,I_γ,Mult.: from (^{7}Li,3nγ).
		419.2 2	6.1 10	21.80	(5)$^+$	E2			E_γ,I_γ,Mult.: from (^{7}Li,3nγ).
		440.99 6	100 3	0.0	(6)$^+$	M1(+E2)	<0.4		E_γ,I_γ,Mult.: from (^{7}Li,3nγ).
447.0	+	57.0[a] 3		390.13	(3)$^+$				
457.89	(2,3,4)$^-$	106.66 9	11.6 14	351.33	(3)$^-$	M1+E2	0.8 3	0.53 15	α(K)=0.44 12; α(L)=0.08 3; α(M)=0.014 5 α(N)=0.0021 7; α(O)=8.5×10^{-5} 19
		267.64 11	44 4	190.28	(3,4)$^-$	M1(+E2)	<0.4	0.0211 13	α(K)=0.0184 11; α(L)=0.00219 17; α(M)=0.00040 3 α(N)=6.3×10^{-5} 5; α(O)=4.10×10^{-6} 20 I_γ: other: 100 (1978MiZO).
		319.01 13	100 11	138.59	(3)$^-$	M1		0.01274	α(K)=0.01117 16; α(L)=0.001295 19; α(M)=0.000235 4 α(N)=3.74×10^{-5} 6; α(O)=2.50×10^{-6} 4

Adopted Levels, Gammas (continued)

γ(^{98}Tc) (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[#]	δ[#]	α[@]	Comments
484.35	(2 to 5)$^-$	294.08 *12*	100 *14*	190.28	(3,4)$^-$	M1(+E2)	<0.45	0.0166 *10*	α(K)=0.0145 *9*; α(L)=0.00172 *13*; α(M)=0.000312 *24* α(N)=4.9×10^{-5} *4*; α(O)=3.22×10^{-6} *16*
		345.75 *17*	6.7 *14*	138.59	(3)$^-$				
502.14		350.06 *21*	100	152.07	(3,4,5)$^+$				
543.45	(1 to 5)$^-$	221.64 *11*	100 *23*	321.92	(2,3,4)$^-$	M1(+E2)	<0.8	0.040 *8*	α(K)=0.035 *7*; α(L)=0.0044 *11*; α(M)=0.00080 *20* α(N)=0.00012 *3*; α(O)=7.5×10^{-6} *12*
		404.63 *16*	80 *14*	138.59	(3)$^-$				
622.31	(2,3,4)$^-$	432.04 *17*	100 *10*	190.28	(3,4)$^-$	M1(+E2)	<1.2		
		472[a] *2*		152.07	(3,4,5)$^+$				
		483.7 *2*	≤100	138.59	(3)$^-$	M1(+E2)	<1.8		
652.72?		324.32[a] *13*	≤100	328.53	(3,4,5)$^+$				
		384.49[a] *15*	38 *8*	268.11	4$^+$,5$^+$				
665.80	(2,3,4)$^+$	275.67 *11*	100 *8*	390.13	(3)$^+$	M1+E2	0.41 *+20−27*	0.0207 *20*	α(K)=0.0180 *17*; α(L)=0.0022 *3*; α(M)=0.00039 *5* α(N)=6.2×10^{-5} *8*; α(O)=4.0×10^{-6} *3*
		583.68[a] *23*	69 *13*	81.68	(4)$^+$				
670.23		323.3[&] *2*	100[&]	346.93	(6,7)$^+$				E_γ: from (^{7}Li,3nγ) only.
688.2	(4,5)$^+$	366.5 *10*		321.92	(2,3,4)$^-$				
		497.8 *10*		190.28	(3,4)$^-$				
713.67	(4,5)$^+$	255.76 *10*	40 *5*	457.89	(2,3,4)$^-$	(M2(+E1))	>1.0	0.08 *3*	α(K)=0.073 *22*; α(L)=0.010 *3*; α(M)=0.0018 *6* α(N)=0.00028 *9*; α(O)=1.8×10^{-5} *6* Mult.: evaluators consider the multipolarity uncertain, as with δ(M2/E1)>1, and with a branching ratio of ≈20% and B(M2)(W.u.)=1 from RUL, the level half-life should be ≈250 ns, but no such isomer has been detected in γγ-coin data in (p,nγ).
		523.45 *20*	≤100	190.28	(3,4)$^-$				
		692.1[a] *5*	≤39	21.80	(5)$^+$				
764.34	(8)$^+$	323.3[&] *2*	100[&] *3*	441.02	(7)$^+$	M1(+E2)	<0.9	0.0140 *17*	α(K)=0.0122 *15*; α(L)=0.00147 *22*; α(M)=0.00027 *4* α(N)=4.2×10^{-5} *6*; α(O)=2.7×10^{-6} *3*
		657.9 *2*	43 *3*	106.43	(7)$^+$	M1,E2			
1018.5	(7,8,9)$^+$	912.0 *3*	100	106.43	(7)$^+$				
1090.65	(8)$^-$	71.9 *5*		1018.5	(7,8,9)$^+$				
		325.8 *7*	56 *3*	764.34	(8)$^+$	E1			δ(M2/E1)<0.25.
		649.6 *2*	33 *2*	441.02	(7)$^+$	E1			
		984.3 *2*	100 *4*	106.43	(7)$^+$	E1			
1102.85	(9)$^+$	662.0	2.5	441.02	(7)$^+$				E_γ,I_γ: γ from (^{6}Li,4nγ) only.
		996.5 *2*	100	106.43	(7)$^+$	(E2)			Mult.: α(K)exp gives M1,E2 but γ(θ) consistent with E2.
1166.34	(9)$^-$	75.6 *4*	100 *22*	1090.65	(8)$^-$	(D)			

$^{98}_{43}Tc_{55}$-7

$\gamma(^{98}Tc)$ (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.#	δ#	α@	Comments
1166.34	$(9)^-$	402.00 8	31 1	764.34	$(8)^+$	E1			
1207.81	$(9)^+$	443.4‡	11‡	764.34	$(8)^+$				
		766.6 2	100 7	441.02	$(7)^+$				
		1101.6 3	43 6	106.43	$(7)^+$				
1254.3	$4^+,5^+$	584.1 2	100	670.23					
1549.73	(10^+)	341.9 1	100 7	1207.81	$(9)^+$	D			
		447.0 2	24 9	1102.85	$(9)^+$				
		785.4‡	39‡	764.34	$(8)^+$				
1582.44	$(10)^-$	416.05 8	100	1166.34	$(9)^-$	M1(+E2)	<0.6		
		491.8‡	4.1‡	1090.65	$(8)^-$				
1851.39	$(11)^-$	268.9 1	100 4	1582.44	$(10)^-$	M1(+E2)	<1.2	0.025 6	α(K)=0.022 5; α(L)=0.0027 7; α(M)=0.00049 13 α(N)=7.6×10^{-5} 19; α(O)=4.6×10^{-6} 8
		685.3 2	74 4	1166.34	$(9)^-$	(E2)			Mult.: α(K)exp gives M1,E2 but $\gamma(\theta)$ data consistent with E2.
1920.3	(10^-)	754.1 4	100	1166.34	$(9)^-$				
		829.9‡	25‡	1090.65	$(8)^-$				
1962.7	(11^+)	413.0‡	100‡	1549.73	(10^+)				
1995.7	(11^+)	892.7 4	100	1102.85	$(9)^+$	(Q)			
2303.83	$(12)^-$	452.5 2	100 14	1851.39	$(11)^-$	M1(+E2)	<1.4		
		721.2 5	53 6	1582.44	$(10)^-$				I_γ: 36 in (^{6}Li,4nγ).
2368.0	(11^-)	448.2‡	20‡	1920.3	(10^-)				
		518.3‡a	<3‡	1851.39	$(11)^-$				
		785.4 4	100	1582.44	$(10)^-$				
2481.6	(12^+)	485.2‡	17‡	1995.7	(11^+)				
		932.1 5	100	1549.73	(10^+)				
2670.5	(12^-)	302.3‡	50‡	2368.0	(11^-)				
		750.5‡	100‡	1920.3	(10^-)				
		819.7‡a	17‡	1851.39	$(11)^-$				
		1088.7‡a	58‡	1582.44	$(10)^-$				
2677.3	$(13)^-$	373.5 1	33	2303.83	$(12)^-$	M1(+E2)	<0.8		I_γ: from (^{6}Li,4nγ).
		825.8& 4	100&	1851.39	$(11)^-$				I_γ: from (^{6}Li,4nγ). In (^{7}Li,3nγ), undivided intensity is given for 825.8 doublet.
2810.4	(13^+)	328.8 3	100	2481.6	(12^+)				
3055.3	(13^+)	1059.6 5	100	1995.7	(11^+)				
3129.5	(14^-)	452.0 3	67	2677.3	$(13)^-$				I_γ: from (^{6}Li,4nγ).
		825.8& 4	100&	2303.83	$(12)^-$				I_γ: from (^{6}Li,4nγ). In (^{7}Li,3nγ), undivided intensity is given for 825.8 doublet.
3265.6	(13^-)	595.2‡	<100‡	2670.5	(12^-)				
		897.5‡	100‡	2368.0	(11^-)				

Adopted Levels, Gammas (continued)

$\gamma(^{98}Tc)$ (continued)

E_i(level)	J^π_i	E_γ †	I_γ †	E_f	J^π_f
3724.3	(15^-)	594.5‡	22‡	3129.5	(14^-)
		1047.3‡	100‡	2677.3	$(13)^-$

† From (p,nγ) up to 714 level and from (^{7}Li,3nγ) above that, unless otherwise noted.

‡ γ from (^{6}Li,4nγ) only.

\# From ce data in (p,nγ) or (^{7}Li,3nγ).

@ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

& Multiply placed with intensity suitably divided.

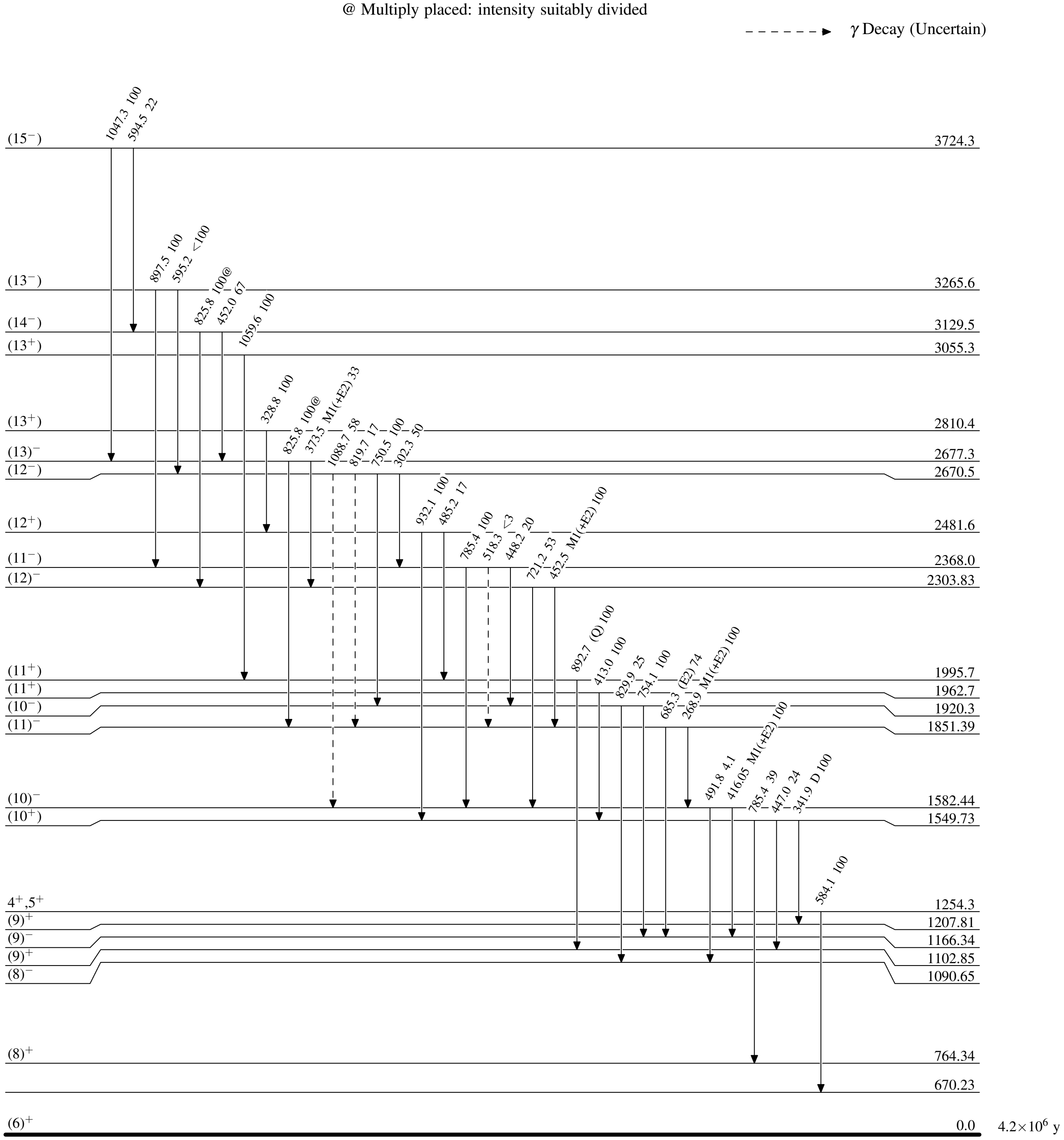
a Placement of transition in the level scheme is uncertain.

$^{98}_{43}Tc_{55}$-9

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided



$^{98}_{43}Tc_{55}$

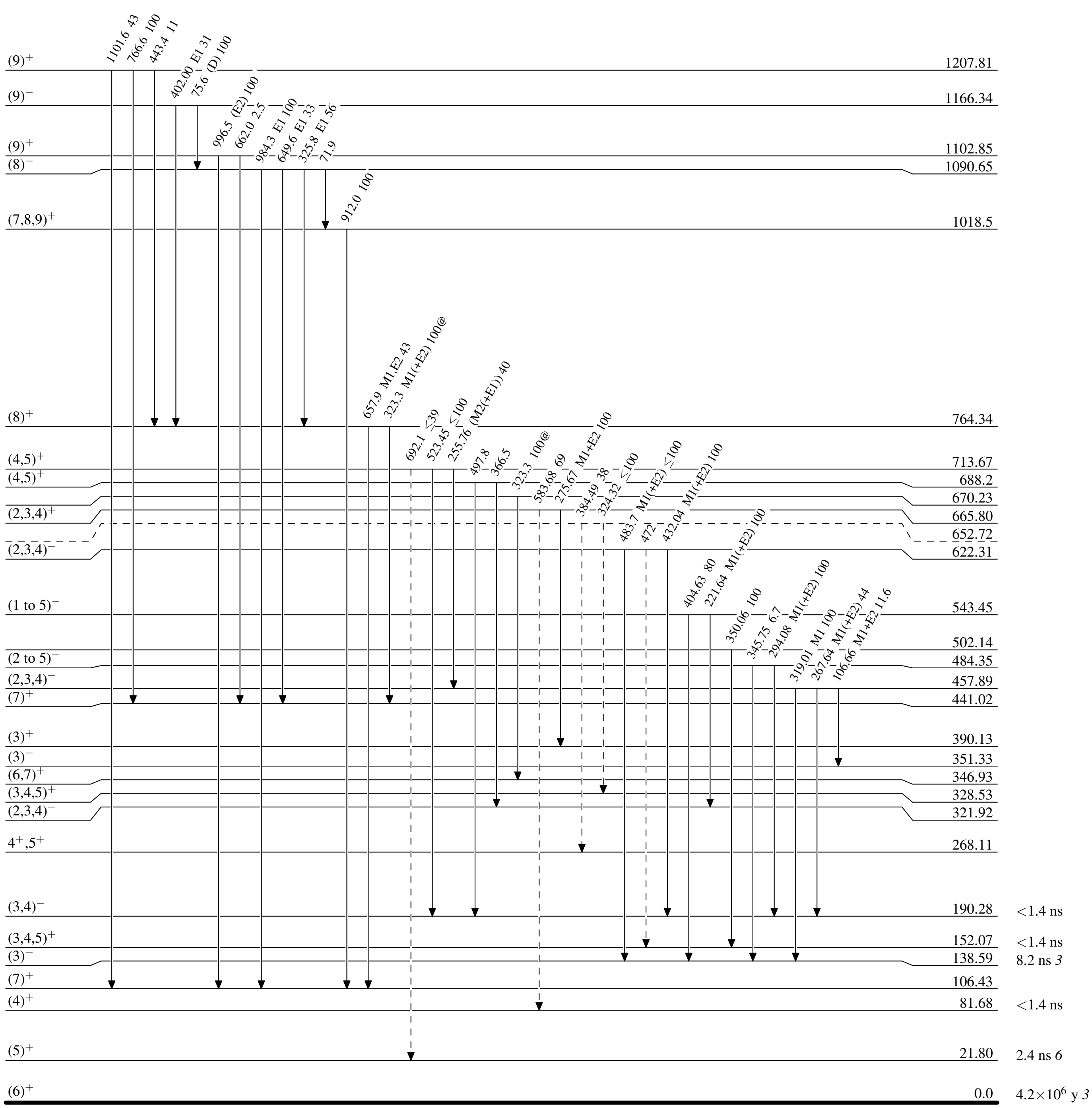
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided

Legend

γ Decay (Uncertain)



$^{98}_{43}Tc_{55}$

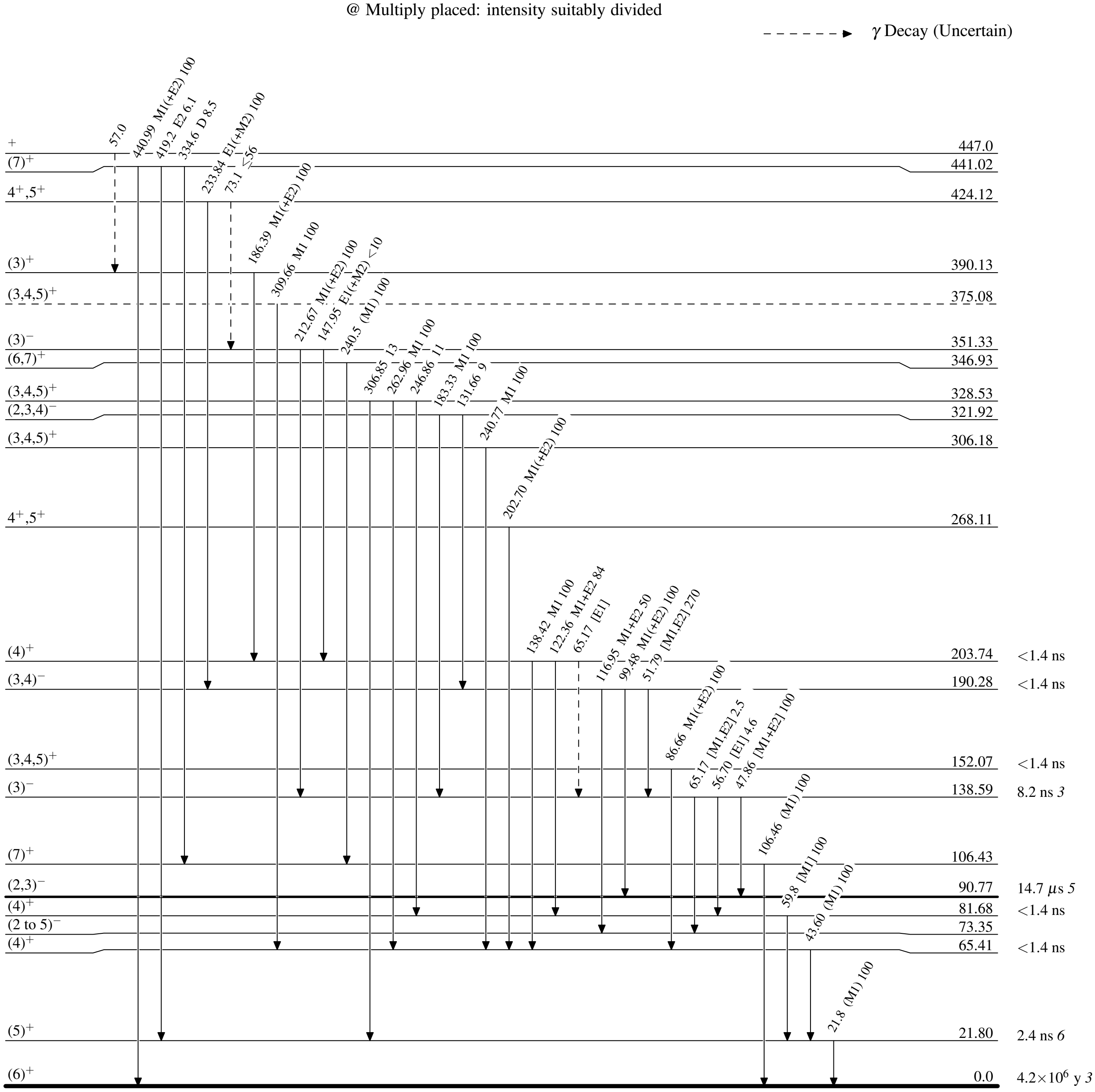
Adopted Levels, Gammas

Legend

Level Scheme (continued)

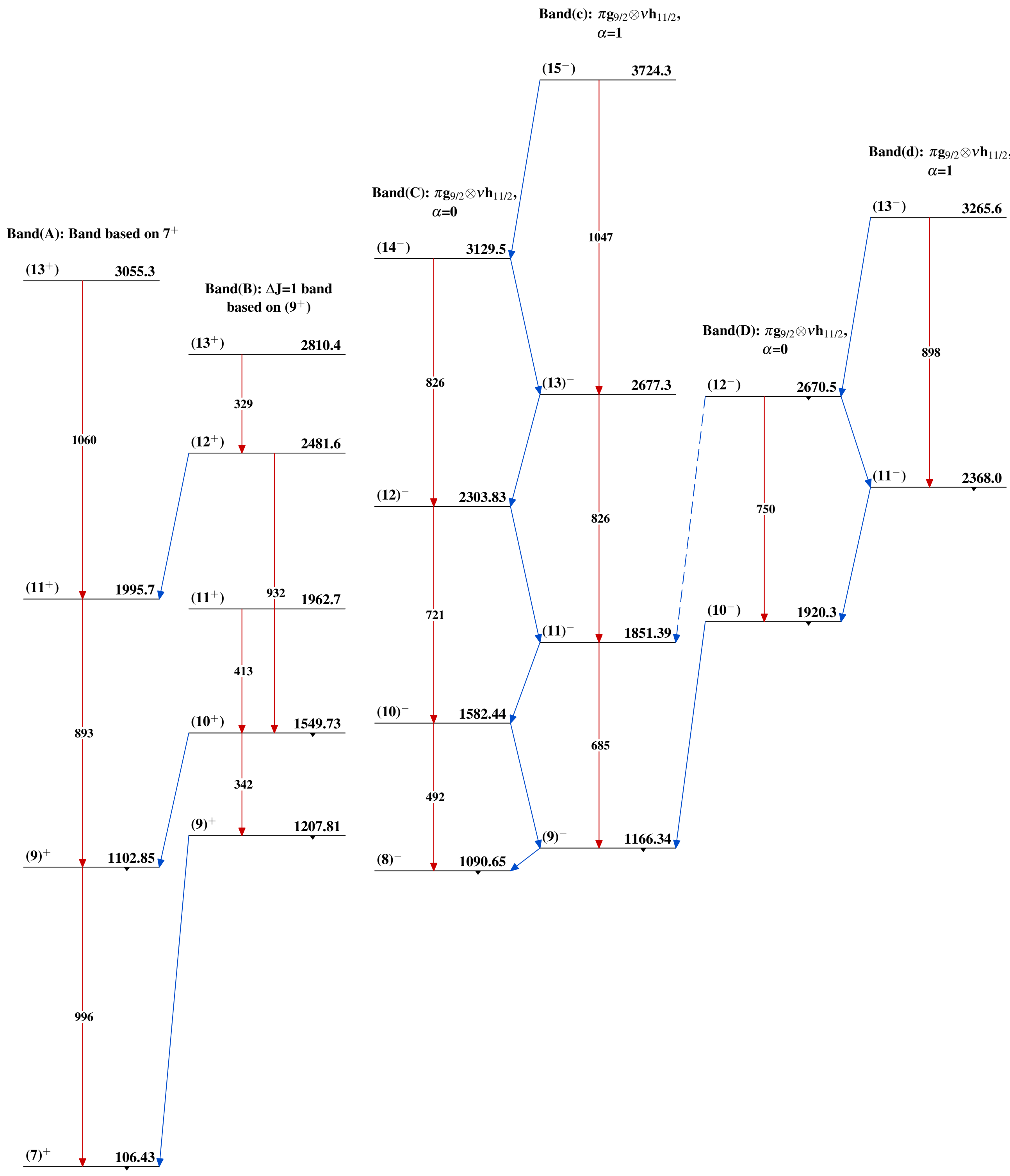
Intensities: Relative photon branching from each level

@ Multiply placed: intensity suitably divided



$^{98}_{43}Tc_{55}$

Adopted Levels, Gammas



$^{98}_{43}Tc_{55}$