^{151}Eu(n,n′γ) 1982Bo07

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

E=fast neutrons. Measured γ, γ(θ) data at 5 angles from 90° to 145°.

^{151}Eu Levels

E(level)‡	Jπ†	E(level)‡	Jπ†	E(level)‡	Jπ†	E(level)‡	Jπ†
0.0	$5/2^+$	353.67 *4*	$5/2^-$,$7/2^-$	600.77 *8*		807.5? *3*	
21.57 *6*	$7/2^+$	415.70 *8*	$(7/2^+)$	611.99? *13*	$(13/2^-)$	881.7 *3*	
196.29 *8*	$11/2^-$	499.68 *6*	$(7/2^+)$	632.7 *1*		946.4 *4*	
196.63 *4*	$(3/2)^+$	502.2	$(15/2^-)$	654.32 *10*	$5/2^+$	957.3?	$(19/2^-)$
243.27 *4*	$7/2^-$	503.42 *9*	$9/2^+$	697.43 *7*	$5/2^+$	960.3 *4*	
260.49 *6*	$5/2^+$	511.17 *9*	$(11/2)^+$	698.1? *2*	$(11/2^-)$	973.0 *5*	$(15/2)^+$
307.02 *7*	$(5/2)^+$	522.24 *8*		715.08 *13*	$(9/2^+)$	1040.8 *4*	$(17/2^-)$
307.48 *4*	$(7/2)^+$	522.84 *11*		719.10 *11*	$(7/2^+,9/2^+)$	1093.5 *3*	
307.89 *7*	$(9/2)^+$	546.33 *9*	$(5/2^+)$	735.0 *3*		1220.5? *5*	$(17/2^+)$
332.19 *7*	$(3/2^+,5/2^+)$	580.11 *13*		752.43 *13*	$(13/2^+)$		
336.2 *1*		587.01 *7*		758.1 *3*			
349.83 *9*	$9/2^-$	600.44 *9*		789.9 *2*	$(11/2^+)$		

† See 'Adopted Levels'.
‡ From least-squares fit to Eγ's. Normalized χ^2=3.3.

γ(^{151}Eu)

γ(θ) data

Eγ	A_2	A_4
153.5	-0.12 4	-0.06 5
196.5	-0.04 1	+0.002 12
238.9	-0.17 3	-0.08 4
243.3	-0.02 1	-0.01 2
260.5	+0.19 6	+0.18 6
286.3	+0.22 3	0.00 3
307.5	+0.06 1	+0.02 2
325.6	+0.02 11	+0.05 14
332.3	-0.08 4	-0.01 5
339.9	+0.12 19	+0.02 24
353.7	-0.01 3	-0.01 4
365.1	-0.3 3	-0.4 4
394.2	+0.16 13	+0.24 16
415.7	+0.03 19	+0.24 18
436.2	+0.23 22	+0.4 3
489.7	+0.11 7	-0.02 9
500+503	+0.14 6	0.00 8
522.8	+0.15 13	+0.27 16
546.2	-0.06 13	+0.06 17
579.1	-0.04 16	-0.008 21
632.7	+0.01 11	+0.08 14

Continued on next page (footnotes at end of table)

^{151}Eu(n,n′γ) 1982Bo07 (continued)

γ(^{151}Eu) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	Comments
(21.54)		21.57	$7/2^+$	0.0	$5/2^+$		
[x]101.0 *4*	2.8 *20*						
106.67 *25*	6.9[@] *20*	349.83	$9/2^-$	243.27	$7/2^-$		
109[c]		611.99?	$(13/2^-)$	502.2	$(15/2^-)$		
110.09 *8*	80 *6*	307.02	$(5/2)^+$	196.63	$(3/2)^+$		
[x]117.34 *15*	1.7 *15*						
[x]124.86[†] *20*	6.5 *13*						
135.36 *18*	4.6 *11*	332.19	$(3/2^+,5/2^+)$	196.63	$(3/2)^+$		
139.68 *7*	19 *3*	336.2		196.63	$(3/2)^+$		
[x]143.25 *10*	7.1 *11*						
149.79 *17*	1.8 *9*	499.68	$(7/2^+)$	349.83	$9/2^-$		
153.49 *7*	94.6 *16*	349.83	$9/2^-$	196.29	$11/2^-$	D	
155.6 *4*	10.7 *10*	415.70	$(7/2^+)$	260.49	$5/2^+$		
168.61[†] *9*	11.3 *11*	522.24		353.67	$5/2^-,7/2^-$		
172.32 *21*	7.6 *11*	415.70	$(7/2^+)$	243.27	$7/2^-$		
174.66 *7*	100 *1*	196.29	$11/2^-$	21.57	$7/2^+$		
[x]179.8 *3*	0.8 *7*						
[x]182.2 *4*	1.1 *8*						
184.8 *3*	2.1 *8*	600.44		415.70	$(7/2^+)$		
192.43 *7*	20.0 *20*	499.68	$(7/2^+)$	307.02	$(5/2)^+$		
196[c]		503.42	$9/2^+$	307.48	$(7/2)^+$		
196.54 *4*	321 *3*	196.63	$(3/2)^+$	0.0	$5/2^+$	D	
203.21 *9*	4.8 *7*	511.17	$(11/2)^+$	307.89	$(9/2)^+$		
206.61[†c] *17*	7.0 *8*	807.5?		600.77			
211.74 *14*	3.9 *8*	715.08	$(9/2^+)$	503.42	$9/2^+$		
214.44[c] *15*	3.0 *7*	546.33	$(5/2^+)$	332.19	$(3/2^+,5/2^+)$		
219.46 *19*	1.6 *7*	719.10	$(7/2^+,9/2^+)$	499.68	$(7/2^+)$		
[x]225.1 *4*	0.8 *7*						
238.92 *5*	68.0 *9*	260.49	$5/2^+$	21.57	$7/2^+$	D	
241[c]		752.43	$(13/2^+)$	511.17	$(11/2)^+$		
243.29 *5*	170 *1*	243.27	$7/2^-$	0.0	$5/2^+$	D	
247.3 *5*	1.2 *7*	600.77		353.67	$5/2^-,7/2^-$		
250.4 *3*	2.4 *7*	600.44		349.83	$9/2^-$		
256.39 *11*	11.5 *16*	499.68	$(7/2^+)$	243.27	$7/2^-$		
260.49 *7*	42.8 *9*	260.49	$5/2^+$	0.0	$5/2^+$		I_γ: out of total Iγ=44.7 *9*, Iγ=1.9 *2* is assigned (by evaluator) to a 260γ from 503 level, based on results from Coul. ex.
261[c]		611.99?	$(13/2^-)$	349.83	$9/2^-$		
[x]266.8 *4*	1.8 *7*						
279.39 *13*	9.2 *10*	587.01		307.48	$(7/2)^+$		
286.30 *5*	115 *1*	307.89	$(9/2)^+$	21.57	$7/2^+$		
292.97[a] *14*	9.3[a] *9*	600.44		307.48	$(7/2)^+$		I_γ: using adopted branching ratios from Coulomb excitation, expected Iγ(293γ multiplet)=12.8 *17*.
292.97[a] *14*	9.3[a] *9*	600.77		307.89	$(9/2)^+$		
303.03[b] *18*	1.9[b] *4*	499.68	$(7/2^+)$	196.63	$(3/2)^+$		I_γ: total Iγ=4.8 *7*. Intensity divided (by evaluator) based on branching in Coul. ex.
303.03[b] *18*	2.9[b] *8*	546.33	$(5/2^+)$	243.27	$7/2^-$		
306.0		502.2	$(15/2^-)$	196.29	$11/2^-$		
307[c]	[#]	307.02	$(5/2)^+$	0.0	$5/2^+$		
307.45 *4*	231.0 *13*	307.48	$(7/2)^+$	0.0	$5/2^+$		
325.57 *10*	21.0 *9*	522.24		196.63	$(3/2)^+$		

Continued on next page (footnotes at end of table)

^{151}Eu(n,n′γ) 1982Bo07 (continued)

γ(^{151}Eu) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	Comments
332.29 *7*	61.2 *10*	332.19	(3/2$^+$,5/2$^+$)	0.0	5/2$^+$	D	
339.98 *12*	12.6 *8*	600.44		260.49	5/2$^+$		
343.78[b] *7*	17[b] *5*	587.01		243.27	7/2$^-$		I$_\gamma$: total Iγ=15.9 *18*. Intensity divided (by evaluator) on the basis of branching in Coul. ex.
343.78[b] *7*	2.2[b] *3*	697.43	5/2$^+$	353.67	5/2$^-$,7/2$^-$		
348.66[†c] *22*	3.7 *7*	698.1?	(11/2$^-$)	349.83	9/2$^-$		
353.68 *4*	78.1 *10*	353.67	5/2$^-$,7/2$^-$	0.0	5/2$^+$		
365.09[†c] *11*	7.4 *8*	715.08	(9/2$^+$)	349.83	9/2$^-$		
369.08 *23*	1.4 *7*	719.10	(7/2$^+$,9/2$^+$)	349.83	9/2$^-$		
[x]377.4 *5*	1.6 *6*						
[x]380.6 *4*	3.9 *7*						
383.48 *12*	15.5 *9*	580.11		196.63	(3/2)$^+$		
389.91[†] *11*	16.8 *9*	697.43	5/2$^+$	307.48	(7/2)$^+$		
394.17 *15*	18.8 *10*	415.70	(7/2$^+$)	21.57	7/2$^+$		
402.99[†] *17*	4.5 *10*	735.0		332.19	(3/2$^+$,5/2$^+$)		
407.47 *18*	6.3 *8*	715.08	(9/2$^+$)	307.48	(7/2)$^+$		
411.2[a] *4*	1.6[a] *7*	654.32	5/2$^+$	243.27	7/2$^-$		
411.2[a] *4*	1.6[a] *7*	719.10	(7/2$^+$,9/2$^+$)	307.48	(7/2)$^+$		This γ could feed 307.0 level also.
415.70[b] *10*	14[b] *4*	415.70	(7/2$^+$)	0.0	5/2$^+$		I$_\gamma$: total Iγ=25.8 *5* divided (by evaluator) using Iγ(416γ)/Iγ(394γ)=0.72 *20* in 'adopted gammas'.
415.70[b] *10*	12[b] *4*	611.99?	(13/2$^-$)	196.29	11/2$^-$		
[x]421.9 *4*	1.9 *9*						
427.35 *15*	7.8 *10*	735.0		307.48	(7/2)$^+$		
429.6 *3*	2.8 *10*	1040.8	(17/2$^-$)	611.99?	(13/2$^-$)		
436.17 *13*	11.8 *10*	632.7		196.63	(3/2)$^+$		
444.54 *11*	7.2 *9*	752.43	(13/2$^+$)	307.89	(9/2)$^+$		
[x]447.6 *5*	1.3 *8*						
[x]453.67[†] *21*	10.9 *10*						
455[c]		957.3?	(19/2$^-$)	502.2	(15/2$^-$)		
461.9 *4*	2.1 *8*	973.0	(15/2)$^+$	511.17	(11/2)$^+$		
468.2[c] *4*	2.1 *8*	1220.5?	(17/2$^+$)	752.43	(13/2$^+$)		
475.89 *15*	9.1 *9*	719.10	(7/2$^+$,9/2$^+$)	243.27	7/2$^-$		
482.05[a] *15*	20.0[a] *10*	503.42	9/2$^+$	21.57	7/2$^+$		
482.05[a] *15*	20.0[a] *10*	789.9	(11/2$^+$)	307.89	(9/2)$^+$		
489.67 *9*	36.7 *10*	511.17	(11/2)$^+$	21.57	7/2$^+$		
500.11[b] *9*	19.9[b] *26*	499.68	(7/2$^+$)	0.0	5/2$^+$		I$_\gamma$: total Iγ=30.6 *24*. Intensity divided (by evaluator) based on branching in Coul. ex.
500.11[b] *9*	11[b] *4*	697.43	5/2$^+$	196.63	(3/2)$^+$		
503.34 *12*	23.8 *24*	503.42	9/2$^+$	0.0	5/2$^+$		
[x]518.9 *4*	3.2 *10*						
522.84 *11*	18.7 *22*	522.84		0.0	5/2$^+$		
531.7[†] *5*	4.3 *9*	881.7		349.83	9/2$^-$		
[x]533.2[†] *5*	4.3 *9*						
546.19 *11*	20.2 *11*	546.33	(5/2$^+$)	0.0	5/2$^+$		
[x]552.6[†] *3*	5.5 *9*						
[x]555.6 *4*	2.1 *9*						
560.6 *4*	2.1 *7*	758.1		196.63	(3/2)$^+$		
574.06 *18*	2.5 *10*	881.7		307.89	(9/2)$^+$		This γ ray is not confirmed in other reactions where the 882 level has been populated.

Continued on next page (footnotes at end of table)

^{151}Eu(n,n′γ) 1982Bo07 (continued)

γ(^{151}Eu) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π
579.13 *10*	15.1 *23*	600.77		21.57	$7/2^+$
580[c]		580.11		0.0	$5/2^+$
582.71 *19*	3.0 *12*	1093.5		511.17	$(11/2)^+$
587.01 *13*	4.8 *8*	587.01		0.0	$5/2^+$
[x]591.9 *3*	2.6 *9*				
600.78 *10*	12.3 *11*	600.77		0.0	$5/2^+$
[x]604.3 *3*	2.5 *8*				
610.3[ac] *3*	12.3[a] *19*	807.5?		196.63	$(3/2)^+$
610.3[a] *3*	12.3[a] *19*	960.3		349.83	$9/2^-$
[x]621.3[†] *3*	2.4 *9*				
[x]627.9 *5*	1.8 *8*				
632.73[a] *9*	25.6[a] *11*	632.7		0.0	$5/2^+$
632.73[a] *9*	25.6[a] *11*	654.32	$5/2^+$	21.57	$7/2^+$
638.5 *3*	4.8 *9*	946.4		307.89	$(9/2)^+$
[x]642.3[†] *6*	1.8 *7*				
[x]644.8 *4*	1.5 *7*				
654.4 *4*	1.5 *7*	654.32	$5/2^+$	0.0	$5/2^+$
[x]657.5 *3*	2.2 *7*				
[x]663.2 *3*	3.9 *8*				
[x]669.1 *4*	7.3[‡] *10*				
[x]670.7 *4*	7.3[‡] *10*				
[x]676.2 *5*	1.7 *8*				
[x]685.6 *4*	1.5 *9*				
696.6[c] *4*	4.0 *8*	697.43	$5/2^+$	0.0	$5/2^+$
[x]709.8 *3*	10.8 *12*				
[x]713.5 *4*	4.0 *8*				
[x]720.67 *23*	14.8 *12*				
[x]730.4 *4*	5.0 *8*				
735.2 *8*	2.5 *8*	735.0		0.0	$5/2^+$
[x]740.3 *7*	3.2 *8*				
[x]743.8 *7*	3.2 *8*				
[x]747.09 *25*	15.1 *11*				
758.11 *23*	10.3 *14*	758.1		0.0	$5/2^+$
[x]761.23 *19*	16.9 *15*				
[x]766.9 *3*	4.3 *9*				
[x]770.6 *6*	2.2 *9*				
[x]776.6 *3*	3.7 *10*				
[x]782.2 *4*	8.6 *11*				
[x]788.4 *7*	2.2 *9*				
[x]795.7[†] *6*	2.2 *11*				
807.5[c] *5*	2.9 *9*	807.5?		0.0	$5/2^+$
[x]813.7 *5*	2.3 *9*				
[x]831.3 *7*	3.0 *9*				
[x]852.8 *3*	2.1 *9*				
[x]875.4 *5*	1.7 *10*				
[x]880.3 *4*	2.5 *12*				
[x]883.3 *4*	2.5 *13*				
[x]888.8 *3*	15.1[‡] *12*				
[x]890.8 *4*	15.1[‡] *12*				
[x]901.4 *4*	1.8 *10*				

[†] Complex line.

Continued on next page (footnotes at end of table)

^{151}Eu(n,n′γ) 1982Bo07 (continued)

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

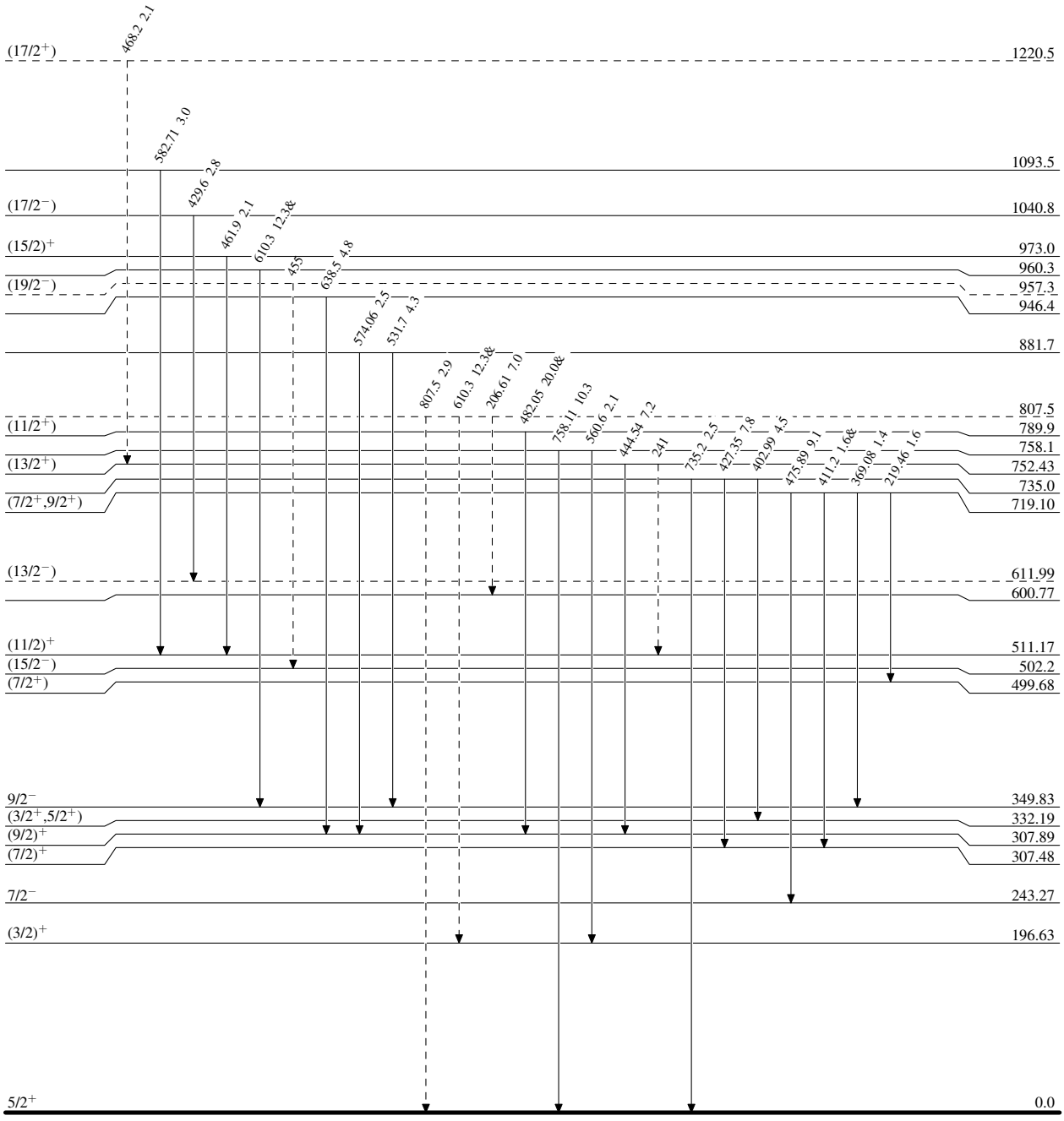
‡ Total intensity for the unresolved peaks.
# Unresolved from intense 307.45γ.
@ Iγ(107γ)/Iγ(153γ)=7.1 disagrees with the adopted value of 1.4 (see 'Adopted Levels, gammas').
& Assigned by the evaluator as implied from $\gamma(\theta)$ data of 1982Bo07, mult=D indicates ΔJ=1, D or D+Q.
a Multiply placed with undivided intensity.
b Multiply placed with intensity suitably divided.
c Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

^{151}Eu(n,n′γ) 1982Bo07

Level Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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)



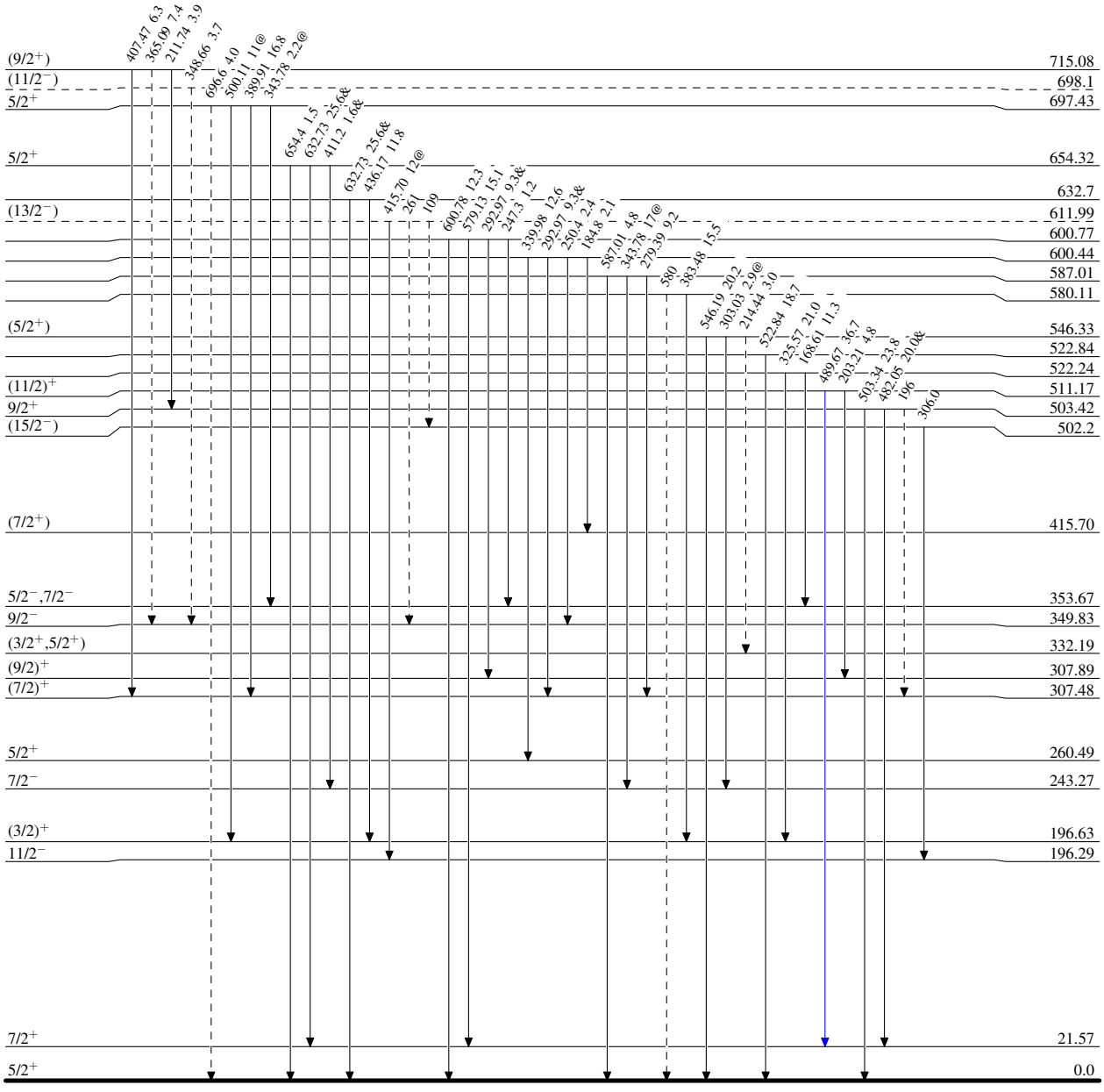
$^{151}_{63}Eu_{88}$

^{151}Eu(n,n′γ) 1982Bo07

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

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



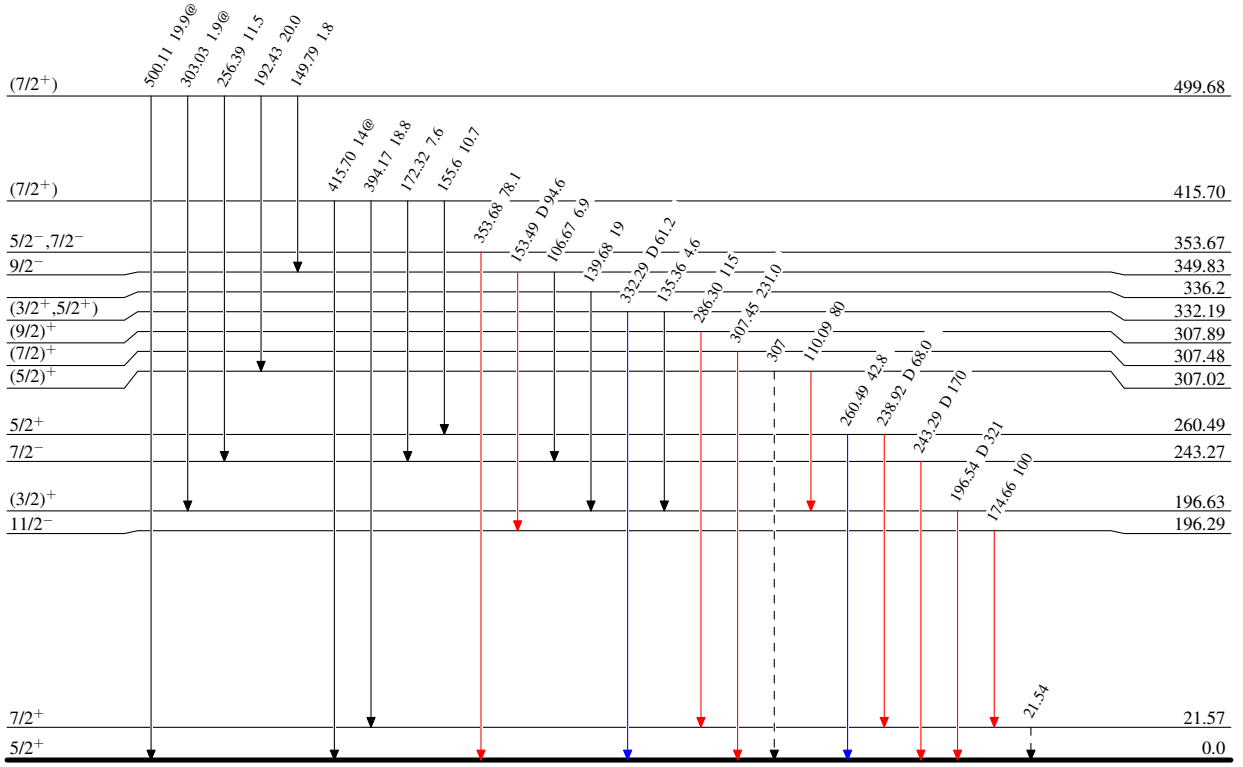
$^{151}_{63}Eu_{88}$

^{151}Eu(n,n′γ) 1982Bo07

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

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



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