^{154}Sm(^{7}Li,α2nγ) 1998Ha27

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 160, 1 (2019)	21-Oct-2019

Additional information 1.

Based on the XUNDL data set compiled by J. Chenkin and B. Singh, May, 1999.

^{154}Sm(^{7}Li,α2nγ), E(^{7}Li)=35 MeV. Enriched (>95%) target, ≈5 mg/cm^2 thick, which stopped the recoiling nuclei. γ's detected using an array of eight escape-suppressed Ge detectors, four at 90° and four at 145°. Measured Eγ, Iγ, $\gamma\gamma$, DCO ratios and B(M1)/B(E2) ratios.

^{155}Eu Levels

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0#	5/2+	357.3a 2	11/2−	785.2# 2	17/2+	1380.1a 3	23/2−
78.6@ 1	7/2+	391.2c 2	7/2+	801.2& 2	(17/2−)	1427.2@ 3	23/2+
104.1& 6	5/2−	443.0# 2	13/2+	944.1c 2	(15/2+)	1567.6b 6	(21/2+)
168.9a 2	7/2−	487.1& 2	13/2−	967.2a 2	19/2−	1648.4?& 6	(25/2−)
179.2# 1	9/2+	500.6b 2	9/2+	982.6@ 2	19/2+	1672.5# 4	25/2+
245.7c 2	3/2+	604.3@ 2	15/2+	1140.2b 4	(17/2+)	1785.9?c 6	(23/2+)
254.7& 1	9/2−	624.2a 2	15/2−	1190.6& 2	(21/2−)	1929.2@ 6	(27/2+)
300.7@ 1	11/2+	626.9c 2	11/2+	1198.1# 3	21/2+	2198.7# 6	(29/2+)
307.3b 2	5/2+	781.9b 2	13/2+	1333.3c 4	(19/2+)		

† From a least-squares fit to the γ energies. Because of the lack of specific knowledge of the uncertainties of the Eγ values, the resulting level energies are quoted to only the nearest 0.1 keV.

‡ From adopted values.

Band(A): π 5/2[413], (π=+,α=+1/2).

@ Band(B): π 5/2[413], (π=+,α=−1/2).

& Band(C): π 5/2[532], (π=−,α=+1/2).

a Band(D): π 5/2[532], (π=−,α=−1/2).

b Band(E): π 3/2[411], (π=+,α=+1/2).

c Band(F): π 3/2[411], (π=+,α=−1/2).

γ(^{155}Eu)

Eγ†	Iγ	Ei(level)	J_i^π	Ef	J_f^π	Mult.‡	Comments
61.6 1		307.3	5/2+	245.7	3/2+		Eγ: from Adopted Gammas. γ not reported in 1998Ha27.
78.6 1		78.6	7/2+	0.0	5/2+		Eγ: from Adopted Gammas. γ not reported in 1998Ha27.
84.1 5		391.2	7/2+	307.3	5/2+		Eγ: from Adopted Gammas. γ not reported in 1998Ha27.
85.8 2	10.3 8	254.7	9/2−	168.9	7/2−	@	
85.8 2	8.9 6	443.0	13/2+	357.3	11/2−	D	R(DCO)=0.7 1.
100.6 2	52 3	179.2	9/2+	78.6	7/2+	@	
102.7 2	12.9 7	357.3	11/2−	254.7	9/2−	@	
109.4 2	8.1 7	500.6	9/2+	391.2	7/2+	@	
117.5 2	5.1 4	604.3	15/2+	487.1	13/2−	&	
121.6 2	17 1	300.7	11/2+	179.2	9/2+	@	
126.2 5	4.5 4	626.9	11/2+	500.6	9/2+	@	
129.9 2	19 1	487.1	13/2−	357.3	11/2−	@	
137.1 2	19 1	624.2	15/2−	487.1	13/2−	@	

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^{154}Sm(^{7}Li,α2nγ) 1998Ha27 (continued)

$\gamma(^{155}Eu)$ (continued)

E_γ[†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
142.4 *2*	8.1 *4*	443.0	13/2$^+$	300.7	11/2$^+$	@	
145.4 *5*	1.0 *2*	391.2	7/2$^+$	245.7	3/2$^+$	E2	R(DCO)=1.0 *2*.
154.9 *2*	5.2 *4*	781.9	13/2$^+$	626.9	11/2$^+$	@	
160.8 *2*	6.3 *4*	785.2	17/2$^+$	624.2	15/2$^-$	D[#]	R(DCO)=0.60 *8*.
161.1 *2*	5.7 *4*	604.3	15/2$^+$	443.0	13/2$^+$	@	
161.9 *5*	2.6 *3*	944.1	(15/2$^+$)	781.9	13/2$^+$		
165.9 *2*	9.0 *5*	967.2	19/2$^-$	801.2	(17/2$^-$)		
169.0 *2*	≈15	168.9	7/2$^-$	0.0	5/2$^+$	&	
176.0 *2*	97 *6*	254.7	9/2$^-$	78.6	7/2$^+$	D[#]	R(DCO)=0.76 *7*.
177.1 *2*	16.4 *8*	801.2	(17/2$^-$)	624.2	15/2$^-$		
178.1 *2*	43 *2*	357.3	11/2$^-$	179.2	9/2$^+$	D[#]	R(DCO)=0.82 *7*.
179.2 *2*	100	179.2	9/2$^+$	0.0	5/2$^+$	[E2][#]	R(DCO)=0.77 *4*.
181.0 *5*	2.6 *2*	785.2	17/2$^+$	604.3	15/2$^+$	@	
181.3 *2*	18 *1*	624.2	15/2$^-$	443.0	13/2$^+$	D[#]	R(DCO)=0.62 *6*.
181.6 *5*	2.9 *3*	967.2	19/2$^-$	785.2	17/2$^+$	&	
181.7 *5*	2.3 *1*	982.6	19/2$^+$	801.2	(17/2$^-$)	&	
182.1 *5*	<1	1380.1	23/2$^-$	1198.1	21/2$^+$	&	
186.5 *2*	28 *1*	487.1	13/2$^-$	300.7	11/2$^+$	#	R(DCO)=0.65 *6*.
188.4 *5*	3.2 *2*	357.3	11/2$^-$	168.9	7/2$^-$	[E2]	
189.4 *5*	2.3 *3*	1380.1	23/2$^-$	1190.6	(21/2$^-$)		
193.1 *5*	2.8 *4*	500.6	9/2$^+$	307.3	5/2$^+$	[E2]	
195.9 *5*	3.1 *2*	1140.2	(17/2$^+$)	944.1	(15/2$^+$)		
196.8 *2*	9.1 *5*	801.2	(17/2$^-$)	604.3	15/2$^+$		
197.0 *5*	2.5 *1*	982.6	19/2$^+$	785.2	17/2$^+$	@	
208.2 *5*	2.1 *2*	1190.6	(21/2$^-$)	982.6	19/2$^+$		
222.0 *2*	84 *5*	300.7	11/2$^+$	78.6	7/2$^+$	E2	R(DCO)=1.02 *6*.
223.2 *2*	7.4 *4*	1190.6	(21/2$^-$)	967.2	19/2$^-$		
230.8 *5*	1.8 *1*	1198.1	21/2$^+$	967.2	19/2$^-$	&	
232.4 *2*	9.8 *5*	487.1	13/2$^-$	254.7	9/2$^-$	[E2]	
235.7 *5*	4.2 *4*	626.9	11/2$^+$	391.2	7/2$^+$	[E2]	
245.7 *2*	≈10	245.7	3/2$^+$	0.0	5/2$^+$		
263.8 *2*	63 *3*	443.0	13/2$^+$	179.2	9/2$^+$	E2	R(DCO)=1.03 *4*.
266.9 *2*	17.8 *9*	624.2	15/2$^-$	357.3	11/2$^-$	E2	R(DCO)=1.0 *1*.
281.3 *2*	5.5 *4*	781.9	13/2$^+$	500.6	9/2$^+$	[E2]	
287.1 *5*	3.6 *4*	391.2	7/2$^+$	104.1	5/2$^-$	&	
303.6 *2*	53 *3*	604.3	15/2$^+$	300.7	11/2$^+$	E2	R(DCO)=1.01 *6*.
314.1 *2*	14.0 *7*	801.2	(17/2$^-$)	487.1	13/2$^-$		
317.1 *2*	5.4 *5*	944.1	(15/2$^+$)	626.9	11/2$^+$		
331.6 *5*	2.7 *2*	500.6	9/2$^+$	168.9	7/2$^-$	&	
342.3 *2*	29 *1*	785.2	17/2$^+$	443.0	13/2$^+$	E2	R(DCO)=1.04 *7*.
342.9 *2*	15.8 *8*	967.2	19/2$^-$	624.2	15/2$^-$	E2	R(DCO)=1.02 *8*.
358.4 *5*	4.8 *3*	1140.2	(17/2$^+$)	781.9	13/2$^+$		
372.1 *2*	8.0 *5*	626.9	11/2$^+$	254.7	9/2$^-$	&	
378.3 *2*	27 *1*	982.6	19/2$^+$	604.3	15/2$^+$	E2	R(DCO)=1.02 *5*.
388.6 *5*	3.5 *3*	1333.3	(19/2$^+$)	944.1	(15/2$^+$)		
389.5 *2*	9.0 *6*	1190.6	(21/2$^-$)	801.2	(17/2$^-$)		
412.9 *2*	13.1 *7*	1198.1	21/2$^+$	785.2	17/2$^+$	E2	R(DCO)=0.95 *6*.
413.0 *2*	6.3 *4*	1380.1	23/2$^-$	967.2	19/2$^-$	E2	R(DCO)=0.97 *8*.
424.6 *2*	8.0 *5*	781.9	13/2$^+$	357.3	11/2$^-$	&	
427.4 *5*	2.2 *2*	1567.6	(21/2$^+$)	1140.2	(17/2$^+$)		
444.6 *2*	8.0 *4*	1427.2	23/2$^+$	982.6	19/2$^+$	E2	R(DCO)=1.04 *8*.

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^{154}Sm(^{7}Li,α2nγ) 1998Ha27 (continued)

γ(^{155}Eu) (continued)

E_γ[†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
452.5[a] *5*	1.9 *4*	1785.9?	(23/2$^+$)	1333.3	(19/2$^+$)		
457.1 *5*	3.0 *3*	944.1	(15/2$^+$)	487.1	13/2$^-$		
457.9[a] *5*	2.0 *2*	1648.4?	(25/2$^-$)	1190.6	(21/2$^-$)		
474.4 *2*	5.4 *3*	1672.5	25/2$^+$	1198.1	21/2$^+$	E2	R(DCO)=1.0 *1*.
502.0 *5*	2.1 *1*	1929.2	(27/2$^+$)	1427.2	23/2$^+$		
516.0 *5*	3.5 *3*	1140.2	(17/2$^+$)	624.2	15/2$^-$		
526.2 *5*	<1	2198.7	(29/2$^+$)	1672.5	25/2$^+$		
532.7 *5*	3.1 *3*	1333.3	(19/2$^+$)	801.2	(17/2$^-$)		

[†] Uncertainty assigned by the evaluator as 0.2 keV for Iγ>5 and 0.5 keV for Iγ<5, based on a general statement by the authors.

[‡] From DCO ratio data. Authors state that R(DCO)≈1.0 for stretched ΔJ=2 (assumed E2) transitions and that ΔJ=1 transitions have R(DCO)≈0.5, if they have a small mixing ratio. Quadrupole transitions are assumed to be E2, rather than M2.

[#] DCO ratio is affected by that from another γ of different multipolarity.

[@] 1998Ha27 choose mult=M1+E2, based on the placement in the level scheme. For transitions within the 3/2[411] and 5/2[532] bands, these authors deduce δ≤0.2, while for transitions within the 5/2[413] band, δ≈0.6 is obtained. These calculations assume that the intraband E2 transition probabilities are accurately given by the expression for collective intraband E2 transitions. The deduced B(M1)/B(E2) ratios are consistent.

[&] No DCO ratio data given. Authors choose mult=E1, based on the need for a parity change as required by the placement in the level scheme. The deduced B(E1)/B(E2) ratios are consistent.

[a] Placement of transition in the level scheme is uncertain.

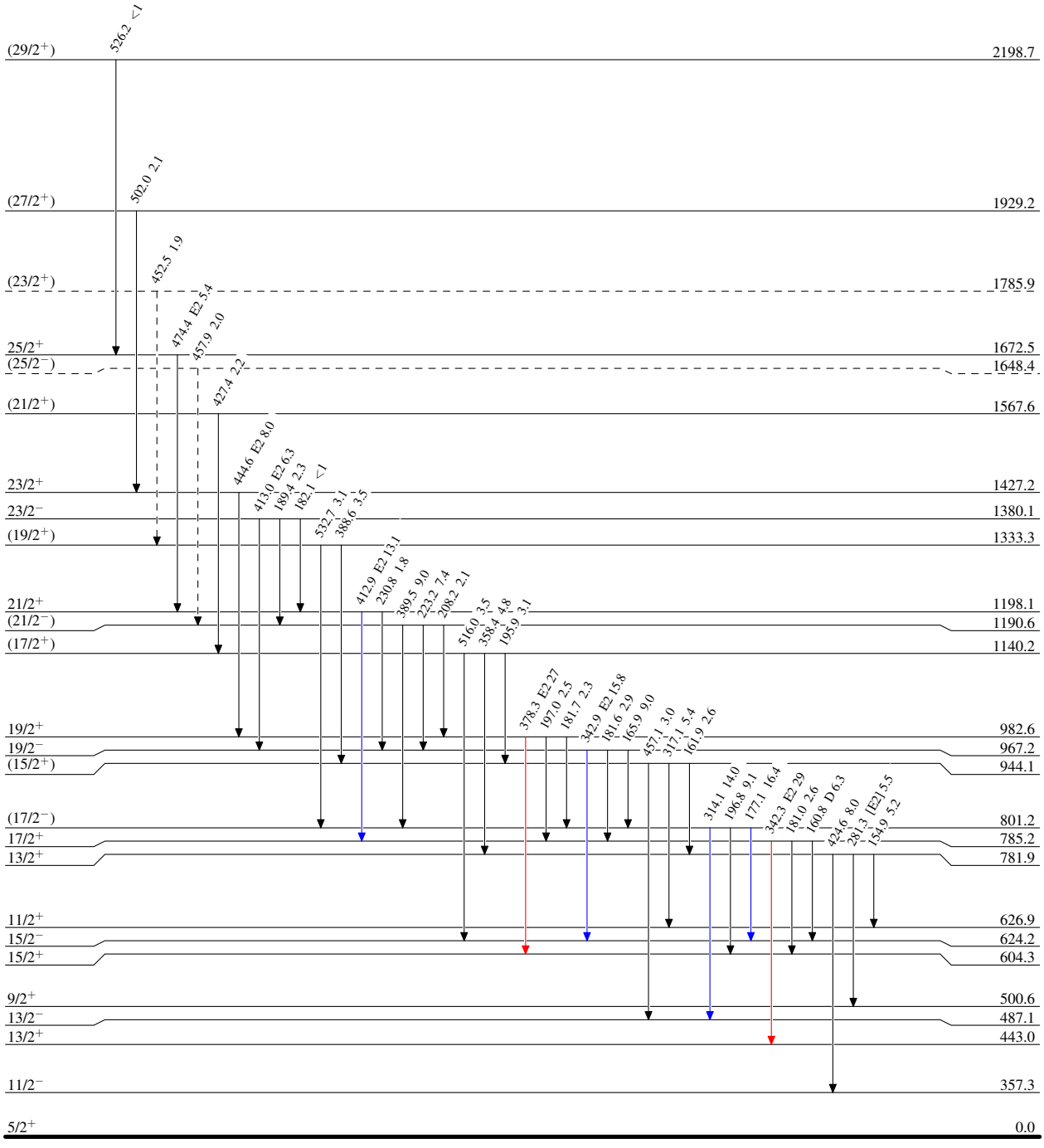
^{154}Sm(^{7}Li,α2nγ) 1998Ha27

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)

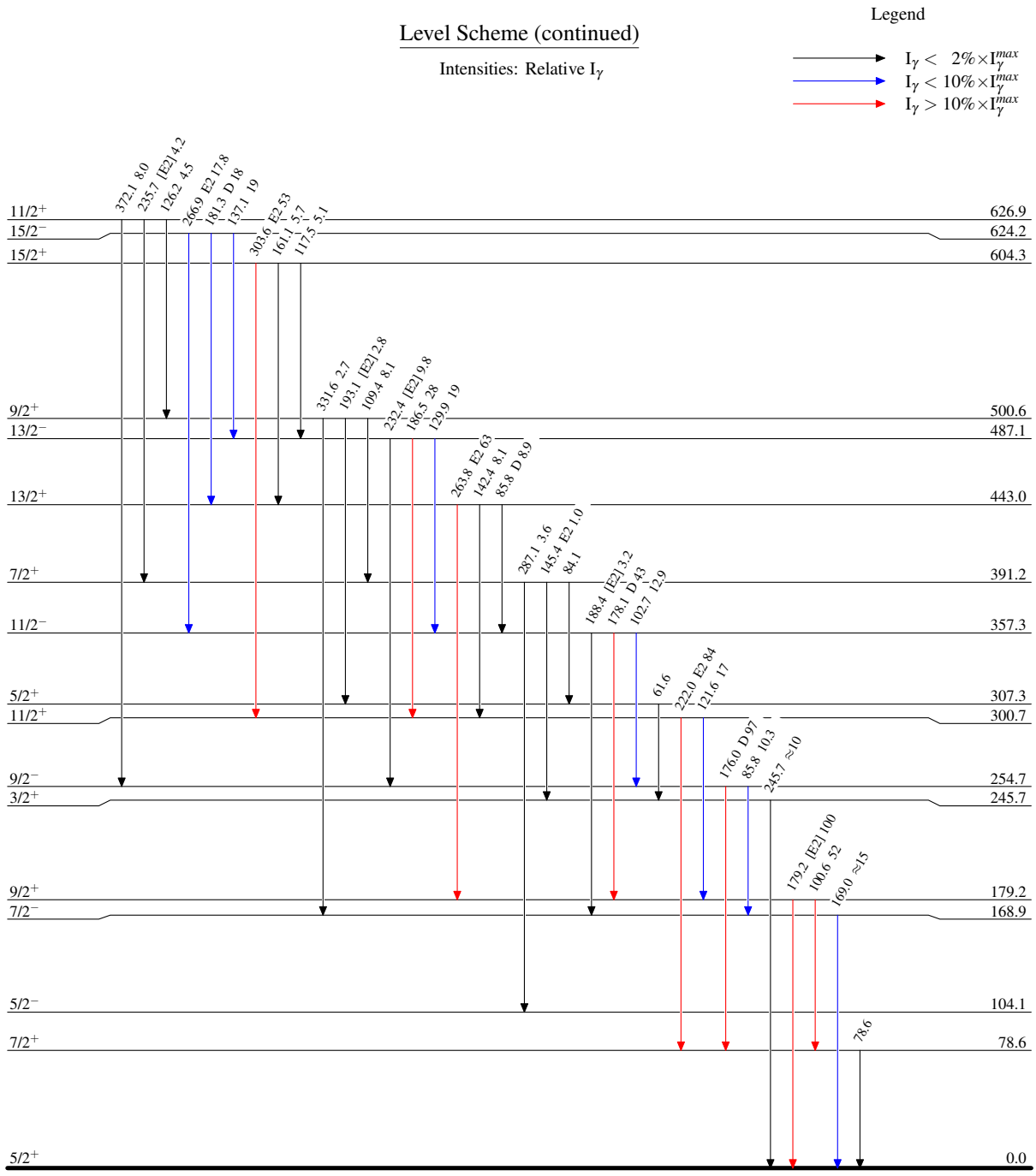


$^{155}_{63}Eu_{92}$

^{154}Sm(^{7}Li,α2nγ) 1998Ha27

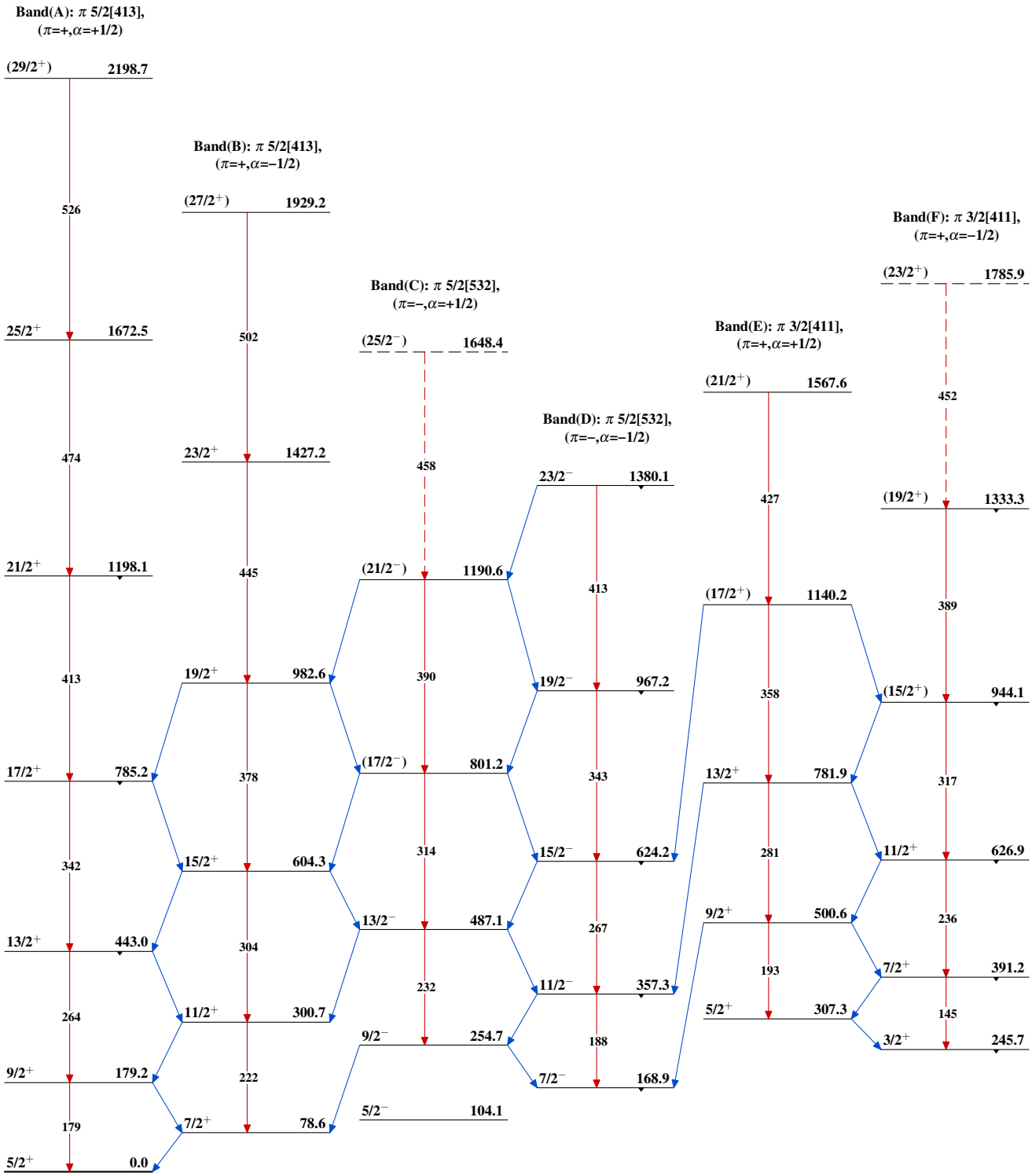
Level Scheme (continued)

Intensities: Relative I_γ



$^{155}_{63}Eu_{92}$

^{154}Sm(^{7}Li,α2nγ) 1998Ha27



$^{155}_{63}Eu_{92}$