^{248}Cm SF decay 1997Ur01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov, A. Rodionov and G. Shulyak	NDS 136, 163 (2016)	14-Jul-2016

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

1997Ur01: ^{248}Cm SF decay; measured Eγ, Iγ, $\gamma\gamma\gamma(\theta)$ coin, linear pol., DCO ratios. ^{146}Ba; assigned by coincidence with Zr partner, deduced levels, J^{π}, band structure, B(E1)/B(E2). EUROGAM2 array (52 Ge detectors in anti-Compton shields including 24 four-crystal detectors (CLOVERS) served as polarimeters also, four LEPS).

Population probability of ^{146}Ba in ^{248}Cm SF decay is estimated as 10^{-1} (independent), 1997Ur01.

Other: 1999SmZX.

^{146}Ba Levels

B(E1)/B(E2) ratios see in fig. 9 of 1997Ur01.

Assignment spins and parities to levels of the bands with bandheads of the 1974.4, 2029.5 and 2097.1 keV based on the observed branching ratios and decay pattern in 1997Ur01. Evaluators found these level structures as having not enough strong arguments for the treatment as bands.

E(level)[†]	J$^{\pi}$[‡]
0.0[#]	0^{+}
181.10[#] *10*	2^{+}
513.76[#] *13*	4^{+}
821.24[@] *13*	3^{-}
958.44[#] *15*	6^{+}
1024.66[@] *14*	5^{-}
1349.25[@] *16*	7^{-}
1482.65[#] *17*	8^{+}
1777.74[@] *18*	9^{-}
1874.78[&] *19*	6^{-}
1944.80[a] *21*	7^{-}
1974.4[b] *4*	
2029.49[d] *24*	(8^{+})
2052.05[#] *19*	10^{+}
2090.53[&] *19*	8^{-}
2096.93[c] *23*	(7^{-})
2191.31[a] *20*	9^{-}
2213.15[b] *25*	(8,9^{-})
2292.79[@] *25*	11^{-}
2349.98[c] *22*	(9^{-})
2389.32[&] *25*	(10^{-})
2443.07[d] *22*	(10^{+})
2516.17[a] *21*	11^{-}
2530.1[b] *3*	(10,11^{-})
2632.4[#] *3*	12^{+}
2710.3[c] *3*	
2790.8[&] *4*	(12^{-})
2876.6[@] *3*	13^{-}
2938.8[a] *3*	13^{-}
2953.6[b] *5*	

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^{248}Cm SF decay 1997Ur01 (continued)

^{146}Ba Levels (continued)

E(level)[†]	J^{π}[‡]	Comments
3192.7[#] *4*	14$^+$	
3297.9[&] *5*	(14$^-$)	
3452.6[a] *4*	(15$^-$)	
3524.1? *4*		Existence of this level requires confirmation (1997Ur01).
3737.1[#] *4*	(16$^+$)	
4072.1[a] *5*	(17$^-$)	

[†] From a least-squares fit to Eγ's; normalized χ^2=0.45.
[‡] From double and triple angular correlations and direction-polarization correlations of γ's (1997Ur01).
[#] Band(A): g.s. band.
[@] Band(B): octupole band.
[&] Band(C): band based on 1874.8 keV, 6$^-$ state.
[a] Band(D): band based on 1944.8 keV, 7$^-$ state.
[b] Band(E): band based on 1974.4 keV state.
[c] Band(F): band based on 2096.9 keV, (7$^-$) state.
[d] Band(G): band based on 2029.5 keV, (8$^+$) state.

γ(^{146}Ba)

DCO for γγ, except where indicated.

E_γ[†]	I_γ[†]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	α[#]	Comments
145.6 *3*	0.6 *2*	2090.53	8$^-$	1944.80	7$^-$			
181.1 *1*	100 *5*	181.10	2$^+$	0.0	0$^+$			
198.2 *3*	0.6 *3*	2389.32	(10$^-$)	2191.31	9$^-$			
203.4 *1*	21 *2*	1024.66	5$^-$	821.24	3$^-$			
215.7 *2*	3 *1*	2090.53	8$^-$	1874.78	6$^-$			
246.5 *2*	2.5 *5*	2191.31	9$^-$	1944.80	7$^-$			
252.9 *3*	≤0.3	2349.98	(9$^-$)	2096.93	(7$^-$)			E_γ: the transition is noted in level scheme of 1997Ur01 as doubtful.
274.5 *3*	0.2 *1*	2052.05	10$^+$	1777.74	9$^-$			
295.1 *3*	0.4 *2*	1777.74	9$^-$	1482.65	8$^+$			
298.7 *2*	6 *1*	2389.32	(10$^-$)	2090.53	8$^-$			
307.5 *1*	15 *1*	821.24	3$^-$	513.76	4$^+$	E1	0.01070	α(K)=0.00922 *13*; α(L)=0.001180 *17*; α(M)=0.000242 *4* α(N)=5.18×10^{-5} *8*; α(O)=7.83×10^{-6} *11*; α(P)=5.38×10^{-7} *8* DCO=1.12 *3*; DCO=1.16 *5* from γγγ; pol=0.06 *3*.
316.7 *3*	0.8 *4*	2530.1	(10,11$^-$)	2213.15	(8,9$^-$)			
324.6 *1*	26 *2*	1349.25	7$^-$	1024.66	5$^-$			
324.8 *2*	6 *2*	2516.17	11$^-$	2191.31	9$^-$			
332.7 *1*	102 *5*	513.76	4$^+$	181.10	2$^+$	E2	0.0326	α(K)=0.0268 *4*; α(L)=0.00464 *7*; α(M)=0.000977 *14* α(N)=0.000207 *3*; α(O)=3.00×10^{-5} *5*; α(P)=1.541×10^{-6} *22* DCO=0.92 *1*; pol=0.09 *2*.
360.3 *2*	1.0 *4*	2710.3		2349.98	(9$^-$)			

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^{248}Cm SF decay 1997Ur01 (continued)

γ(^{146}Ba) (continued)

Eγ†	Iγ†	Ei(level)	J_i^π	E_f	J_f^π	Mult.‡	α#	Comments
390.9 2	2.0 4	1349.25	7⁻	958.44	6⁺	D		DCO=1.32 13.
401.5 2	4.1 8	2790.8	(12⁻)	2389.32	(10⁻)			
413.8 3	0.8 3	2443.07	(10⁺)	2029.49	(8⁺)			
422.8 3	2.2 5	2938.8	13⁻	2516.17	11⁻			
423.5 3	0.4 2	2953.6		2530.1	(10,11⁻)			
428.5 1	19 1	1777.74	9⁻	1349.25	7⁻			
444.7 1	52 3	958.44	6⁺	513.76	4⁺	E2	0.01370	α(K)=0.01145 16; α(L)=0.00179 3; α(M)=0.000373 6 α(N)=7.95×10^{-5} 12; α(O)=1.171×10^{-5} 17; α(P)=6.81×10^{-7} 10 DCO=0.93 1; DCO=0.99 2 from γγγ; pol=0.10 2.
464.2 2	1.2 3	2516.17	11⁻	2052.05	10⁺			
507.1 3	0.5 2	3297.9	(14⁻)	2790.8	(12⁻)			
510.9 1	19 1	1024.66	5⁻	513.76	4⁺	E1	0.00310	α(K)=0.00268 4; α(L)=0.000336 5; α(M)=6.88×10^{-5} 10 α(N)=1.479×10^{-5} 21; α(O)=2.25×10^{-6} 4; α(P)=1.604×10^{-7} 23 DCO=1.16 7; pol=0.13 3.
513.8 2	1.5 5	3452.6	(15⁻)	2938.8	13⁻			
515.0 2	8 1	2292.79	11⁻	1777.74	9⁻			
524.2 1	31 2	1482.65	8⁺	958.44	6⁺	E2	0.00866	α(K)=0.00729 11; α(L)=0.001084 16; α(M)=0.000226 4 α(N)=4.82×10^{-5} 7; α(O)=7.16×10^{-6} 10; α(P)=4.40×10^{-7} 7 DCO=0.96 1; DCO=1.01 3 from γγγ; pol=0.04 2.
544.4 2	1.6 4	3737.1	(16⁺)	3192.7	14⁺	(E2)	0.00782	α(K)=0.00660 10; α(L)=0.000971 14; α(M)=0.000202 3 α(N)=4.32×10^{-5} 6; α(O)=6.42×10^{-6} 9; α(P)=3.99×10^{-7} 6 DCO=0.95 12 from γγγ.
560.3 2	4 1	3192.7	14⁺	2632.4	12⁺	E2	0.00724	α(K)=0.00612 9; α(L)=0.000894 13; α(M)=0.000186 3 α(N)=3.97×10^{-5} 6; α(O)=5.92×10^{-6} 9; α(P)=3.71×10^{-7} 6 DCO=0.93 6 from γγγ; pol=0.15 8.
569.4 1	14 1	2052.05	10⁺	1482.65	8⁺	E2	0.00694	α(K)=0.00587 9; α(L)=0.000854 12; α(M)=0.0001773 25 α(N)=3.79×10^{-5} 6; α(O)=5.66×10^{-6} 8; α(P)=3.56×10^{-7} 5 DCO=1.03 4 from γγγ; pol=0.15 5.
575.8 3	0.5 3	3452.6	(15⁻)	2876.6	13⁻			
580.3 2	7 1	2632.4	12⁺	2052.05	10⁺	E2	0.00660	α(K)=0.00559 8; α(L)=0.000809 12; α(M)=0.0001679 24 α(N)=3.59×10^{-5} 5; α(O)=5.37×10^{-6} 8; α(P)=3.40×10^{-7} 5 DCO=0.97 5 from γγγ; pol=0.14 5.
583.7 2	4 2	2876.6	13⁻	2292.79	11⁻			
607.9 2	3.0 5	2090.53	8⁻	1482.65	8⁺	E1	0.00210	α(K)=0.00181 3; α(L)=0.000226 4; α(M)=4.63×10^{-5} 7 α(N)=9.96×10^{-6} 14; α(O)=1.520×10^{-6} 22; α(P)=1.094×10^{-7} 16 DCO=0.94 8 from γγγ; pol=−0.4 2, ΔJ=0.
619.5 3	0.6 3	4072.1	(17⁻)	3452.6	(15⁻)			

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^{248}Cm SF decay 1997Ur01 (continued)

$\gamma(^{146}Ba)$ (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	α#	Comments
640.1 *1*	12 *1*	821.24	3⁻	181.10	2⁺	E1	0.00188	α(K)=0.001621 *23*; α(L)=0.000202 *3*; α(M)=4.13×10⁻⁵ *6* α(N)=8.89×10⁻⁶ *13*; α(O)=1.357×10⁻⁶ *19*; α(P)=9.79×10⁻⁸ *14* DCO=1.12 *3*; pol=0.07 *6*.
646.1 *3*	1.6 *4*	2938.8	13⁻	2292.79	11⁻			
647.5 *2*	1.0 *3*	3524.1?		2876.6	13⁻			
665.2 *2*	1.8 *4*	2443.07	(10⁺)	1777.74	9⁻			
680.3 *3*	0.7 *3*	2029.49	(8⁺)	1349.25	7⁻			
708.7 *2*	6 *1*	2191.31	9⁻	1482.65	8⁺	E1	1.51×10⁻³	α(K)=0.001307 *19*; α(L)=0.0001622 *23*; α(M)=3.32×10⁻⁵ *5* α(N)=7.14×10⁻⁶ *10*; α(O)=1.091×10⁻⁶ *16*; α(P)=7.91×10⁻⁸ *11* DCO=1.11 *2*; DCO=1.10 *7* from γγγ; pol=0.21 *27*. In table 1 of 1997Ur01 this γ is placed as going from 1944.9 keV level; it is obviously a misprint.
730.0 *3*	0.8 *3*	2213.15	(8,9⁻)	1482.65	8⁺			
738.5 *3*	0.8 *3*	2516.17	11⁻	1777.74	9⁻			
741.3 *3*	0.4 *2*	2090.53	8⁻	1349.25	7⁻			E_γ: the value 714.3 in table 1 and in fig. 7 of 1997Ur01 is a misprint.
752.7 *3*	0.7 *3*	2530.1	(10,11⁻)	1777.74	9⁻			
842.0 *3*	0.7 *2*	2191.31	9⁻	1349.25	7⁻			In table 1 of 1997Ur01 this γ is placed as going from 1944.9 level; it is obviously a misprint.
850.1 *2*	1.4 *3*	1874.78	6⁻	1024.66	5⁻			
864.1 *3*	0.8 *2*	2213.15	(8,9⁻)	1349.25	7⁻			
867.4 *2*	1.3 *4*	2349.98	(9⁻)	1482.65	8⁺			
916.3 *2*	2.6 *5*	1874.78	6⁻	958.44	6⁺	E1	9.00×10⁻⁴	α(K)=0.000780 *11*; α(L)=9.59×10⁻⁵ *14*; α(M)=1.96×10⁻⁵ *3* α(N)=4.22×10⁻⁶ *6*; α(O)=6.47×10⁻⁷ *9*; α(P)=4.75×10⁻⁸ *7* DCO=0.92 *4*; pol=−0.9 *4*, ΔJ=0.
960.5 *3*	0.5 *2*	2443.07	(10⁺)	1482.65	8⁺			
986.3 *2*	2.5 *5*	1944.80	7⁻	958.44	6⁺	E1	7.82×10⁻⁴	α(K)=0.000677 *10*; α(L)=8.31×10⁻⁵ *12*; α(M)=1.698×10⁻⁵ *24* α(N)=3.66×10⁻⁶ *6*; α(O)=5.61×10⁻⁷ *8*; α(P)=4.13×10⁻⁸ *6* DCO=1.16 *4*; pol=0.27 *13*.
1000.7 *3*	0.3 *1*	2349.98	(9⁻)	1349.25	7⁻			
1016.0 *3*	0.4 *2*	1974.4		958.44	6⁺			
1071.2 *3*	0.6 *2*	2029.49	(8⁺)	958.44	6⁺			
1072.0 *3*	0.4 *2*	2096.93	(7⁻)	1024.66	5⁻			
1138.6 *3*	0.5 *2*	2096.93	(7⁻)	958.44	6⁺			

† From 1997Ur01. ΔEγ=0.1 for transitions of Iγ≥10, ΔEγ=0.2 for transitions of 10>I≥1, ΔEγ≥0.3 for transitions of Iγ≤1.

‡ From DCO values and direction-polarization correlations: from γγγ coin DCO=1 for stretched Q transition, DCO=1.20 for stretched unmixed D transition; for non-stretched unmixed D transition in a 4→4→2→0 cascade DCO=0.91 and for stretched unmixed D transition in a 5→4→4→0 cascade DCO=1.28. From γγ coin DCO=0.89 for stretched Q transition, DCO=1.09 for stretched unmixed D transition; for non-stretched unmixed D transition DCO=0.81 for a 6→6→4 cascade and DCO=0.82 for 8→8→6 cascade; and for stretched unmixed D transition DCO=1.19 in a 3→4→3 cascade. Theoretical values of pol. P_{th}: for a stretched Q transition P_{th}=±0.14, for a stretched unmixed D transition P_{th}=±0.09, for a ΔJ=0 unmixed D transition P_{th}=∓0.25 in

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^{248}Cm SF decay 1997Ur01 (continued)

γ(^{146}Ba) (continued)

a 6→6→4 cascade and P_{th}=∓0.23 in a 8→8→6 cascade (upper (lower) sign applies for an electric (magnetic) transitions) (1997Ur01). The evaluators are of opinion that Q multipolarities are E2 for stretched transitions.

Additional information 1.

^{248}Cm SF decay 1997Ur01

Level Scheme

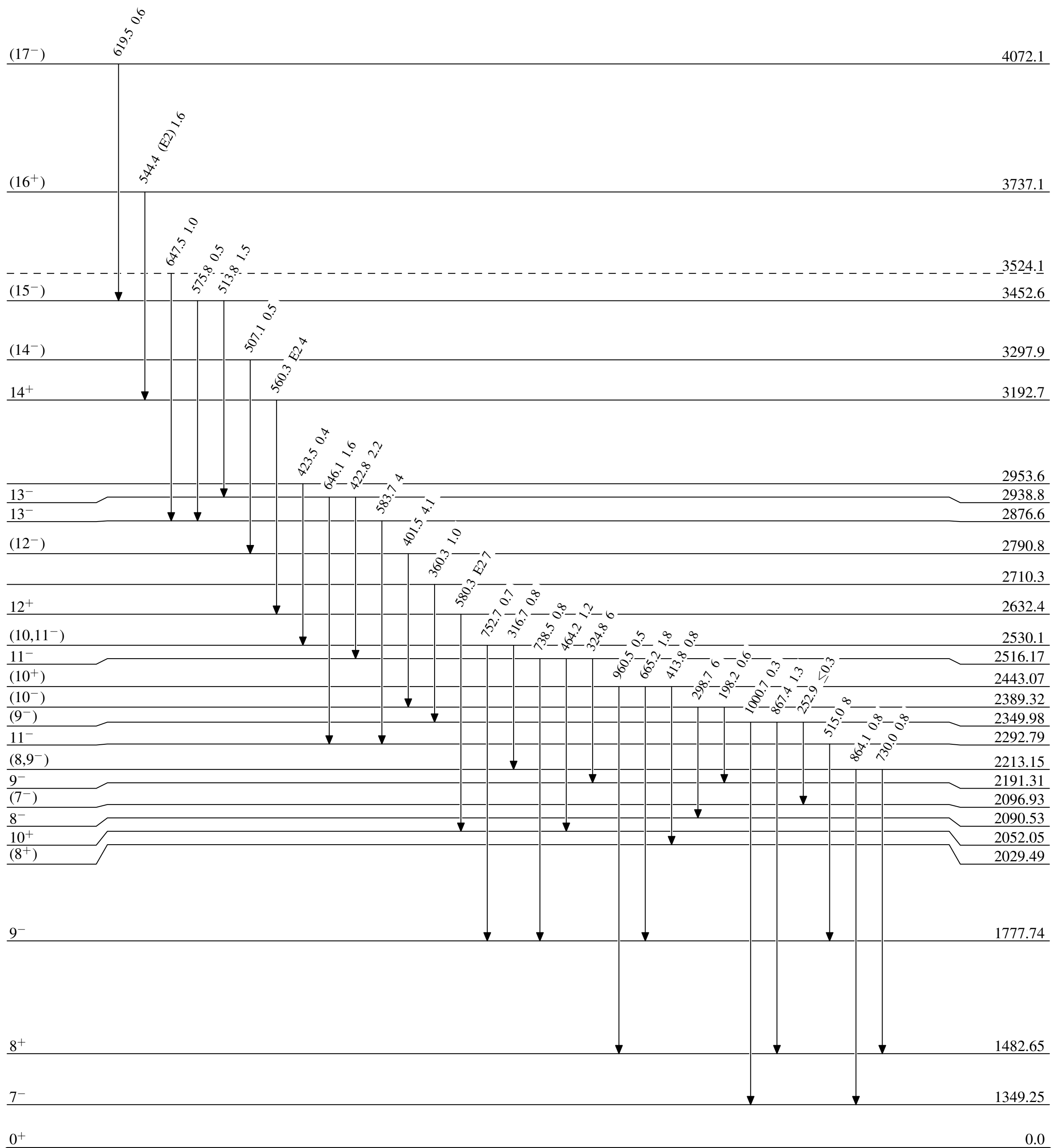
Intensities: Relative I_γ

Legend

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

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

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

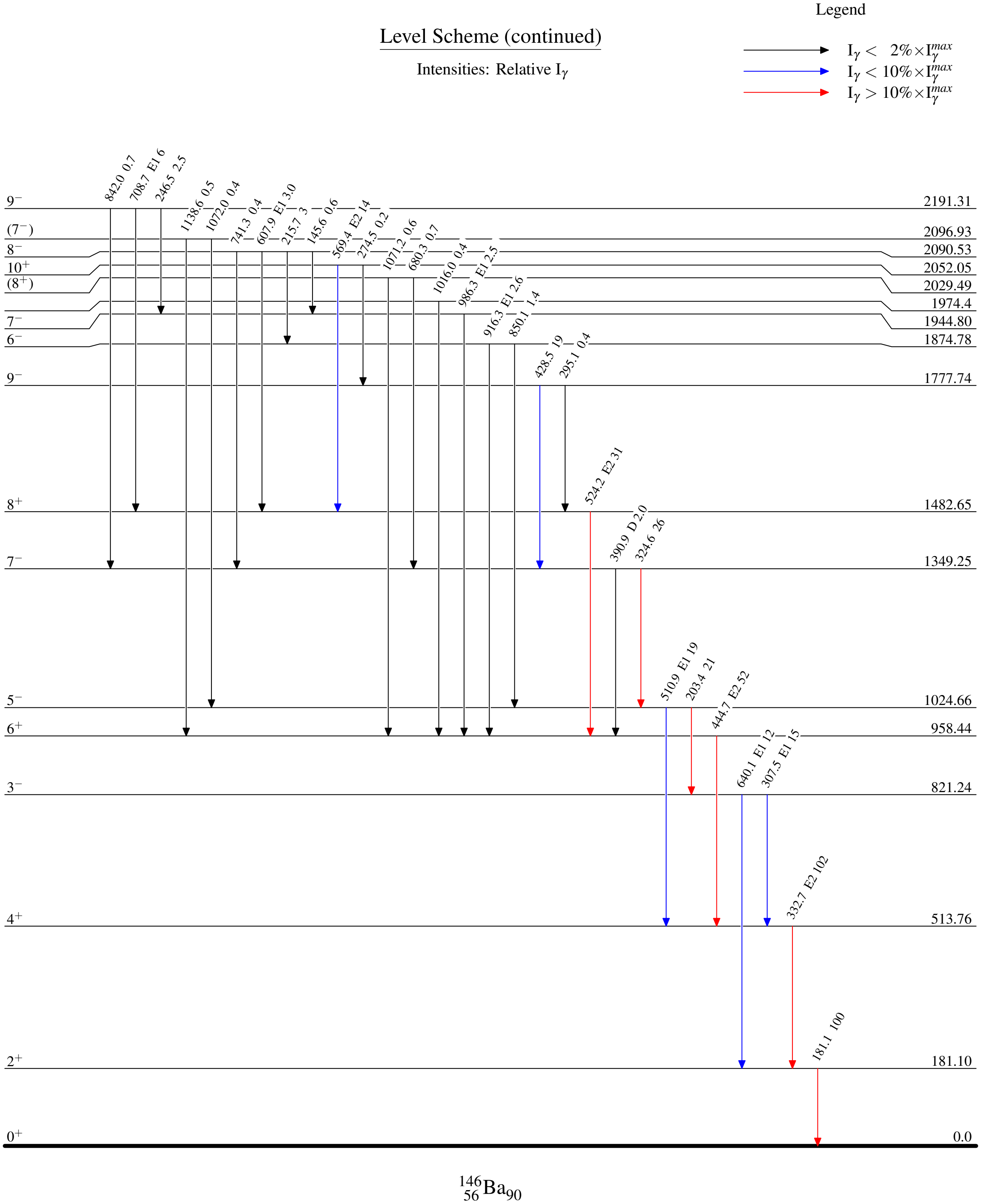


$^{146}_{56}Ba_{90}$

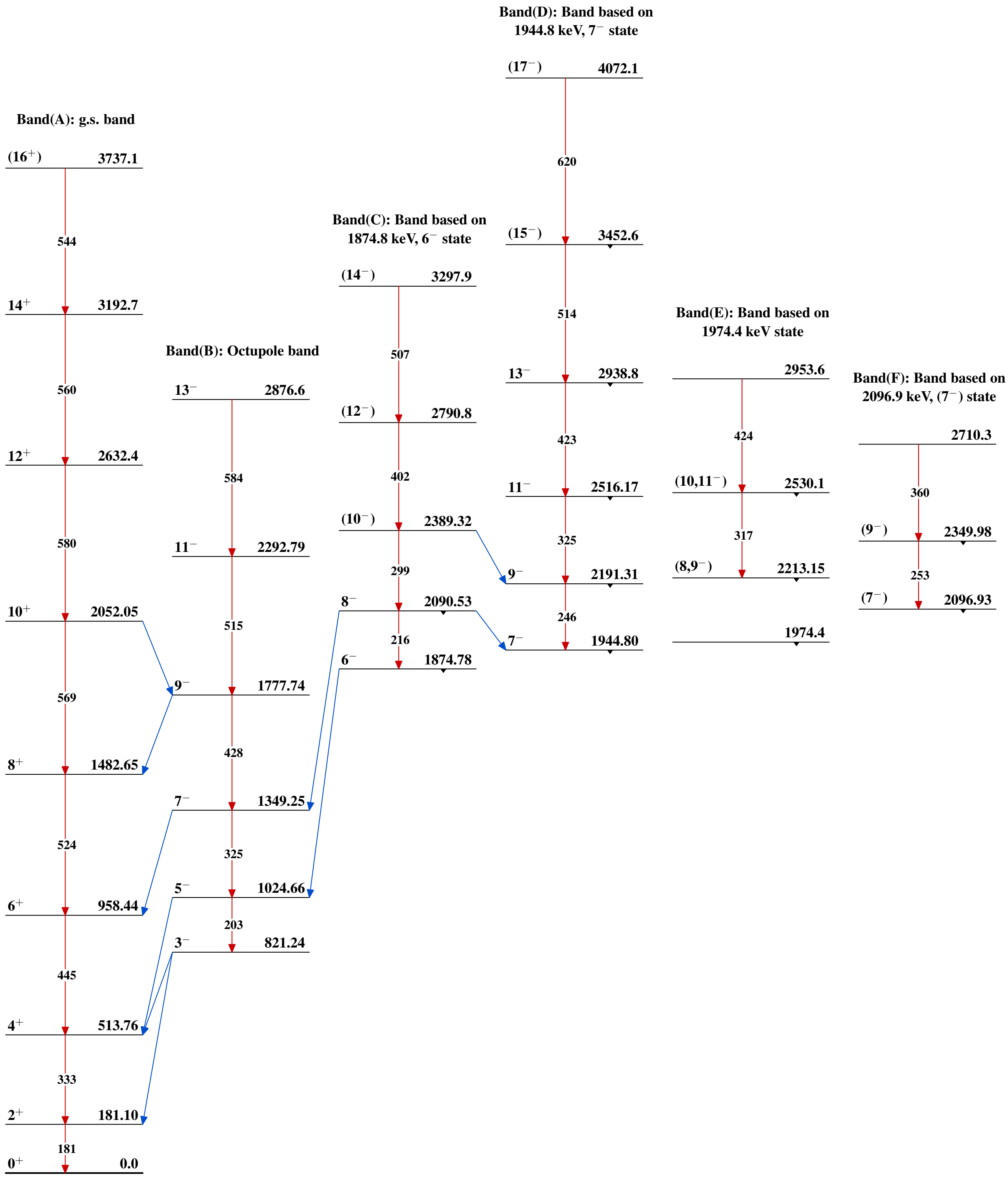
^{248}Cm SF decay 1997Ur01

Level Scheme (continued)

Intensities: Relative I_γ

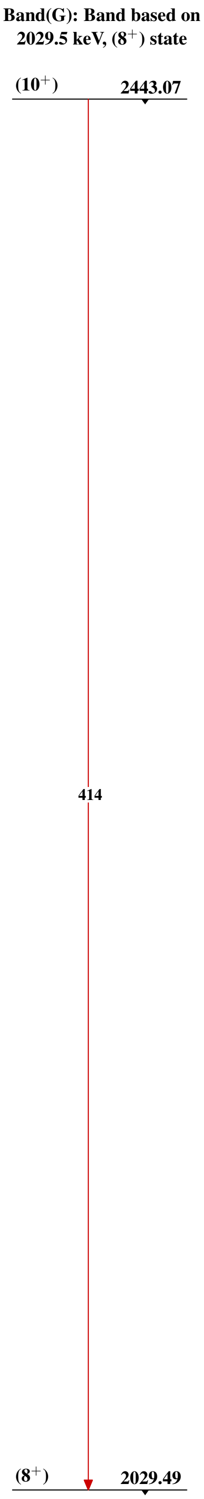


^{248}Cm SF decay 1997Ur01



$^{146}_{56}Ba_{90}$

^{248}Cm SF decay 1997Ur01 (continued)



$^{146}_{56}Ba_{90}$