^{40}Ca(^{32}S,αnγ) 2009Or02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF	18-March-2022

2009Or02, 2009WiZX: ^{32}S beam at 90 MeV from the ATLAS accelerator at Argonne National Lab. γ spectra were measured using the Gammasphere array, consisting of 77 HPGe detectors. Evaporated particles were detected by the Microball array and the 30-element liquid-scintillator neutron shell. Level half-life was determined from measurements of the centroid shifts of the relative-time spectra. Measured Eγ, Iγ, $\gamma\gamma$-coin, level half-life, angular distributions. Deduced levels, J^π, B(E1), B(M2). See also. 2008OrZZ and 2007OrZZ are conference reports from the same authors as 2009Or02.

2008OrZZ cite previous work at LNL, Legnaro using Euroball array by G. de Angelis et al, Proceedings of ENAM (2001), where four γ rays of 647, 717, 915 and 1226 keV were observed.

1989LaZT (abstract): ^{40}Ca(^{32}S,n$\alpha\gamma$),E=95 MeV; measured Eγ, Iγ, n$\gamma\gamma$-coin, (charged particle)$\gamma\gamma$-coin at Lawrence Berkeley Laboratory. Details of this work are not available.

2012Bi10, 2011Ka07, 2010Ka32: authors analyzed origins of observed asymmetry of B(E1) strengths, and high-spin states for ^{67}Se and ^{67}As mirror nuclei.

^{67}Se Levels

No evidence was found by 2009Or02 for a long-lived isomer in ^{67}Se.

E(level)[†]	J^π[#]	$T_{1/2}$	Comments
0.0	$5/2^-$		
26.0 *17*	$3/2^-$		
647.0 *9*	$7/2^-$		
1061.0 *13*	$7/2^-$		
1364.0[@] *9*	$9/2^+$	1.04 ns *42*	$T_{1/2}$: measured mean lifetime τ=1.5 ns *6* (2009Or02, time spectra gated above and below the $9/2^+$ state).
2224.0[&] *13*	$11/2^+$		
2279.0[@] *13*	$13/2^+$		
3062.0[‡&] *17*	$(15/2^+)$		
3505.0[@] *17*	$17/2^+$		
3776.0[‡&] *20*	$17/2^{(+)}$		
4416.0[&] *19*	$(19/2^+)$		
4794.0[@] *19*	$(21/2^+)$		
5561.0[@] *21*	$(25/2^+)$		

[†] From least-squares fit to Eγ data, assuming uncertainty of 1 keV for each γ ray.
[‡] From level-scheme Fig. 1 in 2009WiZX, level not shown in level-scheme Fig. 1 of 2009Or02.
[#] As given by 2009Or02 and 2009WiZX, based on analogous states in mirror nucleus ^{67}As.
[@] Seq.(A): γ cascade based on $9/2^+$.
[&] Seq.(B): γ cascade based on $11/2^{(+)}$. This sequence is from level-scheme Fig. 1 in 2009WiZX, only the $(19/2^+)$ member of this sequence is given in 2009Or02.

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γ(^{67}Se)

ADO=$I_\gamma(162.7°)/I_\gamma(90°)$.

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult.	δ	Comments
647.0	7/2$^-$	647		0.0	5/2$^-$			
1061.0	7/2$^-$	1035		26.0	3/2$^-$			
		1061‡		0.0	5/2$^-$			Weaker γ than the 1035γ, according to Fig. 1 in 2009WiZX.
1364.0	9/2$^+$	303	9 *5*	1061.0	7/2$^-$	[E1+M2]		B(E1)↓<1.4×10^{-8} *9*; B(M2)↓<17 *12* (2009Or02) If M2, B(M2)(W.u.)<216, suggesting that transition should be dominantly E1, as RUL(M2)=1.
		717	77 *16*	647.0	7/2$^-$	(E1+M2)	+2.0 *15*	B(E1)↓=0.4×10^{-8} *4*; B(M2)↓=1.2 *+9−10* (2009Or02) δ: from +0.47<δ<+3.49 in 2009Or02. ADO=1.7 *6*. B(M2)(W.u.)=5.9 *+35−29* is greater than RUL(M2)=1, suggesting that δ(M2/E1) should be <0.40.
		1364	14 *8*	0.0	5/2$^-$	[M2]		B(M2)↓=0.015 *10*
2224.0	11/2$^+$	860		1364.0	9/2$^+$			
2279.0	13/2$^+$	915		1364.0	9/2$^+$			
3062.0	(15/2$^+$)	838‡		2224.0	11/2$^+$			
3505.0	17/2$^+$	1226		2279.0	13/2$^+$			
3776.0	17/2$^{(+)}$	714‡		3062.0	(15/2$^+$)			
4416.0	(19/2$^+$)	640‡		3776.0	17/2$^{(+)}$			
		911		3505.0	17/2$^+$			
4794.0	(21/2$^+$)	378		4416.0	(19/2$^+$)			
		1289		3505.0	17/2$^+$			
5561.0	(25/2$^+$)	767		4794.0	(21/2$^+$)			

† From 2009Or02, unless otherwise stated.
‡ From level-scheme Fig. 1 in 2009WiZX, γ not given in level-scheme Fig. 1 of 2009Or02.

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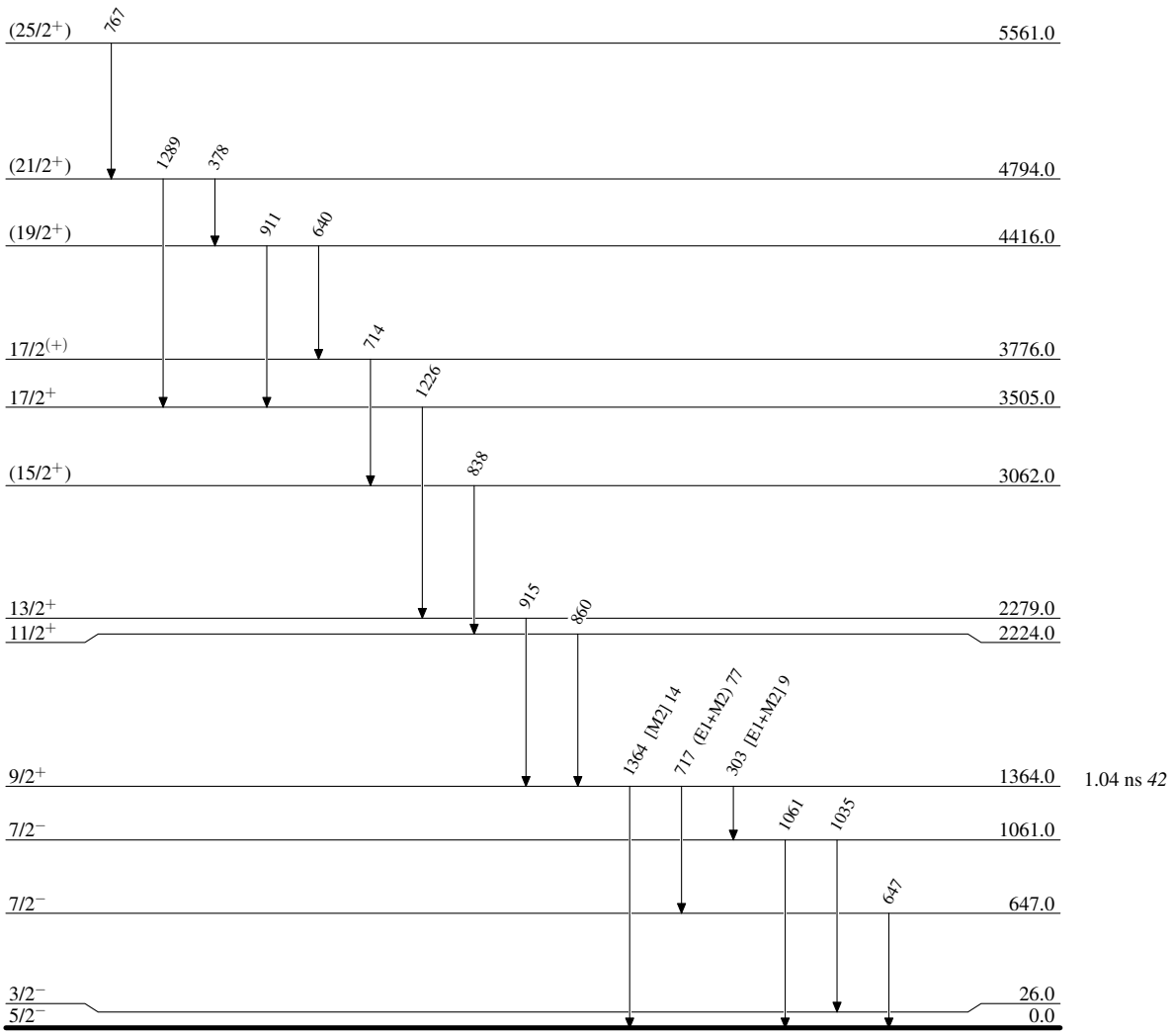
Level Scheme

Intensities: % photon branching from each level



$^{67}_{34}Se_{33}$

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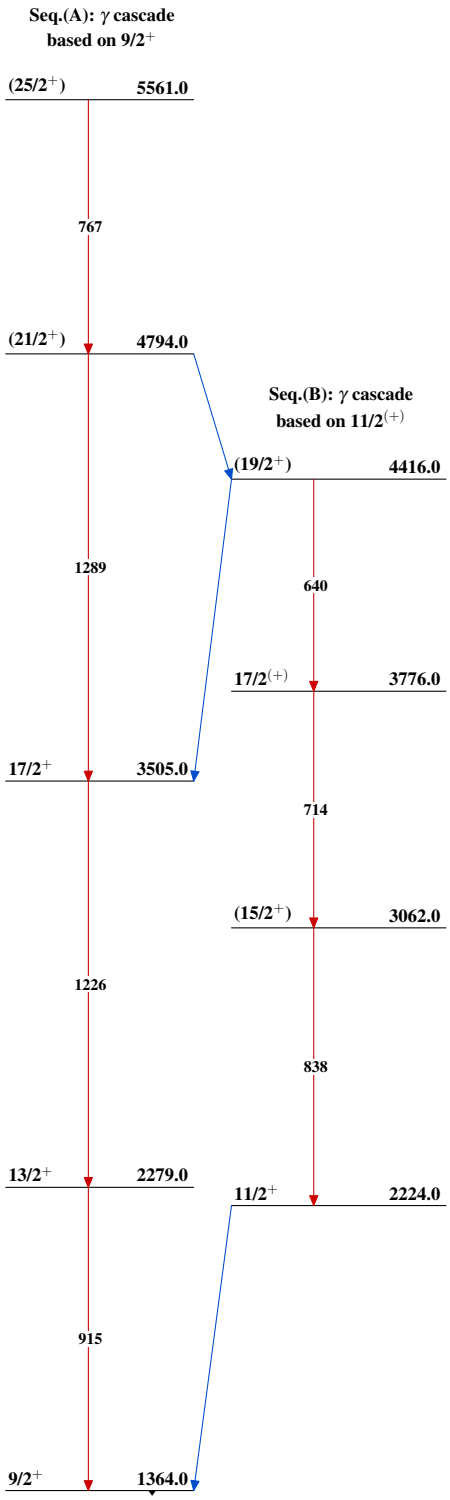

$^{67}_{34}Se_{33}$