

$^{86}\text{Sr}(\alpha, n\gamma), ^{87}\text{Sr}(\alpha, 2n\gamma)$ 1974Bi13, 1979Nu03

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 114, 1 (2013)	20-Oct-2012

1974Bi13: $(\alpha, n\gamma)$ E=12.6 MeV. Measured γ , $\gamma(\theta)$, lifetimes by DSA.

1979Nu03: $(\alpha, n\gamma)$ and $(\alpha, 2n\gamma)$ E=28 MeV. Measured γ , $\gamma\gamma$, $\gamma(\theta)$.

 ^{89}Zr Levels

E(level) [‡]	J π [#]	T _{1/2} [†]	Comments
0.0	9/2 ⁺		
588.0 3	1/2 ⁻	4.161 min	T _{1/2} : from Adopted Levels.
1095.07 25	3/2 ⁻		
1451.5 3	5/2 ⁻	>3.5 ps	
1511.84 19	(9/2) ⁺	0.53 ps 10	
1627.52 19	5/2 ⁺	0.40 ps 3	
1742.8 5	1/2 ⁻	0.40 ps 10	
1833.7 3	5/2 ⁺	0.56 ps 12	
1864.8 4	3/2 ⁻	0.17 ps 3	
1944.13 18	(13/2) ⁺	0.74 ps 11	
2086.7 10	(5/2) ⁺	>2 ps	
2100.0 3	5/2 ⁻	76 fs 14	
2101.6 3	(7/2) ⁺	104 fs 14	
2121.6 3	13/2 ⁻	>3.5 ps	
2128.6 3	(7/2 ⁺)		
2132.4 3	(7/2 ⁺ , 9/2 ⁺)		
2219.8 3	(9/2 ⁻)	24 fs 7	
2298.1 4	(7/2) ⁺	87 fs 14	
2388.5 7	(5/2) ⁺	0.13 ps 4	
2454.6 6	(15/2) ⁻		
2567.5 6	(1/2, 3/2, 5/2) ⁺	0.10 ps 4	
2724.8 6	(17/2) ⁺		
2756.0 4	(7/2 ⁺)	0.35 ps 19	
2995.6 8	(21/2) ⁺		
3109.8 8	(19/2) ⁺		
3576.2 9	(23/2) ⁺		

[†] From DSA measurements (1974Bi13).

[‡] From least-squares fit to E γ data.

[#] From Adopted Levels.

 $\gamma(^{89}\text{Zr})$ -----
Relative γ -ray intensities (1979Nu03)

E γ	I γ ($\alpha, n\gamma$)	I γ ($\alpha, 2n\gamma$)
177.0	39.5	31.6
270.8	15.3	25.8
333.0	4.8	
385.0	4.0	
580.6	4.6	10.5
587.7	21.5	4.9
780.7	28.5	40.8
1511.4	12.9	10.2
1943.6	100.0	100.0
2121.4	24.5	25.5
2219.9	17.3	33.0

E_γ [†]	I_γ [@]	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. ^a	Comments
177.0 [#] 5	8.0 14	2121.6	13/2 ⁻	1944.13	(13/2) ⁺		I_γ : from $I_\gamma(177\gamma)/I_\gamma(2122\gamma)=1.38$ 18 (weighted average from 1979Nu03). $A_2=+0.309$ 22, $A_4=-0.03$ 3 (1979Nu03).
270.8 [#] 5		2995.6	(21/2) ⁺	2724.8	(17/2) ⁺		
333.0 [#] 5		2454.6	(15/2) ⁻	2121.6	13/2 ⁻		
356.6 [‡] 2	10.7 5	1451.5	5/2 ⁻	1095.07	3/2 ⁻	D	$A_2=-0.20$ 2 (1974Bi13).
385.0 [#] 5		3109.8	(19/2) ⁺	2724.8	(17/2) ⁺		
507.4 7		1095.07	3/2 ⁻	588.0	1/2 ⁻		E_γ : from Adopted Gammas. I_γ : the transition may be masked by the 511 $\gamma^\pm$ peak. From intensity balance $I_\gamma \geq 340$.
532.4 [‡] 2	3.4 5	1627.52	5/2 ⁺	1095.07	3/2 ⁻		
580.6 [#] 5		3576.2	(23/2) ⁺	2995.6	(21/2) ⁺	D	$A_2=-0.49$ 12, $A_4=-0.09$ 17 (1979Nu03).
587.7 [#] 5	100.0 6	588.0	1/2 ⁻	0.0	9/2 ⁺	(M4)	Mult.: from Adopted Gammas. $A_2=-0.03$ 5, $A_4=-0.04$ 7 (1979Nu03).
649.1 [‡] 4	3.0 5	2100.0	5/2 ⁻	1451.5	5/2 ⁻		
702.7 [‡] 4	1.7 5	2567.5	(1/2,3/2,5/2) ⁺	1864.8	3/2 ⁻		
769.7 [‡] 2	9.9 5	1864.8	3/2 ⁻	1095.07	3/2 ⁻		$A_2=+0.08$ 8 (1974Bi13).
780.7 [#] 5		2724.8	(17/2) ⁺	1944.13	(13/2) ⁺	Q	$A_2=+0.34$ 4, $A_4=-0.09$ 5 (1979Nu03).
863.4 [‡] 2	19.0 6	1451.5	5/2 ⁻	588.0	1/2 ⁻		$A_2=+0.23$ 2 (1974Bi13).
921.7 [‡] 7	4.2 5	2756.0	(7/2 ⁺)	1833.7	5/2 ⁺		
991.7 [‡]		2086.7	(5/2) ⁺	1095.07	3/2 ⁻	D	$A_2=-0.38$ 15 (1974Bi13).
1004.8 [‡] 2	9.9 6	2100.0	5/2 ⁻	1095.07	3/2 ⁻	D	$A_2=-0.23$ 5 (1974Bi13).
1128.6 [‡] 3	4.5 6	2756.0	(7/2 ⁺)	1627.52	5/2 ⁺		
1154.8 [‡] 3	6.2 5	1742.8	1/2 ⁻	588.0	1/2 ⁻		$A_2=-0.05$ 9 (1974Bi13).
1511.9 2	26.3 7	1511.84	(9/2) ⁺	0.0	9/2 ⁺		
1627.6 [‡] 2	21.3 8	1627.52	5/2 ⁺	0.0	9/2 ⁺		$A_2=+0.10$ 2 (1974Bi13).
1833.6 [‡] 3	18.5 11	1833.7	5/2 ⁺	0.0	9/2 ⁺		
1944.1 2	18.3 8	1944.13	(13/2) ⁺	0.0	9/2 ⁺		$A_2=+0.27$ 4, $A_4=-0.05$ 6 (1979Nu03). Additional information 1.
2101.6 [‡] 3	9.1 8	2101.6	(7/2) ⁺	0.0	9/2 ⁺	D	$\delta(Q/D)=-0.36$ or -1.86 from $A_2=-0.78$ 10 (1974Bi13). $A_2=+0.68$ 5, $A_4=+0.11$ 7 (1979Nu03).
2122.0 3	5.8 7	2121.6	13/2 ⁻	0.0	9/2 ⁺		
2128.6 [‡] 3	<20.7 ^{&}	2128.6	(7/2 ⁺)	0.0	9/2 ⁺		
2132.4 [‡] 3	<20.7 ^{&}	2132.4	(7/2 ⁺ , 9/2 ⁺)	0.0	9/2 ⁺		
2219.7 4	7.1 8	2219.8	(9/2 ⁻)	0.0	9/2 ⁺		$A_2=+0.45$ 23, $A_4=-0.05$ 32 (1979Nu03). Additional information 2.
2298.1 [‡] 4	6.2 9	2298.1	(7/2) ⁺	0.0	9/2 ⁺		$A_2=-0.1$ 7 (1974Bi13).
2388.5 [‡] 7	2.2 9	2388.5	(5/2) ⁺	0.0	9/2 ⁺		

[†] Weighted average from 1974Bi13 and 1979Nu03, unless indicated otherwise.

[‡] Reported by 1974Bi13 only.

[#] Reported by 1979Nu03 only.

[@] From 1974Bi13, at $\theta=55^\circ$.

[&] $I_\gamma(2128)+I_\gamma(2132)=207$ 10, not resolved.

^a From $\gamma(\theta)$. Mult=D corresponds to $\Delta J=1$ and mult=Q to $\Delta J=2$ transitions.

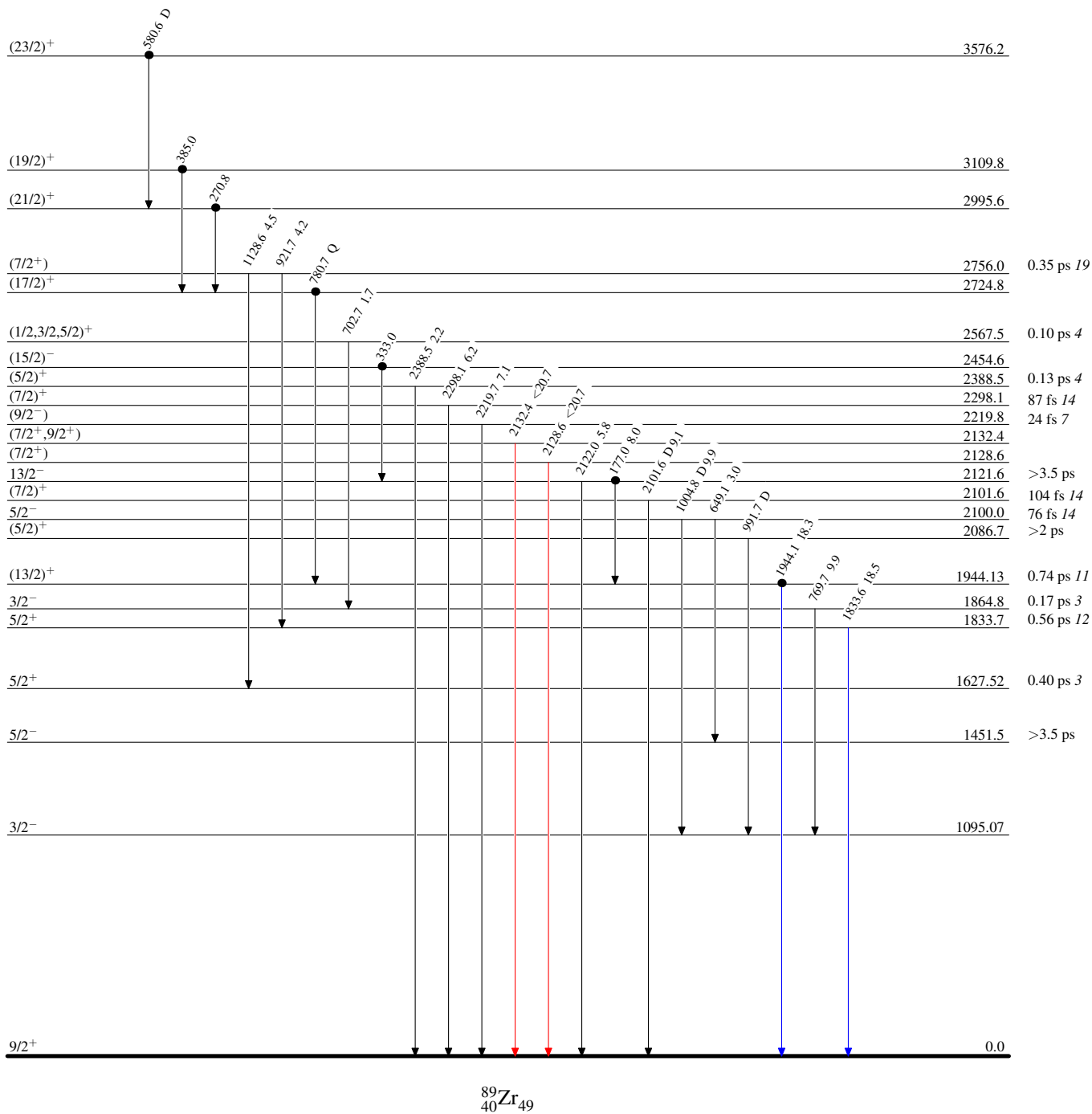
$^{86}\text{Sr}(\alpha, n\gamma), ^{87}\text{Sr}(\alpha, 2n\gamma)$ 1974Bi13, 1979Nu03

Legend

Level Scheme

Intensities: Relative I_γ

- $\longrightarrow$ $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
 $\longrightarrow$ $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
 $\longrightarrow$ $I_\gamma > 10\% \times I_\gamma^{\text{max}}$
 $\bullet$ Coincidence



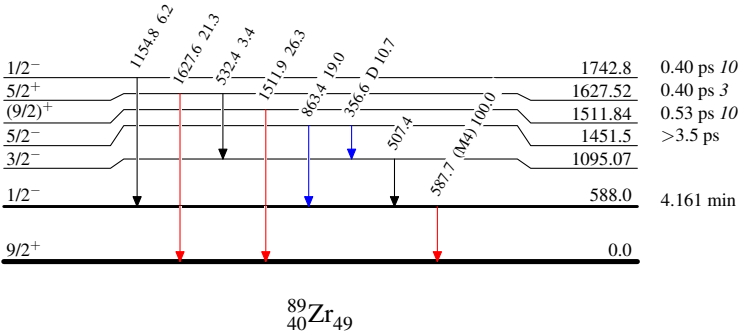
$^{86}\text{Sr}(\alpha, n\gamma), ^{87}\text{Sr}(\alpha, 2n\gamma)$ 1974Bi13, 1979Nu03

Level Scheme (continued)

Intensities: Relative I_γ

Legend

- $\longrightarrow$ $I_\gamma < 2\% \times I_\gamma^{\max}$
- $\longrightarrow$ $I_\gamma < 10\% \times I_\gamma^{\max}$
- $\longrightarrow$ $I_\gamma > 10\% \times I_\gamma^{\max}$



$^{89}_{40}\text{Zr}_{49}$