^{116}Cd(n,n′γ) 2003Ka45,1974Gi06,1977Ne01

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jean Blachot	NDS 111, 717 (2010)	1-Dec-2009

1974Gi06: E=1.1-3.2 MeV , 1977Ne01 E=2.67 MeV fast reactor-neutrons (1976De42,1990Ar20,1991Ar17) 2003Ka45: E=3.8 MeV. Measured Eγ, Iγ, excitation functions, γ(θ), γγ,lifetimes by Doppler-shift attenuation method. Five HPGe detectors were used, one for singles and four for coincidence data. T measured from Doppler-shift method.

1991Ar17: Measured: γ, σ(E(n),Eγ), σ(γ,θ); semi, linear polarization.

^{116}Cd Levels

E(level)	Jπ†	$T_{1/2}$&	E(level)	Jπ†	E(level)	Jπ†
0.0	0^+		2339.78 *6*	4^-,(3^+)	2828.6 *3*	1
513.51 *5*	2^+		2376.46 *5*	4^+	2862.4 *1*	2^+,3
1212.99 *2*	2^+		2377.08 *5*	3^+	2909.8 *2*	1,2^+
1219.45 *2*	4^+		2391.50 *4*	2^+,3	2958.6? *2*	
1282.56 *2*	0^+‡		2435.0 *1*	2^+	2987.5 *2*	
1380.31 *2*	0^+‡		2478.15 *7*	1	3002.2 *4*	
1642.50 *2*	2^+	0.50 ps *+14−9*	2493.5? *2*		3014.9 *3*	
1869.46 *3*	4^+	0.24 ps *+17−7*	2503.83 *5*		3107.6? *3*	
1915.81 *2*	3^+#	0.49 ps *+17−10*	2517.47 *5*		3112.5? *1*	
1921.56 *2*	3^-		2604.84 *5*	3^+,2^+	3118.4 *3*	
1928.45 *6*	0^+@		2653.91? *7*	1,2,3^+	3130.6 *2*	
1951.36 *3*	2^+	0.56 ps *+22−12*	2672.91? *8*	6^+	3155.6 *6*	
2026.67 *4*	6^+	0.44 ps *+31−13*	2720.10 *7*	2^+,3,1^-	3172.9 *2*	
2037.05 *6*	2^+		2727.2 *2*		3175.7 *3*	
2041.92 *4*	4^+		2764.6? *4*		3217.0 *3*	
2118.43 *4*	2^+		2784.1? *2*		3345.1? *3*	
2248.84 *3*	5^-		2786.1 *2*		3388.9 *1*	
2292.4? *1*	2^+,(3)		2803.00 *9*	(2)	3440.3? *2*	
2293.7 *3*	$(2,3^+)$		2810.5 *3*	1,2^+	3471.5 *1*	
2296.30 *5*	(2^+)		2822.0 *2*			

† From 1991Ar17, based on γ multipolarities.
‡ Low yield and isotropic angular distribution gives J=0.
# From γ(θ) and linear polarization 1990Ar20; data of 1976De42 also suggest J=3.
@ From γ(θ) (1977Ne01,1991Ar17), $J^\pi=0^+$, (1) based on the low yield (1976De42).
& From 2003Ka45.

^{116}Cd(n,n′γ) 2003Ka45,1974Gi06,1977Ne01 (continued)

γ(^{116}Cd)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult. ‡	δ	α [b]	Comments
[x]156.4 *5*	0.056 *21*								
173.8[c] *3*	0.056 *28*	2292.4?	2^+,(3)	2118.43	2^+				
178.0 *3*	0.027 *16*	2296.30	(2^+)	2118.43	2^+				
[x]204.64 *20*	0.061 *11*								
[x]236.22 *25*	0.080 *14*								
254.98 *5*	0.414 *20*	2503.83		2248.84	5^-				
258.83[c] *8*	0.119 *16*	2377.08	3^+	2118.43	2^+				
273.41 *5*	0.279[&] *21*	1915.81	3^+	1642.50	2^+				
334.47 *25*	0.040 *16*	2376.46	4^+	2041.92	4^+				
[x]379.54 *20*	0.086 *12*								
399.40 *6*	0.285 *14*	2041.92	4^+	1642.50	2^+	E2		0.01301	
418.19 *25*	0.061 *12*	2339.78	4^-,(3^+)	1921.56	3^-				
423.86 *9*	0.384 *19*	2672.91?	6^+	2248.84	5^-	E1			
[x]426.33 *18*	0.162 *17*								
429.6 *4*	0.036 *11*	1642.50	2^+	1212.99	2^+				
[x]433.84 *20*	0.091 *15*								
[x]438.2 *4*	0.050 *13*								
[x]444.15 *7*	0.034 *15*								
[x]448.6 *4*	0.037 *14*								
[x]449.8 *1*	0.151 *16*								
513.51 *5*	100 *3*	513.51	2^+	0.0	0^+	E2			
577.70[c] *15*	0.097 *10*	2493.5?		1915.81	3^+				
[x]623.87 *20*	0.058 *10*								
[x]628.11 *25*	0.046 *9*								
[x]634.24 *15*	0.169 *15*								
640.2 *3*	0.029 *8*	3118.4		2478.15	1				
650.00[c] *10*	0.68 *5*	2292.4?	2^+,(3)	1642.50	2^+	M1+E2	−1.5 *+5−15*		
650.02[@] *2*	42 *16*	1869.46	4^+	1219.45	4^+	M1+E2	−1.16 *+19−32*		
656.48[@] *2*	39 *16*	1869.46	4^+	1212.99	2^+				
656.73 *5*	1.4 *2*	2037.05	2^+	1380.31	0^+	E2			
[x]664.35 *21*	0.105 *13*								
666.22 *17*	0.133 *14*	2958.6?		2292.4?	2^+,(3)				
668.73 *7*	0.379 *19*	1951.36	2^+	1282.56	0^+	E2			
678.1 *3*	0.027 *7*	2720.10	2^+,3,1^-	2041.92	4^+				
[x]683.7 *3*	0.053 *7*								
[x]688.0 *4*	0.025 *7*								
696.36 *15*	0.73 *15*	1915.81	3^+	1219.45	4^+	M1+E2	−1.3 *+9−5*		δ: −0.6 *+2−12* is another solution.
699.510 *14*	11.9 *4*	1212.99	2^+	513.51	2^+	M1+E2	−1.5 *+3−5*		δ: from 1976De42. δ=−1.6 *+6−11* (2005Ka45).
702.78 *5*	1.39 *14*	1915.81	3^+	1212.99	2^+	M1+E2	−2.13 *+32−39*		δ: −0.2 *7* is another solution.
705.950 *14*	16.4 *5*	1219.45	4^+	513.51	2^+	E2			
708.66 *8*	0.87[a] *14*	1921.56	3^-	1212.99	2^+				
708.7 *5*	0.34[a] *4*	2958.6?		2248.84	5^-				

^{116}Cd(n,n′γ) 2003Ka45,1974Gi06,1977Ne01 (continued)

γ(^{116}Cd) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult. ‡	δ	Comments
x721.8 *3*	0.033 *8*							
731.77 *25*	0.048 *8*	1951.36	2^+	1219.45	4^+			
738.4 *3*	0.023 *10*	1951.36	2^+	1212.99	2^+			
x745.0 *3*	0.019 *9*							
x746.78 *25*	0.042 *10*							
748.61 *25*	0.054 *11*	2391.50	2^+,3	1642.50	2^+			
752.4[c] *5*	0.049 *11*	2672.91?	6^+	1921.56	3^-			
757.2[c] *3*	0.055 *10*	2672.91?	6^+	1915.81	3^+			
x765.21 *20*	0.114 *13*							
x766.87 *21*	0.083 *13*							
769.067 *14*	3.53 *11*	1282.56	0^+	513.51	2^+			
x791.87 *25*	0.077 *10*							
x798.08 *7*	0.381 *16*							E_γ: could belong to ^{112}Cd or ^{116}Cd.
807.21 *3*	1.15 *4*	2026.67	6^+	1219.45	4^+	E2		
822.47 *8*	0.284 *16*	2041.92	4^+	1219.45	4^+	M1+E2		δ: −0.37 *17* or +3 *2* (1990Ar20), +1.66 *23* (2003Ka45.
835.69 *25*	0.73 *11*	2118.43	2^+	1282.56	0^+			
861.32 *10*	0.152 *13*	2503.83		1642.50	2^+			
866.816 *14*	3.51[&] *10*	1380.31	0^+	513.51	2^+			
881.7 *5*	0.041 *13*	2803.00	(2)	1921.56	3^-			
905.48 *25*	0.078 *10*	2118.43	2^+	1212.99	2^+			
x929.0 *7*	0.039 *14*							
931.6 *5*	0.063 *15*	2958.6?		2026.67	6^+			
x941.55 *25*	0.077 *10*							
945.5 *4*	0.030 *9*	2987.5		2041.92	4^+			
x953.5 *4*	0.027 *8*							
x1015.8 *6*	0.050 *17*							
1029.380 *14*	1.85 *16*	2248.84	5^-	1219.45	4^+	E1		
x1056.8[#]	0.091 *12*							
1066.04 *25*	0.054 *9*	2987.5		1921.56	3^-			
1083.29 *4*	0.678 *22*	2296.30	(2^+)	1212.99	2^+	M1+E2		δ: δ=−0.20 *10* or δ=+4.7 *20* (1991Ar17).
x1089.41 *25*	0.055 *9*							
x1118.1 *5*	0.026 *13*							
1120.32 *5*	0.597 *22*	2339.78	4^-,(3^+)	1219.45	4^+	M1+E2	−0.15 *10*	δ: from 1991Ar17.
1122.3 *5*	0.027 *13*	2764.6?		1642.50	2^+			
x1126.1 *6*	0.04 *2*							
1129.000 *14*	3.46 *10*	1642.50	2^+	513.51	2^+	M1+E2	+1.10 *20*	δ: from 1990Ar20, δ=0.0 or +2.3 *+10−5* (1976De42), +1.14 *23* (2005Ka45).
1131.6 *7*	0.040 *20*	3172.9		2041.92	4^+			
1152.46 *15*	0.252 *17*	2435.0	2^+	1282.56	0^+	E2		
1157.00 *4*	0.86 *3*	2376.46	4^+	1219.45	4^+	M1+E2	−0.19 *6*	δ: from 1991Ar17.
1164.07 *15*	0.117 *10*	2377.08	3^+	1212.99	2^+			
1178.40 *15*	0.098 *9*	2391.50	2^+,3	1212.99	2^+			
1190.65[c] *25*	0.074 *10*	3112.5?		1921.56	3^-			
1196.78[c] *15*	0.142 *11*	3112.5?		1915.81	3^+			

$^{116}_{48}Cd_{68}$-3

^{116}Cd(n,n′γ) 2003Ka45,1974Gi06,1977Ne01 (continued)

γ(^{116}Cd) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult. ‡	δ	Comments
1212.980 *14*	5.79 *15*	1212.99	2^+	0.0	0^+	E2		
x1221.2 #	0.217 *14*							
1235.07 *25*	0.059 *9*	2517.47		1282.56	0^+			
x1237.84 *25*	0.059 *9*							
1274.06 c *15*	0.135 *10*	2493.5?		1219.45	4^+			
x1278.4 *3*	0.039 *8*							
x1284.79 *11*	0.167 *12*							
x1298.87 *15*	0.241 *16*							E_γ: assigned to $^{114,\ 116}$Cd
1304.45 *5*	0.59 *5*	2517.47		1212.99	2^+			
x1326.6 *3*	0.060 *9*							
1356.00 @ *4*	19 *8*	1869.46	4^+	513.51	2^+			
x1365.4 *5*	0.048 *12*							
1384.1 *5*	0.037 *11*	2764.6?		1380.31	0^+			
1385.00 c *15*	0.247 *14*	2604.84	3^+,2^+	1219.45	4^+			
1402.310 *19*	1.46 *5*	1915.81	3^+	513.51	2^+	D+Q	−2.3 *4*	δ: δ from 1990Ar20. Others: −0.30 *+5−6* (1976De42), 0.6 *+8−5* (1977Ne01), −2.05 *26* (2003Ka45).
1408.060 *19*	2.72 *7*	1921.56	3^-	513.51	2^+	D+Q	+0.07 *7*	δ: δ from 1991Ar17. Others: 0.00 *5* (1976De42), 0.29<(1977Ne01).
1413.67 c *15*	0.056 *17*	3440.3?		2026.67	6^+			
1414.94 *5*	0.64 *3*	1928.45	0^+	513.51	2^+	E2		
x1416.9 *3*	0.06 *3*							
1423.5 c *3*	0.030 *8*	3345.1?		1921.56	3^-			
x1433.09 *25*	0.108 *13*							
1437.870 *24*	1.69 *4*	1951.36	2^+	513.51	2^+	M1+E2	−0.54 *15*	δ: from 1990Ar20, δ=−1.5 *+3−5* (1976De42), −0.72 *+10−14* (2003Ka45).
1453.57 *13*	0.208 *12*	2672.91?	6^+	1219.45	4^+	E2		
x1456.07 *25*	0.042 *13*							
x1479.44 *25*	0.048 *7*							
1500.89 c *25*	0.064 *8*	2720.10	2^+,$3,1^-$	1219.45	4^+			
1507.9 *3*	0.027 *14*	2727.2		1219.45	4^+			
x1510.5 #	0.197 *15*							
1528.40 *5*	0.926 *25*	2041.92	4^+	513.51	2^+	E2		
x1558.42 *20*	0.089 *7*							
1602.5 *4*	0.084 *14*	2822.0		1219.45	4^+			
1604.95 *3*	1.32 *3*	2118.43	2^+	513.51	2^+	M1+E2	−0.08 *6*	δ: from 1991Ar17. −0.05 *5* for J=3 (1977Ne01), −1.5 *+3−5* for J=2 (1976De42).
x1633.30 *20*	0.081 *7*							
x1634.9 *9*	0.024 *9*							
1642.54 *3*	2.43 *6*	1642.50	2^+	0.0	0^+	E2		
x1646.79 *20*	0.162 *13*							
x1667.0 #	0.120 *10*							
x1678.0 *3*	0.050 *8*							
x1696.21 *20*	0.102 *8*							
x1700.96 *20*	0.117 *10*							

$^{116}_{48}Cd_{68}$-4

^{116}Cd(n,n′γ) 2003Ka45,1974Gi06,1977Ne01 (continued)

γ(^{116}Cd) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult. ‡	δ	Comments
1727.3 [c] *3*	0.064 *8*	3107.6?		1380.31	0^+			
1750.4 *4*	0.030 *7*	3130.6		1380.31	0^+			
[x]1758.8 [#]	0.154 *10*							
1780.2 *3*	1.21 *8*	2293.7	$(2,3^+)$	513.51	2^+	M1+E2	+4.70 *20*	δ: or +0.44 *10* for J=3 (1991Ar17). δ=0.0 or +2.3 *+10−5* for J=2 (1977Ne01). δ=+0.40 *5* for J=3 (1976De42).
[x]1784.8 [#]	0.118 *12*							
1789.2 *4*	0.035 *9*	3002.2		1212.99	2^+			
1797.8 [c] *4*	0.038 *7*	3440.3?		1642.50	2^+			
1801.9 *3*	0.053 *8*	3014.9		1212.99	2^+			
[x]1828.03 [#] *17*	0.081 *10*							E_γ: assigned to $^{114,\ 116}$Cd
1848.09 *25*	0.074 *9*	3130.6		1282.56	0^+			
[x]1853.2 *4*	0.031 *8*							
[x]1857.1 *3*	0.075 *8*							
1863.49 *5*	0.284 *13*	2377.08	3^+	513.51	2^+			δ: δ=−0.18 *10* or δ=−2.5 *9* (1991Ar17).
1878.00 *3*	0.626 *18*	2391.50	2^+,3	513.51	2^+			δ: −0.80 *20* or −3.1 *18* for J=2 (1991Ar17).
[x]1923.3 *4*	0.045 *9*							
[x]1934.66 *23*	0.093 *9*							
[x]1943.4 *3*	0.081 *12*							
[x]1945.9 *9*	0.031 *11*							
1951.35 *6*	0.289 *10*	1951.36	2^+	0.0	0^+	E2		
1956.2 *3*	0.043 *8*	3175.7		1219.45	4^+			
1991.0 *5*	0.034 *8*	2503.83		513.51	2^+			
[x]2002.7 *10*	0.015 *10*							
2004.5 *5*	0.074 *15*	2517.47		513.51	2^+			
[x]2008.97 *25*	0.081 *9*							
[x]2013.6 *17*	0.014 *10*							
[x]2015.8 *5*	0.052 *12*							
[x]2021.4 *16*	0.015 *11*							
[x]2023.8 *5*	0.048 *12*							
[x]2044.2 *3*	0.054 *8*							
[x]2058.56 *15*	0.128 *11*							
2062.4 [c] *7*	0.032 *10*	3345.1?		1282.56	0^+			
2091.36 *5*	0.341 *12*	2604.84	3^+,2^+	513.51	2^+			
[x]2095.9 *3*	0.040 *8*							
2140.39 *6*	0.244 *11*	2653.91?	$1,2,3^+$	513.51	2^+			
2206.56 *7*	0.473 *13*	2720.10	2^+,$3,1^-$	513.51	2^+			
2213.67 *25*	0.090 *8*	2727.2		513.51	2^+			
2250.8 [#]	0.116 *10*	2764.6?		513.51	2^+			
2270.55 *15*	0.226 *14*	2784.1?		513.51	2^+			
2272.63 *15*	0.215 *14*	2786.1		513.51	2^+			
2289.47 *9*	0.264 *12*	2803.00	(2)	513.51	2^+			δ: δ=+0.03 *15* or +2.2 *+10−5* for J=2 (1991Ar17).
2308.6 *3*	0.082 *8*	2822.0		513.51	2^+			

$^{116}_{48}Cd_{68}$-5

^{116}Cd(n,n′γ) 2003Ka45,1974Gi06,1977Ne01 (continued)

γ(^{116}Cd) (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π
x2330.5#	0.093 *9*					x2717.6#	0.094 *10*				
2348.94 *9*	0.171 *9*	2862.4	2+,3	513.51	2+	x2750.9 *3*	0.062 *8*				
2396.27 *17*	0.102 *8*	2909.8	1,2+	513.51	2+	x2760.1#	0.129 *10*				
2435.0 *3*	0.159 *10*	2435.0	2+	0.0	0+	x2772.9 *4*	0.046 *7*				
x2464.5#	0.071 *9*					x2806.3 *13*	0.070 *21*				
2478.12 *7*	0.524 *16*	2478.15	1	0.0	0+	2810.5 *3*	0.209 *16*	2810.5	1,2+	0.0	0+
2488.7 *5*	0.075 *8*	3002.2		513.51	2+	2828.6 *3*	0.180 *11*	2828.6	1	0.0	0+
2501.3 *5*	0.082 *10*	3014.9		513.51	2+	2875.4#	0.131 *10*	3388.9		513.51	2+
x2547.2#	0.095 *9*					x2881.6#	0.037 *8*				
x2589.4#	0.064 *9*					x2896.0 *4*	0.065 *8*				
x2596.2#	0.103 *10*					x2909.4 *3*	0.091 *9*				
2641.8#	0.122 *11*	3155.6		513.51	2+	2958.0#	0.067 *9*	3471.5		513.51	2+
2659.40 *22*	0.203 *15*	3172.9		513.51	2+	x3012.0#	0.085 *10*				
2662.4 *5*	0.073 *12*	3175.7		513.51	2+	x3067.3 *5*	0.093 *9*				
x2673.3 *5*	0.043 *8*					3155.6 *6*	0.061 *8*	3155.6		0.0	0+
2703.5 *3*	0.065 *8*	3217.0		513.51	2+						

† From 1991Ar17.
‡ From 1991Ar17, unless otherwise noted, based on γ(θ) and γ(pol).
# Unresolved multiplet.
@ Only given by 2006Ka45.
& May include a contribution from a contaminant peak.
a From Iγ(708)=1.21 *13* and branching in β^- decay.
b Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
c Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

$^{116}_{48}Cd_{68}$-6

^{116}Cd(n,n′γ) 2003Ka45,1974Gi06,1977Ne01

Level Scheme

Intensities: Relative I_γ

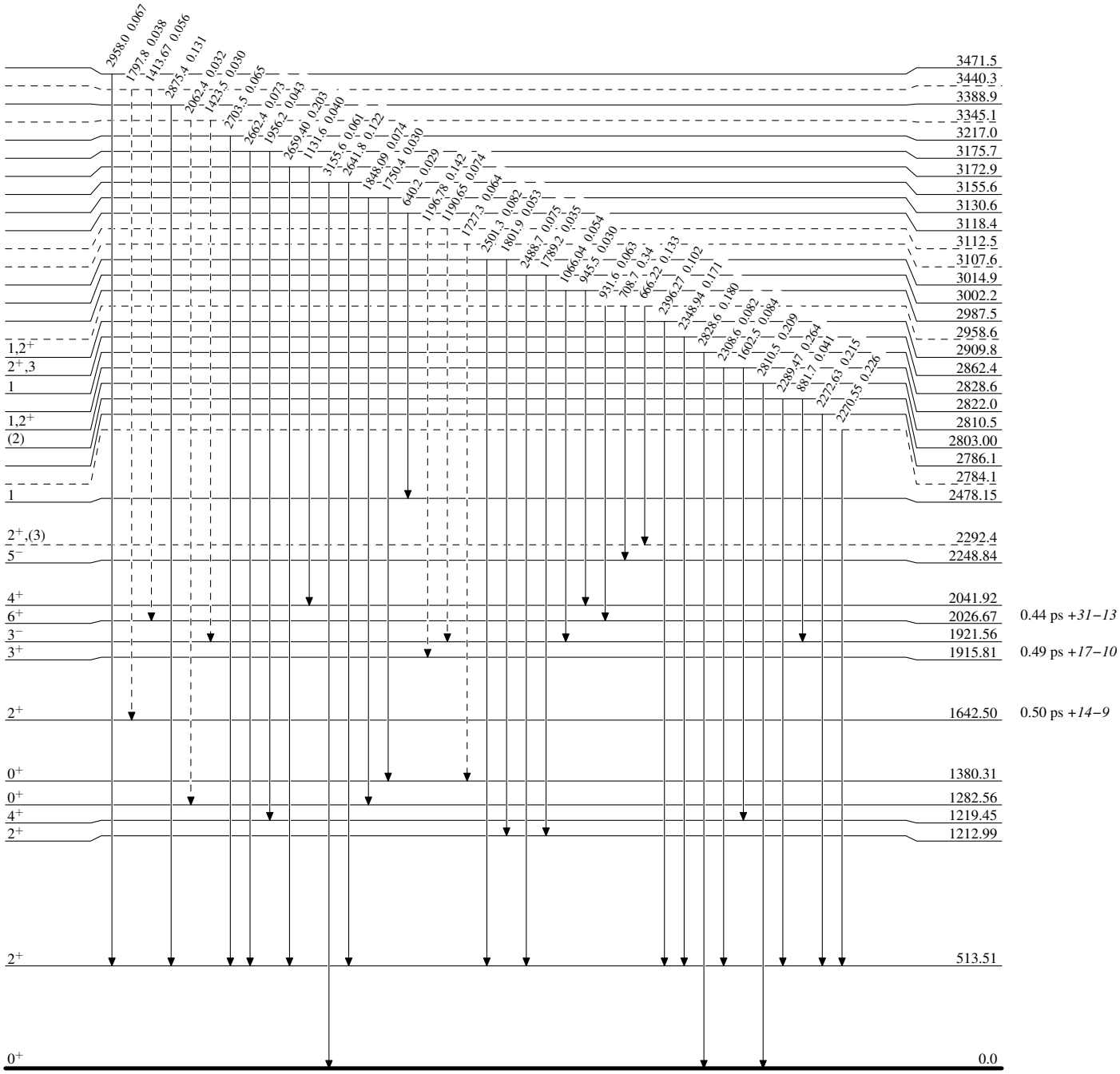
Legend

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

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

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

γ Decay (Uncertain)



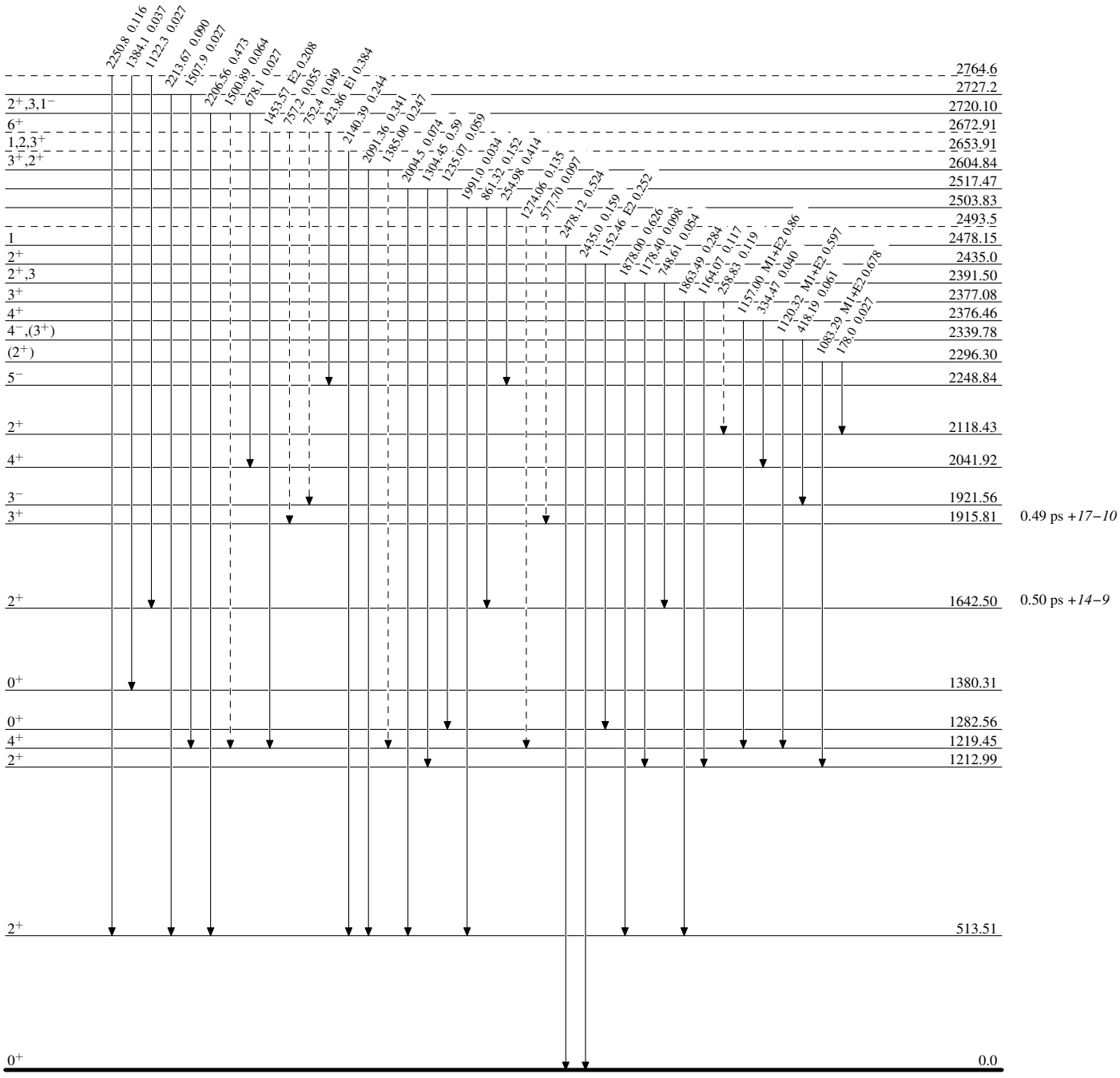
$^{116}_{48}Cd_{68}$

^{116}Cd(n,n′γ) 2003Ka45,1974Gi06,1977Ne01

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)



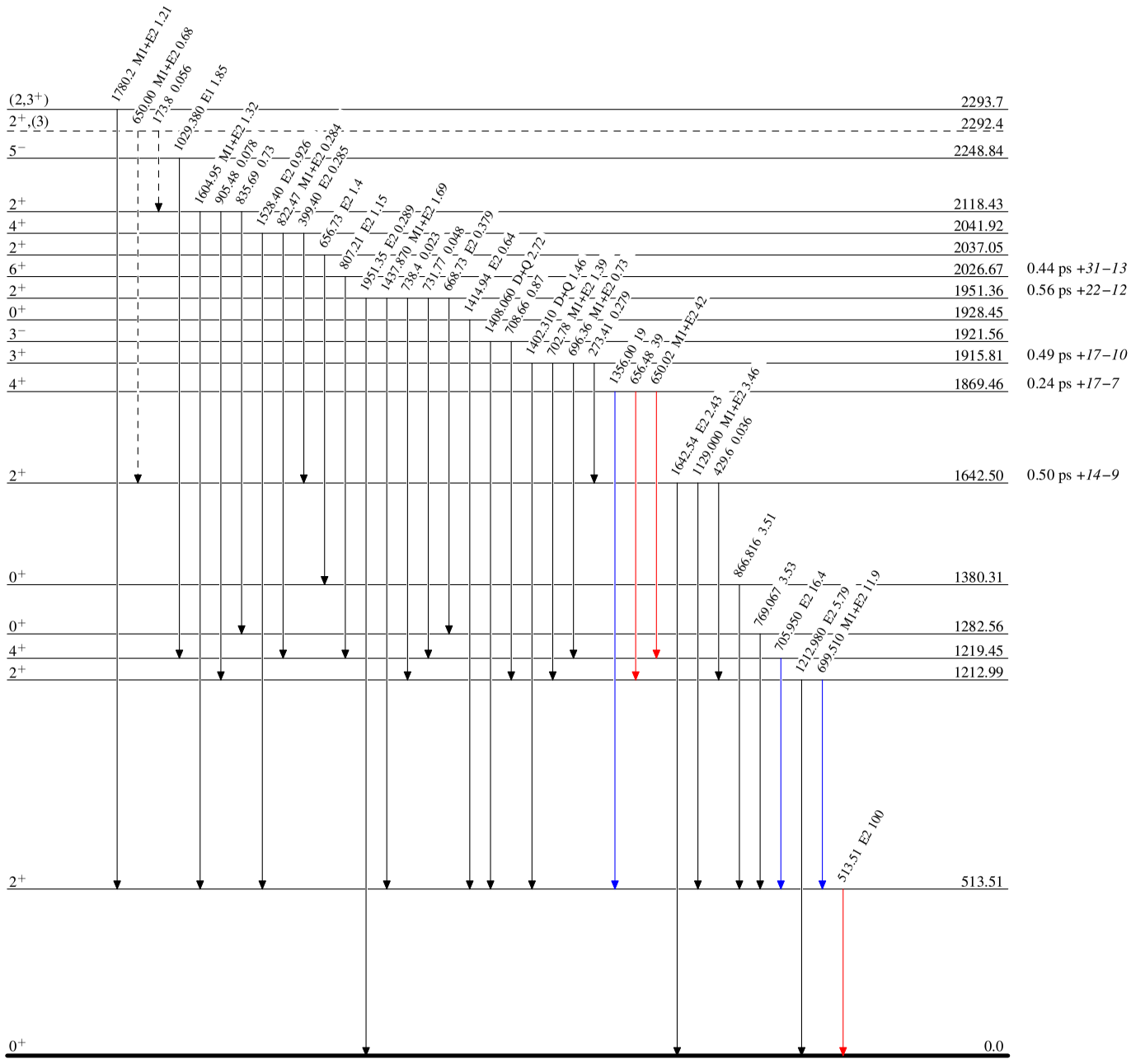
$^{116}_{48}Cd_{68}$

^{116}Cd(n,n′γ) 2003Ka45,1974Gi06,1977Ne01

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)



$^{116}_{48}Cd_{68}$