^{152}Sm(p,2nγ) E=18-28 MeV 1979Lo06

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

1979Lo06: measured γ, $\gamma\gamma$, $\gamma(\theta)$.
For levels and radiation data, consult ENSDF database (http://www.nndc.bnl.gov/ensdf/) and/or Nuclear Data Sheets 80, 263 (1997).

^{151}Eu Levels

E(level)	J$^\pi$†	E(level)	J$^\pi$†	E(level)	J$^\pi$†	E(level)	J$^\pi$†
0.0	$5/2^+$	336.3 *4*		580.0 *4*		882.3 *4*	$(11/2^-)$
21.542 *3*	$7/2^+$	349.9 *2*	$9/2^-$	587.0 *4*		944.9 *11*	
196.3 *2*	$11/2^-$	353.7 *2*	$5/2^-$,$7/2^-$	600.2 *2*		957.3 *3*	$19/2^-$
196.6 *3*	$(3/2)^+$	415.8 *2*	$(7/2^+)$	600.7 *4*		973.5 *3*	$(15/2)^+$
243.3 *2*	$7/2^-$	499.9 *2*	$(7/2^+)$	611.5 *2*	$13/2^-$	1040.9 *4*	$17/2^-$
260.5 *1*	$5/2^+$	502.3 *2*	$15/2^-$	698.3 *2*	$(11/2^-)$	1093.7 *4*	
307.4 *2*	$(5/2)^+$	503.3 *2*	$9/2^+$	714.9 *2*	$(9/2^+)$	1113.6 *2*	$15/2^+$
307.8 *3*	$(7/2)^+$	511.2 *2*	$(11/2)^+$	734.7 *1*		1220.3 *11*	$(17/2^+)$
307.9 *2*	$(9/2)^+$	522.1 *3*		752.3 *2*	$13/2^+$		
332 *1*	$3/2^+$,$5/2^+$	546.2 *4*	$(5/2^+)$	790.1 *4*	(7/2,11/2)		

† From 'Adopted Levels'.

γ(^{151}Eu)

E$_\gamma$†	I$_\gamma$‡	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Comments
21.542 *3*		21.542	$7/2^+$	0.0	$5/2^+$	E$_\gamma$: from 'adopted gammas'.
64 *1*	2.0 *4*	307.4	$(5/2)^+$	243.3	$7/2^-$	
106.5 *4*	1.0 *3*	349.9	$9/2^-$	243.3	$7/2^-$	
109.2 *4*	<25	611.5	$13/2^-$	502.3	$15/2^-$	
110.8 *4*	<25	307.4	$(5/2)^+$	196.6	$(3/2)^+$	I$_\gamma$: for 109.2+110.8+^{19}F line.
139.7 *3*	10 *2*	336.3		196.6	$(3/2)^+$	
153.6 *2*	56 *6*	349.9	$9/2^-$	196.3	$11/2^-$	
155.3 *3*	3.8 *8*	415.8	$(7/2^+)$	260.5	$5/2^+$	
168.4 *3*	2.3 *5*	522.1		353.7	$5/2^-$,$7/2^-$	
172.6 *4*	1.2 *4*	415.8	$(7/2^+)$	243.3	$7/2^-$	
174.7 *2*	100 *10*	196.3	$11/2^-$	21.542	$7/2^+$	
184@		600.2		415.8	$(7/2^+)$	
192.4 *3*	7.5 *15*	499.9	$(7/2^+)$	307.4	$(5/2)^+$	
196.0 *4*		503.3	$9/2^+$	307.8	$(7/2)^+$	
196.6 *4*	131 *13*	196.6	$(3/2)^+$	0.0	$5/2^+$	I$_\gamma$: for 196.0γ+196.6γ.
203.3 *3*	6.0 *12*	511.2	$(11/2)^+$	307.9	$(9/2)^+$	
211.5 *3*	5.3 *11*	714.9	$(9/2^+)$	503.3	$9/2^+$	
238.9 *2*	23 *2*	260.5	$5/2^+$	21.542	$7/2^+$	
241.2 *4*	3.4 *7*	752.3	$13/2^+$	511.2	$(11/2)^+$	
243.3 *2*	67 *7*	243.3	$7/2^-$	0.0	$5/2^+$	
250.4 *3*	3.7 *7*	600.2		349.9	$9/2^-$	
256.5 *3*	4.5 *9*	499.9	$(7/2^+)$	243.3	$7/2^-$	
260.5 *2*	12 *2*	260.5	$5/2^+$	0.0	$5/2^+$	I$_\gamma$: out of total Iγ=13 *2*, Iγ=1.2 *2* is assigned (by evaluator) to a 260γ from 503 level, based on results from Coul. ex.
261.5 *3*	8.1 *16*	611.5	$13/2^-$	349.9	$9/2^-$	
286.4 *2*	91 *9*	307.9	$(9/2)^+$	21.542	$7/2^+$	
292.9 *3*	2.5 *5*	600.7		307.9	$(9/2)^+$	I$_\gamma$: from branching in 'adopted gammas', a substantial fraction of the intensity should be assigned from 600.2 level.
302.9 *3*	3.1 *6*	546.2	$(5/2^+)$	243.3	$7/2^-$	

Continued on next page (footnotes at end of table)

^{152}Sm(p,2nγ) E=18-28 MeV 1979Lo06 (continued)

γ(^{151}Eu) (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
306.0 *2*	91 *9*	502.3	15/2$^-$	196.3	11/2$^-$		
307.6 *4*	<68	307.8	(7/2)$^+$	0.0	5/2$^+$		I_γ: for 307.4+307.6.
307.6 *4*	<68	307.9	(9/2)$^+$	0.0	5/2$^+$		I_γ: for 307.4+307.6.
325.5 *3*	7.5 *15*	522.1		196.6	(3/2)$^+$		Placement from an 829 level by 1979Lo06. A_2=−0.06 *4*, A_4=+0.01 *6*.
332 *1*	<18	332	3/2$^+$,5/2$^+$	0.0	5/2$^+$		I_γ: for 332 doublet.
332[@] *1*	<18	353.7	5/2$^-$,7/2$^-$	21.542	7/2$^+$		
339.7 *3*	8.0 *16*	600.2		260.5	5/2$^+$		
343.7 *3*	7.1 *14*	587.0		243.3	7/2$^-$		
348.3 *3*	4.4 *9*	698.3	(11/2$^-$)	349.9	9/2$^-$	D+Q	A_2=−0.31 *11*, A_4=+0.35 *17*.
353.7 *2*	33 *3*	353.7	5/2$^-$,7/2$^-$	0.0	5/2$^+$		
365.0 *3*	5.0 *10*	714.9	(9/2$^+$)	349.9	9/2$^-$	(D)	Mult.: ΔJ=0, dipole from A_2=+0.18 *6*, A_4=+0.03 *9*.
383.4 *3*	5.4 *11*	580.0		196.6	(3/2)$^+$		
394.2 *3*	9.7 *20*	415.8	(7/2$^+$)	21.542	7/2$^+$		
402.7 *4*	1.4 *4*	734.7		332	3/2$^+$,5/2$^+$		
407.5 *3*	6.4 *13*	714.9	(9/2$^+$)	307.8	(7/2)$^+$		A_2=+0.27 *5*, A_4=−0.03 *7*.
415.2 *2*	24 *3*	611.5	13/2$^-$	196.3	11/2$^-$		I_γ: based on Iγ(416γ)/Iγ(394γ)=0.72 *20* in 'adopted gammas', Iγ≈7 should be associated with 416 level.
429.4 *3*	7.4 *15*	1040.9	17/2$^-$	611.5	13/2$^-$		
444.4 *2*	21 *2*	752.3	13/2$^+$	307.9	(9/2)$^+$		
455.0 *2*	14 *2*	957.3	19/2$^-$	502.3	15/2$^-$		
462.3 *2*	11 *1*	973.5	(15/2)$^+$	511.2	(11/2)$^+$	Q	A_2=+0.30 *4*, A_4=−0.11 *6*.
468 *1*	5.4 *11*	1220.3	(17/2$^+$)	752.3	13/2$^+$	Q	A_2=+0.47 *7*, A_4=−0.25 *10*.
482.3 *2*	11 *1*	790.1	(7/2,11/2)	307.9	(9/2)$^+$	D	A_2=−0.12 *3*, A_4=−0.03 *5*.
489.7 *2*	48 *5*	511.2	(11/2)$^+$	21.542	7/2$^+$		
499.9 *2*	10 *1*	499.9	(7/2$^+$)	0.0	5/2$^+$		
502.0 *2*	13 *2*	698.3	(11/2$^-$)	196.3	11/2$^-$		I_γ: combined with 698 and 1114 level. A_2=+0.08 *4*, A_4=+0.47 *6*.
502.0 *2*	13 *2*	1113.6	15/2$^+$	611.5	13/2$^-$	D+Q	A_2=+0.08 *4*, A_4=+0.47 *6*.
503.4 *2*	15 *2*	503.3	9/2$^+$	0.0	5/2$^+$		
532.4 *3*	3.8 *8*	882.3	(11/2$^-$)	349.9	9/2$^-$	D+Q	A_2=−0.33 *9*, A_4=−0.20 *12*. Negative A_4 is inconsistent with ΔJ=1 indicated by negative A_2.
582.5 *3*	3.3 *7*	1093.7		511.2	(11/2)$^+$	D+Q	A_2=+0.05 *9*, A_4=+0.72 *13*.
610.5 *3*	5.7 *12*	1113.6	15/2$^+$	503.3	9/2$^+$		Deexcites a 960 level (1979Lo06).
637 *1*	7.3 *15*	944.9		307.9	(9/2)$^+$		

[†] Uncertainties are 0.2 for Iγ>10, 0.3 for Iγ=2-10 and 0.4 for Iγ<2 and doublets.
[‡] At 18.7 MeV. Uncertainties are 10% for Iγ>10, 20% for Iγ=2-10, 30% for Iγ<2.
[#] Assigned by the evaluator as implied from γ(θ) data of 1979Lo06. The mult=Q indicates ΔJ=2, stretched quadrupole (most likely E2) and mult=D indicates ΔJ=1, D or D+Q.
[@] Placement of transition in the level scheme is uncertain.

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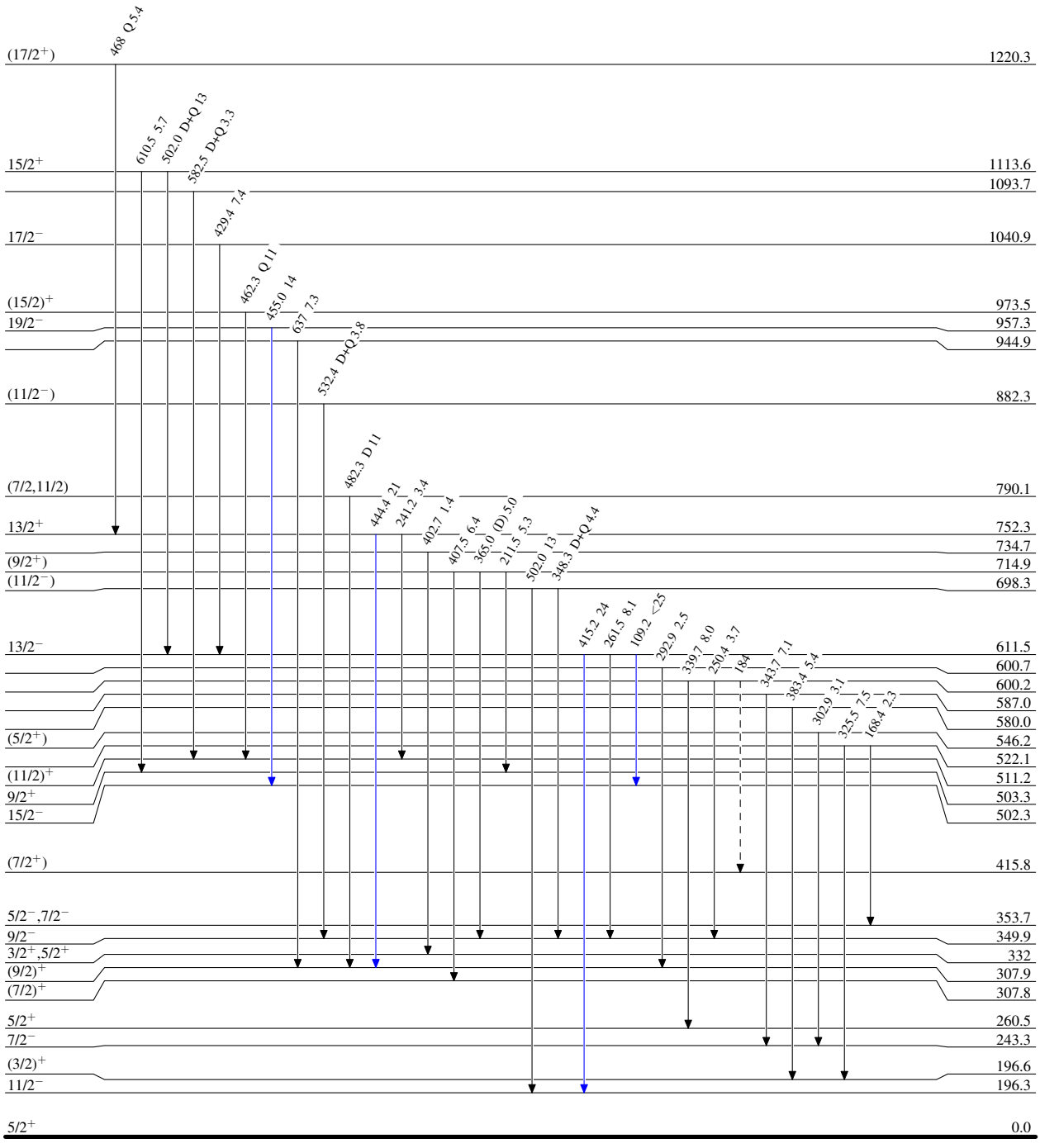
Level Scheme

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)



$^{151}_{63}Eu_{88}$

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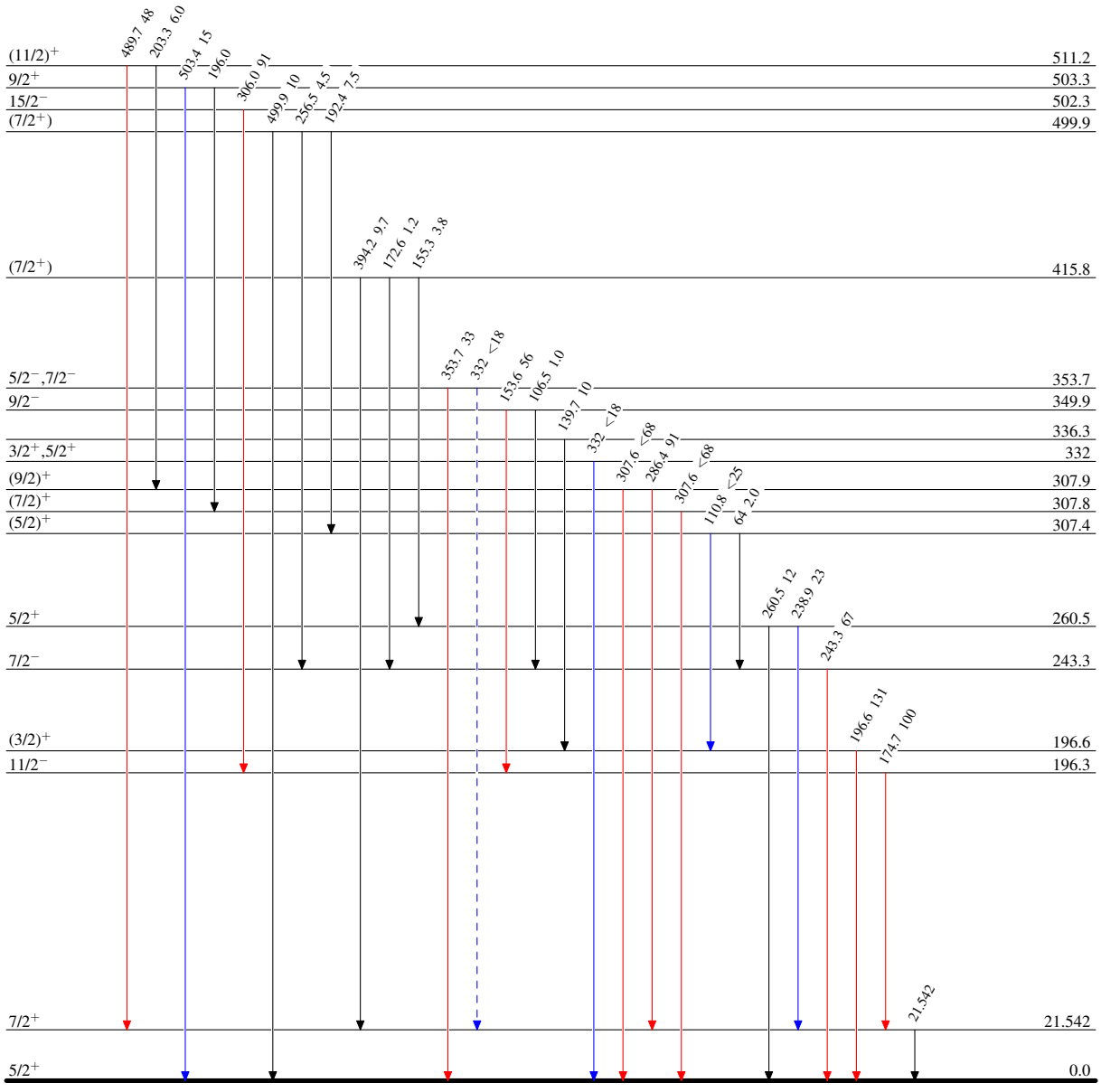
Level Scheme (continued)

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)



$^{151}_{63}Eu_{88}$