

²⁵²Cf SF decay 2004Lu20

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jean Blachot	NDS 109, 1383 (2008)	1-Mar-2008

Parent: ²⁵²Cf: E=0.0; J^π=0⁺; T_{1/2}=2.645 y 8; %SF decay=?

2004LU20: Levels of ¹⁰⁵Tc were studied through the spontaneous fission of a ²⁵²Cf source sandwiched between two Fe foils, and placed in an 8-cm polyethylene ball.

Measured E_γ, I_γ, γγ, lifetimes with the Gammasphere array, comprised of 102 active Compton-suppressed Ge detectors.

1998Hw04: "GAMMASPHERE" with 72 Compton-suppressed Ge detectors.

Others: 1970Wa05, 1972ChYZ, 1973TaZG, 1974ClZX.

Analysis of transitions emitted from fission fragments prior to β decay. Transition half-lives are from (SF-fragment)γ(t)-coin (semi); assignments from (fragment)(fragment)(K x ray)(γ,ce) coin.

¹⁰⁷Tc Levels

E(level) [†]	J ^π	T _{1/2}	Comments
0.0	(3/2 ⁻)		
0+x ^a	(3/2 ⁺)		Additional information 1.
45.83 10			
65.77 14	(5/2 ⁺)	184 ns 3	T _{1/2} : from ENSDF for ¹⁰⁷ Tc.
137.49 [#] 16	(7/2 ⁺)		
172.34+x ^a 10	(7/2 ⁺)		
275.84 [‡] 16	(9/2 ⁺)		
466.23 17			
495.95 16			
501.34+x ^a 15	(11/2 ⁺)		
549.34 17			
568.44 [#] 17	(11/2 ⁺)		
728.01 [‡] 17	(13/2 ⁺)		
766.11& 17	(11/2 ⁺)		
850.69 17			
983.89+x ^a 18	(15/2 ⁺)		
1087.78@ 18	(13/2 ⁺)		
1143.37 [#] 18	(15/2 ⁺)		
1330.31 [‡] 19	(17/2 ⁺)		
1391.73& 18	(15/2 ⁺)		
1612.95+x ^a 20	(19/2 ⁺)		
1731.00@ 19	(17/2 ⁺)		
1840.01 [#] 19	(19/2 ⁺)		
2056.50 [‡] 20	(21/2 ⁺)		
2094.85& 20	(19/2 ⁺)		
2379.58+x ^a 24	(23/2 ⁺)		
2604.72 [#] 20	(23/2 ⁺)		
2845.16 [‡] 21	(25/2 ⁺)		
3226.1+x ^a 3	(27/2 ⁺)		
3350.85 [#] 22	(27/2 ⁺)		
3586.34 [‡] 23	(29/2 ⁺)		
4319.8 [‡] 3	(33/2 ⁺)		

[†] From least-squares fit to E_γ's.

^{252}Cf SF decay **2004Lu20** (continued) ^{107}Tc Levels (continued)‡ Band(A): $\pi 7/2[413]$, $\alpha=+1/2$.# Band(a): $\pi 7/2[413]$, $\alpha=-1/2$.@ Band(B): K+2 satellite band, $\alpha=+1/2$. Band originating from $7/2[413]$ band.& Band(b): K+2 satellite band, $\alpha=-1/2$. Band originating from $7/2[413]$ band.^a Band(C): $\pi 1/2[431]$ intruder band.

E_{γ}^{\dagger}	I_{γ}	$E_i(\text{level})$	J_i^{π}	E_f	J_f^{π}	Mult. [‡]	$\gamma(^{107}\text{Tc})$	Comments
(20.0)		65.77	(5/2 ⁺)	45.83				
45.83 [#] 10		45.83		0.0	(3/2 ⁻)			Additional information 2.
(53.7)		549.34		495.95				
65.77 [#] 14	100	65.77	(5/2 ⁺)	0.0	(3/2 ⁻)	E1		$\alpha(\text{exp}) < 1.06$ Additional information 3.
71.72 [#] 14	78.8	137.49	(7/2 ⁺)	65.77	(5/2 ⁺)	M1		$\alpha(\text{exp}) = 0.65 \text{ } 8$ Additional information 4.
(83.3)		549.34		466.23				
138.40 [#] 14	61.5	275.84	(9/2 ⁺)	137.49	(7/2 ⁺)	M1(+E2)		$\alpha(\text{exp}) = 0.16 \text{ } 8$ Additional information 6.
159.58 [#] 10	15.1	728.01	(13/2 ⁺)	568.44	(11/2 ⁺)	M1(+E2)		$\alpha(\text{exp}) = 0.09 \text{ } 2$ Additional information 15.
172.34 [#] 10	18.8	172.34+x	(7/2 ⁺)	0+x	(3/2 ⁺)			Additional information 5.
187.01 10	4.9	1330.31	(17/2 ⁺)	1143.37	(15/2 ⁺)			Additional information 28.
210.1 1	0.3	275.84	(9/2 ⁺)	65.77	(5/2 ⁺)			Additional information 7.
216.54 11	4.1	2056.50	(21/2 ⁺)	1840.01	(19/2 ⁺)			Additional information 37.
235.39 16		3586.34	(29/2 ⁺)	3350.85	(27/2 ⁺)			Additional information 49.
240.41 11	1	2845.16	(25/2 ⁺)	2604.72	(23/2 ⁺)			Additional information 44.
292.58 [#] 10	20.6	568.44	(11/2 ⁺)	275.84	(9/2 ⁺)			Additional information 13.
301.42 10		850.69		549.34				Additional information 19.
303.93 10	1.6	1391.73	(15/2 ⁺)	1087.78	(13/2 ⁺)			Additional information 30.
321.56 10	2.1	1087.78	(13/2 ⁺)	766.11	(11/2 ⁺)			Additional information 23.
329.00 10	14.1	501.34+x	(11/2 ⁺)	172.34+x	(7/2 ⁺)			Additional information 11.
339.28 10	0.6	1731.00	(17/2 ⁺)	1391.73	(15/2 ⁺)			Additional information 33.
354.74 11	0.8	850.69		495.95				Additional information 20.
358.51 11	7.2	495.95		137.49	(7/2 ⁺)			Additional information 9.
359.86 13		1087.78	(13/2 ⁺)	728.01	(13/2 ⁺)			Additional information 24.
363.82 12	0.3	2094.85	(19/2 ⁺)	1731.00	(17/2 ⁺)			Additional information 39.
384.37 12		850.69		466.23				Additional information 21.
400.38 11		466.23		65.77	(5/2 ⁺)			Additional information 8.
(411.9)		549.34		137.49	(7/2 ⁺)			
415.40 [#] 10	6.3	1143.37	(15/2 ⁺)	728.01	(13/2 ⁺)			Additional information 26.
430.14 10		495.95		65.77	(5/2 ⁺)			Additional information 10.
430.96 [#] 10	3.1	568.44	(11/2 ⁺)	137.49	(7/2 ⁺)			Additional information 14.
452.23 [#] 10	20.5	728.01	(13/2 ⁺)	275.84	(9/2 ⁺)			Additional information 16.
(465.8)		466.23		0.0	(3/2 ⁻)			
482.55 10	8.9	983.89+x	(15/2 ⁺)	501.34+x	(11/2 ⁺)			Additional information 22.
483.64 10		549.34		65.77	(5/2 ⁺)			Additional information 12.
490.29 10	6.6	766.11	(11/2 ⁺)	275.84	(9/2 ⁺)			Additional information 17.
505.70 12	0.5	3350.85	(27/2 ⁺)	2845.16	(25/2 ⁺)			Additional information 47.
509.69 [#] 10	4.6	1840.01	(19/2 ⁺)	1330.31	(17/2 ⁺)			Additional information 35.
519.34 10	2.8	1087.78	(13/2 ⁺)	568.44	(11/2 ⁺)			Additional information 25.
548.23 10	1.2	2604.72	(23/2 ⁺)	2056.50	(21/2 ⁺)			Additional information 42.

Continued on next page (footnotes at end of table)

^{252}Cf SF decay **2004Lu20** (continued) $\gamma(^{107}\text{Tc})$ (continued)

E_γ^\dagger	I_γ	$E_i(\text{level})$	J_i^\ddagger	E_f	J_f^\ddagger	Comments
(549.4)		549.34		0.0	(3/2 ⁻)	
574.92 [#] 10	1.6	1143.37	(15/2 ⁺)	568.44	(11/2 ⁺)	Additional information 27.
602.28 10	14.9	1330.31	(17/2 ⁺)	728.01	(13/2 ⁺)	Additional information 29.
625.68 10	4.3	1391.73	(15/2 ⁺)	766.11	(11/2 ⁺)	Additional information 31.
628.56 10	0.9	766.11	(11/2 ⁺)	137.49	(7/2 ⁺)	Additional information 18.
629.05 10	4.2	1612.95+x	(19/2 ⁺)	983.89+x	(15/2 ⁺)	Additional information 32.
643.15 12	0.2	1731.00	(17/2 ⁺)	1087.78	(13/2 ⁺)	Additional information 34.
696.59 [#] 10	0.9	1840.01	(19/2 ⁺)	1143.37	(15/2 ⁺)	Additional information 36.
703.16 13	0.9	2094.85	(19/2 ⁺)	1391.73	(15/2 ⁺)	Additional information 40.
(713.5)		850.69		137.49	(7/2 ⁺)	
726.24 10	7.9	2056.50	(21/2 ⁺)	1330.31	(17/2 ⁺)	Additional information 38.
733.46 13	0.2	4319.8	(33/2 ⁺)	3586.34	(29/2 ⁺)	Additional information 51.
741.23 12	0.9	3586.34	(29/2 ⁺)	2845.16	(25/2 ⁺)	Additional information 50.
746.01 16	0.1	3350.85	(27/2 ⁺)	2604.72	(23/2 ⁺)	Additional information 48.
764.58 11	0.3	2604.72	(23/2 ⁺)	1840.01	(19/2 ⁺)	Additional information 43.
766.63 12	2.0	2379.58+x	(23/2 ⁺)	1612.95+x	(19/2 ⁺)	Additional information 41.
(785.0)		850.69		65.77	(5/2 ⁺)	
788.74 10	1.8	2845.16	(25/2 ⁺)	2056.50	(21/2 ⁺)	Additional information 45.
846.5 [@] 1		3226.1+x	(27/2 ⁺)	2379.58+x	(23/2 ⁺)	Additional information 46.

[†] Transition energies listed to two decimal places in **2004Lu20** for the purposes of testing sum relationships in the decay scheme and for determining signature splitting. The authors do not believe the the absolute transition energies are accurate to better than 0.1 keV. The uncertainties given here represent statistical standard deviations with systematic uncertainty of 0.1 keV, added in quadrature.

[‡] $\alpha(\text{exp})$'s were determined from the intensity balances.

[#] Already seen by **1998Hw04**.

[@] Placement of transition in the level scheme is uncertain.

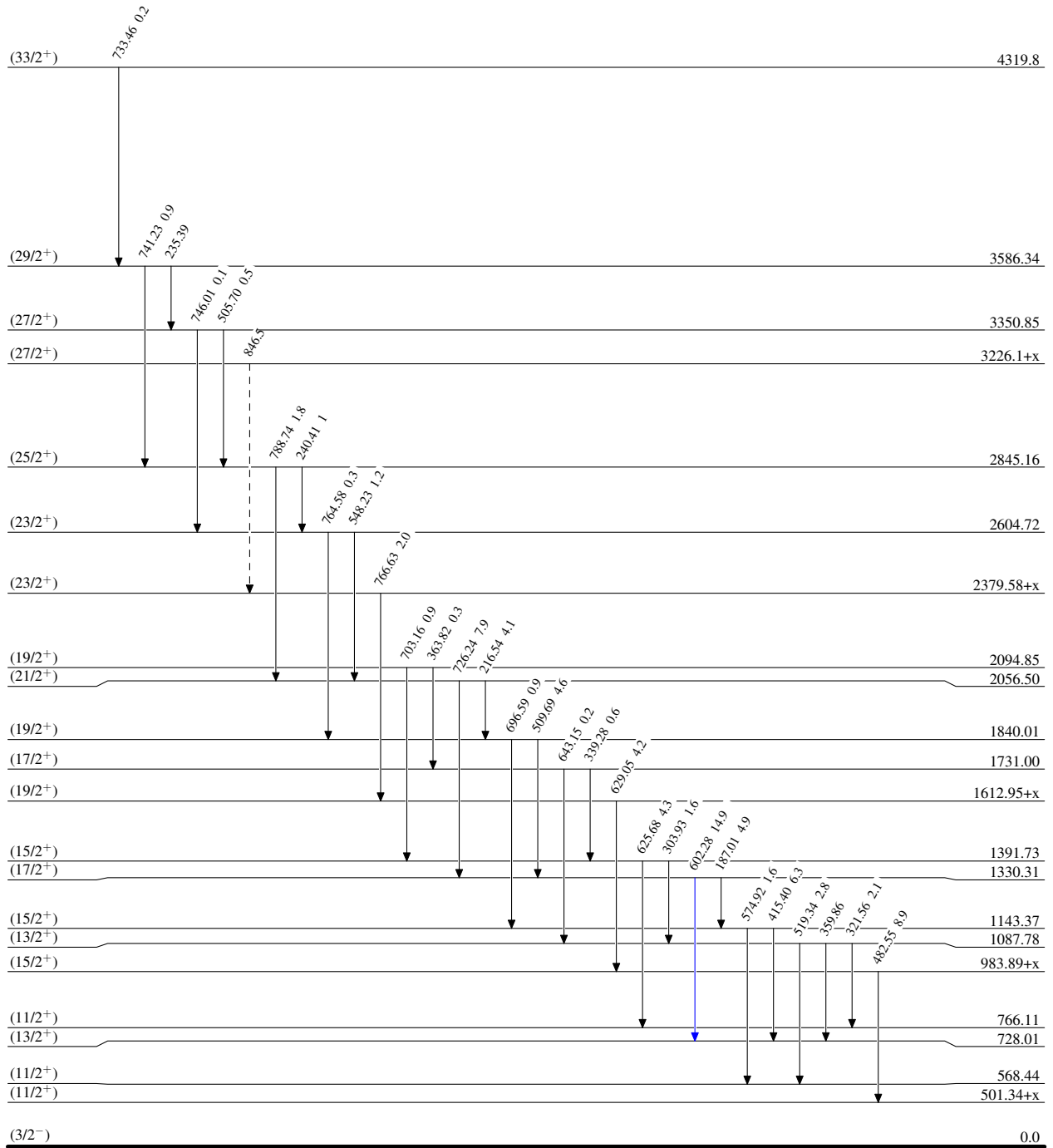
^{252}Cf SF decay 2004Lu20

Legend

Level Scheme

Intensities: Relative I_γ

- $I_\gamma < 2\% \times I_\gamma^{\max}$
- $I_\gamma < 10\% \times I_\gamma^{\max}$
- $I_\gamma > 10\% \times I_\gamma^{\max}$
- - - - -→ γ Decay (Uncertain)

 $^{107}_{43}\text{Tc}_{64}$

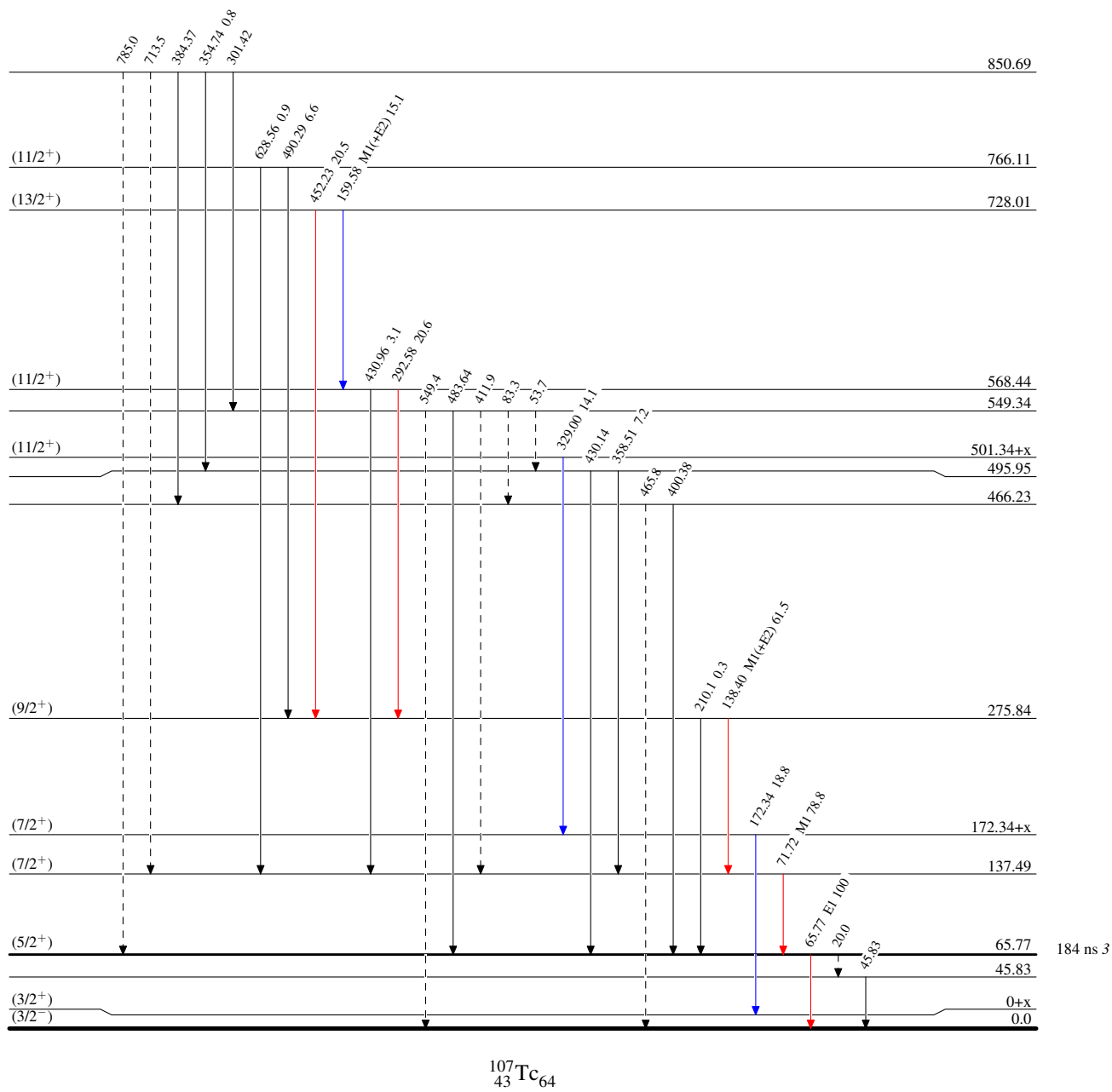
^{252}Cf SF decay 2004Lu20

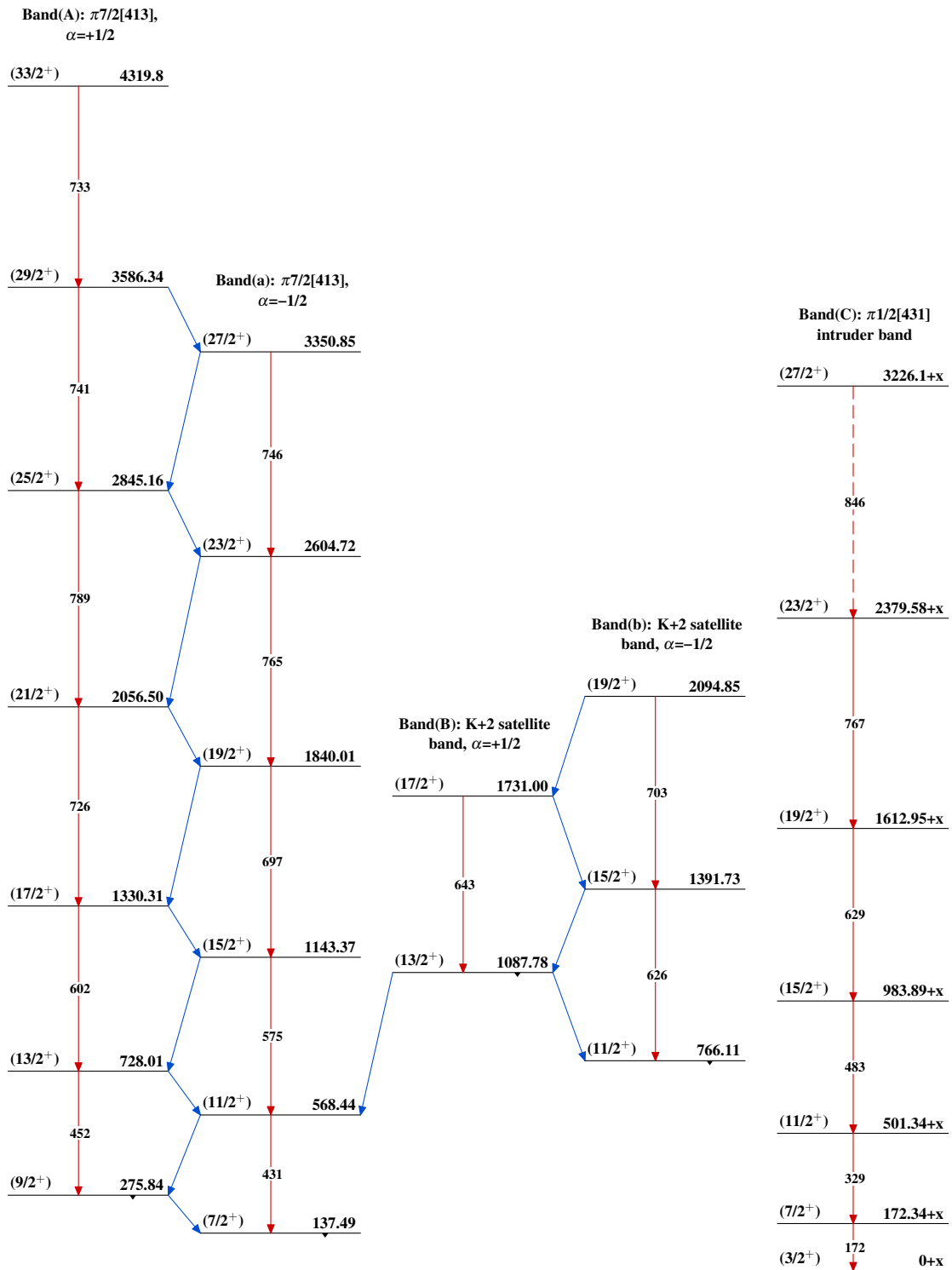
Legend

Level Scheme (continued)

Intensities: Relative I_γ

- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- - - - γ Decay (Uncertain)

 $^{107}_{43}\text{Tc}_{64}$

^{252}Cf SF decay 2004Lu20 $^{107}_{43}\text{Tc}_{64}$