^{63}Cu(n,n′γ) 1983Di04,2001Ko65

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 196,17 (2024)	30-Sep-2023

1983Di04: E=0.7-6.0 MeV neutron beams were produced from the 5 MV Van de Graaff generator facility and the Oak Ridge Electron Linear Accelerator (ORELA). Target was 52 g metallic >99% enriched ^{63}Cu. γ rays were detected with a Ge(Li) detectors. Measured Eγ, Iγ, γ-ray yields. Deduced levels.

2001Ko65: E=fast neutron beam was produced from the reactor VVR-K at the National Nuclear Center (Kazakhstan). Target was enriched ^{63}Cu. γ rays were detected with an anti-Compton NaI(Tl)-Ge(Li) spectrometer (resolution ≈ 3.5 keV for 1332 keV γ-ray). Measured Eγ, Iγ. Deduced levels.

1991Ej04: E=1-5 MeV neutron beams were produced at Osaka University. γ rays were detected with the low-background Ge detector system ELEGANTS IIS. Measured Eγ. Deduced levels.

Other: 1965Tu03, 1968Da14.

^{63}Cu Levels

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0	$3/2^-$	2779.99 *9*	$(3/2^-)$	4039.1 *17*	$(3/2^-)$
669.75 *5*	$1/2^-$	2808.14 *8*	$3/2^-$	4110.2 *24*	$1/2^+$
962.11 *5*	$5/2^-$	2818.87 *20*		4117 *4*	$1/2^+$
1327.16 *6*	$7/2^-$	2835.83 *11*	$(5/2^-)$	4127 *4*	
1412.21 *5*	$5/2^-$	2858.55 *7*	$(1/2^-,3/2^-)$	4141 *4*	
1547.06 *7*	$3/2^-$	2888.87 *9*	$(1/2^-,3/2,5/2^-)$	4183.5 *24*	
1861.01 *8*	$7/2^-$	2958.90 *11*		4189 *4*	
2014.85 *15*	$3/2^-$	2977.61 *18*	$1/2^-,3/2^-,5/2^-$	4284.8 *24*	$5/2^-,7/2^-$
2062.08 *10*	$(3/2)^-$	3032.17 *9*	$3/2^-$	4362.0 *24*	
2081.37 *11*	$5/2^-$	3042.49 *8*	$(5/2)^-$	4383.0 *28*	
2092.87 *8*	$7/2^-$	3095.21 *9*	$(1/2,3/2,5/2^-)$	4413.8 *14*	
2208.16 *15*	$9/2^-$	3101.0 *10*	$1/2^-,3/2^-$	4429 *4*	$1/2^+$
2336.48 *7*	$5/2^-$	3133.9 *18*	$^-$	4496.4 *19*	$5/2^-,7/2^-$
2404.77 *7*	$7/2^-$	3222.1 *30*	$5/2^-$	4511.6 *24*	$5/2^-,7/2^-$
2431.00 *9*		3247.8 *30*	(5/2)	4533 *4*	
2497.30 *6*	(3/2)	3290.8? *30*		4598 *4*	
2503.54 *8*		3313.2 *30*	$(3/2^+)$	4637 *4*	
2506.87 *13*	$9/2^+$	3418.1 *30*		4772? *4*	
2511.07 *20*	$(3/2)^+$	3426.0 *21*	$1/2^-,3/2^-$	4804 *4*	$(1/2^+)$
2535.79 *7*	$5/2^-$	3430.2 *30*	$(3/2)^-$	4870.2 *17*	
2547.55 *8*	$9/2^-$	3461.9 *17*	$5/2^+$	5135 *4*	
2630.96 *10*	$1/2^-,3/2^-$	3475.1 *30*	$5/2^+$	5253 *4*	
2672.51 *13*	$5/2^-,7/2^-$	3537.5? *21*		5292 *4*	
2677.17 *12*	$11/2^-$	3540.2? *14*		5304.3 *24*	
2678.07 *12*	$(5/2^-,7/2^-)$	3565.6 *15*		5362 *4*	
2681.87 *11*	$(1/2^-,3/2^-)$	3574.8? *30*		5401.8 *21*	
2696.28 *10*	$1/2^-,3/2^-,5/2^-$	3607.1 *30*	$5/2^-,7/2^-$	5566 *4*	
2717.04 *8*	$3/2^-,5/2^-$	3659.1 *30*		5835.1 *28*	$(5/2^-,7/2^-)$
2764.56 *9*		3889.7 *21*	$5/2^-,7/2^-$	5878.3? *28*	
2775.84 *11*	$(3/2^-)$	3892.1 *30*	$5/2^-,7/2^-$		

† From a least-squares fit to γ-ray energies.

‡ From Adopted Levels.

^{63}Cu(n,n′γ) 1983Di04,2001Ko65 (continued)

γ(^{63}Cu)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Comments
231.0[l] 12	2.7 14	2092.87	7/2⁻	1861.01	7/2⁻	
[x]299.0 13	1.7 9					
[x]326.0 13	1.6 7					
364.9 1	41 6	1327.16	7/2⁻	962.11	5/2⁻	
414.0[i] 1	3.4[i] 3	2506.87	9/2⁺	2092.87	7/2⁻	
443.0[i] 2	0.47[i] 9	2535.79	5/2⁻	2092.87	7/2⁻	
450.0 1	20.1 6	1412.21	5/2⁻	962.11	5/2⁻	
464.0[‡] 14	2.5 11	2014.85	3/2⁻	1547.06	3/2⁻	
469.0[i] 1	1.3[i] 3	2677.17	11/2⁻	2208.16	9/2⁻	
475.0[i] 2	<0.6[i]	2336.48	5/2⁻	1861.01	7/2⁻	
515.0 14	8 4	2062.08	(3/2)⁻	1547.06	3/2⁻	
535.0[‡] 14	6.0 22	2081.37	5/2⁻	1547.06	3/2⁻	
570.0[i] 1	1.6[i] 3	2431.00		1861.01	7/2⁻	
585.0 2	9.2 4	1547.06	3/2⁻	962.11	5/2⁻	
624.4[i] 1	2.8[i] 3	2717.04	3/2⁻,5/2⁻	2092.87	7/2⁻	
645.0[i@] 1	5.9[i] 6	2506.87	9/2⁺	1861.01	7/2⁻	E_γ: very poor fit and omitted in the fitting; level-energy difference=645.86.
669.6 1	100.0 20	669.75	1/2⁻	0.0	3/2⁻	
675.0[i] 2	0.41[i] 9	2535.79	5/2⁻	1861.01	7/2⁻	
685.6[i@] 2	0.32[i] 16	2696.28	1/2⁻,3/2⁻,5/2⁻	2014.85	3/2⁻	E_γ: very poor fit and omitted in the fitting; level-energy difference=681.43.
686.6[i] 1	5.0[i] 6	2547.55	9/2⁻	1861.01	7/2⁻	
[x]706.0 15	2.5 10					
734.0[l] 15	3.0 15	2062.08	(3/2)⁻	1327.16	7/2⁻	
742.0[‡] 15	11 4	1412.21	5/2⁻	669.75	1/2⁻	
[x]747.0 15	3.4 16					
[x]754.0[‡] 16	8.8 3					
754.2[i] 1	4.1[i] 6	2081.37	5/2⁻	1327.16	7/2⁻	
765.0 16	18.2 5	2092.87	7/2⁻	1327.16	7/2⁻	
811.5[i] 1	1.4[i] 1	2672.51	5/2⁻,7/2⁻	1861.01	7/2⁻	
877.0[i] 2	0.9[i] 3	1547.06	3/2⁻	669.75	1/2⁻	
880.0[j] 16	21.9[j] 6	2208.16	9/2⁻	1327.16	7/2⁻	
884.0[i] 1	3.1[i] 7	2431.00		1547.06	3/2⁻	
899.2 4	47.5 13	1861.01	7/2⁻	962.11	5/2⁻	
903.0[i@] 1	2.5[i] 6	2764.56		1861.01	7/2⁻	E_γ: very poor fit and omitted in the fitting; level-energy difference=903.54.
923.5[i] 2	0.9[i] 3	2336.48	5/2⁻	1412.21	5/2⁻	
944.0[i] 1	1.6[i] 3	2958.90		2014.85	3/2⁻	
955.0 17	15 3	3461.9	5/2⁺	2506.87	9/2⁺	
962.1 1	313 9	962.11	5/2⁻	0.0	3/2⁻	
[x]971.0 17	5.1 16					
976.0[i#] 2	0.9[i] 3	2835.83	(5/2⁻)	1861.01	7/2⁻	E_γ: uncertainty multiplied by a factor of 3 in the fitting; level-energy difference=974.81.
992.4[i] 1	2.5[i] 3	2404.77	7/2⁻	1412.21	5/2⁻	
[x]1009.0 17	7.5 15					
1049.0 17	9.6 5	2014.85	3/2⁻	962.11	5/2⁻	
[x]1055.0 17	1.9 7					
[x]1059.0 17	2.4 7					
1077.6[i] 1	3.4[i] 3	2404.77	7/2⁻	1327.16	7/2⁻	
1085.0[i] 1	1.3[i] 3	2497.30	(3/2)	1412.21	5/2⁻	

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^{63}Cu(n,n′γ) 1983Di04,2001Ko65 (continued)

γ(^{63}Cu) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Comments
x1092.0‡ 18	6.0 15					
1099.0i 2	0.91i 9	2511.07	(3/2)+	1412.21	5/2−	
1119.0j 18	12.7j 23	2081.37	5/2−	962.11	5/2−	
1119.0j‡l 18	12.7j 23	3133.9	−	2014.85	3/2−	
1123.7i 1	2.8i 6	2535.79	5/2−	1412.21	5/2−	
1130.0‡ 18	22 3	2092.87	7/2−	962.11	5/2−	
1131.0i 1	2.2i 6	2678.07	(5/2−,7/2−)	1547.06	3/2−	
x1145.0 18	1.9 10					
1147.0i@ 2	0.75i 13	2696.28	1/2−,3/2−,5/2−	1547.06	3/2−	E_γ: very poor fit and omitted in the fitting; level-energy difference=1149.21.
x1163.0 18	5.4 20					
1168.0i@ 2	0.44i 16	2717.04	3/2−,5/2−	1547.06	3/2−	E_γ: very poor fit and omitted in the fitting; level-energy difference=1169.97.
1178.0i@ 1	3.1i 6	2506.87	9/2+	1327.16	7/2−	E_γ: very poor fit and omitted in the fitting; level-energy difference=1179.71.
x1199.0 18	1.6 7					
x1205.0 18	2.9 10					
1208.7i 2	0.94i 16	2535.79	5/2−	1327.16	7/2−	
1220.2i 2	0.9i 3	2547.55	9/2−	1327.16	7/2−	
1232.4i# 2	≈0.3i	2779.99	(3/2−)	1547.06	3/2−	E_γ: uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=1232.91.
1245.0‡ 18	17.9 8	2208.16	9/2−	962.11	5/2−	
x1260.0 19	4.5 22					
1261.0i 2	i	2808.14	3/2−	1547.06	3/2−	
x1294.0 19	3.3 8					
1327.0 2	185 6	1327.16	7/2−	0.0	3/2−	
1342.0 18	6.0 22	2014.85	3/2−	669.75	1/2−	
x1344.0 19	4.5 22					
1350.0i 1	3.8i 9	2677.17	11/2−	1327.16	7/2−	
1374.6i 1	2.5i 3	2336.48	5/2−	962.11	5/2−	
x1387.0 19	3.7 15					
1389.7i 1	1.3i 3	2717.04	3/2−,5/2−	1327.16	7/2−	
1392.3i 1	4.7i 6	2062.08	(3/2)−	669.75	1/2−	
1412.1 1	65.3 23	1412.21	5/2−	0.0	3/2−	
x1425 2	3.2 11					
1437.4i 1	2.2i 6	2764.56		1327.16	7/2−	
1442.8i 1	5.0i 9	2404.77	7/2−	962.11	5/2−	
1446.4i 1	1.9i 3	2858.55	(1/2−,3/2−)	1412.21	5/2−	
x1460 2	3.0 15					
x1464 2	3.0 15					
1467.6i@ 1	2.5i 9	2431.00		962.11	5/2−	E_γ: very poor fit and omitted in the fitting; level-energy difference=1468.87.
x1471 2	1.5 8					
1481.0i 2	0.9i 3	2808.14	3/2−	1327.16	7/2−	
1535.0i 2	0.3i	2497.30	(3/2)	962.11	5/2−	
1541.5i 1	4.7i 6	2503.54		962.11	5/2−	
1547.1& 1	43.7 14	1547.06	3/2−	0.0	3/2−	
1573.1i 2	1.0i 1	2535.79	5/2−	962.11	5/2−	
1585.4i 1	1.3i 3	2547.55	9/2−	962.11	5/2−	
x1621 2	3.0 10					
x1653 2	2.1 10					

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^{63}Cu(n,n′γ) 1983Di04,2001Ko65 (continued)

γ(^{63}Cu) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Comments
1668.9[i] *1*	5.0[i] *6*	2630.96	1/2⁻,3/2⁻	962.11	5/2⁻	
1706.6[i@] *1*	1.19[i] *13*	3032.17	3/2⁻	1327.16	7/2⁻	E_γ: very poor fit and omitted in the fitting; level-energy difference=1704.99.
[x]1709 *2*	4.3 *13*					
[x]1716 *2*	4.3 *13*					
1716.8[i@] *1*	1.3[i] *3*	2678.07	(5/2⁻,7/2⁻)	962.11	5/2⁻	E_γ: very poor fit and omitted in the fitting; level-energy difference=1715.94.
[x]1724 *2*	3.1 *13*					
[x]1802[‡] *2*	4.3 *10*					
1802.4[i] *1*	≈1.3[i]	2764.56		962.11	5/2⁻	
1813.7[i] *1*	2.8[i] *5*	2775.84	(3/2⁻)	962.11	5/2⁻	
1827.7[i] *1*	1.3[i] *3*	2497.30	(3/2)	669.75	1/2⁻	
[x]1836 *2*	2.5 *7*					
1840.0[i#] *2*	0.75[i] *9*	2511.07	(3/2)⁺	669.75	1/2⁻	E_γ: uncertainty multiplied by a factor of 3 in the fitting; level-energy difference=1841.29.
[x]1848 *2*	3.4 *11*					
1861.2 *3*	58.1 *17*	1861.01	7/2⁻	0.0	3/2⁻	
1866.0[i] *2*	0.78[i] *10*	2535.79	5/2⁻	669.75	1/2⁻	
[x]1881 *2*	3.4 *7*					
1896.0[i#] *1*	2.5[i] *3*	2858.55	(1/2⁻,3/2⁻)	962.11	5/2⁻	E_γ: uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=1896.41.
[x]1900 *2*	1.6 *7*					
[x]1916[‡] *2*	2.8 *6*					
1926.7[i] *1*	1.9[i] *3*	2888.87	(1/2⁻,3/2,5/2⁻)	962.11	5/2⁻	
[x]1943 *2*	1.7 *6*					
[x]1958 *2*	2.2 *6*					
[x]1965[‡] *2*	3.0 *15*					
[x]1971 *2*	1.5 *8*					
[x]1981[‡] *2*	3.4 *14*					
1991[l] *2*	3.4 *14*	3540.2?		1547.06	3/2⁻	
1996.8[i] *1*	1.6[i] *3*	2958.90		962.11	5/2⁻	
2011.2[@] *3*	18.1 *7*	2014.85	3/2⁻	0.0	3/2⁻	E_γ: very poor fit and omitted in the fitting; level-energy difference=2014.82.
2012.0[i] *1*	2.2[i] *6*	2681.87	(1/2⁻,3/2⁻)	669.75	1/2⁻	
2019[l] *2*	2.4 *6*	3565.6		1547.06	3/2⁻	
2026.5[i] *1*	1.38[i] *13*	2696.28	1/2⁻,3/2⁻,5/2⁻	669.75	1/2⁻	
[x]2034 *2*	1.9 *9*					
2047.3[i] *2*	0.75[i] *15*	2717.04	3/2⁻,5/2⁻	669.75	1/2⁻	
2062.1[i] *2*	3.5 *13*	2062.08	(3/2)⁻	0.0	3/2⁻	
2070.0[i] *2*	0.38[i] *16*	3032.17	3/2⁻	962.11	5/2⁻	
2081.4 *3*	7.6 *4*	2081.37	5/2⁻	0.0	3/2⁻	
2093.1[i] *1*	2.5[i] *3*	2092.87	7/2⁻	0.0	3/2⁻	
[x]2101[e] *2*	1.5 *8*					
2107.0[i@] *1*	1.1[i] *3*	2775.84	(3/2⁻)	669.75	1/2⁻	E_γ: very poor fit and omitted in the fitting; level-energy difference=2106.04.
2110.0[i] *2*	≈0.3[i]	2779.99	(3/2⁻)	669.75	1/2⁻	
2130[‡l] *2*	2.2 *8*	3540.2?		1412.21	5/2⁻	
[x]2137 *2*	1.9 *7*					
2138.3[i] *2*	0.6[i]	2808.14	3/2⁻	669.75	1/2⁻	
2166.0[i] *1*	2.2[i] *3*	2835.83	(5/2⁻)	669.75	1/2⁻	

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^{63}Cu(n,n′γ) 1983Di04,2001Ko65 (continued)

γ(^{63}Cu) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Comments
x2168 2	6.7 15					
2178[l] 2	2.5 5	4039.1	(3/2⁻)	1861.01	7/2⁻	
2186.0[i@] 2	0.9[i] 3	2858.55	(1/2⁻,3/2⁻)	669.75	1/2⁻	E_γ: very poor fit and omitted in the fitting; level-energy difference=2188.75.
x2215 2	1.1 5					
2219.0[i] 2	0.31[i] 9	2888.87	(1/2⁻,3/2,5/2⁻)	669.75	1/2⁻	
x2290 2	1.0 5					
x2297 2	1.5 6					
x2304 2	2.0 7					
2308.0[i] 2	0.6[i]	2977.61	1/2⁻,3/2⁻,5/2⁻	669.75	1/2⁻	
2336.5[i] 1	8.5[i] 3	2336.48	5/2⁻	0.0	3/2⁻	
x2343 3	2.8 7					
2351[‡l] 3	4.3 11	3313.2	(3/2⁺)	962.11	5/2⁻	
2372.6[i] 1	2.9[i] 7	3042.49	(5/2)⁻	669.75	1/2⁻	
2404.7[i] 2	<0.6[i]	2404.77	7/2⁻	0.0	3/2⁻	
x2418 3	1.9 5					
2425.5[i] 2	0.4[i] 2	3095.21	(1/2,3/2,5/2⁻)	669.75	1/2⁻	
2429.6[i#] 2	0.9[i] 3	2431.00		0.0	3/2⁻	E_γ: uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=2430.95.
x2450 3	1.9 5					
x2463 3	2.5 7					
2468 3	2.3 7	3430.2	(3/2)⁻	962.11	5/2⁻	
2497.2[i] 1	4.4[i] 5	2497.30	(3/2)	0.0	3/2⁻	
2503.4[i] 1	4.7[i] 6	2503.54		0.0	3/2⁻	
2512.0[i@] 1	2.5[i] 3	2511.07	(3/2)⁺	0.0	3/2⁻	E_γ: very poor fit and omitted in the fitting; level-energy difference=2511.02.
2535.1[i#] 1	2.2[i] 3	2535.79	5/2⁻	0.0	3/2⁻	E_γ: uncertainty multiplied by a factor of 3 in the fitting; level-energy difference=2535.74.
2578[l] 3	1.6 7	3247.8	(5/2)	669.75	1/2⁻	
x2611 3	1.7 7					
2621[‡l] 3	5.2 13	3290.8?		669.75	1/2⁻	
2630.3[i#] 1	1.3[i] 2	2630.96	1/2⁻,3/2⁻	0.0	3/2⁻	E_γ: uncertainty multiplied by a factor of 3 in the fitting; level-energy difference=2630.91.
2673.6[i@] 1	6.6[i] 7	2672.51	5/2⁻,7/2⁻	0.0	3/2⁻	E_γ: very poor fit and omitted in the fitting; level-energy difference=2672.45.
2682.5[i#] 1	1.3[i] 6	2681.87	(1/2⁻,3/2⁻)	0.0	3/2⁻	E_γ: uncertainty multiplied by a factor of 3 in the fitting; level-energy difference=2681.80.
x2690 3	2.2 9					
2696.2[i] 2	0.85[i] 9	2696.28	1/2⁻,3/2⁻,5/2⁻	0.0	3/2⁻	
2712[l] 3	2.7 7	4039.1	(3/2⁻)	1327.16	7/2⁻	
2716.3[i#] 1	1.6[i] 3	2717.04	3/2⁻,5/2⁻	0.0	3/2⁻	E_γ: uncertainty multiplied by a factor of 3 in the fitting; level-energy difference=2716.98.
x2740 3	1.3 5					
x2744 3	2.1 6					
x2751[‡] 3	2.0 6					
2756 3	1.3 3	3426.0	1/2⁻,3/2⁻	669.75	1/2⁻	
2780.0[i] 1	1.9[i] 3	2779.99	(3/2⁻)	0.0	3/2⁻	
2808.1[i] 1	1.9[i] 6	2808.14	3/2⁻	0.0	3/2⁻	
2818.8[i] 2	6.6[i] 9	2818.87		0.0	3/2⁻	
2837.5[i@] 1	1.3[i] 3	2835.83	(5/2⁻)	0.0	3/2⁻	E_γ: very poor fit and omitted in the fitting; level-energy difference=2835.76.

Continued on next page (footnotes at end of table)

^{63}Cu(n,n′γ) 1983Di04,2001Ko65 (continued)

γ(^{63}Cu) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Comments
x2840‡ 3	4.0 10					
2858.5i 1	1.9i 3	2858.55	(1/2−,3/2−)	0.0	3/2−	
2866j‡l 3	2.5j 11	3537.5?		669.75	1/2−	
2866j‡l 3	2.5j 11	4413.8		1547.06	3/2−	
2889.0i 2	0.31i 6	2888.87	(1/2−,3/2,5/2−)	0.0	3/2−	
2895l 3	0.8 5	3565.6		669.75	1/2−	
2905l 3	3.1 7	3574.8?		669.75	1/2−	
x2910 3	1.7 4					
2928l 3	1.3 5	3889.7	5/2−,7/2−	962.11	5/2−	
2949‡gl 3	4.8 15	4496.4	5/2−,7/2−	1547.06	3/2−	
2956.0i@ 1	1.9i 2	2958.90		0.0	3/2−	E_γ: very poor fit and omitted in the fitting; level-energy difference=2958.83.
x2967 3	1.7 6					
x2972 3	2.2 6					
2976.8i# 2	0.9i 3	2977.61	1/2−,3/2−,5/2−	0.0	3/2−	E_γ: uncertainty multiplied by a factor of 2 in the fitting; level-energy difference=2977.54.
3004 3	1.6 9	4413.8		1412.21	5/2−	
3032.1i 1	1.6i 3	3032.17	3/2−	0.0	3/2−	
x3039 3	3.1 16					
3042.5i 1	1.6i 3	3042.49	(5/2)−	0.0	3/2−	
x3062 3	1.3 5					
x3071 3	0.5 2					
3083‡l 3	4.8 19	4413.8		1327.16	7/2−	
3095.1i 1	1.3i 3	3095.21	(1/2,3/2,5/2−)	0.0	3/2−	
3100.9 10	2.0 13	3101.0	1/2−,3/2−	0.0	3/2−	
x3113 3	0.8 5					
x3135 3	1.5 8					
3148l 3	0.7 5	4110.2	1/2+	962.11	5/2−	
x3173 3	1.0 5					
x3179‡ 3	2.0 7					
x3193‡ 3	1.9 7					
3222j‡l 3	3.3j 7	3222.1	5/2−	0.0	3/2−	
3222j‡l 3	3.3j 7	4183.5		962.11	5/2−	
x3234 3	0.4 4					
x3257 3	1.9 6					
x3267 3	0.7 5					
3324k‡l 3	2.5k 10	4284.8	5/2−,7/2−	962.11	5/2−	
3324k‡l 3	2.5k 10	4870.2		1547.06	3/2−	
3418l 3	1.2 6	3418.1		0.0	3/2−	
3426‡ 3	1.9 6	3426.0	1/2−,3/2−	0.0	3/2−	
3452‡l 3	5.8 10	4413.8		962.11	5/2−	
3458b 3		4870.2		1412.21	5/2−	
x3468‡ 3	4.1 11					
3475 3	0.6c 3	3475.1	5/2+	0.0	3/2−	
x3503 3	0.7 2					
x3510 3	0.4 2					
x3527 3	0.4 3					
3539‡l 3	1.7 5	3537.5?		0.0	3/2−	

Continued on next page (footnotes at end of table)

^{63}Cu(n,n′γ) 1983Di04,2001Ko65 (continued)

γ(^{63}Cu) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π
3549 3	1.0 4	4511.6	5/2⁻,7/2⁻	962.11	5/2⁻
3565‡ 3	3.5 7	3565.6		0.0	3/2⁻
3607 3	0.9 6	3607.1	5/2⁻,7/2⁻	0.0	3/2⁻
x3646[a] 3					
3659 3	0.8 4	3659.1		0.0	3/2⁻
x3665 3	0.7 4				
x3685 3	0.9 4				
3692 3	0.4 4	4362.0		669.75	1/2⁻
x3705‡ 3	1.0 4				
3715[l] 4	0.7 4	4383.0		669.75	1/2⁻
x3763‡ 3	0.9 4				
3827 3	0.7 5	4496.4	5/2⁻,7/2⁻	669.75	1/2⁻
3854[a] 3		5401.8		1547.06	3/2⁻
x3865[a] 3					
x3877 3	0.7 4				
3889 3	0.7 4	3889.7	5/2⁻,7/2⁻	0.0	3/2⁻
3892 3	1.9 4	3892.1	5/2⁻,7/2⁻	0.0	3/2⁻
3907[b] 3		4870.2		962.11	5/2⁻
x3934[a] 3					
x3950[a] 3					
3977[bl] 3		5304.3		1327.16	7/2⁻
3990[al] 3		5401.8		1412.21	5/2⁻
x4002 4	0.5 4				
x4014 4	0.8 4				
x4033‡ 4	1.8 9				
x4054‡ 4	1.6 7				
x4061[a] 4					
4102[bl] 4		4772?		669.75	1/2⁻
4110 4	2.1 7	4110.2	1/2⁺	0.0	3/2⁻
4117 4	1.2 7	4117	1/2⁺	0.0	3/2⁻
4127 4	1.8 4	4127		0.0	3/2⁻
4141 4	1.4 5	4141		0.0	3/2⁻
x4161[b] 4					
4182 4	0.9 6	4183.5		0.0	3/2⁻
4189 4	0.6 5	4189		0.0	3/2⁻
4282‡[l] 4	1.3 6	4284.8	5/2⁻,7/2⁻	0.0	3/2⁻
4290[al] 4		5835.1	(5/2⁻,7/2⁻)	1547.06	3/2⁻
4362 4	0.7 4	4362.0		0.0	3/2⁻
4381 4	0.5 4	4383.0		0.0	3/2⁻
4416‡[l] 4	0.9 4	4413.8		0.0	3/2⁻
4429 4	1.1 4	4429	1/2⁺	0.0	3/2⁻
4496[l] 4	1.3 3	4496.4	5/2⁻,7/2⁻	0.0	3/2⁻
x4503 4	[d]				
4512 4	0.5 3	4511.6	5/2⁻,7/2⁻	0.0	3/2⁻
4533[b] 4	[d]	4533		0.0	3/2⁻
x4551[b] 4					
x4573[b] 4					
x4589[b] 4					
4598 4	1.5 6	4598		0.0	3/2⁻

Continued on next page (footnotes at end of table)

^{63}Cu(n,n′γ) 1983Di04,2001Ko65 (continued)

γ(^{63}Cu) (continued)

E_γ †	E_i(level)	J_i^π	E_f	J_f^π	E_γ †	E_i(level)	J_i^π	E_f	J_f^π
4604[al] 4	5566		962.11	5/2⁻	4916[al] 4	5878.3?		962.11	5/2⁻
x4619[b] 4					x4938‡[a] 4				
4637[b] 4	4637		0.0	3/2⁻	5135[ah] 4	5135		0.0	3/2⁻
x4647[b] 4					5163[a] 4	5835.1	(5/2⁻,7/2⁻)	669.75	1/2⁻
x4700[a] 4					5253[b] 4	5253		0.0	3/2⁻
4804[b] 4	4804	(1/2⁺)	0.0	3/2⁻	5292[b] 4	5292		0.0	3/2⁻
x4809[a] 4					5304[b] 4	5304.3		0.0	3/2⁻
x4834[l] 4					5362[b] 4	5362		0.0	3/2⁻
x4851‡[afl] 4					5878[l] 4	5878.3?		0.0	3/2⁻
x4870[l] 4									

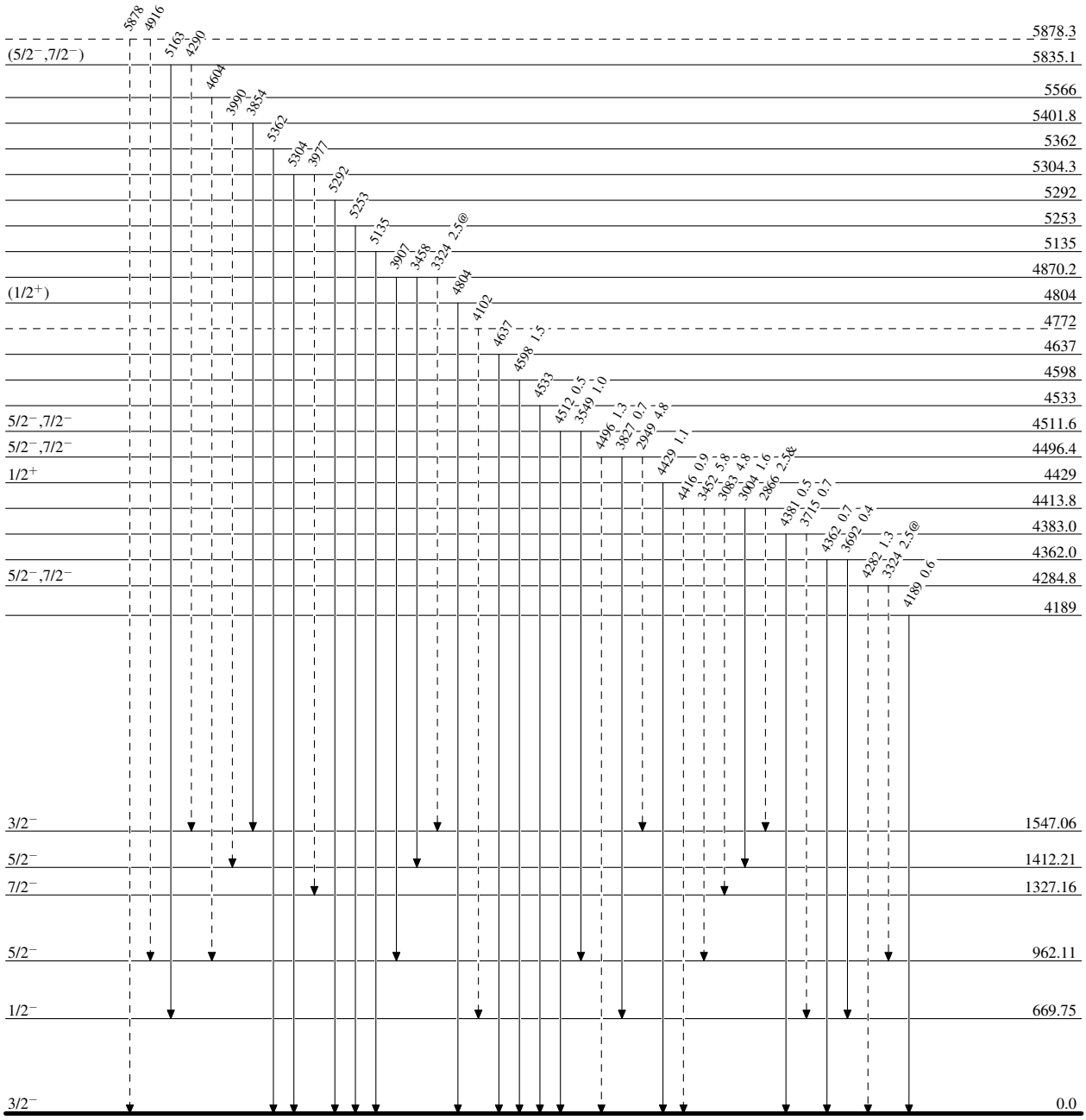
† From 1983Di04, unless otherwise noted. Intensities are relative yield for E(n)=4.9 MeV, except where noted otherwise.
‡ Possible multiplet.
# Poor fit; uncertainty multiplied by a factor in the fitting.
@ Very poor fit and omitted in the fitting.
& Peak broaden for high E(n), may include contribution from a γ-ray at Eγ≈1552 keV for E(n)>2.8 MeV.
a Observed for E(n)≈6 MeV.
b Observed for E(n)≈5.4 MeV.
c Yield appears to be relatively larger in spectrum for E≈5.4 MeV.
d May be observed at E=4.85 MeV; if so, relative yield <0.3.
e Placed under 2963-keV level in 1983Di04, energy does not fit.
f Peak observed for E≈6 MeV, it may include double escape of postulated 5878-keV γ ray.
g Tabulated as 2929 in 1983Di04, assumed an error.
h Tabulated as 5153 in 1983Di04, assumed by the evaluator to be a typographical error.
i From 2001Ko65. Intensity is renormalized to I(962.1γ)=313 in 1983Di04.
j Multiply placed with undivided intensity.
k Multiply placed with intensity suitably divided.
l Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

^{63}Cu(n,n′γ) 1983Di04,2001Ko65

Level Scheme

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

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



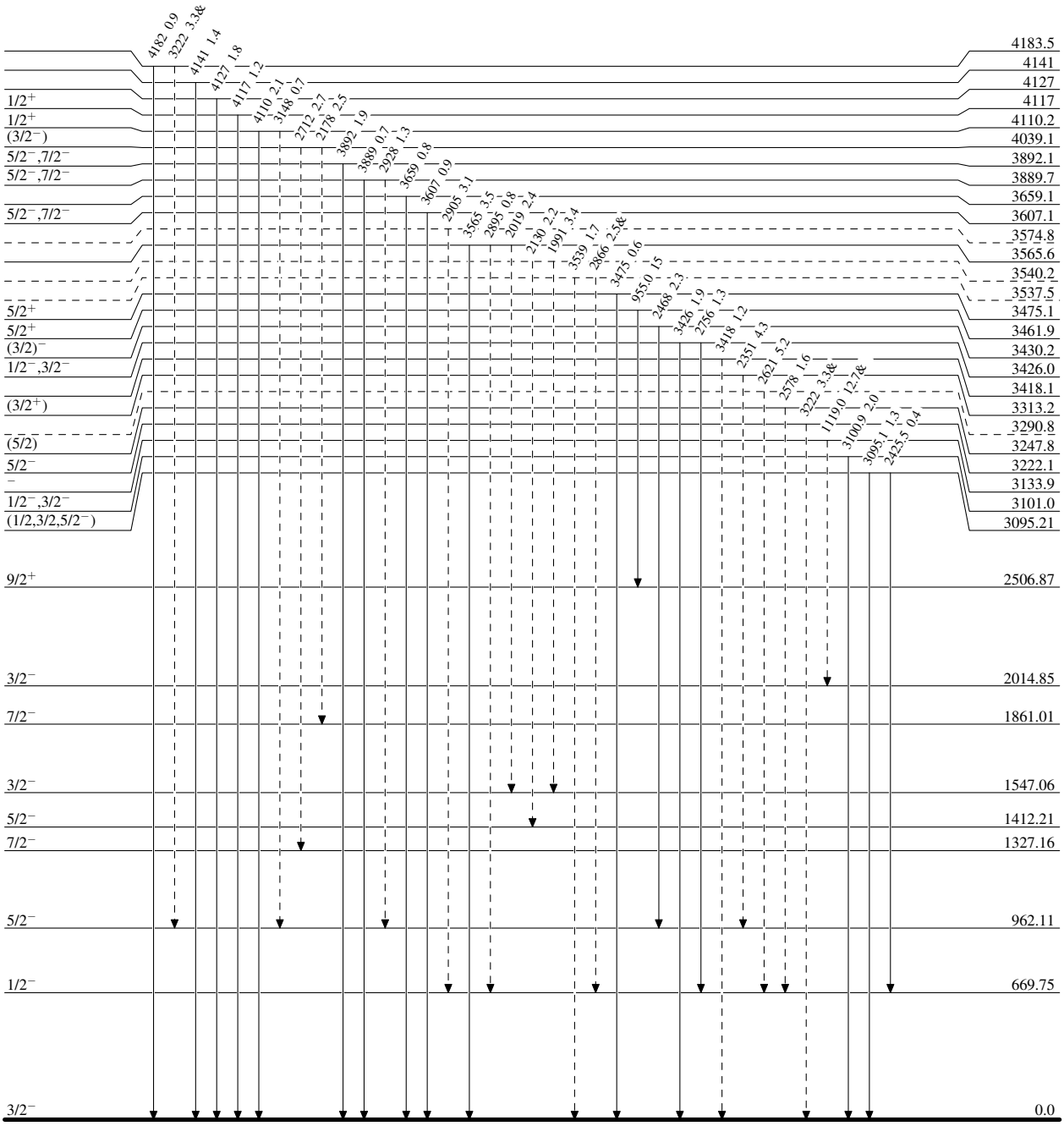
$^{63}_{29}Cu_{34}$

^{63}Cu(n,n′γ) 1983Di04,2001Ko65

Level Scheme (continued)

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

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



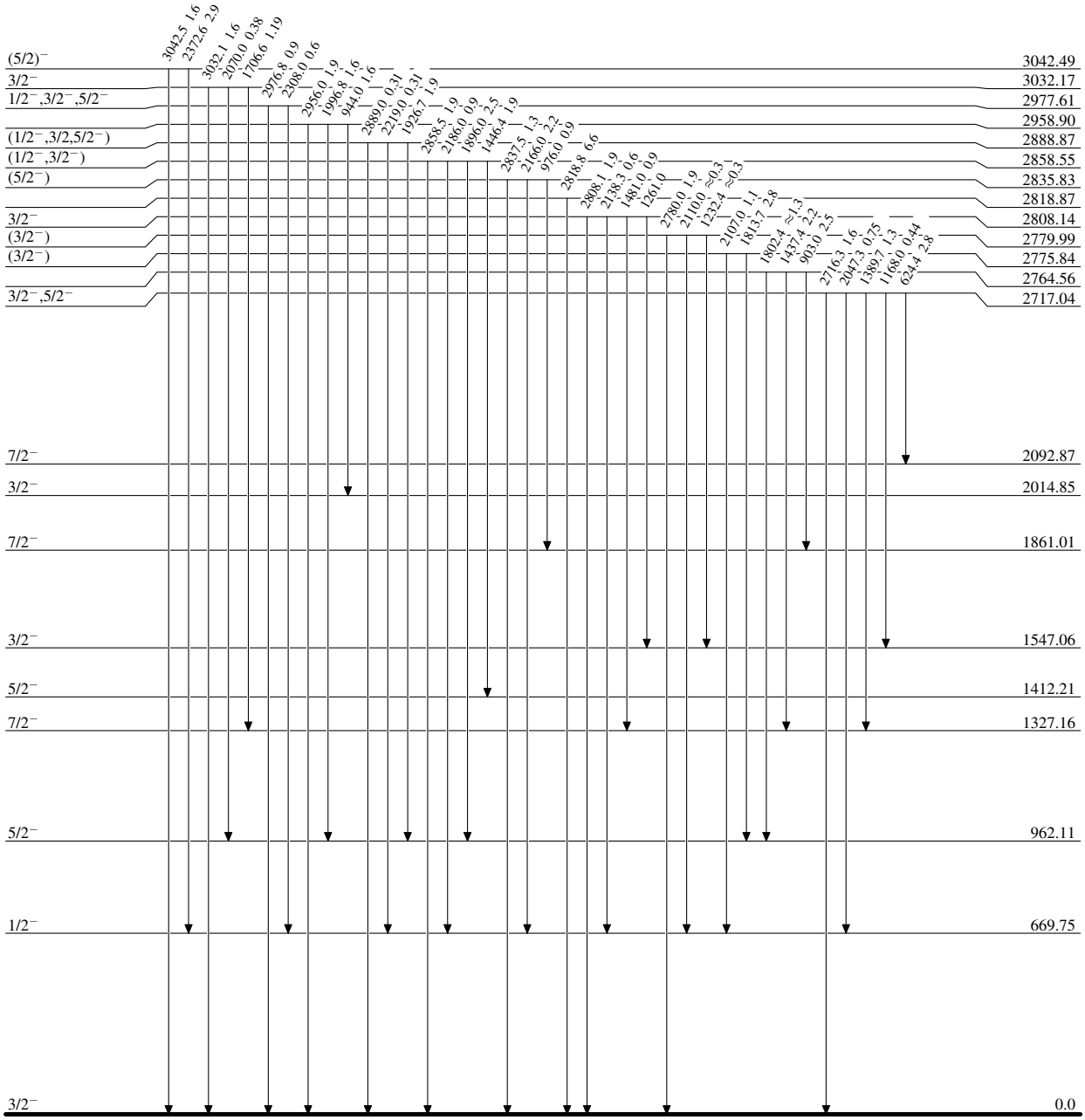
$^{63}_{29}Cu_{34}$

^{63}Cu(n,n′γ) 1983Di04,2001Ko65

Level Scheme (continued)

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

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



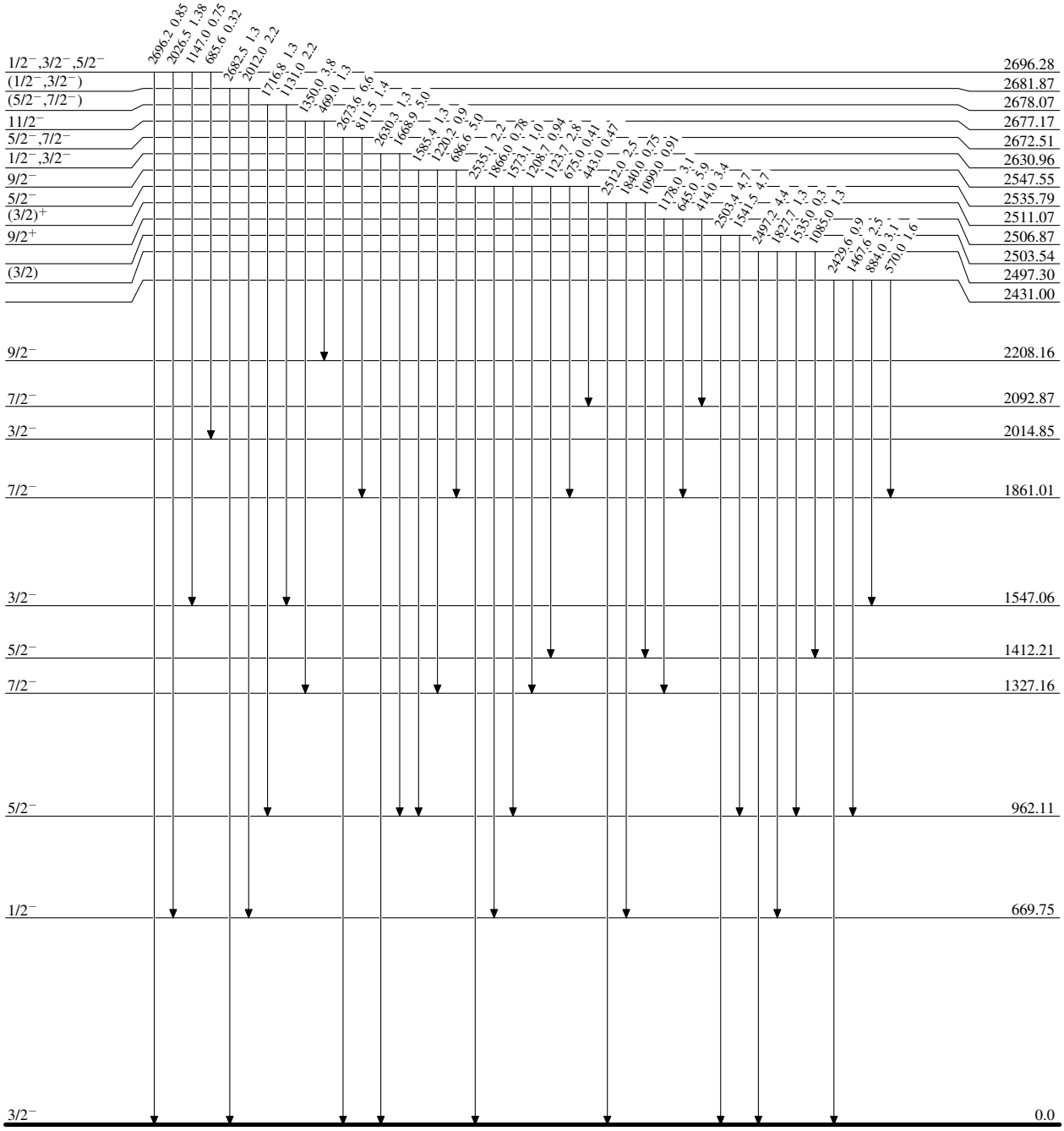
$^{63}_{29}Cu_{34}$

^{63}Cu(n,n′γ) 1983Di04,2001Ko65

Level Scheme (continued)

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

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



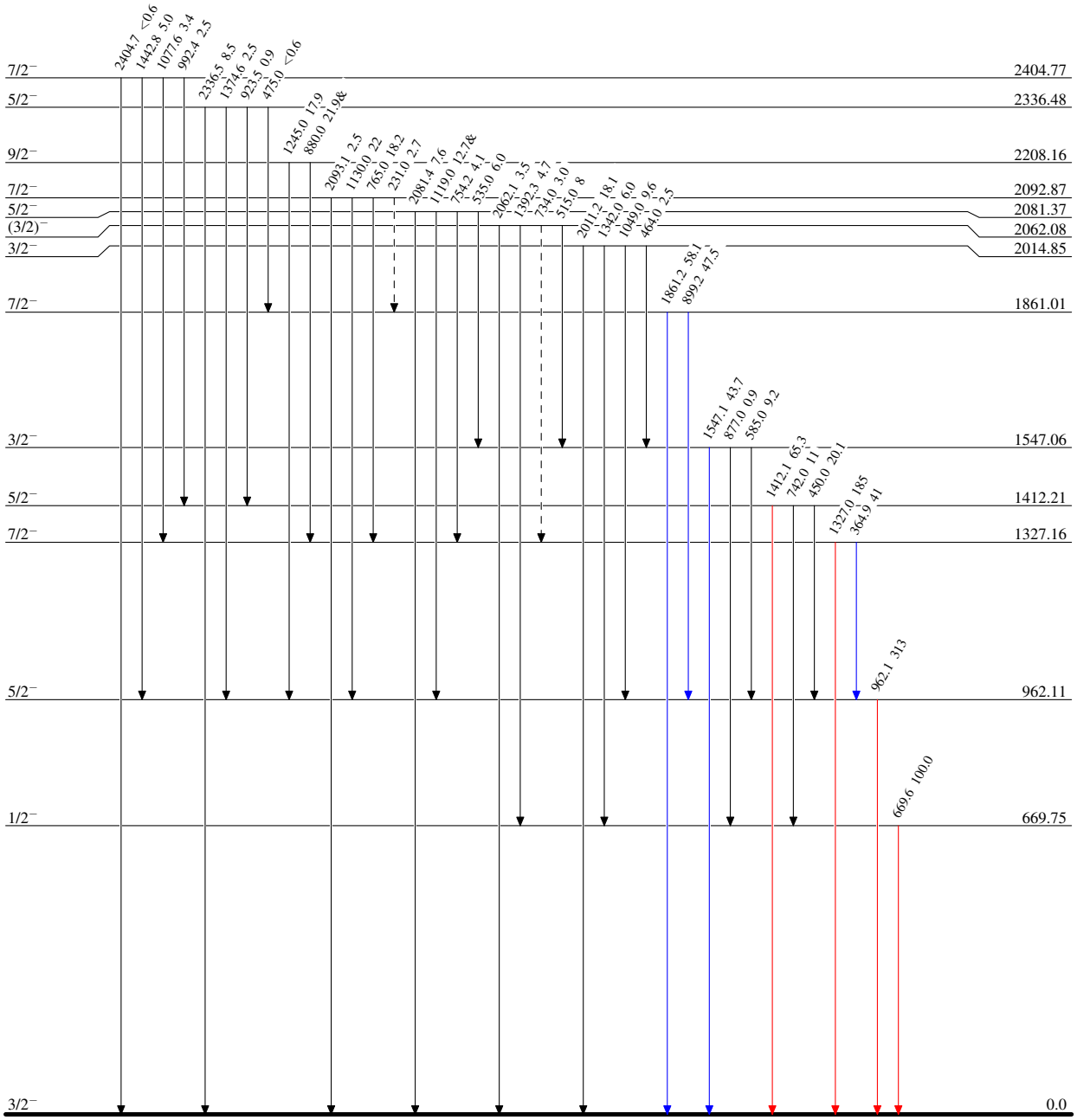
$^{63}_{29}Cu_{34}$

^{63}Cu(n,n′γ) 1983Di04,2001Ko65

Level Scheme (continued)

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

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



$^{63}_{29}Cu_{34}$