Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin, E. A. Mccutchan	NDS 151, 334 (2018)	30-Jun-2018

Q(β^-)=1492.1 *13*; S(n)=5681.6 *4*; S(p)=8770 *50*; Q(α)=−210 *60* 2017Wa10
S(2n)=12938.5 *15*; S(2p)=16700 *300* (2017Wa10).

^{171}Er Levels

Cross Reference (XREF) Flags

A	^{171}Ho β^- decay	E	^{170}Er(^{12}C,^{11}Cγ), (^{16}O,^{15}Oγ)
B	^{170}Er(n,γ) E=thermal	F	^{170}Er(^{238}U,Xγ)
C	^{170}Er(d,p)	G	^{170}Er(n,γ) E=res
D	^{170}Er(d,pγ)		

E(level)†	Jπ‡	$T_{1/2}$	XREF	Comments
0.0[b]	5/2$^-$	7.516 h *2*	ABCDEF	%β^-=100 μ=0.659 *10*; Q=2.86 *9* μ,Q: from atomic beam (1964Bu09); μ relative to μ=−0.56385 *12* for ^{167}Er, Q relative to Q=+3.565 *29* for ^{167}Er. Jπ: 5/2 from atomic beam (1976Fu06); π from μ being consistent with 5/2[512] g.s. orbital assignment. $T_{1/2}$: from 1989Ab18. Others: 1968Me02, 1958Cr84 (7.52 h *3*), 1948Ke11, 1951Ke44.
79.05[b] *10*	(7/2$^-$)		ABC EF	
180.4[#] *7*	(9/2$^-$)		C EF	
198.61[d] *9*	1/2$^-$	210 ns *10*	ABCD F	Jπ: E2 198.6γ to 5/2$^-$; population by primary γ in ^{170}Er(n,γ) E=thermal; spectroscopic factor in (d,p) fits theory for 1/2$^-$ 1/2[521] assignment. $T_{1/2}$: from p-ce(t) in ^{170}Er(d,pγ) (1969BoZL). Others: 200 ns *15* (pγ(t) in ^{170}Er(d,pγ) (1969BoZL)) and 200 ns *30* (1990Ch34) in β^- decay.
256.8[d] *15*	(3/2$^-$)		BC F	Jπ: population by primary γ in ^{170}Er(n,γ) E=thermal; spectroscopic factor in (d,p) fits theory for 3/2$^-$ 1/2[521] assignment.
278.9[d] *8*	(5/2$^-$)		BC F	
303.8[#] *8*	(11/2$^-$)		C EF	
358.28[f] *25*	(7/2$^+$)[&]		A E	
378? *10*			C	E(level): suggested as 9/2[624] bandhead in (d,p); however, if the 971 level is indeed the J=13/2 member of that band, this level energy is far too low for the J=9/2 member. Level shown As uncertain because other low energy configurations are already assigned to other levels.
417.3[f] *9*	(9/2$^+$)[&]		E	
417.8[d] *18*	(7/2$^-$)		C F	
449.2[b] *9*	13/2$^-$		F	
453.9[d] *13*	(9/2$^-$)		C F	
504.3[f] *9*	(11/2$^+$)[&]		E	
532.27[g] *10*	(7/2$^-$)		A C	
615.2[f] *11*	(13/2$^+$)[&]		C E	
615.3[c] *10*	15/2$^-$		F	
645[#] *10*	(9/2$^-$)		C E	
671.8[e] *21*	(11/2$^-$)		C F	
706.9[h] *10*	(1/2$^-$)		BC	Jπ: population by primary γ in ^{170}Er(n,γ) E=thermal; 1/2$^-$ consistent with band assignment.

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Adopted Levels, Gammas (continued)

^{171}Er Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
722.9[d] *17*	13/2⁻	F	
727.60 *10*		A	
736.8?[h] *15*	(3/2⁻)	BC	Jπ: γ to 1/2⁻; 3/2⁻ consistent with band assignment.
794.2[h] *9*	(5/2⁻)	BC	
803.3[b] *11*	17/2⁻	F	
841.23 *21*	(3/2⁻,5/2⁻)	A	E(level): order of 61.2γ-642.5γ cascade not established, but E(level)=259.8 keV seems unlikely since other levels account for the states expected from the lowest-energy configurations. Jπ: (M1) γ from (5/2⁻), γ to 1/2⁻.
880[h] *10*	(7/2⁻)	C	
903.11 *21*	(5/2⁻)	A	Jπ: γ to 1/2⁻; γ-ray intensity data suggest allowed β⁻ feeding from (7/2⁻).
904.8[i] *7*	(3/2⁻)	BC	Jπ: population by primary γ in ^{170}Er(n,γ) E=thermal; 3/2⁻ consistent with band assignment.
907.13 *12*	(5/2⁻)	A	Jπ: γ to 1/2⁻; γ-ray intensity data suggest allowed β⁻ feeding from (7/2⁻).
970.3 *14*	(13/2⁺)	E	E(level): possible member of 9/2[624] band.
972[i] *10*	(5/2⁻)	C	E(level): may include component from 9/2⁻ 1/2[510] state (expected at 977 keV).
1011.1[c] *12*	19/2⁻	F	
1013.8[e] *23*	15/2⁻	F	
1061[i] *10*	(7/2⁻)	C	
1081.9[d] *19*	17/2⁻	F	
1106[h] *10*	(11/2⁻)	C	
1171[i] *10*	(9/2⁻)	C	
1220.2 *7*	(3/2⁻)	BC	Jπ: γ to (7/2⁻); population by primary γ in ^{170}Er(n,γ) E=thermal.
1238.5[b] *13*	21/2⁻	F	
1263.0 *18*	1/2,3/2[a]	BC	
1304 *10*		C	
1334.2 *12*	1/2,3/2[a]	B	
1374.0 *15*	1/2,3/2[a]	BC	
1405 *10*		C	
1435 *10*		C	
1438[e] *3*	19/2⁻	F	
1471 *10*		C	
1485.1[c] *16*	23/2⁻	F	
1496.4 *15*	1/2,3/2[a]	B	
1508 *10*		C	
1519.6 *16*	1/2,3/2[a]	B	
1524.9[d] *22*	21/2⁻	F	
1535 *10*		C	
1560 *20*	(13/2⁺,15/2⁻)[&]	E	E(level): possible 13/2⁺ 11/2[615] or 15/2⁻ 1/2[770] state.
1570 *10*		C	
1616 *10*		C	
1627.0 *12*	1/2,3/2[a]	B	
1647 *10*		C	
1682 *10*		C	
1722.9[@] *16*	1/2,3/2[a]	BC	
1750 *20*	(7/2⁻)[&]	E	E(level): possible 7/2[503] bandhead.
1752.5[b] *17*	25/2⁻	F	
1756.5[@] *16*	1/2,3/2[a]	Bc	
1766.2 *10*		A c	
1796.9?[@] *16*	(1/2,3/2)[a]	BC	
1823[#] *10*	(9/2⁻)[&]	C E	E(level): possible 9/2[505] bandhead.

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Adopted Levels, Gammas (continued)

^{171}Er Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
1857 *10*		C	
1925 *10*		C	
1941[e] *3*	23/2−	F	
1962.0 *12*	1/2,3/2[a]	B	
1976.4[@] *12*	1/2,3/2[a]	BC	
2036.1[c] *19*	27/2−	F	
2036.8 *21*	1/2,3/2[a]	B	
2045.9[d] *24*	25/2−	F	
2053.0 *12*	1/2,3/2[a]	B	
2064.1 *12*	1/2,3/2[a]	B	
2087.3[@] *12*	1/2,3/2[a]	Bc	
2104.0[@] *10*	1/2,3/2[a]	Bc	
2138 *10*		C	
2172 *10*		C	
2195 *10*		C	
2265 *10*		C	
2285 *10*		C	
2308 *10*		C	
2335 *10*		C	
2340.5[b] *19*	29/2−	F	
2361 *10*		C	
2385 *10*		C	
2523[e] *3*	27/2−	F	
2600 *20*	(5/2−)[&]	E	E(level): possible 5/2[503] bandhead.
2639[d] *3*	29/2−	F	
2659.1[c] *21*	31/2−	F	
2998.5[b] *22*	33/2−	F	
3177[e] *3*	31/2−	F	
3299[d] *3*	33/2−	F	
3352.1[c] *24*	35/2−	F	
3723.5[b] *24*	37/2−	F	
3902[e] *4*	35/2−	F	
4018[d] *3*	37/2−	F	
4112[c] *3*	39/2−	F	
4509[b] *3*	41/2−	F	
4790[d] *3*	41/2−	F	
4936[c] *3*	43/2−	F	
5607[d] *4*	45/2−	F	

[†] From least-squares fit to adopted Eγ, except where noted or where cross references clearly indicate other source. 1 keV uncertainty has been assumed In Eγ for which authors did not state an uncertainty.
[‡] From intensity patterns for rotational states, absolute cross sections, and $\sigma(\theta)$ in ^{170}Er(d,p), except where noted.
[#] From ^{170}Er(d,p).
[@] From ^{170}Er(n,γ) E=thermal.
[&] From selective populations of states and/or comparisons of level decay patterns in ^{170}Er(^{12}C,^{11}Cγ), (^{16}O,^{15}Oγ).
[a] From population by primary γ in ^{170}Er(n,γ) E=thermal.
[b] Band(A): 5/2[512], α=+1/2 band. A=11.7, B=−33.3 (5/2, 7/2, 9/2 levels).

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Adopted Levels, Gammas (continued)

^{171}Er Levels (continued)

[c] Band(a): 5/2[512], α=−1/2 band.
[d] Band(B): 1/2[521], α=+1/2 band. A=12.0, B=9.0, a=0.61 (1/2, 3/2, 5/2, 7/2, 9/2 levels).
[e] Band(b): 1/2[521], α=−1/2 band.
[f] Band(C): 7/2[633] band. A=5.4, B=69.3 (7/2, 9/2, 11/2 levels).
[g] Band(D): 7/2[514] band. A=12.5 (7/2, 9/2 levels).
[h] Band(E): 1/2[510] band (+ 5/2[512] γ vibration). A=11.9, B=−57.3, a=−0.22 (1/2, 3/2, 5/2, 7/2, 11/2 levels).
[i] Band(F): 3/2[512] band. A=14.0, B=−62.1 (3/2, 5/2, 7/2 levels).

$\gamma(^{171}Er)$

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Mult.[†]	α[b]	Comments
79.05	(7/2$^-$)	79.1 *1*	100	0.0	5/2$^-$	(M1)	5.59	
180.4	(9/2$^-$)	101.5[a]		79.05	(7/2$^-$)			E_γ: based on level-energy difference.
		180.6[a]		0.0	5/2$^-$			E_γ: based on level-energy difference.
198.61	1/2$^-$	198.6 *1*	100	0.0	5/2$^-$	E2[#]	0.258	B(E2)(W.u.)=0.123 *6*
256.8	(3/2$^-$)	177.8[@] *15*	100	79.05	(7/2$^-$)			
278.9	(5/2$^-$)	279.1[@] *10*	100	0.0	5/2$^-$			
303.8	(11/2$^-$)	123.0[a]		180.4	(9/2$^-$)			E_γ: based on level-energy difference.
		224[a]		79.05	(7/2$^-$)			
358.28	(7/2$^+$)	279.2 *4*	100 *15*	79.05	(7/2$^-$)			
		358.28 *25*	82 *55*	0.0	5/2$^-$			
417.3	(9/2$^+$)	(59[&])	100	358.28	(7/2$^+$)			E_γ: not observed; Eγ estimated from level energy difference.
417.8	(7/2$^-$)	161[a]	100	256.8	(3/2$^-$)			
449.2	13/2$^-$	145.6[a]		303.8	(11/2$^-$)			E_γ: based on level energy difference.
		269[a]		180.4	(9/2$^-$)			
453.9	(9/2$^-$)	175[a]	100	278.9	(5/2$^-$)			
504.3	(11/2$^+$)	87[&d] *1*		417.3	(9/2$^+$)			
		(146[&])		358.28	(7/2$^+$)			E_γ: not observed; Eγ estimated from level energy difference.
		201[&d] *1*		303.8	(11/2$^-$)			
532.27	(7/2$^-$)	453.8 *3*	22 *7*	79.05	(7/2$^-$)			
		532.2 *1*	100 *7*	0.0	5/2$^-$			
615.2	(13/2$^+$)	111[&] *1*	100[&]	504.3	(11/2$^+$)			
		198[&] *1*	79[&]	417.3	(9/2$^+$)			
615.3	15/2$^-$	166.1[a]		449.2	13/2$^-$			E_γ: based on level energy difference.
		312[a]		303.8	(11/2$^-$)			
671.8	(11/2$^-$)	254[a]	100	417.8	(7/2$^-$)			
706.9	(1/2$^-$)	706.9[c@] *10*	100	0.0	5/2$^-$			
722.9	13/2$^-$	269[a]	100	453.9	(9/2$^-$)			
727.60		727.6 *1*	100	0.0	5/2$^-$			
736.8?	(3/2$^-$)	538.2[@] *15*	100	198.61	1/2$^-$			
794.2	(5/2$^-$)	715.2[@] *10*	100[@]	79.05	(7/2$^-$)			
		794.0[@] *15*	96[@]	0.0	5/2$^-$			
803.3	17/2$^-$	187.9[a]		615.3	15/2$^-$			E_γ: based on level energy difference.
		354[a]		449.2	13/2$^-$			
841.23	(3/2$^-$,5/2$^-$)	642.5 *2*	100	198.61	1/2$^-$			
903.11	(5/2$^-$)	61.2 *5*	4 *2*	841.23	(3/2$^-$,5/2$^-$)			
		704.7 *3*	27 *5*	198.61	1/2$^-$			
		823.9 *5*	30 *6*	79.05	(7/2$^-$)			
		903.3 *4*	100 *6*	0.0	5/2$^-$			

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Adopted Levels, Gammas (continued)

γ(^{171}Er) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[‡]	E_f	J_f^π	Comments
904.8	(3/2$^-$)	706.9[c@] *10*	<82[@]	198.61	1/2$^-$	
		904.0[@] *10*	100[@]	0.0	5/2$^-$	
907.13	(5/2$^-$)	708.5 *1*	60 *33*	198.61	1/2$^-$	
		907.2 *2*	100 *11*	0.0	5/2$^-$	
970.3	(13/2$^+$)	466[&] *1*	100	504.3	(11/2$^+$)	
1011.1	19/2$^-$	207.7[a]		803.3	17/2$^-$	E_γ: based on level energy difference.
		396[a]		615.3	15/2$^-$	
1013.8	15/2$^-$	342[a]	100	671.8	(11/2$^-$)	
1081.9	17/2$^-$	359[a]	100	722.9	13/2$^-$	
1220.2	(3/2$^-$)	941.5[@] *10*	100[@]	278.9	(5/2$^-$)	
		1021.7[@] *15*	59[@]	198.61	1/2$^-$	
		1140.3[@] *15*	48[@]	79.05	(7/2$^-$)	
		1220.3[@] *10*	67[@]	0.0	5/2$^-$	
1238.5	21/2$^-$	227.6[a]		1011.1	19/2$^-$	E_γ: based on level energy difference.
		435[a]		803.3	17/2$^-$	
1263.0	1/2,3/2	359.0[@d] *15*	100[@]	904.8	(3/2$^-$)	
		556.1[@] *15*	87[@]	706.9	(1/2$^-$)	
1374.0	1/2,3/2	1175.4[@] *15*	100	198.61	1/2$^-$	
1438	19/2$^-$	424[a]	100	1013.8	15/2$^-$	
1485.1	23/2$^-$	474[a]	100	1011.1	19/2$^-$	
1496.4	1/2,3/2	1297.8[@] *15*	100	198.61	1/2$^-$	
1524.9	21/2$^-$	443[a]	100	1081.9	17/2$^-$	
1752.5	25/2$^-$	514[a]	100	1238.5	21/2$^-$	
1766.2		1687.1 *10*	100	79.05	(7/2$^-$)	
1941	23/2$^-$	503[a]	100	1438	19/2$^-$	
2036.1	27/2$^-$	551[a]	100	1485.1	23/2$^-$	
2045.9	25/2$^-$	521[a]	100	1524.9	21/2$^-$	
2104.0	1/2,3/2	2104[@] *1*	100	0.0	5/2$^-$	
2340.5	29/2$^-$	588[a]	100	1752.5	25/2$^-$	
2523	27/2$^-$	582[a]	100	1941	23/2$^-$	
2639	29/2$^-$	593[a]	100	2045.9	25/2$^-$	
2659.1	31/2$^-$	623[a]	100	2036.1	27/2$^-$	
2998.5	33/2$^-$	658[a]	100	2340.5	29/2$^-$	
3177	31/2$^-$	654[a]	100	2523	27/2$^-$	
3299	33/2$^-$	660[a]	100	2639	29/2$^-$	
3352.1	35/2$^-$	693[a]	100	2659.1	31/2$^-$	
3723.5	37/2$^-$	725[a]	100	2998.5	33/2$^-$	
3902	35/2$^-$	725[a]	100	3177	31/2$^-$	
4018	37/2$^-$	719[a]	100	3299	33/2$^-$	
4112	39/2$^-$	760[a]	100	3352.1	35/2$^-$	
4509	41/2$^-$	786[a]	100	3723.5	37/2$^-$	
4790	41/2$^-$	772[a]	100	4018	37/2$^-$	
4936	43/2$^-$	824[a]	100	4112	39/2$^-$	
5607	45/2$^-$	817[a]	100	4790	41/2$^-$	

[†] From ^{171}Ho β^- decay, except where noted.
[‡] Relative photon branching from each level; values are from ^{171}Ho β^- decay, except where noted. Upper limits are given for photon branchings affected by multiple placement.
[#] From ^{170}Er(d,pγ).

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Adopted Levels, Gammas (continued)

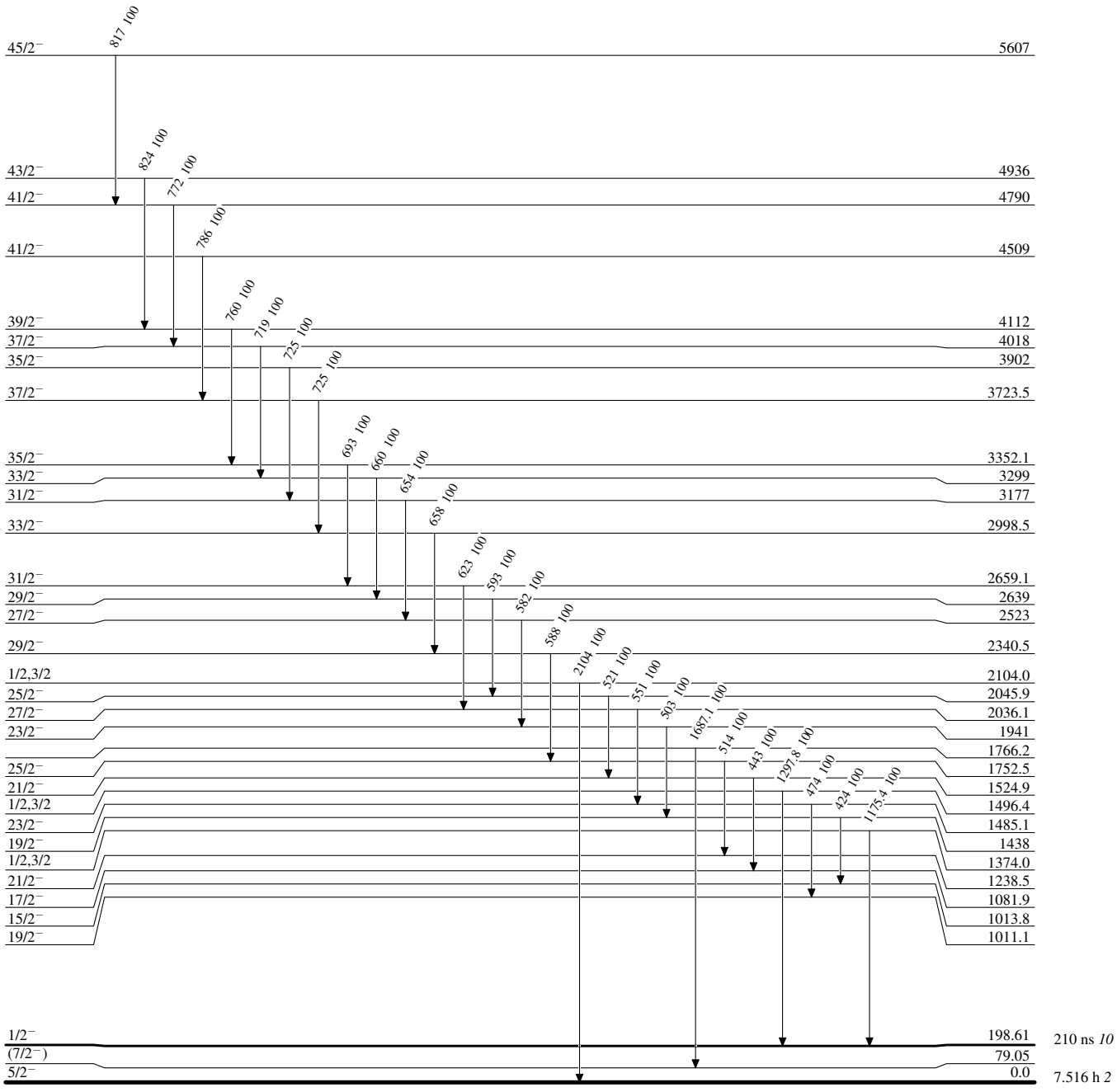
$\gamma(^{171}Er)$ (continued)

@ From $^{170}Er(n,\gamma)$ E=thermal.
& From $^{170}Er(^{12}C,^{11}C\gamma)$, $(^{16}O,^{15}O\gamma)$.
a From $(^{238}U,X\gamma)$.
b 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.
c Multiply placed.
d Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{171}_{68}Er_{103}$

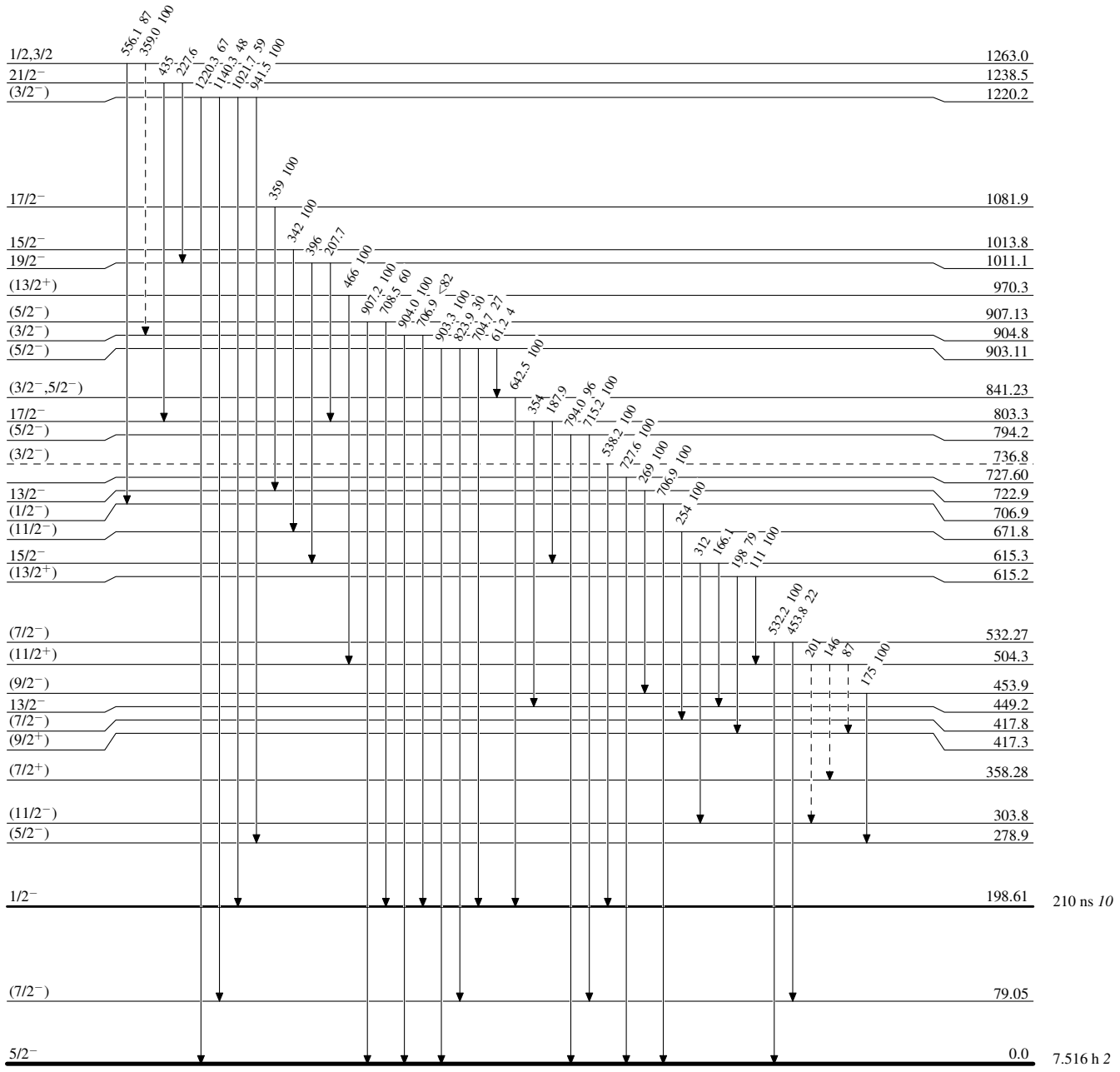
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



$^{171}_{68}Er_{103}$

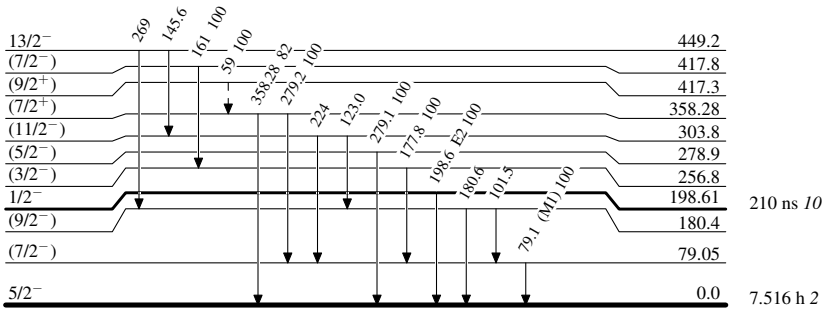
Adopted Levels, Gammas

Legend

Level Scheme (continued)

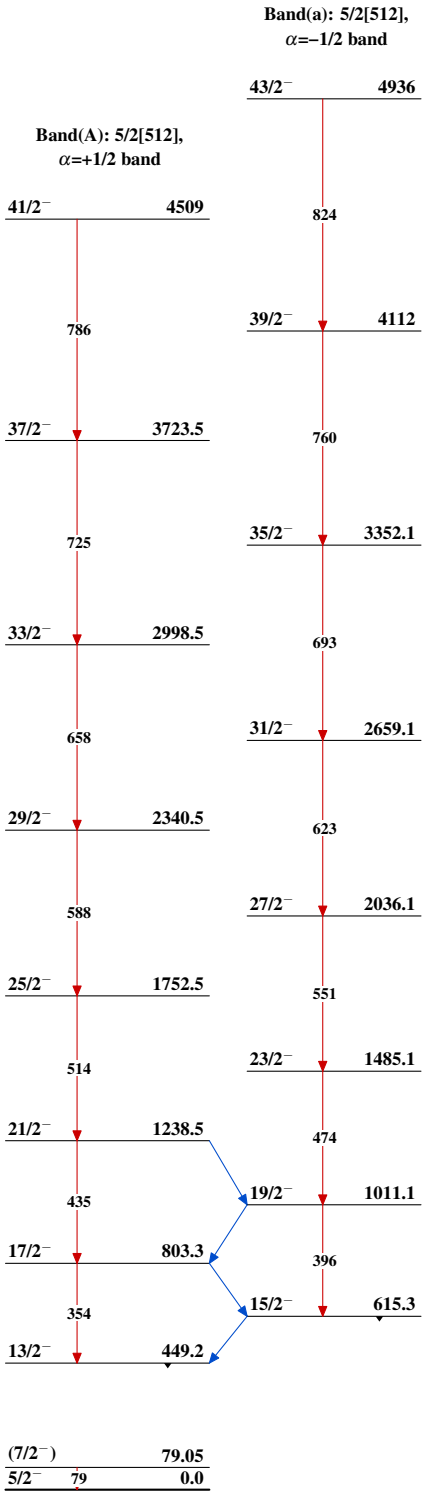
Intensities: Relative photon branching from each level

– – – – – – ► γ Decay (Uncertain)



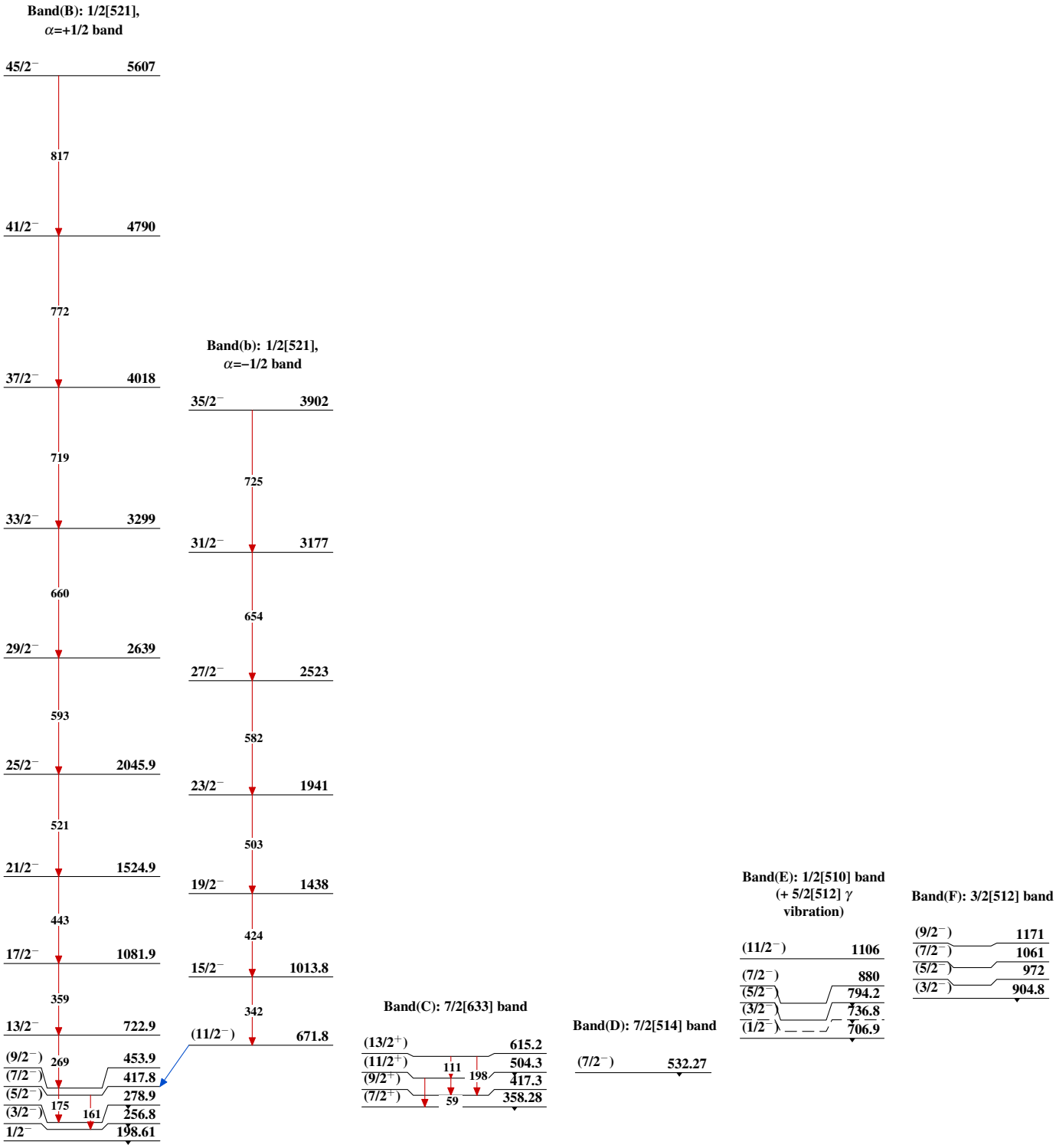
$^{171}_{68}Er_{103}$

Adopted Levels, Gammas



$^{171}_{68}Er_{103}$

Adopted Levels, Gammas (continued)



$^{171}_{68}Er_{103}$