^{40}Ca(^{28}Si,4pγ) E=115 MeV 1998Ga11,1996GaZZ

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 178, 41 (2021).	12-Nov-2021

1998Ga11, 1996GaZZ: E=115 MeV. Measured Eγ, Iγ, $\gamma\gamma$ $\gamma\gamma(\theta)$(DCO), (protons)$\gamma\gamma$ coin using 8π spectrometer array of 20 HPGe detectors with BGO suppression and a shell of 70 BGO detectors. Charged particles were detected with MINIBALL array of 44 CsI detectors.
Details of $\gamma\gamma(\theta)$ data are not available from 1998Ga11 or 1996GaZZ.

^{64}Zn Levels

E(level)[†]	J$^\pi$[#]	E(level)[†]	J$^\pi$[#]	E(level)[†]	J$^\pi$[#]	E(level)[†]	J$^\pi$[#]
0.0[d]	0$^+$	4979.6[f] 2	7$^-$	7444.9?[‡] 11	(10)	512.0+x[h] 8	(13)
991.17[d] 4	2$^+$	5112.0[a] 9	(7)[a]	8423.2[j] 5	(11)	1075.1+x[g] 8	(14)
1798.89[e] 7	2$^+$	5232.0[‡] 12	(7)	8577.5[i] 5	(12)	1677.2+x[h] 10	(15)
2306.21[d] 8	4$^+$	5388.5[‡] 10	(7)	9893.8[‡i] 5	(14)	2385.7+x[g] 11	(16)
2736.07[e] 8	4$^+$	5680.74[b] 11	9$^-$	10097.3[‡j] 11	(13)	3132.0+x[h] 12	(17)
2996.5[f] 5	3$^-$	5681.1?[‡] 10	(6)	10980.0[‡i] 12	(16)[&]	3997.4+x[g] 13	(18)
3076.4 6	(3)[@]	5799.3?[‡] 10	(7)	11526.3[‡j] 15	[&]	4911.7+x[h] 13	(19)
3923.46[f] 14	5$^-$	5890.1[‡] 10	(8)	12236.1?[‡] 15		5994.2+x[g] 14	(20)
3992.75[d] 9	6$^+$	5934.63 21	(8)	12403.5[‡i] 15		7135.2+x[h] 15	(21)
4076.7 6	(5)	6029.5[e] 6	(8)	12677.0?[‡] 15		8532.6+x[g] 16	(22)
4157.0 8	(5)	6122.76[f] 19	9$^-$	13536.3[‡j] 16	[&]	9821.4+x[h] 18	(23)
4236.08[e] 9	6$^+$	6122.9 6	(8$^+$)	13828.1?[‡] 18		11994.3+x[‡g] 19	(24)
4634.28 9	7$^-$	6994.25 19	(11)	13838.5[‡i] 18	[&]		
4669.5 7	(6)	7116.1 5	(10)	0.0+x[cg]	(12)		

[†] From a least-squares fit to Eγ data. Based on work of 2004Ka18, x=9948.5.
[‡] Level not included in the Adopted Levels since it is not confirmed in other in-beam γ-ray studies, namely (^{28}Si,4pγ) work of 2004Ka18.
[#] As proposed by 1998Ga11 based on $\gamma\gamma(\theta)$ data and band assignments. Most assignments are consistent with the levels included in the Adopted Levels, except that some are placed in parentheses in the Adopted Levels. Other exceptions are noted.
[@] 4$^+$ in the Adopted Levels.
[&] Tentative assignments by evaluators based on band assignments.
[a] 954.9γ is placed above 4669 level in the Adopted dataset, thus this level corresponds to 5624, (8$^-$) in the Adopted Levels.
[b] With the reordering of 1314-1046 cascade in the Adopted dataset based on the results of 2004Ka18, this level corresponds to 5952, (9$^-$) in the Adopted Levels.
[c] x ≈6250 (1996GaZZ), based on feeding pattern of this state, but comparison with level scheme of 2004Ka18 gives x=9948.5.
[d] Band(A): g.s. band.
[e] Band(B): ΔJ=2, 2$^+$ band.
[f] Band(C): ΔJ=2, 3$^-$ band.
[g] Band(D): Strongly-coupled band, α=+1/2.
[h] Band(d): Strongly-coupled band, α=−1/2.
[i] Band(E): ΔJ=(2), even spin.
[j] Band(F): ΔJ=(2), odd spin.

^{40}Ca(^{28}Si,4pγ) E=115 MeV 1998Ga11,1996GaZZ (continued)

$\gamma(^{64}Zn)$

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π
154.30 *5*	0.18 *2*	8577.5	(12)	8423.2	(11)
398.17 *4*	5.80 *19*	4634.28	7^-	4236.08	6^+
429.60 *12*	1.59 *8*	2736.07	4^+	2306.21	4^+
512.0 *10*	3.1 *5*	512.0+x	(13)	0.0+x	(12)
512.4 *10*	0.77 *15*	4669.5	(6)	4157.0	(5)
562.5‡ *10*	0.5 *5*	5232.0	(7)	4669.5	(6)
563.1 *10*	10.3 *5*	1075.1+x	(14)	512.0+x	(13)
592.7 *10*	3.1 *5*	4669.5	(6)	4076.7	(5)
602.6 *10*	9.2 *5*	1677.2+x	(15)	1075.1+x	(14)
641.55 *3*	29.7 *9*	4634.28	7^-	3992.75	6^+
708.8 *10*	8.7 *5*	2385.7+x	(16)	1677.2+x	(15)
743.5 *10*	0.90 *11*	4979.6	7^-	4236.08	6^+
746.0 *10*	4.0 *3*	4669.5	(6)	3923.46	5^-
746.1 *10*	7.7 *5*	3132.0+x	(17)	2385.7+x	(16)
769.8 *10*	2.7 *3*	3076.4	(3)	2306.21	4^+
807.70 *6*	12.0 *6*	1798.89	2^+	991.17	2^+
865.6 *10*	6.2 *5*	3997.4+x	(18)	3132.0+x	(17)
871.2‡ *10*	2.55 *16*	6994.25	(11)	6122.76	9^-
914.2 *10*	4.1 *5*	4911.7+x	(19)	3997.4+x	(18)
927.0 *10*	2.21 *16*	3923.46	5^-	2996.5	3^-
937.15 *6*	15.2 *6*	2736.07	4^+	1798.89	2^+
954.9# *3*	3.6 *3*	5112.0	(7)	4157.0	(5)
986.9‡ *10*	2.63 *24*	4979.6	7^-	3992.75	6^+
991.16 *4*	100.0 *5*	991.17	2^+	0.0	0^+
993.0@ *10*	14.7 *6*	7116.1	(10)	6122.9	(8^+)
993.3& *10*	11.1 *5*	7116.1	(10)	6122.76	9^-
1000.0 *10*	2.0 *5*	4076.7	(5)	3076.4	(3)
1046.45 *6*	15.1 *5*	5680.74	9^-	4634.28	7^-
1056.10 *10*	12.9 *6*	4979.6	7^-	3923.46	5^-
1075.1 *10*	3.1 *5*	1075.1+x	(14)	0.0+x	(12)
1082.6 *10*	1.5 *5*	5994.2+x	(20)	4911.7+x	(19)
1086.2‡ *10*	8.2 *3*	10980.0	(16)	9893.8	(14)
1087.5 *10*	11.0 *5*	7116.1	(10)	6029.5	(8)
1141.2 *10*	2.1 *5*	7135.2+x	(21)	5994.2+x	(20)
1143.17 *8*	10.1 *4*	6122.76	9^-	4979.6	7^-
1165.0‡ *10*	4.1 *5*	5799.3?	(7)	4634.28	7^-
1165.2 *10*	6.7 *5*	1677.2+x	(15)	512.0+x	(13)
1180.5 *10*	6.0 *3*	7116.1	(10)	5934.63	(8)
1187.4 *10*	2.32 *16*	3923.46	5^-	2736.07	4^+
1255.8‡ *10*	3.6 *5*	5890.1	(8)	4634.28	7^-
1256.1‡ *10*	1.8 *5*	12236.1?		10980.0	(16)
1307.15 *9*	27.5 *9*	8423.2	(11)	7116.1	(10)
1310.0 *10*	7.7 *5*	2385.7+x	(16)	1075.1+x	(14)
1313.50 *16*	12.3 *6*	6994.25	(11)	5680.74	9^-
1315.06 *8*	66.7 *23*	2306.21	4^+	991.17	2^+
1316.24‡ *19*	10.8 *8*	9893.8	(14)	8577.5	(12)
1340.0 *10*	2.6 *5*	4076.7	(5)	2736.07	4^+
1395.6 *10*	1.03 *18*	6029.5	(8)	4634.28	7^-
1395.7‡ *10*	4.1 *5*	5388.5	(7)	3992.75	6^+
1397.3 *10*	1.0 *5*	8532.6+x	(22)	7135.2+x	(21)
1423.5‡ *10*	3.9 *3*	12403.5		10980.0	(16)
1424.6‡ *10*	0.77 *22*	13828.1?		12403.5	

Continued on next page (footnotes at end of table)

^{40}Ca(^{28}Si,4pγ) E=115 MeV 1998Ga11,1996GaZZ (continued)

$\gamma(^{64}Zn)$ (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π
1429.0‡ *10*	5.5 *3*	11526.3		10097.3	(13)
1429.1‡ *10*	4.6 *5*	8423.2	(11)	6994.25	(11)
1435.0‡ *10*	3.94 *21*	13838.5		12403.5	
1455.0 *10*	7.7 *5*	3132.0+x	(17)	1677.2+x	(15)
1461.4 *10*	7.1 *3*	8577.5	(12)	7116.1	(10)
1488.5 *10*	2.65 *18*	6122.9	(8^+)	4634.28	7^-
1499.86 *8*	14.9 *6*	4236.08	6^+	2736.07	4^+
1510.3‡ *10*	3.46 *25*	7444.9?	(10)	5934.63	(8)
1583.3 *10*	6.15 *24*	8577.5	(12)	6994.25	(11)
1611.7 *10*	5.1 *5*	3997.4+x	(18)	2385.7+x	(16)
1617.22 *12*	15.0 *7*	3923.46	5^-	2306.21	4^+
1674.0‡ *10*	14.7 *5*	10097.3	(13)	8423.2	(11)
1686.57 *5*	51.7 *18*	3992.75	6^+	2306.21	4^+
1688.3‡ *10*	1.3 *4*	5681.1?	(6)	3992.75	6^+
1697.0‡*b* *10*	3.35 *21*	12677.0?		10980.0	(16)
1698.5*b* *10*	2.3 *5*	5934.63	(8)	4236.08	6^+
1771.5 *10*	2.6 *5*	4076.7	(5)	2306.21	4^+
1779.5 *10*	6.7 *5*	4911.7+x	(19)	3132.0+x	(17)
1792.8 *10*	5.18 *25*	6029.5	(8)	4236.08	6^+
1799.0 *5*	2.44 *21*	1798.89	2^+	0.0	0^+
1850.8 *10*	5.4 *4*	4157.0	(5)	2306.21	4^+
1886.7 *10*	2.86 *15*	6122.9	(8^+)	4236.08	6^+
1941.81 *20*	7.0 *4*	5934.63	(8)	3992.75	6^+
1997.1 *10*	4.1 *5*	5994.2+x	(20)	3997.4+x	(18)
2005.3 *5*	5.7 *6*	2996.5	3^-	991.17	2^+
2010.0‡ *5*	4.10 *20*	13536.3		11526.3	
2038.0 *10*	4.6 *3*	6029.5	(8)	3992.75	6^+
2085.2 *10*	1.5 *5*	3076.4	(3)	991.17	2^+
2130.0 *10*	5.6 *3*	6122.9	(8^+)	3992.75	6^+
2223.0 *10*	3.1 *5*	7135.2+x	(21)	4911.7+x	(19)
2538.5 *10*	2.3 *5*	8532.6+x	(22)	5994.2+x	(20)
2686.2 *10*	1.8 *5*	9821.4+x	(23)	7135.2+x	(21)
3461.6‡*a* *10*	1.3 *5*	11994.3+x	(24)	8532.6+x	(22)

† From 1996GaZZ.
‡ γ not included in the Adopted Gammas since it is not confirmed in other in-beam γ-ray studies, namely (^{28}Si,4pγ) work of 2004Ka18.
# Placement is different in the Adopted dataset.
@ γ to 8^+.
& γ to 9^-.
a 2814γ from 21298, (24^-) level in the Adopted dataset.
b Placement of transition in the level scheme is uncertain.

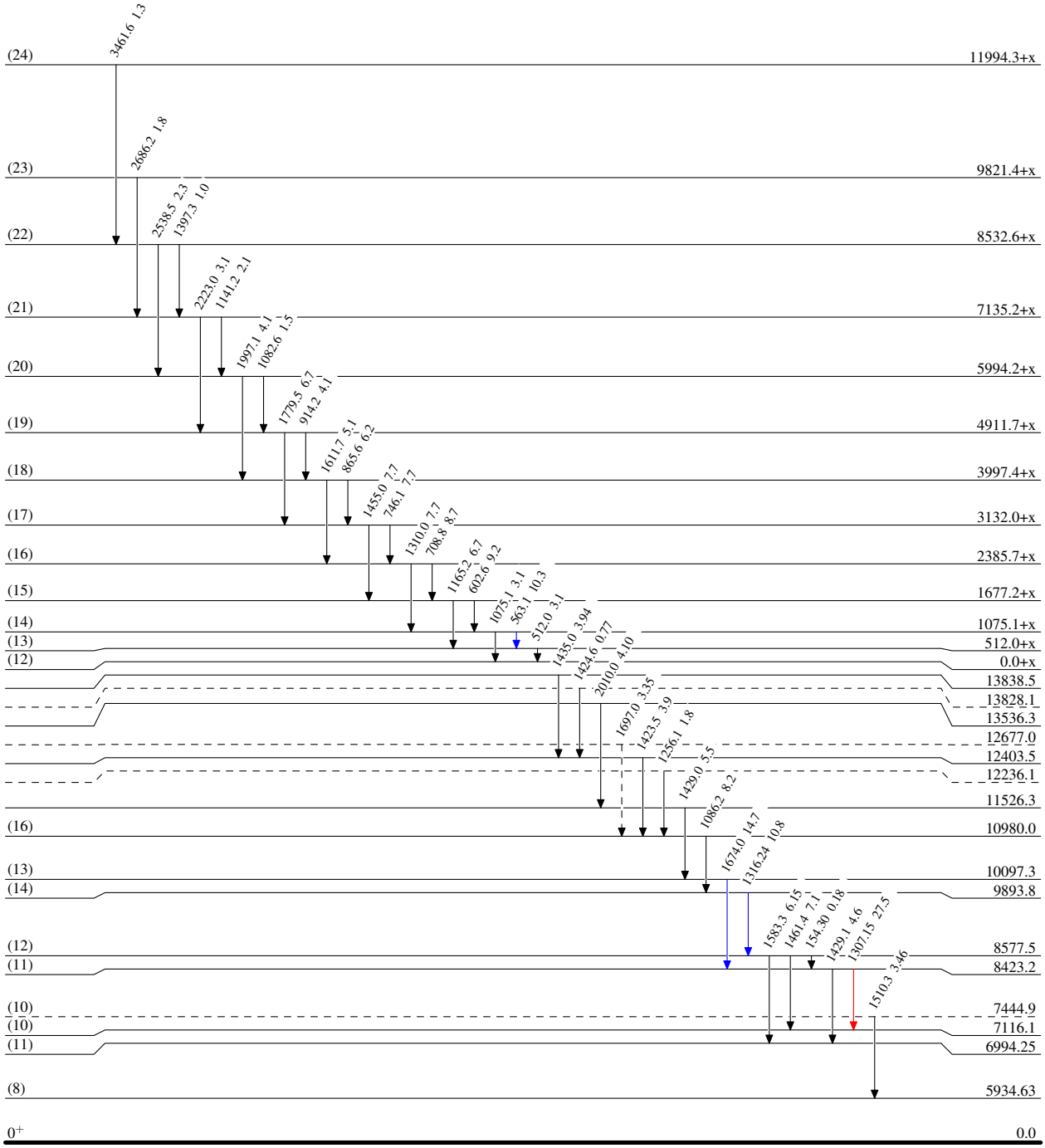
^{40}Ca(^{28}Si,4pγ) E=115 MeV 1998Ga11,1996GaZZ

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)



$^{64}_{30}Zn_{34}$

^{40}Ca(^{28}Si,4pγ) E=115 MeV 1998Ga11,1996GaZZ

Level Scheme (continued)

Intensities: Relative I_γ

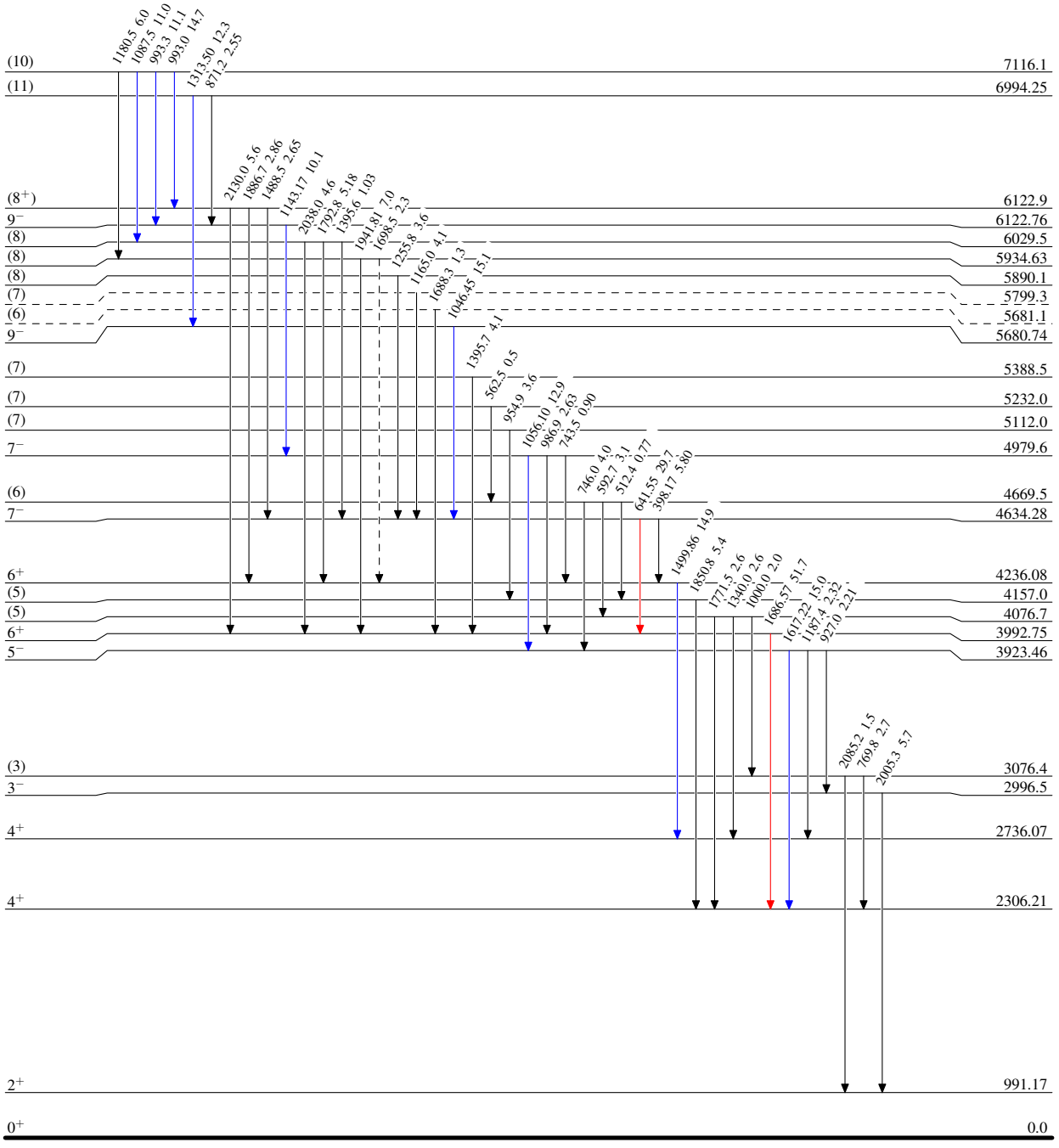
Legend

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

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

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

γ Decay (Uncertain)

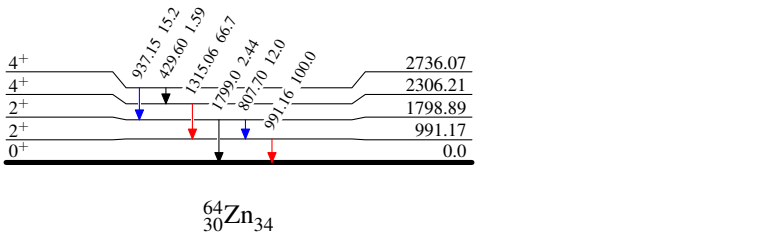


$^{64}_{30}Zn_{34}$

^{40}Ca(^{28}Si,4pγ) E=115 MeV 1998Ga11,1996GaZZ

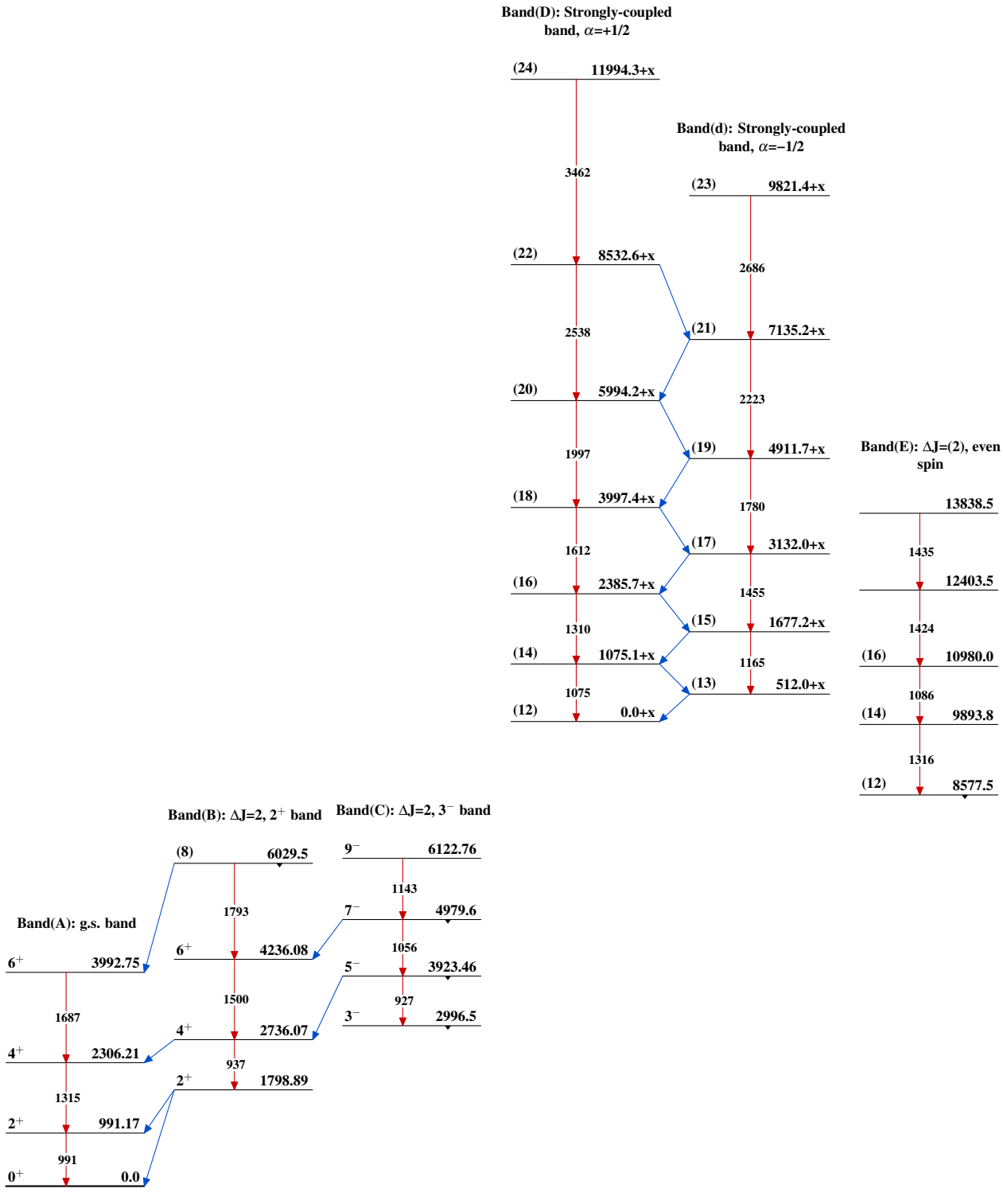
Level Scheme (continued)

Intensities: Relative I_γ



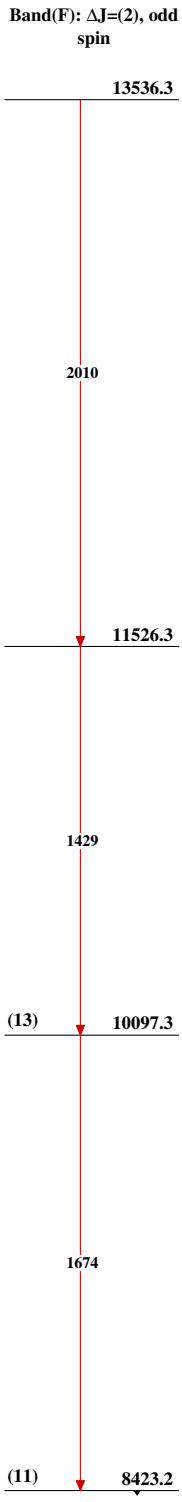
$^{64}_{30}Zn_{34}$

^{40}Ca(^{28}Si,4pγ) E=115 MeV 1998Ga11,1996GaZZ



$^{64}_{30}Zn_{34}$

^{40}Ca(^{28}Si,4pγ) E=115 MeV 1998Ga11,1996GaZZ (continued)



$^{64}_{30}Zn_{34}$