^{90}Zr(^{3}He,3nγ)   1982De34,2009Be49

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	S. K. Basu, E. A. Mccutchan	NDS 165, 1 (2020)	1-Mar-2020

1982De34: ^{90}Zr(^{3}He,3nγ), E(^{3}He)=33-43 MeV. Measured $\gamma(\theta)$, excit, $\gamma\gamma$ and nγ coin. Shell-model analysis.

2009Be49: ^{90}Zr(^{3}He,3nγ), E(^{3}He)=27 MeV. Measured $\gamma\gamma$ coin, $\gamma(\theta)$; deduced mixing ratio; HORUS spectrometer at Univ of Cologne. IBM-2 calculation.

1971Is04: ^{93}Nb(p,4nγ), E(p)=53 MeV; measured γ(t) with Ge(Li).

Other: 1977BeXM.

^{90}Mo Levels

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$	Comments
0	0^+		
948.2 *8*	2^+		
1896.7 *8*	2^+		
2002.6 *17*	4^+		
2433.1 *10*	3^-		
2534.2 *8*	(2^+)		J$^{\pi}$: from $\gamma\gamma(\theta)$ (2009Be49).
2549.5 *18*	5^-		
2812.3 *18*	6^+		
2859.9 *20*	5^-		
2875.2 *21*	8^+	1.05 μs *10*	T$_{1/2}$: From γ(t) (1971Is04).
2902.0 *14*	(4^-)		
2947.7 *20*	(6^+)		
3106.8 *22*	8^+		
3148.4 *14*			
3294.5 *19*			
3368.0 *20*	7^-		
3447.2 *24*	(5^-)		
3660.2 *22*	(7^-)		
4079.9 *23*	(10^+)		
4193.1 *22*	(10^+)		
4298.1 *23*	(9^-)		
4557.0 *23*	(12^+)		
4595.2 *25*	(9^-)		
4788.2 *25*	(11^-)		
4842.5 *23*	(11^-)		
4894 *3*	(13^-)		
5378 *3*	(12^+)		

† From a least-squares fit to Eγ, by evaluators, assuming ΔEγ=1 keV when not specified.

‡ Suggested by 1982De34 from $\gamma(\theta)$, excitation function and tendency to populate yrast states, except where noted.

$\gamma(^{90}$Mo)

E$_\gamma$[†]	I$_\gamma$[‡]	E$_i$(level)	J$_i^{\pi}$	E$_f$	J$_f^{\pi}$	I$_{(\gamma+ce)}$	Comments
62.9 *10*	≈7.7	2875.2	8^+	2812.3	6^+	≈57	I$_\gamma$: Calculated from I(γ+ce)=57 given by 1982De34 corrected for conversion.
105.9 *10*	≈40	4894	(13^-)	4788.2	(11^-)	≈79	I$_\gamma$: Calculated from I(γ+ce)=79 given by 1982De34 corrected for conversion.
113.3 *10*	≈58[#]	4193.1	(10^+)	4079.9	(10^+)		
135.3 *10*	≈23[#]	2947.7	(6^+)	2812.3	6^+		
231.6 *10*	123 *13*	3106.8	8^+	2875.2	8^+		

^{90}Zr(^{3}He,3nγ)   **1982De34,2009Be49 (continued)**

$\gamma(^{90}$Mo) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	Comments
262.9 *10*	21 *2*	2812.3	6^+	2549.5	5^-			
292.2 *10*	12 *2*	3660.2	(7^-)	3368.0	7^-			
297.1 *10*	11 *2*	4595.2	(9^-)	4298.1	(9^-)			
310.3 *10*	46 *5*	2859.9	5^-	2549.5	5^-			
364.0 *10*	21 *2*	4557.0	(12^+)	4193.1	(10^+)			
468.9 *10*	≤27[#]	2902.0	(4^-)	2433.1	3^-			
477.0 *10*	302 *31*	4557.0	(12^+)	4079.9	(10^+)			
482.4 *10*	≈19[#]	3294.5		2812.3	6^+			
490.1 *10*	≈37[#]	4788.2	(11^-)	4298.1	(9^-)			
536.6 *10*	21 *2*	2433.1	3^-	1896.7	2^+			E_γ: other: 536.1 (2009Be49).
544.4 *10*	52 *6*	4842.5	(11^-)	4298.1	(9^-)			
547.0 *10*	252 *25*	2549.5	5^-	2002.6	4^+			
555.7 *10*	25 *3*	3368.0	7^-	2812.3	6^+			
649.4 *10*	24 *3*	4842.5	(11^-)	4193.1	(10^+)			
715.3		3148.4		2433.1	3^-			E_γ: observed only by 2009Be49.
809.9 *15*	456 *46*	2812.3	6^+	2002.6	4^+			
818.5 *15*	<161[@]	3368.0	7^-	2549.5	5^-			
821.1 *15*	<161[@]	5378	(12^+)	4557.0	(12^+)			
857.3 *15*	≈13[#]	2859.9	5^-	2002.6	4^+			
897.7 *15*	≈10[#]	3447.2	(5^-)	2549.5	5^-			
930.1 *15*	79 *8*	4298.1	(9^-)	3368.0	7^-			
945.2 *15*	43 *5*	2947.7	(6^+)	2002.6	4^+			
948.3 *15*	1000	948.2	2^+	0	0^+			
948.5	≤50[#]	1896.7	2^+	948.2	2^+			E_γ: from 2009Be49. Other: 951.2 *10* (1982De34). Evaluators adopt value from 2009Be49, as they also observe ground state transition which supports a level at 1897 keV, rather than at 1899.5-keV as proposed by 1982De34.
973.0 *15*	68 *7*	4079.9	(10^+)	3106.8	8^+			
1054.4 *15*	844 *85*	2002.6	4^+	948.2	2^+			
1291.6		3294.5		2002.6	4^+			
1317.9 *15*	83 *9*	4193.1	(10^+)	2875.2	8^+			
1484.7	37 *6*	2433.1	3^-	948.2	2^+	D+Q	−0.12 *8*	E_γ: observed only by 2009Be49. I_γ: calculated from $I\gamma(536.6\gamma)/I\gamma(1484.7\gamma)$=0.57 *8* from 2009Be49 and $I\gamma(536.1\gamma)$=21 *2* from 1982De34.
1586.2		2534.2	(2^+)	948.2	2^+	D(+Q)	−0.13 *22*	E_γ: observed only by 2009Be49.
1896.8	≤50	1896.7	2^+	0	0^+			E_γ: observed only by 2009Be49. I_γ: calculated from $I\gamma(1896.6\gamma)/I\gamma(948.5\gamma)$=0.059 *9* from 2009Be49 and $I\gamma(948.5\gamma)$<50 from 1982De34.
2534		2534.2	(2^+)	0	0^+			E_γ: transition not observed in 2009Be49, upper limit on intensity of $I\gamma(2534\gamma)/I\gamma(1586.2\gamma)$ < 0.056.

[†] From 1982De34, except where noted.
[‡] From $\gamma(\theta)$ measurement at 33 MeV (1982De34), except where noted.
[#] From coincidence measurement at 90° (1982De34).
[@] Unresolved doublet, composite intensity 146 *15* (1982De34).

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Level Scheme

Intensities: Relative I$_\gamma$

Legend

- $\longrightarrow$ I$_\gamma$ < 2%×I$_\gamma^{max}$
- $\longrightarrow$ I$_\gamma$ < 10%×I$_\gamma^{max}$
- $\longrightarrow$ I$_\gamma$ > 10%×I$_\gamma^{max}$

${}^{90}_{42}$Mo$_{48}$