^{64}Ni(^{64}Ni,p4nγ) 2004Si27

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 174, 1 (2021)	15-Apr-2021

2004Si27: E=265 MeV ^{64}Ni beam was produced from the 88-inch cyclotron at LBNL. Target was a thin foil of 0.476 mg/cm^2 ^{64}Ni (96.5% enriched). γ rays were detected with the Gammasphere spectrometer array, consisting of 100 Compton-suppressed Ge detectors. Measured Eγ, Iγ, γγ-coin, γγ(DCO). Deduced levels, J, π, band structures, configurations, γ-ray multipolarities. Comparisons with cranked Nilsson-Strutinsky calculations for high-spin states.

^{123}Cs Levels

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]	Comments
0.0	1/2$^+$		
30.6 *8*	3/2$^+$		
94.6 *8*	5/2$^+$		
156.3[&] *10*	11/2$^-$	1.7 s *2*	
231.6[h] *9*	7/2$^+$		
328.1[f] *10*	9/2$^+$	114 ns *5*	E(level): 2004Si26 in ^{100}Mo(^{28}Si,4npγ) and 2004Si27 in ^{64}Ni(^{64}Ni,4npγ) propose the 328-keV level (proposed as a separate level by 2000Gi12 in ^{123}Ba ε decay) to be the isomeric (9/2$^+$) bandhead (proposed at 231.7+x by 2000Gi12), based on the intensity balance of the feeding and de-exciting γ transitions (96.5γ and 233.5γ de-exciting the 328-keV level are seen in 2004Si26 with a thick target but not seen in 2004Si27 with a thin target due to ^{123} Cs nuclei recoiling into vacuum after reaction and decaying out of the detectors, supporting the 328-keV level being an isomer).
476.7[&] *10*	15/2$^-$		
596.9[g] *10*	11/2$^+$		
659.6[h] *9*	11/2$^+$		
900.4[f] *10*	13/2$^+$		
999.0[&] *10*	19/2$^-$		
1159.4[@] *10*	17/2$^-$		
1237.1[g] *10*	15/2$^+$		
1260.0[h] *10*	15/2$^+$		
1592.9[a] *11*	19/2$^-$		
1604.9[f] *10*	17/2$^+$		
1684.5[&] *10*	23/2$^-$		
1729.4[@] *10*	21/2$^-$		
1994.6[g] *10*	19/2$^+$		
2003.5[h] *10*	19/2$^+$		
2195.9[a] *11*	23/2$^-$		
2219.4 *11*	19/2$^+$		
2410.4[f] *10*	21/2$^+$		
2436.3[@] *10*	25/2$^-$		
2485.0[&] *10*	27/2$^-$		
2706.1 *10*	23/2$^+$		
2821.2[g] *10*	23/2$^+$		
2843.1[h] *10*	23/2$^+$		
2916.9[a] *11*	27/2$^-$		
2973.1[b] *10*	25/2$^{(+)}$		
3045.4 *10*	25/2$^{(+)}$		
3227.0[@] *10*	29/2$^-$		
3304.6[c] *10*	27/2$^{(+)}$		

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^{64}Ni(^{64}Ni,p4nγ) **2004Si27 (continued)**

^{123}Cs Levels (continued)

E(level)[†]	Jπ[‡]	Comments
3329.6[d] *10*	27/2+	
3353.3[&] *10*	31/2−	
3617.8[b] *10*	29/2(+)	
3728.4[a] *11*	31/2−	
3994.9[c] *10*	31/2(+)	
4045.2[d] *11*	31/2+	
4055.2[@] *11*	33/2−	
4258.2[&] *11*	35/2−	
4407.9[b] *11*	33/2(+)	
4620.4[a] *13*	35/2−	
4833.6[c] *11*	35/2(+)	
4863.0[d] *11*	35/2+	
4933.8[@] *11*	37/2−	
5214.0[&] *11*	39/2−	
5246.4 *12*		
5333.9[b] *11*	37/2(+)	
5596.5[a] *14*	39/2−	
5751.4[d] *11*	39/2+	
5792.5[c] *12*	39/2(+)	
5905.7[@] *11*	41/2−	
6239.9[&] *11*	43/2−	
6296.8 *14*		
6670.3[d] *12*	43/2+	
6678.4[a] *15*	43/2−	
6981.5[@] *11*	45/2−	
7352.8[&] *11*	47/2−	
7413.8 *12*		
7646.6[d] *13*	47/2+	
7837.1[a] *17*	47/2−	
8159.6[@] *12*	49/2−	
8559.6[&] *12*	51/2−	
8699.5[d] *14*	51/2+	
9436.2[@] *12*	53/2−	
9862.7[&] *12*	55/2−	
9887.8[d] *15*	55/2+	
10773.2[@] *13*	57/2−	
11020.6[e] *16*	59/2+	
11213.2[d] *16*	59/2+	
11233.7 *13*	59/2−	
11253.0[&] *13*	59/2−	
11271.2? *13*	(59/2−)	E(level): the level is at 11271 or 11795 depending on the ordering of the 1022-498 cascade.
11916.9 *14*	61/2(−)	
12293.5 *13*	63/2−	
12431.3[&] *14*	63/2−	
12469.0[e] *18*	63/2+	
12609.1[d] *18*	63/2+	
13164.6[e] *19*	67/2+	

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^{64}Ni(^{64}Ni,p4nγ) 2004Si27 (continued)

^{123}Cs Levels (continued)

E(level)[†]	J$^{\pi}$[‡]
13534.0[&] *14*	67/2$^-$
13869.6[e] *20*	(71/2$^+$)
14955.7[&] *15*	71/2$^-$

[†] From least-squares fit γ-ray energies.
[‡] Proposed by 2004Si27 based on measured $\gamma\gamma$(DCO) and band assignments.
[#] From Adopted Levels.
[@] Band(A): 17/2$^-$ band, α=+1/2. $\pi h_{11/2}$ at low spins; $\pi h_{11/2}\otimes\nu h^{6}_{11/2}$ at high spins. See also 2004Si27 for detailed discussion of configurations at high spins.
[&] Band(a): 11/2$^-$ band, α=−1/2. See comment for α=+1/2 signature partner.
[a] Band(B): 19/2$^-$ band.
[b] Band(C): 25/2$^{(+)}$ band, α=+1/2. $\pi g^{-1}_{9/2}\otimes\nu h^{2}_{11/2}$ is most favored although $\pi(g^{-1}_{9/2}h^{1}_{11/2})\otimes\nu h^{1}_{11/2}$ is not ruled out.
[c] Band(c): 27/2$^{(+)}$ band, α=−1/2. See comment for α=+1/2 signature partner.
[d] Band(D): 27/2$^+$ band, α=−1/2. See 2004Si27 detailed discussion of configurations.
[e] Band(d): 59/2$^+$ band, α=−1/2. Forking of 27/2$^+$ band at 55/2$^+$.
[f] Band(E): 9/2$^+$ band, α=+1/2. $\pi g^{-1}_{9/2}$.
[g] Band(e): 11/2$^+$ band, α=−1/2. $\pi g^{-1}_{9/2}$.
[h] Band(F): $\pi g_{7/2}$ based on 7/2$^+$, α=−1/2.

γ(^{123}Cs)

R(DCO)=I($\gamma_2^{35°}$, gated on $\gamma_1^{90°}$)/I($\gamma_2^{90°}$, gated on $\gamma_1^{35°}$) (2004Si27).
All DCO values correspond to gates on ΔJ=2, quadrupole transitions. Typical values of the DCO ratio are 1.0 and 0.5 for ΔJ=2, stretched quadrupole and ΔJ=1, dipole transitions, respectively (2004Si27).

E$_{\gamma}$[†]	I$_{\gamma}$[&]	E$_i$(level)	J$^{\pi}_i$	E$_f$	J$^{\pi}_f$	Mult.[b]	Comments
30.6[‡]		30.6	3/2$^+$	0.0	1/2$^+$		
61.7[‡]		156.3	11/2$^-$	94.6	5/2$^+$	[E3]	
64.0[‡]		94.6	5/2$^+$	30.6	3/2$^+$		
94.6[‡]		94.6	5/2$^+$	0.0	1/2$^+$		
96.5[‡#]		328.1	9/2$^+$	231.6	7/2$^+$		
137.0[‡]		231.6	7/2$^+$	94.6	5/2$^+$		
201.0[‡]		231.6	7/2$^+$	30.6	3/2$^+$		
224.2 *4*	3.2 *5*	3045.4	25/2$^{(+)}$	2821.2	23/2$^+$	M1[c]	DCO=0.53 *9*
233.5[‡#]		328.1	9/2$^+$	94.6	5/2$^+$		
259.2 *6*	2.4 *4*	3304.6	27/2$^{(+)}$	3045.4	25/2$^{(+)}$	M1	DCO=0.62 *6*
268.8 *2*	21.8 *17*	596.9	11/2$^+$	328.1	9/2$^+$	M1	DCO=0.75 *9*
280.3 *6*	0.8 *2*	5214.0	39/2$^-$	4933.8	37/2$^-$		
284.2 *6*	2.2 *3*	3329.6	27/2$^+$	3045.4	25/2$^{(+)}$	M1	DCO=0.52 *7*
288.2 *6*	0.9 *2*	3617.8	29/2$^{(+)}$	3329.6	27/2$^+$		
303.5 *2*	15.0 *13*	900.4	13/2$^+$	596.9	11/2$^+$	M1[c]	DCO=0.62 *7*
313.2 *4*	4.3 *5*	3617.8	29/2$^{(+)}$	3304.6	27/2$^{(+)}$	M1	DCO=0.60 *6*
320.4 *2*	100.0	476.7	15/2$^-$	156.3	11/2$^-$	E2	DCO=0.93 *5*
331.6 *6*	2.6 *4*	3304.6	27/2$^{(+)}$	2973.1	25/2$^{(+)}$		
334.2 *6*	0.3 *1*	6239.9	43/2$^-$	5905.7	41/2$^-$		

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^{64}Ni(^{64}Ni,p4nγ) 2004Si27 (continued)

γ(^{123}Cs) (continued)

E_{γ}[†]	I_{γ}[&]	E_i(level)	J_i^{π}	E_f	J_f^{π}	Mult.[b]	Comments
336.7 2	13.3 10	1237.1	15/2+	900.4	13/2+	M1[c]	DCO=0.69 12
356.5 6	0.4 1	3329.6	27/2+	2973.1	25/2(+)	M1[c]	DCO=0.57 7
367.8 4	8.5 8	1604.9	17/2+	1237.1	15/2+		
371.3 6	0.2 1	7352.8	47/2−	6981.5	45/2−		
377.1 4	4.6 4	3994.9	31/2(+)	3617.8	29/2(+)	M1	DCO=0.66 5
389.7 4	4.0 4	1994.6	19/2+	1604.9	17/2+		
398.6 4	3.4 3	2003.5	19/2+	1604.9	17/2+		
400.0 6	0.2 1	8559.6	51/2−	8159.6	49/2−		
406.9 6	1.2 2	2410.4	21/2+	2003.5	19/2+		
410.8 6	2.7 3	2821.2	23/2+	2410.4	21/2+		
413.0 6	2.1 3	4407.9	33/2(+)	3994.9	31/2(+)	M1	DCO=0.64 7
415.8 6	1.2 2	2410.4	21/2+	1994.6	19/2+		
425.6 6	1.6 3	4833.6	35/2(+)	4407.9	33/2(+)	M1	DCO=0.62 8
426.5 6	0.2 1	9862.7	55/2−	9436.2	53/2−		
428.0 2	16.0 15	659.6	11/2+	231.6	7/2+		
432.7 6	1.0 2	2843.1	23/2+	2410.4	21/2+		
433.5 4	3.3 5	1592.9	19/2−	1159.4	17/2−	M1	DCO=0.76 6
458.5 6	0.6 2	5792.5	39/2(+)	5333.9	37/2(+)		
466.5 6	0.4 1	2195.9	23/2−	1729.4	21/2−		
483.4 6	1.4 3	3304.6	27/2(+)	2821.2	23/2+		
486.7 6	1.8 4	2706.1	23/2+	2219.4	19/2+	E2	DCO=0.90 11
498.0[@] 6	0.5 1	11271.2?	(59/2−)	10773.2	57/2−	M1+E2[c]	DCO=0.98 15
500.4 6	1.2 3	5333.9	37/2(+)	4833.6	35/2(+)		
508.4 6	0.7 2	3329.6	27/2+	2821.2	23/2+		
522.3 2	79 3	999.0	19/2−	476.7	15/2−	E2	DCO=0.95 10
570.0 6	3.0 5	1729.4	21/2−	1159.4	17/2−		
572.3 4	3.9 6	900.4	13/2+	328.1	9/2+		
598.5 6	3.0 6	3304.6	27/2(+)	2706.1	23/2+	E2	DCO=1.16 13
600.4 2	11.0 3	1260.0	15/2+	659.6	11/2+		
603.0 6	1.7 3	2195.9	23/2−	1592.9	19/2−		
623.5 6	2.9 4	3329.6	27/2+	2706.1	23/2+	E2	DCO=0.99 9
640.2 4	6.8 11	1237.1	15/2+	596.9	11/2+		
644.7 4	4.8 5	3617.8	29/2(+)	2973.1	25/2(+)	E2	DCO=0.99 10
663.9 6	0.5 1	11916.9	61/2(−)	11253.0	59/2−	M1[c]	DCO=0.77 10
675.5 6	2.8 4	4933.8	37/2−	4258.2	35/2−	M1[c]	DCO=0.56 6
682.7 4	4.5 6	1159.4	17/2−	476.7	15/2−		
685.5 2	62.8 25	1684.5	23/2−	999.0	19/2−	E2	DCO=0.98 10
690.3 4	3.4 4	3994.9	31/2(+)	3304.6	27/2(+)		
691.7 6	1.9 3	5905.7	41/2−	5214.0	39/2−		
695.6 6	0.5 1	13164.6	67/2+	12469.0	63/2+	E2[c]	DCO=1.59 25
701.9 4	3.7 5	4055.2	33/2−	3353.3	31/2−	M1	DCO=0.58 6
704.5 4	5.6 7	1604.9	17/2+	900.4	13/2+		
705.0 6	0.4 1	13869.6	(71/2+)	13164.6	67/2+	E2[c]	DCO=1.4 3
706.9 4	3.3 4	2436.3	25/2−	1729.4	21/2−	E2	DCO=1.28 22
711.6 6	0.8 2	2706.1	23/2+	1994.6	19/2+		
715.6 4	6.6 10	4045.2	31/2+	3329.6	27/2+	E2	DCO=0.96 6
721.0 6	1.0 2	2916.9	27/2−	2195.9	23/2−		
730.4 4	9.9 8	1729.4	21/2−	999.0	19/2−	M1	DCO=0.47 7
734.6 4	4.2 8	1994.6	19/2+	1260.0	15/2+		
740.6 6	1.1 3	4045.2	31/2+	3304.6	27/2(+)		
741.6 6	1.3 3	6981.5	45/2−	6239.9	43/2−		
742.0 4	5.7 7	3227.0	29/2−	2485.0	27/2−	M1	DCO=0.48 9
743.5 4	3.7 7	2003.5	19/2+	1260.0	15/2+		
751.8 4	6.4 7	2436.3	25/2−	1684.5	23/2−	M1	DCO=0.35 6

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^{64}Ni(^{64}Ni,p4nγ) 2004Si27 (continued)

γ(^{123}Cs) (continued)

Eγ[†]	Iγ[&]	Ei(level)	$J^π_i$	Ef	$J^π_f$	Mult.[b]	Comments
757.5 4	4.1 5	1994.6	19/2+	1237.1	15/2+		
766.5 6	1.9 4	2003.5	19/2+	1237.1	15/2+		
790.1 6	2.6 4	4407.9	33/2(+)	3617.8	29/2(+)	E2	DCO=1.00 10
790.7 4	4.0 6	3227.0	29/2−	2436.3	25/2−	E2	DCO=1.35 15
800.5 2	38.9 18	2485.0	27/2−	1684.5	23/2−	E2	DCO=1.03 8
805.5 6	2.0 3	2410.4	21/2+	1604.9	17/2+		
806.7 6	0.6 2	8159.6	49/2−	7352.8	47/2−		
811.5 6	0.8 2	3728.4	31/2−	2916.9	27/2−		
817.7 6	[a]	2821.2	23/2+	2003.5	19/2+		
817.8 4	7.4 9	4863.0	35/2+	4045.2	31/2+	E2	DCO=1.12 7
826.6 6	3.0 4	2821.2	23/2+	1994.6	19/2+		
828.2 6	2.5 4	4055.2	33/2−	3227.0	29/2−	E2	DCO=1.15 14
838.6 6	2.5 4	4833.6	35/2(+)	3994.9	31/2(+)	E2	DCO=1.44 21
839.6 6	0.9 2	2843.1	23/2+	2003.5	19/2+		
848.6 6	1.6 3	2843.1	23/2+	1994.6	19/2+		
868.3 2	27.0 14	3353.3	31/2−	2485.0	27/2−	E2	DCO=1.10 8
876.7 6	0.6 2	9436.2	53/2−	8559.6	51/2−		
878.5 6	2.5 4	4933.8	37/2−	4055.2	33/2−	E2	DCO=1.13 19
888.4 4	5.7 8	5751.4	39/2+	4863.0	35/2+	E2	DCO=1.11 9
892.0 6	0.6 2	4620.4	35/2−	3728.4	31/2−		
904.9 2	19.7 10	4258.2	35/2−	3353.3	31/2−	E2	DCO=1.09 8
917.8 6	1.3 3	5751.4	39/2+	4833.6	35/2(+)		
918.9 4	4.1 6	6670.3	43/2+	5751.4	39/2+	E2	DCO=1.10 10
926.0 6	1.4 3	5333.9	37/2(+)	4407.9	33/2(+)		
955.8 2	14.5 9	5214.0	39/2−	4258.2	35/2−		DCO=0.95 8
958.9 6	1.8 4	5792.5	39/2(+)	4833.6	35/2(+)		
971.8 6	2.0 4	5905.7	41/2−	4933.8	37/2−	E2	DCO=1.4 3
976.0 6	0.5 1	5596.5	39/2−	4620.4	35/2−		
976.3 4	3.8 5	7646.6	47/2+	6670.3	43/2+	E2	DCO=0.94 8
976.7 6	[a]	2706.1	23/2+	1729.4	21/2−		
988.2 6	0.8 2	5246.4		4258.2	35/2−		
1021.6 6	1.6 4	2706.1	23/2+	1684.5	23/2−	E1	DCO=1.02 15
1022.3[@] 6	[a]	12293.5	63/2−	11271.2?	(59/2−)		
1025.9 2	10.4 8	6239.9	43/2−	5214.0	39/2−	E2	DCO=1.20 10
1040.5 6	0.5 1	12293.5	63/2−	11253.0	59/2−		
1050.4 6	0.5 1	6296.8		5246.4			
1052.9 6	2.7 4	8699.5	51/2+	7646.6	47/2+	E2	DCO=1.05 9
1059.8 6	0.7 2	12293.5	63/2−	11233.7	59/2−	E2[c]	DCO=1.42 17
1060.0 6	1.4 3	2219.4	19/2+	1159.4	17/2−		
1075.8 6	1.6 4	6981.5	45/2−	5905.7	41/2−	E2	DCO=0.95 19
1081.9 6	0.3 1	6678.4	43/2−	5596.5	39/2−		
1102.7 6	0.4 1	13534.0	67/2−	12431.3	63/2−		
1112.9 4	6.8 6	7352.8	47/2−	6239.9	43/2−	E2	DCO=1.03 12
1116.2 6	2.5 5	1592.9	19/2−	476.7	15/2−		
1117.0[d] 6	<0.2	7413.8		6296.8			
1132.8 4	3.1 5	3617.8	29/2(+)	2485.0	27/2−	[c]	
1132.8 6	1.4 3	11020.6	59/2+	9887.8	55/2+	E2	DCO=1.42 21
1158.7 6	0.2 1	7837.1	47/2−	6678.4	43/2−		
1178.0 6	1.9 4	8159.6	49/2−	6981.5	45/2−	E2	DCO=1.18 15
1178.3 6	0.7 2	12431.3	63/2−	11253.0	59/2−		
1188.3 6	1.8 3	9887.8	55/2+	8699.5	51/2+	E2[c]	DCO=1.56 22
1196.9 6	1.1 3	2195.9	23/2−	999.0	19/2−		
1206.8 4	5.8 5	8559.6	51/2−	7352.8	47/2−	E2	DCO=1.13 11
1220.4 6	1.2 3	2219.4	19/2+	999.0	19/2−		

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^{64}Ni(^{64}Ni,p4nγ) 2004Si27 (continued)

γ(^{123}Cs) (continued)

E_γ[†]	I_γ[&]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[b]	Comments
1232.4 *6*	0.7 *2*	2916.9	27/2⁻	1684.5	23/2⁻		
1240.5 *6*	0.8 *2*	13534.0	67/2⁻	12293.5	63/2⁻	E2[c]	DCO=1.61 *23*
1243.4 *6*	0.4 *1*	3728.4	31/2⁻	2485.0	27/2⁻		
1276.6 *6*	1.4 *3*	9436.2	53/2⁻	8159.6	49/2⁻	E2	DCO=1.2 *3*
1288.5 *4*	7.0 *9*	2973.1	25/2$^{(+)}$	1684.5	23/2⁻	E1	DCO=0.63 *7*
1303.1 *4*	4.1 *4*	9862.7	55/2⁻	8559.6	51/2⁻	E2	DCO=1.10 *15*
1325.4 *6*	0.9 *2*	11213.2	59/2⁺	9887.8	55/2⁺	E2	DCO=1.4 *3*
1337.0 *6*	0.8 *2*	10773.2	57/2⁻	9436.2	53/2⁻		
1360.9 *4*	4.9 *6*	3045.4	25/2$^{(+)}$	1684.5	23/2⁻	E1	DCO=0.66 *8*
1371.0 *6*	2.2 *3*	11233.7	59/2⁻	9862.7	55/2⁻	E2	DCO=1.19 *7*
1390.3 *6*	1.7 *2*	11253.0	59/2⁻	9862.7	55/2⁻	E2	DCO=0.97 *9*
1395.9 *6*	0.6 *2*	12609.1	63/2⁺	11213.2	59/2⁺		
1421.7 *6*	0.5 *1*	14955.7	71/2⁻	13534.0	67/2⁻	E2[c]	DCO=1.63 *24*
1448.4 *6*	1.1 *3*	12469.0	63/2⁺	11020.6	59/2⁺	E2[c]	DCO=1.7 *3*

[†] From a general comment by 2004Si27 that the uncertainty is between 0.2 and 0.6 keV depending on intensity, the following have been assigned (by the evaluator): 0.2 keV for Iγ>10; 0.4 keV for Iγ=3-10 and 0.6 keV for Iγ<3.

[‡] From level scheme in Fig.2 of 2004Si27 but not in Table I. Quoted values are rounded values from Adopted Levels.

[#] 2004Si27 claim that due to the use of a thin target and the isomeric halflife of the 328-keV level, the de-exciting 96.5γ and 233.5γ are not expected to be seen because the ^{123}Cs nuclei recoil into vacuum after reaction and decay out of focal plane of the collimated detectors. The non-observation of prompt γ rays for these transitions, on the other hand, support the 328-keV being an isomer.

[@] The ordering of the 498.0 and 1022.3 transitions is tentative.

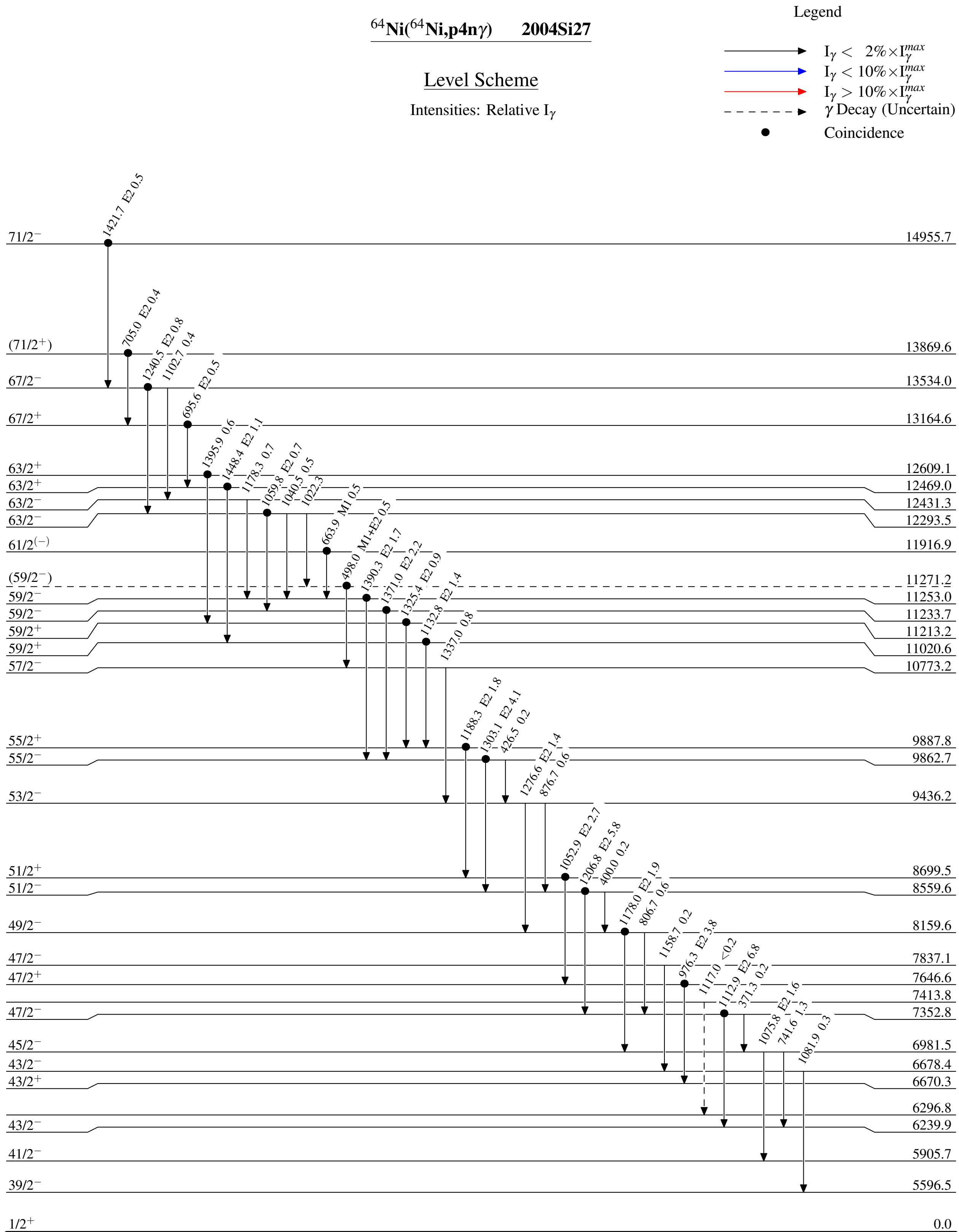
[&] Quoted values are original values in 2004Si27 scaled down by a factor of 10.

[a] Due to overlapping peaks, no intensity and DCO were possible.

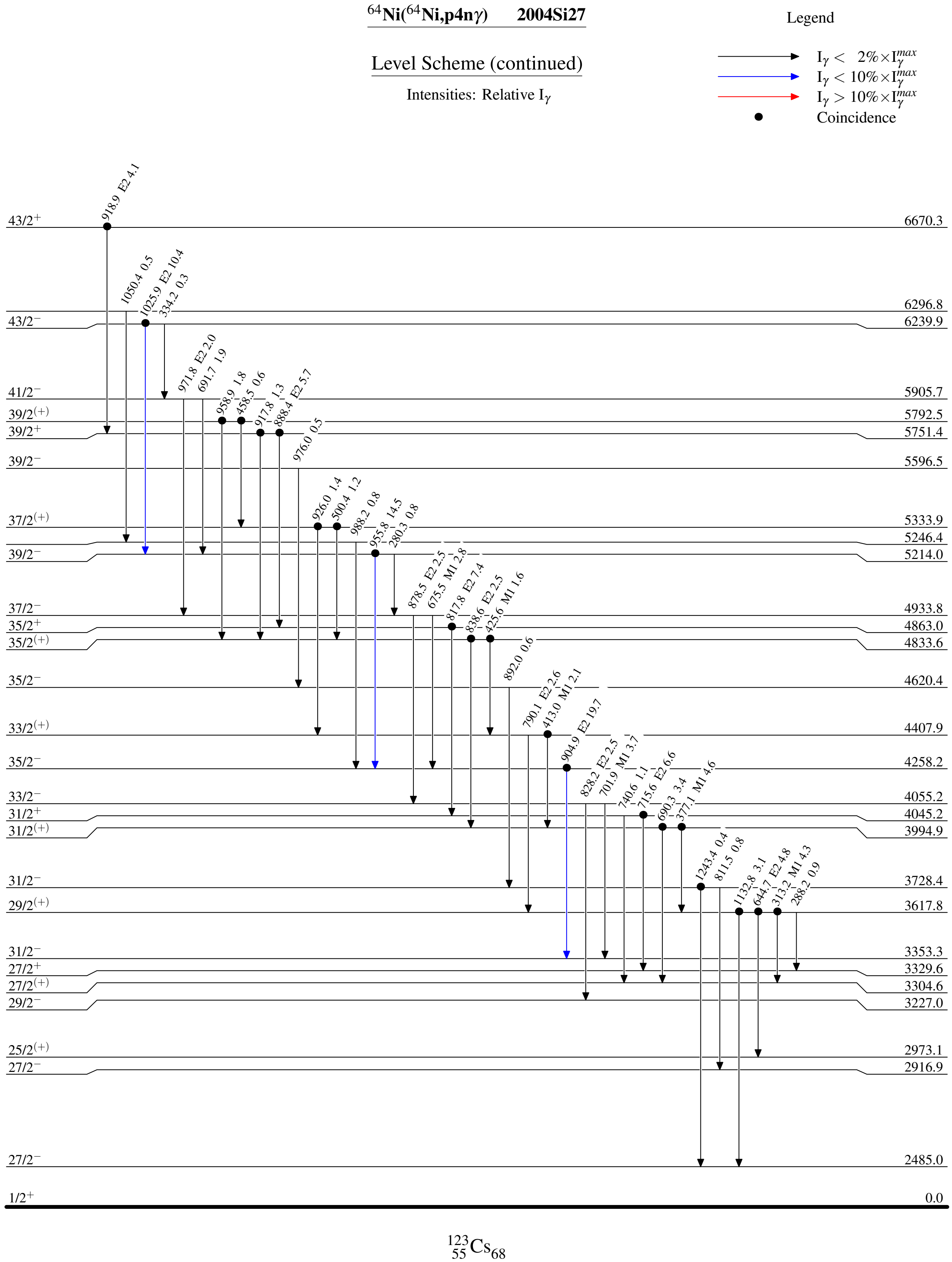
[b] From 2004Si27 based on measured γγ(DCO) and level scheme, unless otherwise noted. When considered in Adopted Gammas, D for E1 or M1 and Q for E2 will be used since there is no experimental evidence for electric or magnetic character, which cannot be determined by γγ(DCO).

[c] DCO ratio value obtained from angular distribution matrices.

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


^{64}Ni(^{64}Ni,p4nγ) 2004Si27
Level Scheme
Intensities: Relative Iγ
Legend
Iγ < 2%×Iγ max
Iγ < 10%×Iγ max
Iγ > 10%×Iγ max
γ Decay (Uncertain)
Coincidence
71/2− 14955.7
(71/2+) 13869.6
67/2− 13534.0
67/2+ 13164.6
63/2+ 12609.1
63/2+ 12469.0
63/2− 12431.3
63/2− 12293.5
61/2(−) 11916.9
(59/2−) 11271.2
59/2− 11253.0
59/2− 11233.7
59/2+ 11213.2
59/2+ 11020.6
57/2− 10773.2
55/2+ 9887.8
55/2− 9862.7
53/2− 9436.2
51/2+ 8699.5
51/2− 8559.6
49/2− 8159.6
47/2− 7837.1
47/2+ 7646.6
7413.8
47/2− 7352.8
45/2− 6981.5
43/2− 6678.4
43/2+ 6670.3
6296.8
43/2− 6239.9
41/2− 5905.7
39/2− 5596.5
1/2+ 0.0
1421.7 E2 0.5
705.0 E2 0.4
1240.5 E2 0.8
1102.7 0.4
695.6 E2 0.5
1395.9 0.6
1448.4 E2 1.1
1178.3 0.7
1059.8 E2 0.7
1040.5 0.5
1022.3
663.9 M1 0.5
498.0 M1+E2 0.5
1390.3 E2 1.7
1371.0 E2 2.2
1325.4 E2 0.9
1132.8 E2 1.4
1337.0 0.8
1188.3 E2 1.8
1303.1 E2 4.1
426.5 0.2
1276.6 E2 1.4
876.7 0.6
1052.9 E2 2.7
1206.8 E2 5.8
400.0 0.2
1178.0 E2 1.9
806.7 0.6
1158.7 0.2
976.3 E2 3.8
1117.0 <0.2
1112.9 E2 6.8
371.3 0.2
1075.8 E2 1.6
741.6 1.3
1081.9 0.3

$^{123}_{55}Cs_{68}$

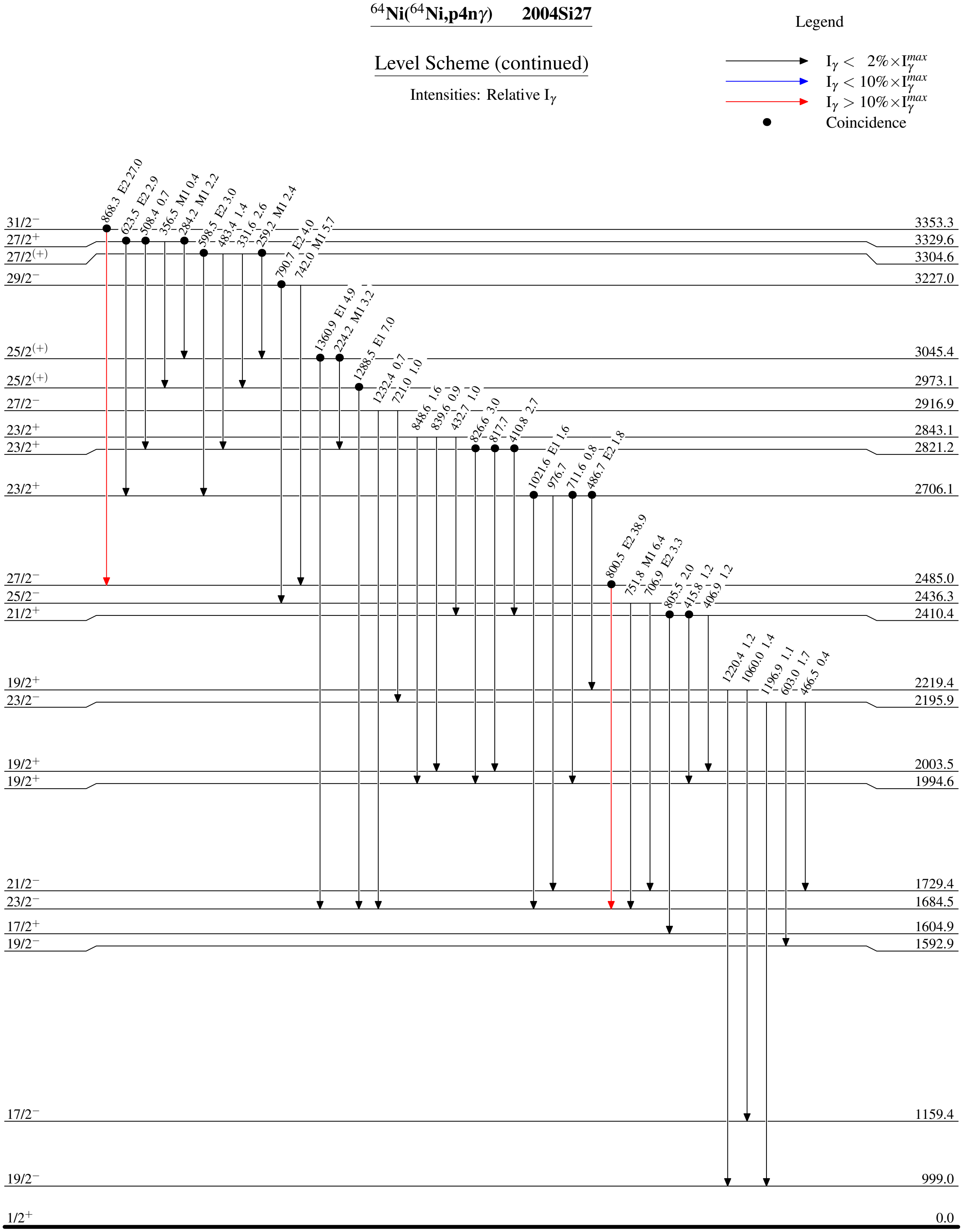


^{64}Ni(^{64}Ni,p4nγ) 2004Si27
Level Scheme (continued)
Intensities: Relative I_γ
Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
Coincidence
43/2+ 6670.3
43/2− 6296.8 6239.9
41/2− 5905.7
39/2(+) 5792.5
39/2+ 5751.4
39/2− 5596.5
37/2(+) 5333.9
5246.4
39/2− 5214.0
37/2− 4933.8
35/2+ 4863.0
35/2(+) 4833.6
35/2− 4620.4
33/2(+) 4407.9
35/2− 4258.2
33/2− 4055.2
31/2+ 4045.2
31/2(+) 3994.9
31/2− 3728.4
29/2(+) 3617.8
31/2− 3353.3
27/2+ 3329.6
27/2(+) 3304.6
29/2− 3227.0
25/2(+) 2973.1
27/2− 2916.9
27/2− 2485.0
1/2+ 0.0
918.9 E2 4.1
1050.4 0.5
1025.9 E2 10.4
334.2 0.3
971.8 E2 2.0
691.7 1.9
958.9 1.8
458.5 0.6
917.8 1.3
888.4 E2 5.7
976.0 0.5
926.0 1.4
500.4 1.2
988.2 0.8
955.8 14.5
280.3 0.8
878.5 E2 2.5
675.5 M1 2.8
817.8 E2 7.4
838.6 E2 2.5
425.6 M1 1.6
892.0 0.6
790.1 E2 2.6
413.0 M1 2.1
904.9 E2 19.7
828.2 E2 2.5
701.9 M1 3.7
740.6 1.1
715.6 E2 6.6
690.3 3.4
377.1 M1 4.6
1243.4 0.4
811.5 0.8
1132.8 3.1
644.7 E2 4.8
313.2 M1 4.3
288.2 0.9
$^{123}_{55}Cs_{68}$

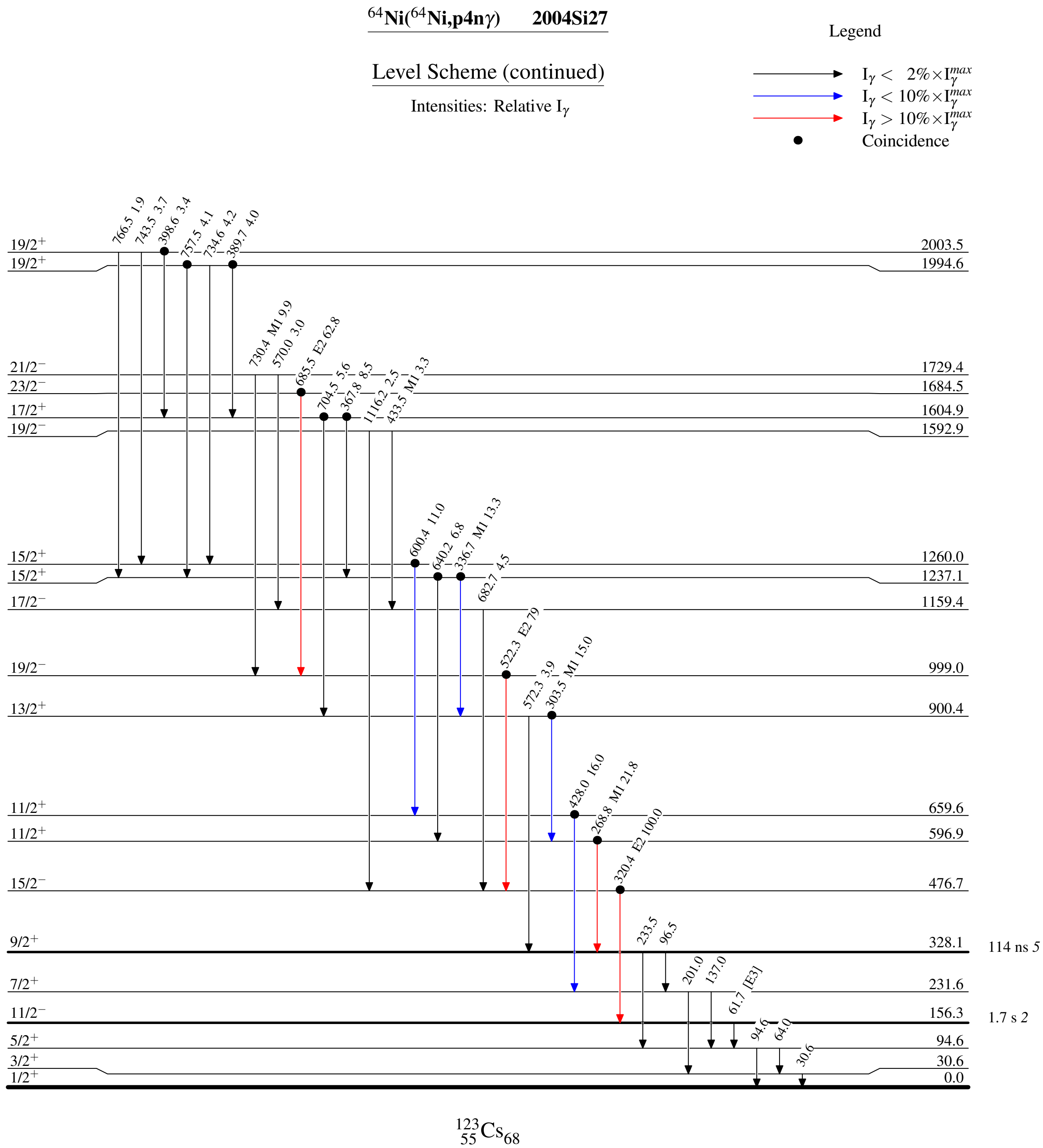
^{64}Ni(^{64}Ni,p4nγ) 2004Si27

Level Scheme (continued)

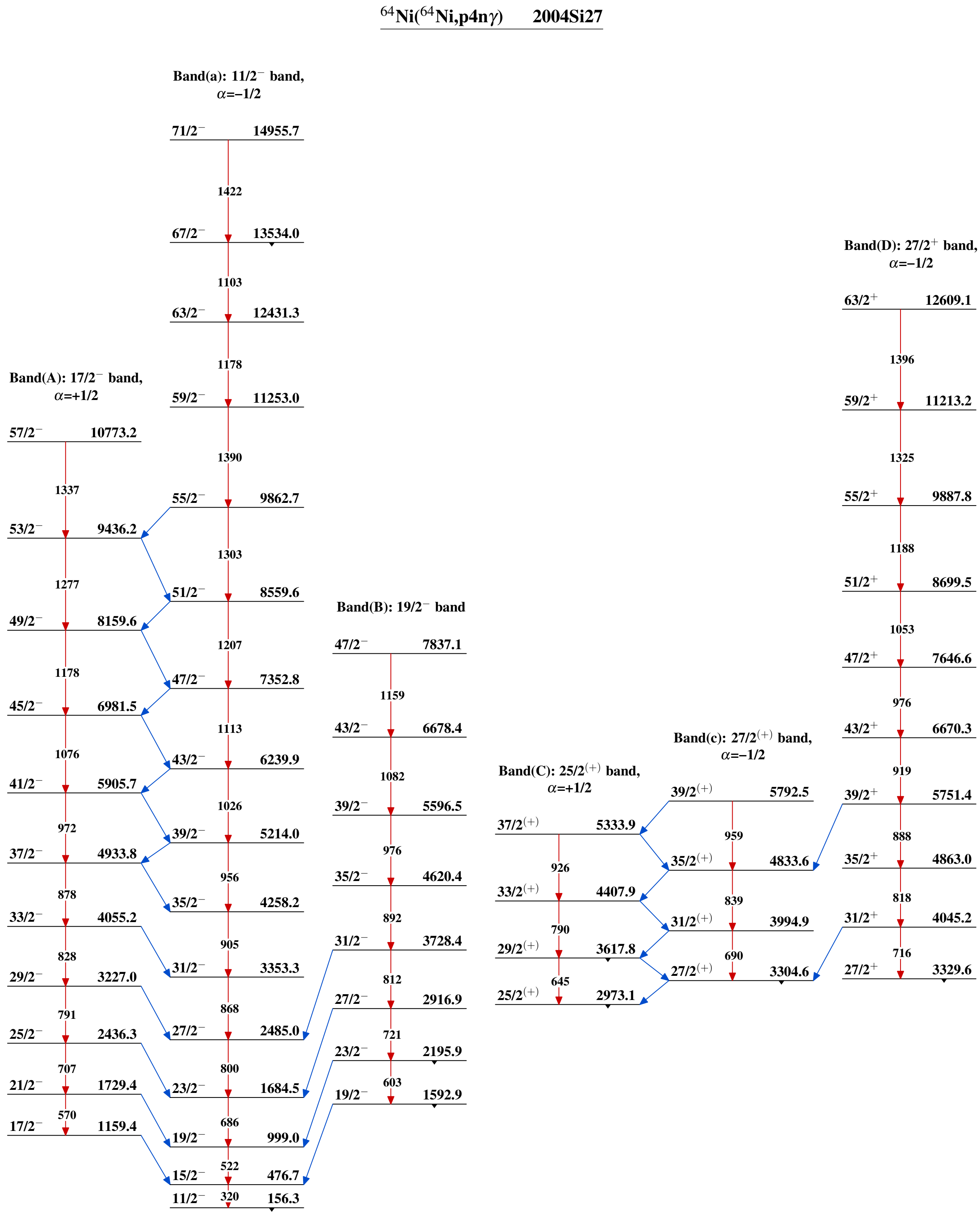
Intensities: Relative I_γ



$^{123}_{55}Cs_{68}$



^{64}Ni(^{64}Ni,p4nγ) 2004Si27
Level Scheme (continued)
Intensities: Relative Iγ
Legend
Iγ < 2%×Iγmax
Iγ < 10%×Iγmax
Iγ > 10%×Iγmax
Coincidence
19/2+ 2003.5
19/2+ 1994.6
21/2− 1729.4
23/2− 1684.5
17/2+ 1604.9
19/2− 1592.9
15/2+ 1260.0
15/2+ 1237.1
17/2− 1159.4
19/2− 999.0
13/2+ 900.4
11/2+ 659.6
11/2+ 596.9
15/2− 476.7
9/2+ 328.1 114 ns 5
7/2+ 231.6
11/2− 156.3 1.7 s 2
5/2+ 94.6
3/2+ 30.6
1/2+ 0.0
766.5 1.9
743.5 3.7
398.6 3.4
757.5 4.1
734.6 4.2
389.7 4.0
730.4 M1 9.9
570.0 3.0
685.5 E2 62.8
704.5 5.6
367.8 8.5
1116.2 2.5
433.5 M1 3.3
600.4 11.0
640.2 6.8
336.7 M1 13.3
682.7 4.5
522.3 E2 79
572.3 3.9
303.5 M1 15.0
428.0 16.0
268.8 M1 21.8
320.4 E2 100.0
233.5
96.5
201.0
137.0
61.7 [E3]
94.6
64.0
30.6
$^{123}_{55}$Cs$_{68}$



^{64}Ni(^{64}Ni,p4nγ) 2004Si27
Band(a): 11/2⁻ band, α=−1/2
71/2⁻ 14955.7
1422
67/2⁻ 13534.0
1103
63/2⁻ 12431.3
1178
59/2⁻ 11253.0
1390
55/2⁻ 9862.7
1303
51/2⁻ 8559.6
1207
47/2⁻ 7352.8
1113
43/2⁻ 6239.9
1026
39/2⁻ 5214.0
956
35/2⁻ 4258.2
905
31/2⁻ 3353.3
868
27/2⁻ 2485.0
800
23/2⁻ 1684.5
686
19/2⁻ 999.0
522
15/2⁻ 476.7
320
11/2⁻ 156.3
Band(A): 17/2⁻ band, α=+1/2
57/2⁻ 10773.2
1337
53/2⁻ 9436.2
1277
49/2⁻ 8159.6
1178
45/2⁻ 6981.5
1076
41/2⁻ 5905.7
972
37/2⁻ 4933.8
878
33/2⁻ 4055.2
828
29/2⁻ 3227.0
791
25/2⁻ 2436.3
707
21/2⁻ 1729.4
570
17/2⁻ 1159.4
Band(B): 19/2⁻ band
47/2⁻ 7837.1
1159
43/2⁻ 6678.4
1082
39/2⁻ 5596.5
976
35/2⁻ 4620.4
892
31/2⁻ 3728.4
812
27/2⁻ 2916.9
721
23/2⁻ 2195.9
603
19/2⁻ 1592.9
Band(C): 25/2(+) band, α=+1/2
37/2(+) 5333.9
926
33/2(+) 4407.9
790
29/2(+) 3617.8
645
25/2(+) 2973.1
Band(c): 27/2(+) band, α=−1/2
39/2(+) 5792.5
959
35/2(+) 4833.6
839
31/2(+) 3994.9
690
27/2(+) 3304.6
Band(D): 27/2⁺ band, α=−1/2
63/2⁺ 12609.1
1396
59/2⁺ 11213.2
1325
55/2⁺ 9887.8
1188
51/2⁺ 8699.5
1053
47/2⁺ 7646.6
976
43/2⁺ 6670.3
919
39/2⁺ 5751.4
888
35/2⁺ 4863.0
818
31/2⁺ 4045.2
716
27/2⁺ 3329.6

$^{123}_{55}Cs_{68}$

$^{64}Ni(^{64}Ni,p4n\gamma)$ 2004Si27 (continued)