^{120}Sn(^{16}O,3nγ) 1974Gi01,1997Em01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov and A. Rodionov, F. G. Kondev	NDS 112, 855 (2011)	31-Oct-2010

1974Gi01: ^{120}Sn(^{16}O,3nγ), E=60-90 MeV; measured γ, $\gamma\gamma$, $\gamma(\theta)$; deduced levels, δ, J^π. Cyclotron, Ge detectors, enriched target.

1997Em01: ^{120}Sn(^{16}O,3nγ) E=70 MeV. Measured lifetimes by recoil-distance Doppler-shift technique.

Others: 1991Pa04, 1987Ma57, 1996Ha20.

The level scheme was constructed by 1974Gi01 on the basis of $\gamma\gamma$-coincidence measurements, energy sums, intensity balance and excitation functions and based upon the 9/2$^-$ state ($T_{1/2}$=5.4 h) of ^{133}Ce. In preceding evaluation of ^{133}Ce data (1995Ra12), this scheme was expanded using the subsequent results of ^{133}Ce investigations and γ-rays, unplaced by 1974Gi01. At present, the evaluators added to the ^{133}Ce level scheme of 1995Ra12 the 1898.6-keV, 15/2$^+$ level, four transitions from unplaced by 1974Gi01, and assigned band structure according to 1987Ma57, 1996Ha20.

^{133}Ce Levels

E(level)†	$J^{\pi\ddagger}$	$T_{1/2}$$^{\#}$	Comments
0.0^{a}	1/2$^+$	97 min *4*	$T_{1/2}$: from 'Adopted Levels'.
37.3$^{\&}$ *6*	9/2$^-$	4.9 h *4*	Additional information 1. E(level),$T_{1/2}$: from 'Adopted Levels'.
134.3^{a} *3*	3/2$^+$		
207.30$^{\&}$ *20*	11/2$^-$	52.7 ps *21*	
317.9^{a} *5*	5/2$^+$		
570.4^{a} *7*	7/2$^+$		
592.1$^{\&}$ *4*	13/2$^-$	5.5 ps *3*	
814.7^{a} *12*	9/2$^+$		
826.9$^{\&}$ *4*	15/2$^-$	2.6 ps *6*	
1200.5 *11*	(15/2)$^-$		
1343.5$^{\&}$ *6*	17/2$^-$	≤0.7 ps	
1589.6$^{\&}$ *7*	19/2$^-$	≤0.7 ps	
1898.6$^{@}$ *11*	15/2$^+$		
2096.2$^{@}$ *10*	17/2$^+$	3.7 ps *4*	
2198.6$^{\&}$ *12*	21/2$^-$		
2297.2$^{@}$ *11*	19/2$^+$	3.1 ps *3*	
2415.4 *22*			
2456.7$^{@}$ *11*	21/2$^+$	3.7 ps *4*	
2485.8$^{\&}$ *20*	23/2$^-$		
2620.8 *22*	(21/2)		
2646.2$^{@}$ *11*	23/2$^+$		
2880.9$^{@}$ *11*	25/2$^+$		
3175.9$^{@}$ *12*	27/2$^+$		
3533.4$^{@}$ *14*	29/2$^+$		

† From a least-squares fit to Eγ's.

‡ From multipolarities of transitions and band structures according to 1974Gi01, 1987Ma57 and 1996Ha20.

\# From 1997Em01, except as noted.

@ Band(A): Band based on the 15/2$^+$ state; configuration=$\nu h_{11/2}\otimes\pi(h_{11/2},g_{7/2})$.

& Band(B): Band based on the 9/2$^-$ state; configuration=ν9/2[514].

a Band(C): Band based on the 1/2$^+$ state; configuration=ν1/2[400].

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$\gamma(^{133}Ce)$

E_γ[†]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	Comments
134.3 *3*	7.2 *14*	134.3	3/2+	0.0	1/2+		
x154.7 *5*	3.4 *11*						
159.5 *2*	23.6 *24*	2456.7	21/2+	2297.2	19/2+	D+Q	$\gamma(\theta)$: A_2=−0.35 *6*.
170.0 *2*	100 *10*	207.30	11/2−	37.3	9/2−	M1+E2	$\gamma(\theta)$: A_2=−0.55 *4*.
183.6 *4*	4.8 *9*	317.9	5/2+	134.3	3/2+		
189.5 *2*	22 *2*	2646.2	23/2+	2456.7	21/2+	D+Q	$\gamma(\theta)$: A_2=−0.39 *6*.
197.3[@] *4*	4.4 *9*	2096.2	17/2+	1898.6	15/2+		
200.7 *4*	19 *4*	2297.2	19/2+	2096.2	17/2+	M1+E2	$\gamma(\theta)$: A_2=−0.38 *7*.
205.4 *4*	4.6 *9*	2620.8	(21/2)	2415.4			
x208.9 *6*	1.3 *4*						
x215.4 *6*	2.2 *7*						
x223.8 *4*	7.1 *14*						
234.80[a] *23*	9.9[a] *9*	826.9	15/2−	592.1	13/2−	D+Q[&]	I_γ: divided according to 1987Ma57. $\gamma(\theta)$: A_2=−0.46 *7*.
234.80[a] *23*	10[a] *3*	2880.9	25/2+	2646.2	23/2+	D+Q[&]	I_γ: divided according to 1987Ma57. $\gamma(\theta)$: A_2=−0.46 *7*.
x240.8 *5*	9.0 *18*						
246.0 *8*	3.6 *10*	1589.6	19/2−	1343.5	17/2−	(M1+E2)	Mult.: by analogy with other M1+E2 γ-rays belonging to the rotational band (stated in Table 4 of 1974Gi01).
252.6 *8*	2.2 *7*	570.4	7/2+	317.9	5/2+		
x276.8 *8*	2.6 *8*						
x283.1 *6*	6.9 *14*						
294.9 *6*	18 *4*	3175.9	27/2+	2880.9	25/2+	D+Q	$\gamma(\theta)$: A_2=−0.42 *6*.
x302.9 *6*	7.3 *14*						
357.5 *7*	14 *3*	3533.4	29/2+	3175.9	27/2+		$\gamma(\theta)$: A_2=−0.07 *11*.
384.7 *4*	64 *6*	592.1	13/2−	207.30	11/2−	M1+E2	$\gamma(\theta)$: A_2=−0.61 *5*.
x390.6 *8*	5.5 *11*						
400.0[@] *8*	5.3 *11*	2297.2	19/2+	1898.6	15/2+		
x416.2 *12*	2.8 *6*						
423.0[@] *8*	6.9 *14*	2880.9	25/2+	2456.7	21/2+		
435.9 *9*	4.6 *9*	570.4	7/2+	134.3	3/2+		
x444.4 *9*	8.2 *15*						
x457.6 *9*	5.0 *10*						
x464.6 *9*	5.2 *10*						
496.8 *10*	9.5 *19*	814.7	9/2+	317.9	5/2+		
x507.7[b] *10*	7.3 *14*						
x511.0 *10*	18.6 *40*						
516.7 *5*	21.1 *21*	1343.5	17/2−	826.9	15/2−	M1+E2	$\gamma(\theta)$: A_2=−0.75 *4*.
530.2 *11*	5 *1*	3175.9	27/2+	2646.2	23/2+		
x544.2 *11*	7.9 *15*						
x553.1 *11*	4.4 *9*						
554.9 *11*	12.9 *25*	592.1	13/2−	37.3	9/2−	E2	$\gamma(\theta)$: A_2=0.19 *14*.
x562.3 *11*	5.8 *12*						
x563.7 *10*	15.5 *30*						
x570.1 *11*	9.3 *19*						
x577.3 *11*	7.3 *15*						
x582.2 *12*	4.7 *9*						
608.7 *12*	9.8 *20*	1200.5	(15/2)−	592.1	13/2−	(M1+E2)	$\gamma(\theta)$: A_2=−0.64 *6*. I_γ: divided according to 1987Ma57.
608.7 *12*	4.7 *10*	2198.6	21/2−	1589.6	19/2−	M1+E2	I_γ: divided according to 1987Ma57.
x617.3 *12*	15.0 *30*						
619.7 *6*	66 *7*	826.9	15/2−	207.30	11/2−	E2	$\gamma(\theta)$: A_2=0.30 *15*.
x624.8 *19*	3.4 *10*						

Continued on next page (footnotes at end of table)

^{120}Sn(^{16}O,3nγ) 1974Gi01,1997Em01 (continued)

γ(^{133}Ce) (continued)

E_γ †	I_γ ‡	E_i(level)	J^π_i	E_f	J^π_f	Mult.#	Comments
x630.1 13	4.6 10						
x644.4 13	4.4 10						
x691.9 14	7.3 14						
x706.3 21	3.9 10						
751.3 8	21.4 21	1343.5	17/2−	592.1	13/2−	E2	γ(θ): A_2=0.33 15.
762.6 8	28 3	1589.6	19/2−	826.9	15/2−	E2	γ(θ): A_2=0.34 14.
x794.7 16	10.8 21						
x798.0 16	4.0 8						
x817.3 25	3.4 10						
855.7 17	9.3 19	2198.6	21/2−	1343.5	17/2−		
x891.0 18	4.0 8						
896.2[a] 18	2.1[a] 5	2096.2	17/2+	1200.5	(15/2)−		I_γ: divided according to 1987Ma57. γ(θ): A_2=0.15 14.
896.2[a] 18	14.6[a] 20	2485.8	23/2−	1589.6	19/2−		I_γ: divided according to 1987Ma57.
x908.0 18	5.5 11						
x913.5 18	4.4 9						
954.0 19	16.4 30	2297.2	19/2+	1343.5	17/2−		γ(θ): A_2=−0.00 20.
x957.0 19	5.2 10						
x981.6 20	6.6 13						
x1023.4 20	8.0 16						
1071.9 21	8.8 18	2415.4		1343.5	17/2−		
x1075.8 21	5.6 22						
x1190.7 24	11.3 22						
1269.3 13	30 3	2096.2	17/2+	826.9	15/2−		
1304.5[@] 30	8.3 17	1898.6	15/2+	592.1	13/2−		

† From 1974Gi01; ΔE assigned by evaluator on the basis of the author's statement that ΔEγ≈0.1% for strong well-resolved lines and increased two or three times higher for the weaker lines: ΔEγ=0.1% for Iγ ≥ 20, ΔEγ=0.2% for 20 > Iγ ≥ 4, ΔEγ=0.3% for the others.

‡ For 55° relative to the incident beam direction in 1974Gi01. ΔIγ assigned by evaluator on the basis of the author's statement that ΔIγ ≈ 10% for strong well-resolved lines and increased two or three times higher for the weaker lines: ΔIγ=10% for Iγ ≥ 20, ΔIγ=20% for 20 > Iγ ≥ 4, ΔIγ=30% for the others.

\# From γ(θ) (1974Gi01).

@ Inserted in the level scheme from unplaced γ's by evaluators.

& Mult.=D+Q for multiply placed transitions.

a Multiply placed with intensity suitably divided.

b 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_γ

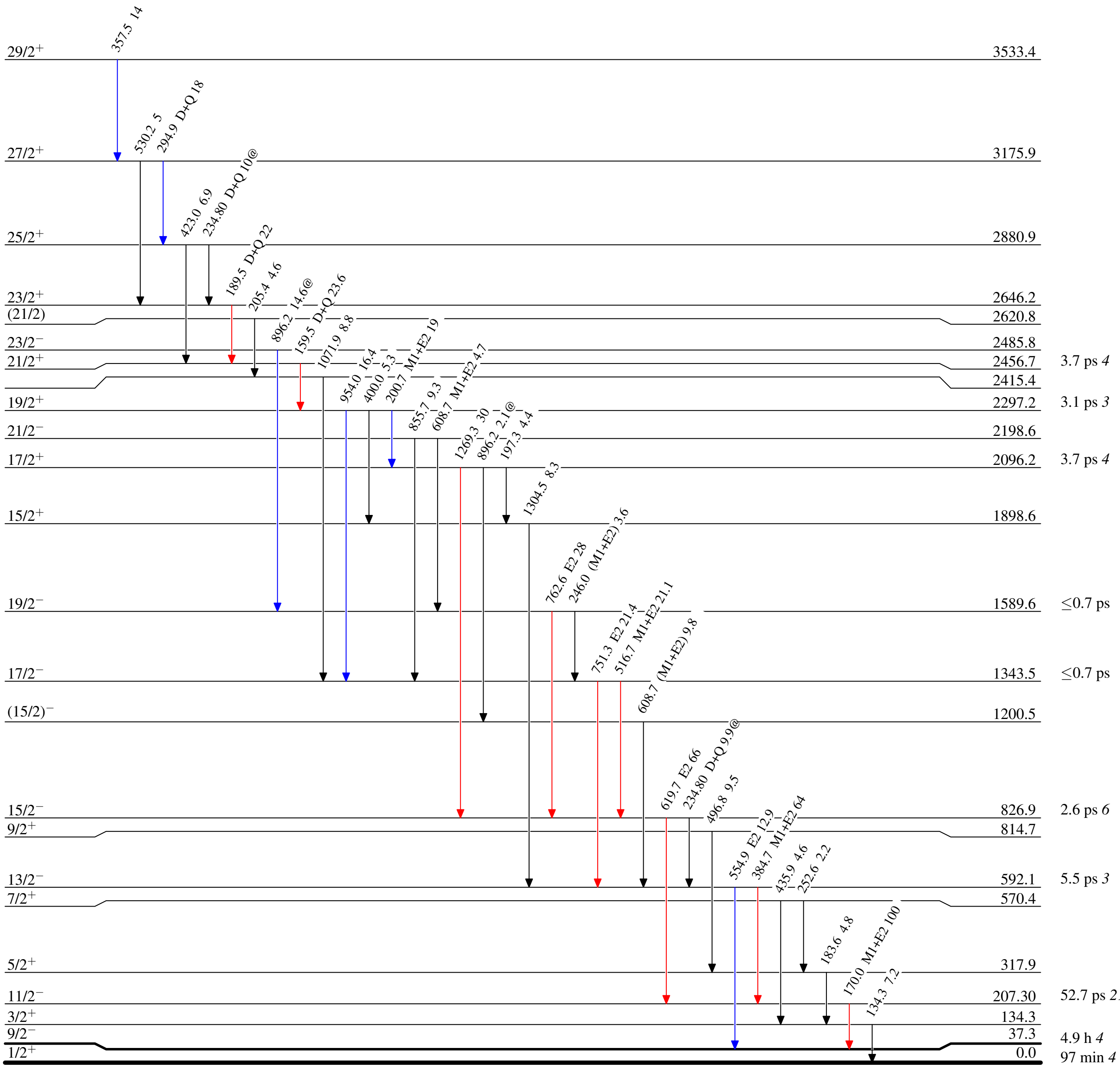
@ Multiply placed: intensity suitably divided

Legend

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

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

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



$^{133}_{58}Ce_{75}$

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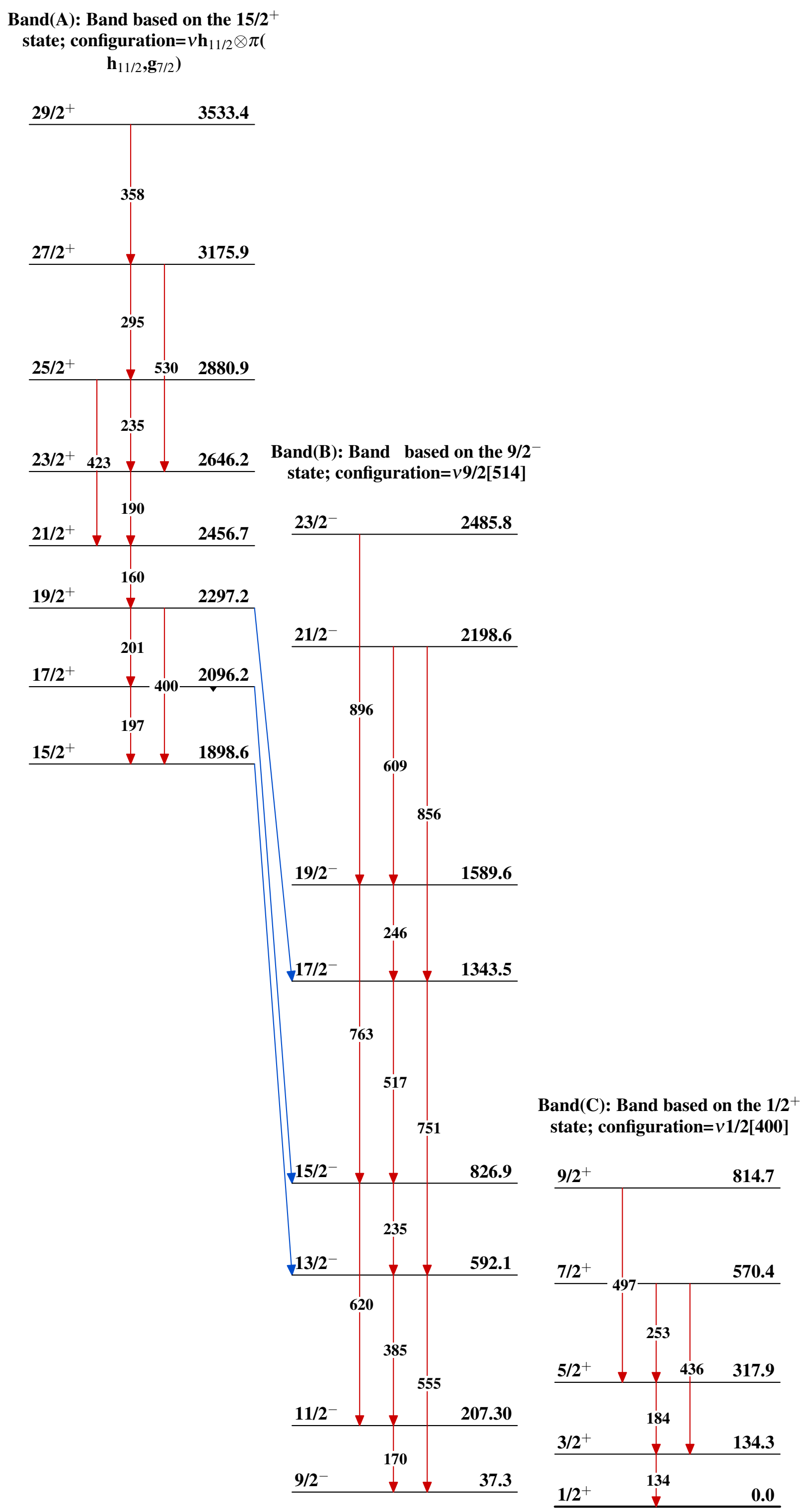

$^{133}_{58}Ce_{75}$