$^{159}_{67}$Ho$_{92}$-1

^{152}Sm(^{11}B,4nγ) 2000Ma06

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich	NDS 113, 157 (2012)	31-Dec-2010

Additional information 1.

All data are from 2000Ma06.

Original data set for 2000Ma06 data created by J. Chenkin and B. Singh (McMaster) May 2000 and placed in the XUNDL database.

2004Es01, in ^{158}Gd(^{7}Li,6nγ), indicate that their study finds no discrepancies with that of 2000Ma06, except for the energy of one γ transition. Except for this Eγ value, they report no other data for this nuclide.

2000Ma06: E(^{11}B)=60 MeV. Measured Eγ, $\gamma\gamma$, Iγ, $\gamma\gamma(\theta)$(DCO) using an array of 8 Compton-suppressed HPGe detectors and one planar HPGe detector.

1974Gr01: E(^{11}B)=58 MeV. Report Eγ and Iγ for 7 γ's in ground-state band.

^{159}Ho Levels

E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]	E(level)[†]	J$^\pi$[‡]
0.0[#]	$7/2^-$	624.5[&] *5*	$13/2^+$	1758.6[a] *8*	$23/2^+$	3128.5[&] *17*	$(33/2^+)$
97.4[@] *3*	$9/2^-$	740.0[@] *5*	$17/2^-$	1866.0[b] *10*	$23/2^+$	3160.5[#] *9*	$35/2^-$
165.8[a] *5*	$7/2^+$	805.5[d] *7*	$13/2^-$	1966.9[d] *11*	$25/2^-$	3419.2[a] *18*	$(35/2^+)$
205.9[c] *7*	$1/2^+$	819.9[a] *5*	$15/2^+$	1981.9[#] *7*	$27/2^-$	3437.0[@] *10*	$37/2^-$
212.2[b] *8*	$3/2^+$	944.8[#] *5*	$19/2^-$	2021.9[&] *9*	$25/2^+$	3520.8[b] *20*	$(35/2^+)$
218.6[#] *4*	$11/2^-$	947.2[b] *8*	$15/2^+$	2293.8[a] *10*	$27/2^+$	3708.4[#] *11*	$(39/2^-)$
252.6[e] *4*	$5/2^+$	1031.0[&] *6*	$17/2^+$	2305.1[@] *8*	$29/2^-$	3771.1[d] *17*	$37/2^-$
296.5[&] *5*	$9/2^+$	1109.7[d] *8*	$17/2^-$	2402.6[b] *15*	$27/2^+$	3992.4[@] *12*	$41/2^-$
341.3[b] *6*	$7/2^+$	1197.9[@] *6*	$21/2^-$	2508.3[d] *13*	$29/2^-$	4090.3[b] *23*	$(39/2^+)$
369.1[@] *4*	$13/2^-$	1261.6[a] *6*	$19/2^+$	2569.6[&] *14*	$29/2^+$	4294.7[#] *12*	$(43/2^-)$
381.6[e] *7*	$(7/2^+)$	1375.2[b] *9*	$19/2^+$	2574.4[#] *8*	$31/2^-$	4464.3[d] *20*	$(41/2^-)$
449.7[a] *5*	$11/2^+$	1431.2[#] *6*	$23/2^-$	2849.2[a] *14*	$(31/2^+)$	4620.5[@] *13*	$(45/2^-)$
536.4[#] *4*	$15/2^-$	1498.5[d] *10*	$21/2^-$	2893.0[@] *9*	$33/2^-$	4955.1[#] *14*	$(47/2^-)$
589.7[d] *7*	$9/2^-$	1503.1[&] *7*	$21/2^+$	2978.0[b] *18*	$(31/2^+)$	5174.1[d] *22*	$(45/2^-)$
598.4[b] *7*	$11/2^+$	1726.7[@] *7*	$25/2^-$	3112.4[d] *14*	$33/2^-$	5331.0[@] *17*	$(49/2^-)$

[†] From least-squares fit to Eγ's.

[‡] Based on the usual considerations in the analysis of data from in-beam studies, including expected band structure, decrease of γ intensity with increasing excitation energy, and patterns of decay and multipolarities of the deexciting γ's.

[#] Band(A): π7/2[523] band, $\alpha=-1/2$.

[@] Band(a): π7/2[523] band, $\alpha=+1/2$.

[&] Band(B): π7/2[404] band, $\alpha=+1/2$.

[a] Band(b): π7/2[404] band, $\alpha=-1/2$.

[b] Band(C): π1/2[411] band, $\alpha=-1/2$.

[c] Band(c): π1/2[411] band, $\alpha=+1/2$.

[d] Band(D): π1/2[541] band, $\alpha=+1/2$.

[e] Band(E): π5/2[402] band.

$^{152}Sm(^{11}B,4n\gamma)$ 2000Ma06 (continued)

$\gamma(^{159}Ho)$

E_γ[†]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
(6.3)		212.2	3/2+	205.9	1/2+		E_γ: from level-energy difference.
88.7 *6*	17 *3*	341.3	7/2+	252.6	5/2+	D	DCO=0.72 *14*
97.5 *3*	100 *10*	97.4	9/2−	0.0	7/2−		DCO=0.77 *11*
121.3 *3*	142 *9*	218.6	11/2−	97.4	9/2−		DCO=0.78 *9*
129.0 *6*	10 *5*	381.6	(7/2+)	252.6	5/2+		
129.1 *6*	<5	341.3	7/2+	212.2	3/2+		
130.7 *6*	6 *3*	296.5	9/2+	165.8	7/2+		
141.4 *6*	7 *3*	947.2	15/2+	805.5	13/2−		
150.5 *3*	156 *6*	369.1	13/2−	218.6	11/2−	D	DCO=0.58 *7*
153.2 *6*	7 *3*	449.7	11/2+	296.5	9/2+		
162.3 *6*	8 *3*	1109.7	17/2−	947.2	15/2+		
165.9 *6*	7 *3*	165.8	7/2+	0.0	7/2−		
167.3 *3*	149 *9*	536.4	15/2−	369.1	13/2−	D	DCO=0.62 *8*
174.8 *6*	6 *3*	624.5	13/2+	449.7	11/2+		
195.4 *6*	<6	819.9	15/2+	624.5	13/2+		
203.6 *4*	110 *13*	740.0	17/2−	536.4	15/2−	D	DCO=0.56 *9*
204.8 *4*	102 *18*	944.8	19/2−	740.0	17/2−	D	DCO=0.60 *10*
205.9 *7*		205.9	1/2+	0.0	7/2−		
207.2 *7*	12 *5*	805.5	13/2−	598.4	11/2+		
208.1 *7*	15 *5*	589.7	9/2−	381.6	(7/2+)		
211.2 *7*	<6	1031.0	17/2+	819.9	15/2+		
215.9 *4*	39 *4*	805.5	13/2−	589.7	9/2−	E2	DCO=0.98 *18*
217.8 *7*	23 *4*	218.6	11/2−	0.0	7/2−	E2	DCO=0.94 *17*
230.6 *7*	<5	1261.6	19/2+	1031.0	17/2+		
233.3 *4*	62 *5*	1431.2	23/2−	1197.9	21/2−	D	DCO=0.63 *7*
241.5 *7*	<4	1503.1	21/2+	1261.6	19/2+		
248.4 *7*	18 *2*	589.7	9/2−	341.3	7/2+	D	DCO=0.67 *10*
252.6 *4*	92 *6*	252.6	5/2+	0.0	7/2−	D	DCO=0.64 *8*
253.1 *4*	78 *7*	1197.9	21/2−	944.8	19/2−	D	DCO=0.62 *9*
255.2 *4*	32 *4*	1981.9	27/2−	1726.7	25/2−	D	DCO=0.65 *11*
255.5[#] *7*		1758.6	23/2+	1503.1	21/2+		
257.1 *4*	35 *3*	598.4	11/2+	341.3	7/2+	E2	DCO=0.97 *20*
265.6 *7*	<4	1375.2	19/2+	1109.7	17/2−		
267.5 *7*	22 *6*	3160.5	35/2−	2893.0	33/2−		
269.3 *7*	21 *7*	2574.4	31/2−	2305.1	29/2−		
271.4 *7*	19 *8*	3708.4	(39/2−)	3437.0	37/2−		
271.8 *4*	54 *10*	369.1	13/2−	97.4	9/2−		
276.5 *7*	24 *3*	3437.0	37/2−	3160.5	35/2−	D	DCO=0.73 *11*
283.9 *7*	8 *3*	449.7	11/2+	165.8	7/2+		
284.0 *7*	14 *2*	3992.4	41/2−	3708.4	(39/2−)		
295.5 *4*	49 *4*	1726.7	25/2−	1431.2	23/2−	D	DCO=0.71 *10*
296.6 *7*	8 *2*	296.5	9/2+	0.0	7/2−		
302.3 *8*	11 *4*	4294.7	(43/2−)	3992.4	41/2−		
304.5 *5*	77 *6*	1109.7	17/2−	805.5	13/2−	E2	DCO=1.00 *16*
317.8 *5*	93 *11*	536.4	15/2−	218.6	11/2−	E2	DCO=1.00 *16*
318.6 *8*	20 *6*	2893.0	33/2−	2574.4	31/2−		
323.2 *8*	29 *3*	2305.1	29/2−	1981.9	27/2−	D	DCO=0.74 *11*
325.9 *8*	<7	4620.5	(45/2−)	4294.7	(43/2−)		
328.0 *8*	12 *4*	624.5	13/2+	296.5	9/2+		
334.4 *8*	<5	4955.1	(47/2−)	4620.5	(45/2−)		
348.6 *5*	37 *3*	947.2	15/2+	598.4	11/2+	E2	DCO=1.01 *21*
352.3 *8*	10 *2*	449.7	11/2+	97.4	9/2−		
370.2 *8*	15 *4*	819.9	15/2+	449.7	11/2+		
370.9 *5*	98 *7*	740.0	17/2−	369.1	13/2−	E2	DCO=1.08 *13*
376.1[#] *8*		5331.0	(49/2−)	4955.1	(47/2−)		

Continued on next page (footnotes at end of table)

^{152}Sm(^{11}B,4nγ) 2000Ma06 (continued)

γ(^{159}Ho) (continued)

E_γ †	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	Comments
388.8 *5*	70 *4*	1498.5	21/2⁻	1109.7	17/2⁻	E2	DCO=1.06 *15*
405.8 *8*	13 *5*	624.5	13/2⁺	218.6	11/2⁻		
406.6 *8*	22 *8*	1031.0	17/2⁺	624.5	13/2⁺		
408.4 *5*	132 *16*	944.8	19/2⁻	536.4	15/2⁻	E2	DCO=1.04 *16*
427.9 *5*	34 *3*	1375.2	19/2⁺	947.2	15/2⁺	E2	DCO=0.97 *23*
441.8 *8*	25 *2*	1261.6	19/2⁺	819.9	15/2⁺	E2	DCO=1.06 *28*
450.7 *8*	13 *2*	819.9	15/2⁺	369.1	13/2⁻		
457.9 *5*	116 *7*	1197.9	21/2⁻	740.0	17/2⁻	E2	DCO=0.98 *10*
468.4 *5*	59 *5*	1966.9	25/2⁻	1498.5	21/2⁻	E2	DCO=1.12 *21*
472.1 *8*	26 *5*	1503.1	21/2⁺	1031.0	17/2⁺		DCO=0.93 *27*
486.4 *5*	135 *9*	1431.2	23/2⁻	944.8	19/2⁻	E2	DCO=1.09 *16*
490.8 *5*	35 *2*	1866.0	23/2⁺	1375.2	19/2⁺	E2	DCO=1.11 *27*
494.6 *8*	11 *5*	1031.0	17/2⁺	536.4	15/2⁻		
497.0 *8*	29 *12*	1758.6	23/2⁺	1261.6	19/2⁺	E2	DCO=0.97 *31*
518.8 *6*	33 *6*	2021.9	25/2⁺	1503.1	21/2⁺	E2	DCO=1.00 *27*
521.6 *10*	10 *3*	1261.6	19/2⁺	740.0	17/2⁻		
528.8 *6*	95 *9*	1726.7	25/2⁻	1197.9	21/2⁻	E2	DCO=1.04 *14*
535.2 *6*	30 *6*	2293.8	27/2⁺	1758.6	23/2⁺	E2	DCO=1.09 *29*
536.6 *10*	28 *3*	2402.6	27/2⁺	1866.0	23/2⁺	E2	DCO=1.14 *31*
541.4 *6*	45 *4*	2508.3	29/2⁻	1966.9	25/2⁻	E2	DCO=1.07 *19*
542.8 *10*	13 *3*	3520.8	(35/2⁺)	2978.0	(31/2⁺)		2004Es01, in ^{158}Gd(^{7}Li,6n), report Eγ=555 for this γ.
544.0 *6*	35 *8*	3437.0	37/2⁻	2893.0	33/2⁻	E2	DCO=1.03 *19*
547.7 *10*	28 *6*	2569.6	29/2⁺	2021.9	25/2⁺	E2	DCO=1.21 *33*
547.9 *10*	25 *8*	3708.4	(39/2⁻)	3160.5	35/2⁻		
550.7 *6*	92 *11*	1981.9	27/2⁻	1431.2	23/2⁻	E2	DCO=1.00 *17*
555.4 *10*	20 *5*	2849.2	(31/2⁺)	2293.8	27/2⁺		
555.4 *10*	23 *4*	3992.4	41/2⁻	3437.0	37/2⁻	E2	DCO=0.97 *17*
558.3 *10*	9 *5*	1503.1	21/2⁺	944.8	19/2⁻		
558.9 *10*	14 *7*	3128.5	(33/2⁺)	2569.6	29/2⁺		
560.7 *10*	<7	1758.6	23/2⁺	1197.9	21/2⁻		
569.5 *10*	10 *4*	4090.3	(39/2⁺)	3520.8	(35/2⁺)		
570.0 *10*	11 *4*	3419.2	(35/2⁺)	2849.2	(31/2⁺)		
575.4 *10*	14 *3*	2978.0	(31/2⁺)	2402.6	27/2⁺		
578.4 *6*	72 *8*	2305.1	29/2⁻	1726.7	25/2⁻	E2	DCO=1.06 *15*
586.1 *6*	43 *15*	3160.5	35/2⁻	2574.4	31/2⁻		
586.3 *10*	15 *6*	4294.7	(43/2⁻)	3708.4	(39/2⁻)		
587.9 *6*	52 *16*	2893.0	33/2⁻	2305.1	29/2⁻	E2	DCO=1.11 *25*
592.5 *6*	63 *8*	2574.4	31/2⁻	1981.9	27/2⁻	E2	DCO=1.13 *19*
604.1 *6*	32 *4*	3112.4	33/2⁻	2508.3	29/2⁻	E2	DCO=0.96 *23*
628.0 *10*	12 *4*	4620.5	(45/2⁻)	3992.4	41/2⁻		
658.7 *10*	26 *4*	3771.1	37/2⁻	3112.4	33/2⁻	E2	DCO=1.19 *27*
660.3 *10*	10 *4*	4955.1	(47/2⁻)	4294.7	(43/2⁻)		
693.2 *10*	19 *6*	4464.3	(41/2⁻)	3771.1	37/2⁻		
709.8 *10*	10 *5*	5174.1	(45/2⁻)	4464.3	(41/2⁻)		
710.5 *10*	<8	5331.0	(49/2⁻)	4620.5	(45/2⁻)		

† The authors state that the uncertainties are 0.3-0.6 keV, increasing with the γ-ray energy, for strong lines and 0.6-1.0 keV, increasing with energy, for weak and contaminated lines. The evaluator has taken "strong lines" to be those with Iγ > 30 and the steps in the uncertainty with energy at 200, 300, and 500 keV.

‡ The authors state that the DCO values are≈1 for stretched quadrupole transitions and≈0.6 for stretched dipole transitions. Although the authors do not give any multipolarities, the evaluator has made assignments of E2 or D based on the authors′ DCO values.

\# Placement of transition in the level scheme is uncertain.

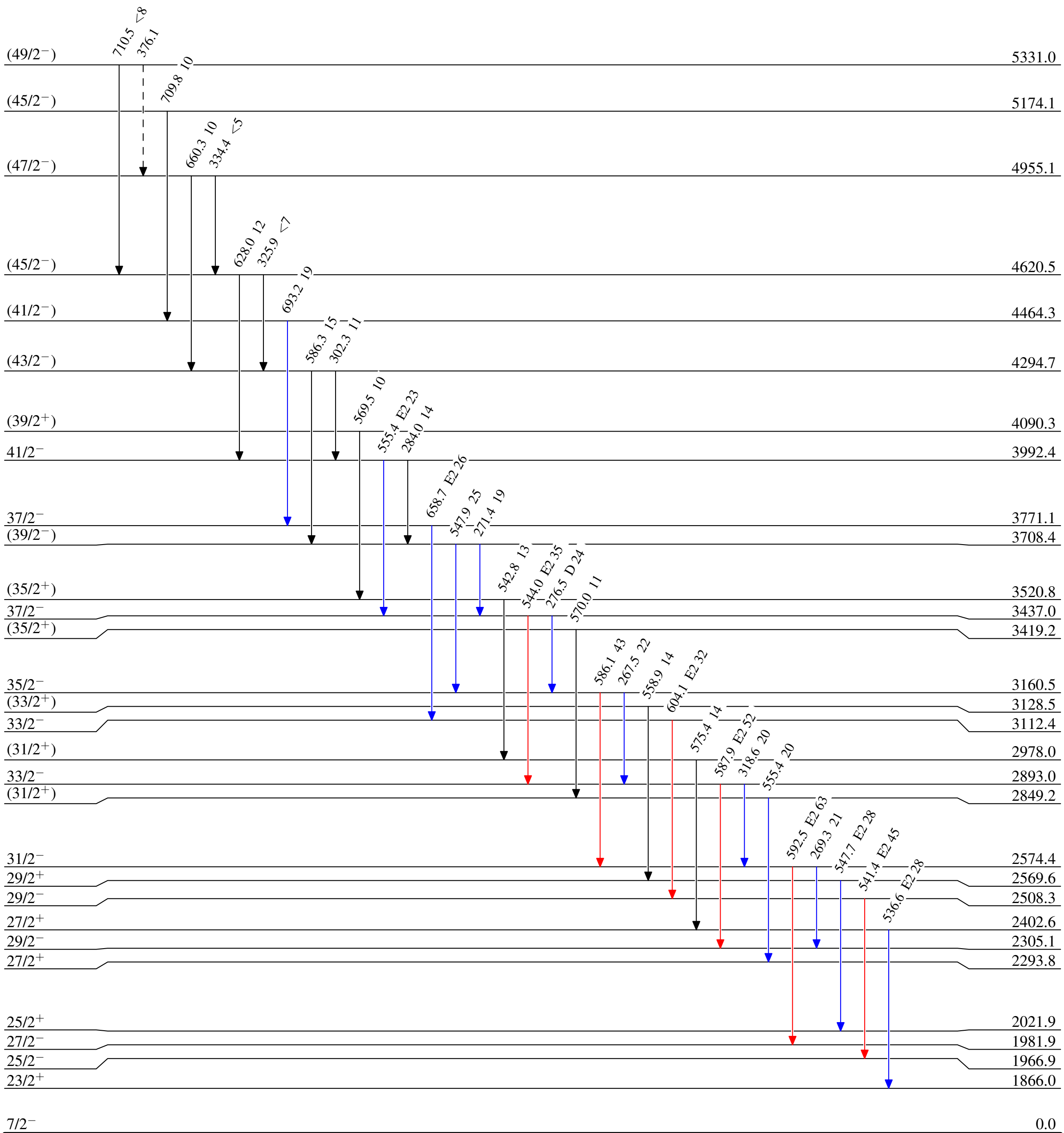
$^{152}Sm(^{11}B,4n\gamma)$ 2000Ma06

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)



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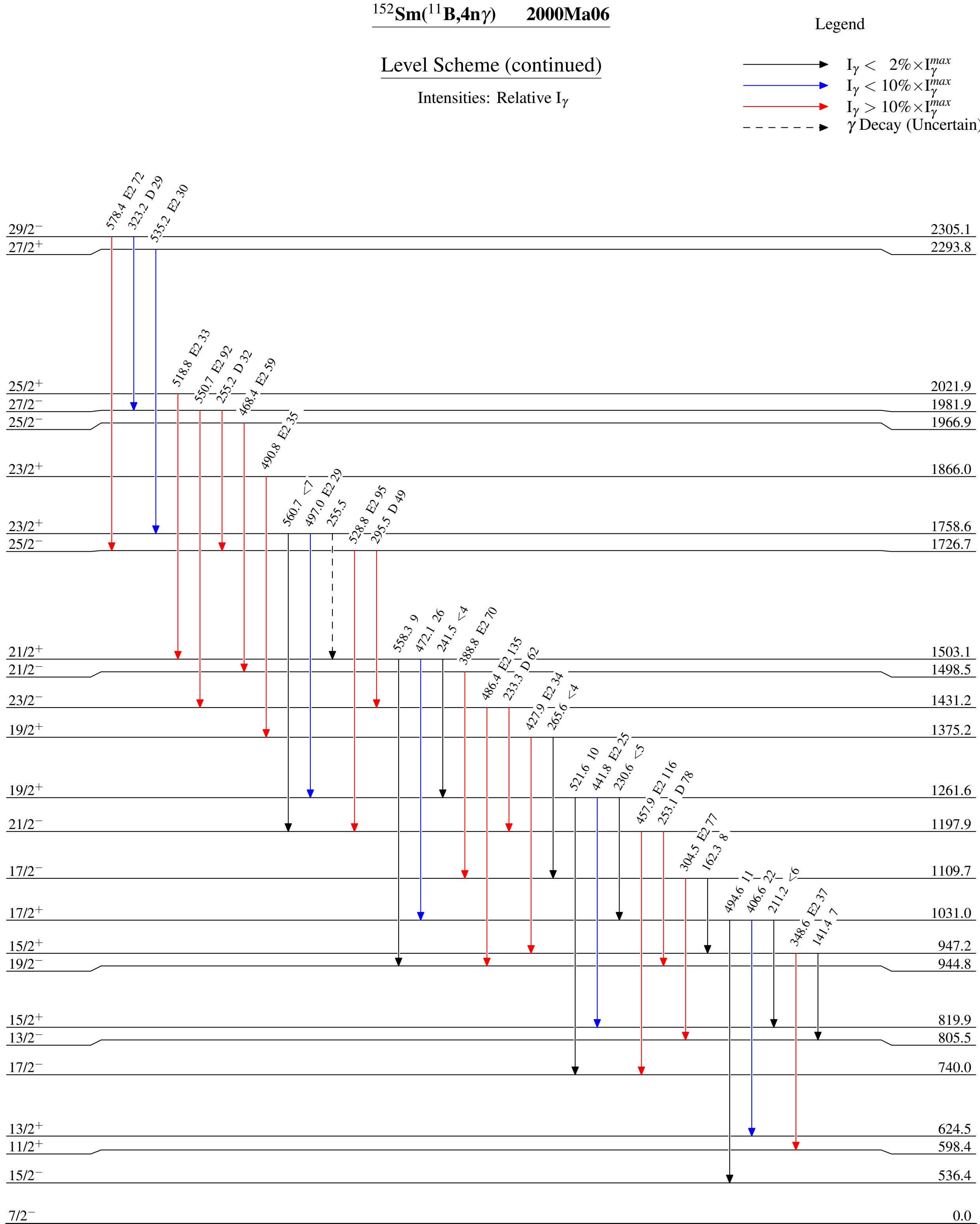
^{152}Sm(^{11}B,4nγ) 2000Ma06

Level Scheme (continued)

Intensities: Relative I_γ



$^{159}_{67}Ho_{92}$

$^{152}Sm(^{11}B,4n\gamma)$ 2000Ma06

Level Scheme (continued)

Intensities: Relative I_γ

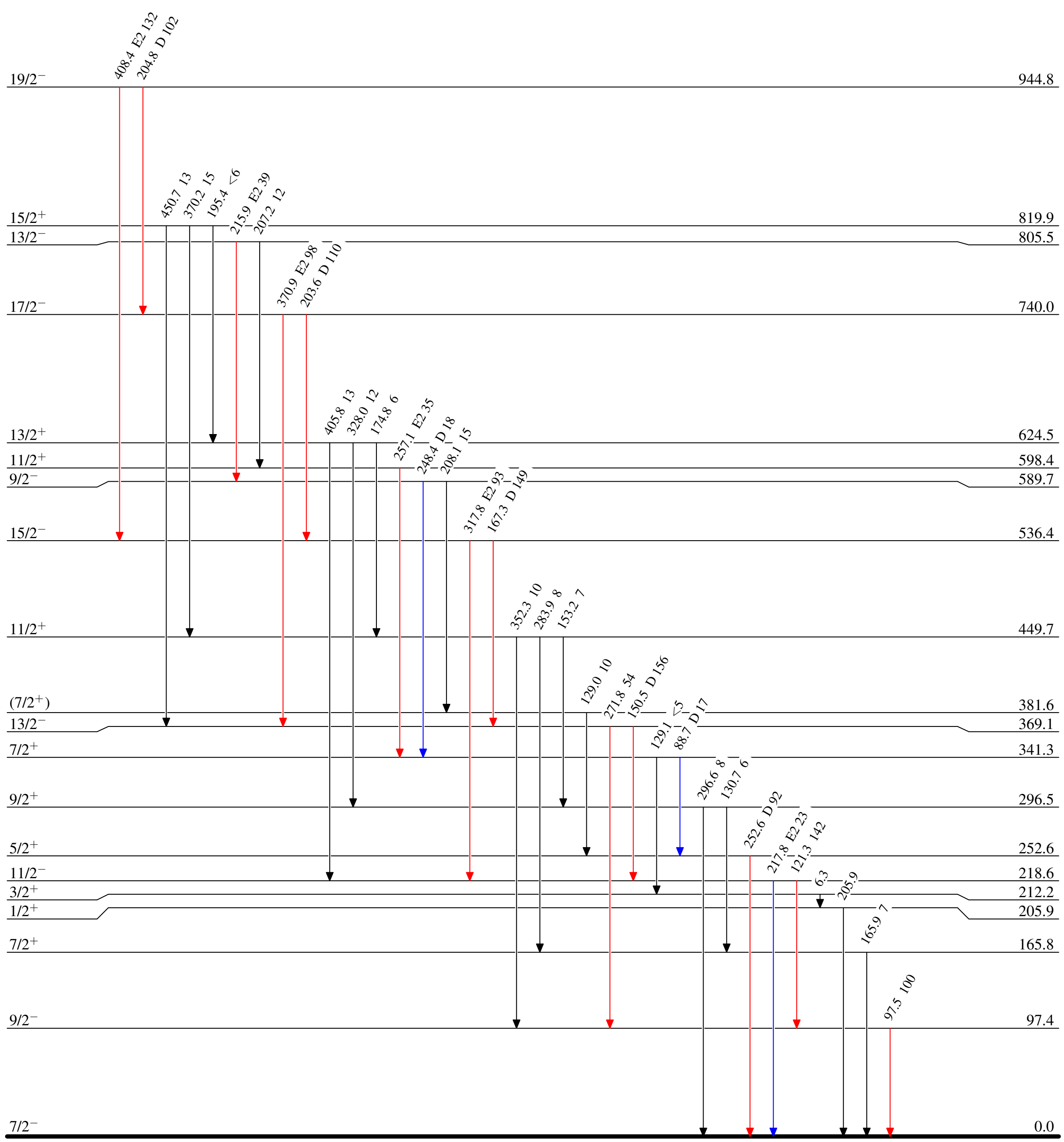
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



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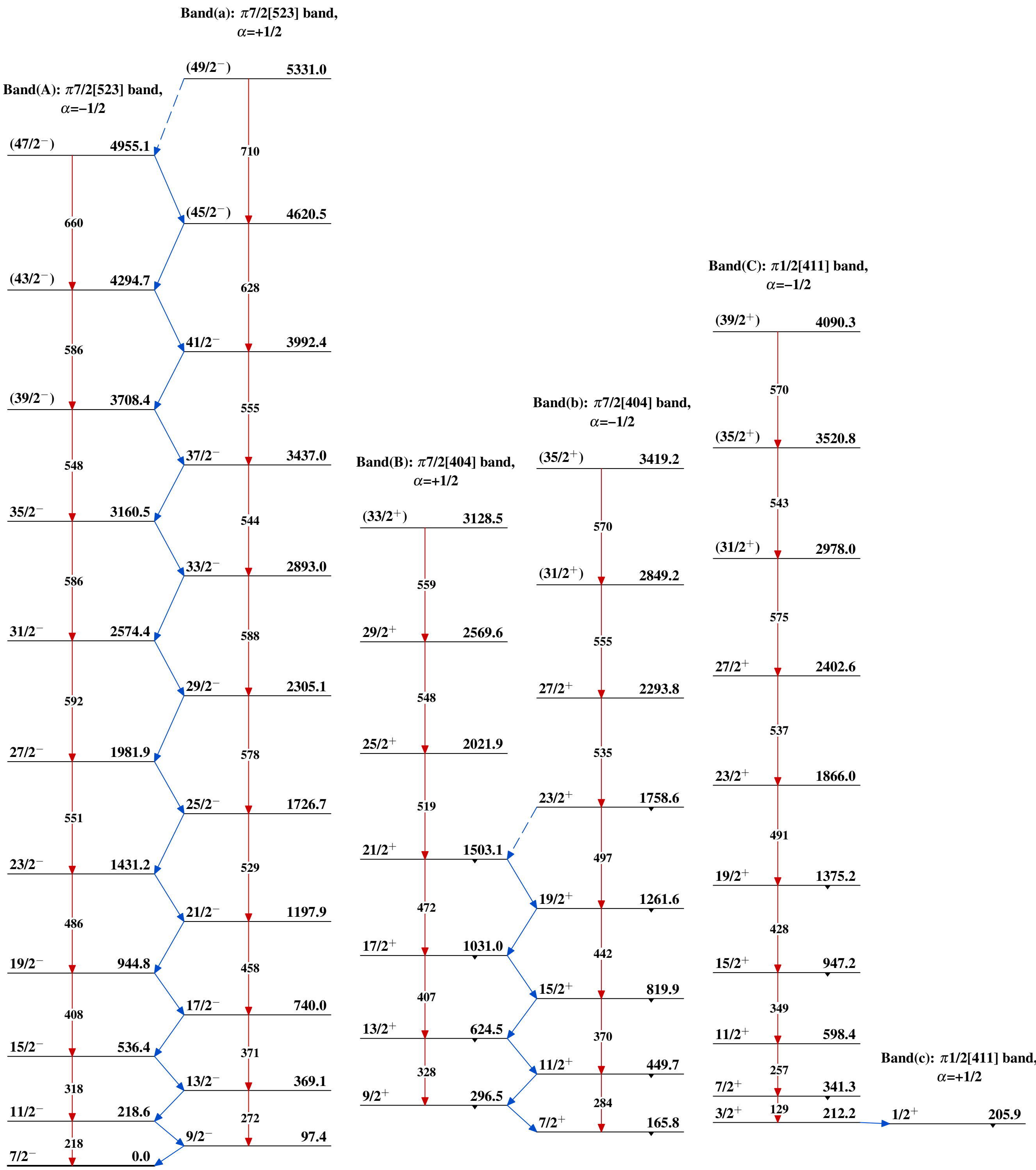
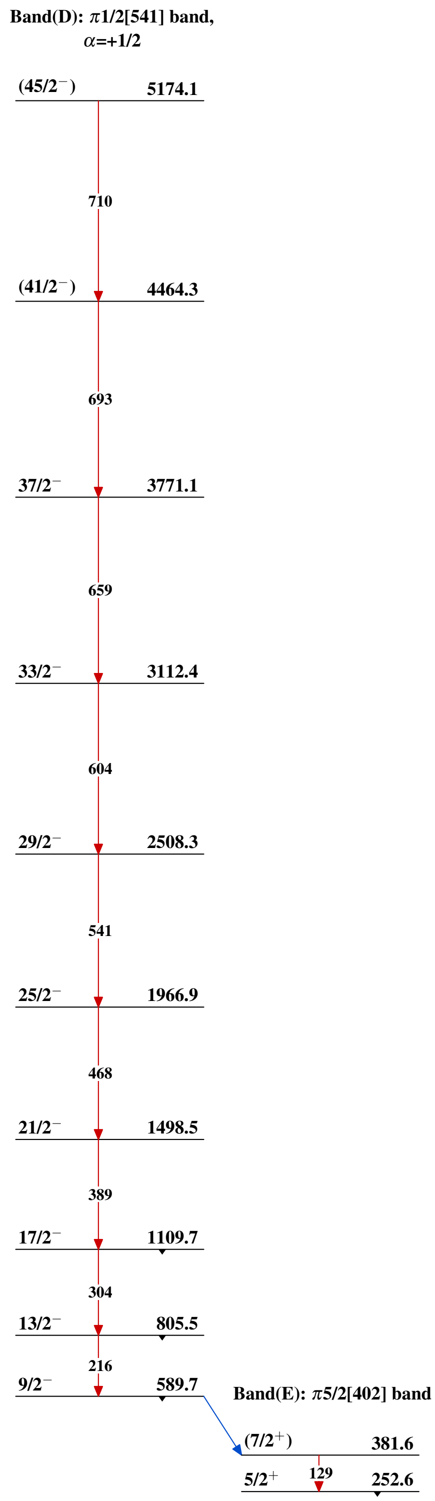


$^{159}_{67}Ho_{92}$

$^{152}Sm(^{11}B,4n\gamma)$ 2000Ma06 (continued)



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