

^{252}Cf SF decay [2004Ch54](#),[1995Lu10](#)

Type	History		Literature Cutoff Date
	Author	Citation	
Full Evaluation	Jean Blachot	ENSDF	1-Jul-2008

Parent: ^{252}Cf : $E=0.0$; $J^\pi=0^+$; $T_{1/2}=2.645$ y δ ; %SF decay=?

[2004Ch54](#) :Measured E_γ , I_γ , $\gamma\gamma$ with the Gammasphere detector array, which consisted of 102 Compton-suppressed Ge detectors.

[1995Lu10](#),[1995HaZZ](#): ^{252}Cf SF. Measured prompt γ -rays emitted by fission.

[1990DuZW](#): $^{232}\text{Th}(^{18}\text{O},\text{xn}\gamma)$. Measured prompt γ -rays emitted by fission fragments from ^{246}Cf fissioning system.

Others: [1970Ch11](#), [1971Ho29](#), 712, they already proposed the 242 and 665 levels.

The identification is based on gating on $2^+ - 0^+$ known transitions but also on the fact that complementary fragments are in coin (Cd,s(n)).

 ^{108}Ru Levels

E(level) [‡]	J^π [†]	$T_{1/2}$	Comments
0.0 [#]	0^+		
242.0 [#] 2	2^+	0.345 ns 30	$T_{1/2}$: from 1974JaZN . Other: 0.22 ns 4 (1970Ch11) from recoil-distance Doppler shift, this value is an average of ^{108}Ru and ^{110}Ru because the 423 γ is common to both nuclides and was not resolved.
664.5 [#] 2	4^+	13.4 ps 10	$T_{1/2}$: from 1986Ma22 . Recoil-distance Doppler shift.
708.4 [@] 2	2^+		
975.4 [@] 3	3^+		
1183.5 [@] 3	4^+		
1240.7 [#] 4	6^+		
1496.9 [@] 4	5^+		
1644.7 ^b 3	(4^+)		
1762.5 [@] 4	6^+		
1826.4 ^b 3	(5^+)		
1942.3 [#] 4	8^+		
2111.0 ^a 4	(5^-)		
2134.1 [@] 4	7^+		
2273.6 ^{&} 4	(6^-)		
2420.4 [@] 5	8^+		
2473.0 ^a 4	(7^-)		
2716.5 ^{&} 4	(8^-)		
2740.2 [#] 5	10^+		
2844.4 [@] 4	(9^+)		
2985.1 ^a 4	(9^-)		
3150.4 [@] 6	(10^+)		
3294.6 ^{&} 5	(10^-)		
3528.3 [#] 6	12^+		
3556.6 ^a 5	(11^-)		
3569.5 [@] 5	(11^+)		
3982.1 ^{&} 5	(12^-)		
4194.0 ^a 6	(13^-)		
4290.5 [#] 6	14^+		
4309.9 [@] 6	(13^+)		
4774.8 ^{&} 6	(14^-)		

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^{252}Cf SF decay 2004Ch54,1995Lu10 (continued) ^{108}Ru Levels (continued)

<u>E(level)[‡]</u>	<u>J^π[†]</u>
4947.7 ^a 6	(15 ⁻)
5154.1 [#] 7	16 ⁺

[†] Authors' J^{π} assignments are based on systematics and theoretical predictions for ground-state rotational band.

[‡] From least-squares fit to E_{γ} 's (by evaluators); $\Delta E_{\gamma}=0.3$ keV assumed for each γ -ray.

[#] Band(A): yrast g.s. band.

@ Band(B): one-phonon γ -vibrational band.

& Band(C): $\nu 5/2[402]\# \nu 5/2[532]$, $\alpha=0$.

^a Band(c): $\nu 5/2[402]\# \nu 5/2[532]$, $\alpha=1$.

^b Band(D): two-phonon γ -vibrational band.

 $\gamma(^{108}\text{Ru})$

<u>E_{γ}[‡]</u>	<u>I_{γ}[†]</u>	<u>$E_i(\text{level})$</u>	<u>J_i^{π}</u>	<u>E_f</u>	<u>J_f^{π}</u>
162.5 [‡]	2.7 3	2273.6	(6 ⁻)	2111.0	(5 ⁻)
181.7 [‡]	0.8 2	1826.4	(5 ⁺)	1644.7	(4 ⁺)
199.5 [‡]	2.6 3	2473.0	(7 ⁻)	2273.6	(6 ⁻)
242.3	100.0	242.0	2 ⁺	0.0	0 ⁺
243.50 [‡]	2.0 2	2716.5	(8 ⁻)	2473.0	(7 ⁻)
262.0 [‡]	0.2 1	3556.6	(11 ⁻)	3294.6	(10 ⁻)
267.1	0.5 1	975.4	3 ⁺	708.4	2 ⁺
268.6 [‡]	1.1 2	2985.1	(9 ⁻)	2716.5	(8 ⁻)
309.5 [‡]	1.0 2	3294.6	(10 ⁻)	2985.1	(9 ⁻)
309.6	0.5 1	975.4	3 ⁺	664.5	4 ⁺
362.0 [‡]	0.8 2	2473.0	(7 ⁻)	2111.0	(5 ⁻)
423.0	71 3	664.5	4 ⁺	242.0	2 ⁺
443.0 [‡]	1.1 3	2716.5	(8 ⁻)	2273.6	(6 ⁻)
465.3	3.6 2	708.4	2 ⁺	242.0	2 ⁺
475.1	9.3 5	1183.5	4 ⁺	708.4	2 ⁺
512.1 [‡]	0.5 1	2985.1	(9 ⁻)	2473.0	(7 ⁻)
517.2	5.4 5	1183.5	4 ⁺	664.5	4 ⁺
521.6	3.5 5	1496.9	5 ⁺	975.4	3 ⁺
522.2	1.0 3	1762.5	6 ⁺	1240.7	6 ⁺
571.5 [‡]	1.0 2	3556.6	(11 ⁻)	2985.1	(9 ⁻)
575.5	37 2	1240.7	6 ⁺	664.5	4 ⁺
578.1 [‡]	0.7 2	3294.6	(10 ⁻)	2716.5	(8 ⁻)
578.3	4.5 4	1762.5	6 ⁺	1183.5	4 ⁺
636.9	1.3 3	2134.1	7 ⁺	1496.9	5 ⁺
637.4 [‡]	0.4 1	4194.0	(13 ⁻)	3556.6	(11 ⁻)
657.9	4.8 4	2420.4	8 ⁺	1762.5	6 ⁺
669.1 [‡]	0.7 2	1644.7	(4 ⁺)	975.4	3 ⁺
687.5 [‡]	0.9 2	3982.1	(12 ⁻)	3294.6	(10 ⁻)
701.4	9.1 12	1942.3	8 ⁺	1240.7	6 ⁺
708.6	4.3 3	708.4	2 ⁺	0.0	0 ⁺
710.4 [‡]	2.6 4	2844.4	(9 ⁺)	2134.1	7 ⁺
725.5 [‡]	0.6 2	3569.5	(11 ⁺)	2844.4	(9 ⁺)

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^{252}Cf SF decay [2004Ch54,1995Lu10](#) (continued) $\gamma(^{108}\text{Ru})$ (continued)

E_γ †	I_γ †	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
730.0 ‡	0.9 2	3150.4	(10 ⁺)	2420.4	8 ⁺	
732.5	7.8 3	975.4	3 ⁺	242.0	2 ⁺	
740.4 ‡	0.5 2	4309.9	(13 ⁺)	3569.5	(11 ⁺)	
753.7 ‡	0.1 1	4947.7	(15 ⁻)	4194.0	(13 ⁻)	E_γ : 735.7 given in the table is a misprint.
762.2 ‡	0.8 2	4290.5	14 ⁺	3528.3	12 ⁺	
788.1 ‡	1.9 3	3528.3	12 ⁺	2740.2	10 ⁺	
792.7 ‡	0.4 1	4774.8	(14 ⁻)	3982.1	(12 ⁻)	
797.4 ‡	3.5 4	2740.2	10 ⁺	1942.3	8 ⁺	
828.9 ‡	0.9 2	3569.5	(11 ⁺)	2740.2	10 ⁺	
830.7	1.9 5	1496.9	5 ⁺	664.5	4 ⁺	
850.8 ‡	4.0 5	1826.4	(5 ⁺)	975.4	3 ⁺	
863.6 ‡	0.4 1	5154.1	16 ⁺	4290.5	14 ⁺	
870.0 ‡	<0.1	2111.0	(5 ⁻)	1240.7	6 ⁺	
893.8 ‡	0.5 1	2134.1	7 ⁺	1240.7	6 ⁺	
902.5 ‡	0.1 1	2844.4	(9 ⁺)	1942.3	8 ⁺	
936.2 ‡	1.9 4	1644.7	(4 ⁺)	708.4	2 ⁺	
941.0	4.1 2	1183.5	4 ⁺	242.0	2 ⁺	
1032.0 ‡	1.7 2	2273.6	(6 ⁻)	1240.7	6 ⁺	E_γ : level-energy difference=1032.9; 1232.0 given in figure 1 of 2004Ch54 seems to be a misprint.
1042.7 ‡	0.6 1	2985.1	(9 ⁻)	1942.3	8 ⁺	
1097.1 ‡	0.8 2	1762.5	6 ⁺	664.5	4 ⁺	
1117.9 ‡	4.5 5	1826.4	(5 ⁺)	708.4	2 ⁺	
1402.5 ‡	0.4 1	1644.7	(4 ⁺)	242.0	2 ⁺	
1445.5 ‡	5.1 5	2111.0	(5 ⁻)	664.5	4 ⁺	
1584.2 ‡	9.9 5	1826.4	(5 ⁺)	242.0	2 ⁺	
1608.0 ‡	0.8 2	2273.6	(6 ⁻)	664.5	4 ⁺	

† From [2004Ch54](#).‡ Seen only by [2004Ch54](#).

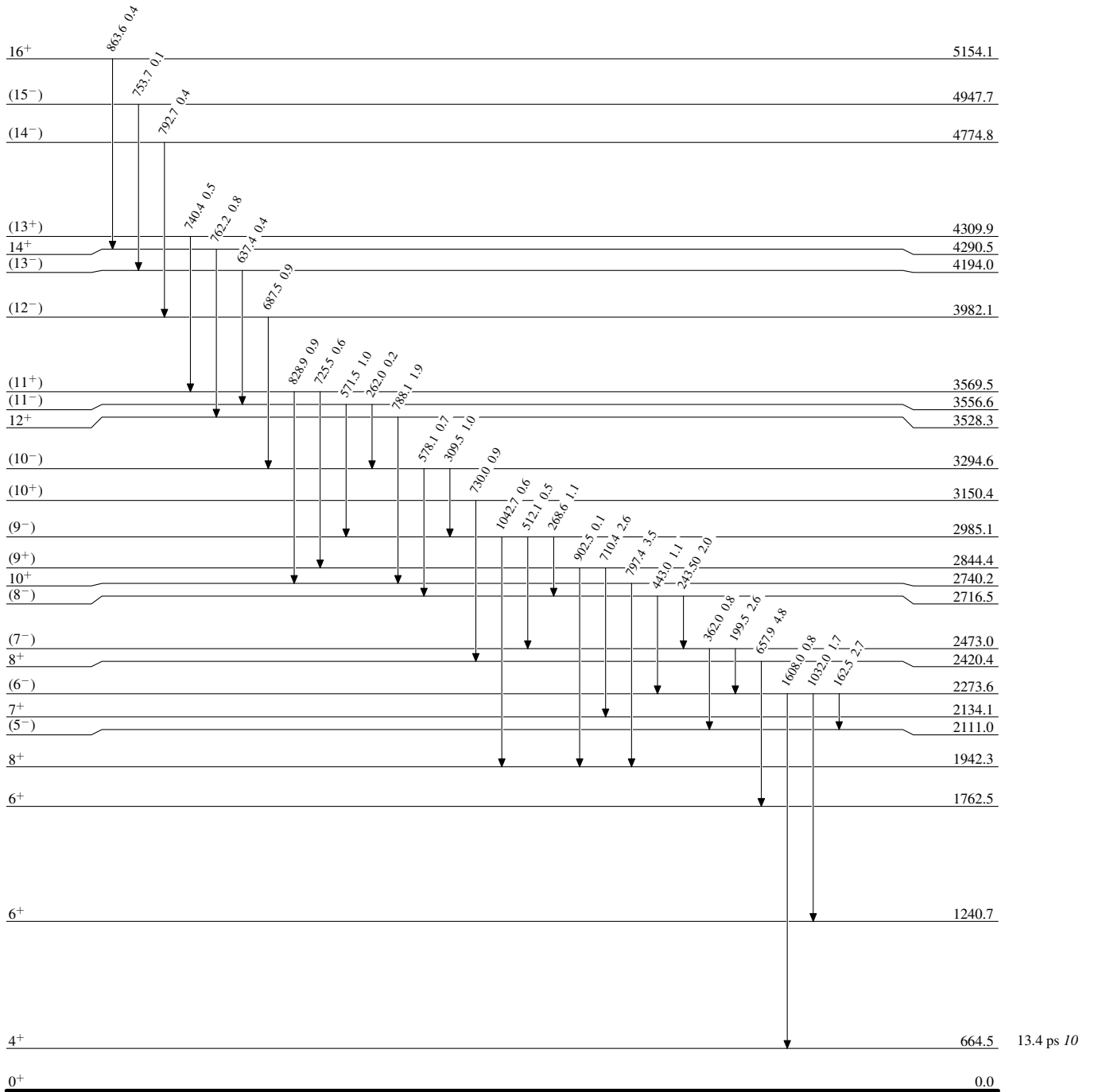
²⁵²Cf SF decay 2004Ch54,1995Lu10

Level Scheme

Intensities: Relative I_γ

Legend

- ▶ I_γ < 2% × I_γ^{max}
- ▶ I_γ < 10% × I_γ^{max}
- ▶ I_γ > 10% × I_γ^{max}



¹⁰⁸Ru₆₄

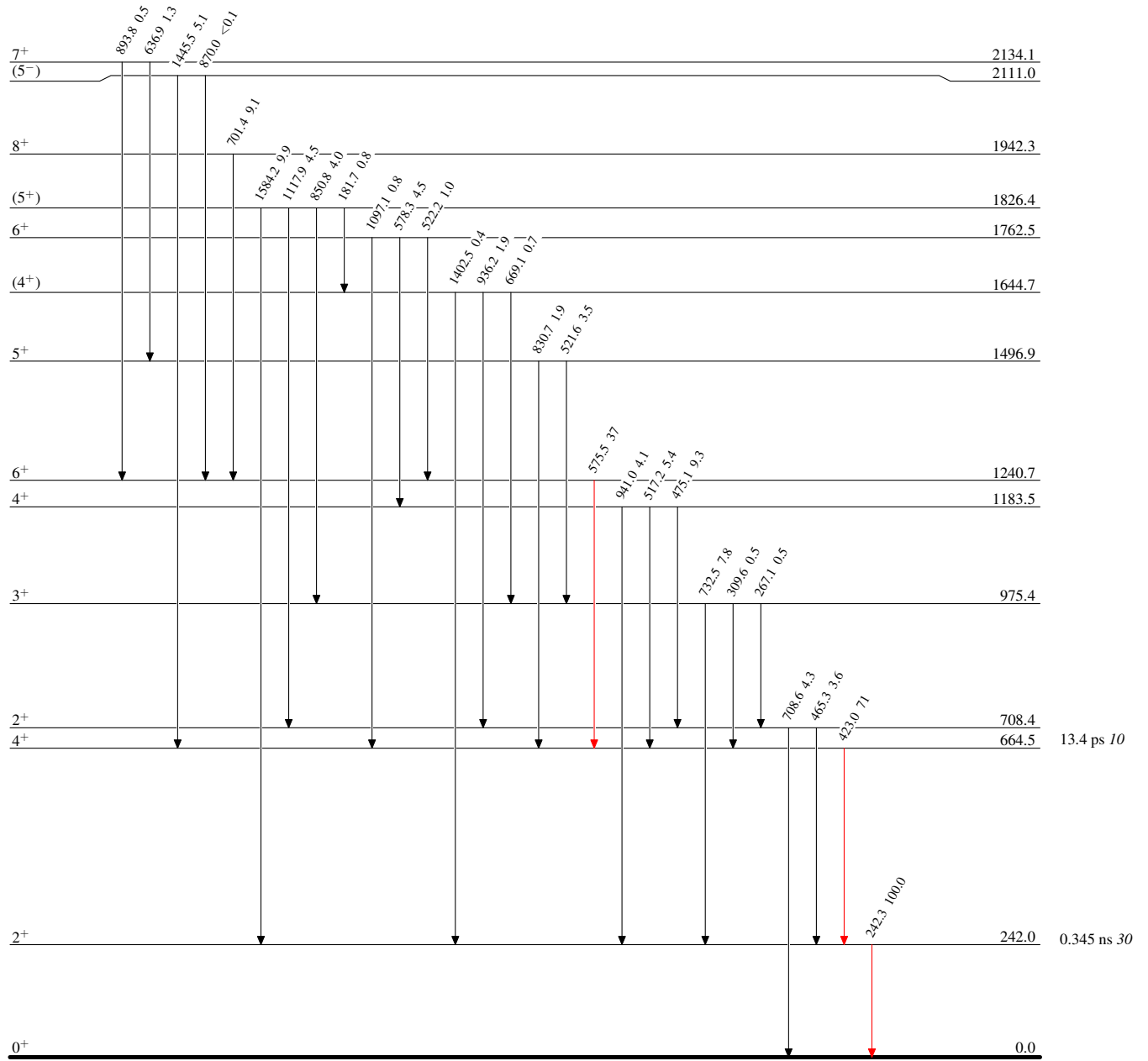
^{252}Cf SF decay 2004Ch54,1995Lu10

Level Scheme (continued)

Intensities: Relative I_γ

Legend

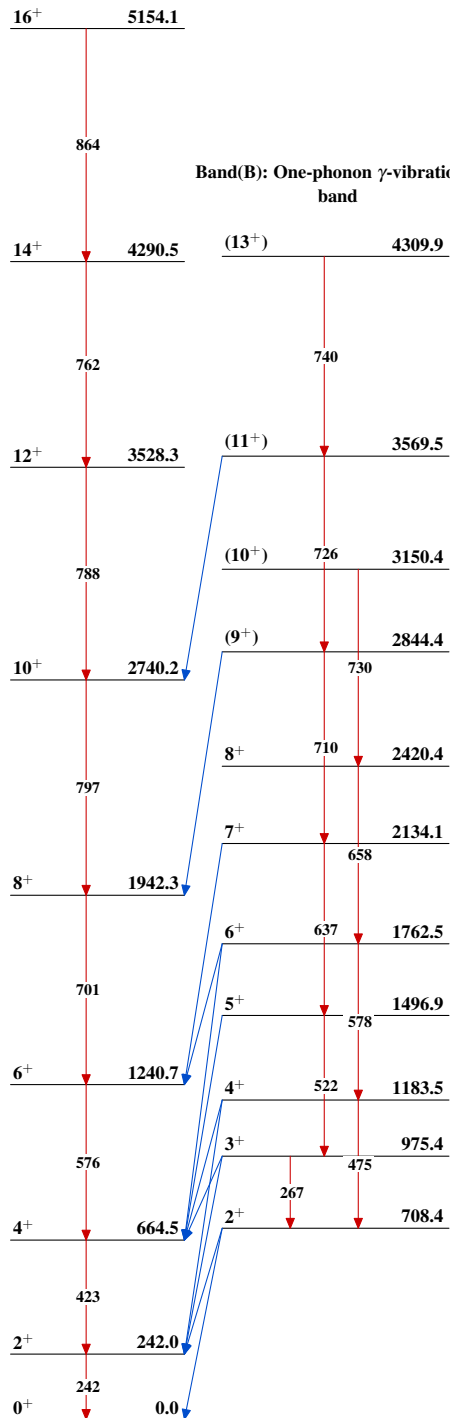
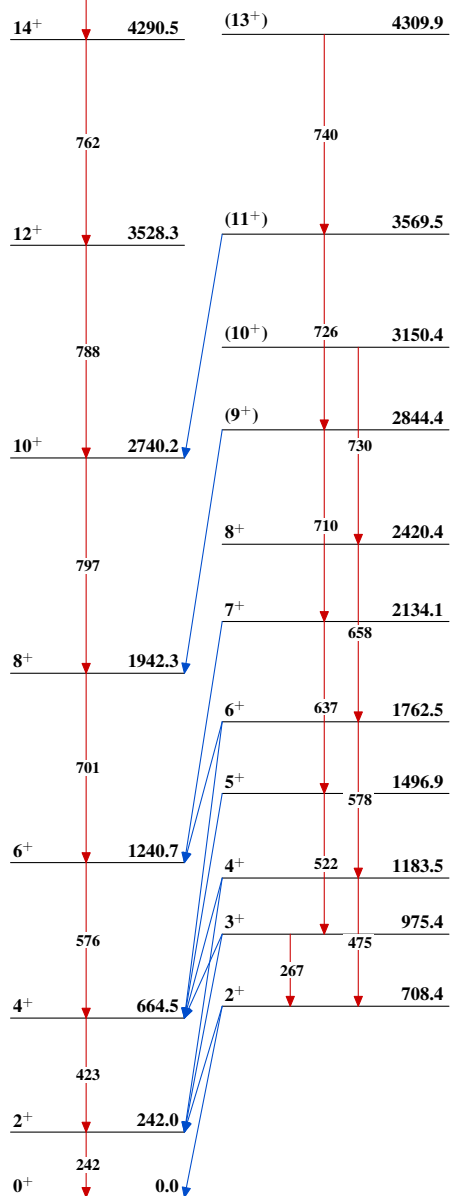
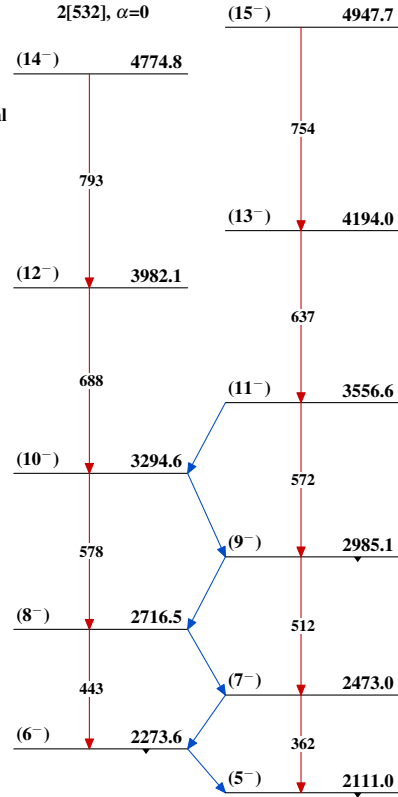
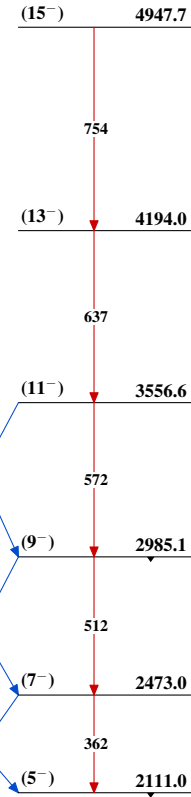
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$



$^{108}_{44}\text{Ru}_{64}$

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Band(A): Yrast g.s. band

Band(B): One-phonon γ -vibrational bandBand(C): $\nu 5/2[402]\# \nu 5/2[532]$, $\alpha=0$ Band(c): $\nu 5/2[402]\# \nu 5/2[532]$, $\alpha=1$ Band(D): Two-phonon γ -vibrational band