^{186}W(^{7}Li,5nγ) 2008Ju02,2004Ba91

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev, S. Juutinen, D. J. Hartley	NDS 150, 1 (2018)	1-Feb-2018

2008Ju02: E=59 MeV beam provided by the accelerator at Legnaro. Measured Eγ, Iγ, $\gamma\gamma$ coin, $\gamma\gamma(\theta)$(DCO) using GASP array of 40 Ge detectors with Compton suppression and an array of 80 BGO detectors as a multiplicity filter.

2004Ba91: E=52 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$(DCO), $\gamma\gamma$ (lin pol) with the YRAST Ball array, consisting of five clover detectors, 17 single-crystal Ge detectors, and four low-energy photon spectrometers (LEPS) detectors. Linear polarization measurements were made using the five clover detectors as Compton polarimeters.

^{188}Ir Levels

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$	Comments
0	1^{-}[#]		
54.82 *4*	2^{-}[#]		
96.73 *4*	2^{-}[#]		
151.93 *13*	3^{-}[#]		
211.19 *8*	$(3)^{-}$[#]		
354.11 *12*	$(4)^{+}$[#]		
492.01[@] *16*	$(6)^{+}$		
641.97[a] *17*	(8^{+})		
675.0 *3*	(8^{-})[#]		
708.17 *20*	(8^{-})[#]		
764.51[@] *19*	(8^{+})		
801.67 *20*			
814.75[&] *17*	(9^{+})		
923.57 *23*	(7 to 10)$^{-}$[#]		
923.57+x[b]	(9^{-})	4.15 ms *15*	Additional information 1. E(level),$T_{1/2}$: from the Adopted Levels. The excitation energy of the isomer in 2008Ju02 is given as >642 keV.
1042.15[a] *18*	(10^{+})		
1143.01[@] *21*	(10^{+})		
1221.84+x[c] *8*	(10^{-})		
1238.16[&] *19*	(11^{+})		
1252.57 *23*			
1398.00+x[b] *8*	(11^{-})		
1419.27 *23*			
1540.63[a] *20*	(12^{+})		
1626.81[@] *23*	(12^{+})		
1663.60+x *12*			
1709.99+x[c] *10*	(12^{-})		
1717.3 *3*			
1753.76[&] *21*	(13^{+})		
1921.18+x[b] *10*	(13^{-})		
2010.57 *25*			
2070.45+x *18*			
2121.14[a] *23*	(14^{+})		
2133.32+x *14*			
2166.55+x *12*	(13^{-})		
2199.56+x *17*			

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^{186}W(^{7}Li,5nγ) 2008Ju02,2004Ba91 (continued)

^{188}Ir Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$	Comments
2218.1[@] *3*	(14$^+$)		
2288.14+x[c] *11*	(14$^-$)		
2352.66[&] *24*	(15$^+$)		
2441.71+x *13*	(14$^-$)		
2455.21+x *11*	(14$^-$)		
2554.28+x[b] *12*	(15$^-$)		
2642.71+x *15*	(16$^-$)	12.27 ns *14*	$T_{1/2}$: from $\gamma\gamma$(t) (2008Ju02).
2677.59+x *13*	(15$^-$)		
2723.98+x *14*	(14$^-$)		
2744.84+x *15*			
2761.1[a] *11*	(16$^+$)		
2892.97+x *14*	(16$^-$)		
2894.7[@] *3*	(16$^+$)		
2946.73+x *16*			
2987.16+x[c] *18*	(16$^-$)		
3001.38+x *25*			
3027.3[&] *3*	(17$^+$)		
3068.59+x *24*	(16$^-$)		
3155.74+x *25*			
3223.27+x *14*	(17$^-$)		
3305.21+x *20*			
3353.1+x *4*			
3449.00+x *18*			
3495.6+x *3*			
3521.01+x *17*			
3521.96+x *17*			
3627.0[@] *11*	(18$^+$)		
3680.0[&] *4*	(19$^+$)		
3693.85+x *15*			
3748.7+x[c] *3*			
3828.36+x *18*			
3907.4+x *3*			
4046.9+x *4*			
4091.50+x *19*			
4098.42+x *17*			
4227.42+x *20*			
4352.60+x *18*			
4459.5+x *3*			
4690.8+x *3*			
4705.63+x *19*			
4824.8+x *3*			
4839.4+x *3*			
4863.92+x *22*			
5047.0+x *3*			
5065.28+x *22*			
5222.3+x *4*			
5262.3+x *3*			
5354.1+x *3*			
5363.63+x *22*			
5479.4+x *11*			
5516.3+x *3*			
5562.6+x *3*			
5669.8+x *11*			
5877.6+x *3*			

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^{186}W(^{7}Li,5nγ) 2008Ju02,2004Ba91 (continued)

^{188}Ir Levels (continued)

E(level)[†]
5998.6+x *4*
6002.5+x *4*
6062.9+x *4*
6127.9+x *3*
6299.3+x *11*

[†] From a least-squares fit to Eγ's.
[‡] From deduced transition multipolarities and the apparent band structures.
[#] From Adopted Levels.
[@] Band(A): Band based on (6^+).
[&] Band(B): Band based on (9^+).
[a] Band(C): Band based on (8^+).
[b] Band(D): Band based on (9^-), α=1.
[c] Band(d): Band based on (10^-), α=0.

γ(^{188}Ir)

E$_\gamma$[†]	I$_\gamma$[#]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.[&]	Comments
33.0[‡] *2*		675.0	(8^-)	641.97	(8^+)	(E1)	Mult.: From Adopted Gammas.
41.98[‡] *5*		96.73	2^-	54.82	2^-		
54.85[‡] *5*		54.82	2^-	0	1^-		
66.2[‡] *1*		708.17	(8^-)	641.97	(8^+)	(E1)	Mult.: From Adopted Gammas.
88.3 *1*	6.9 *4*	2642.71+x	(16^-)	2554.28+x	(15^-)	(M1+E2)	Mult.: DCO=1.4 *3* (2008Ju02).
96.70[‡] *5*		96.73	2^-	0	1^-		
97.2[‡] *2*		151.93	3^-	54.82	2^-		
114.6[‡] *1*		211.19	$(3)^-$	96.73	2^-		
134.9 *2*	2.4 *1*	3828.36+x		3693.85+x			DCO=0.99 *22* (2008Ju02).
137.9[‡] *1*		492.01	$(6)^+$	354.11	$(4)^+$		
142.9[‡] *1*		354.11	$(4)^+$	211.19	$(3)^-$		
150.2 *1*	100[@] *35*	641.97	(8^+)	492.01	$(6)^+$		
156.2[‡] *1*		211.19	$(3)^-$	54.82	2^-		
159.7 *1*	20.0[@] *22*	801.67		641.97	(8^+)		
172.8 *1*	34[@] *3*	814.75	(9^+)	641.97	(8^+)		
176.2 *1*	24.3 *6*	1398.00+x	(11^-)	1221.84+x	(10^-)	M1+E2	Mult.: DCO(Q)=0.63 *7* and DCO(D)=0.76 *7* (2004Ba91).
196.2 *1*	9.6[@] *12*	1238.16	(11^+)	1042.15	(10^+)		
202.2[‡] *1*		354.11	$(4)^+$	151.93	3^-		
211.2 *1*	16.1 *4*	1921.18+x	(13^-)	1709.99+x	(12^-)	M1+E2	Mult.: DCO=0.74 *6* (2008Ju02). Others: DCO(Q)=0.76 *9* and DCO(D)=0.88 *10* (2004Ba91).
215.4[‡] *1*	28 *2*	923.57	(7 to 10)$^-$	708.17	(8^-)	M1,E2	Mult.: From Adopted Gammas.
222.5 *1*	9.4 *6*	2677.59+x	(15^-)	2455.21+x	(14^-)	(M1+E2)	Mult.: DCO=0.97 *6* (2008Ju02). Others: DCO(Q)=0.75 *11* and DCO(D)=1.46 *24* (2004Ba91).
227.4 *1*	16.9[@] *16*	1042.15	(10^+)	814.75	(9^+)		
235.8 *2*	3.9 *1*	2677.59+x	(15^-)	2441.71+x	(14^-)	(M1+E2)	Mult.: DCO=0.58 *13* (2008Ju02). Others:

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^{186}W(^{7}Li,5nγ) 2008Ju02,2004Ba91 (continued)

$\gamma(^{188}Ir)$ (continued)

E_γ[†]	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	Comments
							DCO(Q)=0.42 *13* and DCO(D)=0.74 *19* (2004Ba91).
241.9 *2*	2.9 *2*	2441.71+x	(14^-)	2199.56+x		(M1+E2)	Mult.: DCO(Q)=0.43 *15* (2004Ba91).
255.0 *2*	0.7 *1*	4352.60+x		4098.42+x			
266.2 *1*	9.7 *4*	2554.28+x	(15^-)	2288.14+x	(14^-)	M1+E2	Mult.: DCO(Q)=0.61 *14* (2004Ba91).
272.5 *1*	25.6[@] *24*	764.51	(8^+)	492.01	$(6)^+$		
275.2 *2*	2.1 *1*	2441.71+x	(14^-)	2166.55+x	(13^-)	(M1+E2)	Mult.: DCO=0.51 *13* (2008Ju02).
277.4 *2*	3.0 *1*	3001.38+x		2723.98+x	(14^-)		DCO(Q)=1.06 *20* (2004Ba91).
289.3 *2*	1.2 *1*	2455.21+x	(14^-)	2166.55+x	(13^-)		E_γ: Poor fit, level energy difference=289.65.
298.3[b] *1*	20.8[b] *12*	1221.84+x	(10^-)	923.57+x	(9^-)	M1+E2	Mult.: DCO=0.89 *2* (2008Ju02). Others: DCO(Q)=0.66 *3* and DCO(D)=1.18 *8* (2004Ba91).
298.3[b] *1*	[b]	5363.63+x		5065.28+x			
302.4 *2*	4.6[@] *11*	1540.63	(12^+)	1238.16	(11^+)		
304.2 *1*	60.5 *12*	2946.73+x		2642.71+x	(16^-)		DCO=0.70 *2* (2008Ju02).
306.2 *1*	9.0 *3*	3828.36+x		3521.96+x			DCO=0.73 *3* (2008Ju02).
312.0 *1*	40.3 *10*	1709.99+x	(12^-)	1398.00+x	(11^-)	M1+E2	Mult.: DCO=0.86 *7* (2008Ju02). Others: DCO(Q)=0.76 *4* and DCO(D)=0.95 *7* (2004Ba91).
322.2 *2*	1.7 *1*	2455.21+x	(14^-)	2133.32+x			
322.5 *1*	9.8[@] *13*	814.75	(9^+)	492.01	$(6)^+$		
330.3 *1*	8.2 *3*	3223.27+x	(17^-)	2892.97+x	(16^-)		DCO=0.81 *1* (2008Ju02).
338.8 *1*	9.4 *3*	2892.97+x	(16^-)	2554.28+x	(15^-)	M1+E2	Mult.: DCO=0.70 *3* (2008Ju02).
351.7 *2*	1.5 *1*	3353.1+x		3001.38+x			
353.0 *1*	6.3 *3*	4705.63+x		4352.60+x			DCO=1.02 *9* (2008Ju02).
359.7 *2*	4.9 *2*	5065.28+x		4705.63+x			
367.1 *1*	16.8 *4*	2288.14+x	(14^-)	1921.18+x	(13^-)	M1+E2	Mult.: DCO=0.81 *4* (2008Ju02). Others: DCO(Q)=0.59 *7* and DCO(D)=1.03 *18* (2004Ba91).
378.5 *1*	10.7[@] *12*	1143.01	(10^+)	764.51	(8^+)		
379.5 *2*	1.4 *4*	3828.36+x		3449.00+x			
384.6 *2*	1.4 *1*	2455.21+x	(14^-)	2070.45+x			
389.1[a] *2*	2.1[a] *1*	2677.59+x	(15^-)	2288.14+x	(14^-)		
389.1[a] *2*	2.1[a] *1*	3693.85+x		3305.21+x			
391.0 *2*	3.4 *2*	3068.59+x	(16^-)	2677.59+x	(15^-)		
399.0 *1*	13.3 *4*	4227.42+x		3828.36+x			DCO=0.89 *8* (2008Ju02).
400.4 *1*	17.6[@] *17*	1042.15	(10^+)	641.97	(8^+)		
406.7 *2*	3.5 *1*	2070.45+x		1663.60+x			
410.9 *2*	1.9 *1*	3155.74+x		2744.84+x			
412.7 *2*	2.4 *1*	3305.21+x		2892.97+x	(16^-)		
423.2 *1*	26.1[@] *20*	1238.16	(11^+)	814.75	(9^+)		
427.0 *1*	7.3 *3*	3495.6+x		3068.59+x	(16^-)		
432.8 *2*	4.6 *2*	2987.16+x	(16^-)	2554.28+x	(15^-)		
441.8 *1*	10.0 *4*	1663.60+x		1221.84+x	(10^-)		
450.9 *1*	12.3[@] *23*	1252.57		801.67			
456.7[a] *1*	10.6[a] *4*	2166.55+x	(13^-)	1709.99+x	(12^-)	M1+E2	Mult.: DCO=0.92 *7* (2008Ju02). Others: DCO(Q)=0.92 *12* and DCO(D)=1.58 *19* (2004Ba91).
456.7[a] *1*	10.6[a] *4*	2744.84+x		2288.14+x	(14^-)		DCO=0.92 *7* (2008Ju02).
458.4 *2*	2.4 *2*	3907.4+x		3449.00+x			
464.7 *2*	4.4[@] *9*	1717.3		1252.57			
469.8 *1*	6.4 *2*	2133.32+x		1663.60+x			
470.6 *1*	5.1 *2*	3693.85+x		3223.27+x	(17^-)		DCO=0.99 *9* (2008Ju02).

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^{186}W(^{7}Li,5nγ) 2008Ju02,2004Ba91 (continued)

γ(^{188}Ir) (continued)

E_γ †	I_γ #	E_i(level)	J_i^π	E_f	J_f^π	Mult. &	Comments
474.4 *1*	138 *9*	1398.00+x	(11$^-$)	923.57+x	(9$^-$)	E2	Mult.: DCO=1.02 *3* (2008Ju02). Others: DCO(Q)=0.95 *4* (2004Ba91).
483.8 *1*	13.7@ *16*	1626.81	(12$^+$)	1143.01	(10$^+$)		
488.1 *1*	19.7 *6*	1709.99+x	(12$^-$)	1221.84+x	(10$^-$)	(E2)	Mult.: DCO=1.30 *18* (2008Ju02). Others: DCO(Q)=1.34 *22* and DCO(D)=1.20 *9* (2004Ba91).
497.3 *2*	0.7 *1*	5562.6+x		5065.28+x			
498.5 *1*	12@ *3*	1540.63	(12$^+$)	1042.15	(10$^+$)		
502.3 *1*	7.7 *4*	3449.00+x		2946.73+x			DCO=1.14 *24* (2008Ju02).
511[c]		2677.59+x	(15$^-$)	2166.55+x	(13$^-$)		E_γ: 512.3 keV in 2004Ba91.
515.6 *1*	18@ *3*	1753.76	(13$^+$)	1238.16	(11$^+$)		
521.0 *2*	1.1 *3*	2441.71+x	(14$^-$)	1921.18+x	(13$^-$)		
523.2 *1*	100.0 *19*	1921.18+x	(13$^-$)	1398.00+x	(11$^-$)	E2	Mult.: DCO=0.98 *3* (2008Ju02). Others: DCO(Q)=0.97 *4* and DCO(D)=1.39 *8*.
531.5 *2*	4.1 *4*	5222.3+x		4690.8+x			
533.9 *1*	9.8 *3*	2455.21+x	(14$^-$)	1921.18+x	(13$^-$)		DCO=1.09 *12* (2008Ju02).
545.7 *1*	5.2 *2*	3223.27+x	(17$^-$)	2677.59+x	(15$^-$)		DCO=0.81 *9* (2008Ju02).
551.4[c] *2*	1.1 *3*	4046.9+x		3495.6+x			
552.1 *1*	5.2 *2*	4459.5+x		3907.4+x			
569.5 *1*	11.3 *3*	4091.50+x		3521.96+x			DCO=1.00 *9* (2008Ju02).
575.4 *1*	40.8 *9*	3521.96+x		2946.73+x			DCO=0.99 *5* (2008Ju02).
577.1[a] *1*	7.0[a] *4*	4098.42+x		3521.96+x			
577.1[a] *1*	7.0[a] *4*	4098.42+x		3521.01+x			
578.0 *1*	15.2 *4*	2288.14+x	(14$^-$)	1709.99+x	(12$^-$)		DCO(Q)=0.6 *3* and DCO(D)=1.2 *6* (2004Ba91).
580.5 *1*	6.2@ *21*	2121.14	(14$^+$)	1540.63	(12$^+$)		
591.3 *1*	19.1@ *23*	2010.57		1419.27			
591.3 *1*	19.1@ *23*	2218.1	(14$^+$)	1626.81	(12$^+$)		
591.5[c] *2*	3.7 *2*	3748.7+x		3155.74+x			
598.9 *1*	12.3@ *17*	2352.66	(15$^+$)	1753.76	(13$^+$)		
599.3 *2*	3.0 *5*	4690.8+x		4091.50+x			DCO=1.04 *15* (2008Ju02).
607.7 *2*	0.5 *1*	4705.63+x		4098.42+x			
614.0 *2*	3.1 *4*	4705.63+x		4091.50+x			
617.6 *1*	26@ *3*	1419.27		801.67			
627[c]		3068.59+x	(16$^-$)	2441.71+x	(14$^-$)		
633.0 *1*	87.9 *18*	2554.28+x	(15$^-$)	1921.18+x	(13$^-$)	E2	Mult.: DCO=1.01 *7* (2008Ju02). Others: DCO(Q)=1.06 *6* and DCO(D)=1.38 *9* (2004Ba91).
636.5 *1*	6.9 *4*	4863.92+x		4227.42+x			
640		5479.4+x		4839.4+x			
640		2761.1	(16$^+$)	2121.14	(14$^+$)		
648.5 *2*	2.9 *3*	5354.1+x		4705.63+x			
652.4 *2*	1.1 *2*	5516.3+x		4863.92+x			
652.7 *2*	4.4 *8*	3680.0	(19$^+$)	3027.3	(17$^+$)		
658.2 *2*	0.5 *1*	5363.63+x		4705.63+x			
674.6 *2*	4.4 *7*	3027.3	(17$^+$)	2352.66	(15$^+$)		
676.6 *1*	8.2 *9*	2894.7	(16$^+$)	2218.1	(14$^+$)		
699.1 *2*	4.2 *2*	2987.16+x	(16$^-$)	2288.14+x	(14$^-$)		
708.8 *2*	1.3 *3*	6062.9+x		5354.1+x			
726.4 *2*	0.6 *1*	4824.8+x		4098.42+x			
731.4 *2*	1.5 *3*	2441.71+x	(14$^-$)	1709.99+x	(12$^-$)		
732.3		3627.0	(18$^+$)	2894.7	(16$^+$)		
736.3 *2*	0.7 *1*	5998.6+x		5262.3+x			
741.0 *2*	1.2 *1*	4839.4+x		4098.42+x			
745.4 *2*	1.2 *1*	2455.21+x	(14$^-$)	1709.99+x	(12$^-$)		
747.0 *2*	3.8 *3*	3693.85+x		2946.73+x			DCO=1.05 *2* (2008Ju02).

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^{186}W(^{7}Li,5nγ) 2008Ju02,2004Ba91 (continued)

$\gamma(^{188}Ir)$ (continued)

E_γ[†]	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	Comments
761.5 *2*	2.4 *1*	3748.7+x		2987.16+x	(16$^-$)		
764.3 *2*	1.6 *2*	6127.9+x		5363.63+x			
768.7 *2*	1.6 *2*	2166.55+x	(13$^-$)	1398.00+x	(11$^-$)	[E2]	
783		6299.3+x		5516.3+x			
801.3 *2*	3.7 *2*	2199.56+x		1398.00+x	(11$^-$)	(M1+E2)	Mult.: DCO(Q)=0.6 *3* and DCO(D)=0.35 *10* (2004Ba91).
802.8 *1*	5.8 *3*	2723.98+x	(14$^-$)	1921.18+x	(13$^-$)	M1+E2	Mult.: DCO(Q)=0.30 *17* and DCO(D)=0.68 *28* (2004Ba91).
830.4 *1*	6.6 *4*	4352.60+x		3521.96+x			DCO=0.66 *7* (2008Ju02).
831.6 *2*	0.3 *1*	4352.60+x		3521.01+x			
837.6 *2*	2.6 *3*	5065.28+x		4227.42+x			
878.0 *1*	10.4 *3*	3521.01+x		2642.71+x	(16$^-$)		DCO=0.94 *12* (2008Ju02).
955.5[a] *2*	1.2[a] *1*	5047.0+x		4091.50+x			DCO=1.01 *16* (2008Ju02).
955.5[a] *2*	1.2[a] *1*	6002.5+x		5047.0+x			DCO=1.01 *16* (2008Ju02).
979		5669.8+x		4690.8+x			
1013.7 *2*	1.6 *2*	5877.6+x		4863.92+x			
1034.9 *2*	0.9 *1*	5262.3+x		4227.42+x			DCO=0.89 *25* (2008Ju02).

[†] From 2008Ju02, unless otherwise noted. $\Delta E\gamma$ is assigned from a general statement in 2008Ju02 that it is 0.1 keV for $I\gamma \geq 5.0$ and 0.2 keV for weaker lines.

[‡] From adopted gammas.

[#] From 2008Ju02, normalized to $I\gamma(523.28\gamma)=100$, unless otherwise stated.

[@] From 2008Ju02, normalized to $I\gamma(150.2\gamma)=100$.

[&] From DCO in 2008Ju02. Values are for angles of 35°, 145° and 72°, 108° and gates set on $\Delta J=2$, quadrupole radiations. Expected values are ≈1 for stretched quadrupole and ≈0.6 for $\Delta J=1$, dipole. Others: From DCO in 2004Ba91. $R(DCO)=I_{\gamma 1}^{160^\circ}$ (in coincidence with γ_2 at 90°)/ $I_{\gamma 1}^{90^\circ}$ (in coincidence with γ_2 at 160°). DCO ratios were obtained by either gating on a stretched $\Delta J=2$ transition (denoted as DCO(Q)) or on the 298.6 keV transition, which is a $\Delta J=1$, M1+E2 transition (denoted as DCO(D)).

[a] Multiply placed with undivided intensity.

[b] Multiply placed with intensity suitably divided.

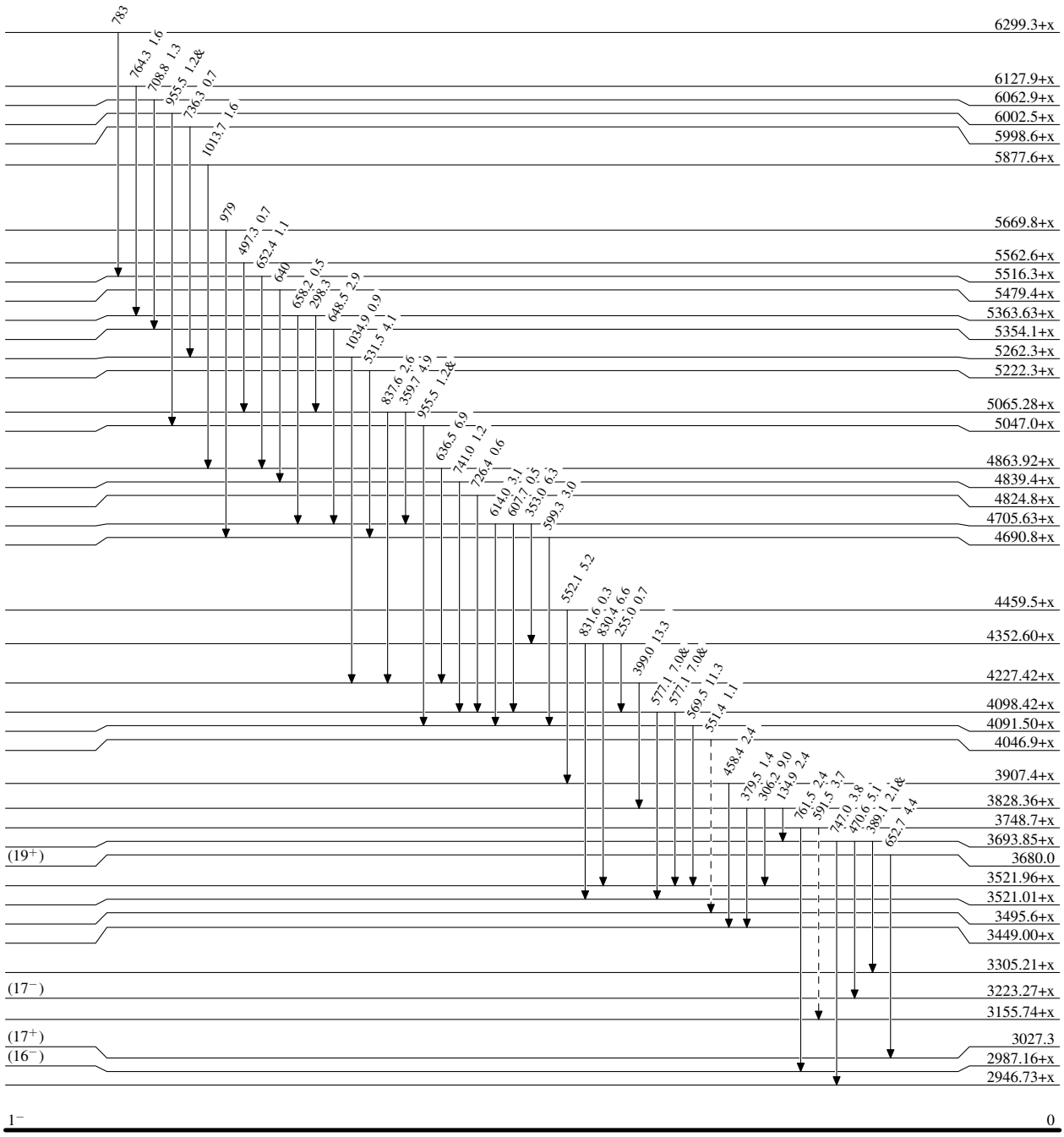
[c] Placement of transition in the level scheme is uncertain.

$^{186}W(^{7}Li,5n\gamma)$ 2008Ju02,2004Ba91

Level Scheme

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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)



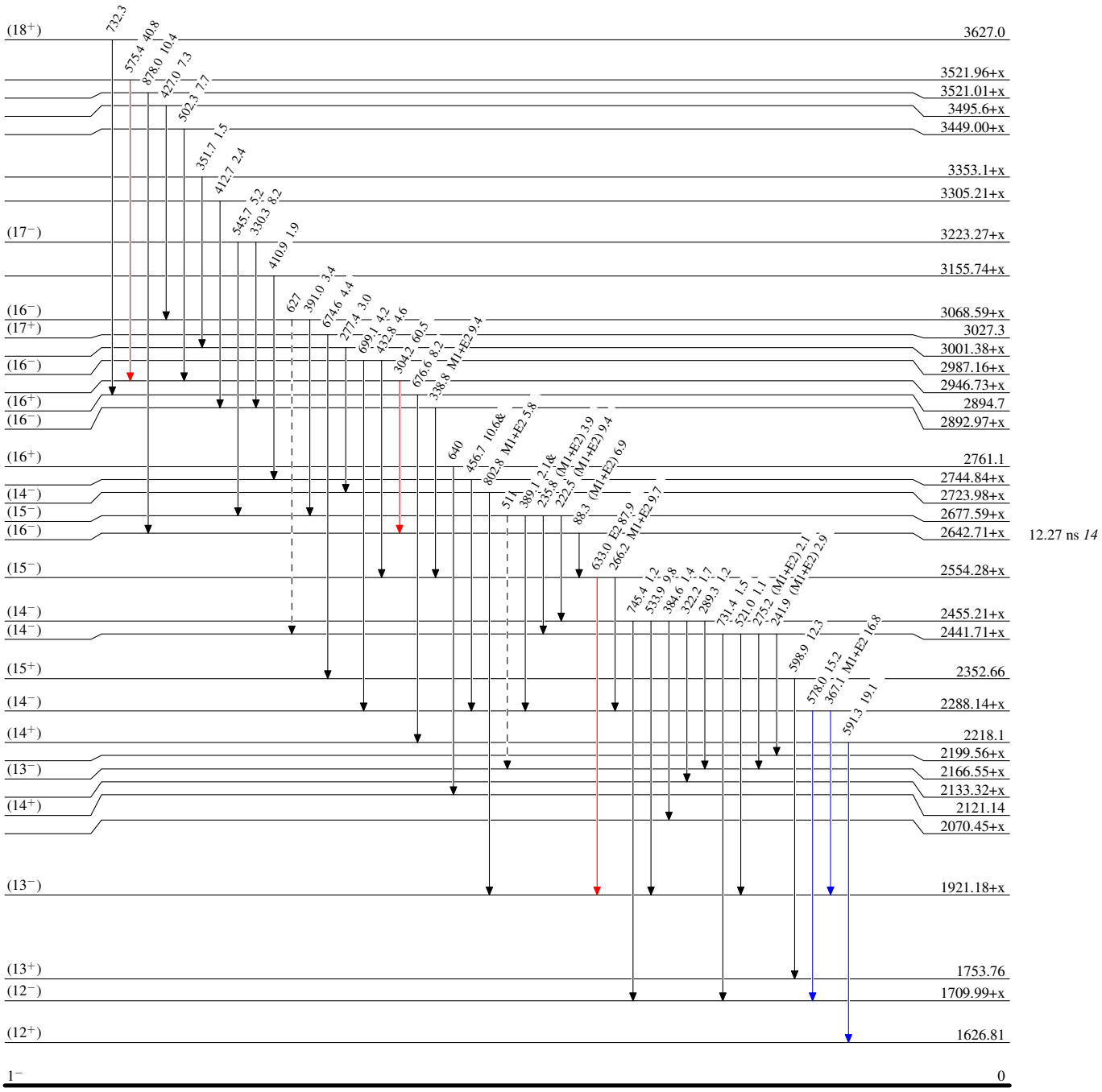
$^{188}_{77}Ir_{111}$

$^{186}W(^{7}Li,5n\gamma)$ **2008Ju02,2004Ba91**

Level Scheme (continued)

Intensities: Relative I_γ
& Multiply placed: undivided intensity given

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)



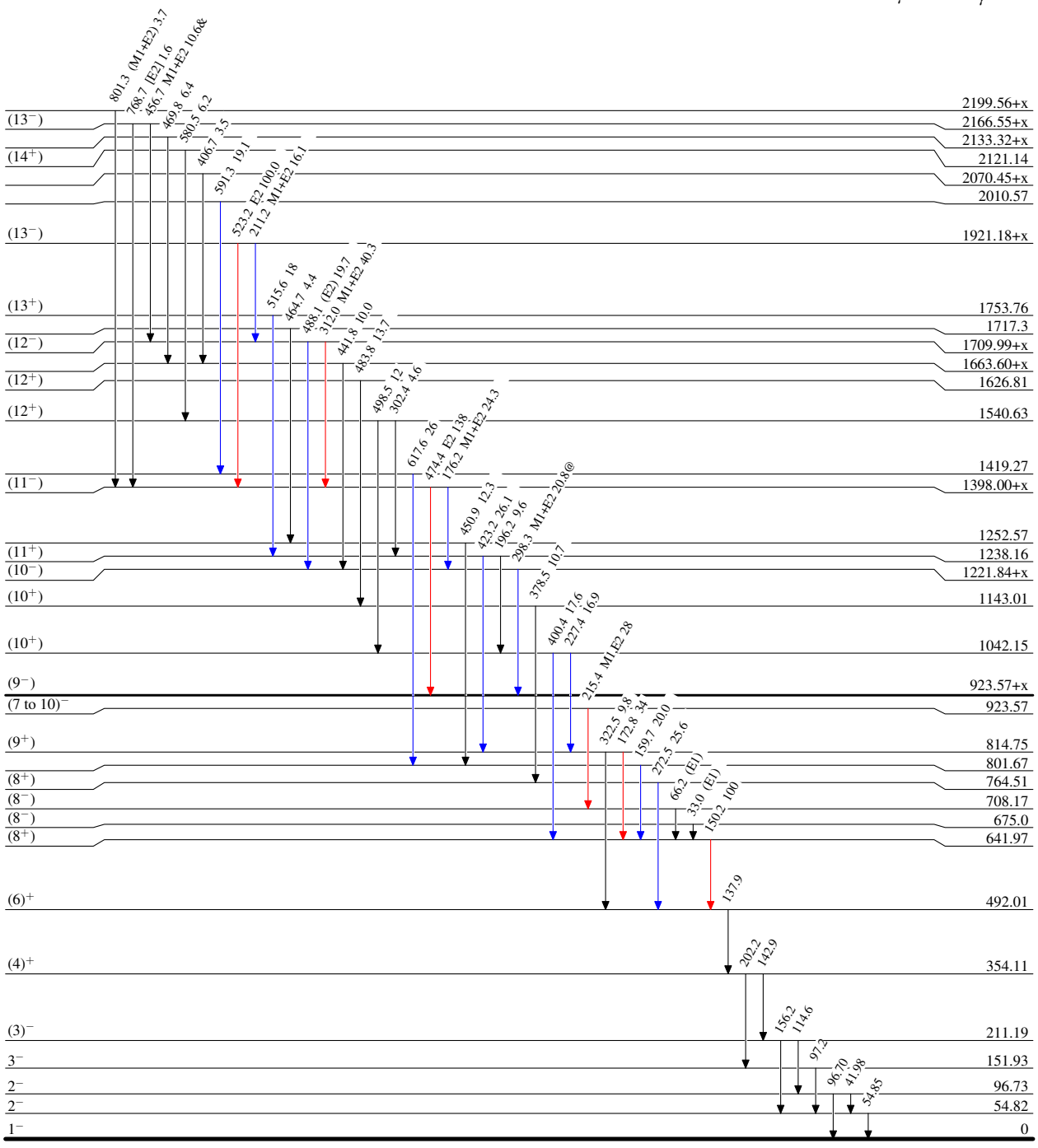
$^{188}_{77}Ir_{111}$

$^{186}W(^{7}Li,5n\gamma)$ **2008Ju02,2004Ba91**

Level Scheme (continued)

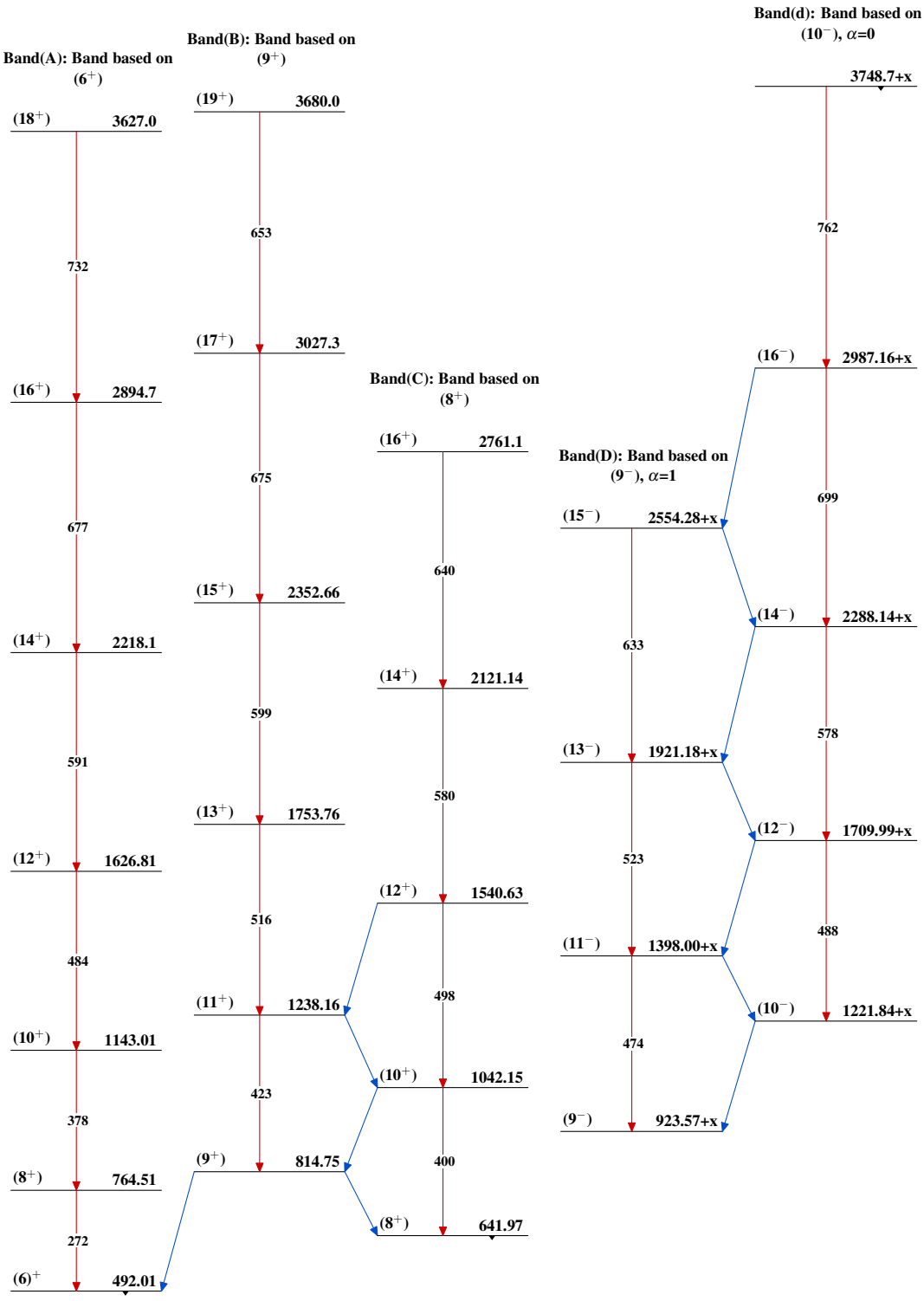
Intensities: Relative I_γ
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$



$^{188}_{77}Ir_{111}$

$^{186}W(^{7}Li,5n\gamma)$ 2008Ju02,2004Ba91



$^{188}_{77}Ir_{111}$