^{94}Zr(α,nγ)   1972Me03

	Type	Author	History Citation	Literature Cutoff Date
	Full Evaluation	N. Nica	NDS 111, 525 (2010)	19-Nov-2009

1972Me03: ^{94}Zr(α,nγ) Eα=12-43 MeV, chem; measured Eγ, Iγ, excit, $\gamma\gamma$, $\gamma(\theta)$, γ(pol), (α)γ(t);Ge(Li).
1992Ko08: Eα=16 MeV; measured Ag(t) by pulsed beam method.

^{97}Mo Levels

A search for isomeric transition with lifetimes longer than 10 ns was performed by 1972Me03. No such transitions were found. Thus, all levels have T$_{1/2}$<7 ns.

E(level)	J$^{\pi\dagger}$	T$_{1/2}$†	Comments
0.0	5/2$^+$	stable	
480.9	3/2$^+$	8.5 ps *4*	J$^{\pi}$: 3/2 from 480.9γ excit.
658.1	7/2$^+$	2.0 ps *5*	J$^{\pi}$: 7/2 from 658.1γ excit, $\gamma(\theta)$.
679.6	1/2$^+$	28.9 ps *19*	J$^{\pi}$: 1/2 from 679.6γ excit, $\gamma(\theta)$.
719.0	5/2$^+$	10 ps *5*	J$^{\pi}$: 3/2,5/2,7/2 from 238.2γ excit; 5/2,7/2 from 718.9γ excit.
888.2	1/2$^+$	2.7 ps *9*	J$^{\pi}$: 1/2,3/2 from 407.3γ excit.
1024.7	7/2$^+$	0.55 ps *12*	J$^{\pi}$: 7/2 from 1024.7γ excit, $\gamma(\theta)$.
1092.7?	3/2$^+$	1.3 ps +*16−7*	J$^{\pi}$: 1/2 or 3/2 from 1092.7γ excit.
1116.9	9/2$^+$	1.20 ps *8*	J$^{\pi}$: 9/2 from 1116.9γ excit, $\gamma(\theta)$.
1268.8	7/2$^+$	0.53 ps *20*	J$^{\pi}$: 7/2 or 9/2 from 1269.0γ excit.
1284.5	3/2$^+$,5/2$^+$	0.7 ps +*5−6*	J$^{\pi}$: 1/2 or 3/2 from 1284.5γ excit.
1322.1?	3/2	<7‡ ns	
1409.5	11/2$^+$	<7‡ ns	J$^{\pi}$: 9/2 or 11/2 from 751.5γ excit.
1437.3	11/2$^-$	2.5 ns *3*	J$^{\pi}$: 9/2,11/2 from 320.4γ excit. T$_{1/2}$: from 1992Ko08.
1515.6	9/2$^+$	1.48 ps *23*	J$^{\pi}$: 5/2 to 9/2 from 246.4γ, 1515.1γ excit.
1545.2	(7/2$^+$,9/2$^+$,11/2$^+$)	<7‡ ns	J$^{\pi}$: 7/2,9/2,11/2 from 428.3γ excit.
1565.1?	(7/2)	<7‡ ns	J$^{\pi}$: 3/2 to 7/2 from 1565.1γ excit.
1626.8	7/2$^+$	<7‡ ns	J$^{\pi}$: 1/2 to 7/2 from 907.8γ excit.
1783?	(11/2$^+$)	<7‡ ns	
1921.3?	13/2$^+$	<7‡ ns	J$^{\pi}$: 7/2 to 11/2 from 804.4γ excit.
1939.7?	(5/2$^+$)	<7‡ ns	J$^{\pi}$: 3/2,5/2 from 823.0γ excit.

† From Adopted Levels, unless otherwise indicated.
‡ From 1972Me03.

$\gamma(^{97}$Mo)

E$_{\gamma}$	I$_{\gamma}$†	E$_i$(level)	J$^{\pi}_i$	E$_f$	J$^{\pi}_f$	Comments
^{x}117.0 *3*	0.7 *1*					
^{x}123.2 *3*	0.5 *1*					
^{x}125.2 *3*	0.6 *1*					
^{x}138.1 *3*	0.9 *1*					
238.2 *3*	14.4 *14*	719.0	5/2$^+$	480.9	3/2$^+$	Mult.,δ: $-0.10\leq\delta\leq+0.02$; ΔJ $\neq$ 0. Adopted value: -0.06 *6* from Coul. ex.
246.4$^{\#}$ *3*	3.0 *3*	1515.6	9/2$^+$	1268.8	7/2$^+$	δ: $0.00\leq\delta\leq+0.12$.
^{x}277.7 *3*	0.8 *1*					
293.2 *3*	1.9 *2*	1409.5	11/2$^+$	1116.9	9/2$^+$	

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^{94}Zr(α,nγ)   **1972Me03** **(continued)**

$\gamma(^{97}$Mo) (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
320.4 *3*	34 *3*	1437.3	11/2$^-$	1116.9	9/2$^+$	E1	Mult.: from adopted gammas. δ: +0.02≤δ≤+0.06.
^{x}352.3 *3*	1.3 *1*						
366.2 *3*	0.8 *1*	1024.7	7/2$^+$	658.1	7/2$^+$		
374.1$^{\#\&}$ *3*	1.4 *1*	1092.7?	3/2$^+$	719.0	5/2$^+$		
397.6 *3*	1.0 *1*	1116.9	9/2$^+$	719.0	5/2$^+$		
407.3 *3*	7.7 *8*	888.2	1/2$^+$	480.9	3/2$^+$		
413.8$^{\#\&}$ *3*	0.8 *1*	1092.7?	3/2$^+$	679.6	1/2$^+$		
428.3 *3*	5.9 *6*	1545.2	(7/2$^+$,9/2$^+$,11/2$^+$)	1116.9	9/2$^+$	(M1+E2)	δ: +0.06≤δ≤+0.15.
458.9 *3*	0.6 *1*	1116.9	9/2$^+$	658.1	7/2$^+$		
480.9 *3*	71 *7*	480.9	3/2$^+$	0.0	5/2$^+$	(M1+E2)	δ: −0.12≤δ≤−0.02; adopted value: +0.47 *3* from Coul. ex.
^{x}532.2 *3*	0.6 *1*						
549.7 *3*	6.3 *6*	1268.8	7/2$^+$	719.0	5/2$^+$		δ: −0.08≤δ≤+0.04; adopted value: 0.8 *3*.
^{x}565.0 *3*	11.5 *12*						
610.2$^{\#}$ *3*	3.2 *3*	1268.8	7/2$^+$	658.1	7/2$^+$		
658.1 *3*	100.0	658.1	7/2$^+$	0.0	5/2$^+$		δ: −0.06≤δ≤+0.01; adopted value: −0.05 *3* from $\gamma(\theta)$ from polarized nuclei (^{97}Nb β^- decay).
666.0$^{\&}$ *3*	4.3 *4*	1783?	(11/2$^+$)	1116.9	9/2$^+$		
^{x}673.0 *3*	2.8 *3*						
679.6 *3*	12.5 *13*	679.6	1/2$^+$	0.0	5/2$^+$		
718.9 *3*	≈30	719.0	5/2$^+$	0.0	5/2$^+$		
^{x}720.7 *3*	≈30						Initial J=5/2 or 7/2 from excit.
751.5 *3*	36 *4*	1409.5	11/2$^+$	658.1	7/2$^+$	(E2)	Mult.: stretched Q from $\gamma(\theta)$, RUL excludes M2.
758.5$^{\&}$ *3*	5.5 *6*	1783?	(11/2$^+$)	1024.7	7/2$^+$		
787.0$^{\&}$ *3*	6.5 *6*	1268.8	7/2$^+$	480.9	3/2$^+$		
^{x}789.6 *3*	8.2 *8*						
797.3 *3*	4.6 *5*	1515.6	9/2$^+$	719.0	5/2$^+$		
804.4$^{@\&}$ *3*	20$^{@}$ *2*	1284.5	3/2$^+$,5/2$^+$	480.9	3/2$^+$		
804.4$^{@}$ *3*	20$^{@}$ *2*	1921.3?	13/2$^+$	1116.9	9/2$^+$		
823.0$^{\&}$ *3*	5.7 *6*	1939.7?	(5/2$^+$)	1116.9	9/2$^+$		
^{x}838.4 *3*	2.8 *3*						
841.2$^{\&}$ *3*	4.2 *4*	1322.1?	3/2	480.9	3/2$^+$		
858.0 *3*	3.3 *3*	1515.6	9/2$^+$	658.1	7/2$^+$		
907.8$^{\&}$ *3*	3.0 *3*	1626.8	7/2$^+$	719.0	5/2$^+$		
1024.7 *3*	44 *4*	1024.7	7/2$^+$	0.0	5/2$^+$		δ: −0.25≤δ≤−0.13. Adopted value: −0.54 +*14*−*24* from Coul. ex.
^{x}1039.8 *3*	7.7 *8*						Initial J=5/2 or 7/2 from excit.
1092.7$^{\&}$ *3*	8.4 *8*	1092.7?	3/2$^+$	0.0	5/2$^+$		δ: −0.24≤δ≤−0.04. Adopted value: +0.51 +*24*−*15* from Coul. ex.
1116.9 *3*	94 *9*	1116.9	9/2$^+$	0.0	5/2$^+$		
^{x}1128.7 *3*	4.2 *4*						
^{x}1149.7 *3*	2.5 *3*						
^{x}1174.3 *3*	1.3 *1*						
^{x}1189.8 *3*	1.8 *2*						
^{x}1239.7 *3*	1.7 *2*						
^{x}1250.1 *3*	2.6 *3*						
^{x}1265.3 *3*	7.9 *8*						Initial J=1/2 to 5/2 from excit.
1269.0 *3*	15.4 *15*	1268.8	7/2$^+$	0.0	5/2$^+$		
1281.8$^{\&}$ *3*	3.7 *4*	1939.7?	(5/2$^+$)	658.1	7/2$^+$		
1284.5 *3*	4.9 *5*	1284.5	3/2$^+$,5/2$^+$	0.0	5/2$^+$		

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^{94}Zr(α,nγ)   1972Me03 (continued)

γ(^{97}Mo) (continued)

E$_\gamma$	I$_\gamma$†	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Comments
^{x}1312.5 *3*	1.6 *2*					
^{x}1331.3 *3*	1.8 *2*					
^{x}1336.7 *3*	1.2 *1*					
1515.1 *3*	9.8 *10*	1515.6	9/2$^+$	0.0	5/2$^+$	
1565.1 *3*	12.6 *13*	1565.1?	(7/2)	0.0	5/2$^+$	δ: $-0.02 \leq \delta \leq +0.08$.
^{x}1761	5.4 *5*					
^{x}1788	2.7 *3*					
^{x}1846	2.4 *2*					

† Relative intensity at Eα=14 MeV, 125°.

‡ Deduced from $\gamma(\theta)$ and γ(pol).

$^\#$ γ not seen in other experiments, not placed in adopted level scheme.

$^@$ Multiply placed with undivided intensity.

$^\&$ Placement of transition in the level scheme is uncertain.

^{x} γ ray not placed in level scheme.

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Level Scheme

Intensities: Relative I$_\gamma$
& Multiply placed: undivided intensity given

Legend

→ I$_\gamma$ < 2%×I$_\gamma^{max}$
→ I$_\gamma$ < 10%×I$_\gamma^{max}$
→ I$_\gamma$ > 10%×I$_\gamma^{max}$
⇢ γ Decay (Uncertain)

Transition labels: 1281.8 3.7; 823.0 5.7; 804.4 20&; 758.5 5.5; 666.0 4.3; 907.8 3.0; 1565.1 12.6; 428.3 (M1+E2) 5.9; 1515.1 9.8; 858.0 3.3; 797.3 4.6; 246.4 3.0; 320.4 E1 34; 751.5 (E2) 36; 293.2 1.9; 841.2 4.2; 1284.5 4.9; 804.4 20&; 1269.0 15.4; 787.0 6.5; 610.2 3.2; 549.7 6.3; 1116.9 94; 458.9 0.6; 397.6 1.0; 1092.7 8.4; 413.8 0.8; 374.1 1.4; 1024.7 44; 366.2 0.8; 407.3 7.7; 718.9 ≈30; 238.2 14.4; 679.6 12.5; 658.1 100.0; 480.9 (M1+E2) 71

Levels (energy, J$^\pi$, lifetime):
(5/2$^+$) 1939.7 <7 ns
13/2$^+$ 1921.3 <7 ns
(11/2$^+$) 1783 <7 ns
7/2$^+$ 1626.8 <7 ns
(7/2) 1565.1 <7 ns
(7/2$^+$,9/2$^+$,11/2$^+$) 1545.2 <7 ns
9/2$^+$ 1515.6 1.48 ps 23
11/2$^-$ 1437.3 2.5 ns 3
11/2$^+$ 1409.5 <7 ns
3/2 1322.1 <7 ns
3/2$^+$,5/2$^+$ 1284.5 0.7 ps +5−6
7/2$^+$ 1268.8 0.53 ps 20
9/2$^+$ 1116.9 1.20 ps 8
3/2$^+$ 1092.7 1.3 ps +16−7
7/2$^+$ 1024.7 0.55 ps 12
1/2$^+$ 888.2 2.7 ps 9
5/2$^+$ 719.0 10 ps 5
1/2$^+$ 679.6 28.9 ps 19
7/2$^+$ 658.1 2.0 ps 5
3/2$^+$ 480.9 8.5 ps 4
5/2$^+$ 0.0 stable

$^{97}_{42}$Mo$_{55}$