

Adopted Levels, Gammas

Type	History		Literature Cutoff Date
	Author	Citation	
Full Evaluation	Balraj Singh	ENSDF	08-Dec-2015

Q(β^-)=891 5; S(n)=6836 4; S(p)=925×10¹ 60; Q(α)=-35×10¹ 14 2012Wa38

S(2n)=12518 4, S(2p)=17400 200 (syst) (2012Wa38).

¹⁷²Er identified by 1956Ne08 from high-energy fission of uranium followed by chemical separation. Later studies of decay of

¹⁷²Er: 1961Ha42, 1961Or01, 1962Gu03, 1967Cl05, 1965Ha24, 1968Ha08, 1972Ba01, 1976MeZC.

Additional information 1.

Nuclear structure theory calculations:

2013Ch02 and 2011Sh38: B(E2).

2011Te04: gamma- and beta-vibrational states, B(E2).

2009Ro17: analyzed energies, routhians, alignments, kinematic and dynamic moments of inertia.

1981Na11: electric quadrupole, hexadecapole moment.

¹⁷²Er Levels

Cross Reference (XREF) Flags

- A ¹⁷²Ho β^- decay (25 s)
- B ¹⁷⁰Er(t,p)
- C ¹⁷⁰Er(¹³⁶Xe,X γ)
- D ¹⁷⁰Er(²³⁸U,X γ)

E(level) [†]	J π [‡]	T _{1/2}	XREF	Comments
0.0 [#]	0 ⁺	49.3 h 5	ABCD	% β^- =100 T _{1/2} : weighted average of 49.8 h 10 (1956Ne08), 49.5 h 5 (1961Ha42), 50.4 h 10 (1961Or01), 48.7 h 5 (1962Gu03). See 1985Be34 for measured $\Delta\langle r^2 \rangle$ and isotope shifts.
77.0 [#] 2	(2 ⁺)		ABCD	
255.2 [#] 3	(4 ⁺)		ABCD	
530.2 [#] 3	(6 ⁺)		CD	
834.3 6			A	
897.9 [#] 4	(8 ⁺)		CD	
961.4 4	(1,2 ⁺)		AB	J π : γ to 0 ⁺ .
1034.4 [@] 3	(3 ⁺)		ABC	E(level): evaluator assumes that only one level is populated near this energy, even though there is disagreement in the gamma-ray deexcitation of this level in the two studies, β^- decay and (¹³⁶ Xe,X γ). J π : Jpi:
1125.5 6			AB	
1131.3 [@] 3	(4 ⁺)		C	
1251.5 [@] 3	(5 ⁺)		C	
1263.3 ^{&} 3	(4 ⁻)	39.5 ns 2l	A C	J π : γ s to (2 ⁺) and (4 ⁺).
1280 3			B	
1322 3	0 ⁺		B	J π : L(t,p)=0.
1351.7 [#] 4	(10 ⁺)		CD	
1367.2 ^{&} 3	(5 ⁻)		C	
1390 3			B	
1396.9 4	(3 ⁺ ,4 ⁺ ,5 ⁺)		A	J π : (E1) γ to (4 ⁻); γ to (4 ⁺).
1470 3	0 ⁺		B	J π : L(t,p)=0.
1491.3 ^{&} 3	(6 ⁻)		C	
1495 3			B	

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Adopted Levels, Gammas (continued) ^{172}Er Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2}	XREF	Comments
1500.9 ^a 3	(6 ⁺)	0.57 μs 6	C	
1635.0 ^{&} 3	(7 ⁻)		C	
1654.3 ^a 3	(7 ⁺)		C	
1713 3			B	
1729 3			B	
1792.4 ^b 3	(7 ⁻)		C	
1798.9 ^{&} 4	(8 ⁻)		C	
1820 3			B	
1828.5 ^a 3	(8 ⁺)		C	
1843 3			B	
1885.3 [#] 5	(12 ⁺)		CD	
1906 3			B	
1926 3			B	
1945.0 ^b 4	(8 ⁻)		C	
1950 3			B	
1980.9 ^{&} 4	(9 ⁻)		C	
1983 3			B	
2004 3			B	
2022.1 ^a 4	(9 ⁺)		C	
2110.7 ^b 4	(9 ⁻)		C	
2234 3			B	
2253 3			B	
2286 3			B	
2294.5 ^b 4	(10 ⁻)		C	
2308 3			B	
2382 3			B	
2403 3	0 ⁺		B	J ^π : L(t,p)=0.
2474 3			B	
2490.3 [#] 11	(14 ⁺)		D	
2498.5 ^b 5	(11 ⁻)		C	
2502 3			B	
2545 3			B	
2635 3			B	
2657 3			B	
2679 3			B	
2697 3			B	
2741 3			B	
2768 3			B	
2789 3			B	
2807 3			B	
2827 3			B	
2856 3			B	
3164.3 [#] 15	(16 ⁺)		D	
3898.3 [#] 18	(18 ⁺)		D	
4686.3 [#] 21	(20 ⁺)		D	
5528.3 [#] 23	(22 ⁺)		D	

[†] From least-squares fit to E_γ values.

[‡] As proposed by 2010Dr02 based on band structures and γ-decay pattern, unless otherwise stated.

Band(A): K^π=0⁺ g.s. band.

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Adopted Levels, Gammas (continued)

^{172}Er Levels (continued)

@ Band(B): $K^\pi=2^+$ γ -vibrational band.

& Band(C): $K^\pi=(4^-)$ band. Dominant configuration= $\pi 7/2[523]+\pi 1/2[411]$.

^a Band(D): $K^\pi=(6^+)$ band. Possible configuration= $\nu 5/2[512]+\nu 7/2[514]$.

^b Band(E): $K^\pi=(7^-)$ band. Probable configuration= $\nu 7/2[633]+\nu 7/2[514]$.

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\ddagger	E_f	J_f^π	Mult.	$\alpha^\#$	Comments
77.0	(2 ⁺)	77.0 2	100	0.0	0 ⁺	[E2]	8.13 15	$\alpha(\text{K})=1.79$ 3; $\alpha(\text{L})=4.85$ 9; $\alpha(\text{M})=1.182$ 23 $\alpha(\text{N})=0.267$ 5; $\alpha(\text{O})=0.0310$ 6; $\alpha(\text{P})=8.04\times 10^{-5}$ 13
255.2	(4 ⁺)	178.1 2	100	77.0	(2 ⁺)	[E2]	0.372	$\alpha(\text{K})=0.227$ 4; $\alpha(\text{L})=0.1116$ 17; $\alpha(\text{M})=0.0267$ 4 $\alpha(\text{N})=0.00607$ 9; $\alpha(\text{O})=0.000741$ 11; $\alpha(\text{P})=1.039\times 10^{-5}$ 15
530.2	(6 ⁺)	275.0 2		255.2	(4 ⁺)			
834.3		757.2 7	100	77.0	(2 ⁺)			
897.9	(8 ⁺)	367.7 2		530.2	(6 ⁺)			
961.4	(1,2 ⁺)	884.4 5	73 20	77.0	(2 ⁺)			
		961.4 5	100 23	0.0	0 ⁺			
1034.4	(3 ⁺)	779.3 2		255.2	(4 ⁺)			E_γ : γ from ($^{136}\text{Xe}, X\gamma$) only, not reported in β^- decay.
		957.3 2	100 27	77.0	(2 ⁺)			
		1033.7 @ 6	32 23	0.0	0 ⁺	[M3]		E_γ : weak γ only from ^{172}Ho decay, considered suspect by the evaluator since implied (M3) multipolarity is unlikely.
1125.5		291.1 5	100	834.3				
1131.3	(4 ⁺)	876.1 2		255.2	(4 ⁺)			
		1054.5 2		77.0	(2 ⁺)			
1251.5	(5 ⁺)	721.6 2		530.2	(6 ⁺)			
		996.3 2		255.2	(4 ⁺)			
1263.3	(4 ⁻)	137.8 6	54 13	1125.5		[D,E2]	0.64 51	E_γ : γ only from ^{172}Ho decay.
		229.4 6	40 3	1034.4	(3 ⁺)	[E1]	0.0365	$\alpha(\text{K})=0.0307$ 5; $\alpha(\text{L})=0.00451$ 7; $\alpha(\text{M})=0.000995$ 16 $\alpha(\text{N})=0.000230$ 4; $\alpha(\text{O})=3.20\times 10^{-5}$ 5; $\alpha(\text{P})=1.543\times 10^{-6}$ 24 $\text{B}(\text{E}1)(\text{W.u.})=6.3\times 10^{-8}$ 11
		1008.1 5	100 3	255.2	(4 ⁺)	[E1]	1.35×10^{-3}	$\alpha(\text{K})=0.001150$ 17; $\alpha(\text{L})=0.0001550$ 22; $\alpha(\text{M})=3.39\times 10^{-5}$ 5 $\alpha(\text{N})=7.89\times 10^{-6}$ 11; $\alpha(\text{O})=1.139\times 10^{-6}$ 16; $\alpha(\text{P})=6.30\times 10^{-8}$ 9 $\text{B}(\text{E}1)(\text{W.u.})=1.8\times 10^{-9}$ 3
		1186.1 6	62 19	77.0	(2 ⁺)	[M2]	0.00984	$\alpha(\text{K})=0.00825$ 12; $\alpha(\text{L})=0.001236$ 18; $\alpha(\text{M})=0.000275$ 4 $\alpha(\text{N})=6.41\times 10^{-5}$ 9; $\alpha(\text{O})=9.29\times 10^{-6}$ 13; $\alpha(\text{P})=5.16\times 10^{-7}$ 8; $\alpha(\text{IPF})=9.84\times 10^{-7}$ 21 $\text{B}(\text{M}2)(\text{W.u.})=0.0023$ 8 E_γ : from ^{172}Ho decay only.
1351.7	(10 ⁺)	453.8 2		897.9	(8 ⁺)			
1367.2	(5 ⁻)	103.8 2		1263.3	(4 ⁻)			
		1112.0 2		255.2	(4 ⁺)			

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Adopted Levels, Gammas (continued)

$\gamma(^{172}\text{Er})$ (continued)								
$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\ddagger	E_f	J_f^π	Mult.	$\alpha^\#$	Comments
1396.9	(3 ⁺ ,4 ⁺ ,5 ⁺)	133.6 3	100	1263.3	(4 ⁻)	(E1)	0.1507 23	$\alpha(\text{K})=0.1259$ 20; $\alpha(\text{L})=0.0194$ 3; $\alpha(\text{M})=0.00428$ 7 $\alpha(\text{N})=0.000983$ 15; $\alpha(\text{O})=0.0001338$ 21; $\alpha(\text{P})=5.91\times 10^{-6}$ 9 Mult.: from estimated $\alpha(\text{exp})$ in ^{172}Ho β^- .
1491.3	(6 ⁻)	1141.7 5 124.1 2 228.0 2	11 4 100 30 3	255.2 (4 ⁺) 1367.2 (5 ⁻) 1263.3 (4 ⁻)				
1500.9	(6 ⁺)	133.6 2	100 3	1367.2 (5 ⁻)		E1	0.1507	$\alpha(\text{K})=0.1259$ 19; $\alpha(\text{L})=0.0194$ 3; $\alpha(\text{M})=0.00428$ 7 $\alpha(\text{N})=0.000983$ 15; $\alpha(\text{O})=0.0001338$ 20; $\alpha(\text{P})=5.91\times 10^{-6}$ 9 B(E1)(W.u.)= 1.09×10^{-7} 13 Mult.: from total conversion coefficient measured from delayed intensity balance in ($^{136}\text{Xe},x\gamma$).
		249.6 2	11.3 8	1251.5 (5 ⁺)		[M1]	0.219	$\alpha(\text{K})=0.184$ 3; $\alpha(\text{L})=0.0272$ 4; $\alpha(\text{M})=0.00603$ 9 $\alpha(\text{N})=0.001406$ 20; $\alpha(\text{O})=0.000204$ 3; $\alpha(\text{P})=1.127\times 10^{-5}$ 16 B(M1)(W.u.)= 1.90×10^{-7} 25
		369.7 2	12.1 8	1131.3 (4 ⁺)		[E2]	0.0373	$\alpha(\text{K})=0.0285$ 4; $\alpha(\text{L})=0.00684$ 10; $\alpha(\text{M})=0.001583$ 23 $\alpha(\text{N})=0.000364$ 6; $\alpha(\text{O})=4.77\times 10^{-5}$ 7; $\alpha(\text{P})=1.520\times 10^{-6}$ 22 B(E2)(W.u.)=0.00021 3
		970.5 2	6.2 8	530.2 (6 ⁺)		[M1]	0.00663	$\alpha(\text{K})=0.00562$ 8; $\alpha(\text{L})=0.000794$ 12; $\alpha(\text{M})=0.0001750$ 25 $\alpha(\text{N})=4.08\times 10^{-5}$ 6; $\alpha(\text{O})=5.93\times 10^{-6}$ 9; $\alpha(\text{P})=3.35\times 10^{-7}$ 5 B(M1)(W.u.)= 1.8×10^{-9} 3
1635.0	(7 ⁻)	143.8 2 267.6 2	100 47 5	1491.3 (6 ⁻) 1367.2 (5 ⁻)				
1654.3	(7 ⁺)	153.3 2		1500.9 (6 ⁺)				
1792.4	(7 ⁻)	138.1 2 291.4 2		1654.3 (7 ⁺) 1500.9 (6 ⁺)				
1798.9	(8 ⁻)	163.8 2 307.7 2	100 92 9	1635.0 (7 ⁻) 1491.3 (6 ⁻)				
1828.5	(8 ⁺)	174.0 2 327.7 2	100 32 7	1654.3 (7 ⁺) 1500.9 (6 ⁺)				
1885.3	(12 ⁺)	533.6 2		1351.7 (10 ⁺)				
1945.0	(8 ⁻)	152.6 2		1792.4 (7 ⁻)				
1980.9	(9 ⁻)	182 1 345.9 2		1798.9 (8 ⁻) 1635.0 (7 ⁻)				
2022.1	(9 ⁺)	193.6 2 368 1		1828.5 (8 ⁺) 1654.3 (7 ⁺)				
2110.7	(9 ⁻)	165.5 2 318.4 2	100 48 7	1945.0 (8 ⁻) 1792.4 (7 ⁻)				
2294.5	(10 ⁻)	183.6 2 349.7 2		2110.7 (9 ⁻) 1945.0 (8 ⁻)				
2490.3	(14 ⁺)	605 1		1885.3 (12 ⁺)				
2498.5	(11 ⁻)	204.0 2 388 1		2294.5 (10 ⁻) 2110.7 (9 ⁻)				
3164.3	(16 ⁺)	674 1		2490.3 (14 ⁺)				
3898.3	(18 ⁺)	734 1		3164.3 (16 ⁺)				

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Adopted Levels, Gammas (continued) $\gamma(^{172}\text{Er})$ (continued)

<u>$E_i(\text{level})$</u>	<u>J_i^π</u>	<u>E_γ</u> [†]	<u>E_f</u>	<u>J_f^π</u>
4686.3	(20 ⁺)	788 <i>I</i>	3898.3	(18 ⁺)
5528.3	(22 ⁺)	842 <i>I</i>	4686.3	(20 ⁺)

[†] Values are from $^{170}\text{Er}(^{136}\text{Xe}, X\gamma)$ when available, otherwise from $^{172}\text{Ho} \beta^-$ decay.

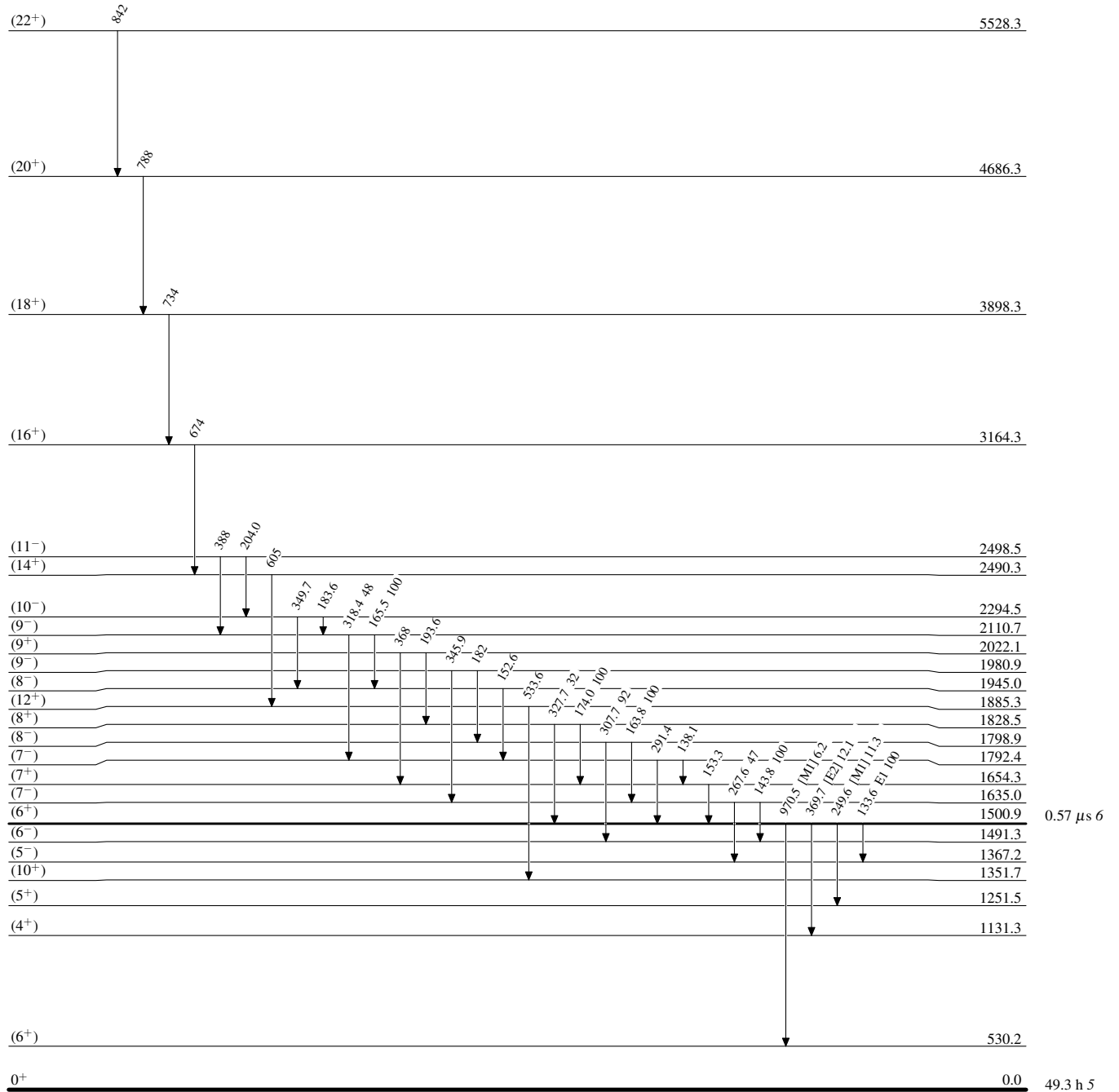
[‡] Primarily from $^{172}\text{Ho} \beta^-$ decay. Only for a few high-spin values are available from ($^{136}\text{Xe}, X\gamma$).

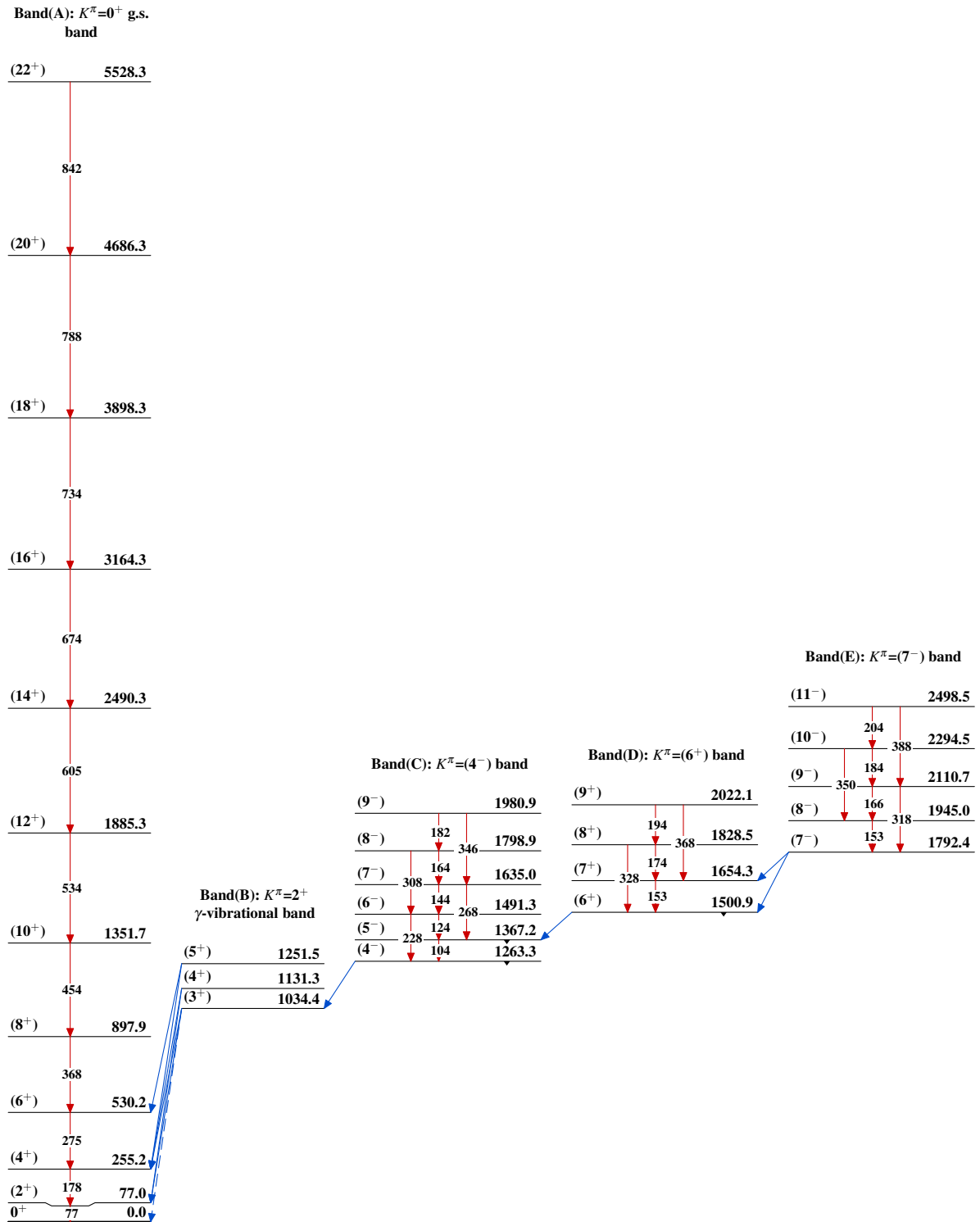
From BrIcc v2.3b (16-Dec-2014) [2008Ki07](#), "Frozen Orbitals" appr. When no δ value given, value overlaps listed multipolarities.

@ Placement of transition in the level scheme is uncertain.

Adopted Levels, GammasLevel Scheme

Intensities: Relative photon branching from each level

 $^{172}_{68}\text{Er}_{104}$

Adopted Levels, Gammas $^{172}_{68}\text{Er}_{104}$