

^{103}Zr β^- decay [1993Li01](#),[1993LiZS](#),[1987Gr18](#)

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

Parent: ^{103}Zr : $E=0.0$; $J^\pi=(5/2^-)$; $T_{1/2}=1.3$ s *I*; $Q(\beta^-)=6945$ 85; $\%\beta^-$ decay=100.0

[1993Li01](#), [1993LiZS](#): assignment based on mass and chemical separation of fission fragments in $^{235}\text{U}(\text{n},\text{f})$ and $^{239}\text{Pu}(\text{n},\text{f})$.

Measured: $E\gamma$, $I\gamma$, $\gamma\gamma$, $\alpha(\text{K})\text{exp}$, $\beta\gamma(\text{t})$. Deduced: ^{103}Nb levels, J^π , $T_{1/2}$, Nilsson assignments, rotational bands.

[1987Gr18](#): on-line mass separator LOHENGRIN, measured $\gamma\beta$, $Q(\beta^-)$, $E\beta$.

Others: [1988PaZV](#), [1984Se05](#).

 ^{103}Nb Levels

The transitional quadrupole moment Q_t were obtained from γ half- life measurements.

E(level) [‡]	J^π [†]	$T_{1/2}$ [#]	Comments
0.0 [@]	(5/2 ⁺)	1.5 s 2	configuration=5/2[422] (1993LiZS).
126.3 [@] 1	(7/2 ⁺)	73 ps 6	Transitional quadrupole moment $Q_t=3.3$ 5 (1993Li01).
163.9 ^{&} 1	(5/2 ⁻)	5.1 ns 1	configuration=5/2[303] (1993LiZS).
247.6 ^a 1	(3/2 ⁻)	1.25 ns 4	$T_{1/2}$: other: 4.7 ns 5 (1984Se05). configuration=3/2[301] (1993LiZS). $T_{1/2}$: other: 2.0 ns 6 (1984Se05).
285.2 [@] 2	(9/2 ⁺)		
314.7 ^{&} 2	(7/2 ⁻)		
367.5 ^a 2	(5/2 ⁻)	41 ps 6	Transitional quadrupole moment $Q_t=3.8$ 8 (1993Li01).
502.3 ^{&} 2	(9/2 ⁻)	38 ps 9	$Q=4.4$ 9 (1993Li01) Transitional quadrupole moment $Q_t=4.4$ 9 (1993Li01).
503.6 [@] 3	(11/2 ⁺)		
533.3 ^a 2	(7/2 ⁻)	18 ps 6	$Q=2.6$ 6 (1993Li01) Transitional quadrupole moment $Q_t=2.6$ 6 (1993Li01).
579.7 3			
620.0 2			
732.8 ^a 2	(9/2 ⁻)	25 ps 11	
763.1 2		43 ps 27	
767.6 2			
856.0 2			
907.8 2			
977.0 2			
1081.1 2			
1216.1 2			
1472.3 3			
1526.2 3			
1642.9 3			
1671.4 3			
1701.1 3			
1759.5 3			
2374.1 3			
2387.7 3			

[†] From Adopted Levels.

[‡] From a least-squares fit to measured γ 's.

[#] From $\beta\gamma(\text{t})$ in ^{103}Zr β^- decay ([1993Li01](#),[1993LiZS](#)).

[@] Band(A): possible member of 5/2⁺ band.

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$^{103}\text{Zr } \beta^- \text{ decay } \text{1993Li01,1993LiZS,1987Gr18 (continued)}$ ^{103}Nb Levels (continued)& Band(B): possible member of $5/2^-$ band.^a Band(C): possible member of $3/2^-$ band. β^- radiations

E(decay)	E(level)	$I\beta^-$ [†]	Comments
5.42×10^3 10	1472.3		E(decay): from 1987Gr18 , no branching given.
63.2×10^2 20	620.0		E(decay): from 1987Gr18 , no branching given.
6.64×10^3 19	367.5		E(decay): from 1987Gr18 , no branching given.
6.83×10^3 23	163.9		E(decay): from 1987Gr18 , no branching given.
(6.95×10^3) 9)	0.0	<10	From (1993LiZS).

[†] Absolute intensity per 100 decays. $\gamma(^{103}\text{Nb})$ $\alpha(\text{K})\text{exp}$: from [1993LiZS](#).

E_γ [†]	I_γ [‡]	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [#]	δ [@]	α ^{&}	Comments
46.4 2	1.4 5	579.7		533.3	(7/2 ⁻)				
120.0 1	68 5	367.5	(5/2 ⁻)	247.6	(3/2 ⁻)	M1+E2	0.118 19	0.143 2	$\alpha(\text{K})\text{exp}=0.15$ 5
126.3 1	84 13	126.3	(7/2 ⁺)	0.0	(5/2 ⁺)	(M1+E2)	0.137 18	0.126 2	$\alpha(\text{K})\text{exp}=0.12$ 3
143.3 2	1.5 5	763.1		620.0					
150.6 1	29.8 21	314.7	(7/2 ⁻)	163.9	(5/2 ⁻)	(M1+E2)		0.17 10	$\alpha(\text{K})\text{exp}=0.07$ 8
158.9 1	33 2	285.2	(9/2 ⁺)	126.3	(7/2 ⁺)	(M1+E2)		0.14 8	$\alpha(\text{K})\text{exp}=0.09$
163.9 2	94 15	163.9	(5/2 ⁻)	0.0	(5/2 ⁺)	(D)			$\alpha(\text{K})\text{exp}=0.06$ 3
165.7 2	26.7 21	533.3	(7/2 ⁻)	367.5	(5/2 ⁻)	M1+E2	0.111 18	0.0594 6	$\alpha(\text{K})\text{exp}=0.35$ 19
									$\alpha(\text{K})\text{exp}$: No explanation for very large value given, could be a typo.
187.9 2	2.7 8	502.3	(9/2 ⁻)	314.7	(7/2 ⁻)	M1+E2	0.85 16		
188.0 2	3.7 6	314.7	(7/2 ⁻)	126.3	(7/2 ⁺)				
199.8 2	3.3 7	732.8	(9/2 ⁻)	533.3	(7/2 ⁻)				
203.7 2	15.9 16	367.5	(5/2 ⁻)	163.9	(5/2 ⁻)	(M1,E2)		0.06 3	
218.3 2	3.6 11	503.6	(11/2 ⁺)	285.2	(9/2 ⁺)				
219.1 2	3.2 9	533.3	(7/2 ⁻)	314.7	(7/2 ⁻)	(M1,E2)		0.049 21	
234.2 2	1.5 7	767.6		533.3	(7/2 ⁻)				
236.2 2	1.9 5	856.0		620.0					
241.1 2	2.5 5	367.5	(5/2 ⁻)	126.3	(7/2 ⁺)	(E1)			
247.6 2	100 15	247.6	(3/2 ⁻)	0.0	(5/2 ⁺)	(E1)			No $\alpha(\text{K})\text{exp}$ given by 1993LiZS .
285.8 2	3.5 14	533.3	(7/2 ⁻)	247.6	(3/2 ⁻)	(E2)		0.0270 4	
314.2 2	5.9 16	314.7	(7/2 ⁻)	0.0	(5/2 ⁺)				
334.7 2	1.6 4	620.0		285.2	(9/2 ⁺)				
338.4 2	7.9 10	502.3	(9/2 ⁻)	163.9	(5/2 ⁻)				
364.9 2	6 3	732.8	(9/2 ⁻)	367.5	(5/2 ⁻)				
399.9 2	5.6 9	767.6		367.5	(5/2 ⁻)				
418.6 2	2.2 8	732.8	(9/2 ⁻)	314.7	(7/2 ⁻)				
453.1 2	2.3 10	767.6		314.7	(7/2 ⁻)				
477.4 2	1.2 5	763.1		285.2	(9/2 ⁺)				
493.7 2	11.7 12	620.0		126.3	(7/2 ⁺)				
520.4 2	1.9 8	767.6		247.6	(3/2 ⁻)				
570.4 2	2.9 5	856.0		285.2	(9/2 ⁺)				

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$^{103}\text{Zr } \beta^- \text{ decay}$ **1993Li01,1993LiZS,1987Gr18 (continued)** $\gamma(^{103}\text{Nb})$ (continued)

$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_i(\text{level})$	J_i^π	E_f	J_f^π	$E_\gamma^\dagger$	$I_\gamma^\ddagger$	$E_i(\text{level})$	J_i^π	E_f	J_f^π
609.4 2	2.3 8	977.0		367.5	(5/2 ⁻)	1186.8 2	3.4 19	1472.3		285.2	(9/2 ⁺)
622.6 2	2.0 7	907.8		285.2	(9/2 ⁺)	1198.8 2	10 3	1701.1		502.3	(9/2 ⁻)
636.9 2	5.4 9	763.1		126.3	(7/2 ⁺)	1211.9 2	4.7 14	1526.2		314.7	(7/2 ⁻)
714.0 2	1.6 9	1216.1		502.3	(9/2 ⁻)	1308.5 2	3.0 15	1472.3		163.9	(5/2 ⁻)
729.4 2	1.6 8	977.0		247.6	(3/2 ⁻)	1346.0 2	27 4	1472.3		126.3	(7/2 ⁺)
729.8 2	2.7 7	856.0		126.3	(7/2 ⁺)	1399.9 2	4.5 14	1526.2		126.3	(7/2 ⁺)
766.7 2	1.3 7	1081.1		314.7	(7/2 ⁻)	1423.8 2	3.5 14	1671.4		247.6	(3/2 ⁻)
781.5 2	0.8 6	907.8		126.3	(7/2 ⁺)	1473.2 2	54 11	1472.3		0.0	(5/2 ⁺)
848.4 2	1.2 7	1216.1		367.5	(5/2 ⁻)	1516.7 2	4.1 14	1642.9		126.3	(7/2 ⁺)
903.5 2	4.7 23	1759.5		856.0		1840.7 2	1.7 7	2374.1		533.3	(7/2 ⁻)
916.0 2	6.5 25	2387.7		1472.3		1853.4 2	5.5 22	2387.7		533.3	(7/2 ⁻)
917.5 2	1.2 11	1081.1		163.9	(5/2 ⁻)	2073.4 2	4.4 18	2387.7		314.7	(7/2 ⁻)
954.7 2	2.0 5	1081.1		126.3	(7/2 ⁺)	2088.9 2	6 3	2374.1		285.2	(9/2 ⁺)
1140.5 2	1.9 16	1642.9		502.3	(9/2 ⁻)	2210.0 2	13 3	2374.1		163.9	(5/2 ⁻)

[†] From [1993LiZS](#). ΔE estimated by the evaluator.

[‡] From [1993LiZS](#). Others: [1984Se05](#), [1988PaZV](#).

From $\alpha(K)\text{exp}$ obtained with fluorescence yield method.

@ Deduced from branching ratios by [1993Li01](#).

& 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.

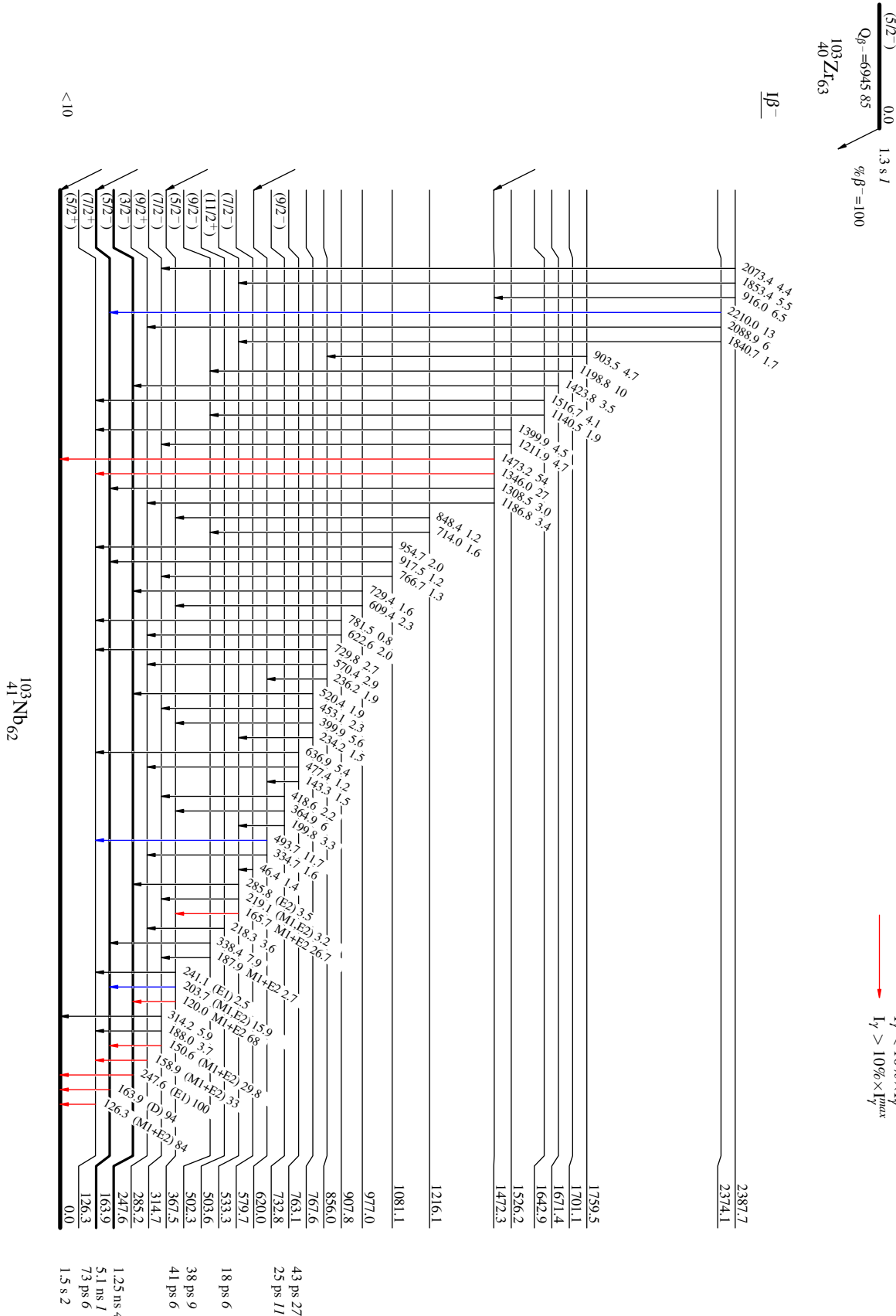
¹⁰³Zr β⁻ decay 1993LI01,1993LIZS,1987Gr18

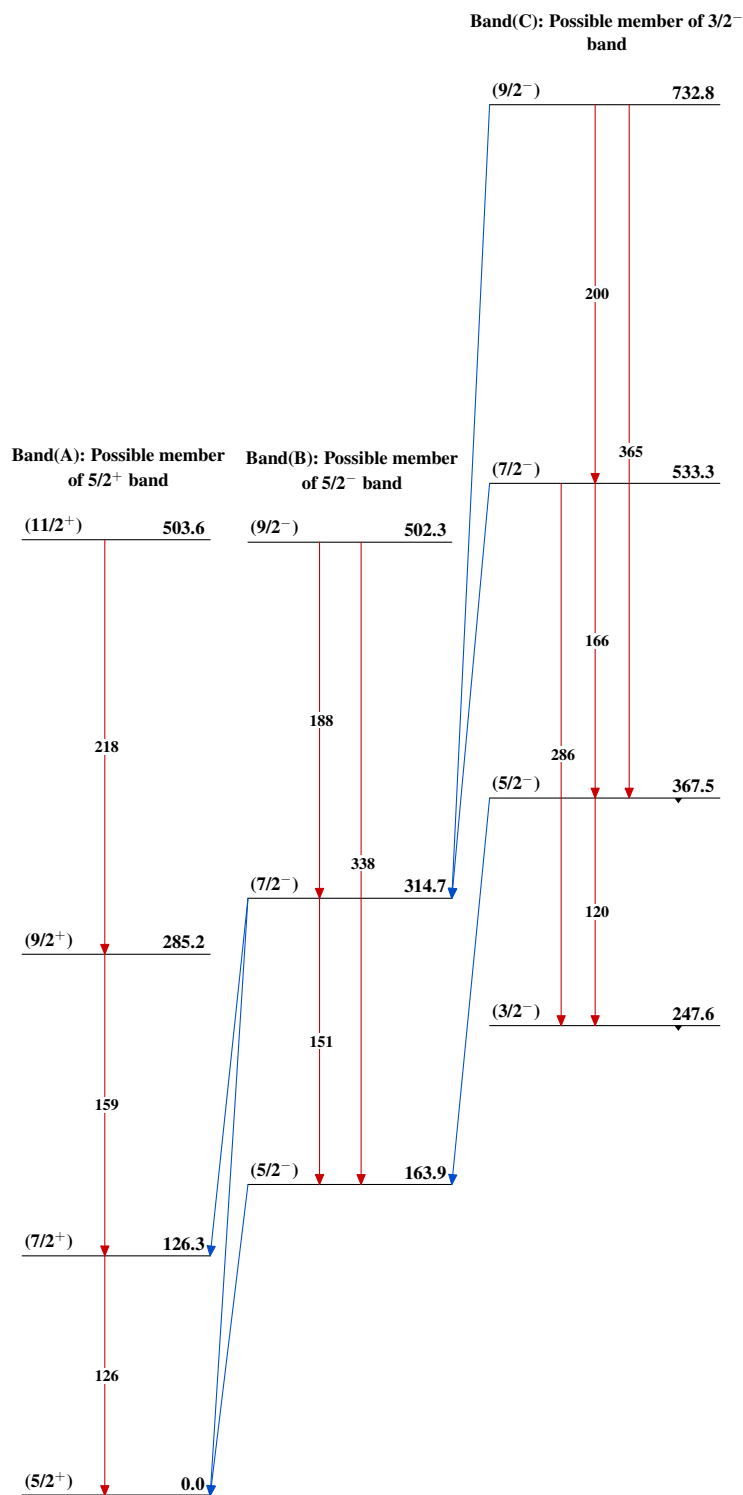
Decay Scheme

Intensities: Relative I_γ

Legend

→ I_γ < 2% × I_{γmax}
→ I_γ < 10% × I_{γmax}
→ I_γ > 10% × I_{γmax}



$^{103}\text{Zr} \beta^- \text{ decay}$ 1993Li01,1993LiZS,1987Gr18

 $^{103}_{41}\text{Nb}_{62}$