^{116}Sn(^{16}O,3nγ),^{117}Sn(^{16}O,4nγ) 1984Ar13,1977Gi17

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Janos Timar and Zoltan Elekes, Balraj Singh	NDS 121, 143 (2014)	31-May-2014

1984Ar13: E=73-85 MeV. Measured Eγ, Iγ, γγ, γ(θ) using four Escape-Suppressed Ge detectors (ESS) at the Niels Bohr Institute.

1977Gi17: ^{116}Sn(^{16}O,3nγ) E=55-85 MeV. Measured Eγ, Iγ, γγ, γγ(t), γ(θ), and excitation function.

1998Li32, 2001Li69: ^{116}Sn(^{16}O,3nγ) E=73 MeV. Measured lifetimes by Doppler-shift attenuation method (DSAM) using seven Compton-suppressed HPGe detectors at CIAE, Beijing. Lifetimes for 19/2$^-$ to 39/2$^-$ levels in the 7/2[523] band in both papers, lifetimes for 15/2$^+$ to 31/2$^+$ levels in the 5/2[402] band in 2001Li69 only.

1998Io01: ^{116}Sn(^{16}O,3nγ) E=70 MeV; measured Iγ(t), Iγ(t,θ,H). Deduced $T_{1/2}$, g-factors, quadrupole moments, pulsed beam. Time-differential perturbed angular distribution (TDPAD) method. Experiments at LNL-GASP facility, Legnaro.

From assignment of 9/2$^-$ to the 60-ns isomer at 108 keV, 1998Io01 assign 7/2$^+$ to g.s. and increase spin by one unit for all the positive- parity levels. For the negative-parity band, a new level is proposed at 119 keV with J^π=11/2$^-$ and energies of higher levels are adjusted accordingly, and the spins increased by 2 units. These modifications proposed by 1998Io01 are not adopted by the evaluators, since the spin of 9/2 for the 60-ns isomer at 108 is not considered by the evaluators as definitely determined. The experimental quadrupole interaction pattern (figure 1 in 1998Io01) fits 9/2 better than 7/2, but the fit for 9/2 still suffers from somewhat large χ^2 of 2.7.

Level scheme is from 1984Ar13. Level scheme in 1977Gi17 contains both band members but level energies are different due to assignment of 82γ and 108γ and revised placements of 144γ, 145γ in 1984Ar13. Some revisions were also proposed in 1998Io01, but as discussed above, these are not adopted by the evaluators.

^{129}Ce Levels

E(level)	Jπ[‡]	$T_{1/2}$[†]	Comments
0.0[#]	5/2$^+$		
108.10[&] *20*	7/2$^-$	60 ns *2*	g=−0.185 *10* (1998Io01); Q=1.32 *13* (1998Io01) g,Q: from Time-differential perturbed angular distribution (TDPAD) method (1998Io01). Jπ: 9/2$^-$ proposed in 1998Io01 based on quadrupole interaction TDPAD experiment, fit for 9/2$^-$ is claimed to be better than that for 7/2, but for 9/2, χ^2 is also 2.7. $T_{1/2}$: γγ(t) (1998Io01). Other: 62 ns *5* from γγ(t) (1977Gi17).
144.34[@] *10*	7/2$^+$		
190.5[a] *8*	9/2$^-$		
335.7[&] *8*	11/2$^-$		
348.09[#] *20*	9/2$^+$		
589.2[@] *4*	11/2$^+$		
596.0[a] *8*	13/2$^-$		
805.8[&] *8*	15/2$^-$		
867.5[#] *5*	13/2$^+$		
1175.8[@] *5*	15/2$^+$	0.51 ps *6*	Q(transition)=7.1 *8* (2001Li69).
1186.5[a] *9*	17/2$^-$		
1421.8[&] *10*	19/2$^-$	1.24 ps *10*	Q(transition)=4.35 *18* (1998Li32,2001Li69).
1512.6[#] *6*	17/2$^+$		
1867.7[@] *8*	19/2$^+$	0.46 ps *4*	Q(transition)=4.9 *4* (2001Li69).
1906.6[a] *11*	21/2$^-$		
2148.6[&] *11*	23/2$^-$	1.01 ps *19*	Q(transition)=3.0 *3* (1998Li32,2001Li69).
2230.6[#] *8*	21/2$^+$		
2533.6[@] *10*	23/2$^+$	0.374 ps *35*	Q(transition)=5.3 *5* (2001Li69).
2663.6[a] *12*	25/2$^-$		
2772.6[#] *11*	25/2$^+$		
2887.6[&] *13*	27/2$^-$	0.471 ps *42*	Q(transition)=4.07 *18* (1998Li32,2001Li69).

Continued on next page (footnotes at end of table)

$^{116}Sn(^{16}O,3n\gamma)$,$^{117}Sn(^{16}O,4n\gamma)$ 1984Ar13,1977Gi17 (continued)

^{129}Ce Levels (continued)

E(level)	J$^{\pi}$‡	$T_{1/2}$†	Comments
3007.6@ *12*	27/2+	1.74 ps *25*	Q(transition)=4.5 *3* (2001Li69).
3205.6a *14*	29/2−		
3285.6# *13*	29/2+		
3458.6& *14*	31/2−	0.92 ps *11*	Q(transition)=4.3 *3* (1998Li32,2001Li69).
3581.6@ *14*	31/2+	<1.8 ps	$T_{1/2}$: effective half-life, not corrected for side feeding. Q(transition)>3.2 (2001Li69).
3784.6a *15*	33/2−		
4114.6& *16*	35/2−	0.69 ps *8*	Q(transition)=3.45 *21* (1998Li32,2001Li69).
4905.6& *19*	39/2−	<0.60 ps	$T_{1/2}$: effective half-life, not corrected for side feeding. Q(transition)>3.0 (1998Li32,2001Li69). Additional information 1. Weakly populated level. Besides the 791γ, there may be other transitions from this level.

† From DSAM (1998Li32,2001Li69), unless otherwise stated. Both papers report same lifetimes for 19/2− to 39/2− levels in the 7/2[523] band. 2001Li69 report, in addition, lifetimes for 15/2+ to 31/2+ levels in the 5/2[402] band.

‡ As proposed in 1984Ar13 on the basis of $\gamma(\theta)$ data, band structures, comparison with cranked-shell model calculation for available Nilsson orbitals. In Adopted Levels, Gammas dataset, all J^{π} assignments are given in parentheses since the spins of the ground state and the 60-ns isomer are not definite.

\# Band(A): ν5/2[402],α=+1/2.

@ Band(a): ν5/2[402],α=−1/2.

& Band(B): ν7/2[523],α=−1/2.

a Band(b): ν7/2[523],α=+1/2.

γ(^{129}Ce)

A_2 and A_4 coefficients are from 1984Ar13, unless otherwise noted.
A composite line at 788.4 with Iγ=11.3 *25* and placed from (23/2$^+$) level in 1977Gi17 is omitted here as no such line is reported in 1984Ar13.

E_γ[†]	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	δ[a]	α[b]	$I_{(\gamma+ce)}$[#]	Comments
82	30 *6*	190.5	9/2$^-$	108.10	7/2$^-$	[M1]		2.09	94 *20*	ce(K)/(γ+ce)=0.577 *5*; ce(L)/(γ+ce)=0.0791 *13*; ce(M)/(γ+ce)=0.0166 *3* α(K)=1.783 *25*; α(L)=0.244 *4*; α(M)=0.0512 *8*; α(N)=0.01135 *16*; α(O)=0.00184 *3* ce(N)/(γ+ce)=0.00367 *7*; ce(O)/(γ+ce)=0.000594 *10*; ce(P)/(γ+ce)=4.46×10^{-5} *8*
108.1[‡] *2*	100 *7*	108.10	7/2$^-$	0.0	5/2$^+$	(E1)		0.196	120 *8*	A_2=−0.15 *5* (1977Gi17); A_2=−0.21 *2* (1998Io01) ce(K)/(γ+ce)=0.1396 *18*; ce(L)/(γ+ce)=0.0193 *3*; ce(M)/(γ+ce)=0.00402 *6* ce(N)/(γ+ce)=0.000879 *14*; ce(O)/(γ+ce)=0.0001370 *21*; ce(P)/(γ+ce)=8.50×10^{-6} *13* α(K)=0.1670 *25*; α(L)=0.0231 *4*; α(M)=0.00481 *8*; α(N)=0.001052 *16*; α(O)=0.0001639 *25* Additional information 3.
144.3 *1*	40.7 *21*	144.34	7/2$^+$	0.0	5/2$^+$	[M1+E2]		0.432 *14*	59 *3*	ce(K)/(γ+ce)=0.252 *4*; ce(L)/(γ+ce)=0.039 *5*; ce(M)/(γ+ce)=0.0082 *11* ce(N)/(γ+ce)=0.00181 *24*; ce(O)/(γ+ce)=0.00029 *4*; ce(P)/(γ+ce)=1.90×10^{-5} *5* α(K)=0.361 *6*; α(L)=0.056 *7*; α(M)=0.0118 *16*; α(N)=0.0026 *4* α(O)=0.00041 *5*; α(P)=2.73×10^{-5} *6* Additional information 4.
145.1 *2*	46 *3*	335.7	11/2$^-$	190.5	9/2$^-$	(M1)		0.413	66 *4*	A_2=−0.52 *5* (1977Gi17) ce(K)/(γ+ce)=0.250 *3*; ce(L)/(γ+ce)=0.0339 *5*; ce(M)/(γ+ce)=0.00710 *11* α(K)=0.353 *6*; α(L)=0.0480 *7*; α(M)=0.01004 *15*; α(N)=0.00223 *4*; α(O)=0.000361 *6* ce(N)/(γ+ce)=0.001576 *24*; ce(O)/(γ+ce)=0.000255 *4*; ce(P)/(γ+ce)=1.93×10^{-5} *3* Additional information 5.
203.6[‡] *2*	21 *2*	348.09	9/2$^+$	144.34	7/2$^+$	(M1+E2)	−0.40 *8*	0.1640 *24*	24 *2*	A_2=−0.38 *3*; A_4=−0.02 *2* ce(K)/(γ+ce)=0.1184 *16*; ce(L)/(γ+ce)=0.0177 *7*; ce(M)/(γ+ce)=0.00374 *15* α(K)=0.1379 *20*; α(L)=0.0206 *8*; α(M)=0.00435 *17*; α(N)=0.00096 *4*; α(O)=0.000153 *5* ce(N)/(γ+ce)=0.00083 *3*; ce(O)/(γ+ce)=0.000131 *5*;

γ(^{129}Ce) (continued)

E_γ[†]	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[a]	α[b]	$I_{(\gamma+ce)}$[#]	Comments
										ce(P)/(γ+ce)=8.88×10^{-6} *17* Additional information 6.
209.9[‡] *2*	13 *1*	805.8	15/2$^-$	596.0	13/2$^-$	(M1+E2)	−1.1 *1*	0.1532 *23*	15 *1*	A_2=−0.81 *2*; A_4=+0.11 *3* ce(K)/(γ+ce)=0.1069 *14*; ce(L)/(γ+ce)=0.0204 *6*; ce(M)/(γ+ce)=0.00439 *13* α(K)=0.1233 *18*; α(L)=0.0236 *7*; α(M)=0.00507 *15*; α(N)=0.00111 *4*; α(O)=0.000169 *5* ce(N)/(γ+ce)=0.00096 *3*; ce(O)/(γ+ce)=0.000147 *4*; ce(P)/(γ+ce)=7.38×10^{-6} *15* Additional information 12.
224	2.5 *2*	2887.6	27/2$^-$	2663.6	25/2$^-$	[M1+E2]		0.1255	2.8 *2*	ce(K)/(γ+ce)=0.0945 *14*; ce(L)/(γ+ce)=0.0134 *6*; ce(M)/(γ+ce)=0.00282 *14* ce(N)/(γ+ce)=0.00062 *3*; ce(O)/(γ+ce)=0.000100 *4*; ce(P)/(γ+ce)=7.17×10^{-6} *19* α(K)=0.1064 *17*; α(L)=0.0151 *7*; α(M)=0.00317 *16*; α(N)=0.00070 *4*; α(O)=0.000113 *5*
228	11 *2*	335.7	11/2$^-$	108.10	7/2$^-$	(E2)		0.1186	12 *2*	A_2=+0.20 *5*; A_4=−0.05 *5* ce(K)/(γ+ce)=0.0822 *11*; ce(L)/(γ+ce)=0.0187 *3*; ce(M)/(γ+ce)=0.00406 *6* α(K)=0.0920 *13*; α(L)=0.0209 *3*; α(M)=0.00454 *7*; α(N)=0.000986 *14*; α(O)=0.0001470 *21* ce(N)/(γ+ce)=0.000881 *13*; ce(O)/(γ+ce)=0.0001314 *19*; ce(P)/(γ+ce)=5.18×10^{-6} *8*
235[c]	5.7[c] *6*	1421.8	19/2$^-$	1186.5	17/2$^-$	(M1+E2)		0.1100	6.3 *7*	A_2=−0.38 *7* (1977Gi17) ce(K)/(γ+ce)=0.0841 *13*; ce(L)/(γ+ce)=0.0119 *5*; ce(M)/(γ+ce)=0.00249 *11* ce(N)/(γ+ce)=0.000551 *23*; ce(O)/(γ+ce)=8.8×10^{-5} *3*; ce(P)/(γ+ce)=6.38×10^{-6} *17* α(K)=0.0934 *16*; α(L)=0.0132 *6*; α(M)=0.00276 *13*; α(N)=0.00061 *3*; α(O)=9.8×10^{-5} *4* Additional information 19.
235[c]	12[c] *1*	3007.6	27/2$^+$	2772.6	25/2$^+$	[M1+E2]		0.1100	13 *1*	ce(K)/(γ+ce)=0.0841 *13*; ce(L)/(γ+ce)=0.0119 *5*; ce(M)/(γ+ce)=0.00249 *11* ce(N)/(γ+ce)=0.000551 *23*; ce(O)/(γ+ce)=8.8×10^{-5} *3*; ce(P)/(γ+ce)=6.38×10^{-6} *17* α(K)=0.0934 *16*; α(L)=0.0132 *6*; α(M)=0.00276 *13*; α(N)=0.00061 *3*; α(O)=9.8×10^{-5} *4*
239	8 *1*	2772.6	25/2$^+$	2533.6	23/2$^+$	(M1+E2)	−0.25 *8*	0.1051	9 *1*	A_2=−0.54 *10*; A_4=+0.11 *8* ce(K)/(γ+ce)=0.0809 *11*; ce(L)/(γ+ce)=0.01123 *25*; ce(M)/(γ+ce)=0.00235 *6* α(K)=0.0895 *14*; α(L)=0.0124 *3*; α(M)=0.00260 *7*; α(N)=0.000576 *13*; α(O)=9.29×10^{-5} *19*

From ENSDF

γ(^{129}Ce) (continued)

E_γ[†]	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	δ[a]	α[b]	$I_{(\gamma+ce)}$[#]	Comments
										ce(N)/(γ+ce)=0.000522 *12*; ce(O)/(γ+ce)=8.40×10^{-5} *17*; ce(P)/(γ+ce)=6.17×10^{-6} *11* δ: −2.2 *5* also possible but less likely due to ΔJ=1 coupled structure.
241	9 *1*	589.2	11/2$^+$	348.09	9/2$^+$	(M1+E2)	−0.25 *8*	0.1028	10 *1*	A_2=−0.47 *8*; A_4=+0.02 *8* ce(K)/(γ+ce)=0.0793 *11*; ce(L)/(γ+ce)=0.01100 *24*; ce(M)/(γ+ce)=0.00231 *6* α(K)=0.0875 *13*; α(L)=0.0121 *3*; α(M)=0.00254 *6*; α(N)=0.000563 *13*; α(O)=9.07×10^{-5} *18* ce(N)/(γ+ce)=0.000511 *12*; ce(O)/(γ+ce)=8.23×10^{-5} *16*; ce(P)/(γ+ce)=6.04×10^{-6} *11* Additional information 8. δ: −2.1 *4* also possible but less likely due to ΔJ=1 coupled structure.
242	3.5 *3*	2148.6	23/2$^-$	1906.6	21/2$^-$	[M1+E2]		0.1015	3.9 *3*	ce(K)/(γ+ce)=0.0783 *13*; ce(L)/(γ+ce)=0.0110 *4*; ce(M)/(γ+ce)=0.00231 *10* ce(N)/(γ+ce)=0.000511 *20*; ce(O)/(γ+ce)=8.21×10^{-5} *25*; ce(P)/(γ+ce)=5.94×10^{-6} *17* α(K)=0.0862 *15*; α(L)=0.0121 *5*; α(M)=0.00254 *11*; α(N)=0.000562 *22*; α(O)=9.0×10^{-5} *3*
253	9 *2*	3458.6	31/2$^-$	3205.6	29/2$^-$	[M1+E2]		0.0900 *14*	10 *2*	ce(K)/(γ+ce)=0.0702 *12*; ce(L)/(γ+ce)=0.0098 *4*; ce(M)/(γ+ce)=0.00206 *8* ce(N)/(γ+ce)=0.000455 *16*; ce(O)/(γ+ce)=7.32×10^{-5} *20*; ce(P)/(γ+ce)=5.32×10^{-6} *15* α(K)=0.0765 *14*; α(L)=0.0107 *4*; α(M)=0.00224 *8*; α(N)=0.000496 *17*; α(O)=7.98×10^{-5} *21*
260.4[‡] *3*	19 *1*	596.0	13/2$^-$	335.7	11/2$^-$	(M1+E2)	−0.7 *2*	0.0814 *15*	21 *1*	A_2=−0.66 *2*; A_4=0.00 *2* ce(K)/(γ+ce)=0.0629 *15*; ce(L)/(γ+ce)=0.0098 *4*; ce(M)/(γ+ce)=0.00208 *10* α(K)=0.0680 *18*; α(L)=0.0106 *5*; α(M)=0.00225 *10*; α(N)=0.000494 *21*; α(O)=7.8×10^{-5} *3* ce(N)/(γ+ce)=0.000457 *19*; ce(O)/(γ+ce)=7.21×10^{-5} *24*; ce(P)/(γ+ce)=4.60×10^{-6} *21* Additional information 10.
278	13 *1*	867.5	13/2$^+$	589.2	11/2$^+$	[M1+E2]		0.0697 *12*	14 *1*	ce(K)/(γ+ce)=0.0555 *11*; ce(L)/(γ+ce)=0.00767 *18*; ce(M)/(γ+ce)=0.00161 *5* ce(N)/(γ+ce)=0.000356 *9*; ce(O)/(γ+ce)=5.74×10^{-5} *12*; ce(P)/(γ+ce)=4.21×10^{-6} *13* α(K)=0.0594 *13*; α(L)=0.00821 *20*; α(M)=0.00172 *5*; α(N)=0.000381 *10*; α(O)=6.14×10^{-5} *12*
278	14 *1*	3285.6	29/2$^+$	3007.6	27/2$^+$	[M1+E2]		0.0697 *12*	15 *1*	ce(K)/(γ+ce)=0.0555 *11*; ce(L)/(γ+ce)=0.00767 *18*; ce(M)/(γ+ce)=0.00161 *5*

From ENSDF

$^{129}_{58}$Ce$_{71}$-5

γ(^{129}Ce) (continued)

E_γ[†]	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[a]	α[b]	$I_{(\gamma+ce)}$[#]	Comments
										ce(N)/(γ+ce)=0.000356 *9*; ce(O)/(γ+ce)=5.74×10^{-5} *12*; ce(P)/(γ+ce)=4.21×10^{-6} *13* α(K)=0.0594 *13*; α(L)=0.00821 *20*; α(M)=0.00172 *5*; α(N)=0.000381 *10*; α(O)=6.14×10^{-5} *12*
296	4.0 *5*	3581.6	31/2$^+$	3285.6	29/2$^+$	[M1+E2]		0.0589 *11*	4.2 *5*	ce(K)/(γ+ce)=0.0474 *10*; ce(L)/(γ+ce)=0.00652 *13*; ce(M)/(γ+ce)=0.00137 *3* ce(N)/(γ+ce)=0.000303 *7*; ce(O)/(γ+ce)=4.88×10^{-5} *8*; ce(P)/(γ+ce)=3.60×10^{-6} *11* α(K)=0.0502 *11*; α(L)=0.00690 *14*; α(M)=0.00145 *3*; α(N)=0.000320 *7*; α(O)=5.17×10^{-5} *9*
303	5.2 *6*	2533.6	23/2$^+$	2230.6	21/2$^+$	(M1+E2)	−0.95 *75*	0.052 *4*	5.5 *6*	A_2=−0.49 *5*; A_4=−0.05 *5* ce(K)/(γ+ce)=0.041 *4*; ce(L)/(γ+ce)=0.0065 *4*; ce(M)/(γ+ce)=0.00138 *10* ce(N)/(γ+ce)=0.000303 *20*; ce(O)/(γ+ce)=4.75×10^{-5} *18*; ce(P)/(γ+ce)=3.0×10^{-6} *5* α(K)=0.043 *5*; α(L)=0.0068 *4*; α(M)=0.00145 *11*; α(N)=0.000318 *21*; α(O)=5.00×10^{-5} *19*
308.3[‡] *3*	5.3 *6*	1175.8	15/2$^+$	867.5	13/2$^+$	(M1+E2)	−0.8 *4*	0.0501 *24*	5.6 *6*	A_2=−0.60 *7*; A_4=−0.02 *7* ce(K)/(γ+ce)=0.0400 *24*; ce(L)/(γ+ce)=0.00610 *20*; ce(M)/(γ+ce)=0.00129 *5* ce(N)/(γ+ce)=0.000284 *10*; ce(O)/(γ+ce)=4.49×10^{-5} *10*; ce(P)/(γ+ce)=2.9×10^{-6} *3* α(K)=0.042 *3*; α(L)=0.00641 *21*; α(M)=0.00135 *6*; α(N)=0.000298 *11*; α(O)=4.72×10^{-5} *11*
318	16 *1*	3205.6	29/2$^-$	2887.6	27/2$^-$	(M1+E2)	−0.09 *6*	0.0494	17 *1*	Additional information 15. A_2=−0.26 *6*; A_4=−0.02 *6* ce(K)/(γ+ce)=0.0403 *6*; ce(L)/(γ+ce)=0.00537 *8*; ce(M)/(γ+ce)=0.001122 *16* α(K)=0.0423 *6*; α(L)=0.00564 *8*; α(M)=0.001178 *17*; α(N)=0.000261 *4*; α(O)=4.24×10^{-5} *6* ce(N)/(γ+ce)=0.000249 *4*; ce(O)/(γ+ce)=4.04×10^{-5} *6*; ce(P)/(γ+ce)=3.08×10^{-6} *5*
326	6.7 *10*	3784.6	33/2$^-$	3458.6	31/2$^-$	[M1+E2]		0.0456 *10*	7 *1*	ce(K)/(γ+ce)=0.0372 *9*; ce(L)/(γ+ce)=0.00507 *8*; ce(M)/(γ+ce)=0.001062 *18* ce(N)/(γ+ce)=0.000235 *4*; ce(O)/(γ+ce)=3.80×10^{-5} *6*; ce(P)/(γ+ce)=2.82×10^{-6} *9* α(K)=0.0389 *10*; α(L)=0.00531 *8*; α(M)=0.001111 *18*; α(N)=0.000246 *4*; α(O)=3.97×10^{-5} *6*
330	5.8 *10*	4114.6	35/2$^-$	3784.6	33/2$^-$	[M1+E2]		0.0442 *10*	6 *1*	ce(K)/(γ+ce)=0.0361 *9*; ce(L)/(γ+ce)=0.00492 *8*; ce(M)/(γ+ce)=0.001029 *17* ce(N)/(γ+ce)=0.000228 *4*; ce(O)/(γ+ce)=3.68×10^{-5} *6*; ce(P)/(γ+ce)=2.74×10^{-6} *9*

$^{129}_{58}$Ce$_{71}$-6

γ(^{129}Ce) (continued)

E_γ[†]	I_γ[@]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	δ[a]	α[b]	$I_{(\gamma+ce)}$[#]	Comments
										α(K)=0.0377 *10*; α(L)=0.00513 *8*; α(M)=0.001074 *17*; α(N)=0.000238 *4*; α(O)=3.85×10^{-5} *6*
336.8[‡] *3*	5.1 *5*	1512.6	17/2$^+$	1175.8	15/2$^+$	(M1+E2)		0.0419 *10*	5.3 *5*	A_2=−0.55 *10* (1977Gi17) ce(K)/(γ+ce)=0.0343 *9*; ce(L)/(γ+ce)=0.00466 *7*; ce(M)/(γ+ce)=0.000976 *15* ce(N)/(γ+ce)=0.000216 *4*; ce(O)/(γ+ce)=3.49×10^{-5} *5*; ce(P)/(γ+ce)=2.60×10^{-6} *9* α(K)=0.0357 *9*; α(L)=0.00486 *7*; α(M)=0.001017 *16*; α(N)=0.000225 *4*; α(O)=3.64×10^{-5} *6* Additional information 21.
348.7[‡] *4*	15.5 *19*	348.09	9/2$^+$	0.0	5/2$^+$	[E2]		0.0306	16 *2*	ce(K)/(γ+ce)=0.0241 *4*; ce(L)/(γ+ce)=0.00434 *7*; ce(M)/(γ+ce)=0.000929 *14* α(K)=0.0249 *4*; α(L)=0.00447 *7*; α(M)=0.000957 *14*; α(N)=0.000209 *3*; α(O)=3.21×10^{-5} *5* ce(N)/(γ+ce)=0.000203 *3*; ce(O)/(γ+ce)=3.12×10^{-5} *5*; ce(P)/(γ+ce)=1.630×10^{-6} *24* Additional information 7.
355	2.1 *8*	1867.7	19/2$^+$	1512.6	17/2$^+$	[M1+E2]		0.0365 *9*	2.2 *8*	ce(K)/(γ+ce)=0.0300 *8*; ce(L)/(γ+ce)=0.00407 *6*; ce(M)/(γ+ce)=0.000851 *12* ce(N)/(γ+ce)=0.000189 *3*; ce(O)/(γ+ce)=3.05×10^{-5} *5*; ce(P)/(γ+ce)=2.28×10^{-6} *8* α(K)=0.0311 *8*; α(L)=0.00422 *6*; α(M)=0.000882 *13*; α(N)=0.000196 *3*; α(O)=3.16×10^{-5} *5*
363	4.7 *9*	2230.6	21/2$^+$	1867.7	19/2$^+$	(M1+E2)	−0.95 *75*	0.031 *4*	4.8 *9*	A_2=−0.57 *6*; A_4=0.00 *6* ce(K)/(γ+ce)=0.025 *4*; ce(L)/(γ+ce)=0.00382 *7*; ce(M)/(γ+ce)=0.000807 *12* α(K)=0.026 *4*; α(L)=0.00394 *7*; α(M)=0.000832 *12*; α(N)=0.000183 *3*; α(O)=2.91×10^{-5} *9* ce(N)/(γ+ce)=0.000178 *3*; ce(O)/(γ+ce)=2.82×10^{-5} *9*; ce(P)/(γ+ce)=1.9×10^{-6} *4*
380.5[‡] *4*	8.4 *7*	1186.5	17/2$^-$	805.8	15/2$^-$	(M1+E2)		0.0304 *8*	8.6 *7*	A_2=−0.66 *9* (1977Gi17) ce(K)/(γ+ce)=0.0252 *7*; ce(L)/(γ+ce)=0.00340 *5*; ce(M)/(γ+ce)=0.000711 *11* ce(N)/(γ+ce)=0.0001577 *24*; ce(O)/(γ+ce)=2.55×10^{-5} *5*; ce(P)/(γ+ce)=1.91×10^{-6} *7* α(K)=0.0260 *8*; α(L)=0.00350 *6*; α(M)=0.000733 *11*; α(N)=0.0001624 *24*; α(O)=2.63×10^{-5} *5* Additional information 17.
405.5[‡] *4*	24 *1*	596.0	13/2$^-$	190.5	9/2$^-$	(E2)		0.0195	24 *1*	ce(K)/(γ+ce)=0.01574 *23*; ce(L)/(γ+ce)=0.00266 *4*; ce(M)/(γ+ce)=0.000566 *9*

$^{129}_{58}$Ce$_{71}$-7

γ(^{129}Ce) (continued)

E_γ [†]	I_γ [@]	E_i(level)	J^π_i	E_f	J^π_f	Mult. [&]	α [b]	$I_{(\gamma+ce)}$ [#]	Comments
									ce(N)/(γ+ce)=0.0001240 *18*; ce(O)/(γ+ce)=1.92×10^{-5} *3*; ce(P)/(γ+ce)=1.083×10^{-6} *16* α(K)=0.01605 *23*; α(L)=0.00271 *4*; α(M)=0.000577 *9*; α(N)=0.0001264 *19*; α(O)=1.96×10^{-5} *3* A_2=+0.24 *3*; A_4=−0.08 *4* Additional information 11.
444.8[‡] *5*	22 *1*	589.2	11/2$^+$	144.34	7/2$^+$	(E2)	0.01493	22 *1*	ce(K)/(γ+ce)=0.01219 *18*; ce(L)/(γ+ce)=0.00199 *3*; ce(M)/(γ+ce)=0.000422 *6* ce(N)/(γ+ce)=9.27×10^{-5} *14*; ce(O)/(γ+ce)=1.444×10^{-5} *21*; ce(P)/(γ+ce)=8.47×10^{-7} *13* α(K)=0.01237 *18*; α(L)=0.00202 *3*; α(M)=0.000429 *7*; α(N)=9.41×10^{-5} *14*; α(O)=1.465×10^{-5} *22* A_2=+0.21 *9* (1977Gi17) Additional information 9.
469.8[‡] *5*	52 *3*	805.8	15/2$^-$	335.7	11/2$^-$	(Q)		52 *3*	A_2=+0.30 *6*; A_4=−0.01 *7* Additional information 13.
474	12 *1*	3007.6	27/2$^+$	2533.6	23/2$^+$			12 *1*	
485	2.5 *5*	1906.6	21/2$^-$	1421.8	19/2$^-$			2.5 *5*	
513	8 *1*	3285.6	29/2$^+$	2772.6	25/2$^+$			8 *1*	
515	5 *1*	2663.6	25/2$^-$	2148.6	23/2$^-$			5 *1*	
519.4[‡] *5*	20 *2*	867.5	13/2$^+$	348.09	9/2$^+$	(Q)		20 *2*	A_2=+0.19 *8* (1977Gi17) Additional information 14.
542	13 *1*	2772.6	25/2$^+$	2230.6	21/2$^+$			13 *1*	
542	13 *1*	3205.6	29/2$^-$	2663.6	25/2$^-$			13 *1*	
571	14 *2*	3458.6	31/2$^-$	2887.6	27/2$^-$			14 *2*	
574	8 *1*	3581.6	31/2$^+$	3007.6	27/2$^+$			8 *1*	
579	11 *1*	3784.6	33/2$^-$	3205.6	29/2$^-$			11 *1*	
586.7[‡] *6*	18 *1*	1175.8	15/2$^+$	589.2	11/2$^+$	(E2)	0.00706	18 *1*	A_2=+0.42 *9* (1977Gi17) ce(K)/(γ+ce)=0.00589 *9*; ce(L)/(γ+ce)=0.000882 *13*; ce(M)/(γ+ce)=0.000186 *3* ce(N)/(γ+ce)=4.09×10^{-5} *6*; ce(O)/(γ+ce)=6.47×10^{-6} *10*; ce(P)/(γ+ce)=4.19×10^{-7} *6* α(K)=0.00593 *9*; α(L)=0.000888 *13*; α(M)=0.000187 *3*; α(N)=4.12×10^{-5} *6*; α(O)=6.51×10^{-6} *10* Additional information 16.
590.6[‡] *6*	18 *2*	1186.5	17/2$^-$	596.0	13/2$^-$	Q		18 *2*	A_2=+0.50 *7*; A_4=−0.18 *7* Additional information 18.
616.2[‡] *6*	48 *2*	1421.8	19/2$^-$	805.8	15/2$^-$	(E2)	0.00623	48 *2*	A_2=+0.7 *2*; A_4=0.0 *2* ce(K)/(γ+ce)=0.00521 *8*; ce(L)/(γ+ce)=0.000770 *11*; ce(M)/(γ+ce)=0.0001623 *24* ce(N)/(γ+ce)=3.57×10^{-5} *5*; ce(O)/(γ+ce)=5.66×10^{-6} *8*;

γ(^{129}Ce) (continued)

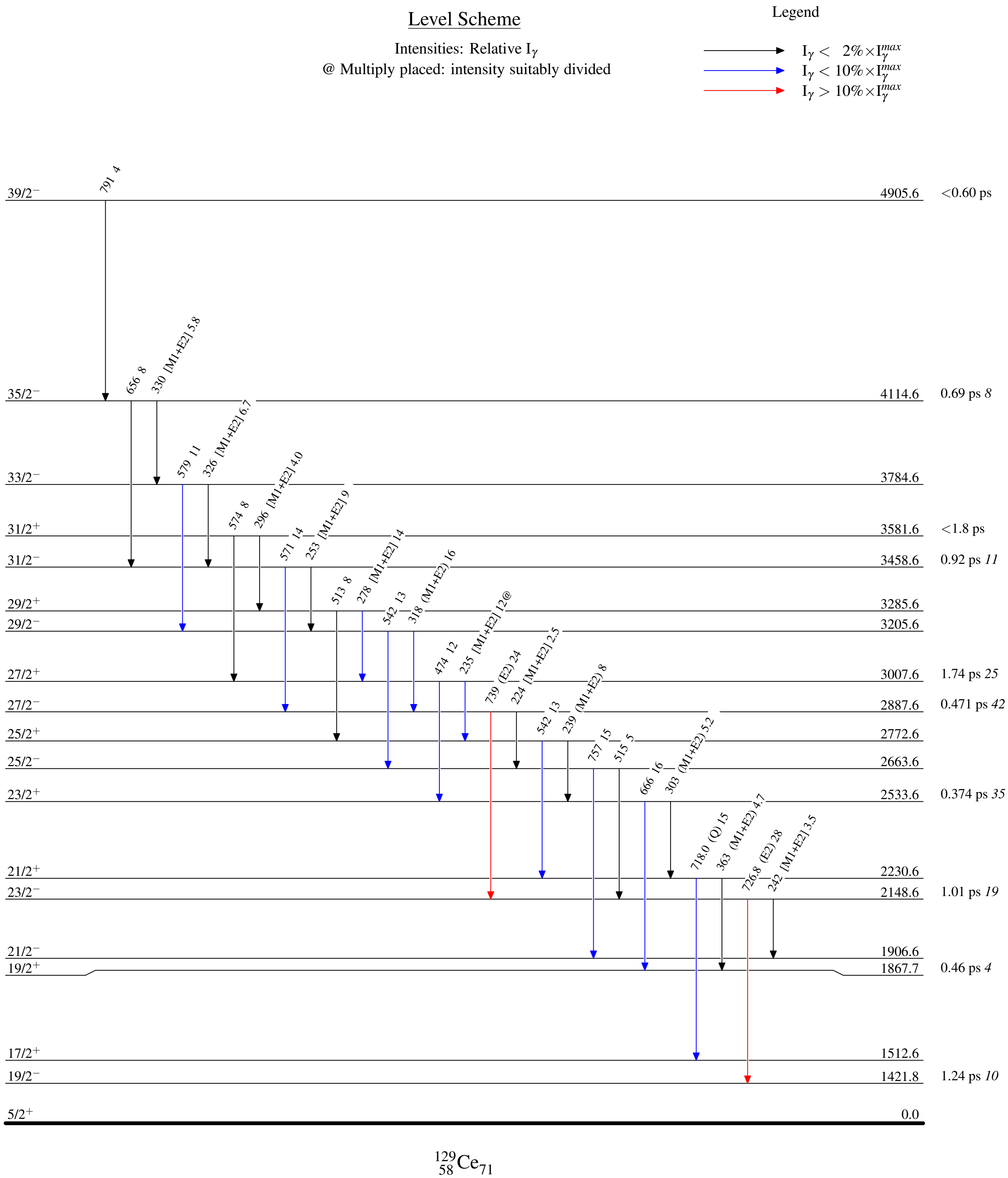
E_γ[†]	I_γ[@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	α[b]	$I_{(\gamma+ce)}$[#]	Comments
									ce(P)/(γ+ce)=3.72×10^{-7} *6* α(K)=0.00525 *8*; α(L)=0.000775 *11*; α(M)=0.0001633 *24*; α(N)=3.60×10^{-5} *6*; α(O)=5.69×10^{-6} *9* Additional information 20.
645.1[‡] *7*	17 *1*	1512.6	17/2$^+$	867.5	13/2$^+$	(Q)		17 *1*	A_2=+0.17 *9* (1977Gi17) Additional information 22.
656	8 *1*	4114.6	35/2$^-$	3458.6	31/2$^-$			8 *1*	
666	16 *2*	2533.6	23/2$^+$	1867.7	19/2$^+$			16 *2*	
692	20 *2*	1867.7	19/2$^+$	1175.8	15/2$^+$			20 *2*	
718.0[‡] *7*	15 *2*	2230.6	21/2$^+$	1512.6	17/2$^+$	(Q)		15 *2*	A_2=+0.34 *12*; A_4=−0.02 *9* Additional information 24.
720	17 *2*	1906.6	21/2$^-$	1186.5	17/2$^-$			17 *2*	
726.8[‡] *7*	28 *2*	2148.6	23/2$^-$	1421.8	19/2$^-$	(E2)	0.00415	28 *2*	A_2=+0.15 *8*; A_4=−0.02 *8* ce(K)/(γ+ce)=0.00350 *5*; ce(L)/(γ+ce)=0.000498 *7*; ce(M)/(γ+ce)=0.0001045 *15* ce(N)/(γ+ce)=2.31×10^{-5} *4*; ce(O)/(γ+ce)=3.67×10^{-6} *6*; ce(P)/(γ+ce)=2.52×10^{-7} *4* α(K)=0.00352 *5*; α(L)=0.000500 *8*; α(M)=0.0001049 *15*; α(N)=2.32×10^{-5} *4*; α(O)=3.69×10^{-6} *6* Additional information 23.
739	24 *2*	2887.6	27/2$^-$	2148.6	23/2$^-$	(E2)	0.00399	24 *2*	A_2=+0.28 *11*; A_4=−0.05 *8* ce(K)/(γ+ce)=0.00337 *5*; ce(L)/(γ+ce)=0.000477 *7*; ce(M)/(γ+ce)=0.0001001 *14* ce(N)/(γ+ce)=2.21×10^{-5} *3*; ce(O)/(γ+ce)=3.52×10^{-6} *5*; ce(P)/(γ+ce)=2.42×10^{-7} *4* α(K)=0.00338 *5*; α(L)=0.000479 *7*; α(M)=0.0001005 *14*; α(N)=2.22×10^{-5} *4*; α(O)=3.54×10^{-6} *5*
757	15 *2*	2663.6	25/2$^-$	1906.6	21/2$^-$			15 *2*	
[x]788.4									E_γ: complex line reported in 1977Gi17 only. Additional information 2.
791	4 *1*	4905.6	39/2$^-$	4114.6	35/2$^-$			4 *1*	

† From 1984Ar13, unless otherwise stated.
‡ From 1977Gi17, value from 1984Ar13 is in agreement but less precise. Uncertainty is 0.1% in 1977Gi17, the evaluators assign minimum uncertainty of 0.2 keV.
\# From 1984Ar13.
@ Deduced by the evaluators from I(γ+ce) given by 1984Ar13.
& From γ(θ) data in 1984Ar13 and 1977Gi17. The ΔJ=2, quadrupole transitions are most likely E2, and ΔJ=1, D+Q are most likely (M1+E2) for ΔJ=1 coupled-band structures. RUL for E2 and M2 used when level lifetimes are available or with assumed ≈10 ns coincidence resolving time in γγ data.

γ(^{129}Ce) (continued)

[a] From γ(θ) (1984Ar13); with sign reversed to make it consistent with Krane-Steffen convention.
[b] δ(E2/M1)=0.3 assumed when not given for M1+E2 transition.
[c] Multiply placed with intensity suitably divided.
[x] γ ray not placed in level scheme.

$^{116}Sn(^{16}O,3n\gamma),^{117}Sn(^{16}O,4n\gamma)$ 1984Ar13,1977Gi17



$^{116}Sn(^{16}O,3n\gamma),^{117}Sn(^{16}O,4n\gamma)$ 1984Ar13,1977Gi17

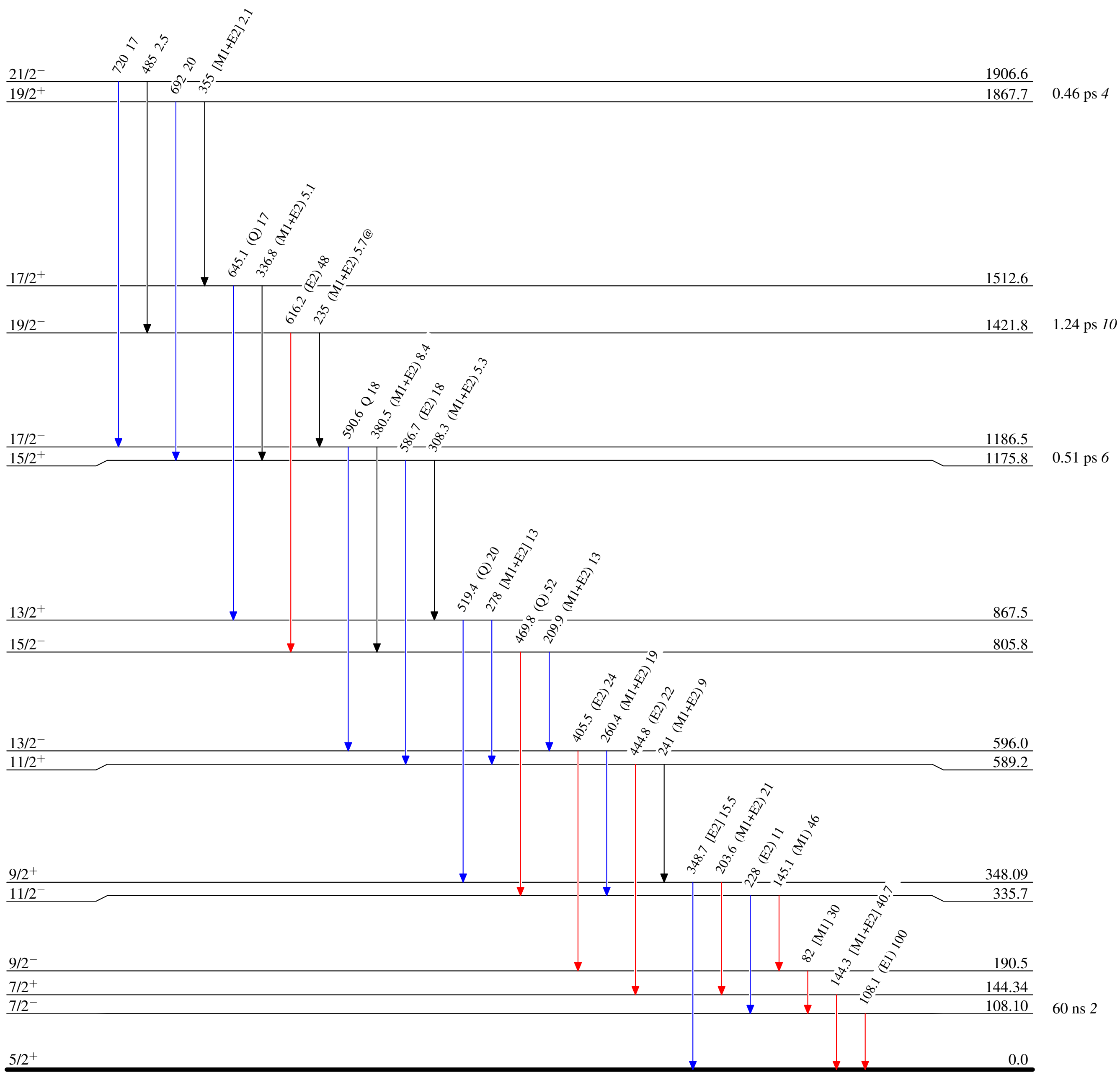
Level Scheme (continued)

Intensities: Relative I_γ

@ Multiply placed: intensity suitably divided

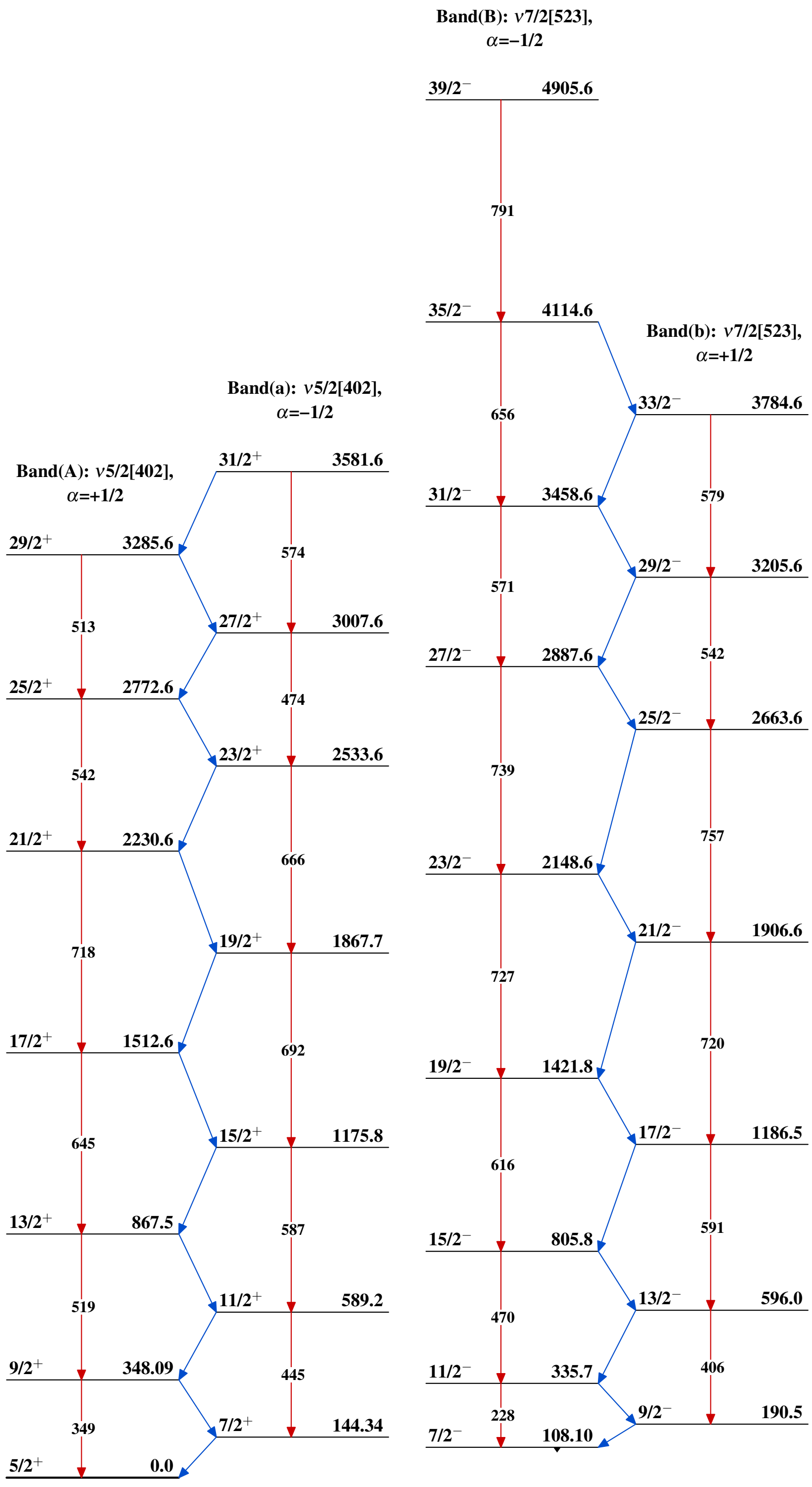
Legend

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



$^{129}_{58}Ce_{71}$

$^{116}Sn(^{16}O,3n\gamma),^{117}Sn(^{16}O,4n\gamma)$ 1984Ar13,1977Gi17



$^{129}_{58}Ce_{71}$