Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 117, 1 (2014)	1-Oct-2013

Q(β^-)=−12714 *14*; S(n)=12940 *40*; S(p)=3011 *11*; Q(α)=2666 *13* 2012Wa38
Q(εp)=5428 *14*, S(2n)=23300 *12*, S(2p)=3502 *12* (2012Wa38).
1982No08: identification and production of ^{148}Er isotope.

^{148}Er Levels

In the table below, observed levels in ^{148}Er are classified in terms of spherical shell-model configurations while comparing with the known states in N=80 isotones and other neighboring nuclides (^{146}Dy,^{144}Gd,^{148}Dy and ^{150}Er). The valence orbitals are: $h_{11/2}$, $s_{1/2}$, $d_{3/2}$, $g_{7/2}$ 2-neutron holes; 2-4 proton orbitals (mainly $h_{11/2}$) outside the ^{146}Gd core. Six-qp configurations are expected above 7 MeV, but 2001Ro15 did not identify specific levels for these configurations due to high level density.

Cross Reference (XREF) Flags

A ^{148}Tm ε decay (0.7 s)
B ^{149}Yb εp decay (0.7 s)
C ^{92}Mo(^{58}Ni,2pγ)

Classification of states in ^{148}Er (2001Ro15)

Possible configuration	Levels
2-quasineutron	646,2$^+$; 1523,4$^+$
2-quasiproton	2253,5$^-$; 2704,7$^-$
$\pi h^2_{11/2}$ +	
$\pi h^2_{11/2}$	2782,8$^+$
$\pi h^2_{11/2}$	2913,10$^+$
$\nu h^{-1}_{11/2}\otimes\nu d^{-1}_{3/2}$	2535,7$^-$
$\pi h^2_{11/2}\otimes\nu(s^{-1}_{1/2},d^{-1}_{3/2})$	3528,11$^+$; 3723,12$^+$
$\pi h^2_{11/2}\otimes\nu(d^{-1}_{3/2},d^{-1}_{5/2})$	4523,13$^+$; 4704,14$^+$
$\pi h^2_{11/2}\otimes 3^-$	4609,12$^-$
$\pi h^2_{11/2}\otimes\nu(d^{-1}_{3/2},h^{-1}_{11/2})$	5097,14$^-$; 5137,14$^-$;
($d_{3/2}$ orbital could be $s_{1/2}$ also)	5248,15$^-$; 5715,16$^-$;
	6187,17$^-$; 6218,17$^-$
$\pi h^3_{11/2}\otimes\pi(s_{1/2})$	4678,13$^-$
$\pi h^3_{11/2}\otimes\pi(d_{3/2})$	4983,15$^-$
$\pi h^4_{11/2}$	5304,16$^+$
$\pi h^2_{11/2}\otimes\nu(h^{-2}_{11/2}$	5946,16$^+$;
	6394,17$^+$
	6636,18$^+$; 6709,18$^+$
	6921,19$^+$; 7354,20$^+$

E(level)†	J$^\pi$‡	T$_{1/2}$	XREF	Comments
0.0	0$^+$	4.6 s *2*	ABC	%ε+%β^+=100; %εp≈0.15 (1988To03) Delayed proton emission probability ≈0.15% (if I(141γ+244γ+315γ)≈25%) (1988To03). T$_{1/2}$: average of 4.8 s *2* (1989Ta11), 4.4 s *2* (1988To03), 4.5 s *4* (1982No08).
645.89# *10*	2$^+$		ABC	J$^\pi$: ΔJ=2, quadrupole (E2) γ to 0$^+$.
1522.68# *15*	(4$^+$)		A C	J$^\pi$: ΔJ=2, quadrupole (E2) γ to 0$^+$.
2252.48 *18*	(5$^-$)		A C	

2525.05[#] *25*	(6^+)		A C

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Adopted Levels, Gammas (continued)

^{148}Er Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
2535.08 21	(7⁻)		A C	
2703.88 20	(7⁻)		C	
2782.1[#] 4	(8⁺)		A C	
2913.2[#] 4	(10⁺)	13 μs 3	A C	%IT=100 $T_{1/2}$: γ(t) (1982No07).
3171.18 22			C	
3354.6? 3			C	
3529.0 4	(11⁺)		C	
3723.3[@] 4	(12⁺)		C	
4174.1 3			C	
4532.0 5	(13⁺)		C	
4609.4[b] 5	(12⁻)		C	
4678.4[c] 4	(13⁻)		C	
4704.5[@] 4	(14⁺)		C	
4983.5[c] 4	(15⁻)		C	
5097.8[b] 5	(14⁻)		C	
5127.4 5	(14⁺)		C	
5137.6 5			C	
5248.2[b] 5	(15⁻)		C	
5304.1[a] 4	(16⁺)		C	
5715.7[b] 5	(16⁻)		C	
5742.6[&] 5	(16⁺)		C	
5946.5[@] 4	(16⁺)		C	
6009.4? 5			C	
6088.1[c] 5	(16⁻)		C	
6103.0 5	(17⁺)		C	
6187.5[b] 5	(17⁻)		C	
6219.0 5	(17⁻)		C	
6287.4 5			C	
6290.0[c] 4	(17⁻)		C	
6395.0[@] 5	(17⁺)		C	
6518.4[a] 5	(18⁺)		C	
6636.9 5	(18⁺)		C	
6709.8[@] 5	(18⁺)		C	
6770.4 6			C	
6895.3[&] 6	(18⁺)		C	
6921.7[@] 5	(19⁺)		C	
7027.3[b] 5	(19⁻)		C	
7051.6[a] 5	(19⁺)		C	
7091.8[c] 5	(19⁻)		C	
7294.8[&] 6	(19⁺)		C	
7354.3[@] 5	(20⁺)		C	
7532.5[a] 5	(20⁺)		C	
7585.3 5	(20⁺)		C	
7670.8 5			C	
7723.0 5	(20⁻)		C	
7733.4[&] 7	(20⁺)		C	
7739.5 7			C	
7832.4[a] 5	(21⁺)		C	
7878.7[&] 7	(21⁺)		C	

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Adopted Levels, Gammas (continued)

^{148}Er Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	XREF	E(level)[†]	J$^{\pi}$[‡]	XREF	E(level)[†]	J$^{\pi}$[‡]	XREF
8017.9[b] *5*	(21$^-$)	C	8274.7?[b] *5*	(22$^-$)	C	9018.3[a] *6*	(23$^+$)	C
8119.7[c] *5*	(21$^-$)	C	8304.0 *6*		C	9590.7[b] *6*		C
8201.4 *6*		C	8549.1?[b] *5*	(23$^-$)	C			

[†] From least-squares fit to Eγ data.
[‡] All assignments are from ^{92}Mo(^{58}Ni,2pγ), based on γ-anisotropy data, decay pattern, yrast type of population in heavy-ion studies, γ-sequence assignments. The parentheses are added by the evaluators.
[#] Band(A): yrast cascade based on g.s..
[@] Band(B): γ sequence based on (12$^+$).
[&] Band(C): γ sequence based on (16$^+$).
[a] Band(D): γ sequence based on (16$^+$).
[b] Band(E): γ sequence based on (12$^-$).
[c] Band(F): γ sequence based on (13$^-$).

γ(^{148}Er)

E$_i$(level)	J$^{\pi}_i$	E$_\gamma$[†]	I$_\gamma$[†]	E$_f$	J$^{\pi}_f$	Mult.[‡]	α[a]	Comments
645.89	2$^+$	645.9 *1*	100	0.0	0$^+$	(E2)[#]		
1522.68	(4$^+$)	876.8 *1*	100	645.89	2$^+$	(E2)[#]		
2252.48	(5$^-$)	729.8 *1*	100	1522.68	(4$^+$)	D[&]		
2525.05	(6$^+$)	1002.4 *2*	100	1522.68	(4$^+$)	(E2)[#]		
2535.08	(7$^-$)	282.6 *2*	100	2252.48	(5$^-$)	Q[#]		
2703.88	(7$^-$)	168.8 *1*	100 *9*	2535.08	(7$^-$)	D(+Q)[@]		
		451.4 *1*	67 *7*	2252.48	(5$^-$)	(Q)[#]		
2782.1	(8$^+$)	78 *1*	2.2	2703.88	(7$^-$)			
		247.1 *3*	46	2535.08	(7$^-$)			
		257.1 *2*	100	2525.05	(6$^+$)	(E2)[#]		
2913.2	(10$^+$)	131.2 *2*	100	2782.1	(8$^+$)	E2	1.082	α(K)=0.538; α(L)=0.418; α(M)=0.1011; α(N)=0.0229; α(O)=0.00273; α(P)=2.30$\times10^{-5}$ Mult.: from measured α(K)exp In In-beam γ-ray study.
3171.18		467.3 *1*	100	2703.88	(7$^-$)			
3354.6?		650.7 *2*	100	2703.88	(7$^-$)			
3529.0	(11$^+$)	615.7 *2*	100	2913.2	(10$^+$)	D(+Q)[@]		
3723.3	(12$^+$)	194.4 *1*	4.9 *3*	3529.0	(11$^+$)	D(+Q)[@]		
		810.1 *1*	100.0 *14*	2913.2	(10$^+$)	Q[#]		
4174.1		819.5 *1*	100	3354.6?				
4532.0	(13$^+$)	809.4 *4*	37 *4*	3723.3	(12$^+$)			
		1003.1 *3*	100 *3*	3529.0	(11$^+$)	Q[#]		
4609.4	(12$^-$)	885.9 *2*	100 *7*	3723.3	(12$^+$)	D(+Q)[@]		
		1080.5 *4*	85 *5*	3529.0	(11$^+$)	D[&]		
4678.4	(13$^-$)	955.0 *1*	100	3723.3	(12$^+$)	D[&]		
4704.5	(14$^+$)	981.1 *1*	100	3723.3	(12$^+$)	Q[#]		
4983.5	(15$^-$)	305.1 *1*	100	4678.4	(13$^-$)	Q[#]		
5097.8	(14$^-$)	393.0 *3*	21 *4*	4704.5	(14$^+$)	(D+Q)[@]		

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Adopted Levels, Gammas (continued)

$\gamma(^{148}Er)$ (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[‡]
5097.8	(14⁻)	488.1 *3*		4609.4	(12⁻)	
		565.8 *1*	100 *5*	4532.0	(13⁺)	D[&]
5127.4	(14⁺)	1404.3 *4*	100	3723.3	(12⁺)	Q[#]
5137.6		459.2 *2*	100	4678.4	(13⁻)	
5248.2	(15⁻)	110.5 *2*	100 *5*	5137.6		D[&]
		150.4 *3*		5097.8	(14⁻)	
5304.1	(16⁺)	599.6 *1*	100	4704.5	(14⁺)	Q[#]
5715.7	(16⁻)	467.4 *1*	100	5248.2	(15⁻)	D(+Q)[@]
5742.6	(16⁺)	1038.1 *2*	100	4704.5	(14⁺)	Q[#]
5946.5	(16⁺)	203.8 *2*		5742.6	(16⁺)	
		819.2[b] *2*	2.3 *2*	5127.4	(14⁺)	
		1242.0 *1*	100.0 *18*	4704.5	(14⁺)	Q[#]
6088.1	(16⁻)	345.5 *3*	36 *4*	5742.6	(16⁺)	
		1104.5 *3*	100 *3*	4983.5	(15⁻)	D(+Q)[@]
6103.0	(17⁺)	798.9 *4*	100	5304.1	(16⁺)	D(+Q)[@]
6187.5	(17⁻)	471.8 *2*	100 *6*	5715.7	(16⁻)	D(+Q)[@]
		1204.3 *2*	46 *4*	4983.5	(15⁻)	Q[#]
6219.0	(17⁻)	503.3 *2*	100 *7*	5715.7	(16⁻)	D(+Q)[@]
		1235.4 *2*	69 *4*	4983.5	(15⁻)	Q[#]
6287.4		1304.1 *4*	100	4983.5	(15⁻)	
6290.0	(17⁻)	201.9 *1*	100 *4*	6088.1	(16⁻)	D(+Q)[@]
		343.5 *1*	44 *3*	5946.5	(16⁺)	(D)[&]
6395.0	(17⁺)	385.6[b] *4*	17 *3*	6009.4?		
		448.5 *1*	100 *3*	5946.5	(16⁺)	D(+Q)[@]
6518.4	(18⁺)	415.4 *3*	46 *5*	6103.0	(17⁺)	D(+Q)[@]
		1214.3 *1*	100 *3*	5304.1	(16⁺)	Q[#]
6636.9	(18⁺)	242.0 *2*	36 *3*	6395.0	(17⁺)	D(+Q)[@]
		346.9 *1*	100 *10*	6290.0	(17⁻)	D[&]
6709.8	(18⁺)	314.8 *1*	100	6395.0	(17⁺)	D(+Q)[@]
6770.4		1054.7 *3*	100	5715.7	(16⁻)	
6895.3	(18⁺)	1152.7 *3*	100	5742.6	(16⁺)	
6921.7	(19⁺)	211.9 *1*	100 *4*	6709.8	(18⁺)	D(+Q)[@]
		284.7 *2*	26 *4*	6636.9	(18⁺)	
7027.3	(19⁻)	739.9 *3*	56 *5*	6287.4		Q[#]
		808.0 *2*	167 *17*	6219.0	(17⁻)	
		839.8 *1*	100 *5*	6187.5	(17⁻)	Q[#]
7051.6	(19⁺)	533.2 *1*	100	6518.4	(18⁺)	D(+Q)[@]
7091.8	(19⁻)	381.8 *4*	85 *6*	6709.8	(18⁺)	D[&]
		454.8 *2*	50 *4*	6636.9	(18⁺)	D[&]
		801.9 *2*	100 *4*	6290.0	(17⁻)	Q[#]
7294.8	(19⁺)	399.5 *2*	100	6895.3	(18⁺)	D(+Q)[@]
7354.3	(20⁺)	432.6 *1*	100	6921.7	(19⁺)	D(+Q)[@]
7532.5	(20⁺)	480.9 *1*	100	7051.6	(19⁺)	D(+Q)[@]
7585.3	(20⁺)	948.4 *2*	100	6636.9	(18⁺)	Q[#]
7670.8		1152.4 *2*	100	6518.4	(18⁺)	
7723.0	(20⁻)	631.2 *2*	100	7091.8	(19⁻)	D(+Q)[@]
7733.4	(20⁺)	438.6 *3*	100	7294.8	(19⁺)	D(+Q)[@]

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Adopted Levels, Gammas (continued)

$\gamma(^{148}Er)$ (continued)

E_i(level)	J^π_i	E_γ[†]	I_γ[†]	E_f	J^π_f	Mult.[‡]
7739.5		969.1 *4*	100	6770.4		
7832.4	(21$^+$)	299.9 *1*	100	7532.5	(20$^+$)	D(+Q)[@]
7878.7	(21$^+$)	145.3[b] *3*	100	7733.4	(20$^+$)	D(+Q)[@]
8017.9	(21$^-$)	990.6 *1*	100	7027.3	(19$^-$)	Q[#]
8119.7	(21$^-$)	1027.9 *2*	100	7091.8	(19$^-$)	Q[#]
8201.4		616.1 *3*	100	7585.3	(20$^+$)	
8274.7?	(22$^-$)	256.8 *2*	100	8017.9	(21$^-$)	
8304.0		1252.4 *3*	100	7051.6	(19$^+$)	
8549.1?	(23$^-$)	274.4 *1*	100	8274.7?	(22$^-$)	D(+Q)[@]
9018.3	(23$^+$)	1185.9 *3*	100	7832.4	(21$^+$)	Q[#]
9590.7		1041.6 *3*	100	8549.1?	(23$^-$)	

[†] From $^{92}Mo(^{58}Ni,2p\gamma)$.

[‡] From γ-asymmetry data in $^{92}Mo(^{58}Ni,2p\gamma)$.

[#] From γ-asymmetry, $\Delta J=2$, quadrupole (most likely E2). Mult=(E2) is assigned to transitions in the yrast sequence from g.s. to (10$^+$) isomer, based on definite E2 for (10$^+$) to (8$^+$) transition and stretched quadrupoles to other four transitions.

[@] From γ-asymmetry, $\Delta J=1$, dipole+quadrupole (most likely M1+E2). In a few cases transition is indicated as $\Delta J=0$.

[&] From γ-asymmetry, $\Delta J=1$, dipole (most likely E1).

[a] 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.

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

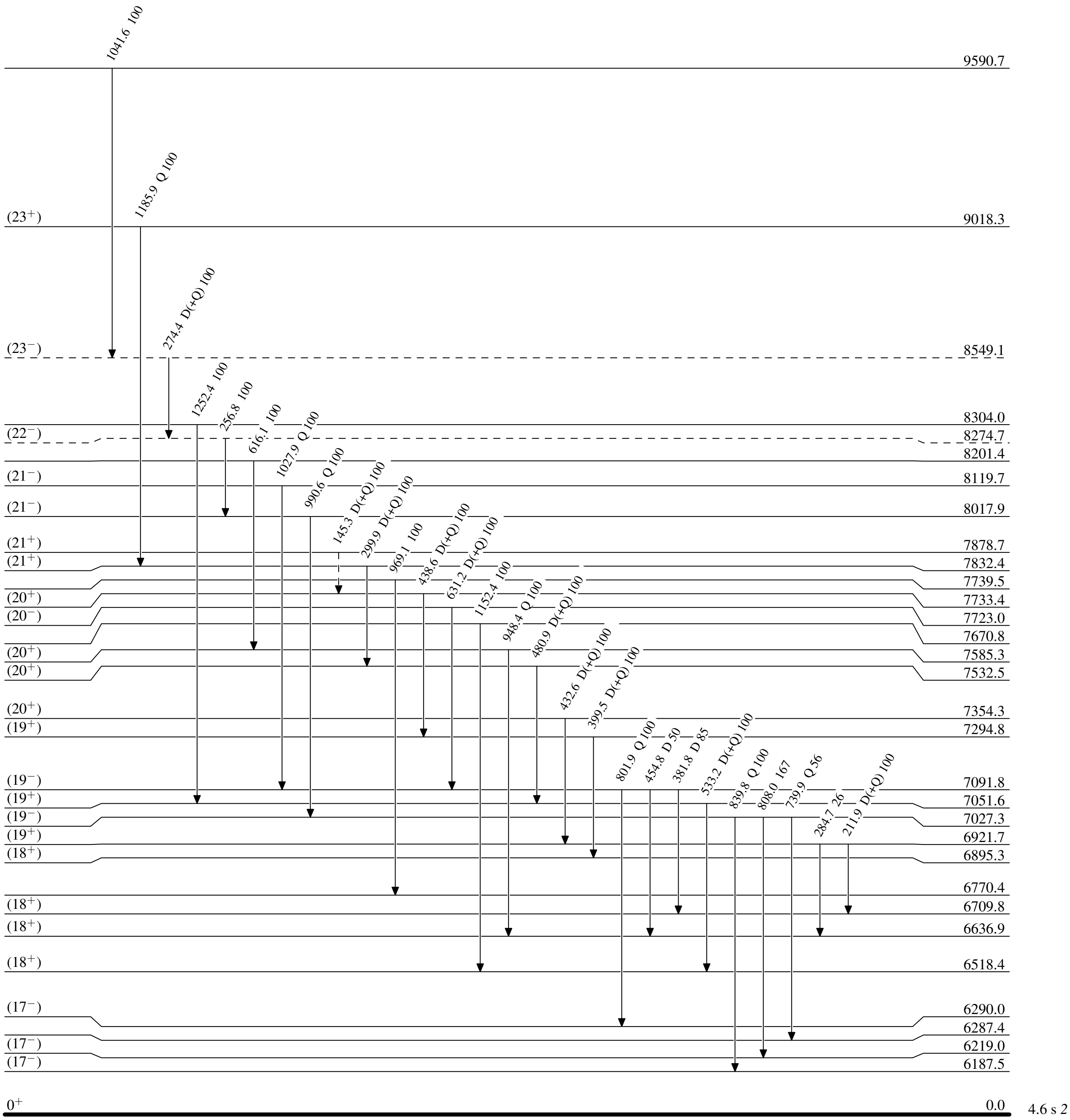
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)

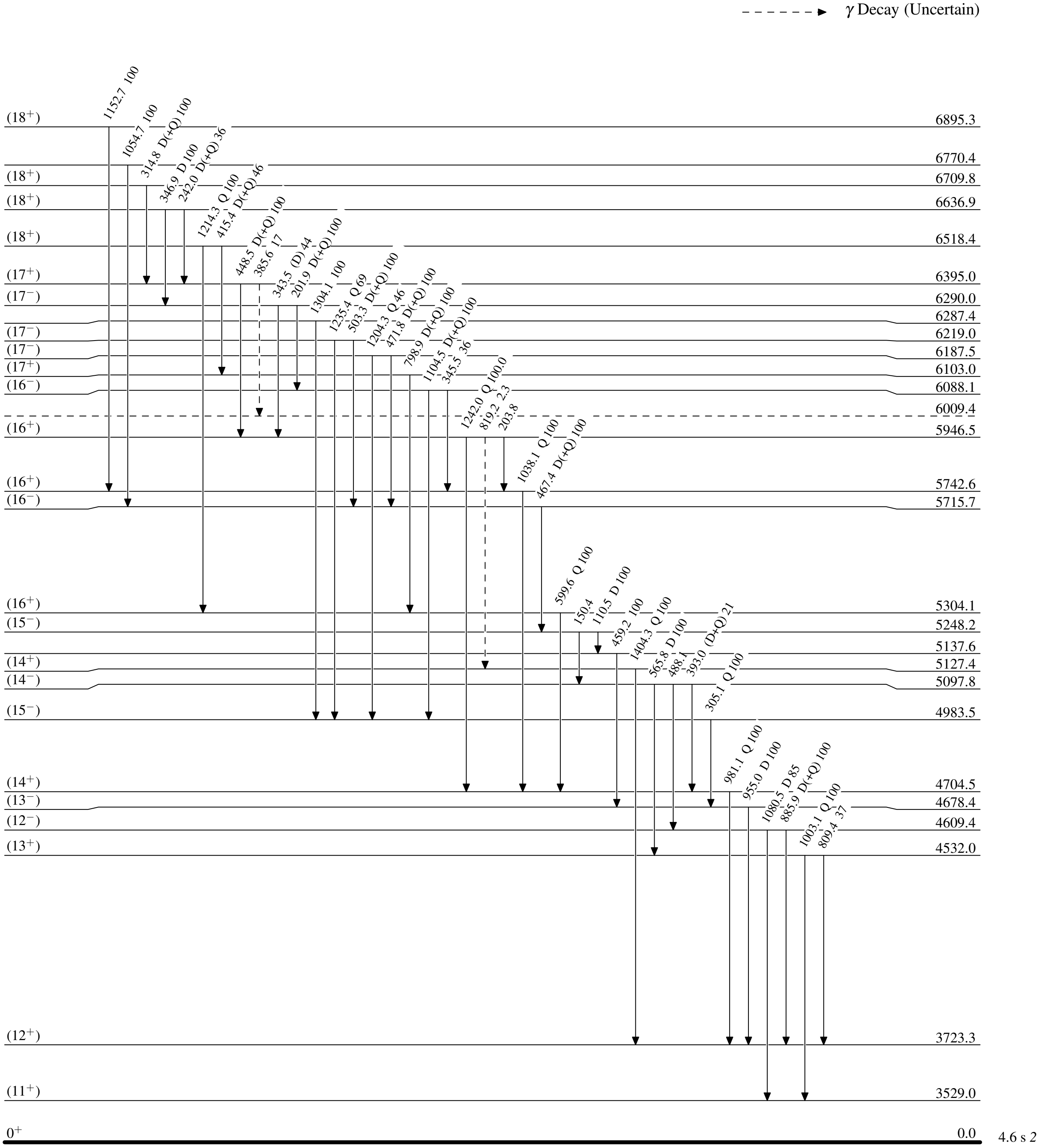


$^{148}_{68}Er_{80}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

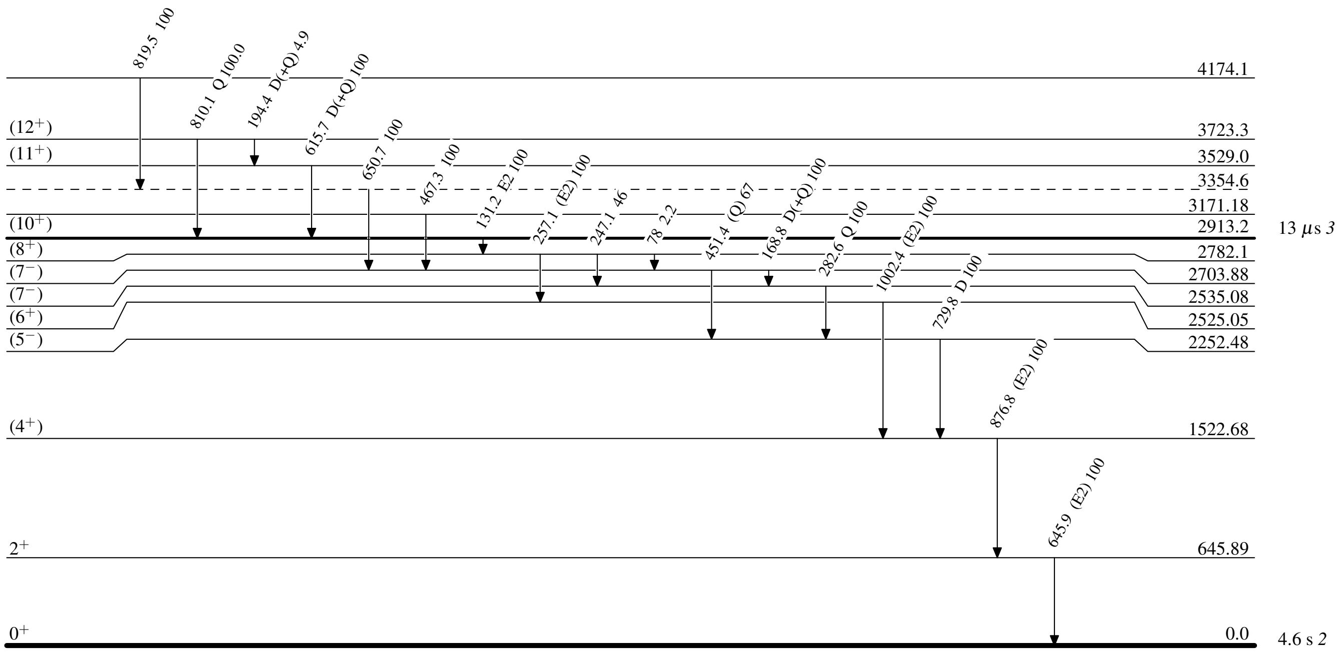


$^{148}_{68}Er_{80}$

Adopted Levels, Gammas

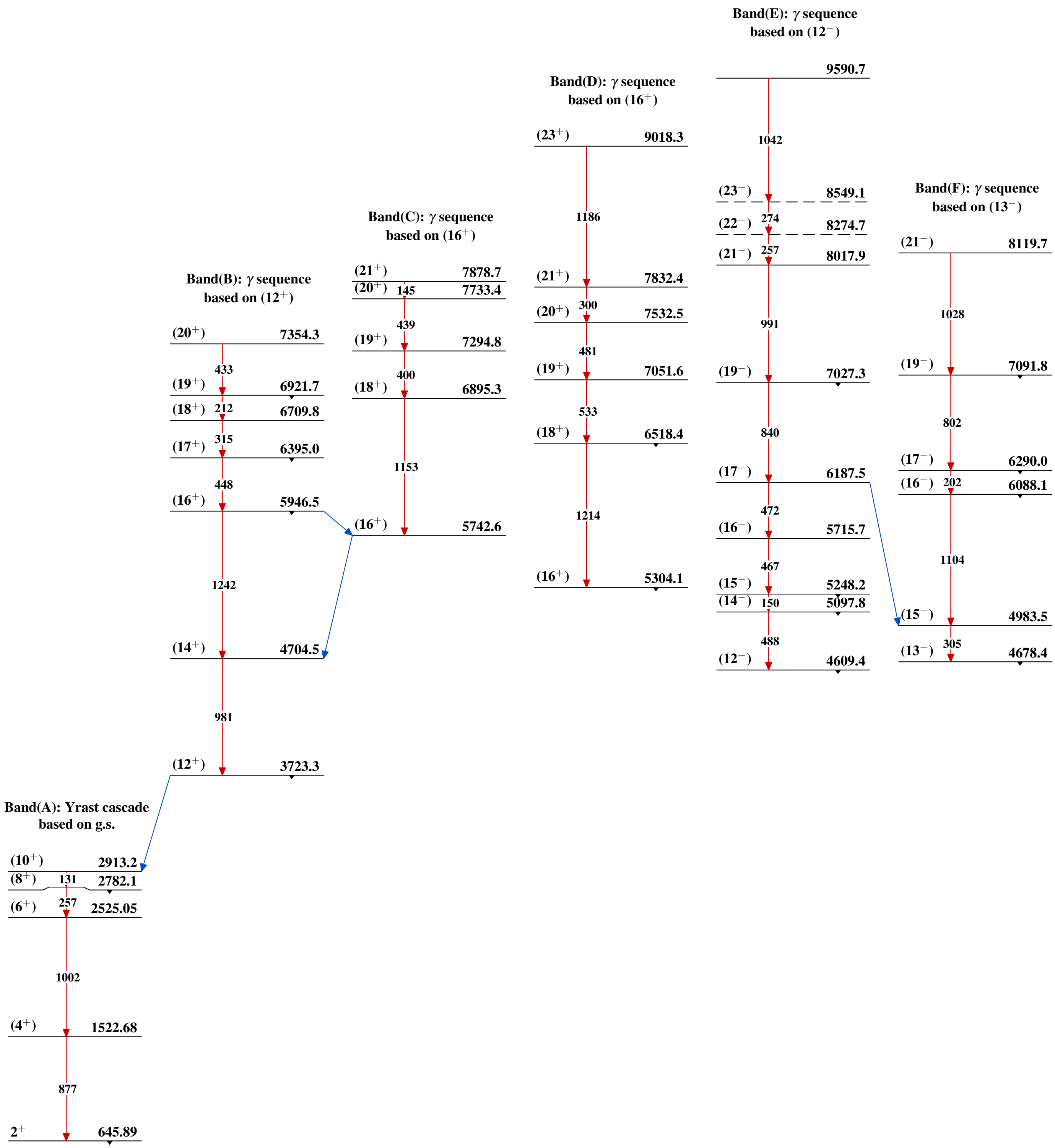
Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{148}_{68}Er_{80}$

Adopted Levels, Gammas



$^{148}_{68}Er_{80}$