^{176}Yb(^{18}O,4nγ) 2014Li21,2008Ma58

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, [1] and Jun Chen[2]	NDS 169, 1 (2020)	15-Oct-2020

2014Li21: E(^{18}O)=88 MeV; measured Eγ, Iγ, $\gamma\gamma$-coin, $\gamma\gamma(\theta)$(ADO) using JAEA detector array comprising of 14 HPGe detectors with BGO anti-Compton shields. Deduced levels, J, π, multipolarities, bands, configurations. Calculated total Routhian surfaces.

2014Li21 state that their experiment is different from the one carried out at JAEA and reported in 2008Ma58. The two studies are shared by many of the same authors.

2008Ma58: E=88, 95 MeV; measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$(DCO) using JAEA detector array comprising of 12 HPGe detectors with BGO anti-Compton shields.

The level scheme has been adopted from 2014Li21, as these authors have modified the level scheme proposed in their earlier work 2008Ma58. Several γ rays such as 202.0, 451.8 and 605.1 in 2008Ma58 were not confirmed by 2014Li21; the 417.2 γ is seen as a single line by 2104Li21, as compared to a doublet in 2008Ma58. Many other transitions have been reordered in 2014Li21 from a better counting statistics.

^{190}Pt Levels

Following levels reported by 2008Ma58 have been discarded either due to re-ordering of the transitions in γ cascades in the work of 2014Li21 or due to non-observation of γ rays reported by 2008Ma58: 2682, 10^- (605.1γ not seen); 3212 (451.8γ not seen); 4051, (18^+) (386.8γ reordered); 4313, (19^+) (508.0γ reordered); 4846, (20^+) (795.0γ reordered); 5108, (21^+) (795.0γ reordered); 5578, (22^+) (732.5γ reordered); 5999, (23^+) (890.3γ reordered); 6000, (24^+) (422.0γ reordered); 6417, (26^+) (417.0γ seen as single line only, not a doublet, its placement is from a level near 4084 keV in both the studies); 6590, (28^+) (173.0γ reordered). The ordering of the γ transitions in cascades is adopted here from 2014Li21.

E(level)[†]	J$^\pi$	Comments
0.0[#]	0^+	
295.70[#] *10*	2^+	
737.00[#] *15*	4^+	
1287.70[#] *18*	6^+	
1464.8 *3*	5^-	
1631.3[&] *4*	7^-	
1915.50[#] *20*	8^+	
2078.7[c] *6*	8^-	
2222.7[&] *5*	9^-	
2297.7[c] *7*	10^-	
2535.50[@] *23*	10^+	
2571.0[c] *7*	11^-	
2603.8 *5*	10^+	
2702.3 *6*		J$^\pi$: 10^+ in 2008Ma58.
2726.9[@] *4*	12^+	
2761.3?[‡&] *6*	11^-	
3069.6[@] *4*	14^+	
3112.1[c] *6*	13^-	
3345.0[&] *5*	13^-	
3415.2[b] *5*	14^+	A 202.0γ with Iγ=1.5 from this level reported by 2008Ma58 was not confirmed by 2014Li21.
3577.0[@] *5*	16^+	
3666.4[b] *5*	16^+	
3808.2[b] *7*	18^+	J$^\pi$: (17^+) in 2008Ma58.
3856.4[&] *5*	15^-	

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^{176}Yb(^{18}O,4nγ) 2014Li21,2008Ma58 (continued)

^{190}Pt Levels (continued)

E(level)†	Jπ	E(level)†	Jπ	E(level)†	Jπ	E(level)†	Jπ
4055.9? *7*		4653.9[a] *7*	21⁻	5720.7 *10*	25⁺	7469.4?[‡b] *13*	30⁺
4083.6[a] *5*	17⁻	4930.0[b] *9*	22⁺	6007.1?[‡a] *9*	(24⁻)	7534.6?[‡a] *13*	(30⁻)
4134.1[b] *8*	20⁺	4958.9[@] *9*	20⁺	6282.5?[‡b] *10*	26⁺	7957.5?[‡a] *14*	(32⁻)
4215.3[@] *7*	18⁺	5330.4 *9*	23⁺	6740.0?[‡a] *11*	(26⁻)	7992.3?[‡b] *14*	32⁺
4267.0[a] *6*	19⁻	5391.7?[‡b] *10*	24⁺	6790.8?[‡b] *11*	28⁺	8131.3?[‡a] *15*	(33⁻)
4612.6 *9*	21⁺	5448.4[a] *8*	23⁻	7227.7?[‡a] *12*	(28⁻)	8772.7?[‡a] *15*	(35⁻)

† From least-squares fit to the Eγ data.
‡ Level energy is uncertain due to ambiguous ordering of the γ transitions in cascades.
# Band(A): g.s. band.
@ Band(B): 2-qusiparticle band based on 10⁺.
& Seq.(E): γ cascade based on 7⁻. Possible configuration=$\nu i^{-1}_{13/2}\otimes\nu(p^{-1}_{3/2}$ or $f^{-1}_{5/2})$ (2014Li12).
a Band(C): Band based on 17⁻. Possible configuration=$\nu i^{-3}_{13/2}\otimes\nu(p^{-1}_{3/2}$ or $f^{-1}_{5/2})$ (2014Li12).
b Band(D): Band based on 14⁺. Possible configuration=$\nu i^{-2}_{13/2}\otimes\nu h^{-1}_{9/2}\otimes\ \nu(p^{-1}_{3/2}$ or $f^{-1}_{5/2})$ (2008Ma58, 2014Li21).
c Seq.(F): γ cascade based on 8⁻.

γ(^{190}Pt)

Expected ADO ratio is 1.2 for ΔJ=2, quadrupole transitions and 0.7 for ΔJ=1, dipole transitions (2014Li21).

Eγ†	Iγ†	E_i(level)	J^π_i	E_f	J^π_f	Mult.	Comments
27.7[@]		4083.6	17⁻	4055.9?			
75.0[@]		2297.7	10⁻	2222.7	9⁻		Eγ=75.0 (2008Ma58).
123.1 *5*		2726.9	12⁺	2603.8	10⁺		Eγ=123.0 (2008Ma58).
141.8 *5*	12.5 *13*	3808.2	18⁺	3666.4	16⁺	Q	DCO=0.5 *3* (2008Ma58) Eγ=141.3, Iγ=6.0 (2008Ma58). R_{ADO}=1.17 *22*.
166.5 *5*	13.9 *10*	1631.3	7⁻	1464.8	5⁻	Q	Eγ=166.0 (2008Ma58). R_{ADO}=1.15 *14*.
173.8[‡] *5*	≤4.5	8131.3?	(33⁻)	7957.5?	(32⁻)	D	Eγ=173.0, Iγ=1.0, placed from a 6590, (28⁺) level (2008Ma58). R_{ADO}=0.72 *9*.
183.4 *3*	24.1 *25*	4267.0	19⁻	4083.6	17⁻	Q	R_{ADO}=1.35 *17*.
191.4 *3*	42.0 *45*	2726.9	12⁺	2535.50	10⁺	Q	Eγ=191.1 (2008Ma58). R_{ADO}=1.22 *14*.
199.5 *5*	7.0 *12*	4055.9?		3856.4	15⁻	D	R_{ADO}=0.79 *22*.
219.0 *5*	7.6 *15*	2297.7	10⁻	2078.7	8⁻	Q	Eγ=219.3 (2008Ma58). R_{ADO}=1.06 *19*.
227.2 *5*	4.8 *4*	4083.6	17⁻	3856.4	15⁻	Q	R_{ADO}=1.14 *27*.
251.2 *3*	35.6 *31*	3666.4	16⁺	3415.2	14⁺	Q	DCO=1.10 *15* (2008Ma58) Eγ=250.8, Iγ=28 *2* (2008Ma58). R_{ADO}=1.28 *13*.
273.3 *5*	8.3 *11*	2571.0	11⁻	2297.7	10⁻	D	Eγ=273.0 (2008Ma58). R_{ADO}=0.57 *13*.
295.7 *1*	134 *12*	295.70	2⁺	0.0	0⁺	Q	R_{ADO}=1.13 *11*. Eγ=295.3 (2008Ma58).
303.1 *5*	6.3 *11*	3415.2	14⁺	3112.1	13⁻	D	Eγ=302.3 (2008Ma58). R_{ADO}=0.73 *15*.

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^{176}Yb(^{18}O,4nγ) 2014Li21,2008Ma58 (continued)

$\gamma(^{190}Pt)$ (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
306.9‡ *5*	12.6 *12*	7534.6?	(30^-)	7227.7?	(28^-)	Q	R_{ADO}=1.17 *32*.
325.9 *3*	24.2 *19*	4134.1	20^+	3808.2	18^+	Q	R_{ADO}=1.26 *12*.
342.7 *3*	48.9 *48*	3069.6	14^+	2726.9	12^+	Q	Eγ=342.5 (2008Ma58). R_{ADO}=1.18 *13*.
343.6 *5*	14.5 *28*	1631.3	7^-	1287.70	6^+	D	Eγ=343.5 (2008Ma58). R_{ADO}=0.73 *19*.
345.6 *5*	15.6 *18*	3415.2	14^+	3069.6	14^+	Q	Eγ=345.8 (2008Ma58). R_{ADO}=1.19 *19*.
386.9 *3*	31.2 *25*	4653.9	21^-	4267.0	19^-	Q	Eγ=386.8, Iγ=21, placed from a 4051, (18^+) level (2008Ma58). R_{ADO}=1.29 *14*.
390.3 *5*	6.8 *8*	5720.7	25^+	5330.4	23^+	Q	R_{ADO}=1.17 *28*.
400.4 *5*	6.1 *7*	5330.4	23^+	4930.0	22^+	D	R_{ADO}=0.82 *18*.
417.2 *5*	14.3 *11*	4083.6	17^-	3666.4	16^+	D	Eγ=417.0 (2008Ma58). R_{ADO}=0.72 *11*.
422.9‡ *5*	11.7 *9*	7957.5?	(32^-)	7534.6?	(30^-)	Q	Eγ=422.0, Iγ=2.3, placed from a 6000, (24^+) level (2008Ma58). R_{ADO}=1.19 *14*.
441.2 *5*		3856.4	15^-	3415.2	14^+		I_γ: intensity is not given by 2014Li21, as the γ line is unresolved from the strong 441.3γ from the first 4^+ state.
441.3 *1*	133 *11*	737.00	4^+	295.70	2^+	Q	DCO=1.12 *13* (2008Ma58) Eγ=441.0, Iγ=100 *5* (2008Ma58). I_γ: total intensity for 441.3γ and 441.2γ doublet. R_{ADO}=1.17 *9* for unresolved 441.3γ and 441.2γ.
447.4 *5*	13.9 *14*	2078.7	8^-	1631.3	7^-	Q	Eγ=447.1 (2008Ma58). R_{ADO}=1.15 *8*.
461.7‡ *5*	10.8 *11*	5391.7?	24^+	4930.0	22^+	Q	R_{ADO}=1.20 *22*.
478.5 *5*	≤9.0	4612.6	21^+	4134.1	20^+	D	R_{ADO}=0.81 *23*.
487.7‡ *5*	14.8 *12*	7227.7?	(28^-)	6740.0?	(26^-)	Q	R_{ADO}=1.28 *21*.
506.6 *5*		4083.6	17^-	3577.0	16^+		Eγ=507.1 (2008Ma58). I_γ: intensity is not given by 2014Li21, as the γ line is unresolved from the strong 507.4γ from the 3577, 16^+ state.
507.4 *3*	33.7 *25*	3577.0	16^+	3069.6	14^+	Q	Eγ=507.0 (2008Ma58). R_{ADO}=1.20 *17* and Iγ for unresolved triplet: 507.4γ, 506.6γ and 508.3γ.
508.3‡ *5*	≤6.0	6790.8?	28^+	6282.5?	26^+	Q	Eγ=508.0, Iγ=2.1, placed from a 4313, (19^+) level (2008Ma58). R_{ADO}=1.28 *32*.
511.4 *5*	13.5 *13*	3856.4	15^-	3345.0	13^-	Q	R_{ADO}=1.17 *17*.
522.9‡ *5*	≤6.0	7992.3?	32^+	7469.4?	30^+	Q	R_{ADO}=1.38 *52*.
538.6‡ *5*	≤17.0	2761.3?	11^-	2222.7	9^-	Q	Eγ=538.8 (2008Ma58). R_{ADO}=1.25 *16*.
541.1 *5*	6.7 *10*	3112.1	13^-	2571.0	11^-	Q	Eγ=541.0 (2008Ma58). R_{ADO}=1.23 *22*.
550.7 *1*	100.0 *80*	1287.70	6^+	737.00	4^+	Q	Eγ=550.6 (2008Ma58). R_{ADO}=1.17 *10*.
558.7‡ *5*	17.6 *15*	6007.1?	(24^-)	5448.4	23^-	D	R_{ADO}=0.74 *7*.
561.8 *5*		6282.5?	26^+	5720.7	25^+		
583.7‡ *5*	16.3 *13*	3345.0	13^-	2761.3?	11^-	Q	Eγ=583.8 (2008Ma58). R_{ADO}=1.14 *18*.
591.4 *3*	21.3 *16*	2222.7	9^-	1631.3	7^-	Q	Eγ=591.3 (2008Ma58). R_{ADO}=1.15 *21*.
596.8 *5*		3666.4	16^+	3069.6	14^+		Eγ=596.0 (2008Ma58).

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^{176}Yb(^{18}O,4nγ) 2014Li21,2008Ma58 (continued)

$\gamma(^{190}Pt)$ (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
618.1 *5*		3345.0	13^-	2726.9	12^+		I_γ: intensity is not given by 2014Li21, as the γ line is unresolved from the strong 620.0 from the first 10^+ state at 2535 keV.
620.0 *1*	67.8 *52*	2535.50	10^+	1915.50	8^+	Q	Eγ=619.8 (2008Ma58). R_{ADO}=1.18 *10* for 620.0γ and 618.1.
627.8 *1*	82.4 *62*	1915.50	8^+	1287.70	6^+	Q	Eγ=627.5 (2008Ma58). R_{ADO}=1.16 *9*.
638.3 *5*	8.9 *11*	4215.3	18^+	3577.0	16^+	Q	Eγ=638.1 (2008Ma58). R_{ADO}=1.22 *21*.
641.4‡ *5*	≤4.5	8772.7?	(35^-)	8131.3?	(33^-)	Q	R_{ADO}=1.49 *46*.
678.6‡ *5*	≤6.0	7469.4?	30^+	6790.8?	28^+	Q	R_{ADO}=1.31 *39*.
688.3# *5*	≤10.0#	2603.8	10^+	1915.50	8^+	Q	Eγ=688.0 (2008Ma58). R_{ADO}=1.31 *31*.
688.3# *5*	16.8# *14*	3415.2	14^+	2726.9	12^+	Q	Eγ=688.0 (2008Ma58). R_{ADO}=1.02 *11*.
717.8 *5*	≤4.0	5330.4	23^+	4612.6	21^+		R_{ADO}=1.04 *35*.
727.8 *3*	24.6 *20*	1464.8	5^-	737.00	4^+	D	Eγ=727.5 (2008Ma58). R_{ADO}=0.71 *7*.
732.9‡ *5*	16.6 *28*	6740.0?	(26^-)	6007.1?	(24^-)	Q	Eγ=732.5, Iγ=4, placed from a 5578, (22^+) level (2008Ma58). R_{ADO}=1.23 *14*.
743.6 *5*	7.2 *8*	4958.9	20^+	4215.3	18^+	Q	Eγ=743.0, Iγ=1.2 (2008Ma58). R_{ADO}=1.27 *25*.
786.8 *5*		2702.3		1915.50	8^+		Eγ=786.8 (2008Ma58).
786.8 *5*	6.8 *12*	3856.4	15^-	3069.6	14^+	D	R_{ADO}=0.62 *17*.
794.5 *3*	21.6 *19*	5448.4	23^-	4653.9	21^-	Q	Eγ=795.0, Iγ=1.7, placed from a 5108, (21^+) level (2008Ma58). R_{ADO}=1.30 *18*.
795.9 *5*	19.2 *15*	4930.0	22^+	4134.1	20^+	Q	Eγ=795.0, Iγ=12.5, placed from a 4846, (20^+) level (2008Ma58). R_{ADO}=1.17 *18*.
890.8‡ *5*	9.9 *9*	6282.5?	26^+	5391.7?	24^+	Q	Eγ=890.3, Iγ=1.1, placed from a 5999, (23^+) level (2008Ma58). R_{ADO}=1.48 *27*.

† From 2014Li21. The uncertainty in energy is stated by the authors as within 0.5 keV, evaluators assign 0.1 keV for strong γ rays (Iγ≥50), 0.3 keV for medium intensity (Iγ=20-50), and 0.5 keV for γ rays with Iγ<20. Overall uncertainty in 2008Ma58 was also stated as 0.1-0.5 keV.

‡ Ordering of this transition in the γ cascade is not established.

Multiply placed with intensity suitably divided.

@ Placement of transition in the level scheme is uncertain.

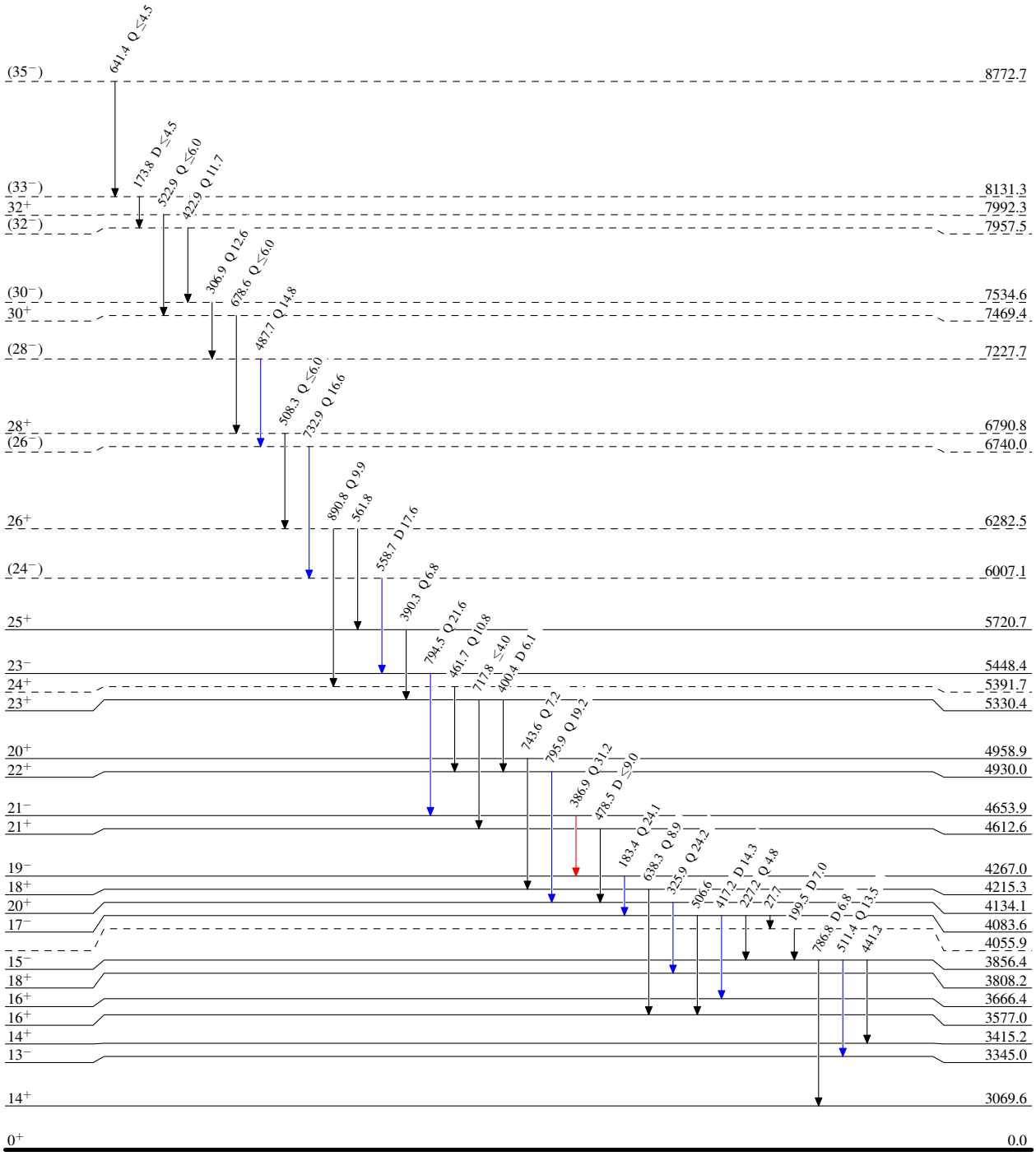
^{176}Yb(^{18}O,4nγ) 2014Li21,2008Ma58

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)



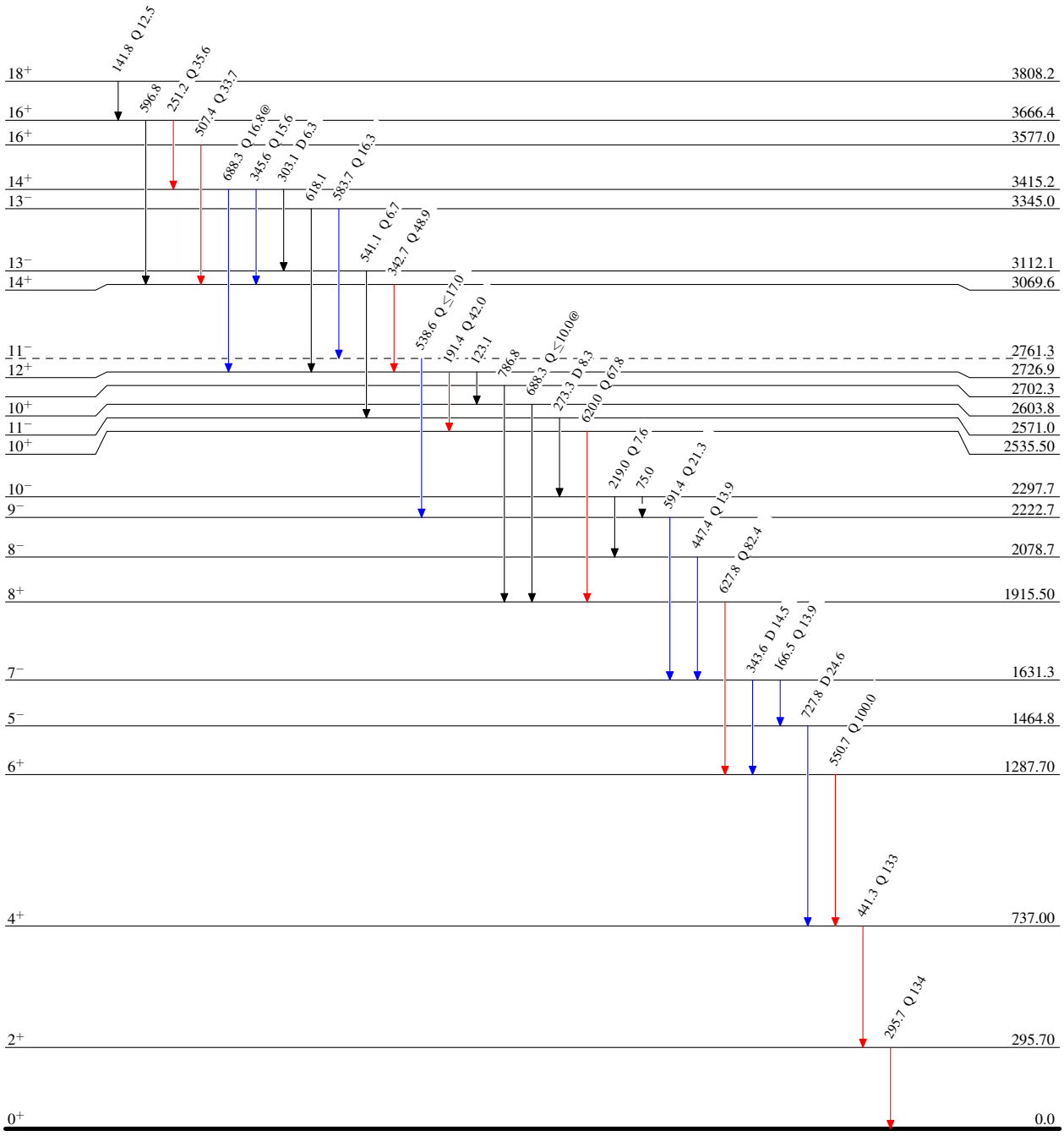
$^{190}_{78}Pt_{112}$

^{176}Yb(^{18}O,4nγ) 2014Li21,2008Ma58

Level Scheme (continued)

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

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)



$^{190}_{78}Pt_{112}$

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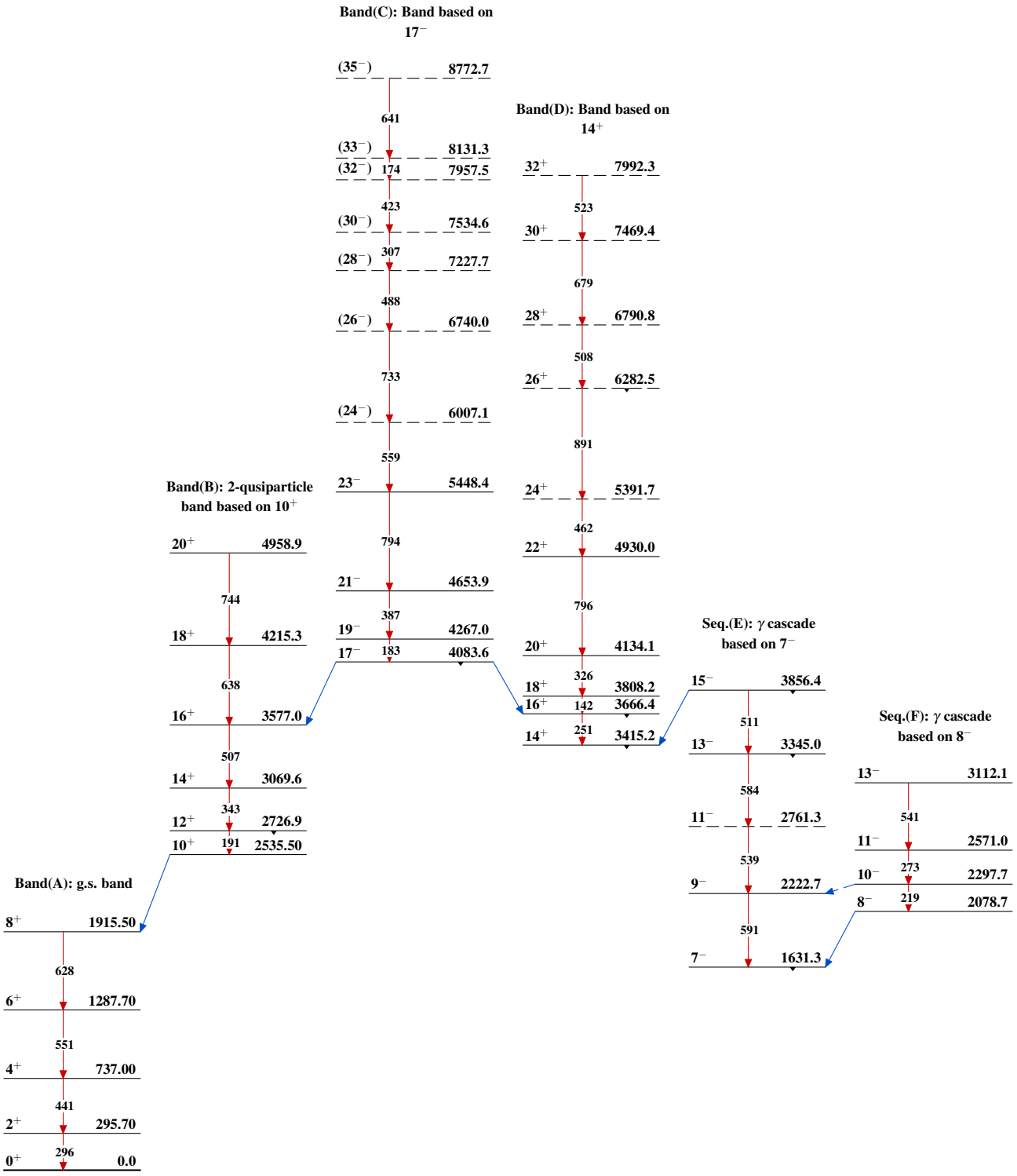

$^{190}_{78}Pt_{112}$