Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	D. De Frenne	NDS 110, 2081 (2009)	1-Mar-2009

Q(β^-)=5942 *11*; S(n)=6786 *6*; S(p)=10720 *10*; Q(α)=−6794 *8* 2012Wa38
Note: Current evaluation has used the following Q record.
Q-=5830 32 (2007Ha32).
Q(β^-)=5530 *30*; S(n)=704×10^1 *8*; S(p)=1086×10^1 *8*; Q(α)=−754×10^1 *7* 2003Au03

^{103}Nb Levels

J^π assignments are based mainly on the following arguments.
1) Observed band structure in ^{252}Cf SF decay, ^{248}Cm SF decay and ^{238}U(α,Fγ) and systematics of neighboring Nb nuclei.
2) deduced values for $(g_K-g_R)/Q[_0$,where $Q[_0$ is transitional quadrupole moment, fit well to the calculated estimates.
3) $T_{1/2}$ of 164-keV and 248-keV levels agree with Nilsson estimates.
The transitional quadrupole moment Q_t were obtained from γ half- life measurements.
All band information suggested from ^{238}U(α,Fγ) (2002Hu07).

Cross Reference (XREF) Flags

A ^{103}Zr β^- decay
B ^{248}Cm SF decay
C ^{252}Cf SF decay
D ^{238}U(α,Fγ)

E(level)†	J$^\pi$	$T_{1/2}$‡	XREF	Comments
0.0#	(5/2$^+$)	1.5 s *2*	ABCD	%β^-=100 configuration=5/2[422] Nilsson state (1984Se05,1993Li01,1991Ho16). $T_{1/2}$: from 103γ decay curve in the β^- decay of ^{103}Nb (1976Ah06,1984Sh03). Other: 1.3 s *1* (1988PaZV).
126.42@ *8*	(7/2$^+$)	73 ps *6*	ABCD	Transitional quadrupole moment Q_t=3.3 *5* (1993Li01).
163.97& *8*	(5/2$^-$)	5.1 ns *1*	ABCD	configuration=5/2[303] Nilsson state (1984Se05,1993Li01,1991Ho16). $T_{1/2}$: other: 4.7 ns *5* $\gamma\gamma$(t) in ^{103}Zr β^- decay (1984Se05).
247.72b *12*	(3/2$^-$)	1.25 ns *4*	A CD	configuration=3/2[301] Nilsson state (1984Se05,1993Li01). $T_{1/2}$: other: 2.0 ns *6* $\gamma\gamma$(t) in ^{103}Zr β^- decay (1984Se05).
285.42# *10*	(9/2$^+$)		ABCD	
314.51a *9*	(7/2$^-$)		ABCD	
367.80c *11*	(5/2$^-$)	41 ps *6*	A CD	Transitional quadrupole moment Q_t=3.8 *8* (1993Li01).
502.39& *14*	(9/2$^-$)	38 ps *9*	ABCD	Transitional quadrupole moment Q_t=4.4 *9* (1993Li01).
503.7@ *3*	(11/2$^+$)		ABCD	
533.63b *12*	(7/2$^-$)	18 ps *6*	A CD	Transitional quadrupole moment Q_t=2.6 *6* (1993Li01).
580.03 *23*			A	
619.99 *14*			A	
720.8# *4*	(13/2$^+$)		BCD	
729.8a *4*	(11/2$^-$)		D	
733.10c *15*	(9/2$^-$)	25 ps *11*	A CD	
763.14 *15*		43 ps *27*	A	
767.82 *14*			A	
856.08 *15*			A	
907.97 *17*			A	
977.16 *18*			A	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{103}Nb Levels (continued)

E(level)†	Jπ	XREF	E(level)†	Jπ	XREF	E(level)†	Jπ	XREF
980.9[b] 5	(11/2⁻)	CD	1606.3[&] 7	(17/2⁻)	CD	2387.81 14		A D
988.0[&] 5	(13/2⁻)	BCD	1643.01 17		A	2389.5[@] 8	(23/2⁺)	C
1022.5[@] 5	(15/2⁺)	BCD	1659.8[@] 7	(19/2⁺)	CD	2721.9[#] 8	(25/2⁺)	CD
1081.27 14		A	1671.54 23		A	2750.3[a] 11	(23/2⁻)	CD
1207.9 11	(13/2⁻)	D	1701.20 24		A	3153.7[&] 12	(25/2⁻)	CD
1216.30 18		A	1759.58 25		A	3194.1[@] 8	(27/2⁺)	D
1285.5[#] 6	(17/2⁺)	BCD	1960.9[#] 7	(21/2⁺)	CD	3539.3[#] 13	(29/2⁺)	D
1287.5[a] 6	(15/2⁻)	BCD	1969.0[a] 8	(19/2⁻)	CD	3607.1[a] 13	(27/2⁻)	CD
1472.43 11		A	2336.1[&] 10	(21/2⁻)	CD			
1526.42 22		A	2374.23 14		A			

† Obtained from least-squares procedure using adopted γ's.
‡ From βγ(t) in ^{103}Zr β⁻ decay (1993Li01), unless given otherwise.
[#] Band(A): π5/2[422], α=+1/2.
[@] Band(a): π5/2[422], α=−1/2.
[&] Band(B): π5/2[303], α=+1/2.
[a] Band(b): π5/2[303], α=−1/2.
[b] Band(C): π3/2[301], α=−1/2.
[c] Band(c): π3/2[301], α=+1/2.

γ(^{103}Nb)

E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π	Mult.‡	δ[#]	α[@]	Comments
126.42	(7/2⁺)	126.3 1	100	0.0	(5/2⁺)	(M1+E2)	0.137 18	0.126 2	B(M1)(W.u.)=0.131 11; B(E2)(W.u.)=1.4×10² 4
163.97	(5/2⁻)	164.01 11	100	0.0	(5/2⁺)	(D)			E_γ: weighted av from β⁻ decay, ^{252}Cf SF decay, ^{248}Cm SF decay. If E1 B(E1)(W.u.)=1.5×10⁻⁵ 2.
247.72	(3/2⁻)	247.6 2	100	0.0	(5/2⁺)	(E1)			B(E1)(W.u.)=1.62×10⁻⁵ 6 If E1 B(E1)(W.u.)=1.0×10⁻⁵ 3.
285.42	(9/2⁺)	158.9 1	100 10	126.42	(7/2⁺)	(M1+E2)		0.14 8	α(K)exp=0.09
		285.3 6		0.0	(5/2⁺)				
314.51	(7/2⁻)	150.6 1	100 7	163.97	(5/2⁻)	(M1+E2)		0.17 10	α(K)exp=0.07 8
		188.0 2	12.4 20	126.42	(7/2⁺)				
		314.2 2	20 5	0.0	(5/2⁺)				
367.80	(5/2⁻)	120.0 1	100 7	247.72	(3/2⁻)	M1+E2	0.118 19	0.143 2	B(M1)(W.u.)=0.21 4; B(E2)(W.u.)=1.9×10² 7
		203.7 2	23 3	163.97	(5/2⁻)	(M1,E2)		0.06 3	
		241.1 2	4 7	126.42	(7/2⁺)	(E1)			B(E1)(W.u.)=2.E−5 +3−2
502.39	(9/2⁻)	187.9 2	34 10	314.51	(7/2⁻)	M1+E2	0.85 16	0.075 8	B(M1)(W.u.)=0.013 6; B(E2)(W.u.)=2.3×10² 11
		338.4 2	100 13	163.97	(5/2⁻)				
503.7	(11/2⁺)	218.3 3	100 31	285.42	(9/2⁺)				
		377.4 6	9	126.42	(7/2⁺)				E_γ,I_γ: from ^{248}Cm SF.
533.63	(7/2⁻)	165.7 2	100 8	367.80	(5/2⁻)	M1+E2	0.111 18	0.0594 6	B(M1)(W.u.)=0.20 7; B(E2)(W.u.)=8.E+1 4
		219.1 2	12 3	314.51	(7/2⁻)	(M1,E2)		0.049 21	

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Adopted Levels, Gammas (continued)

$\gamma(^{103}Nb)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]	α[@]	Comments
533.63	(7/2$^-$)	285.8 *2*	13 *5*	247.72	(3/2$^-$)	(E2)	0.0270 *4*	B(E2)(W.u.)=6.E+1 *3*
580.03		46.4 *2*	100	533.63	(7/2$^-$)			
619.99		334.7 *2*	13 *4*	285.42	(9/2$^+$)			
		493.7 *2*	100 *10*	126.42	(7/2$^+$)			
720.8	(13/2$^+$)	217.1 *6*	100	503.7	(11/2$^+$)			
		435.5 *6*	18	285.42	(9/2$^+$)			
729.8	(11/2$^-$)	227.4 *6*	13	502.39	(9/2$^-$)			
		415.2 *6*	100	314.51	(7/2$^-$)			
733.10	(9/2$^-$)	199.8 *2*	55 *12*	533.63	(7/2$^-$)			
		364.9 *2*	100 *50*	367.80	(5/2$^-$)			
		418.6 *2*	37 *13*	314.51	(7/2$^-$)			
763.14		143.3 *2*	28 *9*	619.99				
		477.4 *2*	22 *9*	285.42	(9/2$^+$)			
		636.9 *2*	100 *17*	126.42	(7/2$^+$)			
767.82		234.2 *2*	27 *13*	533.63	(7/2$^-$)			
		399.9 *2*	100 *16*	367.80	(5/2$^-$)			
		453.1 *2*	41 *18*	314.51	(7/2$^-$)			
		520.4 *2*	34 *14*	247.72	(3/2$^-$)			
856.08		236.2 *2*	66 *17*	619.99				
		570.4 *2*	100 *17*	285.42	(9/2$^+$)			
		729.8 *2*	93 *24*	126.42	(7/2$^+$)			
907.97		622.6 *2*	100 *35*	285.42	(9/2$^+$)			
		781.5 *2*	40 *30*	126.42	(7/2$^+$)			
977.16		609.4 *2*	100 *35*	367.80	(5/2$^-$)			
		729.4 *2*	70 *35*	247.72	(3/2$^-$)			
980.9	(11/2$^-$)	247.2 *7*		733.10	(9/2$^-$)			
		447.9 *7*		533.63	(7/2$^-$)			
988.0	(13/2$^-$)	258.3 *7*		729.8	(11/2$^-$)			
		485.7 *7*	100	502.39	(9/2$^-$)			
1022.5	(15/2$^+$)	301.8 *6*	100	720.8	(13/2$^+$)			
		518.9 *6*	27	503.7	(11/2$^+$)			
1081.27		766.7 *2*	65 *35*	314.51	(7/2$^-$)			
		917.5 *2*	60 *55*	163.97	(5/2$^-$)			
		954.7 *2*	100 *25*	126.42	(7/2$^+$)			
1207.9	(13/2$^-$)	474.8 *10*	100	733.10	(9/2$^-$)			
1216.30		714.0 *2*	100 *56*	502.39	(9/2$^-$)			
		848.4 *2*	75 *44*	367.80	(5/2$^-$)			
1285.5	(17/2$^+$)	263.0 *6*	100	1022.5	(15/2$^+$)			
		564.8 *6*	67	720.8	(13/2$^+$)			
1287.5	(15/2$^-$)	299.3 *7*		988.0	(13/2$^-$)			
		557.5 *7*	100	729.8	(11/2$^-$)			
1472.43		1186.8 *2*	6 *4*	285.42	(9/2$^+$)			
		1308.5 *2*	6 *3*	163.97	(5/2$^-$)			
		1346.0 *2*	50 *7*	126.42	(7/2$^+$)			
		1473.2 *2*	100 *20*	0.0	(5/2$^+$)			
1526.42		1211.9 *2*	100 *30*	314.51	(7/2$^-$)			
1606.3	(17/2$^-$)	318.5 *7*		1287.5	(15/2$^-$)			
		618.7 *7*		988.0	(13/2$^-$)			
1643.01		1140.5 *2*	46 *39*	502.39	(9/2$^-$)			
		1516.7 *2*	100 *34*	126.42	(7/2$^+$)			
1659.8	(19/2$^+$)	374.4 *7*		1285.5	(17/2$^+$)			
		637.4 *7*		1022.5	(15/2$^+$)			
1671.54		1423.8 *2*	100	247.72	(3/2$^-$)			
1701.20		1198.8 *2*	100	502.39	(9/2$^-$)			
1759.58		903.5 *2*	100	856.08				
1960.9	(21/2$^+$)	301.2 *7*		1659.8	(19/2$^+$)			

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Adopted Levels, Gammas (continued)

$\gamma(^{103}Nb)$ (continued)

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π
1960.9	(21/2$^+$)	675.6 *7*		1285.5	(17/2$^+$)
1969.0	(19/2$^-$)	363.0 *7*		1606.3	(17/2$^-$)
		681.4 *7*		1287.5	(15/2$^-$)
2336.1	(21/2$^-$)	367.2 *10*		1969.0	(19/2$^-$)
		729.6 *10*		1606.3	(17/2$^-$)
2374.23		1840.7 *2*	13 *5*	533.63	(7/2$^-$)
		2088.9 *2*	46 *23*	285.42	(9/2$^+$)
		2210.0 *2*	100 *23*	163.97	(5/2$^-$)
2387.81		916.0 *2*	100 *38*	1472.43	
		1853.4 *2*	85 *34*	533.63	(7/2$^-$)
		2073.4 *2*	68 *28*	314.51	(7/2$^-$)
2389.5	(23/2$^+$)	428.6 *7*		1960.9	(21/2$^+$)
		729.8 *7*		1659.8	(19/2$^+$)
2721.9	(25/2$^+$)	332.5 *7*		2389.5	(23/2$^+$)
		761.2 *7*		1960.9	(21/2$^+$)
2750.3	(23/2$^-$)	781.3 *7*		1969.0	(19/2$^-$)
3153.7	(25/2$^-$)	817.6 *7*		2336.1	(21/2$^-$)
3194.1	(27/2$^+$)	473.0 *10*		2721.9	(25/2$^+$)
		805.6 *10*		2387.81	
3539.3	(29/2$^+$)	345.2 *10*	100	3194.1	(27/2$^+$)
3607.1	(27/2$^-$)	856.7 *7*		2750.3	(23/2$^-$)

† Unless mentioned otherwise, relative branching for each level is weighted average of data from ^{103}Zr β^- decay, ^{248}Cm SF decay, ^{252}Cf decay and ^{238}U(α,Fγ) if all available, if not, only data available data sets used. If no δE given on γ's δE=1 keV taken by the evaluator.

‡ From conversion data in ^{103}Zr β^- decay (1993LiZS).

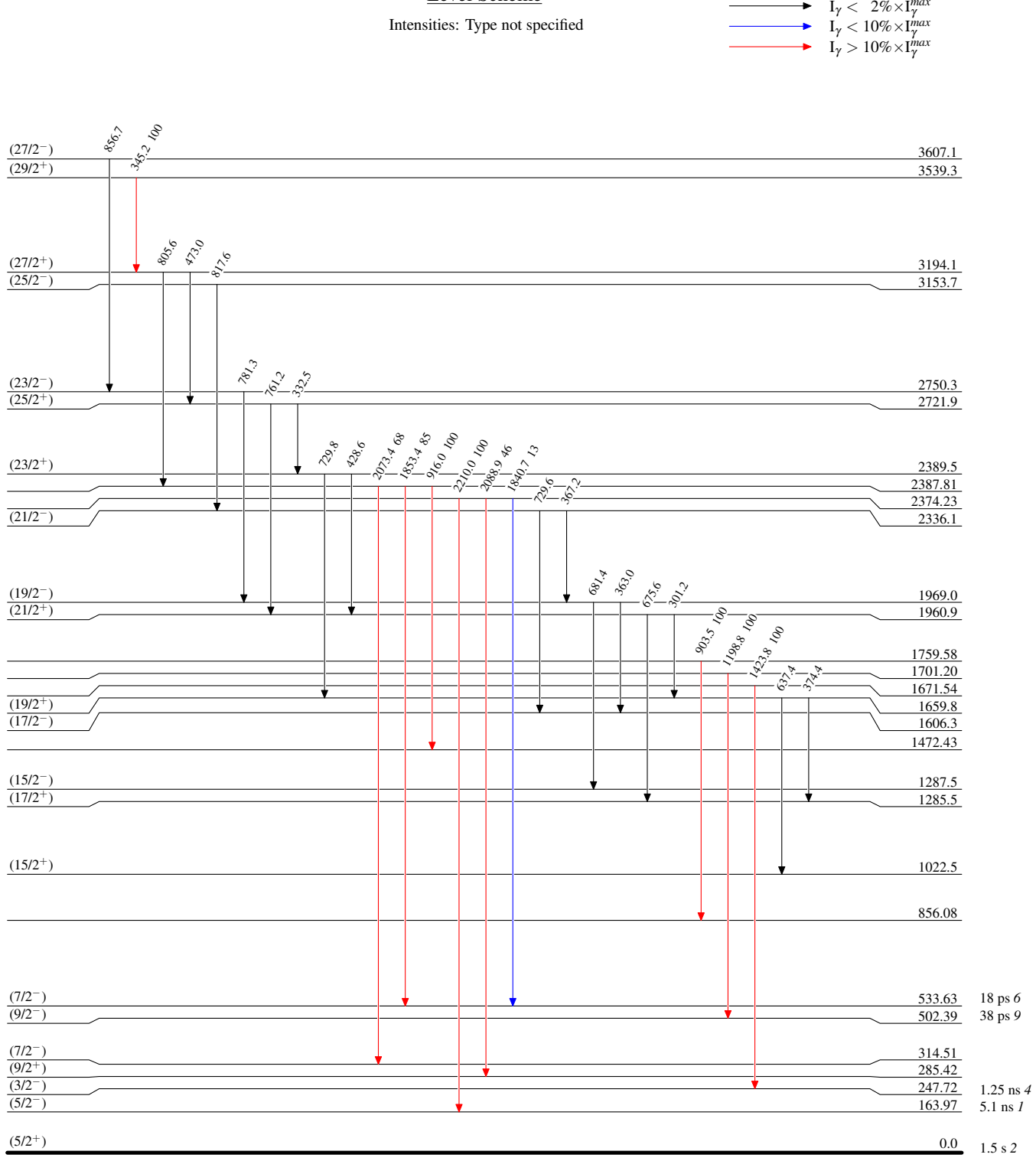
From ^{103}Zr β^- decay (1993LiZS).

@ 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.

Adopted Levels, Gammas

Level Scheme

Intensities: Type not specified

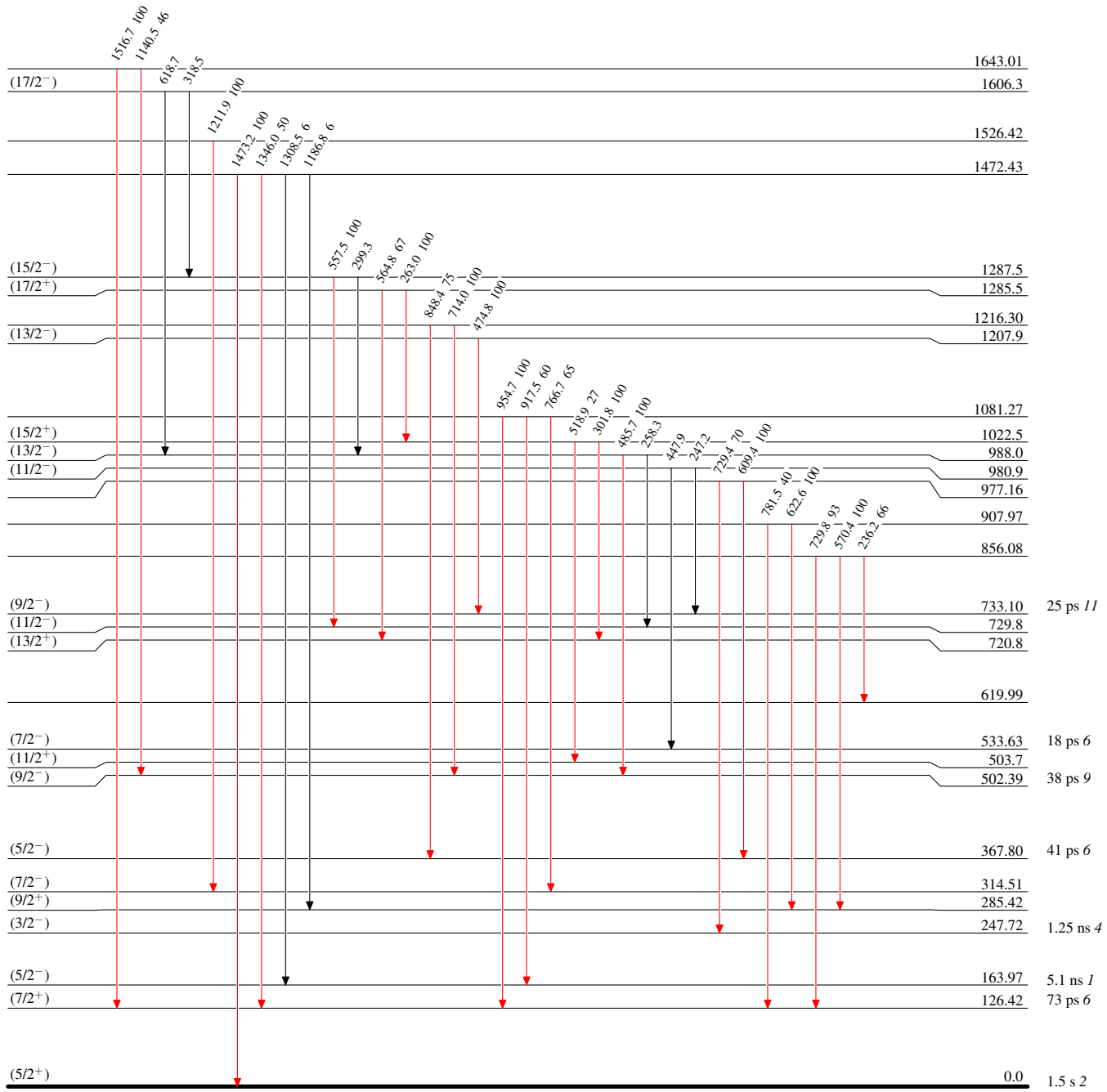


$^{103}_{41}Nb_{62}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified

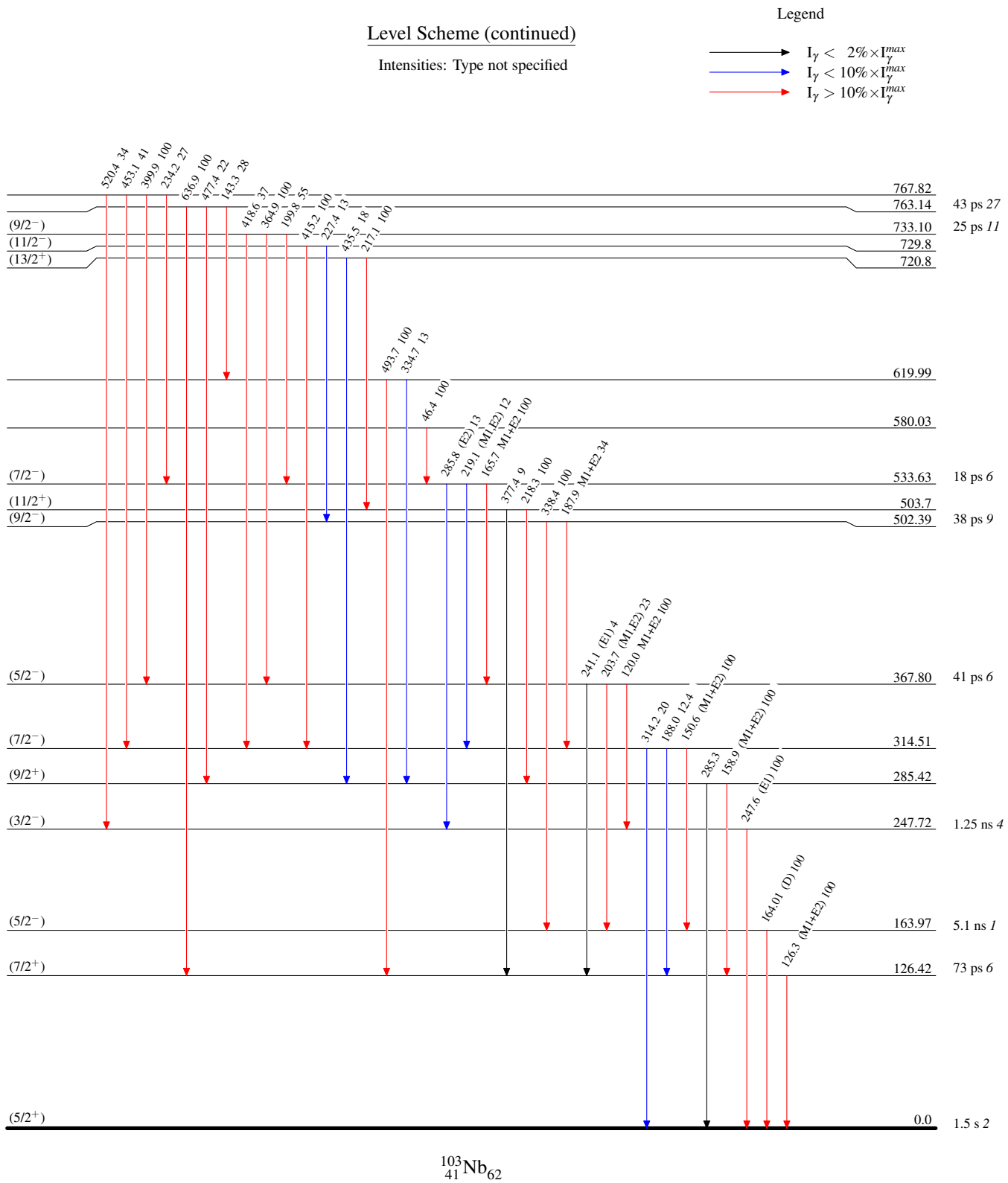


$^{103}_{41}Nb_{62}$

Adopted Levels, Gammas

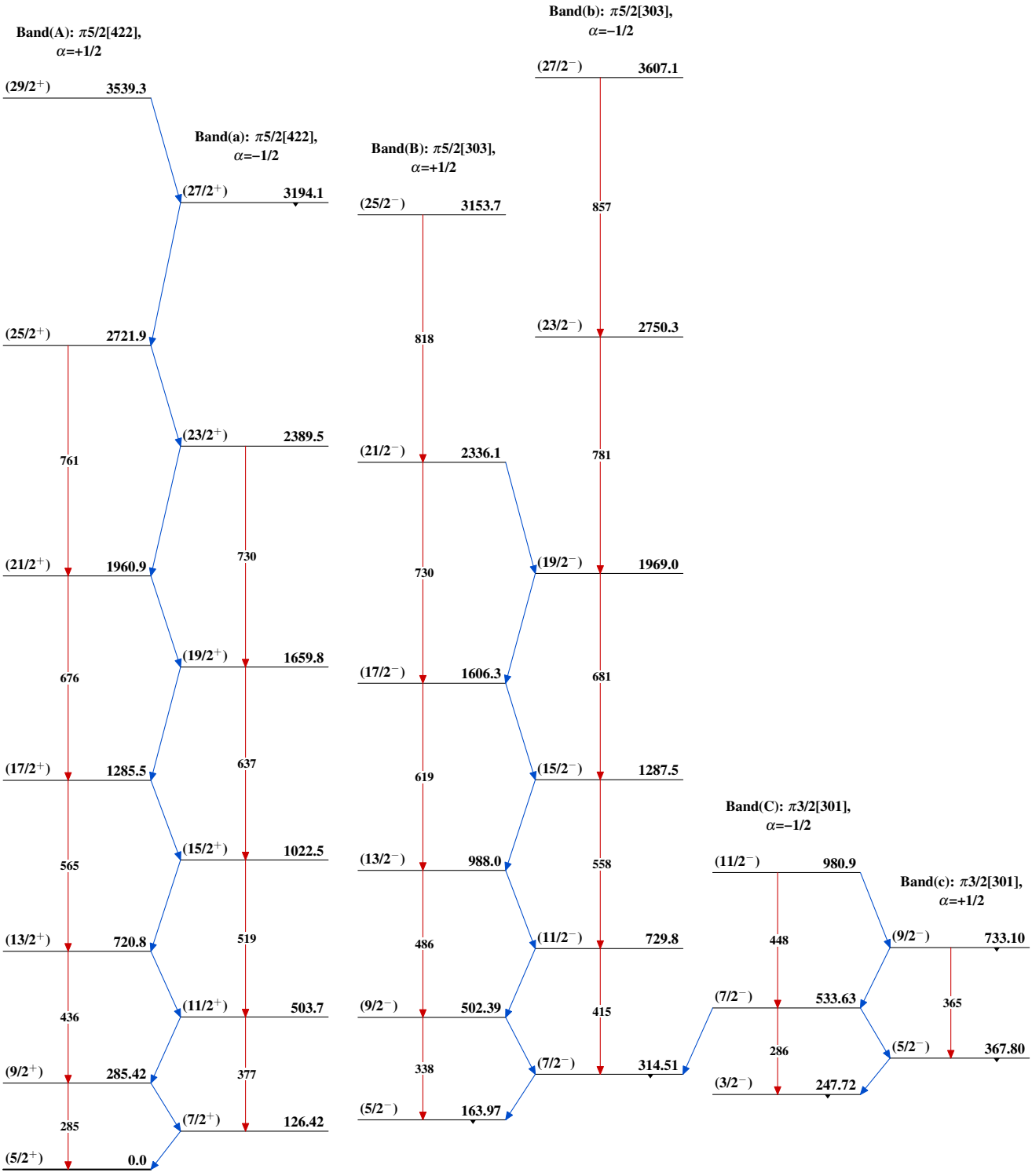
Level Scheme (continued)

Intensities: Type not specified



$^{103}_{41}Nb_{62}$

Adopted Levels, Gammas



$^{103}_{41}Nb_{62}$