

¹⁵⁴Sm(d,3nγ) 1975Dr07,1980Be61

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 170, 1 (2020)	16-Aug-2020

1975Dr01: E=18-25 MeV; measured Eγ, Iγ γγ coincidences, and γ(θ).
 1980Be61: E=13.5 MeV; measured Eγ, Iγ.

¹⁵³Eu Levels

Levels are reported in both 1975Dr07 and 1980Be61, unless otherwise noted.

E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]	E(level) [†]	J ^π [‡]
0.0 ^{&}	5/2 ⁺	269.63 ^b 14	(7/2 ⁺)	589.3	(15/2 ⁻)	954.2 ^a	(19/2 ⁻)
83.4 5	7/2 ⁺	321.7 ^a	(11/2 ⁻)	654.6 ^{&}	(15/2 ⁺)	1061.0 ^{&}	(19/2 ⁺)
97.2 ^a 4	5/2 ⁻	324.8 ^{&}	(11/2 ⁺)	693.57 [@] 19		1261.5 ^{#a}	(21/2 ⁻)
103.19 ^b 3	3/2 ⁺	396.32 ^b 14	(9/2 ⁺)	715.9 ^b	(13/2 ⁺)	1293.3 ^{#&}	(21/2 ⁺)
151.7 ^a	(7/2 ⁻)	477.8 ^a	(13/2 ⁻)	825.4 ^a	(17/2 ⁻)	1404.1 ^{#a}	(23/2 ⁻)
172.86 ^b 7	5/2 ⁺	480.9	(13/2 ⁺)	851.5 ^{&}	(17/2 ⁺)	1536.0 ^{#&}	(23/2 ⁺)
192.9 ^{&}	9/2 ⁺	537.8 ^b	(11/2 ⁺)	891.7 [#]		1771 ^{#a}	(25/2 ⁻)
235.2 ^a	(9/2 ⁻)	569.5 [@] 3		942.6 [#]		1924 ^{#a}	(27/2 ⁻)

- [†] From fit to γ energies.
- [‡] From ¹⁵³Eu Adopted Levels, and all assignments agree with 1975Dr07 and 1980Be61.
- # Level reported only by 1975Dr07.
- @ Level reported only by 1980Be61.
- & Band(A): 5/2[413] band.
- ^a Band(B): 5/2[532] band.
- ^b Band(C): 3/2[411] band.

γ(¹⁵³Eu)

Many of the γ(θ) results given by 1975Dr01 are for γ peaks including two or more γ's. These data are not given here, but they exist for the following γ combinations: 108.5 + 109.7 + 111.6, 126.7 + 128.8 +129.5 +131.6, 151.6 +151.9, 241.3 + 242.6, 267.7 + 268.2, and 365.3 + 367.

E _γ [†]	I _γ ^{‡#}	E _i (level)	J _i ^π	E _f	J _f ^π	Comments
54.2	14.9 20	151.7	(7/2 ⁻)	97.2	5/2 ⁻	
69.67 6	12.0 5	172.86	5/2 ⁺	103.19	3/2 ⁺	
83.4	36 8	83.4	7/2 ⁺	0.0	5/2 ⁺	I _γ : From I _γ (83.4+83.7)=69.5 8.
83.7	34 8	235.2	(9/2 ⁻)	151.7	(7/2 ⁻)	I _γ : I _γ (83.4+83.7)=69.5 8.
86.6	33.2 9	321.7	(11/2 ⁻)	235.2	(9/2 ⁻)	
89.6	<18	324.8	(11/2 ⁺)	235.2	(9/2 ⁻)	
96.9	28 7	269.63	(7/2 ⁺)	172.86	5/2 ⁺	I _γ : I _γ (96.9+97.4)=117.0 I15.
97.4	89 7	97.2	5/2 ⁻	0.0	5/2 ⁺	I _γ : From I _γ (96.9+97.4)=117.0 I5.
103.19 3	39.9 10	103.19	3/2 ⁺	0.0	5/2 ⁺	
108.5 ^c	3 1	589.3	(15/2 ⁻)	480.9	(13/2 ⁺)	
109.7	16.5 7	192.9	9/2 ⁺	83.4	7/2 ⁺	
111.44 12	19.5 8	589.3	(15/2 ⁻)	477.8	(13/2 ⁻)	
126.69 3	14.6 7	396.32	(9/2 ⁺)	269.63	(7/2 ⁺)	

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¹⁵⁴Sm(d,3nγ) 1975Dr07,1980Be61 (continued)

γ(¹⁵³Eu) (continued)

E_γ †	I_γ ‡#	E_i (level)	J_i^π	E_f	J_f^π	Mult. @	δ &	Comments
128.8	17.6 20	321.7	(11/2) ⁻	192.9	9/2 ⁺			I_γ : $I_\gamma(128.8+129.5)=21.9$ 8.
129.5 ^c	4.3 22	954.2	(19/2) ⁻	825.4	(17/2) ⁻			I_γ : $I_\gamma(128.8+129.5)=21.9$ 8.
131.97 12	5.8 6	324.8	(11/2) ⁺	192.9	9/2 ⁺			
137.7	3.2 6	235.2	(9/2) ⁻	97.2	5/2 ⁻			
141.5	<10.2	537.8	(11/2) ⁺	396.32	(9/2) ⁺			I_γ : $I_\gamma(141.5+142.0)=10.2$ 11.
142.0 ^c	<10.2	1404.1	(23/2) ⁻	1261.5	(21/2) ⁻			I_γ : $I_\gamma(141.5+142.0)=10.2$ 11.
151.6	59 10	151.7	(7/2) ⁻	0.0	5/2 ⁺			I_γ : From $I_\gamma(151.6+151.9)=100$.
151.9	41 10	235.2	(9/2) ⁻	83.4	7/2 ⁺			I_γ : $I_\gamma(151.6+151.9)=100$.
156.1	43.0 13	477.8	(13/2) ⁻	321.7	(11/2) ⁻	[M1+E2]	+0.18 6	Mult.: $A_2=+0.028$ 20; $A_4=-0.047$ 34.
159.20 18	6.5 9	480.9	(13/2) ⁺	321.7	(11/2) ⁻			
166.7	3.8 8	269.63	(7/2) ⁺	103.19	3/2 ⁺			
169.99 12	10.7 9	321.7	(11/2) ⁻	151.7	(7/2) ⁻			I_γ : Other: $I_\gamma(86)/I_\gamma(169)=1.31$ (1980Be61).
178.08 12	4.4 8	715.9	(13/2) ⁺	537.8	(11/2) ⁺			
193.1	44.0 12	192.9	9/2 ⁺	0.0	5/2 ⁺	E2		Mult.: $A_2=+0.224$ 18; $A_4=+0.01$ 4. I_γ : Other: $I_\gamma(193)/I_\gamma(109)=1.50$ 5 (1980Be61).
223.44 12	7.8 10	396.32	(9/2) ⁺	172.86	5/2 ⁺			
236.07 12	22.0 15	825.4	(17/2) ⁻	589.3	(15/2) ⁻	[M1+E2]	+0.18 8	Mult.: $A_2=+0.06$ 4; $A_4=-0.01$ 7. δ : Alternative value is $\delta = 14 + 999 - 8$.
241.3	42 7	324.8	(11/2) ⁺	83.4	7/2 ⁺			I_γ : $I_\gamma(241.3+242.6)=72.5$ 17.
242.6	30 5	477.8	(13/2) ⁻	235.2	(9/2) ⁻			I_γ : $I_\gamma(241.3+242.6)=72.5$ 17.
267.7	35 3	589.3	(15/2) ⁻	321.7	(11/2) ⁻			I_γ : $I_\gamma(267.7+268.2)=42.5$ 18.
268.2	7.6 22	537.8	(11/2) ⁺	269.63	(7/2) ⁺			I_γ : $I_\gamma(267.7+268.2)=42.5$ 18.
288.02 15	42.0 20	480.9	(13/2) ⁺	192.9	9/2 ⁺	E2		Mult.: $A_2=+0.236$ 25; $A_4=-0.097$ 40.
302.7	7.1 19	537.8	(11/2) ⁺	235.2	(9/2) ⁻			
306.8	4.0 13	1261.5	(21/2) ⁻	954.2	(19/2) ⁻			
319.8	6.8 15	715.9	(13/2) ⁺	396.32	(9/2) ⁺			
329.8	30.7 19	654.6	(15/2) ⁺	324.8	(11/2) ⁺	E2		Mult.: $A_2=+0.27$ 3; $A_4=-0.02$ 5.
347.7 3	18.0 15	825.4	(17/2) ⁻	477.8	(13/2) ⁻	E2		$A_2=+0.35$ 6; $A_4=-0.09$ 10.
353.3	6.1 12	942.6		589.3	(15/2) ⁻			
364.9 3	<31.0	954.2	(19/2) ⁻	589.3	(15/2) ⁻			I_γ : $I_\gamma(365.3+367)=31.0$ 15.
367	<31.0	1771	(25/2) ⁻	1404.1	(23/2) ⁻			I_γ : $I_\gamma(365.3+367)=31.0$ 15.
370.6 4	28.5 15	851.5	(17/2) ⁺	480.9	(13/2) ⁺	E2		Mult.: $A_2=+0.203$ 22; $A_4=-0.080$ 36.
394.1 4	5.5 10	715.9	(13/2) ⁺	321.7	(11/2) ⁻			
406.4 5	12.8 13	1061.0	(19/2) ⁺	654.6	(15/2) ⁺	E2		Mult.: $A_2=+0.35$ 7; $A_4=-0.10$ 10.
413.9	6.5 9	891.7		477.8	(13/2) ⁻			
423.91 13	100 ^a 9	693.57		269.63	(7/2) ⁺			
436.5	12.0 10	1261.5	(21/2) ⁻	825.4	(17/2) ⁻	(E2)		Mult.: $A_2=+0.235$ 8.
441.8	9.4 9	1293.3	(21/2) ⁺	851.5	(17/2) ⁺	E2		Mult.: $A_2=+0.28$ 7; $A_4=+0.05$ 14.
449.9	13.2 10	1404.1	(23/2) ⁻	954.2	(19/2) ⁻	E2		Mult.: $A_2=+0.24$ 6; $A_4=-0.11$ 10.
^x 464.4 ^b 8								
472.2 5	37 ^a 5	569.5		97.2	5/2 ⁻			
475.0	6. 1	1536.0	(23/2) ⁺	1061.0	(19/2) ⁺			
486.0 9	39 ^a 13	569.5		83.4	7/2 ⁺			
520		1924	(27/2) ⁻	1404.1	(23/2) ⁻			
521 3	≤239 ^a	693.57		172.86	5/2 ⁺			
^x 531.1 7								
^x 534.0 6								
^x 540.4 8								
569.5 3	100 ^a 8	569.5		0.0	5/2 ⁺			
^x 585.0 ^b 4								
596.7 5	116 ^a 55	693.57		97.2	5/2 ⁻			
^x 617.7 ^b 4								

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$^{154}\text{Sm}(d,3n\gamma)$ 1975Dr07,1980Be61 (continued) $\gamma(^{153}\text{Eu})$ (continued)

<u>E_γ^\dagger</u>	<u>$E_i(\text{level})$</u>
^x 636.7 12	
^x 742.6 7	

† Values with uncertainties are from 1980Be61 and others are from 1975Dr07. Many lines in 1980Be61 are noted as containing contributions from other reactions.

‡ From 1975Dr07 for $E(d) = 22$ MeV; other: 1980Be61. Often the values from the two papers are quite different, probably due contributions from other reactions. Significant differences in branching from a level are noted.

The intensities of γ rays from peaks that are multiple are based on the branching ratios in the ^{153}Eu Adopted data.

@ E2 assignments are made by evaluator based on authors' statement that "large positive A_2 and negative A_4 are characteristic of stretched quadrupole transitions" and the fact that M2 transitions are not expected.

& From 1975Dr07.

^a Relative branching from level (1980Be61).

^b Includes contribution from another reaction (1980Be61).

^c Placement of transition in the level scheme is uncertain.

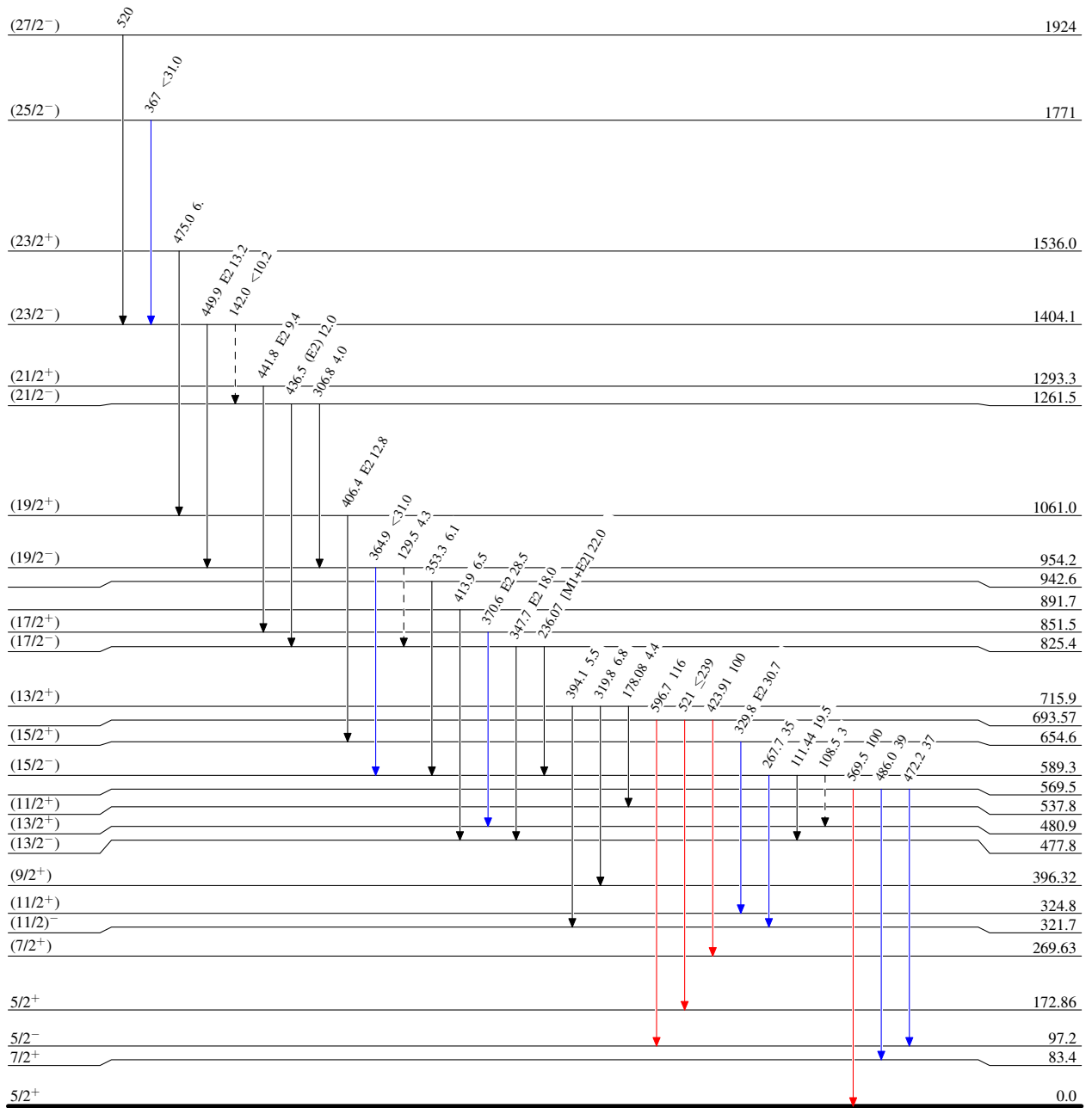
^x γ ray not placed in level scheme.

¹⁵⁴Sm(d,3nγ) 1975Dr07,1980Be61

Legend

Level Scheme
Intensities: Relative I_γ

- I_γ < 2% × I_γ^{max}
- I_γ < 10% × I_γ^{max}
- I_γ > 10% × I_γ^{max}
- - - - - γ Decay (Uncertain)



¹⁵³Eu₉₀

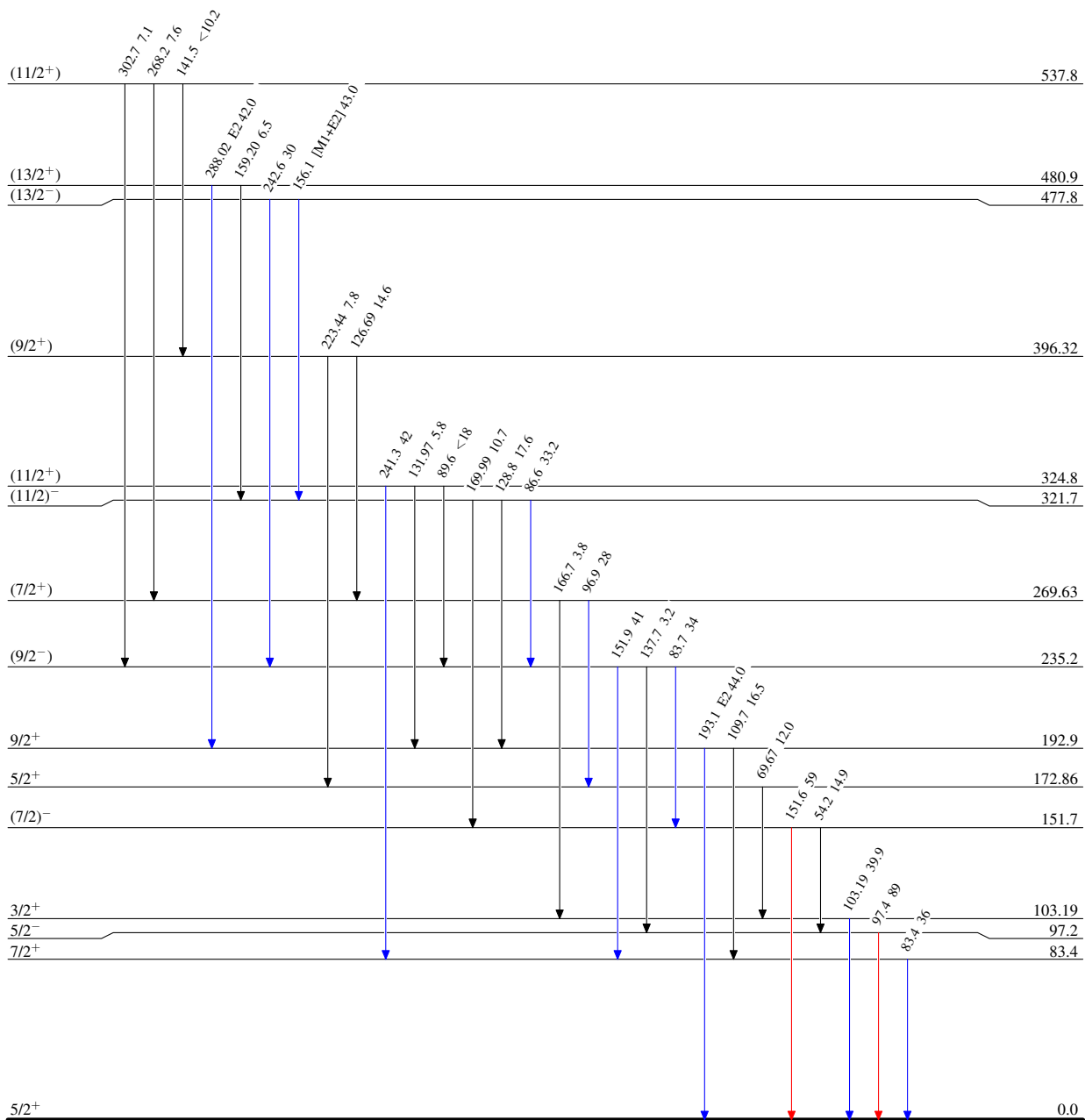
$^{154}\text{Sm}(d,3n\gamma)$ 1975Dr07,1980Be61

Level Scheme (continued)

Intensities: Relative I_γ

Legend

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



$^{153}_{63}\text{Eu}_{90}$

$^{154}\text{Sm}(d,3n\gamma)$ 1975Dr07,1980Be61