Adopted levels, gammas

Q(β^-)=351.3$_{11}$; S(n)=6003.27$_{15}$; S(p)=8150$_{30}$; Q(α)=264.3$_{12}$; 2003Au03

U other reactions:

^{168}Er(n,γ) E=10-90 keV *55*00 keV (2000HaZX):
Measured cross sections (±5%) and capture γ spectra.

XREF Table

A	^{169}Ho β^- decay
B	^{167}Er(t,p)
C	^{168}Er(n,γ) E=Thermal
D	^{168}Er(n,γ) E=Resonance
E	^{168}Er(d,p), ^{170}Er(d,t)
F	^{168}Er(d,pγ)
G	^{168}Er(^{16}O,^{15}Oγ), (^{12}C,^{11}Cγ)
H	^{170}Er(^{3}He,α)
I	^{170}Er(^{238}U,^{238}U'nγ)

Bands

A	1/2[521], α=+1/2 band
B	1/2[521], α=-1/2 band
C	5/2[512] band
D	7/2[633], α=-1/2 band
E	7/2[633], α=+1/2 band
F	1/2[510] band + (5/2[512] γ vibration)
G	3/2[521] band + (1/2[521] γ vibration)
H	7/2[514] band
I	5/2[523] band
J	3/2[512] band
K	9/2[624] band.
L	11/2[505] band.
M	3/2[402] band.
N	1/2[400] band.

Decay table

Level	Jπ	$T_{1/2}$	μ	Decay Mode
0.0	1/2-	9.392 d *18*	+0.515$_{25}$	%β- =*100*
92.05	(5/2)-	285 ns *20*		
243.69	7/2+	200 ns *10*		

0.0 *moment:* Atomic beam (direct) (1989Ra17).
0.0: Weighted average of 9.40 d *2* (1977My02) and 9.36 d *4* (2004Sc04). others: 1948Ke11 (9.4 d *2*), 1956Bi30 (9.0 d *2*), 1958Pa16 (9.5 d), 1960Wi10 (9.8 d *5*), 1961Bj02 (9.6 d *1*), 1963Ra15 (9.0 d *1*).
92.05: From pγ(t), p-CE(t) in ^{168}Er(d,pγ).
243.69: From pγ(t), p-CE(t) in ^{168}Er(d,pγ).

^{169}Er Levels

Band	E_{level}[a]	Jπ[b]	XREF
A	0.0	1/2-	A CDEF
B	64.550 *20*	3/2-	A CDEF I
A	74.59 *6*	5/2-	A C EF I
C	92.05 *10*	(5/2)-	A C EF
C	176.80 *12*	(7/2)-	A C EFG
B	224.13 *8*	7/2-	A C E I
A	242.00 *12*	9/2-	A C E I
D	243.69 *17*	7/2+	ABC EF I
C	285.20 *24*	(9/2-)[h]	C EF
E	317.3 *6*	(9/2+)[h]	AB E I
D	413.1 *11*	(11/2+)	B E I
C	414 *3*	(11/2-)[h]	E
B	475.1 *10*	11/2-[h]	E I
A	501.0 *10*	13/2-	I
E	526.3 *12*	(13/2)+	B E GHI
F	562.03 *9*	(1/2)-	CDE
	592 *5*		B
F	599.29 *9*	(3/2)-	CDE
F	654.06 *25*	(5/2-)[h]	C E
D	664.1 *15*	(15/2+)	I
G	714.56 *12*	(3/2)-	CDE
F	739.7 *7*	(7/2-)[h]	C E
G	769.56 *10*	(5/2-)[h]	A C E
B	813.1 *15*	15/2-	I
E	816.3 *15*	(17/2+)	I
H	822 *3*	(7/2-)[h]	E
A	848.0 *15*	17/2-	I
	848 *5*	+	B
G	850 *3*[g]	(7/2-)[h]	E H
I	853.00 *8*	5/2-	A C E
	860.12 *14*	(3/2+,5/2+)	CD
	905 *5*	7/2+	B
H	930 *3*[c]	(9/2-)[h]	E GH
I	941.04 *13*	(7/2)-	A E
G	≈ 947	(9/2-)[h]	E
	971 *5*	(+)	B
	990 *3*[c]	(+)	B E
D	999.1 *18*	(19/2+)	I
H	1051 *5*	(11/2-)[h]	E
I	1052 *5*[c]	(9/2-)[h]	E H
	1053.1	1/2-,3/2-	D
	1056 *5*		B
G	1076 *5*	(11/2-)[h]	E
J	1081.65 *22*	(3/2-)	CDE
	1085 *5*		B
	1094.36 *11*	1/2-,3/2-	CDE
	1113 *5*[d]		B E
	1117.35 *25*	(3/2-)	C E
	1119 *5*		E
	1137 *5*	(+)	B
	1142.8 *6*	1/2,3/2[i]	C
J	1145.17 *23*	(5/2-)[h]	C E
K	1150 *20*	(13/2+)	G
I	1186 *5*	(11/2-)[h]	E
E	1186.3 *19*	(21/2+)	I
	1215 *5*		E
	1221 *5*	(+)	B
J	1229 *5*[c]	(7/2-)[h]	E H
B	1237.1 *18*	19/2-	I
	1238 *4*[c]		B E
	1276 *4*[c]		B E
A	1280.0 *18*	21/2-	I
	1296 *5*		B
J	1341 *5*	(9/2-)[h]	E
	1360.10 *19*	1/2(+)	C E
	1386.98 *15*	1/2-,3/2-	CDE
L	1394 *5*[c]	(11/2-)[h]	E H
	1415 *5*		E
D	1419.1 *20*	(23/2+)	I
	1434 *5*		B
	1456 *4*[c]		B E
	1470.7 *7*[e]	1/2(-),3/2(-)	CDE
	1483.9 *18*[e]	1/2,3/2[i]	BC E
	1488.0 *11*[e]	1/2-,3/2-	CDE
M	1526 *5*	(3/2+)[h]	E
	1529.6 *7*[e]	1/2-,3/2-	CD
	1535 *5*		E
	1548 *5*[c]	11/2+,13/2+	B H
	1553.7 *7*[e]	1/2-,3/2-	CDE
	1564 *5*		E
	1572.3[f]	1/2(-),3/2(-)	DE
	1601 *5*		E
	1608 *5*		E
	1622 *5*[g]		B E
E	1632.3 *21*	(25/2+)	I
N	1647.2 *6*[e]	(1/2+)[h]	C E
	1652 *4*[c]		B E
	1667.5 *16*	1/2,3/2[i]	C
	1676 *4*[c]		B E
	1680.0 *9*[e]	1/2,3/2[i]	C E
	1700 *4*		E

Band	E_{level}[a]	Jπ[b]	XREF
	1710.1 *7*	1/2,3/2[i]	C
	1716 *4*		E
	1727 *5*		E
B	1741.1 *20*	23/2-	I
	1743 *5*		B
	1755 *5*		E
	1774 *4*[c]		B E
	1783.6 *7*[e]	1/2,3/2[i]	CD
	1790 *5*		E
A	1793.0 *20*	25/2-	I
	1795.3 *9*[e]	1/2,3/2[i]	CD
	1806.3 *19*	1/2,3/2[i]	C
	1819.7 *17*[e]	1/2(-),3/2(-)	CDE
	1826.0 *11*[e]	1/2,3/2[i]	BC E
	1839.3 *8*[e]	1/2(-),3/2(-)	CDE
	1848.4 *8*[e]	1/2-,3/2-	CDE
	1856 *4*[c]		B E
	1867.2 *8*[e]	1/2(-),3/2(-)	CDE
	1886 *5*		E
	1897.7 *7*[e]	1/2,3/2[i]	CDE
	1913 *5*		E
D	1919.1 *23*	(27/2+)	I
	1924 *5*		E
	1928.8 *7*[e]	1/2-,3/2-	CDE
	1948.0 *14*[e]	1/2-,3/2-	BCD
	1955.3 *23*[e]	1/2-,3/2-	BCDE
	1966.9	1/2,3/2	D
	1974 *5*		E
	1978.9 *7*	1/2,3/2[i]	C
	1997.0 *7*[e]	1/2,3/2[i]	CDE
	2018 *5*		E
	2022.9	1/2-,3/2-	D
	2029.3 *8*[e]	1/2-,3/2-	CDE
	2047.1 *13*[e]	1/2,3/2[i]	BC
	2055 *4*		E
	2063.0 *8*	1/2,3/2[i]	C
	2092 *5*[g]		B E
	2098[f]	1/2,3/2	B D
	2112.5 *9*	1/2,3/2[i]	C
	2125.2 *7*[e]	1/2-,3/2-	CDE
	2141.2 *30*[e]	1/2(-),3/2(-)	CD
E	2149.3 *23*	(29/2+)	I
	2165.5 *16*[e]	1/2-,3/2-	CD
	2180.4 *7*[e]	1/2-,3/2-	CD
	2185.2 *8*[e]	1/2,3/2[i]	C E
	2204 *5*		E
	2219.4 *7*[e]	1/2,3/2[i]	BCD
	2225.3 *11*[e]	1/2-,3/2-	CDE
	2237.9 *8*	1/2,3/2[i]	C
	2255 *5*		E
	2264.5	1/2,3/2	D
	2272 *5*		E
	2295 *5*		E G
B	2324.1 *23*	27/2-	I
	2336 *5*		E
	2382 *5*		E
A	2383.0 *23*	29/2-	I
	2420 *5*		E
	2440 *5*		E
	2482 *5*		B E
	2522 *15*		E
	2583 *15*		E
B	2979.1 *25*	31/2-	I
A	3045.0 *25*	33/2-	I
	≈ 3400		G
B	3701 *3*	35/2-	I
A	3773 *3*	37/2-	I
A	4549 *3*	41/2-	I

[a] **E:** From least-squares fit to Eγ, except where noted or where cross references clearly indicate other source.
[b] **J:** From population by E1 (or probable E1) γ from 1/2+ in ^{168}Er(n,γ) E=Resonance, except as noted.
[c] **E:** Weighted average from reactions populating level.
[d] **E:** From ^{167}Er(t,p).
[e] **E:** From ^{168}Er(n,γ) E=Thermal.
[f] **E:** From ^{168}Er(n,γ) E=Resonance.
[g] **E:** From ^{168}Er(d,p), ^{170}Er(d,t).
[h] **J:** From combined analysis of the relative populations of band members, absolute cross sections, and angular distributions in ^{168}Er(d,p), ^{170}Er(d,t).
[i] **J:** From population by primary γ in ^{168}Er(n,γ) E=Thermal.

0.0: *Jπ*: Atomic beam (1976Fu06); E1 γ from 1/2+ in ^{168}Er(n,γ) E=Resonance.
64.550: *Jπ*: M1+E2 65γ to 1/2- g.s..
92.05: *Jπ*: E1 152γ from 7/2+ 244; 5/2- consistent with band assignment.
176.80: *Jπ*: M1 85γ to (5/2)- 92; 7/2- consistent with band assignment.
242.00: *Jπ*: Cross section fingerprint in (d,p).
243.69: *Jπ*: L=0 in ^{167}Er(t,p) on 7/2+ target.
413.1: *Jπ*: From analysis of energy and intensity data for 7/2[633] band members in ^{167}Er(t,p).
526.3: *Jπ*: L=6 in ^{170}Er(^{3}He,α); 13/2+ consistent with band assignment.
562.03: *Jπ*: E1 γ from 1/2+ in ^{168}Er(n,γ) E=Resonance; J=1/2 consistent with band assignment.
599.29: *Jπ*: E1 γ from 1/2+ in ^{168}Er(n,γ) E=Resonance; 3/2- consistent with band assignment.
714.56: *Jπ*: E1 γ from 1/2+ in ^{168}Er(n,γ) E=Resonance; 3/2- consistent with band assignment.
848: *Jπ*: L=2 in ^{167}Er(t,p) on 7/2+ target.
853.00: *Jπ*: log*ft*=4.9 from 7/2-; indicates allowed unhindered transition which, in this mass region, would establish configurations of (ν 5/2[523]) for this state and (π 7/2[523]) for the ^{169}Ho parent.
860.12: *Jπ*: Primary γ from 1/2+ in (n,γ) E=Thermal; 617γ to 7/2+ 244. assignment as member of K-2 γ-vibration band built on 7/2[633], suggested by 1970Mu15 in ^{168}Er(n,γ), is questioned by 1985Lo19.
905: *Jπ*: L=0 in ^{167}Er(t,p) on 7/2+ target.
941.04: *Jπ*: log*ft*=5.4 from 7/2-; 7/2- consistent with band assignment.
971: *Jπ*: L=(4) in ^{167}Er(t,p) on 7/2+ target.
990: *Jπ*: L=(2) in ^{167}Er(t,p) on 7/2+ target.
1081.65: *Jπ*: (E1) γ from 1/2+ in ^{168}Er(n,γ) E=Resonance; 3/2- consistent with band assignment.
1117.35: *Jπ*: Dipole γ from 1/2+ in ^{168}Er(n,γ) E=Thermal; possible γ to (7/2)-.
1137: *Jπ*: L=(4) in ^{167}Er(t,p) on 7/2+ target.
1150: *Jπ*: Based on relative population strengths in ^{168}Er(^{16}O,^{15}Oγ) and ^{168}Er(^{12}C,^{11}Cγ); 13/2+ consistent with band assignment.
1221: *Jπ*: L=(2) in ^{167}Er(t,p) on 7/2+ target.
1360.10: *Jπ*: D γ from 1/2+ in ^{168}Er(n,γ) E=Thermal; absence of population in ^{168}Er(n,γ) E=Resonance and absence of decay to 5/2- states suggest 1/2+.
1548: *Jπ*: L=6 in ^{170}Er(^{3}He,α).
1966.9: *Jπ*: Dipole γ from 1/2+ in ^{168}Er(n,γ) E=Resonance.
2098: *Jπ*: Dipole γ from 1/2+ in ^{168}Er(n,γ) E=Resonance.
2264.5: *Jπ*: Dipole γ from 1/2+ in ^{168}Er(n,γ) E=Resonance.

$\gamma(^{169}$Er)

E_i	J_i	E_f	J_f	E_γ [a]	I_γ [bc]	Mult [c]	δ	α	B(Eλ)(W.u.)
64.550	3/2-			64.55 *2*	100	M1+E2	0.67	12.12	
74.59	5/2-	64.550	3/2-	10.0 *1*		[M1]		69.1	
74.59	5/2-			74.6 *1*	100 *20*	(E2)		9.23	
92.05	(5/2)-	74.59	5/2-	17.46 *12*	$>$ 18				
92.05	(5/2)-	64.550	3/2-	27.6 *2*	100	[M1]		20.0 *6*	
176.80	(7/2)-	92.05	(5/2)-	84.9 *1*	100	M1		4.56	
224.13	7/2-	74.59	5/2-	149.6 *2*	99 *16*	[M1,E2]		0.79 *12*	
224.13	7/2-	64.550	3/2-	159.59 *9*	100 *17*	[E2]		0.542	
242.00	9/2-	74.59	5/2-	167.4 *1*	100	[E2]		0.460	
243.69	7/2+	176.80	(7/2)-	67.3 *3*	$\approx$ 9[d]	E1		0.917 *17*	$7.1x10^{-7}$ *4*
243.69	7/2+	92.05	(5/2)-	151.5 *2*	100 *11*[d]	E1		0.1079	$1.79x10^{-7}$ *9*
285.20	(9/2-)	176.80	(7/2)-	108.4 *2*	100	[M1]		2.259	
317.3	(9/2+)	243.69	7/2+	73.6 *5*	100				
413.1	(11/2+)	243.69	7/2+	169.4[e]	100				
475.1	11/2-	224.13	7/2-	251[e]	100				
501.0	13/2-	242.00	9/2-	259[e]	100				
526.3	(13/2)+	317.3	(9/2+)	209[e]	100				
562.03	(1/2)-	92.05	(5/2)-	470.2 *4*	28 *7*				
562.03	(1/2)-	64.550	3/2-	497.5 *1*	100 *20*				
562.03	(1/2)-			562.0 *2*	27 *6*				
599.29	(3/2)-	92.05	(5/2)-	507.1 *2*	24 *6*				
599.29	(3/2)-	74.59	5/2-	524.8 *1*	72 *15*				
599.29	(3/2)-	64.550	3/2-	534.7 *2*	41 *8*				
599.29	(3/2)-			599.2 *2*	100 *21*				
654.06	(5/2-)	224.13	7/2-	429.9 *1*[f]	$<$ 221[g]				
654.06	(5/2-)	74.59	5/2-	579.3 *4*	7.1 *17*				
654.06	(5/2-)	64.550	3/2-	589.6 *3*	100 *21*				
664.1	(15/2+)	413.1	(11/2+)	251[e]	100				
714.56	(3/2)-	92.05	(5/2)-	622.8 *6*	3.1 *12*				
714.56	(3/2)-	74.59	5/2-	640.0 *2*	17 *4*				
714.56	(3/2)-	64.550	3/2-	650.0 *2*	55 *12*				
714.56	(3/2)-			714.5 *2*	100 *20*				
739.7	(7/2-)	74.59	5/2-	665.1 *7*	100				
769.56	(5/2-)	224.13	7/2-	545.0 *6*[f]	$<$ 15[g]				
769.56	(5/2-)	74.59	5/2-	695.0 *2*	100 *21*				
769.56	(5/2-)	64.550	3/2-	705.0 *1*	83 *17*				
813.1	15/2-	475.1	11/2-	338[e]	100				
816.3	(17/2+)	526.3	(13/2)+	290[e]	100				
848.0	17/2-	501.0	13/2-	347[e]	100				
853.00	5/2-	224.13	7/2-	628.9 *3*	13.1 *19*[d]				
853.00	5/2-	176.80	(7/2)-	676.5 *2*	19.9 *19*[d]				
853.00	5/2-	92.05	(5/2)-	760.8 *2*[h]	48 *9*[i]				
853.00	5/2-	74.59	5/2-	778.4 *2*	48 *3*[d]				
853.00	5/2-	64.550	3/2-	788.4 *1*	100 *10*[d]				
853.00	5/2-			853.0 *2*	53 *6*[d]				
860.12	(3/2+,5/2+)	243.69	7/2+	616.8 *4*	9.1 *26*				
860.12	(3/2+,5/2+)	74.59	5/2-	785.4 *2*	100 *23*				
860.12	(3/2+,5/2+)	64.550	3/2-	795.6 *2*	71 *14*				
941.04	(7/2)-	243.69	7/2+	697.0 *5*	9 *5*[d]				
941.04	(7/2)-	242.00	9/2-	698.8 *4*	21 *7*[d]				
941.04	(7/2)-	224.13	7/2-	717.0 *2*	71 *5*[d]				
941.04	(7/2)-	176.80	(7/2)-	764.9 *6*	11 *3*[d]				
941.04	(7/2)-	92.05	(5/2)-	849.4 *6*	23 *3*[d]				
941.04	(7/2)-	74.59	5/2-	866.4 *2*	100 *14*[d]				
941.04	(7/2)-	64.550	3/2-	876.4 *3*	47 *9*[d]				
999.1	(19/2+)	664.1	(15/2+)	335[e]	100				
1081.65	(3/2-)	92.05	(5/2)-	989.6 *2*	100				
1094.36	1/2-,3/2-	92.05	(5/2)-	1002.1 *2*	14 *3*				
1094.36	1/2-,3/2-	74.59	5/2-	1019.9 *2*	26 *6*				
1094.36	1/2-,3/2-	64.550	3/2-	1029.8 *2*	33 *7*				
1094.36	1/2-,3/2-			1094.5 *3*	100 *20*				
1117.35	(3/2-)	176.80	(7/2)-	939.60 *25*	38 *10*				
1117.35	(3/2-)	74.59	5/2-	1042.5 *3*	100 *21*				
1117.35	(3/2-)	64.550	3/2-	1052.6 *2*[f]	$<$ 222[g]				
1117.35	(3/2-)			1117.8 *4*	71 *15*				
1145.17	(5/2-)	714.56	(3/2)-	429.9 *1*[f]	$<$ 625[g]				
1145.17	(5/2-)	599.29	(3/2)-	545.0 *6*[f]	$<$ 33[g]				
1145.17	(5/2-)	176.80	(7/2)-	968.4 *2*	100 *20*				
1145.17	(5/2-)	92.05	(5/2)-	1052.6 *2*[f]	$<$ 231[g]				

E_i	J_i	E_f	J_f	E_γ [a]	I_γ [bc]	Mult [c]	δ	α	B(Eλ)(W.u.)
1145.17	(5/2-)	74.59	5/2-	1069.8 *10*	24 *13*				
1186.3	(21/2+)	816.3	(17/2+)	370[e]	100				
1237.1	19/2-	813.1	15/2-	424[e]	100				
1280.0	21/2-	848.0	17/2-	432[e]	100				
1360.10	1/2(+)	599.29	(3/2)-	760.8 *2*[h]	< 29[i]				
1360.10	1/2(+)	562.03	(1/2)-	798.6 *5*	100 *28*				
1360.10	1/2(+)	64.550	3/2-	1295.5 *5*[f]	< 56[g]				
1360.10	1/2(+)			1359.6 *5*	68 *16*				
1386.98	1/2-,3/2-	1094.36	1/2-,3/2-	292.6 *3*	2.6 *9*				
1386.98	1/2-,3/2-	654.06	(5/2-)	732.2 *2*	100 *21*				
1386.98	1/2-,3/2-	599.29	(3/2)-	787.9 *3*	14 *9*				
1386.98	1/2-,3/2-	92.05	(5/2)-	1295.5 *5*[f]	< 9.1[g]				
1386.98	1/2-,3/2-	74.59	5/2-	1312.1 *3*	12 *3*				
1386.98	1/2-,3/2-	64.550	3/2-	1322.5 *3*	10.5 *23*				
1386.98	1/2-,3/2-			1387.0 *4*	7.9 *19*				
1419.1	(23/2+)	999.1	(19/2+)	420[e]	100				
1632.3	(25/2+)	1186.3	(21/2+)	446[e]	100				
1741.1	23/2-	1237.1	19/2-	504[e]	100				
1793.0	25/2-	1280.0	21/2-	513[e]	100				
1919.1	(27/2+)	1419.1	(23/2+)	500[e]	100				
2149.3	(29/2+)	1632.3	(25/2+)	517[e]	100				
2324.1	27/2-	1741.1	23/2-	583[e]	100				
2383.0	29/2-	1793.0	25/2-	590[e]	100				
2979.1	31/2-	2324.1	27/2-	655[e]	100				
3045.0	33/2-	2383.0	29/2-	662[e]	100				
3701	35/2-	2979.1	31/2-	722[e]	100				
3773	37/2-	3045.0	33/2-	728[e]	100				
4549	41/2-	3773	37/2-	776[e]	100				

[a] **E:** From ^{168}Er(n,γ) E=Thermal, except as noted.
[b] **Iγ:** Relative photon branching from each level; values are from ^{168}Er(n,γ) E=Thermal, except as noted. Upper limits are given for photon branchings affected by multiple placement.
[c] **M,δ,Iγ:** From ^{168}Er(d,pγ).
[d] **Iγ:** From ^{169}Ho β^- decay.
[e] **E:** From (^{238}U,^{238}U'nγ).
[f] **E:** Multiply placed with undivided intensity
[g] **Iγ:** Multiply placed with undivided intensity
[h] **E:** Multiply placed with intensity suitably divided
[i] **Iγ:** Multiply placed with intensity suitably divided
10.0(*L74.59***) E:** From level energy difference.
17.46(*L92.05***) E:** From level energy difference.
149.6(*L224.13***) Iγ:** Weighted average from β^- decay and (n,γ) E=Thermal.
159.59(*L224.13***) Iγ:** Weighted average from β^- decay and (n,γ) E=Thermal.
67.3(*L243.69***) :** Other Iγ: 35 from (d,pγ) for Eγ=65.5.
73.6(*L317.3***) E:** From β^- decay.
705.0(*L769.56***) E:** From β^- decay.
705.0(*L769.56***) :** Other Iγ: 100 *23* in β^- decay.
628.9(*L853.00***) E:** From ^{169}Ho β^- decay.
676.5(*L853.00***) E:** From ^{169}Ho β^- decay.
760.8(*L853.00***) E:** Average from β^- decay and (n,γ) E=Thermal.
778.4(*L853.00***) E:** Weighted average from β^- decay and (n,γ) E=Thermal.
788.4(*L853.00***) E:** From ^{169}Ho β^- decay.
853.0(*L853.00***) E:** Weighted average from β^- decay and (n,γ) E=Thermal.
697.0(*L941.04***) E:** From ^{169}Ho β^- decay.
698.8(*L941.04***) E:** From ^{169}Ho β^- decay.
717.0(*L941.04***) E:** From ^{169}Ho β^- decay.
764.9(*L941.04***) E:** From ^{169}Ho β^- decay.
849.4(*L941.04***) E:** From ^{169}Ho β^- decay.
866.4(*L941.04***) E:** From ^{169}Ho β^- decay.
876.4(*L941.04***) E:** From ^{169}Ho β^- decay.
787.9(*L1386.98***) E,Iγ:** From (n,γ) E=Thermal. Doublet; divided Iγ given.

^{167}Er(t,p)

Target Jπ=7/2+.
E(t)=15 MeV, isotope separated ^{167}Er (> 99% enrichment) embedded in carbon foil; E(t)=17 MeV, metallic Er targets enriched to 95.6% in ^{167}Er; θ=7.5 ° to 67.5 ° (7.5 ° intervals); measured E(level) (mag spect, FWHM ≈ 15 keV), angular distributions, absolute cross sections; used multistep CCBA calculations to interpret levels.

Bands

A	7/2[633] band.

^{169}Er Levels

Band	E_{level}	Jπ	l[a]
A	244 *5*		0
A	319 *5*		
A	413 *5*		
A	525 *5*		
	592 *5*		
	848 *5*		2
	905 *5*		0
	971 *5*		(4)
	988 *5*		(2)
	1056 *5*		
	1085 *5*		
	1113 *5*		
	1137 *5*		(4)
	1221 *5*		(2)
	1238 *5*		
	1278 *5*		
	1296 *5*		
	1434 *5*		
	1456 *5*		
	1482 *5*		
	1547 *5*		
	1619 *5*		
	1654 *5*		
	1675 *5*		
	1743 *5*		
	1773 *5*		
	1827 *5*		
	1856 *5*		
	1952 *5*		
	2049 *5*		
	2094 *5*		
	2216 *5*		
	2482 *5*		

[a] **L:** From DWBA analysis of angular distributions.

^{168}Er(n,γ) E=Thermal

σ_n=2.74 *8* (2006MuZX). % abundance(^{168}Er)=26.78 *26*.
Others: 2007ChZX (supersedes 2003ChZS), 1966Ko03.
1970Mu15; Er oxide targets enriched to 99.987% in ^{168}Er; measured Eγ, Iγ for primary and secondary transitions; Si(Li), FWHM=0.45 keV at 25 keV *0*0.75 keV at 100 keV; Ge(Li) (singly and in pair mode), FWHM ≈ 3 keV at 500 keV, ≈ 7 keV at 6 MeV.

^{169}Er Levels

E_{level}[a]	Jπ[b]
0.0	1/2-
64.55 *2*	3/2-
74.56 *7*	5/2-
92.13 *12*	(5/2)-
177.03 *16*	(7/2)-
224.14 *9*	7/2-
241.96 *12*	9/2-
243.57 *21*	7/2+
285.4 *3*	(9/2-)
562.04 *9*	(1/2)-
599.31 *9*	(3/2)-
654.05 *25*	(5/2-)
714.54 *12*	(3/2)-
739.7 *7*	(7/2-)
769.51 *15*	(5/2-)
853.4 *3*	5/2-
860.10 *14*	(3/2+,5/2+)
1081.72 *23*	(3/2-)
1094.36 *11*	1/2-,3/2-
1117.30 *24*	(3/2-)
1142.8 *6*	1/2,3/2
1145.4 *3*	(5/2-)
1360.1 *4*	1/2(+)
1386.87 *16*	1/2-,3/2-
1470.7 *8*	1/2(-),3/2(-)
1483.9 *18*	1/2,3/2
1488.0 *12*	1/2-,3/2-
1529.6 *8*	1/2-,3/2-
1553.7 *7*	1/2-,3/2-
1647.2 *7*	(1/2+)
1667.5 *17*	1/2,3/2
1680.0 *10*	1/2,3/2
1710.1 *8*	1/2,3/2
1783.6 *8*	1/2,3/2
1795.3 *10*	1/2,3/2
1806.3 *19*	1/2,3/2
1819.7 *18*	1/2(-),3/2(-)
1826.0 *12*	1/2,3/2
1839.3 *9*	1/2(-),3/2(-)
1848.4 *9*	1/2-,3/2-
1867.2 *9*	1/2(-),3/2(-)
1897.7 *8*	1/2,3/2
1928.8 *8*	1/2-,3/2-
1948.0 *15*	1/2-,3/2-
1955.3 *23*	1/2-,3/2-
1978.9 *8*	1/2,3/2
1997.0 *8*	1/2,3/2
2029.3 *9*	1/2-,3/2-
2047.1 *14*	1/2,3/2
2063.0 *9*	1/2,3/2
2112.5 *10*	1/2,3/2
2125.2 *8*	1/2-,3/2-
2141 *3*[c]	1/2(-),3/2(-)
2165.5 *17*	1/2-,3/2-
2180.4 *8*	1/2-,3/2-
2185.2 *9*	1/2,3/2
2219.4 *8*	1/2,3/2
2225.3 *12*	1/2-,3/2-
2237.9 *9*	1/2,3/2
6003.17 *19*[d]	1/2+[e]

[a] **E:** From least-squares fit to Eγ, omitting transitions with multiple or uncertain placements.
[b] **J:** Adopted values, except where noted.
[c] **E:** The apparent discrepancy between Eγ=3861.9 and E(level)=2131.2 (see table 3 in 1970Mu15) is resolved if Eγ is taken as correct and E(level) changed to 2141.2. this level probably corresponds to E(level)=2139.1 in ^{168}Er(n,γ) E=Res.
[d] **E:** Neutron capture state(Sn) Cf. Sn=6003.27 *15* (2003Au03).
[e] **J:** s-wave capture by even-even nucleus.

$\gamma(^{169}\mathrm{Er})$

E_γ[a]	I_γ[b]	E_i	J_i	E_f	J_f
27.6 2	1.4 4	92.13	(5/2)-	64.55	3/2-
64.55 2[c]	12.6 25	64.55	3/2-		
74.6 1	2.5 5	74.56	5/2-		
84.9 1	0.53 11	177.03	(7/2)-	92.13	(5/2)-
99.3 4[de]	0.36 10				
108.4 2	0.21 4	285.4	(9/2-)	177.03	(7/2)-
149.6 2	3.7 9	224.14	7/2-	74.56	5/2-
151.5 2	4.4 11	243.57	7/2+	92.13	(5/2)-
159.59 9[c]	4.1 8	224.14	7/2-	64.55	3/2-
167.4 1	0.57 12	241.96	9/2-	74.56	5/2-
174.7 3	0.16 4				
209.3 3	0.17 4				
219.9 4	0.16 4				
254.5 4[d]	0.09 4				
292.6 3	0.11 4	1386.87	1/2-,3/2-	1094.36	1/2-,3/2-
368.8 6[d]	0.28 10				
422.8 2	0.25 6				
429.9 1[j]	5.3 11[k]	654.05	(5/2-)	224.14	7/2-
429.9 1[j]	5.3 11[k]	1145.4	(5/2-)	714.54	(3/2)-
439.9 4[d]	0.20 5				
470.2 4	2.4 6	562.04	(1/2)-	92.13	(5/2)-
477.6 5	1.0 4				
497.5 1	8.6 17	562.04	(1/2)-	64.55	3/2-
507.1 2	0.95 22	599.31	(3/2)-	92.13	(5/2)-
524.8 1	2.8 6	599.31	(3/2)-	74.56	5/2-
534.7 2	1.6 3	599.31	(3/2)-	64.55	3/2-
545.0 6[j]	0.27 8[k]	769.51	(5/2-)	224.14	7/2-
545.0 6[j]	0.27 8[k]	1145.4	(5/2-)	599.31	(3/2)-
562.0 2	2.3 5	562.04	(1/2)-		
579.3 4	0.17 4	654.05	(5/2-)	74.56	5/2-
589.6 3	2.4 5	654.05	(5/2-)	64.55	3/2-
599.2 2	3.9 8	599.31	(3/2)-		
616.8 4	0.32 9	860.10	(3/2+,5/2+)	243.57	7/2+
622.8 6	0.15 6	714.54	(3/2)-	92.13	(5/2)-
631.5 4	0.27 8				
640.0 2	0.84 18	714.54	(3/2)-	74.56	5/2-
650.0 2	2.7 6	714.54	(3/2)-	64.55	3/2-
663.0 6	0.64 23				
665.1 7	0.46 22	739.7	(7/2-)	74.56	5/2-
682.4 2	1.19 25				
695.0 2	2.4 5	769.51	(5/2-)	74.56	5/2-
704.9 2	2.0 4	769.51	(5/2-)	64.55	3/2-
714.5 2	4.9 10	714.54	(3/2)-		
732.2 2	4.3 9	1386.87	1/2-,3/2-	654.05	(5/2-)
756.5 3	0.40 9				
760.7 2[l]	0.48 9[hm]	853.4	5/2-	92.13	(5/2)-
760.7 2[l]	< 0.2[hm]	1360.1	1/2(+)	599.31	(3/2)-
768.0 4	0.75 17				
772.1 3	1.43 30[f]				
779.4 5	0.52 13	853.4	5/2-	74.56	5/2-
785.4 2	3.5 8	860.10	(3/2+,5/2+)	74.56	5/2-
787.9 3[l]	0.99 19[im]	853.4	5/2-	64.55	3/2-
787.9 3[l]	0.6 4[im]	1386.87	1/2-,3/2-	599.31	(3/2)-
795.6 2	2.5 5	860.10	(3/2+,5/2+)	64.55	3/2-
798.6 5	0.69 19	1360.1	1/2(+)	562.04	(1/2)-
821.7 9	0.11 6				
823.4 2	1.11 23				
836.7 2	1.4 3				
853.2 3	0.48 11	853.4	5/2-		
858.7 3	0.32 8				
870.5 3	0.98 23				
896.1 2	1.01 21				
915.0 5	0.31 10				
918.5 2	1.16 25				
936.5 3	0.55 12				
939.60 25	0.34 9	1117.30	(3/2-)	177.03	(7/2)-
944.4 3	0.31 8				
968.4 2	0.83 17	1145.4	(5/2-)	177.03	(7/2)-
978.5 2	0.53 11				

E_γ[a]	I_γ[b]	E_i	J_i	E_f	J_f
989.6 2	5.4 11	1081.72	(3/2-)	92.13	(5/2)-
998.2 3	0.57 14				
1002.1 2	1.00 23	1094.36	1/2-,3/2-	92.13	(5/2)-
1013.8 2	2.5 5				
1019.9 2	1.8 4	1094.36	1/2-,3/2-	74.56	5/2-
1029.8 2	2.3 5	1094.36	1/2-,3/2-	64.55	3/2-
1042.5 3	0.89 19	1117.30	(3/2-)	74.56	5/2-
1046.6 5	0.46 11				
1052.6 2[j]	2.0 4[k]	1117.30	(3/2-)	64.55	3/2-
1052.6 2[j]	2.0 4[k]	1145.4	(5/2-)	92.13	(5/2)-
1069.8 10[d]	0.20 11	1145.4	(5/2-)	74.56	5/2-
1078.5 3	0.93 21				
1094.5 3	6.9 14	1094.36	1/2-,3/2-		
1117.8 4	0.63 13	1117.30	(3/2-)		
1121.9 5	0.23 6				
1270.1 11	0.13 7				
1275.3 7	0.42 18				
1277.6 10	0.25 15				
1291.9 7	0.19 6				
1295.5 5[j]	0.31 8[k]	1360.1	1/2(+)	64.55	3/2-
1295.5 5[j]	0.31 8[k]	1386.87	1/2-,3/2-	92.13	(5/2)-
1312.1 3	0.52 12	1386.87	1/2-,3/2-	74.56	5/2-
1315.4 6	0.23 7				
1322.5 3	0.45 10	1386.87	1/2-,3/2-	64.55	3/2-
1330.8 4	0.30 8				
1356.0 7	0.35 8				
1359.6 5	0.47 11	1360.1	1/2(+)		
1387.0 4	0.34 8	1386.87	1/2-,3/2-		
1393.3 6	0.28 8				
1396.5 5	0.38 10				
1407.9 4	0.42 10				
1412.7 3	1.5 3				
1417.8 6	0.30 9[g]				
1423.2 3	0.84 18				
3765.2 8	0.36 10	6003.17	1/2+	2237.9	1/2,3/2
3777.8 11	0.17 6	6003.17	1/2+	2225.3	1/2-,3/2-
3783.7 7	0.55 14	6003.17	1/2+	2219.4	1/2,3/2
3817.9 8	0.41 12	6003.17	1/2+	2185.2	1/2,3/2
3822.7 7	1.7 4	6003.17	1/2+	2180.4	1/2-,3/2-
3837.6 16	0.05 2	6003.17	1/2+	2165.5	1/2-,3/2-
3861.9 26	0.07 3	6003.17	1/2+	2141	1/2(-),3/2(-)
3877.9 7	1.5 3	6003.17	1/2+	2125.2	1/2-,3/2-
3890.6 9	0.18 5	6003.17	1/2+	2112.5	1/2,3/2
3940.1 8	0.33 8	6003.17	1/2+	2063.0	1/2,3/2
3956.0 13	0.10 4	6003.17	1/2+	2047.1	1/2,3/2
3973.8 8	0.24 6	6003.17	1/2+	2029.3	1/2-,3/2-
4006.1 7	0.82 17	6003.17	1/2+	1997.0	1/2,3/2
4024.2 7	0.22 5	6003.17	1/2+	1978.9	1/2,3/2
4047.8 23	0.09 5	6003.17	1/2+	1955.3	1/2-,3/2-
4055.1 14	0.14 5	6003.17	1/2+	1948.0	1/2-,3/2-
4074.3 7	2.3 5	6003.17	1/2+	1928.8	1/2-,3/2-
4105.4 7	0.61 13	6003.17	1/2+	1897.7	1/2,3/2
4135.9 8	0.27 7	6003.17	1/2+	1867.2	1/2(-),3/2(-)
4154.7 8	0.31 8	6003.17	1/2+	1848.4	1/2-,3/2-
4163.8 8	0.29 7	6003.17	1/2+	1839.3	1/2(-),3/2(-)
4177.1 11	0.19 6	6003.17	1/2+	1826.0	1/2,3/2
4183.4 17	0.09 3	6003.17	1/2+	1819.7	1/2(-),3/2(-)
4196.8 19	0.05 2	6003.17	1/2+	1806.3	1/2,3/2
4207.8 9	0.18 5	6003.17	1/2+	1795.3	1/2,3/2
4219.5 7	0.39 9	6003.17	1/2+	1783.6	1/2,3/2
4293.0 7	0.27 6	6003.17	1/2+	1710.1	1/2,3/2
4323.1 9	0.11 3	6003.17	1/2+	1680.0	1/2,3/2
4335.6 16	0.05 2	6003.17	1/2+	1667.5	1/2,3/2
4355.9 6	0.42 9	6003.17	1/2+	1647.2	(1/2+)
4449.4 7	0.36 13	6003.17	1/2+	1553.7	1/2-,3/2-
4473.5 7	0.34 8	6003.17	1/2+	1529.6	1/2-,3/2-
4515.1 11	0.30 10	6003.17	1/2+	1488.0	1/2-,3/2-
4519.2 18	0.14 10	6003.17	1/2+	1483.9	1/2,3/2
4532.4 7	0.44 10	6003.17	1/2+	1470.7	1/2(-),3/2(-)
4616.5 4	6.0 12	6003.17	1/2+	1386.87	1/2-,3/2-
4860.3 5	0.18 4	6003.17	1/2+	1142.8	1/2,3/2

E_γ[a]	I_γ[b]	E_i	J_i	E_f	J_f
4887.1 *15*	0.31 *13*	6003.17	1/2+	1117.30	(3/2-)
4908.8 *4*	10.3 *21*	6003.17	1/2+	1094.36	1/2-,3/2-
4922.4 *15*	0.27 *11*	6003.17	1/2+	1081.72	(3/2-)
5142.9 *7*	0.76 *16*	6003.17	1/2+	860.10	(3/2+,5/2+)
5289.0 *8*	0.12 *3*	6003.17	1/2+	714.54	(3/2)-
5441.0 *4*	3.0 *6*	6003.17	1/2+	562.04	(1/2)-
5938.2 *4*	6.6 *14*	6003.17	1/2+	64.55	3/2-
6002.4 *7*	0.12 *3*	6003.17	1/2+		

[a] **E:** From 1970Mu15, except as noted.
[b] **Iγ:** Relative Iγ (1970Mu15); uncertainties include 20% assumed overall uncertainty. Corrected by authors for target self-absorption. See comment with normalization to obtain absolute intensities.
[c] **E:** From ^{167}Er(n,γ) (seen as impurity) (1966Ko03); value used by 1970Mu15 for energy calibration.
[d] **E:** Assignment to ^{169}Er uncertain.
[e] **E:** Includes components from 99.0γ and 99.3γ in ^{168}Er.
[f] **Iγ:** Reported uncertainty of 0.03 is most probably 0.30.
[g] **Iγ:** Evaluator assumes that Iγ=0.3 *9*, as reported by 1970Mu15, was intended to be Iγ=0.30 *9*.
[h] **Iγ:** Deduced from Iγ=0.54 *11* (total for both placements of 760.7γ) and adopted relative branching from 853.0 level.
[i] **Iγ:** Deduced from Iγ=1.6 *4* (total for both placements of 787.9γ) and adopted relative branching from 853.0 level.
[j] **E:** Multiply placed with undivided intensity
[k] **Iγ:** Multiply placed with undivided intensity
[l] **E:** Multiply placed with intensity suitably divided
[m] **Iγ:** Multiply placed with intensity suitably divided

84.9(*L177.03***) :** Other Eγ: 84.74 *12* (2007ChZX; budapest data).
562.0(*L562.04***) :** Other Eγ: 563.3 *3* (2007ChZX; budapest data).
622.8(*L714.54***) :** Other Eγ: 623.0 *6* (2007ChZX; budapest data).
695.0(*L769.51***) :** Other Eγ: 694.6 *4* (2007ChZX; budapest data).
779.4(*L853.4***) :** Other Eγ: 779.34 *19* (2007ChZX; budapest data).
795.6(*L860.10***) :** Other Eγ: 795.0 *3* (2007ChZX; budapest data).
1019.9(*L1094.36***) :** Other Eγ: 1019.92 *20* (2007ChZX; budapest data).
1029.8(*L1094.36***) :** Other Eγ: 1030.0 *5* (2007ChZX; budapest data).
3817.9(*L6003.17***) :** Other Eγ: 3818.9 *5* (2007ChZX; budapest data).
3973.8(*L6003.17***) :** Other Eγ: 3972.1 *9* (2007ChZX; budapest data).
4105.4(*L6003.17***) :** Other Eγ: 4103.6 *4* (2007ChZX; budapest data).
4293.0(*L6003.17***) :** Other Eγ: 4292.5 *4* (2007ChZX; budapest data).