^{248}Cm SF decay 2004Ur05

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jean Blachot	NDS 110, 1239 (2009)	1-Feb-2008

Parent: ^{248}Cm: E=0.0; J$^{\pi}$=0^{+}; $T_{1/2}$=3.48×10^{5} y *6*; %SF decay=?

2004Ur05: Measured Eγ, Iγ, γγ, γγ(θ), γγ(lin pol) with the EUROGAM2 array, consisting of 52 large Ge detectors in anti-Compton shields,including 24 four-crystal CLOVER detectors, which could act as Compton polarimeters. In addition, four LEPS detectors were used to measure X rays and low energy transitions (1997Ur02).

2003UrZZ was a preprint of 2004Ur05.

^{111}Ru Levels

E(level)‡	J$^{\pi}$	E(level)‡	J$^{\pi}$	E(level)‡	J$^{\pi}$	E(level)‡	J$^{\pi}$
0.0#	5/2+	581.5@ *5*	11/2+	1331.0& *10*	(15/2+)	2561.3@ *10*	(23/2+)
9.7a *7*	(1/2+)	669.0 *5*	(9/2−)	1431.8e *6*	(17/2−)	2653.9b *10*	(25/2−)
39.3& *7*	(3/2+)	695.6b *5*	13/2−	1456.6# *8*	17/2+	2676.0c *10*	27/2−
150.2@ *4*	7/2+	705.6d *5*	11/2−	1640.9a *10*	(17/2+)	2809.2& *12*	
185.3a *5*	(5/2+)	746.0& *8*	(11/2+)	1757.6d *6*	19/2−	2922.1# *10*	
254.0c *4*	7/2−	750.1c *6*	15/2−	1805.3@ *9*	19/2+	3178.6a *12*	
279.8 *5*	(5/2−)	851.2# *6*	13/2+	1888.4b *8*	21/2−	3345.1d *10*	
306.2& *7*	(7/2+)	856.4e *6*	(13/2−)	1915.3c *8*	23/2−	3391.3?†@ *11*	
316.8b *5*	9/2−	1022.9a *8*	(13/2+)	2029.4& *11*	(19/2+)	3497.9b *11*	
356.0# *4*	9/2+	1132.3d *5*	15/2−	2133.8e *8*		3522.0c *11*	
392.5c *5*	11/2−	1139.3@ *7*	15/2+	2152.1# *9*	(21/2+)		
489.4e *7*	(9/2−)	1227.4b *6*	17/2−	2367.6a *11*	(21/2+)		
531.3a *7*	(9/2+)	1264.4c *7*	19/2−	2505.1d *8*	(23/2−)		

† 3380 given in figure 2 of 2004Ur05 seems to be a misprint.
‡ From least-squares fit to Eγ's ; ΔEγ=0.5 keV assumed for each γ-ray.
# Band(A): g.s. band, α=+1/2.
@ Band(a): g.s. band, α=−1/2.
& Band(B): (1/2^{+}) band, α=−1/2. Assigned to ^{111}Ru based on the ratio of intensities of the 1180.0 keV line in ^{135}Te and the 1278.9 keV line in ^{134}Te, I_{γ}(1180.0)/I_{γ}(1278.9), as such a ratio is correlated with the mass of the gated Ru isotope.
a Band(b): (1/2^{+}) band, α=+1/2. See comment for the other signature partner of this band.
b Band(C): 7/2^{-} band, α=+1/2.
c Band(c): 7/2^{-} band, α=−1/2.
d Band(D): 11/2^{-} band.
e Band(E): γ-sequence based on (9/2^{-}).

γ(^{111}Ru)

R(pol)=[a$N_{perpendicular}$ − $N_{parallel}$] / Q[a$N_{perpendicular}$ + $N_{parallel}$], where Q is the polarization sensitivity and a=0.977.

Eγ	Iγ	E_i(level)	J_i^{π}	E_f	J_f^{π}	Mult.†‡	Comments
62.8	22 *1*	316.8	9/2−	254.0	7/2−	M1+E2	A_2=−0.08 *4*; A_4=−0.04 *4*; α(K)exp=2.7 *9*
75.7	56 *2*	392.5	11/2−	316.8	9/2−		A_2=−0.09 *2*; A_4=−0.08 *4*
103.8	85 *4*	254.0	7/2−	150.2	7/2+	(E1)	A_2=+0.10 *2*; A_4=+0.05 *3*; α(K)exp=0.2 *1* Mult.: ΔJ=0 transition. A multipolarity of M1 cannot be ruled out for this γ-ray. However, an M1 assignment to this transition, would

Continued on next page (footnotes at end of table)

^{248}Cm SF decay 2004Ur05 (continued)

γ(^{111}Ru) (continued)

E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Mult.[†‡]	Comments
							imply that the admixture of an E2 component would be rather small, considering the obtained α_K value. Also, the pure M1 transition of such an energy should usually be faster than the rate which was observed.
138.6	9.9 *6*	392.5	11/2⁻	254.0	7/2⁻	E2	A_2=+0.08 *2*; A_4=−0.06 *4* Mult.: An M2 multipolarity for this transition is ruled, as it imply a long half-life for this level.
146.0	3.1 *3*	185.3	(5/2⁺)	39.3	(3/2⁺)	M1+E2	A_2=−0.12 *3*; A_4=−0.09 *5*
150.2	100 *5*	150.2	7/2⁺	0.0	5/2⁺	M1+E2	A_2=−0.10 *2*; A_4=+0.03 *2*; α(K)exp=1.2 *3* Mult.: ΔJ=1 transition.
166.6	25 *1*	316.8	9/2⁻	150.2	7/2⁺	E1	A_2=−0.09 *2*; A_4=+0.00 *3* Mult.: ΔJ=1 transition.
172.6	3.0 *6*	489.4	(9/2⁻)	316.8	9/2⁻		
175.6	5.0 *3*	185.3	(5/2⁺)	9.7	(1/2⁺)		A_2=+0.09 *2*; A_4=−0.08 *4* Mult.: ΔJ=2 transition.
185.3	2.4 *3*	185.3	(5/2⁺)	0.0	5/2⁺	M1+E2	A_2=−0.06 *2*; A_4=+0.04 *3*
205.9	10.2 *6*	356.0	9/2⁺	150.2	7/2⁺		A_2=−0.12 *3*; A_4=+0.01 *5*
225.1	0.6 *2*	531.3	(9/2⁺)	306.2	(7/2⁺)		A_2=+0.01 *2*; A_4=−0.08 *5*
225.5	1.9 *4*	581.5	11/2⁺	356.0	9/2⁺		
254.0	3.7 *4*	254.0	7/2⁻	0.0	5/2⁺		Mult.: ΔJ=1 transition.
267.0	7.6 *4*	306.2	(7/2⁺)	39.3	(3/2⁺)		A_2=+0.09 *2*; A_4=−0.02 *3* Mult.: ΔJ=2 transition.
269.8[#]	0.9 *3*	851.2	13/2⁺	581.5	11/2⁺		
275.6	4.6 *3*	1132.3	15/2⁻	856.4	(13/2⁻)		
277[#]	0.3 *1*	1022.9	(13/2⁺)	746.0	(11/2⁺)		
279.8	2.7 *4*	279.8	(5/2⁻)	0.0	5/2⁺		
303.3	12.8 *5*	695.6	13/2⁻	392.5	11/2⁻		A_2=−0.12 *4*; A_4=+0.08 *6*
325.9	2.3 *4*	1757.6	19/2⁻	1431.8	(17/2⁻)		
346.0	7.2 *5*	531.3	(9/2⁺)	185.3	(5/2⁺)		A_2=+0.05 *1*; A_4=+0.01 *3*
356.0	19 *2*	356.0	9/2⁺	0.0	5/2⁺		A_2=+0.07 *2*; A_4=−0.04 *2*
357.8	62 *3*	750.1	15/2⁻	392.5	11/2⁻	E2	A_2=+0.09 *2*; A_4=+0.08 *4* POL=+0.14 *6*.
378.7	13.5 *6*	695.6	13/2⁻	316.8	9/2⁻		A_2=+0.08 *2*; A_4=+0.01 *3*
382.9	1.2 *4*	1132.3	15/2⁻	750.1	15/2⁻		
388.8	3.0 *7*	705.6	11/2⁻	316.8	9/2⁻		A_2=−0.13 *4*; A_4=−0.04 *6*
389.2	1.5 *5*	669.0	(9/2⁻)	279.8	(5/2⁻)		
415.0	1.6 *4*	669.0	(9/2⁻)	254.0	7/2⁻		
426.6	4.6 *5*	1132.3	15/2⁻	705.6	11/2⁻		A_2=+0.11 *3*; A_4=−0.07 *4*
431.3	10.0 *5*	581.5	11/2⁺	150.2	7/2⁺		A_2=+0.12 *3*; A_4=−0.05 *3*
436.6	5.3 *6*	1132.3	15/2⁻	695.6	13/2⁻		
439.8	5.4 *5*	746.0	(11/2⁺)	306.2	(7/2⁺)		A_2=+0.09 *2*; A_4=−0.02 *3*
451.6	4.3 *5*	705.6	11/2⁻	254.0	7/2⁻		A_2=−0.08 *3*; A_4=+0.05 *3*
463.8	10.5 *6*	856.4	(13/2⁻)	392.5	11/2⁻		A_2=−0.02 *1*; A_4=−0.06 *3*
477.0	6.5 *6*	1227.4	17/2⁻	750.1	15/2⁻		
491.5	7.0 *4*	1022.9	(13/2⁺)	531.3	(9/2⁺)		A_2=+0.05 *1*; A_4=+0.01 *3*
493.0[#]	0.8 *4*	1757.6	19/2⁻	1264.4	19/2⁻		
495.1	8.7 *6*	851.2	13/2⁺	356.0	9/2⁺		A_2=+0.07 *2*; A_4=−0.04 *2*
514.1	52 *4*	1264.4	19/2⁻	750.1	15/2⁻		A_2=+0.09 *2*; A_4=+0.08 *4* POL=+0.09 *3*.
532.0	12.6 *8*	1227.4	17/2⁻	695.6	13/2⁻		A_2=+0.08 *2*; A_4=+0.01 *3*
557.8	7.2 *5*	1139.3	15/2⁺	581.5	11/2⁺		A_2=+0.12 *3*; A_4=−0.05 *3*
575.7	1.8 *3*	1431.8	(17/2⁻)	856.4	(13/2⁻)		
585.0	3.8 *3*	1331.0	(15/2⁺)	746.0	(11/2⁺)		A_2=+0.08 *2*; A_4=−0.03 *2*
605.4	5.9 *7*	1456.6	17/2⁺	851.2	13/2⁺		A_2=+0.14 *5*; A_4=−0.08 *7*
618.0	5.7 *6*	1640.9	(17/2⁺)	1022.9	(13/2⁺)		A_2=+0.4 *1*; A_4=−0.04 *3*

Continued on next page (footnotes at end of table)

^{248}Cm SF decay 2004Ur05 (continued)

$\gamma(^{111}Ru)$ (continued)

E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f	Comments
625.3	14 *2*	1757.6	19/2$^-$	1132.3	15/2$^-$	A_2=+0.09 *3*; A_4=+0.07 *4*
650.9	33 *3*	1915.3	23/2$^-$	1264.4	19/2$^-$	A_2=+0.11 *3*; A_4=−0.05 *3* POL=+0.07 *3*.
661.0	8.0 *7*	1888.4	21/2$^-$	1227.4	17/2$^-$	
666.0	4.2 *5*	1805.3	19/2$^+$	1139.3	15/2$^+$	A_2=+0.12 *3*; A_4=−0.04 *5*
681.6	3.5 *6*	1431.8	(17/2$^-$)	750.1	15/2$^-$	A_2=−0.10 *3*; A_4=−0.12 *7*
695.5	3.0 *6*	2152.1	(21/2$^+$)	1456.6	17/2$^+$	
698.4	1.8 *3*	2029.4	(19/2$^+$)	1331.0	(15/2$^+$)	A_2=+0.08 *2*; A_4=−0.03 *3*
702[#]	1.2 *5*	2133.8		1431.8	(17/2$^-$)	
726.7	2.9 *7*	2367.6	(21/2$^+$)	1640.9	(17/2$^+$)	
747.5	7.0 *6*	2505.1	(23/2$^-$)	1757.6	19/2$^-$	
756.0	2.6 *5*	2561.3	(23/2$^+$)	1805.3	19/2$^+$	
760.7	23 *2*	2676.0	27/2$^-$	1915.3	23/2$^-$	A_2=+0.11 *3*; A_4=+0.03 *2*
765.5	6.4 *9*	2653.9	(25/2$^-$)	1888.4	21/2$^-$	
770.0	2.4 *5*	2922.1		2152.1	(21/2$^+$)	
779.8	1.5 *3*	2809.2		2029.4	(19/2$^+$)	
811[#]	0.9 *4*	3178.6		2367.6	(21/2$^+$)	
830[#]	1.8 *6*	3391.3?		2561.3	(23/2$^+$)	
840[#]	5.0 *7*	3345.1		2505.1	(23/2$^-$)	
844.0	3.4 *7*	3497.9		2653.9	(25/2$^-$)	
846.0	16 *2*	3522.0		2676.0	27/2$^-$	

† For stretched transitions, A_2=0.10 and A_4=0.01 for a ΔJ=2−ΔJ=2 cascade; A_2=−0.07 and A_4=0 for a ΔJ=2−ΔJ=1 cascade; and A_2=0.05 and A_4=0 for a ΔJ=1−ΔJ=1 cascade (a_0=1). All stretched ΔJ=2 transitions with energies lower than 750 keV are assigned E2 multipolarity based on the observation of no half-lives longer than 10 ns for any of the ΔJ=2 transitions.

‡ Clover detectors were used to extract linear polarization from direction-polarization correlations where linear polarization was induced by observing a reference γ-ray. Please refer to table 1 of 2004Ur05 for specific reference γ-rays used.

Placement of transition in the level scheme is uncertain.

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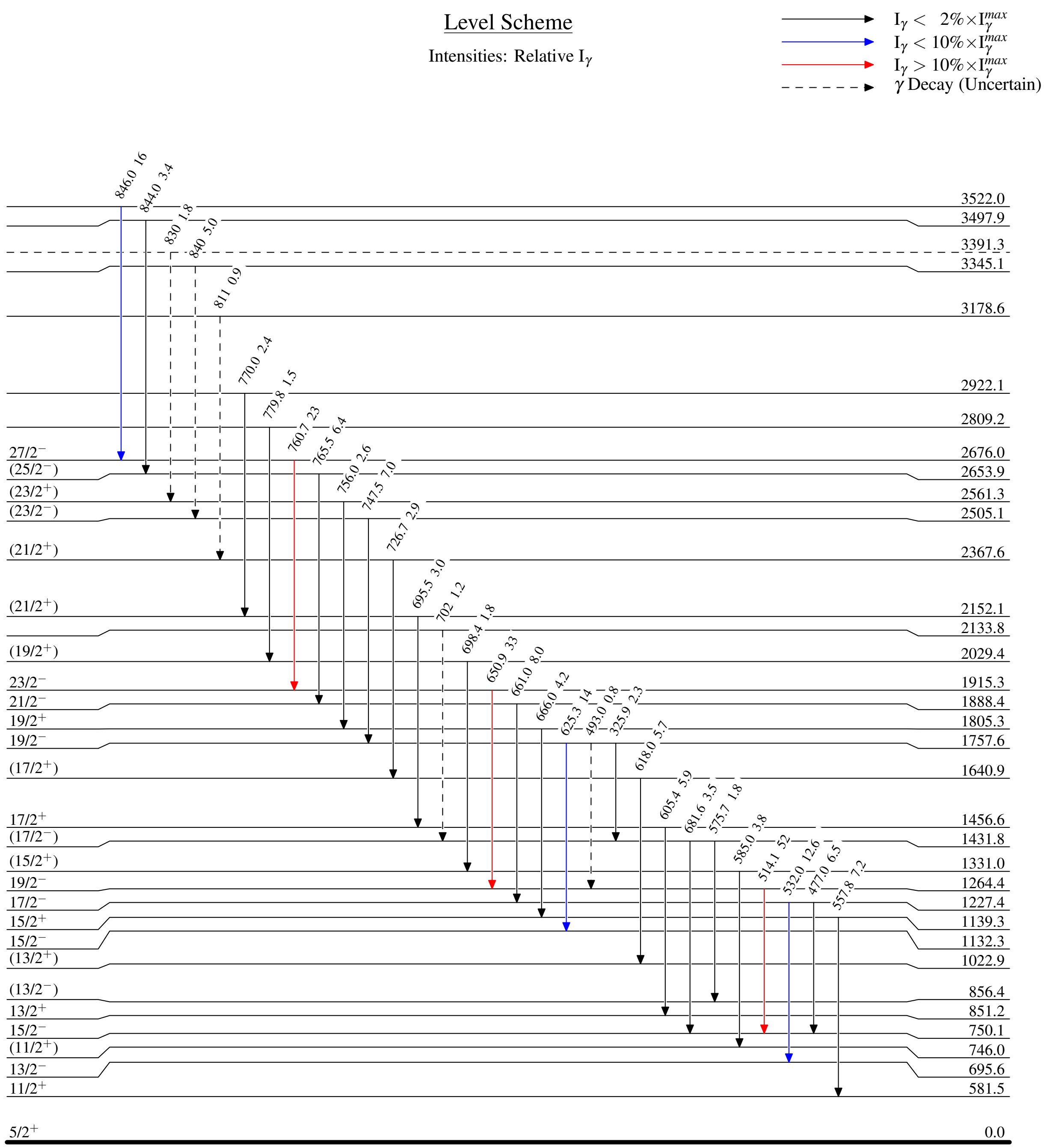
Level Scheme

Intensities: Relative I_γ



$^{111}_{44}Ru_{67}$

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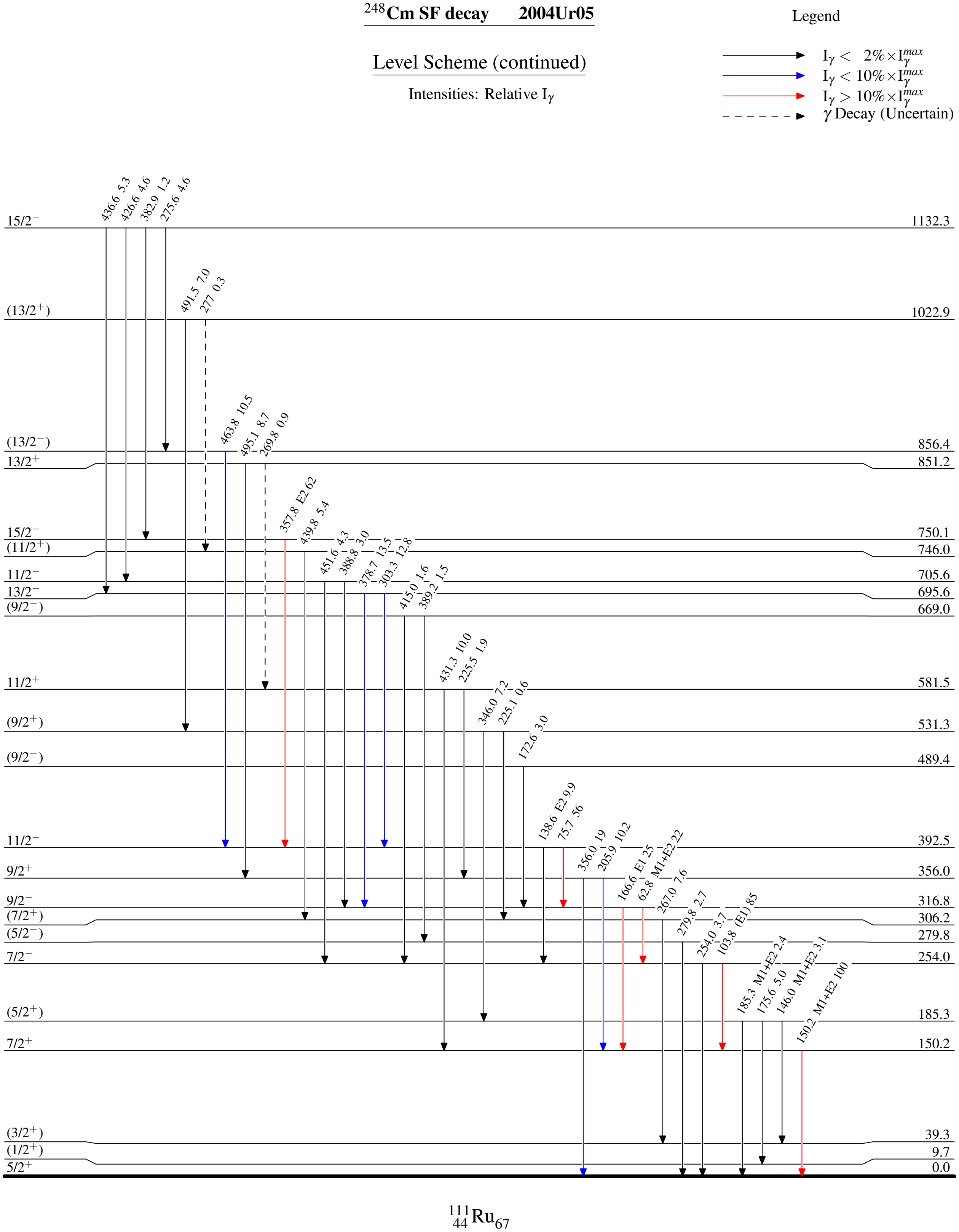
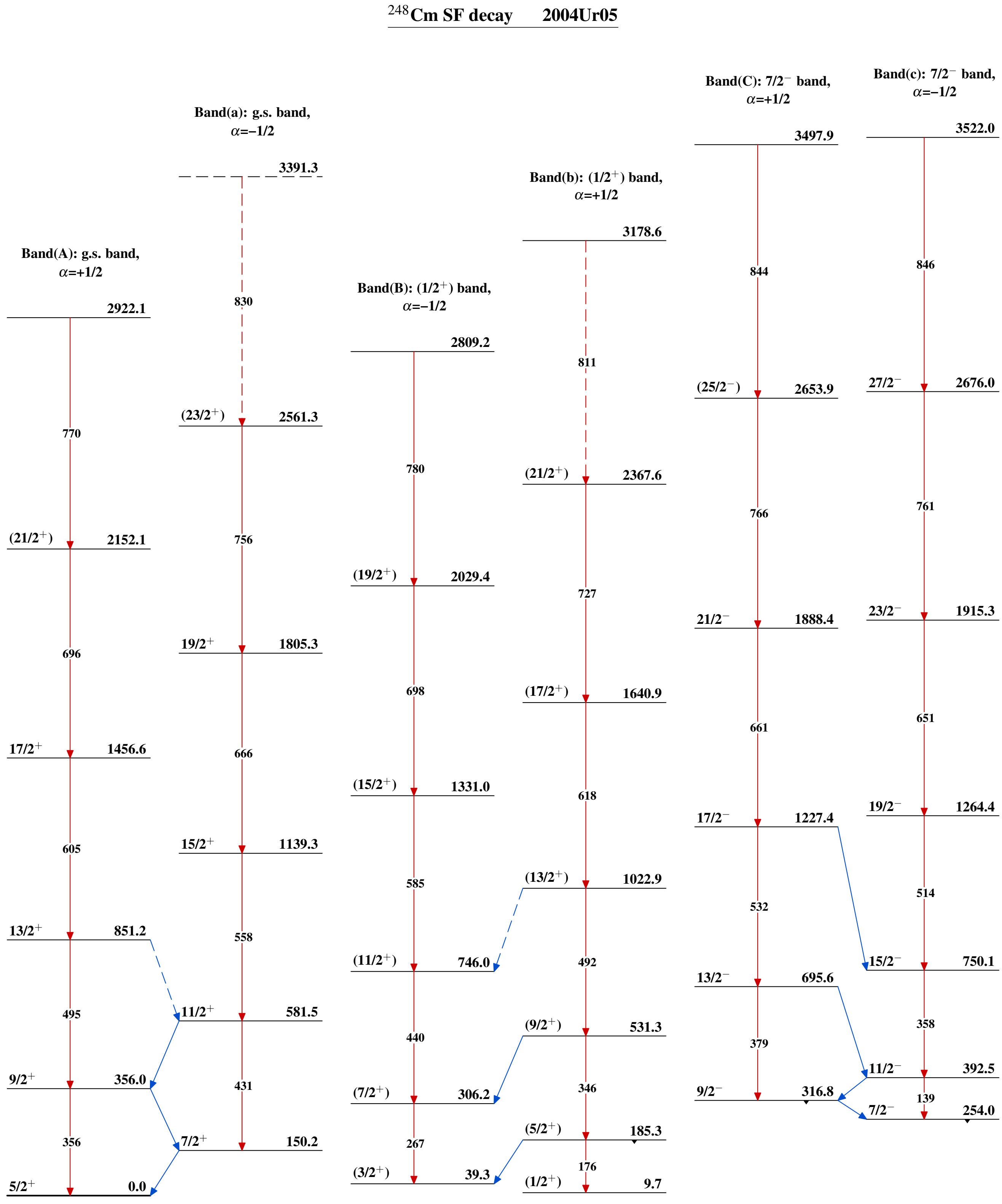
Level Scheme (continued)

Intensities: Relative I_γ





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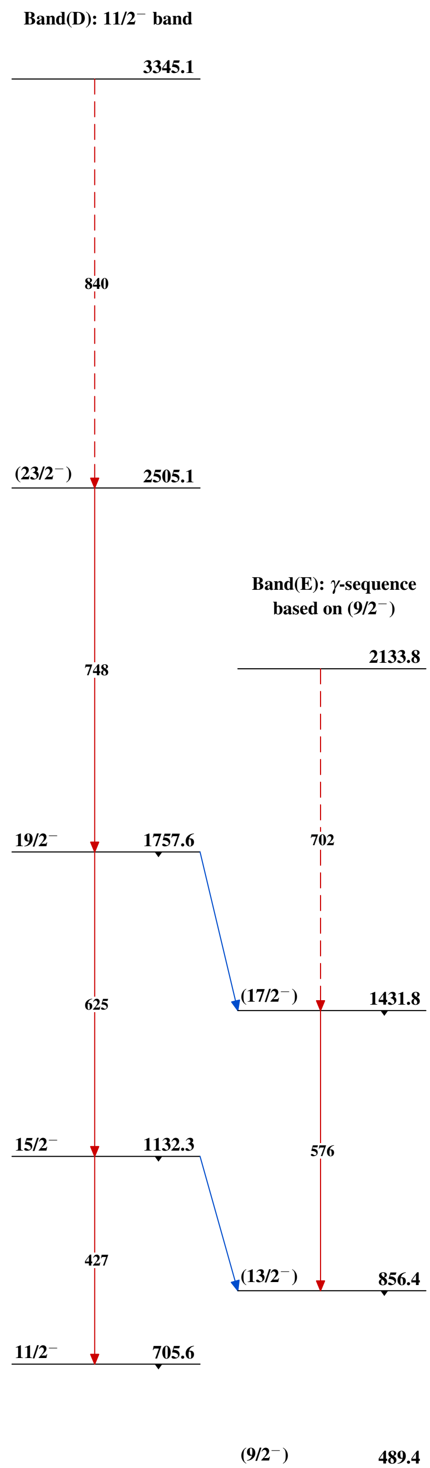
Band(A): g.s. band, α=+1/2
Band(a): g.s. band, α=−1/2
Band(B): (1/2+) band, α=−1/2
Band(b): (1/2+) band, α=+1/2
Band(C): 7/2− band, α=+1/2
Band(c): 7/2− band, α=−1/2
2922.1
770
(21/2+) 2152.1
696
17/2+ 1456.6
605
13/2+ 851.2
495
9/2+ 356.0
356
5/2+ 0.0
3391.3
830
(23/2+) 2561.3
756
19/2+ 1805.3
666
15/2+ 1139.3
558
11/2+ 581.5
431
7/2+ 150.2
2809.2
780
(19/2+) 2029.4
698
(15/2+) 1331.0
585
(11/2+) 746.0
440
(7/2+) 306.2
267
(3/2+) 39.3
3178.6
811
(21/2+) 2367.6
727
(17/2+) 1640.9
618
(13/2+) 1022.9
492
(9/2+) 531.3
346
(5/2+) 185.3
176
(1/2+) 9.7
3497.9
844
(25/2−) 2653.9
766
21/2− 1888.4
661
17/2− 1227.4
532
13/2− 695.6
379
9/2− 316.8
3522.0
846
27/2− 2676.0
761
23/2− 1915.3
651
19/2− 1264.4
514
15/2− 750.1
358
11/2− 392.5
139
7/2− 254.0

$^{111}_{44}Ru_{67}$

^{248}Cm SF decay 2004Ur05 (continued)



$^{111}_{44}Ru_{67}$