^{226}Ra(n,γ) E=thermal 1981Vo03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Ictp-2014 Workshop Group	NDS 132, 257 (2016)	15-Jan-2016

1981Vo03: ILL high-flux reactor. Detectors: bent-crystal spectrometer and Ge(Li) pair spectrometer. Measured: Eγ, Iγ, conversion coefficients. Deduced: level scheme and S(n)=4561.41 keV *27*.

^{227}Ra Levels

E(level)[†]	J$^{\pi}$[‡]	Comments
0.0[#]	3/2$^+$	
1.736[@] *13*	(5/2)$^+$	
25.768[#] *3*	5/2$^+$	
64.077[#] *10*	7/2$^+$	
90.0342[&] *19*	3/2$^-$	
101.8942[&] *20*	5/2$^-$	
120.710[a] *5*	1/2$^+$	
153.276 *13*	(1/2,3/2)$^+$	
161.050[a] *5*	3/2$^+$	
176.973[a] *7*	(5/2)$^+$	
284.280[b] *6*	3/2$^-$	
296.576[b] *4*	1/2$^-$	
384.357 *8*	1/2$^+$,3/2$^+$	
438.795 *9*	(3/2)$^+$	
471.569[c] *7*	3/2$^-$	
475.035 *15*	3/2$^+$	
523.848 *9*	(3/2)$^-$	
598.51 *4*	(3/2$^+$)	
675.84[d] *5*	1/2$^-$	
731.650 *15*	(3/2)$^+$	
738.11[d] *11*	(5/2$^-$)	
4561.4 *3*	1/2$^+$	Additional information 1. E(level): S(n) value from 2012Wa38. J$^{\pi}$: s-wave neutron capture state.

[†] From a least-squares fit to Eγ, unless otherwise stated.
[‡] From Adopted Levels.
[#] Band(A): 3/2[631] rotational band.
[@] Band(B): 5/2[633] rotational band.
[&] Band(C): 3/2[761] rotational band.
[a] Band(D): 1/2[631] rotational band.
[b] Band(E): 1/2[631]$\otimes$0$^-$ (octupole vibration).
[c] Band(F): Possible 1/2[770] rotational band.
[d] Band(G): 1/2[501] rotational band.

^{226}Ra(n,γ) E=thermal 1981Vo03 (continued)

γ(^{227}Ra)

E_γ †	I_γ †	E_i(level)	J^π_i	E_f	J^π_f	Mult.#	α@	Comments
64.085 *10*	0.5 *1*	64.077	7/2+	0.0	3/2+			
64.267 *2*	11.9 *10*	90.0342	3/2−	25.768	5/2+	E1	0.364	Mult.: α(exp)≤2.6, from γ-ray intensity balance.
90.035 *2*	36 *10*	90.0342	3/2−	0.0	3/2+	E1	0.148	Mult.: α(exp)≤0.9, from γ-ray intensity balance.
x98.622 *6*	4.2 *14*							
101.894 *2*	10.9 *23*	101.8942	5/2−	0.0	3/2+	E1	0.107	Mult.: α(exp)≤2.6, from γ-ray intensity balance.
107.306 *4*	2.4 *3*	284.280	3/2−	176.973	(5/2)+			
x110.613 *9*	1.1 *2*							
113.030 *46*	0.8 *1*	176.973	(5/2)+	64.077	7/2+			
120.709 *8*	3.5 *5*	120.710	1/2+	0.0	3/2+			
135.280 *8*	2.6 *4*	161.050	3/2+	25.768	5/2+			
135.525 *5*	4.6 *6*	296.576	1/2−	161.050	3/2+			
x145.139 *16*	2.0 *3*							
151.177 *21*	1.0 *2*	176.973	(5/2)+	25.768	5/2+			
151.553 *25*	0.9 *1*	153.276	(1/2,3/2)+	1.736	(5/2)+			
153.272 *15*	1.3 *3*	153.276	(1/2,3/2)+	0.0	3/2+			
159.742 *41*	0.7 *3*	598.51	(3/2+)	438.795	(3/2)+			
x160.303 *18*	0.8 *2*							
161.052 *13*	1.9 *5*	161.050	3/2+	0.0	3/2+			
x161.168 *23*	1.4 *4*							
163.563 *7*	8.2 *9*	284.280	3/2−	120.710	1/2+			
175.228 *14*	1.6 *2*	176.973	(5/2)+	1.736	(5/2)+			
175.867 *4*	6.5 *6*	296.576	1/2−	120.710	1/2+			
182.394 *15*	1.3 *3*	284.280	3/2−	101.8942	5/2−			
187.274 *35*	0.9 *2*	471.569	3/2−	284.280	3/2−			
194.255 *10*	1.1 *2*	284.280	3/2−	90.0342	3/2−			
x202.394 *4*	3.1 *6*							
206.539 *5*	1.8 *4*	296.576	1/2−	90.0342	3/2−			
207.852 *20*	0.7 *2*	731.650	(3/2)+	523.848	(3/2)−			
x225.469 *39*	1.8 *3*							
x257.12 *20*	0.9 *4*							
263.70 *10*	0.9 *3*	384.357	1/2+,3/2+	120.710	1/2+			
284.314 *30*	1.3 *2*	284.280	3/2−	0.0	3/2+			
294.52 *11*	0.8 *2*	471.569	3/2−	176.973	(5/2)+			
299.37 *11*	0.5 *1*	738.11	(5/2−)	438.795	(3/2)+			
x310.269 *28*	1.0 *3*							
x316.617 *28*	0.8 *2*							
321.763 *25*	1.3 *2*	475.035	3/2+	153.276	(1/2,3/2)+			
x332.426 *54*	0.6 *1*							
x340.449 *15*	3.0 *4*							
x341.058 *52*	0.7 *1*							
x341.646 *89*	0.6 *1*							
x342.475 *87*	0.6 *1*							
347.251 *18*	2.3 *3*	731.650	(3/2)+	384.357	1/2+,3/2+			
348.803 *25*	1.4 *2*	438.795	(3/2)+	90.0342	3/2−			
x355.22 *12*	0.4 *2*							
x355.661 *45*	0.6 *1*							
x368.119 *24*	0.9 *2*							
369.669 *8*	6.3 *7*	471.569	3/2−	101.8942	5/2−			
373.122 *61*	0.6 *1*	475.035	3/2+	101.8942	5/2−			
x378.734 *41*	2.5 *3*							
381.556 *15*	4.4 *4*	471.569	3/2−	90.0342	3/2−			
x382.082 *53*	1.5 *3*							
384.348 *8*	11.6 *11*	384.357	1/2+,3/2+	0.0	3/2+			

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^{226}Ra(n,γ) E=thermal 1981Vo03 (continued)

γ(^{227}Ra) (continued)

E_γ†	I_γ†	E_i(level)	J^π_i	E_f	J^π_f	Comments
^{x}396.49 *21*	3.8 *15*					
^{x}401.80 *27*	1.8 *9*					
^{x}402.702 *38*	0.8 *2*					
^{x}404.354 *35*	0.6 *2*					
^{x}405.976 *52*	1.1 *3*					
^{x}410.18 *14*	0.5 *2*					
411.140 *80*	0.8 *2*	475.035	3/2$^+$	64.077	7/2$^+$	
^{x}411.850 *80*	0.9 *2*					
413.029 *11*	4.0 *5*	438.795	(3/2)$^+$	25.768	5/2$^+$	
433.824 *9*	7.4 *9*	523.848	(3/2)$^-$	90.0342	3/2$^-$	
434.92 *13*	0.8 *2*	731.650	(3/2)$^+$	296.576	1/2$^-$	
437.071 *28*	1.8 *3*	438.795	(3/2)$^+$	1.736	(5/2)$^+$	
438.768 *18*	2.4 *3*	438.795	(3/2)$^+$	0.0	3/2$^+$	
^{x}443.347 *52*	0.7 *2*					
449.263 *29*	2.5 *5*	475.035	3/2$^+$	25.768	5/2$^+$	
^{x}455.66 *16*	1.9 *4*					
^{x}456.056 *35*	2.7 *4*					
473.330 *64*	2.5 *6*	475.035	3/2$^+$	1.736	(5/2)$^+$	
475.016 *23*	3.8 *9*	475.035	3/2$^+$	0.0	3/2$^+$	
^{x}479.340 *28*	2.2 *3*					
^{x}514.84 *13*	4.5 *11*					E_γ: not the same γ ray as the 514.8γ observed in ^{227}Fr β^- decay.
^{x}532.87 *12*	1.2 *2*					
534.335 *88*	1.2 *3*	598.51	(3/2$^+$)	64.077	7/2$^+$	
^{x}548.790 *54*	2.2 *3*					
572.71 *17*	0.9 *2*	598.51	(3/2$^+$)	25.768	5/2$^+$	
^{x}582.26 *12*	0.5 *2*					
585.804 *49*	2.8 *5*	675.84	1/2$^-$	90.0342	3/2$^-$	
^{x}589.11 *26*	0.6 *2*					
596.76 *21*	0.7 *1*	598.51	(3/2$^+$)	1.736	(5/2)$^+$	
598.43 *18*	0.7 *1*	598.51	(3/2$^+$)	0.0	3/2$^+$	
^{x}611.82 *17*	1.2 *2*					
629.755 *73*	2.8 *4*	731.650	(3/2)$^+$	101.8942	5/2$^-$	
^{x}631.33 *23*	1.3 *4*					
^{x}640.21 *46*	0.4 *1*					
641.77 *11*	1.2 *2*	731.650	(3/2)$^+$	90.0342	3/2$^-$	
648.11 *55*	0.3 *1*	738.11	(5/2$^-$)	90.0342	3/2$^-$	
^{x}652.05 *10*	0.3 *1*					
^{x}664.22 *18*	0.6 *2*					
^{x}671.40 *15*	1.1 *2*					
^{x}679.98 *19*	1.4 *2*					
^{x}695.20 *23*	1.1 *2*					
^{x}696.984 *90*	3.1 *3*					
711.58 *42*	0.7 *2*	738.11	(5/2$^-$)	25.768	5/2$^+$	
^{x}752.136 *92*	2.7 *5*					
^{x}756.15 *31*	0.9 *3*					
^{x}866.10 *13*	6.3 *11*					
^{x}892.04 *34*	4.2 *9*					
^{x}990.36 *40*	5.7 *11*					
3885.6‡ *4*	2.5 *2*	4561.4	1/2$^+$	675.84	1/2$^-$	
4178.0‡ *4*	1.6 *2*	4561.4	1/2$^+$	384.357	1/2$^+$,3/2$^+$	
4277.2‡ *4*	2.9 *2*	4561.4	1/2$^+$	284.280	3/2$^-$	
4399.5‡ *5*	0.9 *1*	4561.4	1/2$^+$	161.050	3/2$^+$	
4471.3‡ *3*	4.5 *3*	4561.4	1/2$^+$	90.0342	3/2$^-$	

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^{226}Ra(n,γ) E=thermal 1981Vo03 (continued)

γ(^{227}Ra) (continued)

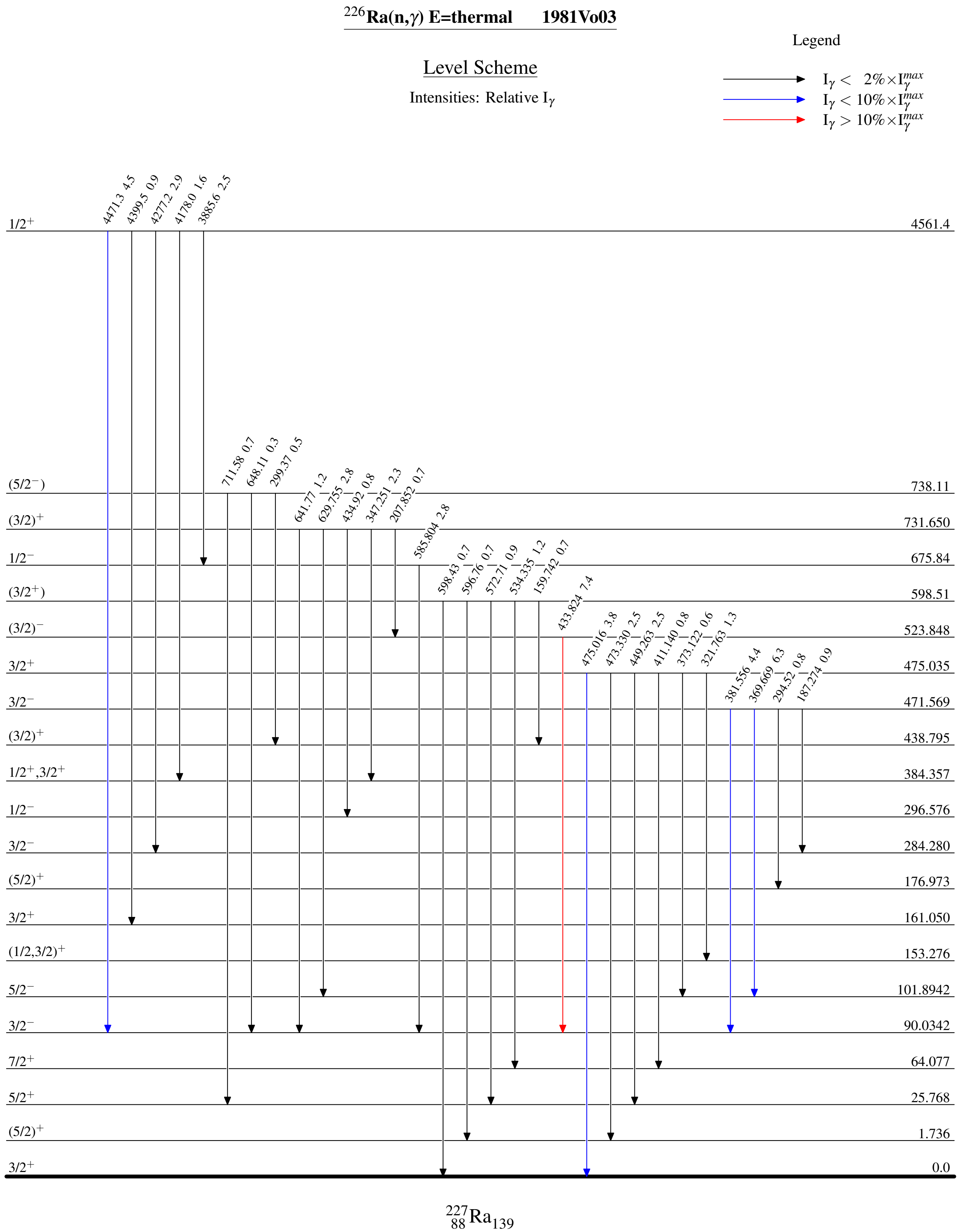
† From 1981Vo03. The energy calibration was performed using the thorium Kα_1 x ray line at 93.3483 keV (1976Bo50) corrected with respect to 411.80441 keV *15* transition from ^{198}Au β^- decay (1978Ke02).

‡ Measured with a Ge(Li) pair spectrometer and corrected for recoil energy. Uncertainties were estimated by the evaluators.

From α(exp) in 1981Vo03.

@ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

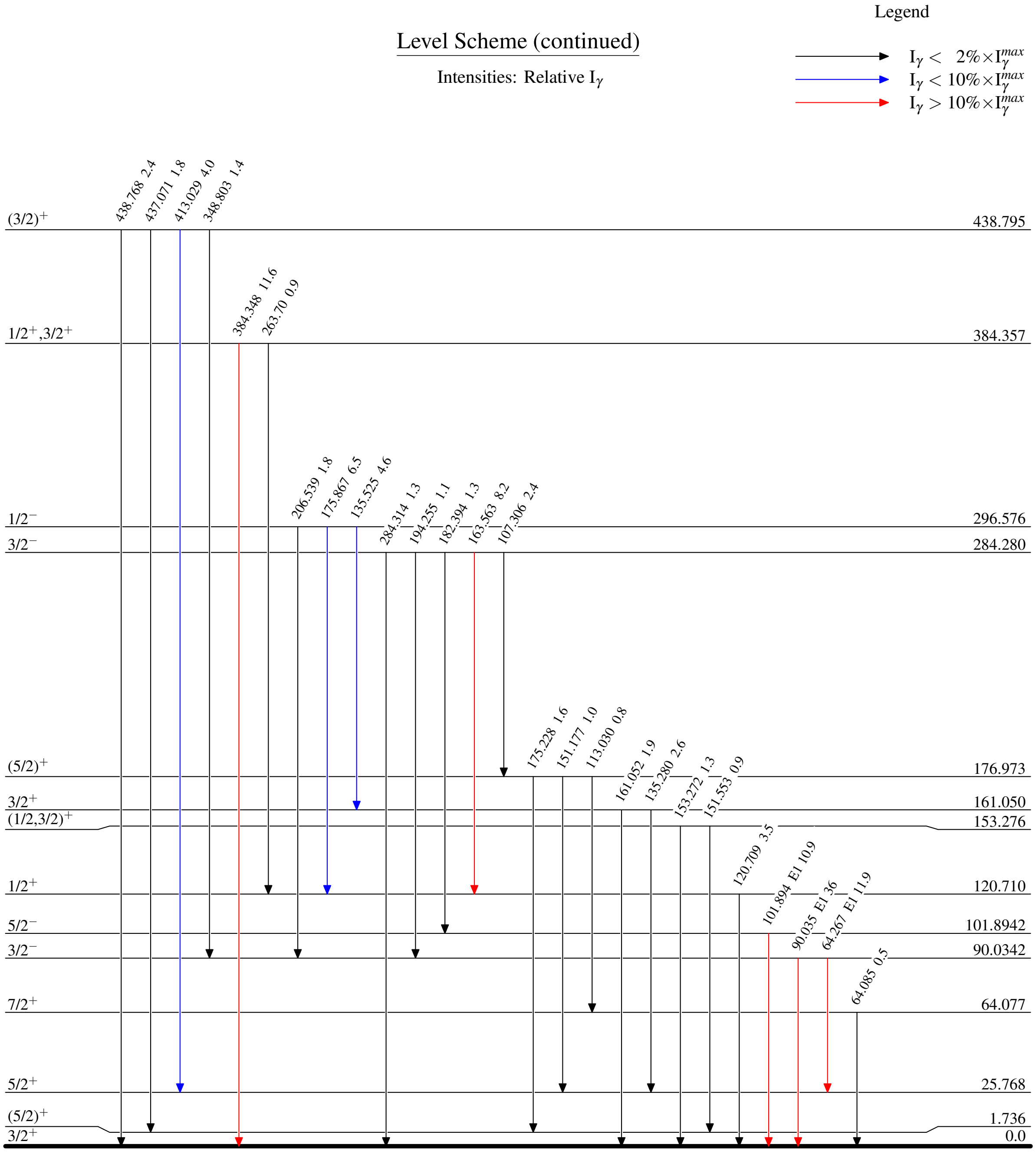
^{x} γ ray not placed in level scheme.


^{226}Ra(n,γ) E=thermal 1981Vo03
Level Scheme
Intensities: Relative I_γ
Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
1/2+ 4561.4
4471.3 4.5
4399.5 0.9
4277.2 2.9
4178.0 1.6
3885.6 2.5
(5/2−) 738.11
711.58 0.7
648.11 0.3
299.37 0.5
(3/2)+ 731.650
641.77 1.2
629.755 2.8
434.92 0.8
347.251 2.3
207.852 0.7
1/2− 675.84
585.804 2.8
(3/2+) 598.51
598.43 0.7
596.76 0.7
572.71 0.9
534.335 1.2
159.742 0.7
(3/2)− 523.848
433.824 7.4
3/2+ 475.035
475.016 3.8
473.330 2.5
449.263 2.5
411.140 0.8
373.122 0.6
321.763 1.3
3/2− 471.569
381.556 4.4
369.669 6.3
294.52 0.8
187.274 0.9
(3/2)+ 438.795
1/2+,3/2+ 384.357
1/2− 296.576
3/2− 284.280
(5/2)+ 176.973
3/2+ 161.050
(1/2,3/2)+ 153.276
5/2− 101.8942
3/2− 90.0342
7/2+ 64.077
5/2+ 25.768
(5/2)+ 1.736
3/2+ 0.0
$^{227}_{88}Ra_{139}$

^{226}Ra(n,γ) E=thermal 1981Vo03

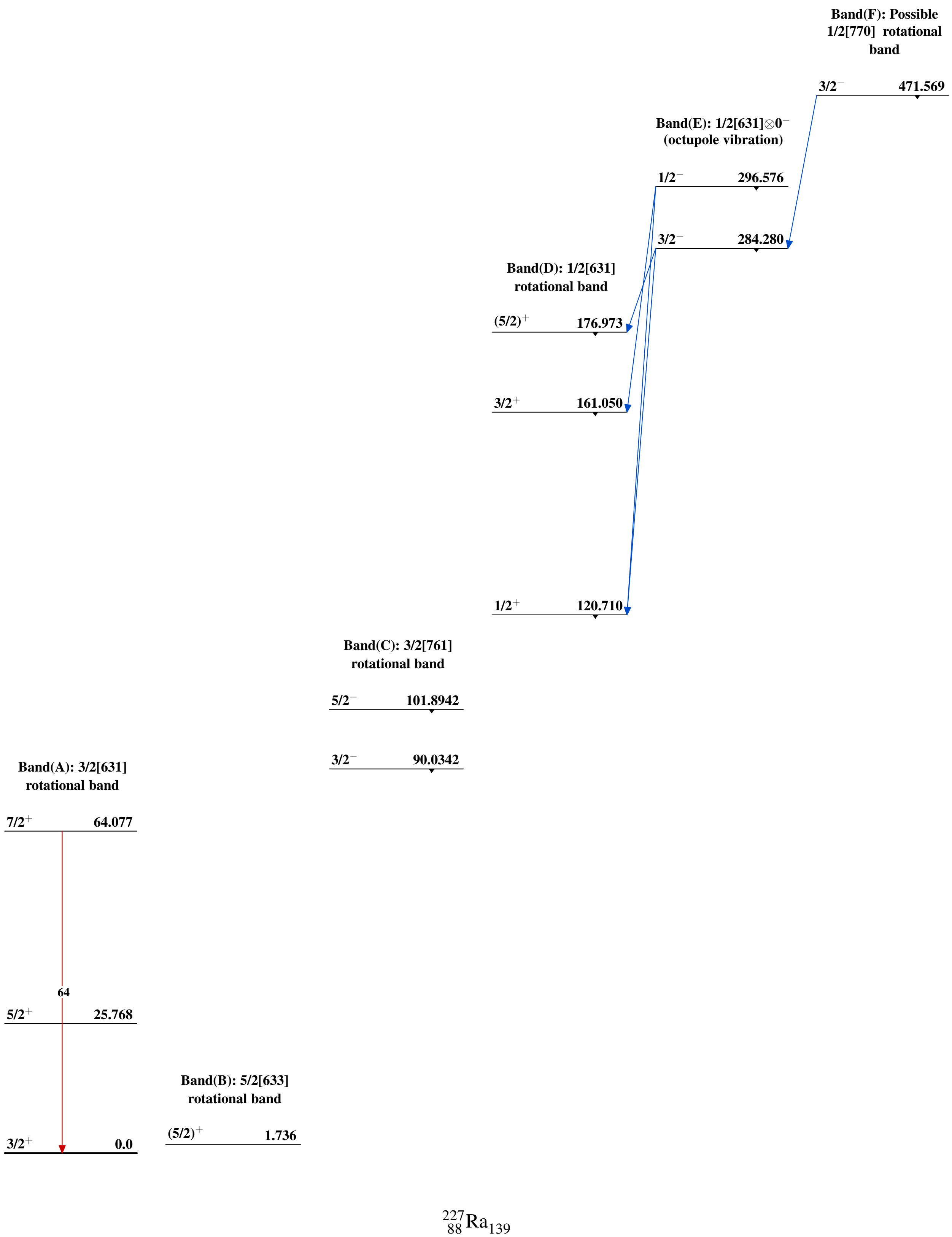
Level Scheme (continued)

Intensities: Relative I_γ



$^{227}_{88}Ra_{139}$

^{226}Ra(n,γ) E=thermal 1981Vo03



^{226}Ra(n,γ) E=thermal 1981Vo03 (continued)

$^{227}_{88}Ra_{139}$