^{92}Mo(^{58}Ni,2pγ) 2001Ro15

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

2001Ro15: E=260 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$(DCO) using the NORDBALL array consisting of 15 BGO-shielded HPGe detectors situated in three rings at 79°, 101° and 143° relative to the beam direction. Interpretation of level structure in terms of spherical shell model and comparison with the structure of N=80 isotones (^{146}Dy, ^{144}Gd) and neighboring nuclides (^{148}Dy, ^{150}Er).

1982No07: E=250 MeV. Measured: Eγ, Iγ, $\gamma\gamma$, γ(t). Levels reported up to 2913, 10^+.

^{148}Er Levels

For classification of observed levels in terms of shell-model configurations, as proposed in 2001Ro15, see Adopted Levels.

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	Comments
0[#]	0^+		
645.89[#] *10*	2^+		
1522.68[#] *15*	4^+		
2252.48 *18*	5^-		
2525.05[#] *25*	6^+		
2535.08 *21*	7^-		
2703.88 *20*	7^-		
2782.1[#] *4*	8^+		
2913.2[#] *4*	10^+	13 μs *3*	%IT=100 $T_{1/2}$: γ(t) (1982No07).
3171.18 *22*			
3354.6? *3*			
3529.0 *4*	11^+		
3723.3[@] *4*	12^+		
4174.1 *3*			
4532.0 *5*	13^+		
4609.4[b] *5*	12^-		
4678.4[c] *4*	13^-		
4704.5[@] *4*	14^+		
4983.5[c] *4*	15^-		
5097.8[b] *5*	14^-		
5127.4 *5*	14^+		
5137.6 *5*			
5248.2[b] *5*	15^-		
5304.1[a] *4*	16^+		
5715.7[b] *5*	16^-		
5742.6[&] *5*	16^+		
5946.5[@] *4*	16^+		
6009.4? *5*			
6088.1[c] *5*	16^-		
6103.0 *5*	17^+		
6187.5[b] *5*	17^-		
6219.0 *5*	17^-		
6287.4 *5*			
6290.0[c] *4*	17^-		
6395.0[@] *5*	17^+		

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^{92}Mo(^{58}Ni,2pγ) 2001Ro15 (continued)

^{148}Er Levels (continued)

E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]
6518.4[a] 5	18+	7051.6[a] 5	19+	7723.0 5	(20−)	8201.4 6	
6636.9 5	18+	7091.8[c] 5	19−	7733.4[&] 7	(20+)	8274.7?[b] 5	(22−)
6709.8[@] 5	18+	7294.8[&] 6	(19+)	7739.5 7		8304.0 6	
6770.4 6		7354.3[@] 5	20+	7832.4[a] 5	21+	8549.1?[b] 5	(23−)
6895.3[&] 6	(18+)	7532.5[a] 5	20+	7878.7[&] 7	(21+)	9018.3[a] 6	23+
6921.7[@] 5	19+	7585.3 5	20+	8017.9[b] 5	21−	9590.7[b] 6	
7027.3[b] 5	19−	7670.8 5		8119.7[c] 5	21−		

[†] From least-squares fit to Eγ data.
[‡] As proposed in 2001Ro15, based on γ(anisotropy) data for many transitions, decay patterns, γ sequences, and yrast type of population in heavy-ion in-beam γ-ray measurements.
[#] 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)

The γ anistropy information was extracted from projected spectra recorded at 79°, 101° and 143° relative to the beam direction. The assignments of levels spins was based mostly on these anistropies, defined as asymmetry ratio R=2Iγ(143°)/[Iγ(79°+101°]. Expected average values are 1.4 for ΔJ=2, quadrupole and 0.7 for ΔJ=1, dipole. The ΔJ=0, dipole transitions have nearly the same ratio as for ΔJ=2, quadrupole, as judged from listed values in contents of table 3 of 2001Ro15.

Eγ	Iγ	Ei(level)	J_i^π	E_f	J_f^π	Mult.	α[a]	Comments
78[‡] 1	2.0[‡]	2782.1	8+	2703.88	7−			Additional information 7.
110.5 2	7.9 4	5248.2	15−	5137.6		D		R=0.50 7.
131.2 2		2913.2	10+	2782.1	8+	E2	1.082	α(K)exp=0.53 20 (1982No07) α(K)=0.538; α(L)=0.418; α(M)=0.1011; α(N)=0.0229; α(O)=0.00273; α(P)=2.30×10−5 Mult.: from α(K)exp deduced from measured K x ray(Er)/I(131γ) in K x ray-γ coin (1982No07). Additional information 10.
145.3[b] 3	4.4 4	7878.7	(21+)	7733.4	(20+)	D(+Q)[@]		R=0.65 5.
150.4 3		5248.2	15−	5097.8	14−			
168.8 1	8.7 8	2703.88	7−	2535.08	7−	D(+Q)[@]		R=2.1 7, ΔJ=0 transition. Additional information 6.
194.4 1	7.3 5	3723.3	12+	3529.0	11+	D(+Q)[@]		R=0.64 9.
201.9 1	18.1 7	6290.0	17−	6088.1	16−	D(+Q)[@]		R=0.65 5.
203.8 2		5946.5	16+	5742.6	16+			
211.9 1	14.2 6	6921.7	19+	6709.8	18+	D(+Q)[@]		R=0.75 6.
242.0 2	4.8 4	6636.9	18+	6395.0	17+	D(+Q)[@]		Iγ: uncertainty of 4.0 in 2001Ro15 seems a misprint, evaluators assign 0.4. R=0.8 1.
247.1[‡] 3	6.0[‡]	2782.1	8+	2535.08	7−			Additional information 8.

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^{92}Mo(^{58}Ni,2pγ) 2001Ro15 (continued)

γ(^{148}Er) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
256.8 *2*	5.6† *6*	8274.7?	(22$^-$)	8017.9	21$^-$		I_γ: see comment for 257.1γ.
257.1 *2*	8.4† *9*	2782.1	8$^+$	2525.05	6$^+$	Q#	I_γ: 14.0 *17* for 257.1+256.8, about 60% intensity for 257.1. R=0.9 *2* for 257.1+256.8. Additional information 9.
274.4 *1*	16.5 *6*	8549.1?	(23$^-$)	8274.7?	(22$^-$)	D(+Q)@	R=0.84 *7*.
282.6 *2*	13.9 *6*	2535.08	7$^-$	2252.48	5$^-$	Q#	R=1.3 *1*. Additional information 5.
284.7 *2*	3.7 *5*	6921.7	19$^+$	6636.9	18$^+$	@	R=0.5 *2*.
299.9 *1*	7.3 *5*	7832.4	21$^+$	7532.5	20$^+$	D(+Q)@	R=0.8 *1*.
305.1 *1*	41.7 *7*	4983.5	15$^-$	4678.4	13$^-$	Q#	R=1.28 *4*.
314.8 *1*	17.9 *6*	6709.8	18$^+$	6395.0	17$^+$	D(+Q)@	R=0.86 *5*.
343.5 *1*	8.0 *6*	6290.0	17$^-$	5946.5	16$^+$	(D)&	R=1.0 *1*.
345.5 *3*	5.8† *6*	6088.1	16$^-$	5742.6	16$^+$		I_γ: see comment for 346.9γ.
346.9 *1*	13.5† *14*	6636.9	18$^+$	6290.0	17$^-$	D&	I_γ: 19.3 *7* for 345.5+346.9, about 70% intensity for 346.9. R=0.70 *5* for 345.5+346.9.
381.8 *4*	10.0 *7*	7091.8	19$^-$	6709.8	18$^+$	D&	R=0.8 *1*.
385.6[b] *4*	4.1 *7*	6395.0	17$^+$	6009.4?			R=1.2 *4*.
393.0 *3*	3.8 *7*	5097.8	14$^-$	4704.5	14$^+$	(D+Q)@	R=1.5 *6*, ΔJ=0 transition.
399.5 *2*	8.4 *8*	7294.8	(19$^+$)	6895.3	(18$^+$)	D(+Q)@	R=0.7 *1*.
415.4 *3*	6.8 *7*	6518.4	18$^+$	6103.0	17$^+$	D(+Q)@	R=0.7 *1*.
432.6 *1*	16.7 *7*	7354.3	20$^+$	6921.7	19$^+$	D(+Q)@	R=0.78 *6*.
438.6 *3*	7.5 *6*	7733.4	(20$^+$)	7294.8	(19$^+$)	D(+Q)@	R=0.9 *1*.
448.5 *1*	24.6 *7*	6395.0	17$^+$	5946.5	16$^+$	D(+Q)@	R=0.91 *5*.
451.4 *1*	5.9† *6*	2703.88	7$^-$	2252.48	5$^-$	(Q)#	I_γ: 11.7 *5* for 451.8+451.4; 50% assigned for each component arbitrarily. R=1.00 *9* for 451.4+451.8.
[x]451.8 *2*	5.9† *6*						I_γ: see comment for 451.4γ.
454.8 *2*	5.9 *5*	7091.8	19$^-$	6636.9	18$^+$	D&	R=0.36 *8*.
459.2 *2*	7.4 *6*	5137.6		4678.4	13$^-$		R=1.0 *2*.
467.3 *1*	5.8† *6*	3171.18		2703.88	7$^-$		I_γ: see comment for 467.4γ.
467.4 *1*	23.1† *23*	5715.7	16$^-$	5248.2	15$^-$	D(+Q)@	I_γ: 28.9 *7* for 467.3+467.4, about 80% intensity for 467.4. R=0.85 *5* for 467.3+467.4.
471.8 *2*	9.8 *6*	6187.5	17$^-$	5715.7	16$^-$	D(+Q)@	R=0.78 *9*.
480.9 *1*	14.1 *12*	7532.5	20$^+$	7051.6	19$^+$	D(+Q)@	R=0.45 *9*.
488.1 *3*		5097.8	14$^-$	4609.4	12$^-$		
503.3 *2*	13.0 *9*	6219.0	17$^-$	5715.7	16$^-$	D(+Q)@	R=0.9 *1*.
533.2 *1*	17.1 *8*	7051.6	19$^+$	6518.4	18$^+$	D(+Q)@	R=0.66 *7*.
565.8 *1*	17.7 *8*	5097.8	14$^-$	4532.0	13$^+$	D&	R=0.91 *8*.
599.6 *1*	37.4 *7*	5304.1	16$^+$	4704.5	14$^+$	Q#	R=1.60 *6*.
615.7 *2*	38† *4*	3529.0	11$^+$	2913.2	10$^+$	D(+Q)@	I_γ: 41.9 *7* for 615.7+616.1, about 90% intensity for 615.7. R=0.56 *2*.
616.1 *3*	4† *1*	8201.4		7585.3	20$^+$		I_γ: see comment for 615.7γ.
631.2 *2*	7.6 *5*	7723.0	(20$^-$)	7091.8	19$^-$	(D+Q)@	R=1.1 *1*.
645.9 *1*	28.0 *7*	645.89	2$^+$	0	0$^+$	Q#	Additional information 1. R=1.42 *7*.
650.7 *2*	6.8 *5*	3354.6?		2703.88	7$^-$		R=2.2 *3*.

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^{92}Mo(^{58}Ni,2pγ) 2001Ro15 (continued)

γ(^{148}Er) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
729.8 *1*	19.3 *7*	2252.48	5^-	1522.68	4^+	D[&]	R=0.96 *7*. Additional information 3.
739.9 *3*	5.8 *5*	7027.3	19^-	6287.4		Q[#]	R=1.5 *2*.
798.9 *4*	11.9 *6*	6103.0	17^+	5304.1	16^+	D(+Q)[@]	R=0.35 *9*.
801.9 *2*	11.8 *5*	7091.8	19^-	6290.0	17^-	Q[#]	R=1.4 *1*.
808.0 *2*	17.4[†] *17*	7027.3	19^-	6219.0	17^-		I_γ: 174.1 for 810.1+809.4+808.0, about 10% intensity for 808.0.
809.4 *4*	8.7[†] *9*	4532.0	13^+	3723.3	12^+		I_γ: 174.1 15 for 810.1+809.4+808.0, about 5% intensity for 809.4.
810.1 *1*	148[†] *15*	3723.3	12^+	2913.2	10^+	Q[#]	I_γ: 174.1 *15* for 810.1+809.4+808.0, about 85% intensity for 810.1. R=1.43 *2* for 810.1+809.4+808.0.
819.2[b] *2*	0.8[†] *1*	5946.5	16^+	5127.4	14^+		I_γ: see comment for 819.5.
819.5 *1*	6.9[†] *7*	4174.1		3354.6?			I_γ: 7.7 *5* for 819.5+819.2, about 95% intensity for 819.5. R=2.0 *3* for 819.5+819.2.
839.8 *1*	10.4 *5*	7027.3	19^-	6187.5	17^-	Q[#]	R=1.4 *1*.
876.8 *1*	24.0 *6*	1522.68	4^+	645.89	2^+	Q[#]	R=1.44 *7*. Additional information 2.
885.9 *2*	9.4 *7*	4609.4	12^-	3723.3	12^+	D(+Q)[@]	R=1.1 *2*, ΔJ=0 transition.
948.4 *2*	7.1 *4*	7585.3	20^+	6636.9	18^+	Q[#]	R=2.1 *3*.
955.0 *1*	50.1 *8*	4678.4	13^-	3723.3	12^+	D[&]	R=1.01 *3*.
969.1 *4*	3.1 *5*	7739.5		6770.4			
981.1 *1*	100.0 *7*	4704.5	14^+	3723.3	12^+	Q[#]	R=1.60 *3*.
990.6 *1*	18.0 *5*	8017.9	21^-	7027.3	19^-	Q[#]	R=1.50 *8*.
1002.4 *2*	10.0[†] *10*	2525.05	6^+	1522.68	4^+	(Q)[#]	I_γ: see comment for 1003.1γ. Additional information 4.
1003.1 *3*	23.6[†] *24*	4532.0	13^+	3529.0	11^+	Q[#]	I_γ: 33.6 *7* for 1002.4+1003.1, about 70% intensity for 1003.1. R=1.56 *6* for 1002.4+1003.1.
1027.9 *2*	8.0 *4*	8119.7	21^-	7091.8	19^-	Q[#]	R=1.8 *2*.
1038.1 *2*	25.0 *6*	5742.6	16^+	4704.5	14^+	Q[#]	R=1.45 *7*.
1041.6 *3*	7.2 *4*	9590.7		8549.1?	(23^-)		R=1.6 *2*.
1054.7 *3*	5.8 *5*	6770.4		5715.7	16^-		
1080.5 *4*	8.0 *5*	4609.4	12^-	3529.0	11^+	D[&]	R=0.88 *9*.
1104.5 *3*	16.3 *5*	6088.1	16^-	4983.5	15^-	D(+Q)[@]	R=0.86 *6*.
1152.4 *2*	6.4[†] *6*	7670.8		6518.4	18^+		I_γ: see comment for 1152.7γ.
1152.7 *3*	9.5[†] *10*	6895.3	(18^+)	5742.6	16^+		I_γ: 15.9 *8* for 1152.7+1152.4, about 60% intensity for 1152.7.
1185.9 *3*	3.1 *3*	9018.3	23^+	7832.4	21^+	Q[#]	R=2.1 *4*.
1204.3 *2*	4.5 *4*	6187.5	17^-	4983.5	15^-	Q[#]	R=1.2 *2*.
1214.3 *1*	14.8 *5*	6518.4	18^+	5304.1	16^+	Q[#]	R=1.52 *9*.
1235.4 *2*	9.0 *5*	6219.0	17^-	4983.5	15^-	Q[#]	R=1.3 *1*.
1242.0 *1*	34.2 *6*	5946.5	16^+	4704.5	14^+	Q[#]	R=1.48 *5*.
1252.4 *3*	17.8 *6*	8304.0		7051.6	19^+		R=0.89 *6*.
1304.1 *4*	13.5[†] *14*	6287.4		4983.5	15^-		I_γ: 15.0 *5* for 1304.9+1304.1, about 90% intensity for 1304.1. R=1.59 *9* for 1304.9+1304.1.

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^{92}Mo(^{58}Ni,2pγ) 2001Ro15 (continued)

γ(^{148}Er) (continued)

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
1304.9[b] *4*	1.5[†] *2*	6009.4?		4704.5	14^+		I_γ: see comment for 1304.1γ.
1404.3 *4*	4.2 *3*	5127.4	14^+	3723.3	12^+	Q[#]	R=1.5 *2*.

[†] Unresolved structure. Intensity and DCO ratios are combined for both components. Based on the thickness of the arrows by which the γ-rays are drawn in the level-scheme figures, the evaluator has given under comments estimate of separate intensities for the components.
[‡] γ from 1982No07 only. Intensity at E=250 MeV, renormalized to 28.0 for 645.9γ.
[#] From γ-asymmetry, ΔJ=2, quadrupole (most likely E2).
[@] From γ-asymmetry, ΔJ=1, dipole+quadrupole (most likely M1+E2). In a few cases transition is indicated as ΔJ=0.
[&] From γ-asymmetry, ΔJ=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.
[x] γ ray not placed in level scheme.

^{92}Mo(^{58}Ni,2pγ) 2001Ro15

Level Scheme

Intensities: Relative I_γ

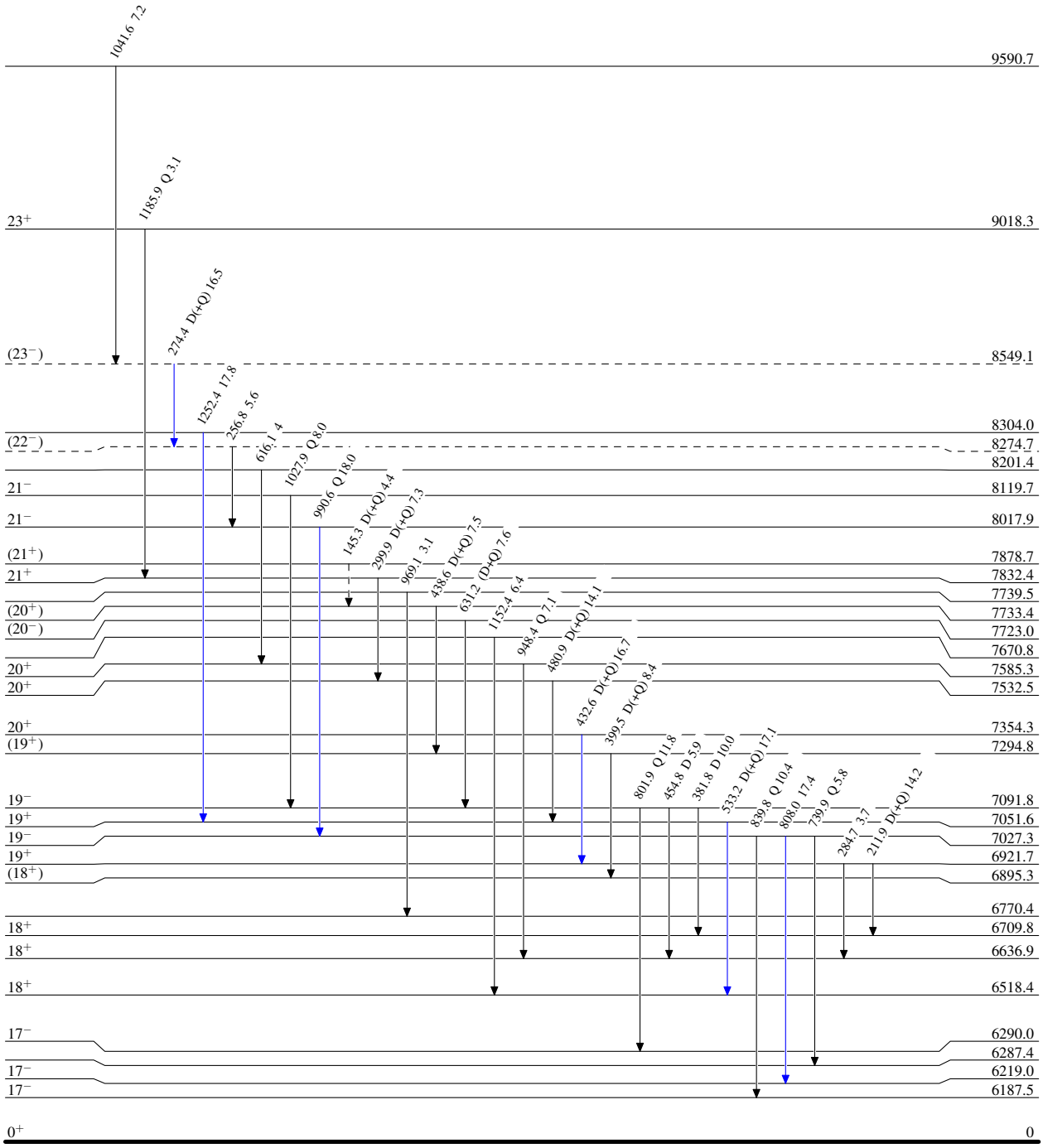
Legend

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

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

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

γ Decay (Uncertain)



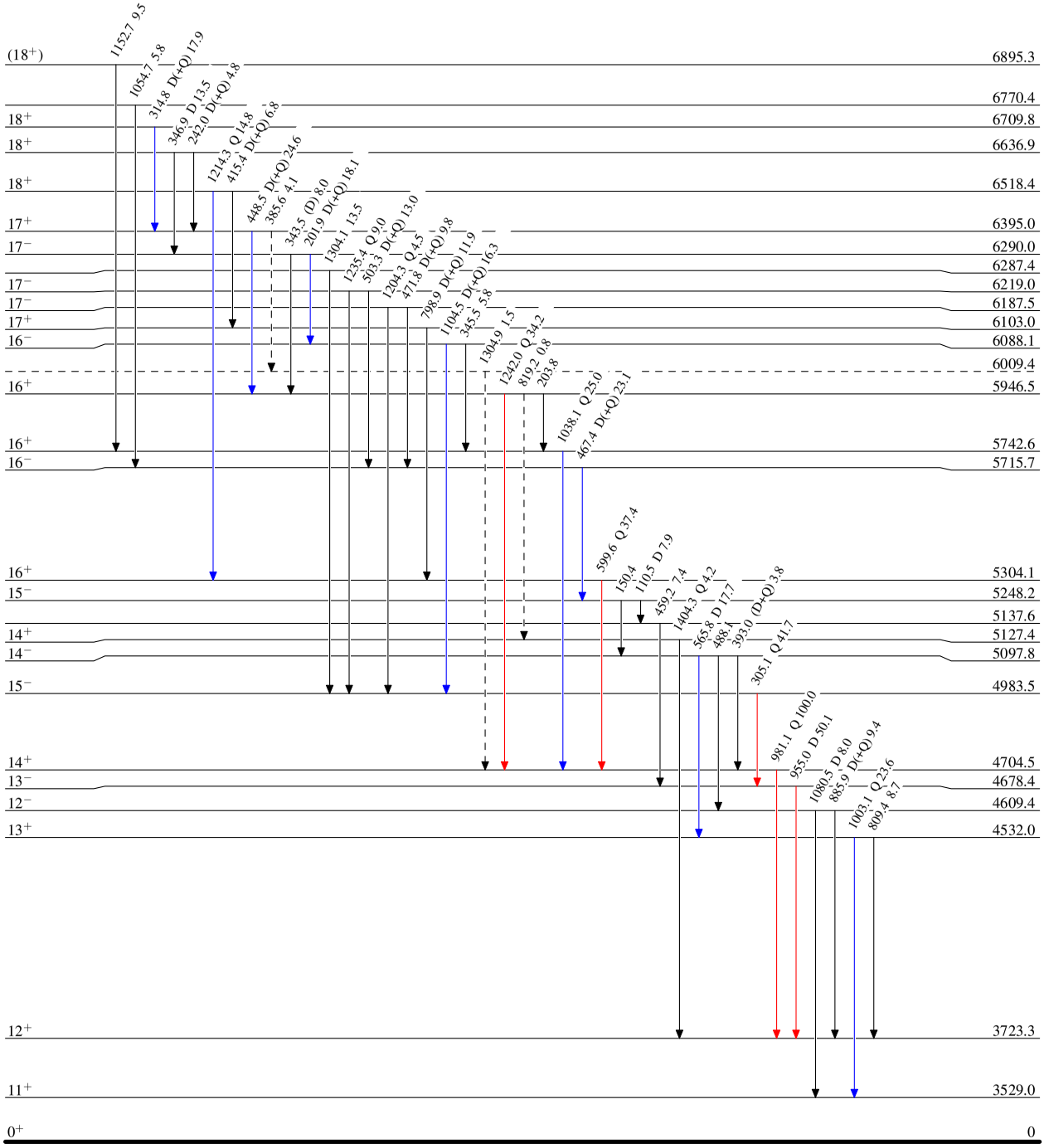
$^{148}_{68}Er_{80}$

$^{92}Mo(^{58}Ni,2p\gamma)$ 2001Ro15

Level Scheme (continued)

Intensities: Relative I_γ

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- γ Decay (Uncertain)



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

^{92}Mo(^{58}Ni,2pγ) 2001Ro15

Level Scheme (continued)

Intensities: Relative I_γ

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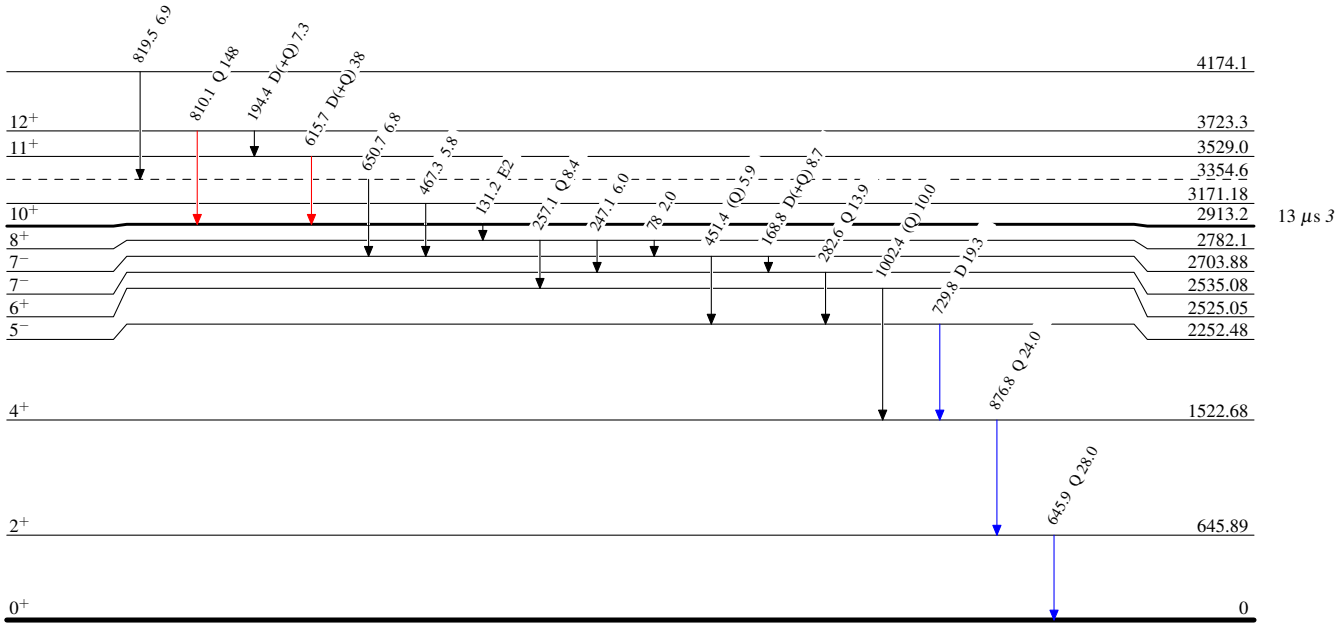
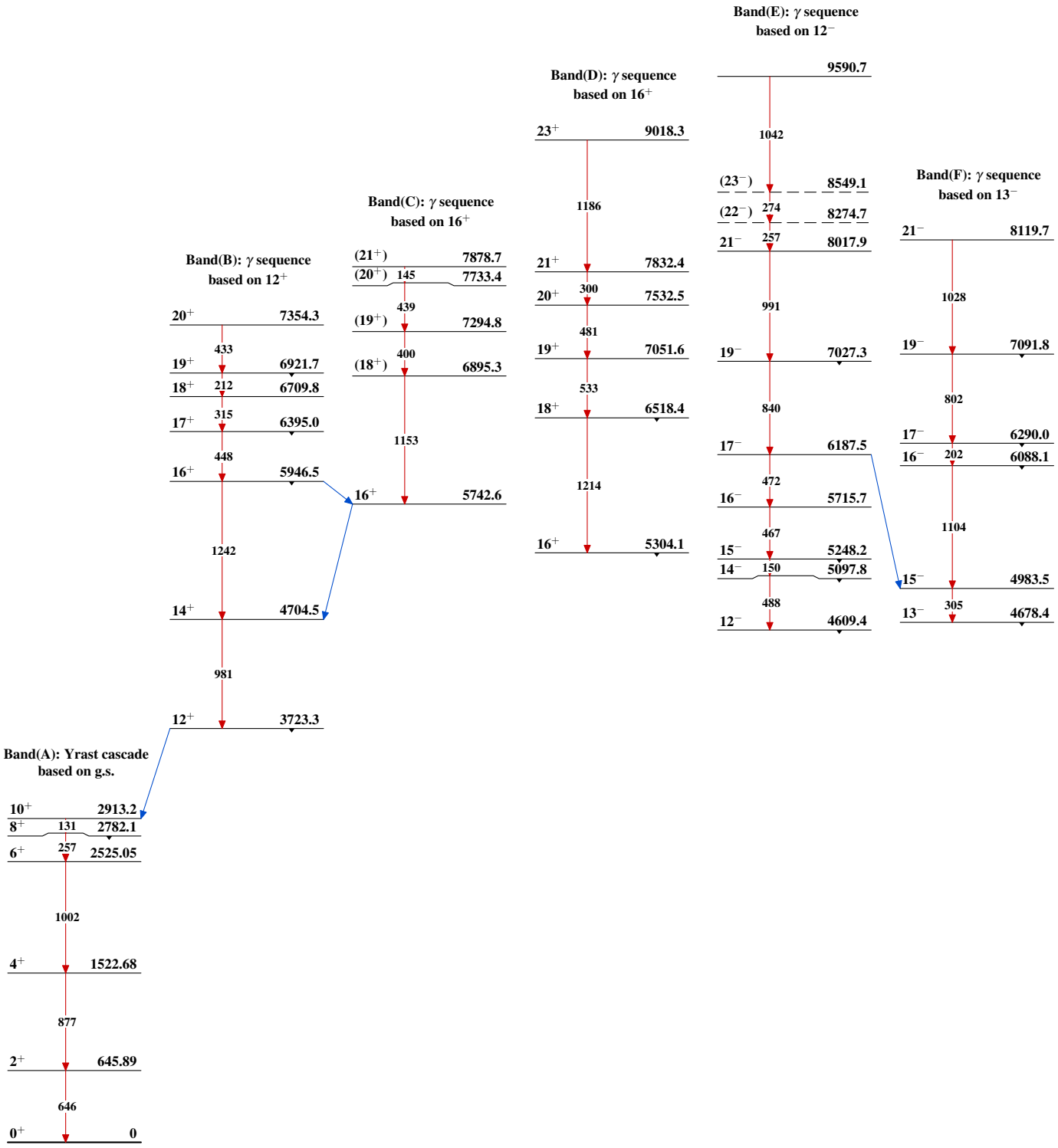
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



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

^{92}Mo(^{58}Ni,2pγ) 2001Ro15



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