Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	D. Abriola and M. Galan	NDS 110,2815 (2009)	30-Sep-2009

Q(β^-)=−6.5×10^3 *syst*; S(n)=1.07×10^4 *syst*; S(p)=2.4×10^3 *syst*; Q(α)=−2.3×10^3 *syst* 2012Wa38
Note: Current evaluation has used the following Q record −6720 syst 10880 syst 2600 syst-2500 syst 2009AuZZ.
ΔQ(β^-)=500, ΔS(n)=420, ΔS(p)=ΔQ(α)=300 (2009AuZZ).
Q(εp)=3700 *300* (syst,2009AuZZ).
The values in 2003Au03 are: Q(β^-)=−6070 *500*, S(n)=10990 *430*, S(p)=2710 *310*, Q(α)=−3090 *350*, Q(εp)=3160 *300*; all from systematics.
^{84}Nb nuclide evaluated by D. Abriola and M. Galan.

^{84}Nb Levels

Cross Reference (XREF) Flags

- A ^{84}Nb IT decay
- B ^{84}Mo ε decay
- C ^{28}Si(^{58}Ni,npγ)
- D ^{58}Ni(^{28}Si,pnγ)

E(level)†	Jπ‡	$T_{1/2}$	XREF	Comments
0.0	(1$^+$,2$^+$,3$^+$)#	9.8 s *9*	AB D	%ε+%β^+=100; %εp=? $T_{1/2}$: weighted average of 9.5 s *10* (2003Do01) and 12 s *3* (1977Ko05). Jπ: (M1) γ from (2$^+$,3$^+$); log *ft*=5.9 to 2$^+$. 2003Do01 proposed (1,2,3)$^+$ from strong β feeding to 2$^+$ in ^{84}Nb decay to ^{84}Zr; 2000Ch07 listed (2$^+$), 1999Ma23 listed 3$^+$ and 2009St04 proposed (1$^+$) from some evidence of ground state to ground state β decays in ^{84}Mo –>^{84}Nb –>^{84}Zr chain. Note that (E1) γ from 48.0, (3$^-$,4$^-$) level is inconsistent with 1$^+$.
48.0 *5*	(3$^-$,4$^-$)#		A D	Jπ: (E1) γ from (4$^+$,5$^+$).
65.0 *5*	(2$^+$,3$^+$)#		A D	Jπ: (E1) γ from (3$^-$).
162.5 *4*	(4$^+$,5$^+$)#		A D	Jπ: (E1) γ from (5$^-$).
205.0 *4*	(3$^-$)#		A D	Jπ: (E2) γ from (5$^-$).
217.5 *4*			D	
306.0 *4*			D	
337.7[a] *4*	(5$^-$)	103 ns *19*	A CD	%IT=100 $T_{1/2}$: from 2000Ch07.
358.3 *5*			D	
501.7 *6*			D	
565.7[b] *5*	(6$^-$)		CD	
570.2 *5*	(7$^+$)		CD	
574.0[c] *4*			D	
673.7 *6*			D	
770.7 *5*			D	
809.1[d] *7*			D	
865.2[&] *6*	(8$^+$)		CD	
923.9[a] *5*	(7$^-$)		CD	
1201.7[@] *6*	(9$^+$)		CD	
1205.6[c] *7*			D	
1267.1[b] *5*	(8$^-$)		CD	

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Adopted Levels, Gammas (continued)

^{84}Nb Levels (continued)

E(level)†	Jπ‡	XREF	E(level)†	Jπ‡	XREF	E(level)†	Jπ‡	XREF
1281.0[d] 8		D	2783.0[a] 8	(11⁻)	D	5376.9[&] 11	(16⁺)	D
1293.8 8		D	2986.5[@] 8	(13⁺)	CD	5470.0[@] 10	(17⁺)	CD
1535.1 7		D	3055.8[c] 10		D	5822.4[a] 11	(17⁻)	D
1590.5 8		D	3113.5[b] 8	(12⁻)	CD	5879.7 11		D
1707.4[&] 6	(10⁺)	CD	3122.6[d] 10		D	6239.6[b] 12	(18⁻)	D
1765.5[a] 6	(9⁻)	CD	3851.7[a] 9	(13⁻)	D	6760.5[&] 13	(18⁺)	D
1991.2[@] 7	(11⁺)	CD	3963.5 8		D	6903.1[@] 11	(19⁺)	CD
2049.4[c] 8		D	4041.9[&] 10	(14⁺)	CD	6993.3[a] 15	(19⁻)	D
2099.6[d] 8		D	4084.9[b] 9	(14⁻)	CD	7218.0 14		D
2120.9[b] 6	(10⁻)	CD	4086.1 11		D	7579.6[b] 13	(20⁻)	D
2527.8 9		D	4151.2[@] 9	(15⁺)	CD	8394.7[@] 12	(21⁺)	D
2628.9 9		D	4748.6[a] 10	(15⁻)	CD	8596.2 15		D
2774.5[&] 8	(12⁺)	CD	5073.0[b] 10	(16⁻)	D	9093.0[b] 13	(22⁻)	D

† From least-squares fit to Eγ.
‡ From γ-ray multipolarities and band structure (1991Gr16,1999Ma23), except when noted.
# Assignment based on weak arguments from tentative multipolarity assignments of γ rays from the 103-ns isomer assigned as (5⁻). It is assumed that spins of four intermediate levels do not increase as the isomer decays to g.s.
@ Band(A): Band based on (9⁺),α=1.
& Band(a): Band based on (8⁺),α=0.
a Band(B): Band based on (5⁻),α=1.
b Band(b): Band based on (6⁻),α=0.
c Band(C): γ cascade-1.
d Band(D): γ cascade-2.

γ(^{84}Nb)

E_i(level)	J_i^π	E_γ	I_γ†	E_f	J_f^π	Mult.	α[a]	Comments
48.0	(3⁻,4⁻)	47.4	100	0.0	(1⁺,2⁺,3⁺)	(E1)[&]	1.031	
65.0	(2⁺,3⁺)	65.0 5	100	0.0	(1⁺,2⁺,3⁺)	(M1)[&]	0.76	
162.5	(4⁺,5⁺)	114.5 5	100 15	48.0	(3⁻,4⁻)	(E1)[&]	0.0803	
		163[b]	12 3	0.0	(1⁺,2⁺,3⁺)			E_γ: tentatively proposed by 2000Ch07, Iγ estimated by the evaluators.
205.0	(3⁻)	140.0	100‡ 16	65.0	(2⁺,3⁺)	(E1)[&]	0.0436	
		205.0 5	86‡ 18	0.0	(1⁺,2⁺,3⁺)	(E1)[&]	0.0148	
217.5		217.5 5		0.0	(1⁺,2⁺,3⁺)			
306.0		100.7 5		205.0	(3⁻)			
		143.3 5	100 21	162.5	(4⁺,5⁺)			
		257.9 5		48.0	(3⁻,4⁻)			
337.7	(5⁻)	132.6 5	100‡ 12	205.0	(3⁻)	(E2)[&]	0.408	B(E2)(W.u.)=3.0 8
		175.2 5	61‡ 9	162.5	(4⁺,5⁺)	(E1)[&]	0.023	B(E1)(W.u.)=1.9×10⁻⁷ 5
358.3		140.7 5		217.5				
		196.0 5		162.5	(4⁺,5⁺)			
501.7		143.6 5		358.3				
565.7	(6⁻)	228.0[@] 3	100 8	337.7	(5⁻)	(M1,E2)		Additional information 1.
		259.8[@] 4	14 4	306.0				Additional information 2.

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Adopted Levels, Gammas (continued)

γ(^{84}Nb) (continued)

E_i(level)	J_i^π	E_γ	I_γ †	E_f	J_f^π	Mult.	Comments
570.2	(7$^+$)	232.4@ *4*	100	337.7	(5$^-$)		Additional information 3.
574.0		266.8 *5*		306.0			
		369.6 *5*		205.0	(3$^-$)		
		411.8 *5*		162.5	(4$^+$,5$^+$)		
673.7		103.6 *5*		570.2	(7$^+$)		
		172.1 *5*		501.7			
770.7		196.4 *5*		574.0			
		205.0 *5*		565.7	(6$^-$)		
		465.0 *5*		306.0			
809.1		238.8 *5*		570.2	(7$^+$)		
865.2	(8$^+$)	191.8@ *4*	7.1 *24*	673.7			Additional information 4.
		294.9@ *3*	100 *8*	570.2	(7$^+$)	(E2)	Additional information 5.
923.9	(7$^-$)	358.2@ *3*	66 *12*	565.7	(6$^-$)	(M1,E2)	Additional information 6.
		586.0@ *4*	100 *12*	337.7	(5$^-$)	(E2)	Additional information 7.
1201.7	(9$^+$)	336.4@ *3*	100	865.2	(8$^+$)	(D,E2)	Additional information 8.
		392.5 *5*	<10#	809.1			
1205.6		631.6 *5*		574.0			
1267.1	(8$^-$)	343.2 *5*	<10#	923.9	(7$^-$)		
		496.3 *5*	<10#	770.7			
		701.5@ *4*	100 *7*	565.7	(6$^-$)	(E2)	Additional information 9.
1281.0		471.8 *5*		809.1			
1293.8		484.7 *5*		809.1			
1535.1		764.4 *5*		770.7			
1590.5		296.6 *5*		1293.8			
		309.5 *5*		1281.0			
		781.7@ *9*		809.1			Additional information 10.
1707.4	(10$^+$)	505.8 *5*		1201.7	(9$^+$)		
		842.2@ *4*	100 *14*	865.2	(8$^+$)	(E2)	Additional information 11.
1765.5	(9$^-$)	498.3 *5*		1267.1	(8$^-$)		
		841.6@ *4*	100 *19*	923.9	(7$^-$)	(E2)	Additional information 12.
1991.2	(11$^+$)	283.9@ *3*	39 *3*	1707.4	(10$^+$)	(M1,E2)	Additional information 13.
		789.5@ *4*	100 *8*	1201.7	(9$^+$)	(E2)	Additional information 14.
2049.4		843.8 *5*		1205.6			
2099.6		509.1 *5*		1590.5			
		818.6 *5*		1281.0			
2120.9	(10$^-$)	853.8@ *4*	100	1267.1	(8$^-$)	(E2)	Additional information 15.
2527.8		992.7 *5*		1535.1			
2628.9		1038.4 *5*		1590.5			
2774.5	(12$^+$)	1067.0 *5*	100	1707.4	(10$^+$)	(E2)	
2783.0	(11$^-$)	1017.5 *5*		1765.5	(9$^-$)		
2986.5	(13$^+$)	212.0 *5*		2774.5	(12$^+$)		
		995.3 *5*	100 *16*	1991.2	(11$^+$)	(E2)	
3055.8		1006.4 *5*		2049.4			
3113.5	(12$^-$)	992.6@ *5*	100	2120.9	(10$^-$)	(E2)	Additional information 16.
3122.6		1023.0 *5*		2099.6			
3851.7	(13$^-$)	1068.7 *5*		2783.0	(11$^-$)		
3963.5		1972.2 *5*		1991.2	(11$^+$)		
4041.9	(14$^+$)	1267.4@ *7*	100	2774.5	(12$^+$)	(E2)	Additional information 17.
4084.9	(14$^-$)	971.4@ *4*	100	3113.5	(12$^-$)	(E2)	Additional information 18.
4086.1		1099 *1*		2986.5	(13$^+$)		

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Adopted Levels, Gammas (continued)

γ(^{84}Nb) (continued)

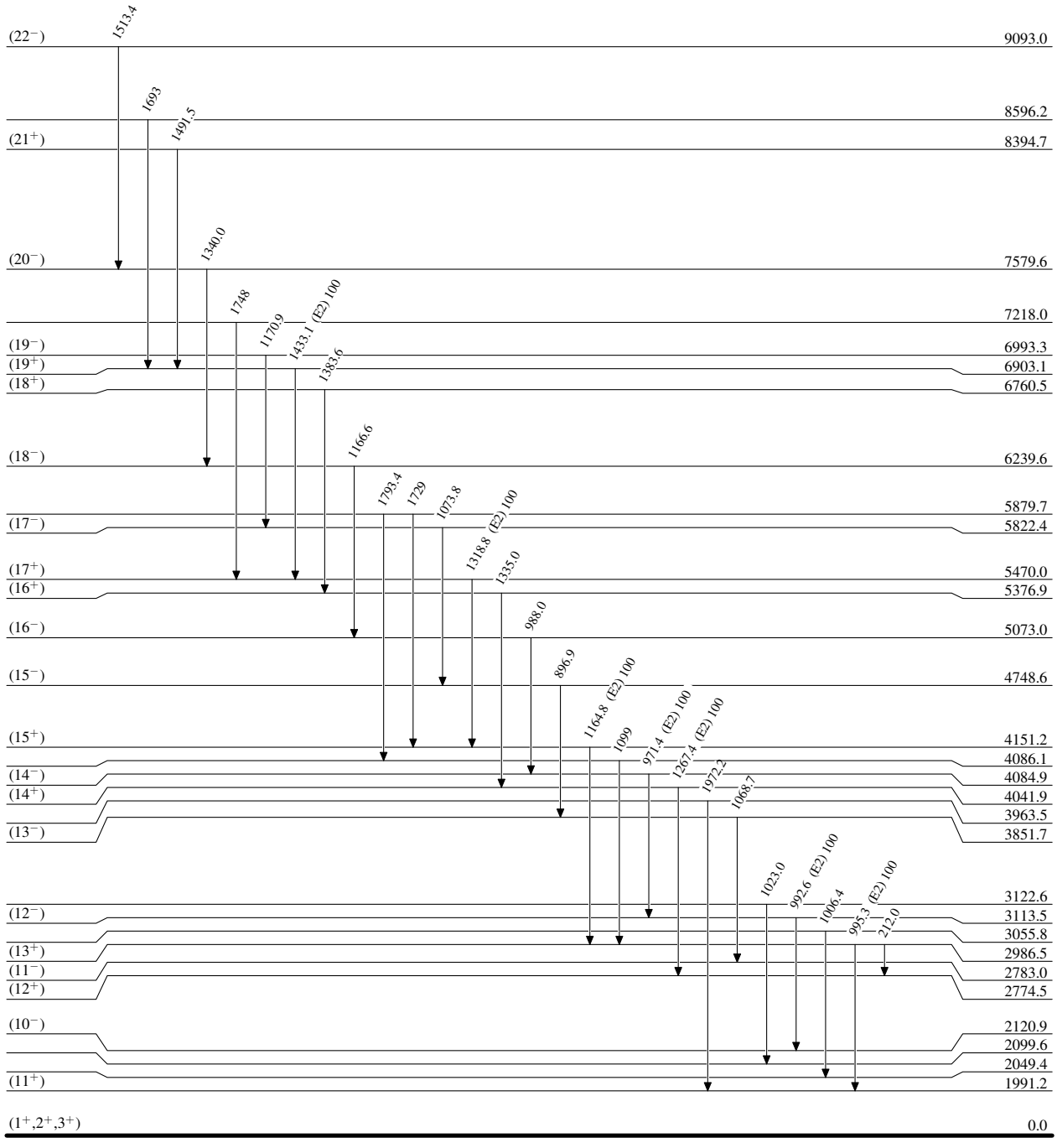
E_i(level)	J_i^π	E_γ	I_γ[†]	E_f	J_f^π	Mult.	Comments
4151.2	(15$^+$)	1164.8[@] *4*	100	2986.5	(13$^+$)	(E2)	Additional information 19.
4748.6	(15$^-$)	896.9 *5*		3851.7	(13$^-$)		
5073.0	(16$^-$)	988.0 *5*		4084.9	(14$^-$)		
5376.9	(16$^+$)	1335.0 *5*		4041.9	(14$^+$)		
5470.0	(17$^+$)	1318.8[@] *5*	100	4151.2	(15$^+$)	(E2)	Additional information 20.
5822.4	(17$^-$)	1073.8 *5*		4748.6	(15$^-$)		
5879.7		1729 *1*		4151.2	(15$^+$)		
		1793.4 *5*		4086.1			
6239.6	(18$^-$)	1166.6 *5*		5073.0	(16$^-$)		
6760.5	(18$^+$)	1383.6[@] *6*		5376.9	(16$^+$)		Additional information 21.
6903.1	(19$^+$)	1433.1[@] *5*	100	5470.0	(17$^+$)	(E2)	Additional information 22.
6993.3	(19$^-$)	1170.9		5822.4	(17$^-$)		
7218.0		1748 *1*		5470.0	(17$^+$)		
7579.6	(20$^-$)	1340.0 *5*		6239.6	(18$^-$)		
8394.7	(21$^+$)	1491.5 *5*		6903.1	(19$^+$)		
8596.2		1693 *1*		6903.1	(19$^+$)		
9093.0	(22$^-$)	1513.4 *4*		7579.6	(20$^-$)		

[†] Deduced from 1991Gr16 unless otherwise stated.
[‡] From ^{84}Nb IT decay.
[#] Estimated by evaluators from spectral Figure 2 in 1991Gr16. γ proposed in ^{58}Ni(^{28}Si,pnγ) reaction (1999Ma23).
[@] Weighted average of values in ^{28}Si(^{58}Ni,npγ) and ^{58}Ni(^{28}Si,pnγ).
[&] Tentative assignments proposed in 2000Ch07 based on γ-ray intensity-balance arguments.
[a] 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.
[b] Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

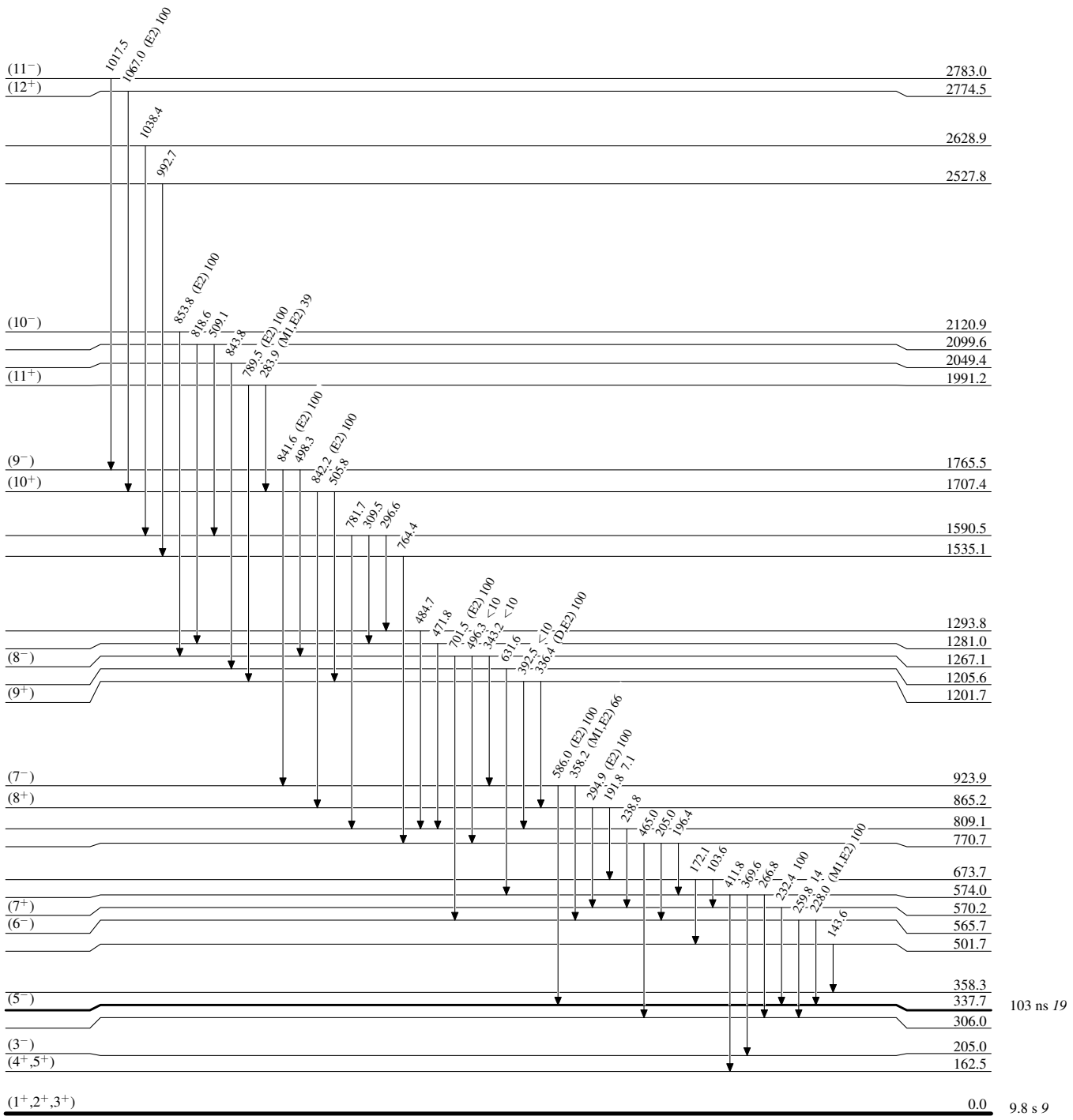


$^{84}_{41}Nb_{43}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{84}_{41}Nb_{43}$

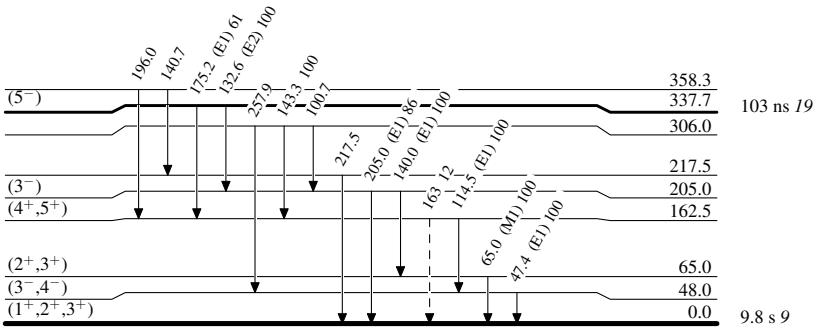
Adopted Levels, Gammas

Legend

Level Scheme (continued)

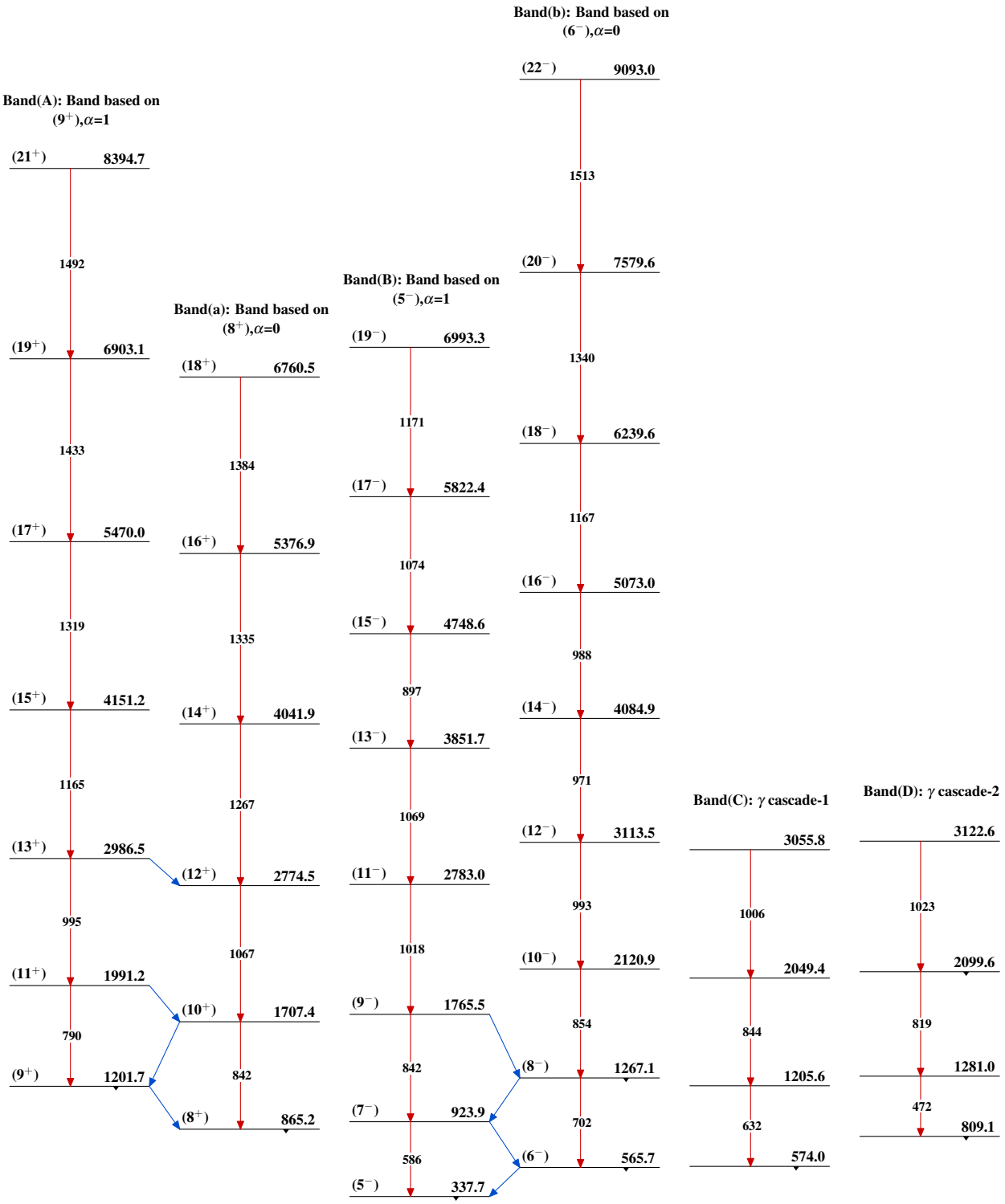
Intensities: Relative photon branching from each level

– – – – – – ► γ Decay (Uncertain)



$^{84}_{41}Nb_{43}$

Adopted Levels, Gammas



$^{84}_{41}Nb_{43}$