^{160}Gd(^{9}Be,5nγ):E=57 MeV 2012Sw02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen[#]	NDS 147, 1 (2018)	30-Nov-2017

2012Sw02: measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma$(t) using CAESAR array of six HPGe detectors at ANU Heavy-ion accelerator facility. Enriched (>95%) ^{160}Gd target of 4.4 mg/cm^2 thickness. Pulsed-beam γ-ray Spectroscopy. Deduced reduced K-forbidden hindrance factors.

^{164}Er Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$	Comments
0.0[#]	0$^+$		
92.0[#] 5	2$^+$		
300.0[#] 7	4$^+$		
614.9[#] 7	6$^+$		
947.0[b] 7	3$^+$		
1024.9[#] 8	8$^+$		
1198.0[b] 7	5$^+$		
1518.7[#] 8	10$^+$		
1665.0[@] 8	5$^-$		
1745.1 7	6$^-$		
1845.8[@] 7	7$^-$		
1985.5[a] 7	7$^-$	23.0 ns 12	T$_{1/2}$: from Adopted Levels.
2083.4[#] 8	12$^+$		
2164.4[a] 7	8$^-$		
2340.6 7	(8)		
2364.3[a] 8	9$^-$		
2526.5 7	(9)		
2584.3[a] 8	10$^-$		
2730.2 7	(10)		
2759.5 7	9$^-$		
2823.2[a] 8	11$^-$		
2950.9 7	(11)		
2981.2 7	10$^-$		
3221.8 7	11$^-$		
3378.2[&] 8	12$^+$	68 ns 2	T$_{1/2}$: from 555γ(t) (2012Sw02).
3547.0[&] 9	13$^+$		
3736.3[&] 9	14$^+$		
3944.6[&] 9	15$^+$		
4171.5[&] 9	16$^+$		
4415.5[&] 10	17$^+$		

[†] From least-squares fit to Eγ data, assuming 0.5 keV uncertainty for Eγ when not stated.
[‡] As listed in 2012Sw02, based mostly on previous assignments.
[#] Band(A): g.s. band.
[@] Band(B): K^π=5$^-$ band.
[&] Band(C): K^π=12$^+$ band.
[a] Band(D): K^π=7$^-$ band.
[b] Band(E): γ band.

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$\gamma(^{164}Er)$

Hindrance factor $F_W=\Gamma(\text{Weisskopf})/\Gamma_\gamma$. Reduced hindrance factor $f_\nu=F_W^{1/\nu}$, where $\nu=\Delta K-\lambda$, where λ=multipole order. See further details of the formulation and definitions in 2015Ko14 review. 2012Sw02 give f_ν values as well as effective f_ν values, where for the latter is obtained from $F_W/10^4$.

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[‡]	Comments
80		1745.1	6^-	1665.0	5^-			
92		92.0	2^+	0.0	0^+			
101		1845.8	7^-	1745.1	6^-			
139.8 *1*	57 *2*	1985.5	7^-	1845.8	7^-	[M1]	1.095	Mult.: E2 in Adopted dataset based on ce data in ^{164}Tm ε decay (5.1 min).
156.4 *1*	22 *2*	3378.2	12^+	3221.8	11^-	(E1)	0.099	α(exp)=0.12 *11* (2012Sw02) Reduced hindrance factor f_ν=53-2800; effective f_ν=5.3-28.
169		3547.0	13^+	3378.2	12^+			
179		2164.4	8^-	1985.5	7^-			
185.9 *1*	6 *1*	2526.5	(9)	2340.6	(8)			
189		3736.3	14^+	3547.0	13^+			
200		2364.3	9^-	2164.4	8^-			
203.7 *1*	5.2 *3*	2730.2	(10)	2526.5	(9)			
208		300.0	4^+	92.0	2^+			
208		3944.6	15^+	3736.3	14^+			
220		2584.3	10^-	2364.3	9^-			
220.7 *1*	7 *2*	2950.9	(11)	2730.2	(10)			
221.7 *1*	2.8 *6*	2981.2	10^-	2759.5	9^-			
227		4171.5	16^+	3944.6	15^+			
239		2823.2	11^-	2584.3	10^-			
240.4 *1*	181 *6*	1985.5	7^-	1745.1	6^-	[M1]	0.242	
240.6 *1*	10 *1*	3221.8	11^-	2981.2	10^-			
244		4415.5	17^+	4171.5	16^+			
251		1198.0	5^+	947.0	3^+			
315		614.9	6^+	300.0	4^+			
355.0 *1*	9.6 *5*	2340.6	(8)	1985.5	7^-			
358		3736.3	14^+	3378.2	12^+			
362.1 *1*	6.2 *5*	2526.5	(9)	2164.4	8^-			
366.6 *1*	4.8 *7*	2950.9	(11)	2584.3	10^-			
379		2364.3	9^-	1985.5	7^-			
389.6 *1*	1.9 *2*	2730.2	(10)	2340.6	(8)			
398		3944.6	15^+	3547.0	13^+			
410		1024.9	8^+	614.9	6^+			
420		2584.3	10^-	2164.4	8^-			
424.4 *1*	7.4 *8*	2950.9	(11)	2526.5	(9)			
427.3 *1*	21 *1*	3378.2	12^+	2950.9	(11)	[D]	0.030 *22*	If E1, reduced hindrance factor f_ν=114-13000; effective f_ν=11-130. If M1, reduced hindrance factor f_ν=36-1300.
435		4171.5	16^+	3736.3	14^+			
459		2823.2	11^-	2364.3	9^-			
462.3 *1*	1.6 *2*	3221.8	11^-	2759.5	9^-	[E2]		
471		4415.5	17^+	3944.6	15^+			
494		1518.7	10^+	1024.9	8^+			
547		1745.1	6^-	1198.0	5^+			
555.0 *1*	100 *3*	3378.2	12^+	2823.2	11^-	[E1]	0.004	Reduced hindrance factor f_ν=94 *1*; effective f_ν=9.4 *1*.
565		2083.4	12^+	1518.7	10^+			
583		1198.0	5^+	614.9	6^+			
595.1 *1*	0.7 *3*	2759.5	9^-	2164.4	8^-			
616.9 *1*	1.2 *2*	2981.2	10^-	2364.3	9^-			

Continued on next page (footnotes at end of table)

^{160}Gd(^{9}Be,5nγ):E=57 MeV 2012Sw02 (continued)

γ(^{164}Er) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[‡]	Comments
637.5 *1*	3.9 *4*	3221.8	11^-	2584.3	10^-			
647		947.0	3^+	300.0	4^+			
773.9 *1*	3.6 *5*	2759.5	9^-	1985.5	7^-	[E2]		
816.8 *1*	4.9 *5*	2981.2	10^-	2164.4	8^-			
821		1845.8	7^-	1024.9	8^+			
855		947.0	3^+	92.0	2^+			
857.5 *1*	7.1 *5*	3221.8	11^-	2364.3	9^-			
898		1198.0	5^+	300.0	4^+			
960.6 *2*	5.6 *7*	1985.5	7^-	1024.9	8^+	[E1]	0.001	Reduced hindrance factor f_ν=43 *1*; effective f_ν=9.2 *2*.
1050		1665.0	5^-	614.9	6^+			
1130		1745.1	6^-	614.9	6^+			
1231		1845.8	7^-	614.9	6^+			
1294.8 *3*	2.0 *3*	3378.2	12^+	2083.4	12^+	[M1]	0.003	Reduced hindrance factor f_ν=6.2 *1*.
1365		1665.0	5^-	300.0	4^+			
1370.6 *2*	19 *1*	1985.5	7^-	614.9	6^+	[E1]	0.001	Reduced hindrance factor f_ν=42 *1*; effective f_ν=9.0 *2*.
1859.5[#] *6*	0.4 *2*	3378.2	12^+	1518.7	10^+	[E2]	0.001	Reduced hindrance factor f_ν=5.9 *+4−2*.

[†] Some multipolarities are listed by 2012Sw02 based on ΔJ^π; these are treated as assumed here in the absence of supporting data.

[‡] 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.

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

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Level Scheme

Intensities: Relative I_γ

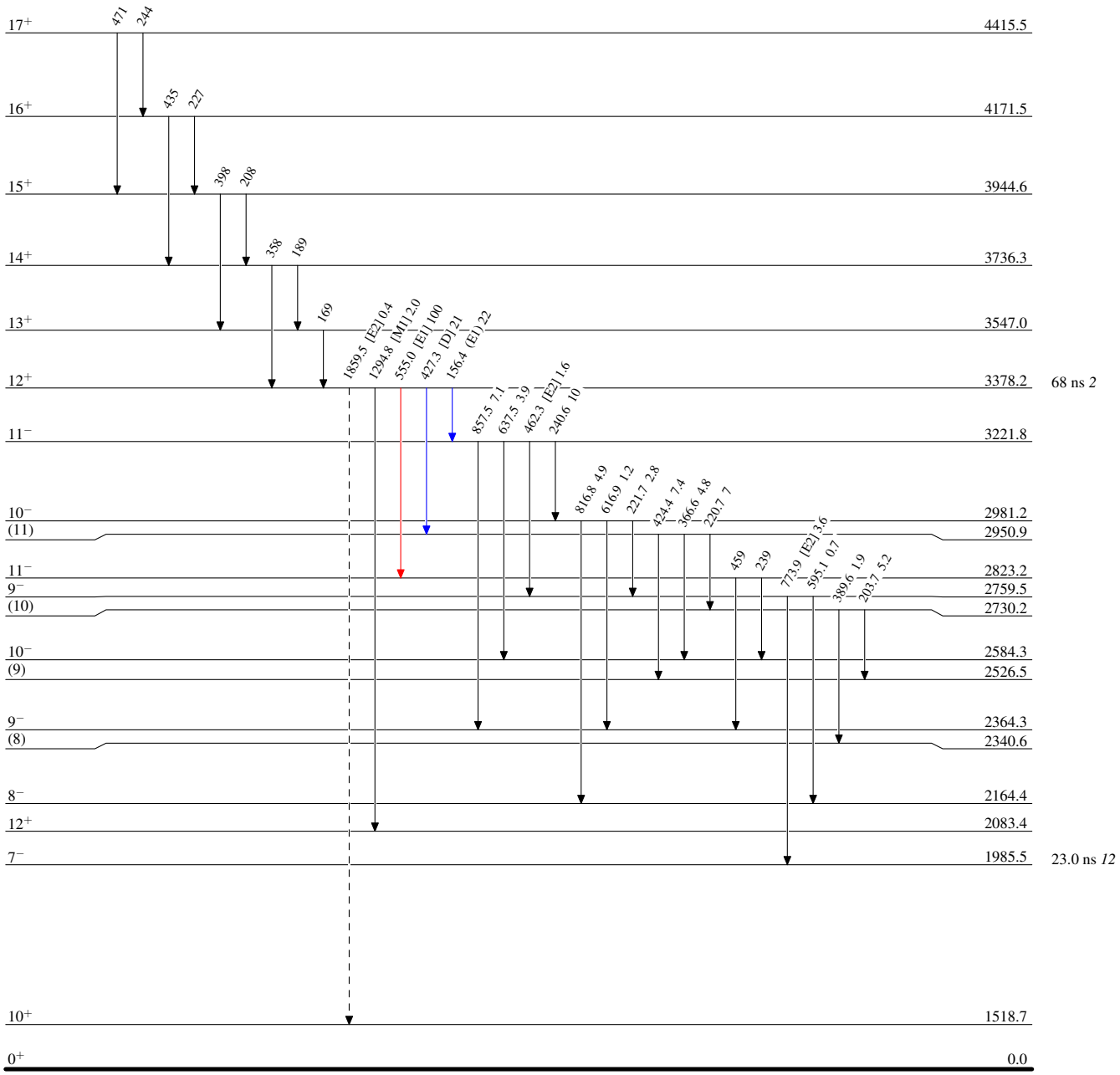
Legend

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

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

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

γ Decay (Uncertain)



$^{164}_{68}Er_{96}$

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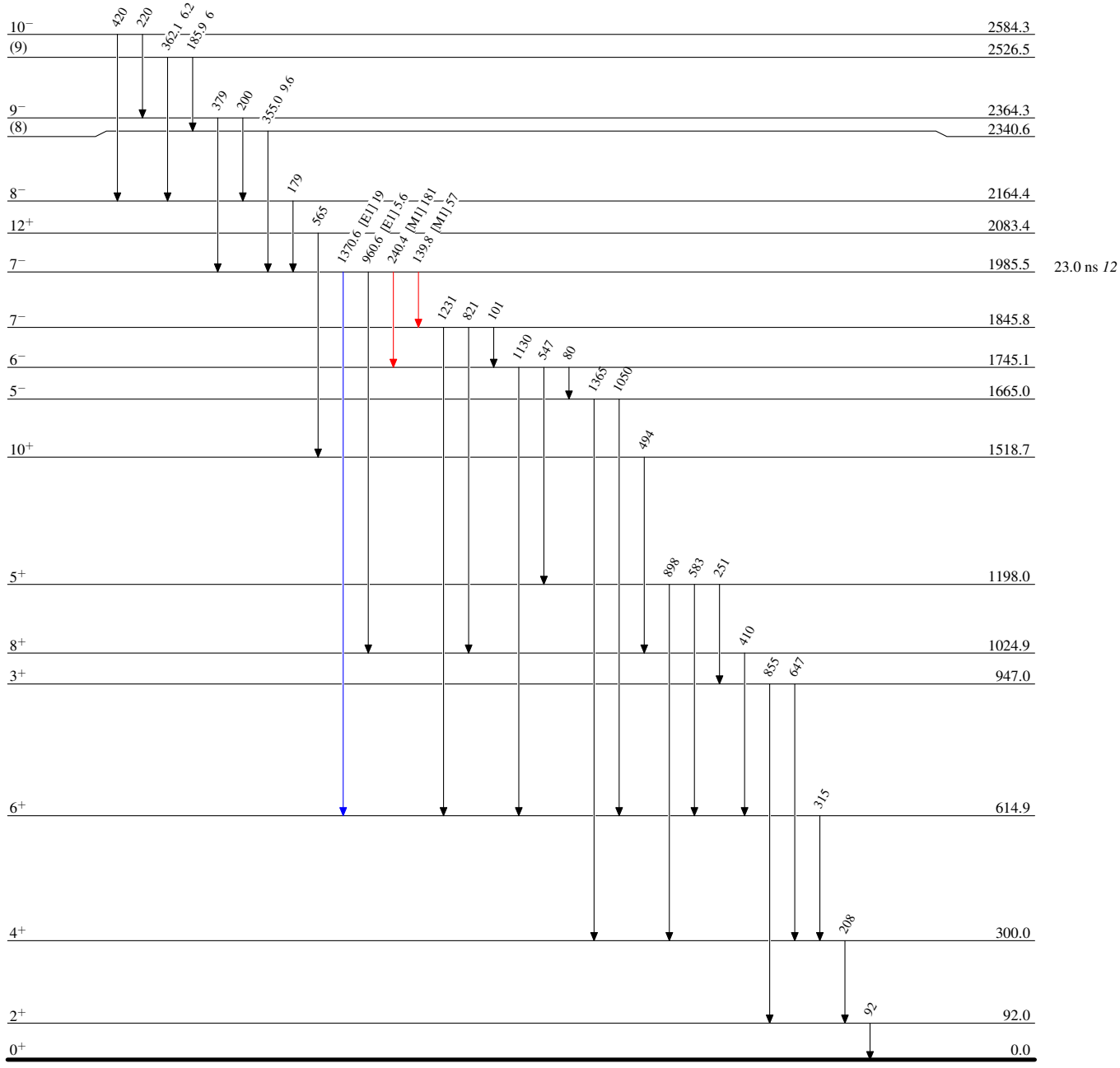
Level Scheme (continued)

Intensities: Relative I_γ

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



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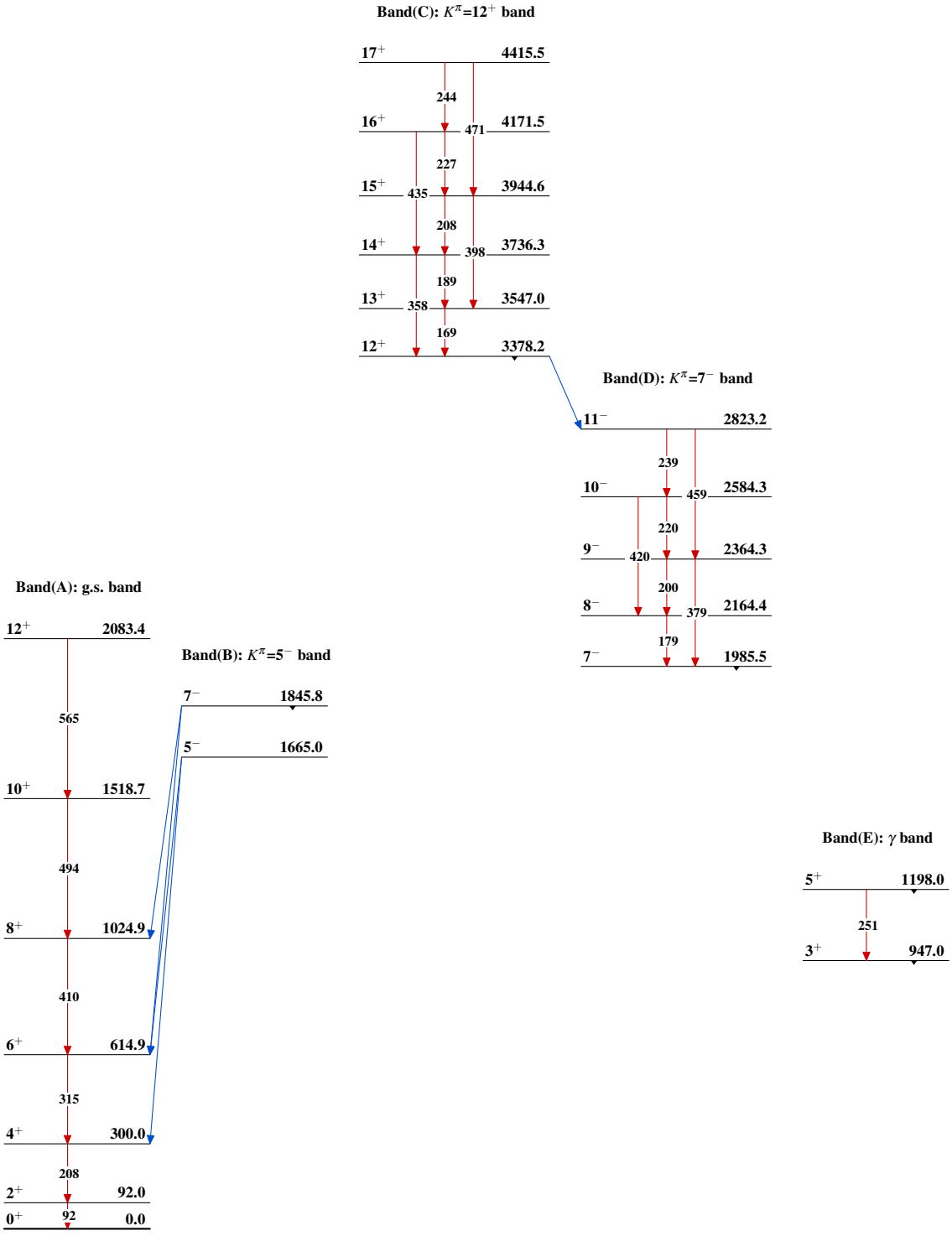

$^{164}_{68}Er_{96}$