^{40}Ca(^{24}Mg,3pnγ) 2004Iz01

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 114, 1849 (2013)	31-Dec-2012

Additional information 1.

E=96 MeV. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$(DCO), $\gamma\gamma$(lin pol) with the EUROBALL Ge-detector array consisting of 26 CLOVER detectors and 15 CLUSTER detectors. Evaporated charged particles were detected in the 40-element silicon (ΔE-E) array ISIS.

^{60}Cu Levels

E(level)‡	Jπ#	E(level)‡	Jπ#	E(level)‡	Jπ#	E(level)‡	Jπ#
0.0	2^+	1603.8 *8*	5^+	3155.9 *10*	6^-	5648.7 *12*	10^-
62.2† *8*	1^+	1778.8 *10*	5^+	3190.8 *11*	7^+	6094.4 *13*	11^-
287.3 *7*	2^+	2026.8 *9*	5^+	3354.9 *11*	7^-	7394.6 *15*	11^+
453.9 *7*	3^+	2197.8 *9*	6^+	3771.9† *11*	7^-	8132.5 *15*	13^+
557.8 *7*	4^+	2691.8 *13*	6^+	4520.8 *11*	8^-		
780.9† *9*		2816.8 *13*	6^+	5187.9 *11*	9^-		

† From figure 3 of 2004Iz01; not listed in authors′ table I.

‡ Deduced by evaluators from least-squares fit to γ-ray energies; Δ(Eγ)=1 keV assumed for each γ ray.

Based on DCO ratios and angular correlations of coincident γ rays.

γ(^{60}Cu)

POL=[aN(perpendicular)−N(parallel)]/[aN(perpendicular)+N(parallel)], where a=normalization function. POL is positive for stretched pure electric transitions and negative for stretched pure magnetic transitions.

R(DCO)=I(γ_1 at 156°; gated with γ_2 at 77°,103°)/ I(γ_1 at 77°,103°; gated with γ_2 at 156°).

Eγ	Ei(level)	Jiπ	Ef	Jfπ	Mult.†	α#	Comments
62‡	62.2	1^+	0.0	2^+			
104‡	557.8	4^+	453.9	3^+			
225	287.3	2^+	62.2	1^+	M1	0.00655 *10*	α=0.00655 *10*; α(K)=0.00587 *9*; α(L)=0.000594 *9*; α(M)=8.35×10^{-5} *12*; α(N+..)=2.52×10^{-6} *4* α(N)=2.52×10^{-6} *4* R(DCO)=0.52 *9*. POL=−0.09 *3*.
270	557.8	4^+	287.3	2^+	E2	0.01479	α(K)=0.01322 *19*; α(L)=0.001371 *20*; α(M)=0.000192 *3*; α(N+..)=5.43×10^{-6} *8* α(N)=5.43×10^{-6} *8* R(DCO)=0.90 *11*. POL=+0.125 *22*.
287	287.3	2^+	0.0	2^+			POL=+0.05 *3*. Mult.: ΔJ=0 transition. Eγ: doublet structure indicated in table I of 2004Iz01; but the other component is not identified either in ^{60}Cu or in any of the other 7 nuclides listed in table I of 2004Iz01.
417‡	3771.9	7^-	3354.9	7^-			
446	6094.4	11^-	5648.7	10^-	E2+M1	0.0019 *7*	α=0.0019 *7*; α(K)=0.0017 *6*; α(L)=0.00018 *7*; α(M)=2.5×10^{-5} *9*; α(N+..)=7.3×10^{-7} *25*

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^{40}Ca(^{24}Mg,3pnγ) 2004Iz01 (continued)

γ(^{60}Cu) (continued)

E_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[#]	Comments
							α(N)=7.3×10^{-7} *25* R(DCO)=0.38 *8*. POL=−0.019 *19*.
454	453.9	3$^+$	0.0	2$^+$	E2+M1	0.0018 *7*	α=0.0018 *7*; α(K)=0.0017 *6*; α(L)=0.00017 *6*; α(M)=2.3×10^{-5} *8*; α(N+..)=7.0×10^{-7} *23* α(N)=7.0×10^{-7} *23* R(DCO)=0.44 *3*. POL=−0.061 *7*.
461	5648.7	10$^-$	5187.9	9$^-$	M1	0.001183 *17*	α=0.001183 *17*; α(K)=0.001062 *15*; α(L)=0.0001058 *15*; α(M)=1.489×10^{-5} *21* α(N)=4.54×10^{-7} *7* R(DCO)=0.50 *6*. POL=−0.084 *11*.
558	557.8	4$^+$	0.0	2$^+$	E2	0.001295 *19*	α=0.001295 *19*; α(K)=0.001161 *17*; α(L)=0.0001168 *17*; α(M)=1.638×10^{-5} *23* α(N)=4.88×10^{-7} *7* R(DCO)=1.05 *7*. POL=+0.084 *6*.
594[‡]	2197.8	6$^+$	1603.8	5$^+$			
616[‡]	3771.9	7$^-$	3155.9	6$^-$			
667[‡]	5187.9	9$^-$	4520.8	8$^-$			
738	8132.5	13$^+$	7394.6	11$^+$	E2	0.000580 *9*	α=0.000580 *9*; α(K)=0.000520 *8*; α(L)=5.19×10^{-5} *8*; α(M)=7.29×10^{-6} *11*; α(N+..)=2.19×10^{-7} *3* α(N)=2.19×10^{-7} *3* R(DCO)=1.05 *6*. POL=+0.099 *6*.
781[‡]	780.9		0.0	2$^+$			
790	2816.8	6$^+$	2026.8	5$^+$	E2+M1	0.00042 *6*	α=0.00042 *6*; α(K)=0.00038 *6*; α(L)=3.8×10^{-5} *6*; α(M)=5.3×10^{-6} *8*; α(N+..)=1.61×10^{-7} *23* α(N)=1.61×10^{-7} *23* R(DCO)=0.85 *15*. POL=−0.07 *5*.
823[‡]	1603.8	5$^+$	780.9				
906	6094.4	11$^-$	5187.9	9$^-$	E2	0.000340 *5*	α=0.000340 *5*; α(K)=0.000305 *5*; α(L)=3.03×10^{-5} *5*; α(M)=4.26×10^{-6} *6*; α(N+..)=1.290×10^{-7} *18* α(N)=1.290×10^{-7} *18* R(DCO)=0.90 *11*. POL=+0.075 *18*.
1046	1603.8	5$^+$	557.8	4$^+$	E2+M1	0.000222 *19*	α=0.000222 *19*; α(K)=0.000199 *17*; α(L)=1.97×10^{-5} *17*; α(M)=2.77×10^{-6} *24*; α(N+..)=8.5×10^{-8} *7* α(N)=8.5×10^{-8} *7* R(DCO)=0.25 *2*. POL=+0.006 *5*.
1088	2691.8	6$^+$	1603.8	5$^+$	E2+M1	0.000204 *16*	α=0.000204 *16*; α(K)=0.000183 *14*; α(L)=1.81×10^{-5} *14*; α(M)=2.54×10^{-6} *20*; α(N+..)=7.8×10^{-8} *6* α(N)=7.8×10^{-8} *6* R(DCO)=0.29 *6*. POL=+0.002 *17*.
1128	5648.7	10$^-$	4520.8	8$^-$	E2	0.000203 *3*	α=0.000203 *3*; α(K)=0.000181 *3*; α(L)=1.79×10^{-5} *3*; α(M)=2.52×10^{-6} *4*; α(N+..)=1.95×10^{-6} *3* α(N)=7.67×10^{-8} *11*; α(IPF)=1.87×10^{-6} *3* E_γ: 1129 and 1128 form a doublet structure. R(DCO)=1.00 *5*. POL=+0.070 *9*.

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^{40}Ca(^{24}Mg,3pnγ) 2004Iz01 (continued)

$\gamma(^{60}Cu)$ (continued)

E_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.†	α#	Comments
1129	3155.9	6−	2026.8	5+	E1	0.0001083 *16*	α=0.0001083 *16*; α(K)=8.28×10^{-5} *12*; α(L)=8.12×10^{-6} *12*; α(M)=1.142×10^{-6} *16*; α(N+..)=1.622×10^{-5} α(N)=3.50×10^{-8} *5*; α(IPF)=1.618×10^{-5} *23* E_γ: 1129 and 1128 form a doublet structure. POL=+0.065 *11*.
1157	3354.9	7−	2197.8	6+	E1	0.0001151 *17*	α=0.0001151 *17*; α(K)=7.92×10^{-5} *11*; α(L)=7.77×10^{-6} *11*; α(M)=1.092×10^{-6} *16*; α(N+..)=2.70×10^{-5} α(N)=3.34×10^{-8} *5*; α(IPF)=2.70×10^{-5} *4* R(DCO)=0.49 *3*. POL=+0.051 *5*.
1166	4520.8	8−	3354.9	7−	E2+M1	0.000180 *13*	α=0.000180 *13*; α(K)=0.000158 *11*; α(L)=1.56×10^{-5} *11*; α(M)=2.19×10^{-6} *15*; α(N+..)=4.0×10^{-6} *7* α(N)=6.7×10^{-8} *5*; α(IPF)=3.9×10^{-6} *7* R(DCO)=0.23 *5*. POL=+0.026 *18*.
1221	1778.8	5+	557.8	4+	E2+M1	0.000170 *12*	α=0.000170 *12*; α(K)=0.000143 *9*; α(L)=1.41×10^{-5} *9*; α(M)=1.99×10^{-6} *13*; α(N+..)=1.05×10^{-5} *18* α(N)=6.1×10^{-8} *4*; α(IPF)=1.04×10^{-5} *18* R(DCO)=0.67 *7*. POL=+0.02 *3*.
1325	1778.8	5+	453.9	3+	E2	0.0001757 *25*	α=0.0001757 *25*; α(K)=0.0001272 *18*; α(L)=1.254×10^{-5} *18*; α(M)=1.763×10^{-6} *25* α(N)=5.39×10^{-8} *8*; α(IPF)=3.42×10^{-5} *5* POL=+0.07 *3*.
1330	4520.8	8−	3190.8	7+	E1	0.000206 *3*	α=0.000206 *3*; α(K)=6.19×10^{-5} *9*; α(L)=6.07×10^{-6} *9*; α(M)=8.53×10^{-7} *12*; α(N+..)=0.0001371 *20* α(N)=2.62×10^{-8} *4*; α(IPF)=0.0001371 *20* R(DCO)=0.46 *8*. POL=+0.039 *19*.
1365	4520.8	8−	3155.9	6−	E2	0.0001771 *25*	α=0.0001771 *25*; α(K)=0.0001194 *17*; α(L)=1.177×10^{-5} *17*; α(M)=1.655×10^{-6} *24* α(N)=5.06×10^{-8} *7*; α(IPF)=4.42×10^{-5} *7* R(DCO)=0.96 *13*. POL=+0.086 *15*.
1416	5187.9	9−	3771.9	7−	E2	0.000181 *3*	α=0.000181 *3*; α(K)=0.0001106 *16*; α(L)=1.090×10^{-5} *16*; α(M)=1.532×10^{-6} *22* α(N)=4.69×10^{-8} *7*; α(IPF)=5.83×10^{-5} *9* R(DCO)=1.03 *12*. POL=+0.060 *19*.
1469	2026.8	5+	557.8	4+	E2+M1	0.000176 *14*	α=0.000176 *14*; α(K)=9.9×10^{-5} *4*; α(L)=9.7×10^{-6} *5*; α(M)=1.37×10^{-6} *6*; α(N+..)=6.7×10^{-5} *9* α(N)=4.19×10^{-8} *17*; α(IPF)=6.7×10^{-5} *9* R(DCO)=0.68 *9*. POL=−0.011 *13*.
1552	3155.9	6−	1603.8	5+	E1	0.000351 *5*	α=0.000351 *5*; α(K)=4.79×10^{-5} *7*; α(L)=4.68×10^{-6} *7*; α(M)=6.58×10^{-7} *10*; α(N+..)=0.000297 *5* α(N)=2.02×10^{-8} *3*; α(IPF)=0.000297 *5* R(DCO)=0.56 *3*. POL=+0.029 *10*.
1573	2026.8	5+	453.9	3+	E2	0.000215 *3*	α=0.000215 *3*; α(K)=8.94×10^{-5} *13*; α(L)=8.79×10^{-6} *13*; α(M)=1.236×10^{-6} *18*; α(N+..)=0.0001159 α(N)=3.79×10^{-8} *6*; α(IPF)=0.0001158 *17* POL=+0.09 *5*.
1587	3190.8	7+	1603.8	5+	E2	0.000219 *3*	α=0.000219 *3*; α(K)=8.78×10^{-5} *13*; α(L)=8.64×10^{-6} *12*;

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^{40}Ca(^{24}Mg,3pnγ) 2004Iz01 (continued)

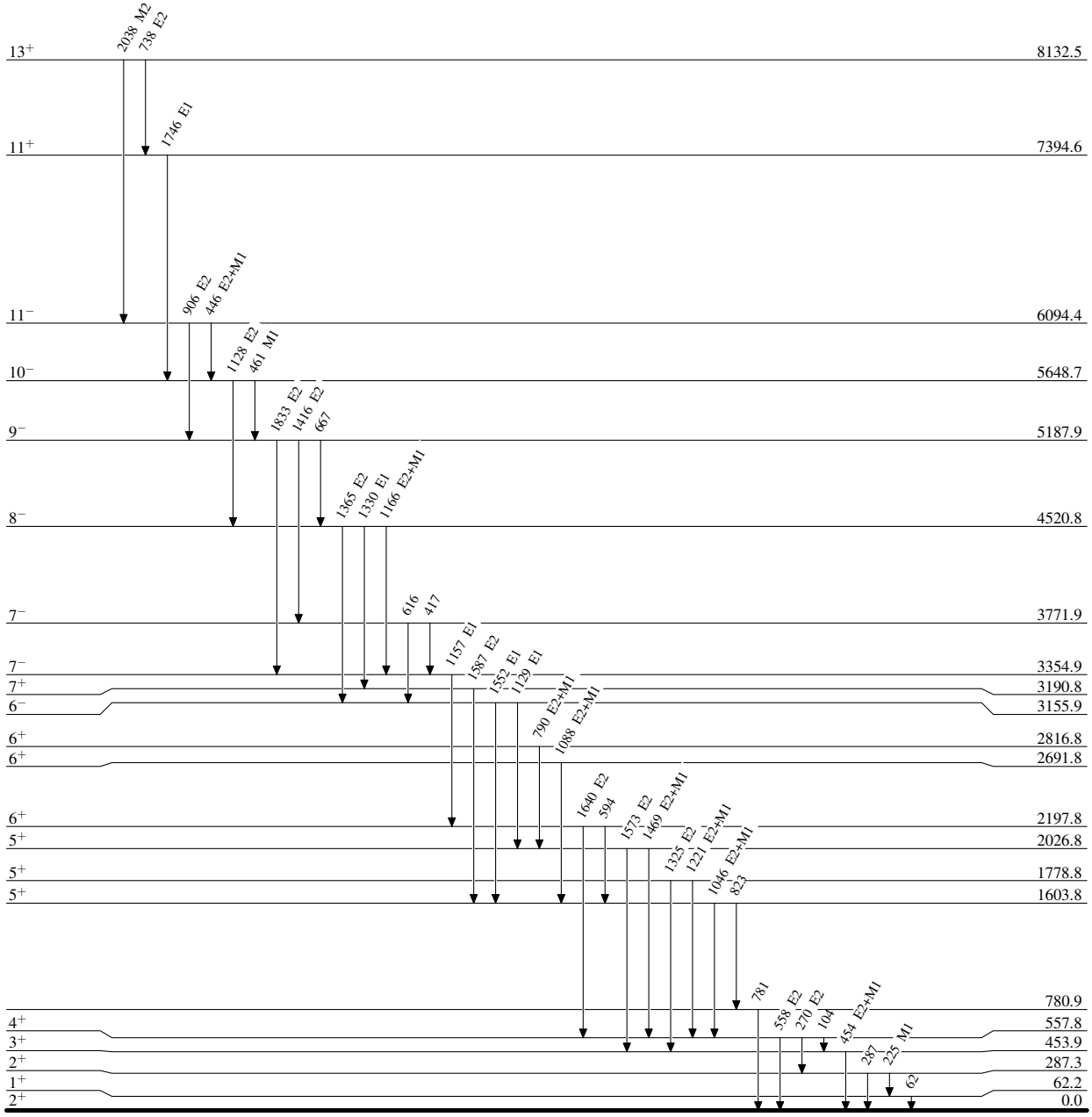
γ(^{60}Cu) (continued)

E_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[#]	Comments
							α(M)=1.215×10^{-6} *17*; α(N+..)=0.0001218 α(N)=3.72×10^{-8} *6*; α(IPF)=0.0001218 *17* R(DCO)=0.95 *14*. POL=+0.071 *17*.
1640	2197.8	6$^+$	557.8	4$^+$	E2	0.000236 *4*	α=0.000236 *4*; α(K)=8.23×10^{-5} *12*; α(L)=8.09×10^{-6} *12*; α(M)=1.138×10^{-6} *16*; α(N+..)=0.0001446 α(N)=3.49×10^{-8} *5*; α(IPF)=0.0001446 *21* R(DCO)=0.94 *6*. POL=+0.060 *6*.
1746	7394.6	11$^+$	5648.7	10$^-$	E1	0.000493 *7*	α=0.000493 *7*; α(K)=3.97×10^{-5} *6*; α(L)=3.88×10^{-6} *6*; α(M)=5.46×10^{-7} *8*; α(N+..)=0.000449 *7* α(N)=1.678×10^{-8} *24*; α(IPF)=0.000449 *7* R(DCO)=0.51 *4*. POL=+0.046 *8*.
1833	5187.9	9$^-$	3354.9	7$^-$	E2	0.000306 *5*	α=0.000306 *5*; α(K)=6.65×10^{-5} *10*; α(L)=6.53×10^{-6} *10*; α(M)=9.18×10^{-7} *13*; α(N+..)=0.000232 *4* α(N)=2.82×10^{-8} *4*; α(IPF)=0.000232 *4* R(DCO)=1.15 *17*. POL=+0.054 *16*.
2038	8132.5	13$^+$	6094.4	11$^-$	M2	0.000250 *4*	α=0.000250 *4*; α(K)=9.13×10^{-5} *13*; α(L)=8.99×10^{-6} *13*; α(M)=1.264×10^{-6} *18*; α(N+..)=0.0001488 α(N)=3.90×10^{-8} *6*; α(IPF)=0.0001487 *21* R(DCO)=1.2 *3*. POL=−0.13 *5*.

[†] From DCO ratios and angular correlations of coincident γ rays.
[‡] From figure 3 of 2004Iz01; not listed in authors′ table I.
[#] 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.

^{40}Ca(^{24}Mg,3pnγ) 2004Iz01

Level Scheme



$^{60}_{29}Cu_{31}$