

$^{13}\text{C}(^{48}\text{Ca}, 2n\gamma)$ **2007De56**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia		NDS 151, 1 (2018)	1-Apr-2018

Enriched ^{13}C target. Projectile: ^{48}Ca , $E=2.75$ MeV/nucleon, provided by ATLAS facility at Argonne. Measured $E\gamma$, $I\gamma$, $\gamma\gamma$ coin, $\gamma(\theta)$ using GAMMASPHERE array of 91 Compton-suppressed HPGe detectors. Detected charged ions with the Fragment Mass Analyzer. Deduced excited levels, level scheme, spin-parity.

 ^{59}Fe Levels

E(level) [†]	$J^{\pi\ddagger}$	E(level) [†]	$J^{\pi\ddagger}$	E(level) [†]	$J^{\pi\ddagger}$
0.0	$3/2^-$	3429.48 ^{# 19}	$15/2^-$	7030.3 ^{& 3}	$(23/2^+)$
473.04 ⁸	$5/2^-$	3558.43 ^{& 19}	$15/2^+$	7233.2 ⁸	
570.32 ⁸	$5/2^-$	3738.15 ^{@ 19}	$17/2^+$	7671.3 ^{@ 5}	$(25/2^+)$
1022.65 ^{# 7}	$7/2^-$	4141.7 ⁶		7764.3 ¹⁴	
1516.75 ^{@ 13}	$9/2^+$	4272.8 ⁴	$17/2^+$	7928.6 ^{# 5}	$27/2^-$
1599.19 ¹²	$9/2^-$	4329.5 ¹²		8552.7 ¹⁴	
1936.5 ¹³		4870.3 ^{# 4}	$19/2^-$	9544.7 ^{& 16}	$(27/2^+)$
2311.73 ^{@ 16}	$13/2^+$	4978.1 ^{& 3}	$(19/2^+)$	10025.8 ^{# 9}	$(31/2^-)$
2414.82 ^{# 17}	$11/2^-$	5542.48 ^{@ 21}	$21/2^+$	10203.2 ^{@ 14}	$(29/2^+)$
2483.55 ²³	$13/2^+$	5895.1 ²⁴		12637 ^{# 4}	$(35/2^-)$
3051.6 ⁴	$(13/2, 15/2)$	6023.8 ¹¹		12915.1 ^{@ 21}	$(33/2^+)$
3179.43 ²⁰	$13/2^-$	6923.6 ^{# 4}	$23/2^-$	14352 ^{# 4}	$(39/2^-)$

[†] From least-squares fit to γ -ray energies.

[‡] Proposed in **2007De56** from band assignment, $\gamma(\theta)$ measurements, and assuming the sequence of stretched-quadrupole transitions.

[#] Band(A): Band based on $7/2^-$.

[@] Band(B): Band based on $9/2^+$.

[&] Band(C): Band based on $15/2^+$.

 $\gamma(^{59}\text{Fe})$

$E\gamma$	$I\gamma$	$E_i(\text{level})$	J_i^{π}	E_f	J_f^{π}	Mult. [‡]	Comments
250.1 ¹	4.51 ²¹	3429.48	$15/2^-$	3179.43	$13/2^-$	D	$A_2=-0.28$ 5
452.4 ¹	55.3 ¹⁹	1022.65	$7/2^-$	570.32	$5/2^-$		$A_2=-0.34$ 2
473.0 ¹	21.5 ⁴	473.04	$5/2^-$	0.0	$3/2^-$		$A_2=-0.16$ 3
^x 494 [#]							
494.1 ¹	100 ³	1516.75	$9/2^+$	1022.65	$7/2^-$	D	$A_2=-0.24$ 1
549.5 ¹	3.34 ²³	1022.65	$7/2^-$	473.04	$5/2^-$		$A_2=-0.38$ 11
568.0 ³	1.7 ³	3051.6	$(13/2, 15/2)$	2483.55	$13/2^+$		
570.4 ¹	56.8 ⁴	570.32	$5/2^-$	0.0	$3/2^-$		$A_2=-0.35$ 2
714.8 ⁴	1.44 ¹⁸	4272.8	$17/2^+$	3558.43	$15/2^+$		$A_2=-0.47$ 15
795.0 ¹	83 ³	2311.73	$13/2^+$	1516.75	$9/2^+$	Q	$A_2=+0.37$ 3; $A_4=-0.08$ 3
815.7 ³	2.43 ²¹	2414.82	$11/2^-$	1599.19	$9/2^-$		$A_2=+0.88$ 10; $A_4=-0.24$ 20
							Mult.: Transition is indicative of a quadrupole nature. However, γ -ray must facilitate $\Delta J=1$, an argument supported by A_2 coefficient approaches the upper limit of that of a highly mixed $11/2$ to $9/2$ transition.
^x 891 [#]							
962.3 ⁵	1.59 ²⁴	4141.7		3179.43	$13/2^-$		
966.7 ²	7.5 ⁵	2483.55	$13/2^+$	1516.75	$9/2^+$		$A_2=+0.33$ 9; $A_4=-0.19$ 11

Continued on next page (footnotes at end of table)

$^{13}\text{C}(^{48}\text{Ca},2n\gamma)$ 2007De56 (continued) $\gamma(^{59}\text{Fe})$ (continued)

E_γ	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [‡]	Comments
1005.0 2	5.0 3	7928.6	27/2 ⁻	6923.6	23/2 ⁻	Q	$A_2=+0.25$ 13
1014.6 1	15.0 7	3429.48	15/2 ⁻	2414.82	11/2 ⁻	Q	$A_2=+0.10$ 7; $A_4=-0.19$ 9
1022.6 1	70 3	1022.65	7/2 ⁻	0.0	3/2 ⁻		$A_2=+0.20$ 3; $A_4=-0.15$ 4
1029.1 21	0.67 22	1599.19	9/2 ⁻	570.32	5/2 ⁻		
1126.2 1	15.7 8	1599.19	9/2 ⁻	473.04	5/2 ⁻	Q	$A_2=+0.29$ 7; $A_4=-0.18$ 10
1221.0 5	1.84 21	4272.8	17/2 ⁺	3051.6	(13/2,15/2)		$A_2=+0.7$ 4
1240.2 8	2.0 3	4978.1	(19/2 ⁺)	3738.15	17/2 ⁺		
1246.7 1	18.2 8	3558.43	15/2 ⁺	2311.73	13/2 ⁺		
1270.2 14	0.9 3	5542.48	21/2 ⁺	4272.8	17/2 ⁺		
1319.5 11	1.11 24	8552.7		7233.2			
1366.2 13	1.5 4	1936.5		570.32	5/2 ⁻		
1391.9 2	16.7 10	2414.82	11/2 ⁻	1022.65	7/2 ⁻	Q	$A_2=+0.31$ 7; $A_4=-0.09$ 8
^x 1392 [#]							
1419.6 2	10.0 6	4978.1	(19/2 ⁺)	3558.43	15/2 ⁺		
1426.4 1	57.0 19	3738.15	17/2 ⁺	2311.73	13/2 ⁺	Q	$A_2=+0.36$ 8; $A_4=-0.15$ 12
1440.8 3	8.3 5	4870.3	19/2 ⁻	3429.48	15/2 ⁻	Q	$A_2=+0.44$ 7; $A_4=-0.18$ 9
1565.6 21	1.0 3	5895.1		4329.5			
1580.7 3	6.9 5	3179.43	13/2 ⁻	1599.19	9/2 ⁻	Q	$A_2=+0.37$ 13; $A_4=-0.22$ 18
1690.7 7	2.9 3	7233.2		5542.48	21/2 ⁺		
1715.6 22	0.9 3	14352	(39/2 ⁻)	12637	(35/2 ⁻)		
^x 1750 [#]							
1788.7 6	3.9 4	4272.8	17/2 ⁺	2483.55	13/2 ⁺		$A_2=+0.37$ 13; $A_4=-0.22$ 18
1804.3 1	24.7 10	5542.48	21/2 ⁺	3738.15	17/2 ⁺	Q	$A_2=+0.45$ 6; $A_4=-0.21$ 8
2017.7 11	2.7 4	4329.5		2311.73	13/2 ⁺		
2052.2 [†] 1	6.5 5	7030.3	(23/2 ⁺)	4978.1	(19/2 ⁺)	Q	$A_2=+0.38$ 7
2053.3 [†] 1	8.2 6	6923.6	23/2 ⁻	4870.3	19/2 ⁻	Q	$A_2=+0.38$ 7
2097.1 7	4.6 4	10025.8	(31/2 ⁻)	7928.6	27/2 ⁻		
2128.8 4	9.1 5	7671.3	(25/2 ⁺)	5542.48	21/2 ⁺		
2221.8 13	2.3 4	7764.3		5542.48	21/2 ⁺		
2285.6 10	3.2 4	6023.8		3738.15	17/2 ⁺		
2514.3 15	2.6 4	9544.7	(27/2 ⁺)	7030.3	(23/2 ⁺)		
2531.8 13	3.1 4	10203.2	(29/2 ⁺)	7671.3	(25/2 ⁺)		
2611 3	1.9 5	12637	(35/2 ⁻)	10025.8	(31/2 ⁻)		
2711.9 15	2.9 4	12915.1	(33/2 ⁺)	10203.2	(29/2 ⁺)		

[†] Value of A_2 is for the unresolved doublet.

[‡] Assigned by evaluator based on reported angular distribution coefficients A_2 and A_4 and discussions in 2007De56.

[#] Mentioned in text as unplaced. 474 γ in self-coincidence and associated with the possibility of a second 1392 γ .

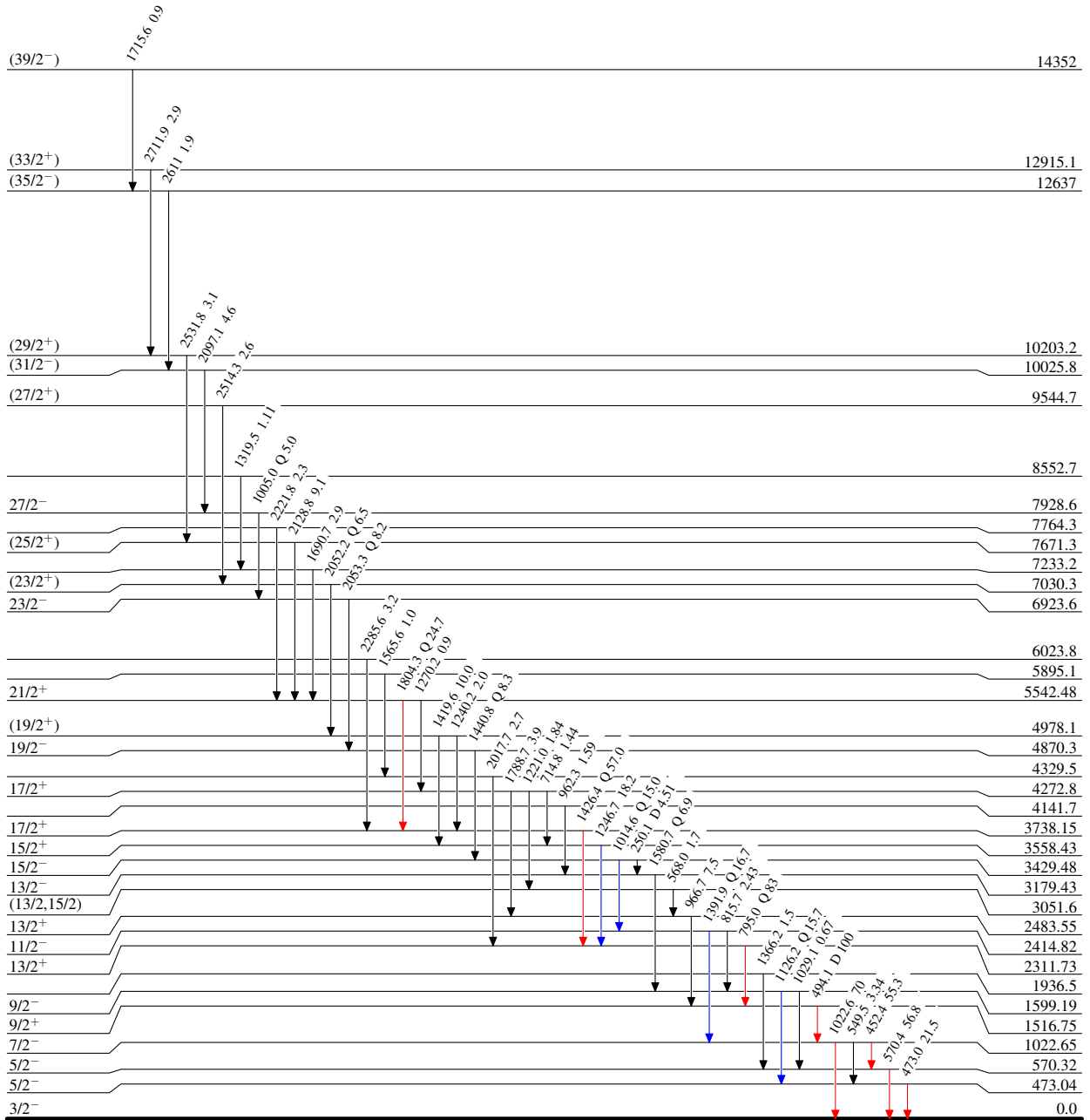
^x γ ray not placed in level scheme.

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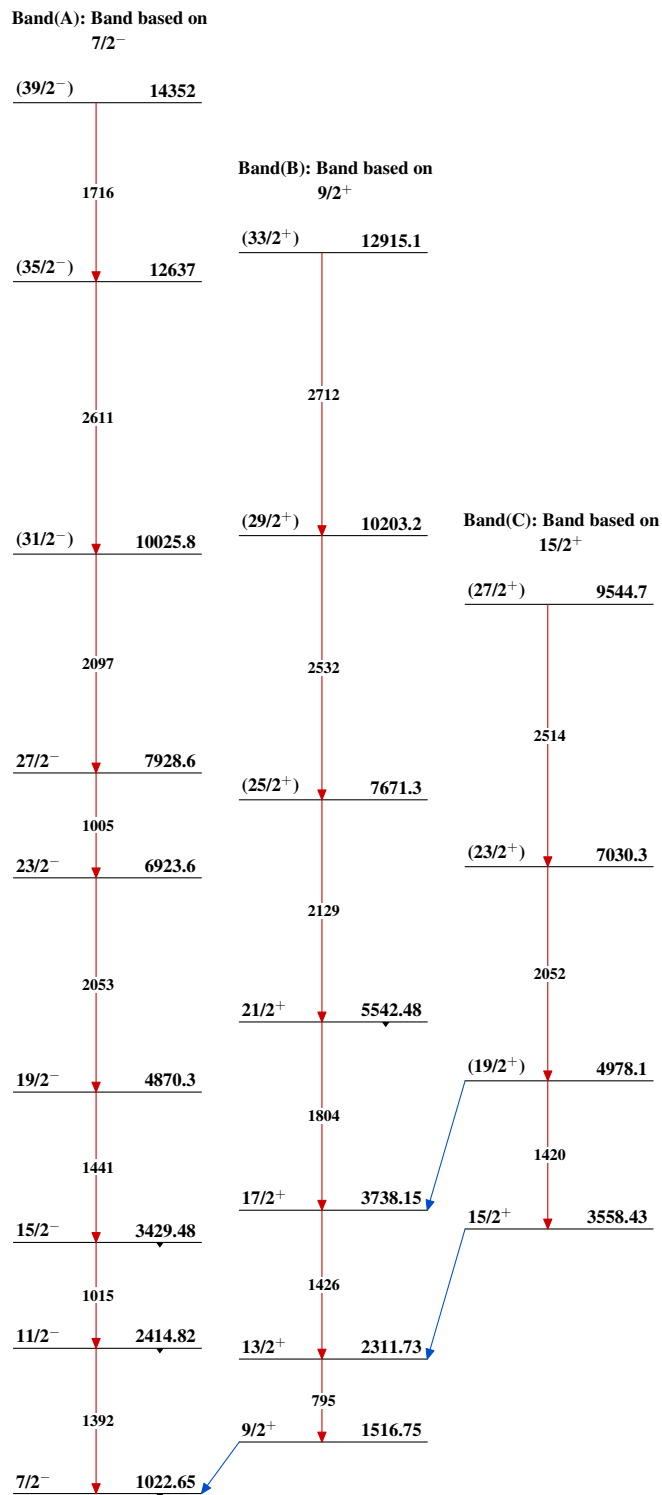
Legend

Level Scheme
Intensities: Relative I_γ

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



$^{59}_{26}\text{Fe}_{33}$

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