^{149}Sm(α,2nγ),^{150}Sm(α,3nγ) 1977Sm01,1977Kl04

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 110, 1 (2009)	20-Nov-2008

Includes ^{148}Sm(α,nγ).

1977Sm01: ^{149}Sm(α,2nγ) at E(α)=24 MeV. γ, $\gamma\gamma$, excitation functions, $\gamma(\theta)$, ce measurements. See also 1973Sm08 from the same authors.

1977Kl04: ^{150}Sm(α,3nγ) at E(α)=35-45 MeV. γ, $\gamma\gamma$, excitation functions, $\gamma(\theta)$, γ(linear pol) measurements. See also 1974Kl01 from the same authors.

Others:

1990ShZQ: ^{148}Sm(α,nγ) E=17.9 MeV. Measured $\gamma(\theta)$ the authors report $\gamma(\theta)$ for 251.9γ, 263.7γ, 443.9γ, 731.3γ from ^{148}Sm(α,nγ) E=17.9 MeV; and population of 839 level in (α,nγ) deexciting by (nearly isotropic) 251.9γ, 443.9γ, and 731.3γ.

^{151}Gd Levels

E(level)[†]	J$^\pi$[@]	E(level)[†]	J$^\pi$[@]	E(level)[†]	J$^\pi$[@]
0.0	$7/2^-$	851.95 *4*	$13/2^+$	1851.60 *6*	$19/2^+$
108.01 *4*	$5/2^-$	902.00 *4*	$13/2^-$	1853.00 *7*	$(21/2)^+$
379.31 *3*	$9/2^-$[&]	1076.95 *12*	$(9/2 \text{ to } 13/2)^-$	2003.70 *11*	$(17/2)^-$
395.41 *5*	$3/2^-$	1115.77 *4*	$13/2^+$	2077.80 *12*	$(19/2^-)$
426.68 *4*	$5/2^-$	1163.8? *10*		2196.6 *7*	(17/2 to 21/2)
574.06? *9*	$1/2^-$	1210.10 *8*	$11/2^-$	2295.09 *13*	$(19/2)^-$
584.75 *11*		1345.47 *6*	$17/2^+$	2297.3 *6*	$(21/2^-)$
587.32 *10*	$3/2^-$	1363.86 *5*	$15/2^+$	2325.14 *9*	$23/2^+$
589.13 *9*		1425.0 *10*		2405.4 *5*	$(25/2^+)$
617.89 *12*	$5/2 \text{ to } 9/2^-$	1435.02 *7*	$(15/2)^-$	2600.10 *14*	$(21/2^-)$
670.92 *7*	$(5/2,7/2)^-$	1463.30 *9*	$(13/2)^-$	2866.2[‡] *5*	$(27/2^+)$
705.98 *3*	$11/2^-$[a]	1505.75 *14*		2915.30 *17*	$(23/2)^-$
719.45 *4*	$9/2^-$[b]	1510.95 *6*	$17/2^-$	3007.7[‡] *8*	$(29/2^+)$
784.79 *4*	$11/2^+$[c]	1676.62 *7*	$(17/2)^+$	3238.19 *19*	$(25/2^-)$
839.3[#] *6*	$1/2^-$	1725.73 *10*	$(15/2)^-$	3728.2?[‡] *8*	

[†] From least-squares fit to Eγ's. For six γ rays uncertainty was doubled for fitting purpose. This gives normalized χ^2=2.7 as compared to critical χ^2=1.6. Otherwise normalized χ^2=5.2.

[‡] Level reported in (α,3nγ) (1977Kl04).

[#] Level from ^{148}Sm(α,nγ) (1990ShZQ).

[@] From 'Adopted Levels', except when noted otherwise. For levels with J≥9/2, assignments are from $\gamma(\theta)$ data and mult assignments from ce data.

[&] 379$\gamma(\theta)$ and 379γ(pol) restrict J to 9/2.

[a] 706$\gamma(\theta)$ and γ(pol) give J=11/2.

[b] 719$\gamma(\theta)$ gives 9/2, not 11/2.

[c] 405$\gamma(\theta)$ and γ(pol) give 11/2, not 9/2.

^{149}Sm(α,2nγ),^{150}Sm(α,3nγ) 1977Sm01,1977Kl04 (continued)

$\gamma(^{151}Gd)$

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α[e]	Comments
65.30 *4*	4.2 *3*	784.79	11/2$^+$	719.45	9/2$^-$	(E1)[a]		0.909	α(K)=0.753 *11*; α(L)=0.1226 *18*; α(M)=0.0266 *4*; α(N+..)=0.00687 *10* α(N)=0.00598 *9*; α(O)=0.000853 *12*; α(P)=3.97×10^{-5} *6* A$_2$=+0.16 *6*, A$_4$=+0.04 *10*, δ=+0.27. A$_2$ value in disagreement with ΔJ=1 and pure E1 assignment.
67.08 *4*	5.8 *1*	851.95	13/2$^+$	784.79	11/2$^+$	(M1)[a]		6.37	α(K)=5.37 *8*; α(L)=0.781 *11*; α(M)=0.1698 *24*; α(N+..)=0.0455 *7* α(N)=0.0391 *6*; α(O)=0.00605 *9*; α(P)=0.000402 *6* A$_2$=−0.19 *11*, A$_4$=+0.17 *15*, δ=+0.10.
78.71 *4*	9.1 *1*	784.79	11/2$^+$	705.98	11/2$^-$	(E1)[a]		0.555	α(K)=0.463 *7*; α(L)=0.0725 *11*; α(M)=0.01572 *23*; α(N+..)=0.00408 *6* α(N)=0.00354 *5*; α(O)=0.000512 *8*; α(P)=2.50×10^{-5} *4* A$_2$=+0.069 *5*, A$_4$=+0.010 *7*, δ=−0.46. A$_2$=+0.42 *6* (1977Kl04) disagrees with A$_2$ from 1977Sm01.
[x]88.96 *23*	0.15 *4*								
108.00 *4*	11.0 *4*	108.01	5/2$^-$	0.0	7/2$^-$	[M1,E2]		1.76 *15*	α(K)=1.15 *21*; α(L)=0.5 *3*; α(M)=0.11 *7*; α(N+..)=0.028 *17* α(N)=0.024 *15*; α(O)=0.0033 *18*; α(P)=7.E−5 *3* A$_2$=+0.052 *9*, A$_4$=+0.093 *9*, δ=−1.7.
[x]121.70 *6*	0.3 *1*								
146.03 *4*	16.0 *2*	851.95	13/2$^+$	705.98	11/2$^-$	[E1]		0.1052	α(K)=0.0888 *13*; α(L)=0.01288 *18*; α(M)=0.00279 *4*; α(N+..)=0.000732 *11* α(N)=0.000633 *9*; α(O)=9.41×10^{-5} *14*; α(P)=5.23×10^{-6} *8* A$_2$=−0.20 *1*, A$_4$=+0.049 *9*, δ=+0.03. Pol=+0.4 *2* (1977Kl04).
147.1[#] *2*	1.4 *3*	1510.95	17/2$^-$	1363.86	15/2$^+$				
180.13	0.69 *4*	574.06?	1/2$^-$	395.41	3/2$^-$	[M1,E2]		0.35 *4*	α(K)=0.27 *6*; α(L)=0.063 *17*; α(M)=0.014 *5*; α(N+..)=0.0037 *11* α(N)=0.0032 *10*; α(O)=0.00046 *11*; α(P)=1.8×10^{-5} *6* A$_2$=0.0 *1*, A$_4$=+0.14 *12*.
191.65 *13*	0.31 *6*	587.32	3/2$^-$	395.41	3/2$^-$	[M1,E2]		0.29 *4*	α(K)=0.22 *5*; α(L)=0.051 *12*; α(M)=0.011 *3*; α(N+..)=0.0030 *7* α(N)=0.0026 *7*; α(O)=0.00037 *7*; α(P)=1.5×10^{-5} *6*
193.74 *8*	0.36 *6*	589.13		395.41	3/2$^-$	[D,E2]		0.19 *13*	
196.00 *9*	0.5 *1*	902.00	13/2$^-$	705.98	11/2$^-$				
214.67[d] *15*	0.6 *2*	1115.77	13/2$^+$	902.00	13/2$^-$	(D+Q)			E$_\gamma$: poor fit. Level energy difference=213.81. Mult.: A$_2$=−0.17 *8*, A$_4$=+0.10 *10*; consistent with ΔJ=0, D+Q transition. however deduced δ=−0.8 is too large to be consistent with E1+M2.
229.59 *7*	0.4 *1*	1345.47	17/2$^+$	1115.77	13/2$^+$				A$_2$=0.0 *3*, A$_4$=−0.2 *4*.
247.98 *5*	1.0 *1*	1363.86	15/2$^+$	1115.77	13/2$^+$	M1(+E2)	<1	0.147 *13*	α(K)=0.121 *14*; α(L)=0.0200 *9*; α(M)=0.00440 *25*; α(N+..)=0.00117 *6* α(N)=0.00101 *6*; α(O)=0.000152 *4*; α(P)=8.7×10^{-6} *13* A$_2$=+0.15 *13*, A$_4$=−0.13 *17* gives δ=+0.17. α(K)exp=0.130 *15*.
251.9[c]		839.3	1/2$^-$	587.32	3/2$^-$				A$_2$=+0.09 *9*, A$_4$=−0.08 *13* (1990ShZQ).

$^{151}_{64}Gd_{87}$-2

^{149}Sm(α,2nγ),^{150}Sm(α,3nγ) 1977Sm01,1977Kl04 (continued)

$\gamma(^{151}Gd)$ (continued)

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α[e]	Comments
253.21 *4*	6.6 *1*	1463.30	(13/2)$^-$	1210.10	11/2$^-$	M1+E2	−0.22[b] *5*	0.1483 *24*	α(K)=0.1251 *21*; α(L)=0.0182 *3*; α(M)=0.00396 *6*; α(N+..)=0.001061 *16* α(N)=0.000911 *14*; α(O)=0.0001407 *20*; α(P)=9.21×10^{-6} *17* A_2=−0.57 *2*, A_4=−0.01 *2*. α(K)exp=0.113 *12* gives mult=M1(+E2) with δ<1.
262.42 *4*	3.5 *1*	1725.73	(15/2)$^-$	1463.30	(13/2)$^-$	M1+E2	−0.18[b] *5*	0.1353 *21*	α(K)=0.1143 *19*; α(L)=0.01647 *24*; α(M)=0.00358 *6*; α(N+..)=0.000959 *14* α(N)=0.000823 *12*; α(O)=0.0001274 *18*; α(P)=8.43×10^{-6} *15* A_2=−0.54 *2*, A_4=+0.02 *3*. α(K)exp=0.128 *13* gives mult=M1(+E2) with δ<0.3.
263.76 *4*	5.1 *1*	1115.77	13/2$^+$	851.95	13/2$^+$	M1(+E2)	<0.4	0.132 *4*	α(K)=0.111 *4*; α(L)=0.0163 *3*; α(M)=0.00355 *7*; α(N+..)=0.000950 *15* α(N)=0.000816 *14*; α(O)=0.0001258 *18*; α(P)=8.2×10^{-6} *4* A_2=+0.36 *2*, A_4=−0.01 *2*, δ=−0.03. Additional information 1. α(K)exp=0.125 *13*.
[x]266.61 *11*	0.4 *1*								
271.2 *3*	0.7 *1*	379.31	9/2$^-$	108.01	5/2$^-$	[E2]		0.0825	α(K)=0.0620 *9*; α(L)=0.01599 *24*; α(M)=0.00364 *6*; α(N+..)=0.000941 *14* α(N)=0.000822 *12*; α(O)=0.0001157 *17*; α(P)=3.80×10^{-6} *6* A_2=0.0 *3*, A_4=+0.1 *3*.
274.66[d] *13*	0.4 *1*	670.92	(5/2,7/2)$^-$	395.41	3/2$^-$				E_γ: poor fit. Level energy difference=275.5.
277.96 *5*	2.0 *1*	2003.70	(17/2)$^-$	1725.73	(15/2)$^-$	M1(+E2)	<0.5	0.113 *5*	α(K)=0.095 *5*; α(L)=0.01410 *21*; α(M)=0.00307 *5*; α(N+..)=0.000822 *13* α(N)=0.000706 *11*; α(O)=0.0001086 *16*; α(P)=7.0×10^{-6} *4* A_2=−0.6 *2*, A_4=−0.2 *3* (1977Kl04). α(K)exp=0.110 *15*.
287.35 *4*	3.9 *1*	395.41	3/2$^-$	108.01	5/2$^-$	M1(+E2)	<0.8	0.100 *8*	α(K)=0.083 *8*; α(L)=0.01285 *18*; α(M)=0.00281 *5*; α(N+..)=0.000750 *11* α(N)=0.000645 *10*; α(O)=9.85×10^{-5} *18*; α(P)=6.0×10^{-6} *7* A_2=+0.06 *2*, A_4=+0.04 *2*, δ=−0.04. α(K)exp=0.086 *9*.
291.38 *8*	1.3 *1*	2295.09	(19/2)$^-$	2003.70	(17/2)$^-$	M1(+E2)	−0.13[b] *13*	0.1027 *23*	α(K)=0.0869 *22*; α(L)=0.01237 *18*; α(M)=0.00268 *4*; α(N+..)=0.000720 *10* α(N)=0.000618 *9*; α(O)=9.58×10^{-5} *14*; α(P)=6.41×10^{-6} *18* A_2=−0.54 *6*, A_4=+0.06 *8*. α(K)exp=0.11 *2* gives mult=M1(+E2) with δ<0.2.
[x]296.66 *8*	0.7 *1*								
304.92 *8*	0.8 *1*	2600.10	(21/2$^-$)	2295.09	(19/2)$^-$				A_2=−0.1 *4*, A_4=−0.5 *6*, δ<+0.16.
315.09 *12*	0.4 *1*	2915.30	(23/2)$^-$	2600.10	(21/2$^-$)				A_2=+0.01 *14*, A_4=−0.2 *2*, δ=+0.1 *3*.
318.76 *7*	1.1 *1*	426.68	5/2$^-$	108.01	5/2$^-$				A_2=+0.04 *10*, A_4=−0.09 *11*, δ=−0.40.
324[#f] *1*		3238.19	(25/2$^-$)	2915.30	(23/2)$^-$				

$^{151}_{64}Gd_{87}$-3

^{149}Sm(α,2nγ),^{150}Sm(α,3nγ) 1977Sm01,1977Kl04 (continued)

γ(^{151}Gd) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α[e]	Comments
326.7 *2*	0.9 *2*	705.98	11/2$^-$	379.31	9/2$^-$	M1,E2		0.061 *15*	α(K)=0.050 *15*; α(L)=0.0086 *5*; α(M)=0.00191 *8*; α(N+..)=0.00050 *3* α(N)=0.000435 *20*; α(O)=6.5×10^{-5} *6*; α(P)=3.5×10^{-6} *13* α(K)exp=0.05 *2*.
330.93 *4*	4.3 *2*	1115.77	13/2$^+$	784.79	11/2$^+$	M1(+E2)	<0.6	0.070 *4*	α(K)=0.059 *4*; α(L)=0.00866 *18*; α(M)=0.00189 *4*; α(N+..)=0.000504 *11* α(N)=0.000433 *9*; α(O)=6.67×10^{-5} *18*; α(P)=4.3×10^{-6} *4* A$_2$=−0.51 *4*, A$_4$=0.00 *4*, δ=−0.2. α(K)exp=0.070 *15*.
331.1[#] *1*	0.5 *2*	1676.62	(17/2)$^+$	1345.47	17/2$^+$				
340.65 *4*	6.2 *2*	1851.60	19/2$^+$	1510.95	17/2$^-$	E1		0.01162	α(K)=0.00989 *14*; α(L)=0.001361 *19*; α(M)=0.000294 *5*; α(N+..)=7.80×10^{-5} *11* α(N)=6.71×10^{-5} *10*; α(O)=1.023×10^{-5} *15*; α(P)=6.36×10^{-7} *9* A$_2$=−0.27 *5*, A$_4$=+0.04 *6*, δ=+0.017. Pol=+0.06 *22* (1977Kl04). α(K)exp=0.010 *2*.
345[#] *1*	2.0 *5*	2196.6	(17/2 to 21/2)	1851.60	19/2$^+$				
346.58[f] *14*	0.9 *2*	1510.95	17/2$^-$	1163.8?					A$_2$=+0.2 *2*, A$_4$=−0.1 *3*. See comment for 379γ.
358.04 *9*	1.3 *2*	1210.10	11/2$^-$	851.95	13/2$^+$	E1		0.01029	α(K)=0.00876 *13*; α(L)=0.001202 *17*; α(M)=0.000259 *4*; α(N+..)=6.89×10^{-5} *10* α(N)=5.93×10^{-5} *9*; α(O)=9.05×10^{-6} *13*; α(P)=5.65×10^{-7} *8* A$_2$=0.0 *2*, A$_4$=0.0 *2*. α(K)exp<0.009.
379[#f] *1*	≈1	1163.8?		784.79	11/2$^+$				Placement from (347γ)(379γ). However, the positions of the 347γ and 379γ could be reversed thus defining the level at 1132 instead of 1164.
379.39 *4*	100.0 *4*	379.31	9/2$^-$	0.0	7/2$^-$	M1(+E2)	<0.25	0.0509 *10*	α(K)=0.0431 *9*; α(L)=0.00609 *10*; α(M)=0.001320 *20*; α(N+..)=0.000354 *6* α(N)=0.000304 *5*; α(O)=4.71×10^{-5} *8*; α(P)=3.16×10^{-6} *7* A$_2$=−0.091 *4*, A$_4$=+0.014 *5*, δ=+0.075. α(K)exp=0.044 *4*. Pol=−0.23 *5* (1977Kl04).
395.47 *8*	1.4 *2*	395.41	3/2$^-$	0.0	7/2$^-$	E2[&]		0.0265	α(K)=0.0211 *3*; α(L)=0.00425 *6*; α(M)=0.000951 *14*; α(N+..)=0.000249 *4* α(N)=0.000216 *3*; α(O)=3.14×10^{-5} *5*; α(P)=1.377×10^{-6} *20* α(K)exp=0.02 *1* gives mult=E2(+M1) with δ>1.
[x]397.44 *15*	0.6 *2*								
405.48 *4*	35.6 *1*	784.79	11/2$^+$	379.31	9/2$^-$	E1[@]		0.00764	α(K)=0.00651 *10*; α(L)=0.000888 *13*; α(M)=0.000191 *3*; α(N+..)=5.09×10^{-5} *8* α(N)=4.38×10^{-5} *7*; α(O)=6.70×10^{-6} *10*; α(P)=4.23×10^{-7} *6*

$^{151}_{64}Gd_{87}$-4

^{149}Sm(α,2nγ),^{150}Sm(α,3nγ) 1977Sm01,1977Kl04 (continued)

$\gamma(^{151}Gd)$ (continued)

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	α [e]	Comments
								A_2=−0.20 *1*, A_4=+0.03 *1*, δ=+0.035. Pol=+0.40 *10* (1977Kl04). α(K)exp=0.0074 *9* gives E1(+M2) with δ<0.16.
409.8[#] *5*	1.4 *5*	1115.77	13/2$^+$	705.98	11/2$^-$			
426.65 *4*	6.9 *2*	426.68	5/2$^-$	0.0	7/2$^-$	[M1,E2]	0.030 *9*	α(K)=0.025 *8*; α(L)=0.0039 *6*; α(M)=0.00086 *12*; α(N+..)=0.00023 *4* α(N)=0.00020 *3*; α(O)=3.0×10^{-5} *6*; α(P)=1.7×10^{-6} *7* A_2=−0.02 *9*, A_4=−0.03 *11*, δ=0.0.
443.9[c]		839.3	1/2$^-$	395.41	3/2$^-$			A_2=+0.02 *4*, A_4=−0.00 *6* (1990ShZQ).
461.92 *4*	6.1 *2*	1363.86	15/2$^+$	902.00	13/2$^-$	E1[@]	0.00564	α(K)=0.00481 *7*; α(L)=0.000652 *10*; α(M)=0.0001404 *20*; α(N+..)=3.74×10^{-5} *6* α(N)=3.22×10^{-5} *5*; α(O)=4.93×10^{-6} *7*; α(P)=3.15×10^{-7} *5* A_2=−0.19 *2*, A_4=+0.07 *3*, δ=+0.05. Pol=+0.4 *4* (1977Kl04). α(K)exp=0.006 *2* gives mult=E1(+M2) with δ<0.25.
466.04 *8*	1.3 *2*	574.06?	1/2$^-$	108.01	5/2$^-$			
473.53 *6*	4.3 *3*	2325.14	23/2$^+$	1851.60	19/2$^+$	E2[&]	0.01612	α(K)=0.01305 *19*; α(L)=0.00240 *4*; α(M)=0.000533 *8*; α(N+..)=0.0001401 *20* α(N)=0.0001214 *17*; α(O)=1.79×10^{-5} *3*; α(P)=8.71×10^{-7} *13* A_2=+0.36 *6*, A_4=−0.12 *8*. α(K)exp=0.018 *8* gives mult=M1,E2.
476.5 *2*	0.6 *2*	584.75		108.01	5/2$^-$			
479.56 *13*	1.0 *3*	587.32	3/2$^-$	108.01	5/2$^-$			
480.4[d] *2*	0.7 *3*	589.13		108.01	5/2$^-$			
[x]483.42 *15*	1.2 *3*					M1,E2	0.021 *7*	α(K)=0.018 *6*; α(L)=0.0028 *5*; α(M)=0.00060 *11*; α(N+..)=0.00016 *3* α(N)=0.000138 *25*; α(O)=2.1×10^{-5} *5*; α(P)=1.3×10^{-6} *5* α(K)exp=0.015 *7*.
487.77 *6*	5.1 *3*	1851.60	19/2$^+$	1363.86	15/2$^+$	E2[&]	0.01490	α(K)=0.01209 *17*; α(L)=0.00219 *3*; α(M)=0.000487 *7*; α(N+..)=0.0001280 *18* α(N)=0.0001108 *16*; α(O)=1.636×10^{-5} *23*; α(P)=8.09×10^{-7} *12* A_2=+0.35 *4*, A_4=−0.02 *5*. α(K)exp=0.013 *4* gives mult=E2(+M1) with δ>0.7.
493.57 *6*	25.6 *3*	1345.47	17/2$^+$	851.95	13/2$^+$	E2[@]	0.01444	α(K)=0.01173 *17*; α(L)=0.00212 *3*; α(M)=0.000470 *7*; α(N+..)=0.0001235 *18* α(N)=0.0001069 *15*; α(O)=1.580×10^{-5} *23*; α(P)=7.86×10^{-7} *11* A_2=+0.35 *1*, A_4=−0.11 *1*. Pol=+0.69 *14*. α(K)exp=0.014 *2* gives mult=E2(+M1) with δ>1.
[x]496.2 *2*	1.3 *3*							
504.4 *2*	1.5 *6*	1210.10	11/2$^-$	705.98	11/2$^-$	M1,E2	0.019 *6*	α(K)=0.016 *5*; α(L)=0.0024 *5*; α(M)=0.00054 *10*; α(N+..)=0.00014 *3* α(N)=0.000123 *23*; α(O)=1.9×10^{-5} *4*; α(P)=1.1×10^{-6} *4* A_2=+0.6 *4*, A_4=+0.3 *5*, δ=+0.27. α(K)exp=0.012 *7*.
506.08[#] *15*	3 *1*	1851.60	19/2$^+$	1345.47	17/2$^+$			
507.53 *4*	9.6 *5*	1853.00	(21/2)$^+$	1345.47	17/2$^+$	E2[&]	0.01341	α(K)=0.01092 *16*; α(L)=0.00195 *3*; α(M)=0.000432 *6*; α(N+..)=0.0001136 *16* α(N)=9.83×10^{-5} *14*; α(O)=1.455×10^{-5} *21*; α(P)=7.34×10^{-7} *11* A_2=+0.07 *8*, A_4=−0.34 *10* (1977Sm01). A_2=+0.36 *4*, A_4=−0.03 *4* (1977Kl04). A_2 values quoted by 1977Sm01 and 1977Kl04 disagree. α(K)exp=0.010 *2* gives mult=E2(+M1) with δ>3.

$^{151}_{64}Gd_{87}$-5

^{149}Sm(α,2nγ),^{150}Sm(α,3nγ) 1977Sm01,1977Kl04 (continued)

$\gamma(^{151}Gd)$ (continued)

E_γ [†]	I_γ [†]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [‡]	α [e]	Comments
512.2 *2*	2.4 *9*	1363.86	$15/2^+$	851.95	$13/2^+$	M1,E2	0.018 *6*	α(K)=0.015 *5*; α(L)=0.0023 *5*; α(M)=0.00051 *10*; α(N+..)=0.00014 *3* α(N)=0.000118 *22*; α(O)=1.8×10^{-5} *4*; α(P)=1.1×10^{-6} *4* α(K)exp=0.008 *3*.
515.1 *4*	1.1 *5*	1725.73	$(15/2)^-$	1210.10	$11/2^-$			
520[#] *1*	1.0 *5*	2196.6	(17/2 to 21/2)	1676.62	$(17/2)^+$			
522.77 *4*	39.2 *4*	902.00	$13/2^-$	379.31	$9/2^-$	E2[@]	0.01242	α(K)=0.01014 *15*; α(L)=0.001783 *25*; α(M)=0.000395 *6*; α(N+..)=0.0001040 *15* α(N)=9.00×10^{-5} *13*; α(O)=1.335×10^{-5} *19*; α(P)=6.82×10^{-7} *10* A_2=+0.30 *1*, A_4=−0.02 *1*. Pol=+0.51 *12* (1977Kl04). α(K)exp=0.0110 *15* gives mult=E2(+M1) with δ>1.5.
[x]528.8 *3*	0.9 *2*							
540.82[d] *10*	1.9 *3*	2003.70	$(17/2)^-$	1463.30	$(13/2)^-$			A_2=+0.3 *3*, A_4=−0.2 *3*. Probably a doublet. See placement of 541γ deexciting a 2867 level suggested by 1977Kl04.
541.1 *5*	10 *1*	2866.2	$(27/2^+)$	2325.14	$23/2^+$	(E2)[@]	0.01136	α(K)=0.00930 *14*; α(L)=0.001613 *23*; α(M)=0.000357 *5*; α(N+..)=9.41×10^{-5} *14* α(N)=8.13×10^{-5} *12*; α(O)=1.209×10^{-5} *18*; α(P)=6.28×10^{-7} *9* A_2=+0.38 *8*, A_4=−0.08 *10*, Pol=+0.8 *6* (1977Kl04). Probably a doublet. See placement of 540.8γ deexciting a 2004 level.
552.4[#] *5*	2.3 *5*	2405.4	$(25/2^+)$	1853.00	$(21/2)^+$			A_2=+0.33 *4* (1977Kl04).
560.89 *7*	3.5 *3*	1676.62	$(17/2)^+$	1115.77	$13/2^+$	E2[&]	0.01037	α(K)=0.00851 *12*; α(L)=0.001455 *21*; α(M)=0.000321 *5*; α(N+..)=8.48×10^{-5} *12* α(N)=7.33×10^{-5} *11*; α(O)=1.092×10^{-5} *16*; α(P)=5.76×10^{-7} *8* A_2=+0.31 *17*, A_4=−0.11 *21*. Negative sign of A_2 in 1977Sm01 is a misprint. A_2=+0.41 *10* (1977Kl04). α(K)exp=0.008 *3* gives mult=E2(+M1) with δ>1.
562.93 *7*	5.0 *3*	670.92	$(5/2,7/2)^-$	108.01	$5/2^-$	M1,E2	0.015 *5*	α(K)=0.012 *4*; α(L)=0.0018 *4*; α(M)=0.00040 *8*; α(N+..)=0.000106 *22* α(N)=9.1×10^{-5} *19*; α(O)=1.4×10^{-5} *4*; α(P)=9.E−7 *3* A_2=−0.3 *3*, A_4=−0.3 *4*, δ=−0.13. α(K)exp=0.013 *4*.
568.74[d] *15*	1.6 *5*	2295.09	$(19/2)^-$	1725.73	$(15/2)^-$			α(K)exp=0.020 *10* gives mult=M1,E2.
579.08 *10*	3.5 *3*	1363.86	$15/2^+$	784.79	$11/2^+$			A_2=+0.4 *4*, A_4=−0.1 *4*.
583.52[d] *11*	3.5 *4*	1435.02	$(15/2)^-$	851.95	$13/2^+$			A_2=+0.14 *7*, A_4=−0.16 *9*, δ=+0.17.
584.84 *12*	4.9 *4*	584.75		0.0	$7/2^-$			A_2=−0.16 *6*, A_4=+0.05 *7*, δ=+0.05.
589.2 *2*	1.8 *4*	589.13		0.0	$7/2^-$			
596.7 *2*	1.4 *2*	2600.10	$(21/2^-)$	2003.70	$(17/2)^-$			
602.3 *5*	5 *1*	3007.7	$(29/2^+)$	2405.4	$(25/2^+)$			A_2=+0.45 *20*, A_4=−0.1 *3*.
603.75 *14*	2.5 *4*	1505.75		902.00	$13/2^-$			A_2=−0.1 *4*, A_4=+0.3 *5*.
608.94 *4*	15.6 *3*	1510.95	$17/2^-$	902.00	$13/2^-$	E2[@]	0.00845	α(K)=0.00697 *10*; α(L)=0.001155 *17*; α(M)=0.000255 *4*; α(N+..)=6.73×10^{-5} *10*

$^{151}_{64}Gd_{87}$-6

^{149}Sm(α,2nγ),^{150}Sm(α,3nγ) 1977Sm01,1977Kl04 (continued)

γ(^{151}Gd) (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α[e]	Comments
									α(N)=5.81×10^{-5} *9*; α(O)=8.70×10^{-6} *13*; α(P)=4.75×10^{-7} *7* A_2=+0.26 *11*, A_4=+0.02 *2*. Pol=+0.63 *25* (1977Kl04). α(K)exp=0.007 *2* gives mult=E2(+M1) with δ>2.
617.89 *12*	1.3 *2*	617.89	5/2 to 9/2$^-$	0.0	7/2$^-$	M1(+E2)	<2	0.012 *3*	α(K)=0.0103 *24*; α(L)=0.0015 *3*; α(M)=0.00032 *6*; α(N+..)=8.6×10^{-5} *15* α(N)=7.4×10^{-5} *13*; α(O)=1.14×10^{-5} *21*; α(P)=7.4×10^{-7} *19* A_2=+0.34 *13*, A_4=+0.13 *17*, δ=−0.84. α(K)exp=0.012 *3*.
620.5 *2*	1.8 *4*	2915.30	(23/2)$^-$	2295.09	(19/2)$^-$	E2[&]		0.00807	α(K)=0.00667 *10*; α(L)=0.001097 *16*; α(M)=0.000242 *4*; α(N+..)=6.39×10^{-5} *9* α(N)=5.52×10^{-5} *8*; α(O)=8.27×10^{-6} *12*; α(P)=4.54×10^{-7} *7* A_2=+0.6 *3*, A_4=+0.6 *4*. α(K)exp=0.007 *3* gives mult=E2(+M1) with δ>1.
638.09 *12*	1.5 *5*	3238.19	(25/2$^-$)	2600.10	(21/2$^-$)				A_2=+0.2 *4*, A_4=+0.1 *5*, δ=−0.27.
642.78 *10*	2.5 *3*	2077.80	(19/2$^-$)	1435.02	(15/2)$^-$				A_2=+0.2 *3*, A_4=−0.2 *4*.
671.01 *11*	2.5 *4*	670.92	(5/2,7/2)$^-$	0.0	7/2$^-$				A_2=+0.1 *3*, A_4=+0.2 *4*, δ=−0.7.
697.64 *11*	5.3 *6*	1076.95	(9/2 to 13/2)$^-$	379.31	9/2$^-$	(E2)[&]		0.00610	α(K)=0.00507 *8*; α(L)=0.000803 *12*; α(M)=0.0001762 *25*; α(N+..)=4.67×10^{-5} *7* α(N)=4.03×10^{-5} *6*; α(O)=6.08×10^{-6} *9*; α(P)=3.48×10^{-7} *5* A_2=+0.4 *4*, A_4=−0.1 *5*. α(K)exp=0.005 *2* gives mult=E2(+M1) with δ>1.
705.93 *4*	46.5 *4*	705.98	11/2$^-$	0.0	7/2$^-$	E2[@]		0.00593	α(K)=0.00494 *7*; α(L)=0.000779 *11*; α(M)=0.0001708 *24*; α(N+..)=4.53×10^{-5} *7* α(N)=3.91×10^{-5} *6*; α(O)=5.90×10^{-6} *9*; α(P)=3.39×10^{-7} *5* A_2=+0.25 *1*, A_4=−0.03 *1*. Pol=+0.76 *17* (1977Kl04). α(K)exp=0.0052 *10* gives mult=E2(+M1) with δ>2.
719[#f] *1*	2.0	1425.0		705.98	11/2$^-$				
719.38 *5*	8.0 *3*	719.45	9/2$^-$	0.0	7/2$^-$	E2(+M1)	>1	0.0068 *12*	α(K)=0.0057 *10*; α(L)=0.00085 *12*; α(M)=0.000186 *24*; α(N+..)=5.0×10^{-5} *7* α(N)=4.3×10^{-5} *6*; α(O)=6.5×10^{-6} *9*; α(P)=4.0×10^{-7} *8* A_2=−0.35 *4*, A_4=+0.10 *5*, δ=−3. α(K)exp=0.0052 *11*.
721.0 *5*	2.2 *9*	1505.75		784.79	11/2$^+$				
729.00 *6*	6.8 *3*	1435.02	(15/2)$^-$	705.98	11/2$^-$	E2[&]		0.00551	α(K)=0.00459 *7*; α(L)=0.000717 *10*; α(M)=0.0001572 *22*; α(N+..)=4.17×10^{-5} *6* α(N)=3.59×10^{-5} *5*; α(O)=5.44×10^{-6} *8*; α(P)=3.15×10^{-7} *5* A_2=+0.16 *6*, A_4=+0.07 *6*, δ=−.017. α(K)exp=0.0052 *11* gives mult=E2(+M1) with δ>1.
731.3[c]		839.3	1/2$^-$	108.01	5/2$^-$				A_2=+0.07 *6*, A_4=−0.04 *9* (1990ShZQ).
786.4 *6*	0.5 *1*	2297.3	(21/2$^-$)	1510.95	17/2$^-$				A_2=+0.35 *10*, A_4=+0.24 *11*. Positive A_4 is inconsistent with ΔJ=2, quadrupole transition.
824.2 *4*	1.5 *3*	1676.62	(17/2)$^+$	851.95	13/2$^+$				

$^{151}_{64}Gd_{87}$-7

^{149}Sm(α,2nγ),^{150}Sm(α,3nγ) 1977Sm01,1977Kl04 (continued)

$\gamma(^{151}Gd)$ (continued)

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
830.81 *14*	4.4 *2*	1210.10	11/2$^-$	379.31	9/2$^-$	D+Q	A_2=+0.12 *7*, A_4=+0.25 *8*, δ=+6.3.
[x]835.2 *3*	1.7 *3*						
[x]839.0 *4*	1.6 *3*						
[x]854.6 *5*	1.2 *2*						
862.0[f] *5*	1.5 *4*	3728.2?		2866.2	(27/2$^+$)		A_2=+0.4 *5*, A_4=0.0 *7* (1977Kl04).
1210.8 *4*	1.8 *3*	1210.10	11/2$^-$	0.0	7/2$^-$	Q	A_2=+0.30 *8*, A_4=−0.06 *2*.

[†] From 1977Sm01, unless otherwise stated.
[‡] From ce data (1977Sm01), unless otherwise stated. δ's deduced by 1977Sm01 from $\gamma(\theta)$ are given under comments. No uncertainties are available on δ's.
[#] From $\gamma\gamma$ data only.
[@] From $\gamma(\theta)$ and γ(linear pol) data. Consistent with ce data.
[&] ce and $\gamma(\theta)$ data give E2(+M1) but ΔJ^π rules out M1.
[a] Deduced from intensity balance in $\gamma\gamma$ data (1977Sm01).
[b] From $\gamma(\theta)$ (1977Sm01).
[c] From 1990ShZQ.
[d] Uncertainty doubled for fitting purpose.
[e] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
[f] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

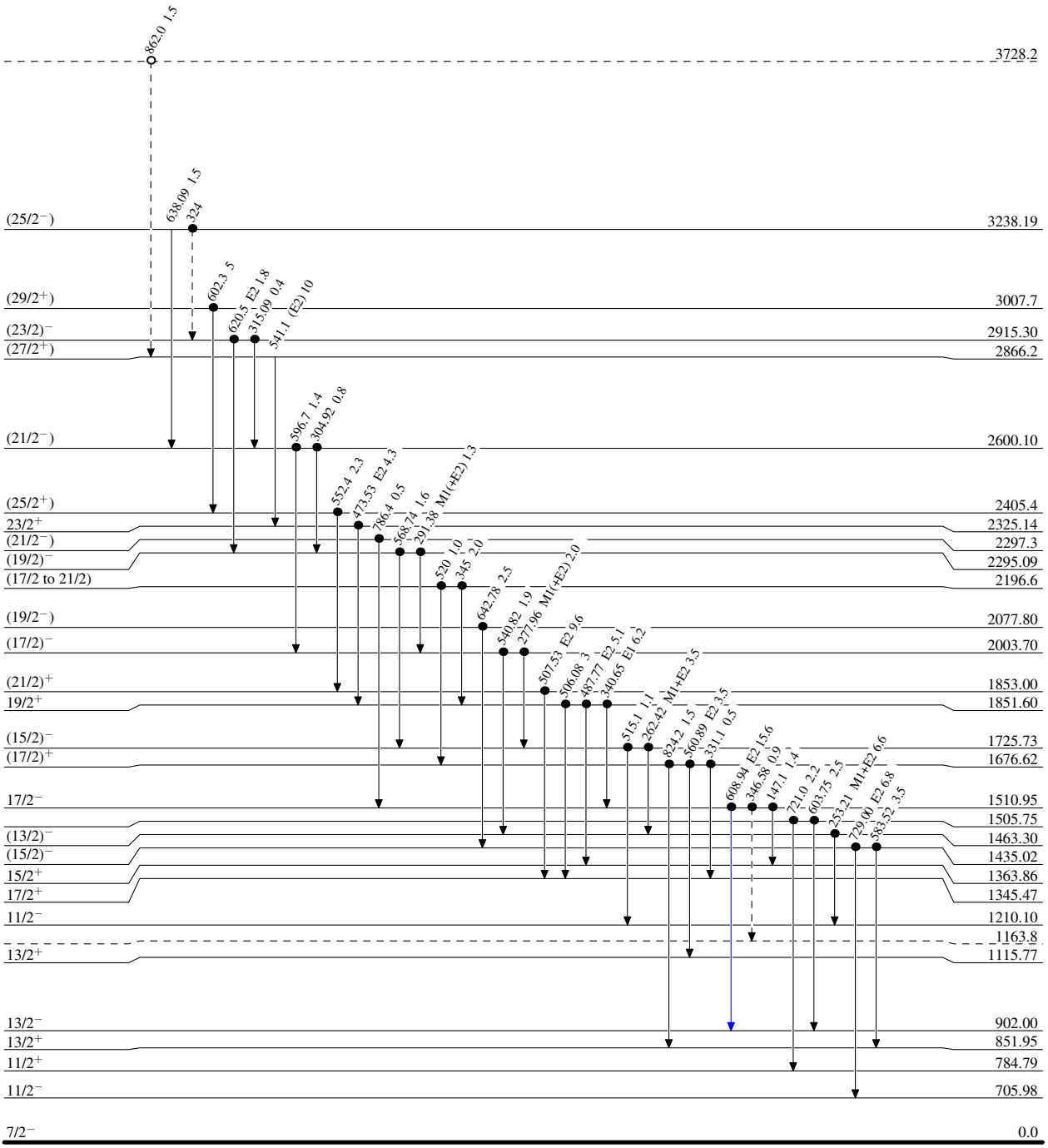
$^{151}_{64}Gd_{87}$-8

^{149}Sm(α,2nγ),^{150}Sm(α,3nγ) **1977Sm01,1977Kl04**

Level Scheme

Intensities: Relative I_γ

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)
- Coincidence
- Coincidence (Uncertain)

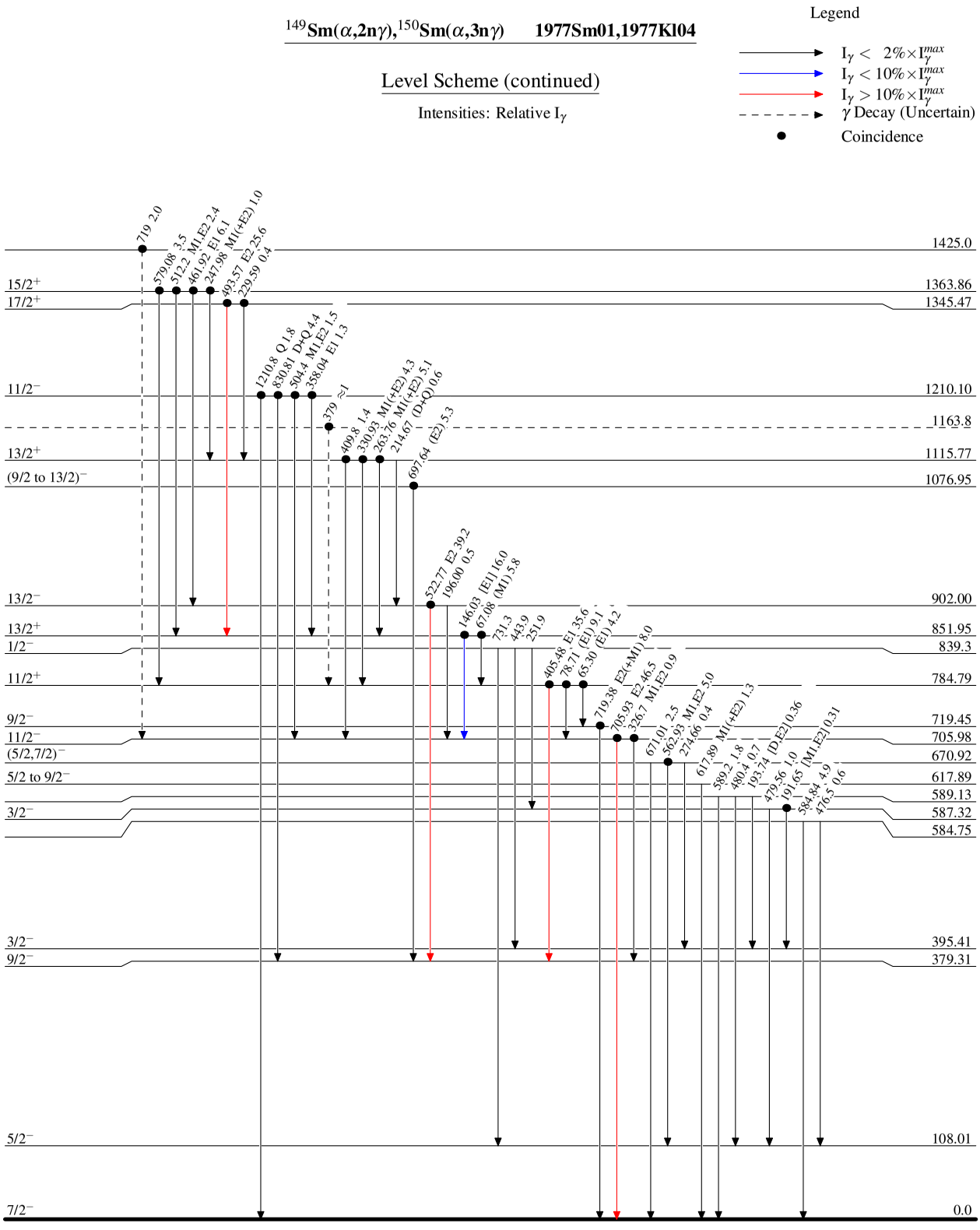


$^{151}_{64}Gd_{87}$

^{149}Sm(α,2nγ),^{150}Sm(α,3nγ) **1977Sm01,1977Kl04**

Level Scheme (continued)

Intensities: Relative I_γ

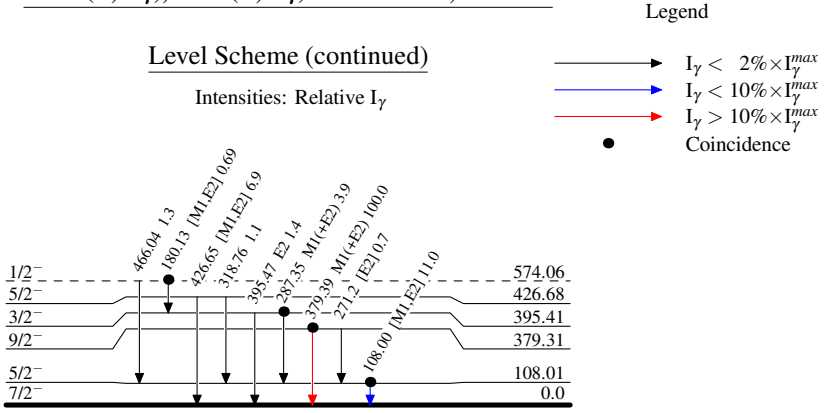


$^{151}_{64}Gd_{87}$

^{149}Sm(α,2nγ),^{150}Sm(α,3nγ) 1977Sm01,1977Kl04

Level Scheme (continued)

Intensities: Relative I_γ



$^{151}_{64}Gd_{87}$