^{52}Cr(^{37}Cl,2pnγ) 2009Ru03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Alexandru Negret, Balraj Singh	NDS 124, 1 (2015)	30-Nov-2014

E=115 MeV beam provided by XTU Tandem accelerator at INFN-Legnaro. Measured Eγ, Iγ, nγ coin, $\gamma(\theta)$ using GASP array of 40 Compton-suppressed HPGe detectors and 80 BGO detectors as a multiplicity filter. Comparisons with shell-model calculations.

^{86}Y Levels

E(level)[†]	J^{π}	$T_{1/2}$	Comments
0.0	4^-		
208.00 *10*	5^-		
218.30[‡] *18*	$8^{(+)}$	47.4 min *4*	$T_{1/2}$: from Adopted Levels.
302.10 *13*	6^+		
303.30 *20*	$7^{(+)}$		
662.00 *14*			
850.30 *14*			
886.30[#] *20*	$9^{(+)}$		
900.20 *15*			
1202.61 *18*	$7^{(-)}$		
1325.41[‡] *19*	$10^{(+)}$		
1408.61 *19*	$9^{(+)}$		
1494.01 *20*	$8^{(-)}$		
1854.9 *3*	(8)		
1954.6 *3*			
1987.41[#] *20*	$11^{(+)}$		
2042.31 *18*	$9^{(-)}$		
2258.71 *18*	$10^{(-)}$		
2351.31 *19*	$11^{(-)}$		
2521.52[‡] *21*	$12^{(+)}$		
2757.62[@] *20*	$11^{(-)}$		
2913.12 *20*	$12^{(-)}$		
3090.22[&] *20*	$12^{(-)}$		
3182.62 *23*	$12^{(+)}$		
3189.42[#] *21*	$13^{(+)}$		
3301.72 *22*	$13^{(-)}$		
3454.02[@] *21*	$13^{(-)}$		
3654.92 *21*	$13^{(+)}$		
3877.82[‡] *22*	$14^{(+)}$		
4010.42[&] *22*	$14^{(-)}$		
4073.02 *24*	$14^{(-)}$		
4192.03[#] *22*	$15^{(+)}$		
4398.7 *3*	$14^{(+)}$		
4465.93 *23*	$14^{(-)}$		
4526.33 *22*	$14^{(+)}$		
4709.82[@] *23*	$15^{(-)}$		
4884.8 *3*	$15^{(+)}$		
4961.23 *23*	$15^{(-)}$		
4977.0 *3*	$14^{(+)}$		
5094.73 *23*	$15^{(+)}$		
5362.74 *24*	$15^{(+)}$		
5429.73[&] *23*	$16^{(-)}$		

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^{52}Cr(^{37}Cl,2pnγ) 2009Ru03 (continued)

^{86}Y Levels (continued)

E(level)†	J$^\pi$	E(level)†	J$^\pi$	E(level)†	J$^\pi$	E(level)†	J$^\pi$
5662.5 3	15$^{(+)}$	6394.84 25	17$^{(+)}$	8003.3& 3	20$^{(-)}$	10736.6?‡ 4	(22$^+$)
5728.1 3		6411.74 23	17$^{(-)}$	8091.4 10		10996.0 5	(22$^+$)
5777.14‡ 24	16$^{(+)}$	6778.64& 24	18$^{(-)}$	8443.6@ 3	21$^{(-)}$	11230.4?# 4	(23$^+$)
5992.7# 4	17$^{(+)}$	6868.4‡ 3	18$^{(+)}$	8474.6‡ 3	20$^{(+)}$	11781.2?‡ 4	(24$^+$)
6009.64 25	(16$^-$)	7081.8 3		9358.3 4	(20$^+$)	12414.7?# 5	(25$^+$)
6087.0@ 3	17$^{(-)}$	7215.7@ 3	19$^{(-)}$	9443.8 5			
6188.5 3		7611.6# 3	19$^{(+)}$	9469.1# 3	21$^{(+)}$		
6222.84 25	17$^{(+)}$	7689.9 3	19$^{(+)}$	10610.0@ 5	23$^{(-)}$		

† From least-squares fit to Eγ values.
‡ Band(A): Band based on 8$^{(+)}$,α=0.
# Band(a): Band based on 9$^{(+)}$,α=1.
@ Band(B): Band based on 11$^{(-)}$,α=1.
& Band(b): Band based on 12$^{(-)}$,α=0.

γ(^{86}Y)

Expected values of R(ADO) are: 1.36 for ΔJ=2, quadrupole; 1.46 for ΔJ=0, dipole and 0.82 for ΔJ=1, dipole transition.

E$_\gamma$	I$_\gamma$	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.	Comments
(10.3 2)		218.30	8$^{(+)}$	208.00	5$^-$	[E3]	
85.0 1	7 2	303.30	7$^{(+)}$	218.30	8$^{(+)}$	D	R(ADO)=0.86 17.
92.6 1	26 3	2351.31	11$^{(-)}$	2258.71	10$^{(-)}$	D	R(ADO)=0.85 4.
94.1 1	1.4 4	302.10	6$^+$	208.00	5$^-$		
177.1 1	0.9 2	3090.22	12$^{(-)}$	2913.12	12$^{(-)}$	D	R(ADO)=1.7 4.
187.4 3	0.7 2	2042.31	9$^{(-)}$	1854.9	(8)	(D)	R(ADO)=1.02 14.
208.0 1	131 9	208.00	5$^-$	0.0	4$^-$	D+Q	R(ADO)=1.75 13.
216.4 1	18 2	2258.71	10$^{(-)}$	2042.31	9$^{(-)}$	D	R(ADO)=0.81 2.
222.9 1	3.1 4	3877.82	14$^{(+)}$	3654.92	13$^{(+)}$	D	R(ADO)=0.87 10.
238.2 1	0.8 2	900.20		662.00			
304.1 3	1.1 2	2258.71	10$^{(-)}$	1954.6			
314.2 1	11 1	4192.03	15$^{(+)}$	3877.82	14$^{(+)}$	D	R(ADO)=0.77 3.
332.6 1	7.4 5	3090.22	12$^{(-)}$	2757.62	11$^{(-)}$	D	R(ADO)=0.85 4.
359.9 1	0.6 2	662.00		302.10	6$^+$		
363.8 1	24 2	3454.02	13$^{(-)}$	3090.22	12$^{(-)}$	D	R(ADO)=0.68 7.
363.9 1	8.4 7	2351.31	11$^{(-)}$	1987.41	11$^{(+)}$	D	R(ADO)=1.44 11.
366.9 1	12 1	6778.64	18$^{(-)}$	6411.74	17$^{(-)}$	D	R(ADO)=0.82 3.
385.7 1	2.1 2	5362.74	15$^{(+)}$	4977.0	14$^{(+)}$	D	R(ADO)=0.84 10.
388.6 1	17 1	3301.72	13$^{(-)}$	2913.12	12$^{(-)}$	D	R(ADO)=0.73 3.
402.1 1	1.7 2	6411.74	17$^{(-)}$	6009.64	(16$^-$)		
414.4 1	4.6 4	5777.14	16$^{(+)}$	5362.74	15$^{(+)}$	D	R(ADO)=0.89 7.
437.1 1	17 1	7215.7	19$^{(-)}$	6778.64	18$^{(-)}$	D	R(ADO)=0.69 4.
439.1 3	1.7 7	1325.41	10$^{(+)}$	886.30	9$^{(+)}$		
440.3 1	9.1 7	8443.6	21$^{(-)}$	8003.3	20$^{(-)}$	D	R(ADO)=0.73 5.
445.7 1	12 1	6222.84	17$^{(+)}$	5777.14	16$^{(+)}$	D	R(ADO)=0.65 4.
460.4 1	3.1 4	6188.5		5728.1			

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^{52}Cr(^{37}Cl,2pnγ) 2009Ru03 (continued)

γ(^{86}Y) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
465.5 *2*	1.8 *3*	3654.92	$13^{(+)}$	3189.42	$13^{(+)}$		
468.5 *1*	6.2 *6*	5429.73	$16^{(-)}$	4961.23	$15^{(-)}$	D	R(ADO)=0.73 *5*.
472.3 *1*	3.5 *4*	3654.92	$13^{(+)}$	3182.62	$12^{(+)}$		
473.6 *2*	1.6 *3*	6868.4	$18^{(+)}$	6394.84	$17^{(+)}$		
486.1 *1*	3.7 *5*	4884.8	$15^{(+)}$	4398.7	$14^{(+)}$	D	R(ADO)=0.92 *14*.
493.8 *1*	2.9 *3*	11230.4?	(23^+)	10736.6?	(22^+)	D	R(ADO)=0.56 *9*.
495.3 *1*	2.9 *3*	4961.23	$15^{(-)}$	4465.93	$14^{(-)}$	D	R(ADO)=0.69 *7*.
529.8 *3*	1.3 *3*	7611.6	$19^{(+)}$	7081.8			
540.9 *1*	4.4 *4*	3454.02	$13^{(-)}$	2913.12	$12^{(-)}$	D	R(ADO)=0.78 *7*.
548.3 *1*	1.9 *3*	2042.31	$9^{(-)}$	1494.01	$8^{(-)}$	D	R(ADO)=0.94 *9*.
550.8 *1*	2.0 *2*	11781.2?	(24^+)	11230.4?	(23^+)	D	R(ADO)=0.77 *7*.
556.4 *1*	24 *2*	4010.42	$14^{(-)}$	3454.02	$13^{(-)}$	D	R(ADO)=0.69 *3*.
560.3 *2*	1.6 *3*	6222.84	$17^{(+)}$	5662.5	$15^{(+)}$		
561.8 *1*	26 *2*	2913.12	$12^{(-)}$	2351.31	$11^{(-)}$	D	R(ADO)=0.69 *3*.
568.4 *1*	3.6 *4*	5094.73	$15^{(+)}$	4526.33	$14^{(+)}$	D	R(ADO)=0.67 *9*.
617.7 *1*	5.6 *6*	6394.84	$17^{(+)}$	5777.14	$16^{(+)}$	D	R(ADO)=0.70 *11*.
633.5 *2*	1.4 *2*	12414.7?	(25^+)	11781.2?	(24^+)	D	R(ADO)=0.96 *8*.
633.7 *1*	3.8 *7*	2042.31	$9^{(-)}$	1408.61	$9^{(+)}$	D	R(ADO)=1.41 *17*.
642.3 *1*	0.8 *3*	850.30		208.00	5^-		
645.6 *1*	10 *1*	6868.4	$18^{(+)}$	6222.84	$17^{(+)}$	D	R(ADO)=0.67 *4*.
657.3 *3*	2.1 *5*	6087.0	$17^{(-)}$	5429.73	$16^{(-)}$	D	R(ADO)=0.64 *9*.
661.1[†] *3*	2.1 *15*	3182.62	$12^{(+)}$	2521.52	$12^{(+)}$		
662.0 *3*	0.5 *2*	662.00		0.0	4^-		
662.0 *1*	20 *2*	1987.41	$11^{(+)}$	1325.41	$10^{(+)}$	D	R(ADO)=0.76 *4*.
667.9 *1*	26 *2*	3189.42	$13^{(+)}$	2521.52	$12^{(+)}$	D	R(ADO)=0.74 *4*.
668.0 *1*	8 *2*	886.30	$9^{(+)}$	218.30	$8^{(+)}$	D	R(ADO)=0.81 *7*.
682.4 *1*	10 *1*	5777.14	$16^{(+)}$	5094.73	$15^{(+)}$	D	R(ADO)=0.68 *4*.
688.4 *1*	11 *1*	3877.82	$14^{(+)}$	3189.42	$13^{(+)}$	D	R(ADO)=0.74 *7*.
692.2 *2*	0.5 *2*	900.20		208.00	5^-		
692.8 *5*	1.3 *5*	4884.8	$15^{(+)}$	4192.03	$15^{(+)}$		
699.4 *1*	10 *1*	4709.82	$15^{(-)}$	4010.42	$14^{(-)}$	D	R(ADO)=0.63 *3*.
719.9 *1*	5.5 *6*	5429.73	$16^{(-)}$	4709.82	$15^{(-)}$	D	R(ADO)=0.65 *4*.
738.9 *1*	22 *2*	3090.22	$12^{(-)}$	2351.31	$11^{(-)}$	D	R(ADO)=0.64 *3*.
743.2 *1*	8 *1*	7611.6	$19^{(+)}$	6868.4	$18^{(+)}$	D	R(ADO)=0.65 *3*.
771.3 *1*	10 *1*	4073.02	$14^{(-)}$	3301.72	$13^{(-)}$	D	R(ADO)=0.62 *3*.
784.6 *7*	0.7 *3*	8474.6	$20^{(+)}$	7689.9	$19^{(+)}$		
787.6 *1*	12 *1*	8003.3	$20^{(-)}$	7215.7	$19^{(-)}$	D	R(ADO)=0.69 *5*.
821.5 *1*	3.9 *5*	7689.9	$19^{(+)}$	6868.4	$18^{(+)}$	D	R(ADO)=0.79 *9*.
836.4 *2*	2.5 *4*	5362.74	$15^{(+)}$	4526.33	$14^{(+)}$	D	R(ADO)=0.77 *8*.
839.7 *1*	2.8 *3*	2042.31	$9^{(-)}$	1202.61	$7^{(-)}$	Q	R(ADO)=1.24 *8*.
843.3 *2*	2.4 *5*	5728.1		4884.8	$15^{(+)}$		
850.1 *2*	5.0 *8*	2258.71	$10^{(-)}$	1408.61	$9^{(+)}$	D	R(ADO)=0.84 *7*.
859.0 *2*	3.9 *6*	7081.8		6222.84	$17^{(+)}$	D	R(ADO)=0.78 *12*.
862.9 *1*	4.3 *5*	8474.6	$20^{(+)}$	7611.6	$19^{(+)}$	D	R(ADO)=0.68 *11*.
871.4 *1*	7 *2*	4526.33	$14^{(+)}$	3654.92	$13^{(+)}$	D	R(ADO)=0.79 *15*.
888.2 *3*	1.4 *3*	4961.23	$15^{(-)}$	4073.02	$14^{(-)}$		
902.7 *2*	4.2 *8*	5094.73	$15^{(+)}$	4192.03	$15^{(+)}$	D	R(ADO)=1.7 *3*.
933.3 *1*	8.8 *8*	2258.71	$10^{(-)}$	1325.41	$10^{(+)}$	D	R(ADO)=1.32 *9*.
950.8 *1*	3.6 *5*	4961.23	$15^{(-)}$	4010.42	$14^{(-)}$	D	R(ADO)=0.76 *7*.
982.0 *1*	4.2 *4*	6411.74	$17^{(-)}$	5429.73	$16^{(-)}$	D	R(ADO)=0.66 *7*.
994.5 *1*	1.9 *4*	9469.1	$21^{(+)}$	8474.6	$20^{(+)}$	D	R(ADO)=0.57 *7*.

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$^{52}Cr(^{37}Cl,2pn\gamma)$ 2009Ru03 (continued)

$\gamma(^{86}Y)$ (continued)

E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.	Comments
994.6 *2*	2.7 *2*	1202.61	$7^{(-)}$	208.00	5^-	Q	R(ADO)=1.28 *12*.
1002.6 *1*	4.2 *15*	4192.03	$15^{(+)}$	3189.42	$13^{(+)}$		
1004.6 *5*	1.0 *4*	1854.9	(8)	850.30			
1025.9 *1*	7.3 *8*	2351.31	$11^{(-)}$	1325.41	$10^{(+)}$	D	R(ADO)=0.86 *14*.
1054.4 *4*	1.0 *2*	1954.6		900.20			
1101.1 *3*	3.6 *6*	1987.41	$11^{(+)}$	886.30	$9^{(+)}$		
1105.3 *2*	5 *1*	1408.61	$9^{(+)}$	303.30	$7^{(+)}$	Q	R(ADO)=1.21 *17*.
1107.1 *1*	100 *8*	1325.41	$10^{(+)}$	218.30	$8^{(+)}$	Q	R(ADO)=1.49 *9*.
1128.7 *3*	2.2 *4*	7215.7	$19^{(-)}$	6087.0	$17^{(-)}$		
1133.4 *1*	9 *1*	3654.92	$13^{(+)}$	2521.52	$12^{(+)}$	D	R(ADO)=0.76 *8*.
1164.2 *2*	2.9 *4*	4465.93	$14^{(-)}$	3301.72	$13^{(-)}$	D	R(ADO)=0.59 *7*.
1190.3 *5*	1.9 *8*	1408.61	$9^{(+)}$	218.30	$8^{(+)}$	D	R(ADO)=0.54 *8*.
1190.7 *4*	1.8 *6*	1494.01	$8^{(-)}$	303.30	$7^{(+)}$	D	R(ADO)=0.80 *10*.
1195.2[†] *8*	<1.8	3182.62	$12^{(+)}$	1987.41	$11^{(+)}$		
1196.1 *1*	51 *4*	2521.52	$12^{(+)}$	1325.41	$10^{(+)}$	Q	R(ADO)=1.54 *7*.
1202.0 *2*	5.1 *6*	3189.42	$13^{(+)}$	1987.41	$11^{(+)}$	Q	
1209.3 *2*	3.9 *6*	4398.7	$14^{(+)}$	3189.42	$13^{(+)}$	D	R(ADO)=0.62 *8*.
1216.9 *3*	2.2 *4*	5094.73	$15^{(+)}$	3877.82	$14^{(+)}$		
1275.7 *5*	0.8 *2*	1494.01	$8^{(-)}$	218.30	$8^{(+)}$	D	R(ADO)=1.3 *3*.
1303.7 *3*	3.3 *6*	6188.5		4884.8	$15^{(+)}$		
1329.4 *6*	1.0 *3*	5728.1		4398.7	$14^{(+)}$		
1336.9 *4*	2.4 *5*	4526.33	$14^{(+)}$	3189.42	$13^{(+)}$		
1348.9 *1*	7.5 *7*	6778.64	$18^{(-)}$	5429.73	$16^{(-)}$	Q	R(ADO)=1.45 *9*.
1356.3 *2*	6.3 *6*	3877.82	$14^{(+)}$	2521.52	$12^{(+)}$	Q	R(ADO)=1.46 *11*.
1372.4 *3*	2.9 *4*	2258.71	$10^{(-)}$	886.30	$9^{(+)}$	D	R(ADO)=0.77 *5*.
1375.7 *2*	3.1 *5*	4465.93	$14^{(-)}$	3090.22	$12^{(-)}$	Q	R(ADO)=1.44 *18*.
1377.2 *5*	1.2 *3*	6087.0	$17^{(-)}$	4709.82	$15^{(-)}$	Q	R(ADO)=1.33 *20*.
1419.3 *1*	5.2 *5*	5429.73	$16^{(-)}$	4010.42	$14^{(-)}$	Q	R(ADO)=1.46 *9*.
1432.2 *1*	9 *1*	2757.62	$11^{(-)}$	1325.41	$10^{(+)}$	D	R(ADO)=0.82 *8*.
1450.5 *1*	4.3 *6*	6411.74	$17^{(-)}$	4961.23	$15^{(-)}$	Q	R(ADO)=1.56 *12*.
1501.4 *3*	2.5 *4*	7689.9	$19^{(+)}$	6188.5			
1507.2 *4*	1.6 *4*	4961.23	$15^{(-)}$	3454.02	$13^{(-)}$	Q	R(ADO)=1.51 *13*.
1543.7 *2*	1.8 *4*	6009.64	(16^-)	4465.93	$14^{(-)}$		
1585.1 *4*	1.7 *3*	5777.14	$16^{(+)}$	4192.03	$15^{(+)}$	D	R(ADO)=0.70 *12*.
1637.7 *3*	2.8 *5*	10996.0	(22^+)	9358.3	(20^+)	Q	R(ADO)=1.23 *15*.
1667.5 *7*	1.1 *4*	3654.92	$13^{(+)}$	1987.41	$11^{(+)}$		
1668.3 *3*	3.3 *5*	9358.3	(20^+)	7689.9	$19^{(+)}$	(D)	R(ADO)=0.91 *14*.
1695.4 *3*	3.5 *6*	4884.8	$15^{(+)}$	3189.42	$13^{(+)}$	Q	R(ADO)=1.13 *18*.
1697.2 *8*	0.5 *2*	7689.9	$19^{(+)}$	5992.7	$17^{(+)}$		
1702.0 *9*	0.8 *2*	6411.74	$17^{(-)}$	4709.82	$15^{(-)}$		
1746.6 *3*	0.7 *2*	9358.3	(20^+)	7611.6	$19^{(+)}$		
1784.7 *4*	1.6 *6*	5662.5	$15^{(+)}$	3877.82	$14^{(+)}$	D	R(ADO)=0.76 *22*.
1787.6 *3*	2.0 *6*	4977.0	$14^{(+)}$	3189.42	$13^{(+)}$		
1800.7 *3*	3.7 *6*	5992.7	$17^{(+)}$	4192.03	$15^{(+)}$	Q	R(ADO)=1.62 *14*.
1824.0 *1*	8 *1*	2042.31	$9^{(-)}$	218.30	$8^{(+)}$	D	R(ADO)=0.88 *5*.
1857.2 *3*	5 *1*	3182.62	$12^{(+)}$	1325.41	$10^{(+)}$	Q	R(ADO)=1.24 *20*.
1877.2 *4*	2.6 *5*	4398.7	$14^{(+)}$	2521.52	$12^{(+)}$	Q	R(ADO)=1.31 *20*.
1899.3 *6*	1.3 *3*	5777.14	$16^{(+)}$	3877.82	$14^{(+)}$		
1905.3 *3*	2.5 *4*	5094.73	$15^{(+)}$	3189.42	$13^{(+)}$	Q	R(ADO)=1.6 *3*.
2004.8 *3*	3.7 *6*	4526.33	$14^{(+)}$	2521.52	$12^{(+)}$	Q	R(ADO)=1.21 *25*.
2098.6 *9*	0.8 *3*	8091.4		5992.7	$17^{(+)}$		

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$^{52}Cr(^{37}Cl,2pn\gamma)$ 2009Ru03 (continued)

$\gamma(^{86}Y)$ (continued)

E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.	Comments
2166.3 *3*	2.2 *3*	10610.0	$23^{(-)}$	8443.6	$21^{(-)}$	Q	R(ADO)=1.46 *18*.
2228.0 *4*	1.6 *3*	9443.8		7215.7	$19^{(-)}$		
2262.0 *2*	2.8 *3*	10736.6?	(22^+)	8474.6	$20^{(+)}$	(Q)	R(ADO)=1.4 *5*.
2455.5 *8*	1.0 *5*	4977.0	$14^{(+)}$	2521.52	$12^{(+)}$		

† Placement of transition in the level scheme is uncertain.

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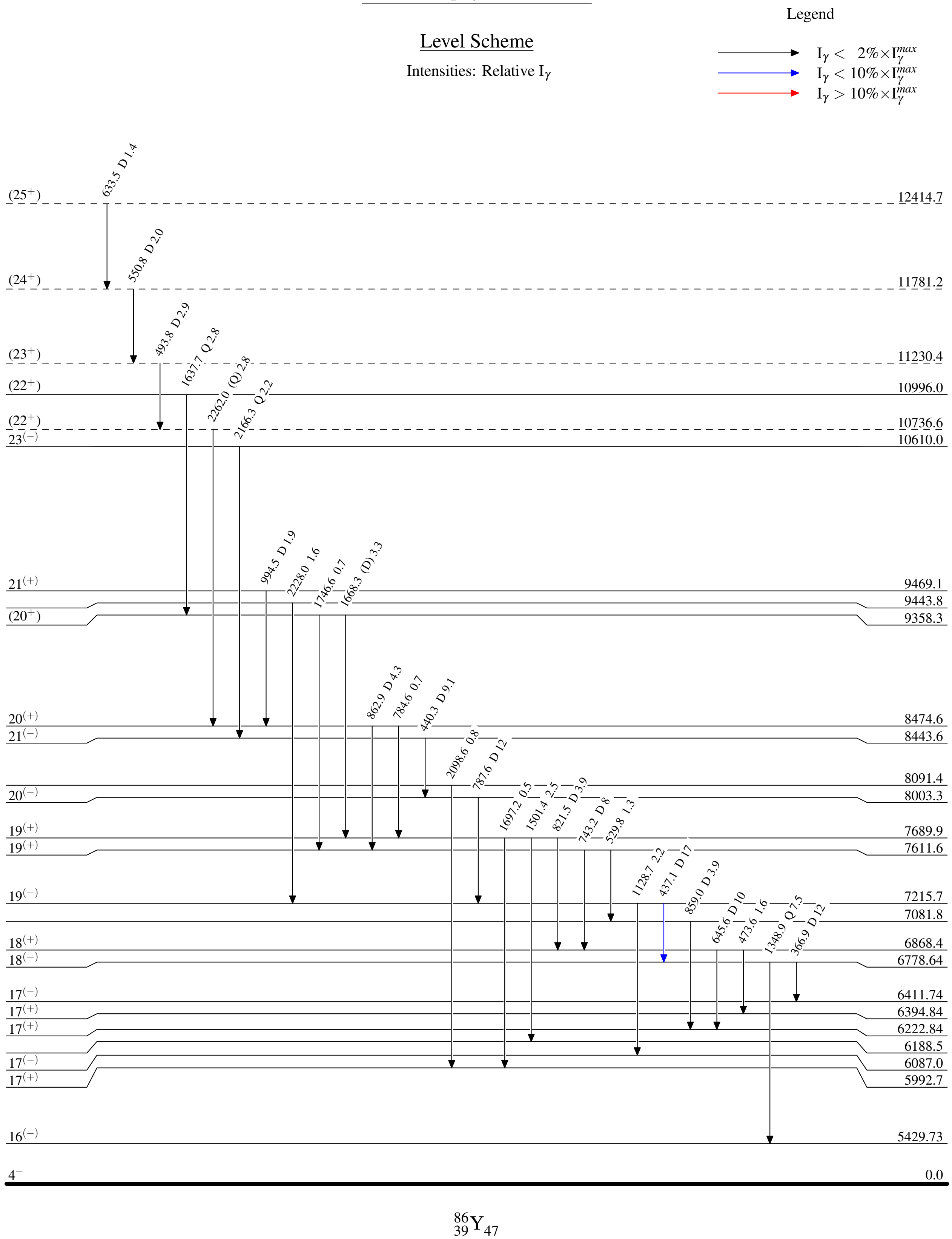
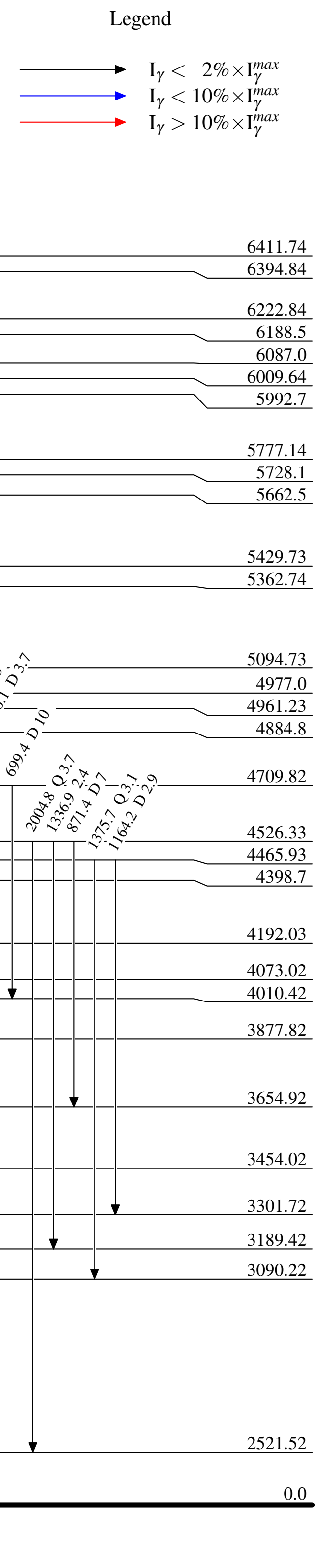


$^{52}Cr(^{37}Cl,2pn\gamma)$ 2009Ru03

Level Scheme (continued)

Intensities: Relative I_γ

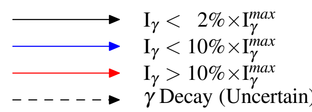


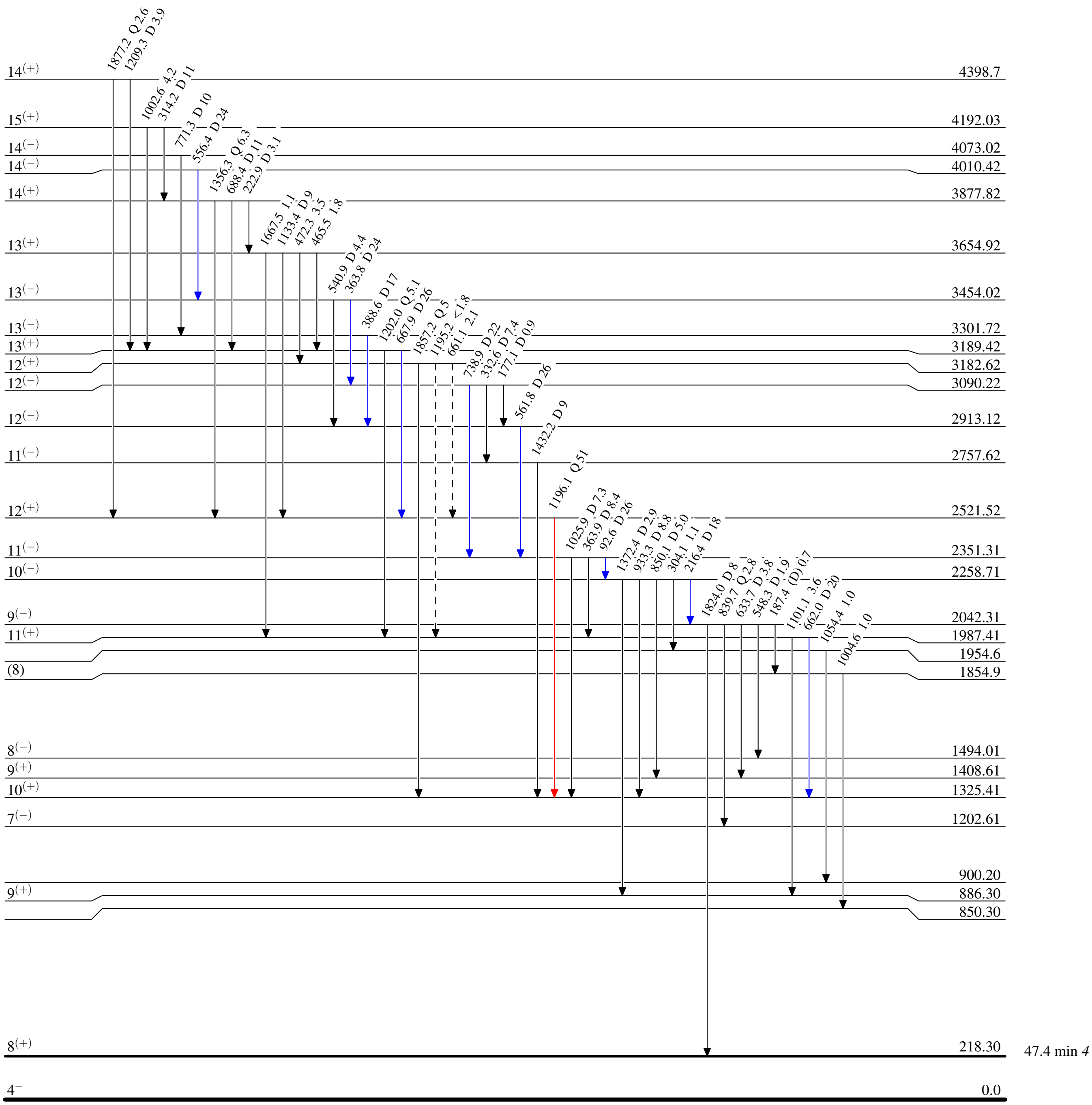
$^{52}Cr(^{37}Cl,2pn\gamma)$ 2009Ru03

Level Scheme (continued)

Intensities: Relative I_γ

Legend



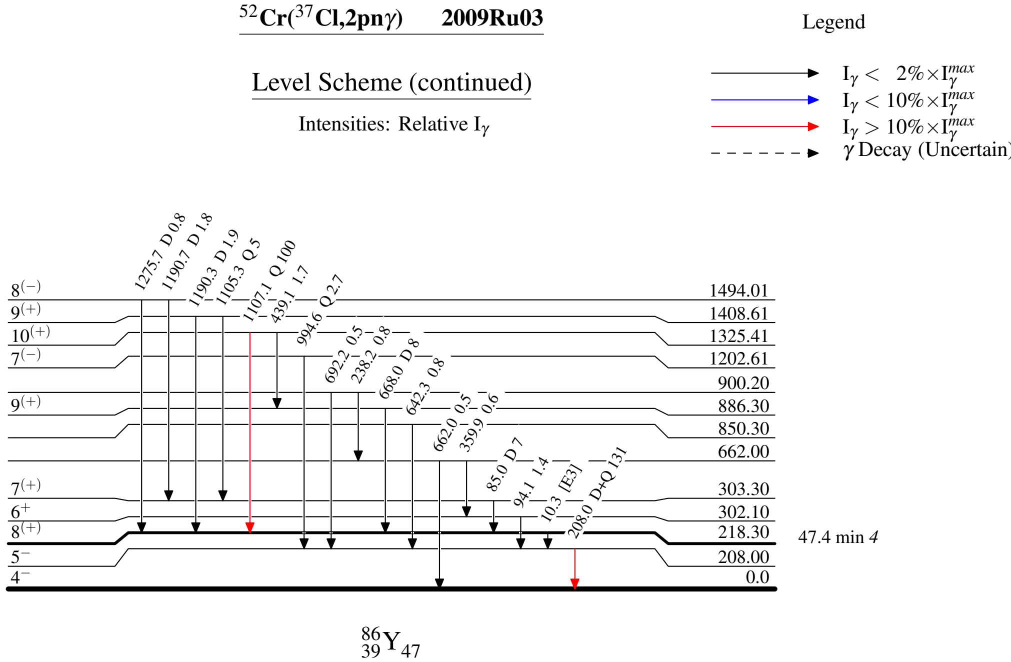


$^{86}_{39}Y_{47}$

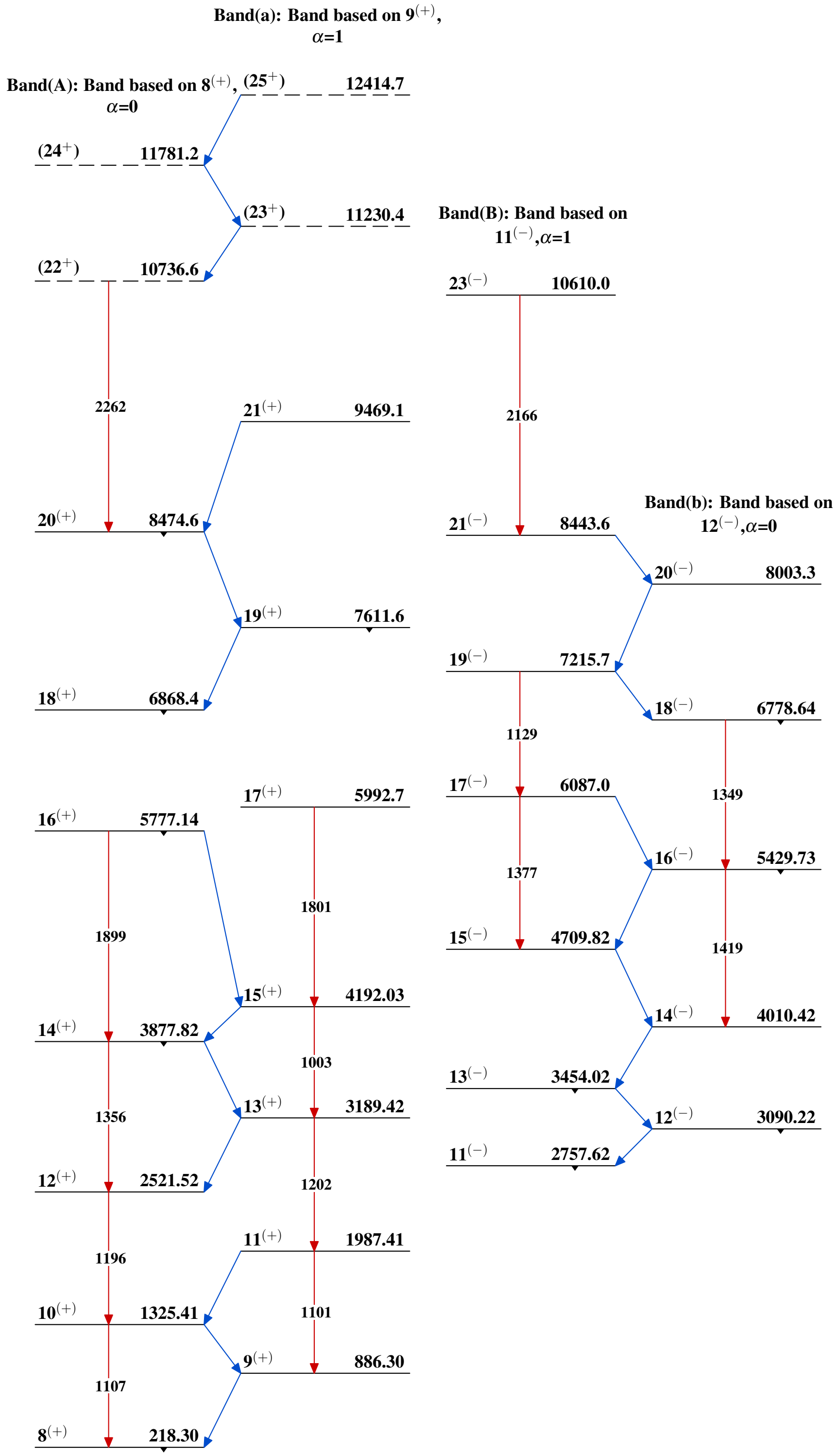
$^{52}Cr(^{37}Cl,2pn\gamma)$ 2009Ru03

Level Scheme (continued)

Intensities: Relative I_γ



$^{52}Cr(^{37}Cl,2pn\gamma)$ 2009Ru03



$^{86}_{39}Y_{47}$