^{66}Ga ε decay **2004BeZR,2002Ba38**

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 111, 1093 (2010)	3-Mar-2009

Parent: ^{66}Ga: E=0.0; J$^\pi$=0^+; T$_{1/2}$=9.49 h *3*; Q(ε)=5175 *3*; %ε+%β^+ decay=100.0

Additional information 1.

2004BeZR: Data evaluated by E. Browne for the Decay Data Evaluation Project (DDEP). A detailed description of the evaluation procedures used is given in www.nucleide.org/DDEP_WG/DDEPdata.htm.

2002Ba38: Reports a combination of γ-ray intensity measurements from two laboratories: The Lawrence Berkeley National Laboratory (USA), and the Budapest Neutron Center (Hungary).

Berkeley measurement: Activity produced by ^{66}Zn(p,n), E=17.5 MeV using a>99% pure natural zinc target. Detector: Hyper-pure Ge. The relative detector efficiency was calibrated with sources of ^{56}Co, ^{152}Eu, ^{154}Eu, and ^{228}Th. Absolute detector efficiency was determined using sources of ^{60}Co, ^{137}Cs, and a ^{13}C(^{238}Pu) source, which provided a 6129-keV γ ray produced via the ^{13}C(α,n)^{16}O reaction.

Budapest measurement: Activity produced by ^{66}Zn(p,n), E=14.5 MeV, using a target of 99.0 % 1 enriched ^{66}Zn. Detector: hyper-pure Ge with a Compton-suppression system. The detector efficiency was calibrated with sources of ^{133}Ba and ^{152}Eu, as well as using capture γ rays from the ^{35}Cl(n,γ) reaction.

2000Ra36: γ-ray activity measured with a large hyper-pure Compton-suppressed Ge detector. Its efficiency was calibrated using the following sources: ^{22}Na, ^{54}Mn, ^{57}Co, ^{60}Co, ^{88}Y, ^{133}Ba, ^{137}Cs, ^{152}Eu, ^{207}Bi, ^{241}Am, ^{226}Ra, and ^{228}Th. Also using capture γ rays from the ^{12}C(n,γ) and ^{14}N(n,γ) reactions.

1994En02: Activity produced by ^{63}Cu(α,n), E=18 MeV using a target of high-purity natural copper. Detector: Ge(Li) with a Compton-suppression shield. Detector efficiency was internally calibrated with the strongest γ rays from ^{66}Ga decay.

1960Sc06: Eγ, Iγ, $\gamma\gamma$ coincidences, $\gamma\gamma(\theta)$, Eβ+, Iβ^+, $\beta^+\gamma$ coincidences, and internal conversion; magnetic spectrometer, scintillators.

Others: 1953Ma01, 1966Ac02, 1966Co05, 1966Fr13, 1966Wi13, 1967Ca12, 1967Va13, 1967Vr03, 1969St08, 1970Ph01, 1971Ca14, 1972GeZF, 1975Mc07, and 1993Al15.

1963Ca03: β^+ spectrum, analyzed shape of g.s. transition; magnetic spectrometer, proportional counters, scintillators.

1952Mu35: Eγ, Iγ, $\gamma\gamma$ coincidences, Eβ+, and Iβ^+; magnetic spectrometer, lead radiator, scintillators.

1950La55: Eγ, Iγ, Eβ+, Iβ^+, $\beta^+\gamma$ coincidences, and Auger electrons; magnetic spectrometer, gas counters, uranium radiator.

^{66}Zn Levels

E(level)	J$^\pi$†	T$_{1/2}$†
0	0^+	stable
1039.2279 *21*	2^+	1.68 ps *3*
1872.7653 *24*	2^+	0.19 ps *7*
2372.353 *4*	0^+	>0.21 ps
2780.157 *7*	2^+	0.26 ps *7*
2826.69 *5*	3^-	0.180 ps *7*
2938.074 *3*	2^+	0.044 ps *16*
3105.040 *4*	0^+	
3212.582 *8*	2^+	0.083 ps *+21−14*
3228.885 *3*	1^+	0.12 ps *3*
3331.441 *6*	2^+	0.083 ps *+21−14*
3380.944 *4*	1^-	20 fs *5*
3427.406 *18*	$1,2^-$	
3432.408 *4*	1^-	30 fs *+19−8*
3507.249 *23*	2^+	
3531.692 *14*	0^+	
3576.370 *22*	4^+	
3670.72 *5*	2^+	
3738.207 *21*	$^+$	9.7 fs *+30−18*
3753.01 *4*	4^+	
3791.123 *3*	1^+	

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^{66}Ga ε decay 2004BeZR,2002Ba38 (continued)

^{66}Zn Levels (continued)

E(level)	J$^{\pi}$†	T$_{1/2}$†	Comments
3825.0 *3*	0^{+}		
3882.424 *10*	(2)$^{+}$		
4085.983 *4*	1^{+}		
4295.339 *4*	1^{+}	4.2 fs +*18*−*9*	Additional information 2.
4461.409 *5*	1^{+}	7.0 fs +*12*−*3*	Additional information 3.
4638.24 *14*	1		
4675.6 *5*	1^{+}		
4806.199 *5*	1^{+}	3.8 fs +*13*−*8*	Additional information 4.
4849.93 *3*	1^{+}		
4866.056 *16*	1^{+}		
4958.2 *4*	1^{+}		
5005.8 *3*	1^{+}		

† From Adopted Levels.

ε,β^{+} radiations

Analysis of the ^{66}Ga β^{+} spectrum has established that the g.s. transition has a non-statistical shape (1963Ca03).

E(decay)	E(level)	Iβ^{+} †‡	Iε†‡	Log *ft*	I($\varepsilon+\beta^{+}$)‡	Comments
(169 *3*)	5005.8		0.00122 *18*	7.47 *7*	0.00122 *18*	εK=0.8744; εL=0.10644 *18*; εM+=0.01916 *4*
(217 *3*)	4958.2		0.0020 *5*	7.48 *11*	0.0020 *5*	εK=0.8770; εL=0.10429 *11*; εM+=0.018726 *22*
(309 *3*)	4866.056		0.047 *6*	6.42 *6*	0.047 *6*	εK=0.8796; εL=0.1021; εM+=0.01828
(325 *3*)	4849.93		0.033 *4*	6.62 *6*	0.033 *4*	εK=0.8799; εL=0.1018; εM+=0.01823
(369 *3*)	4806.199		2.30 *19*	4.89 *4*	2.30 *19*	εK=0.8806; εL=0.1013; εM+=0.01811
(499 *3*)	4675.6		0.0015 *5*	8.35 *15*	0.0015 *5*	εK=0.8819; εL=0.1002; εM+=0.01789
(537 *3*)	4638.24		0.0042 *10*	7.96 *11*	0.0042 *10*	εK=0.8822; εL=0.09997; εM+=0.01785
(714 *3*)	4461.409		1.96 *17*	5.54 *4*	1.96 *17*	εK=0.8830; εL=0.09927; εM+=0.01770
(880 *3*)	4295.339		6.2 *5*	5.23 *4*	6.2 *5*	εK=0.8835; εL=0.09888; εM+=0.01762
(1089 *3*)	4085.983		1.67 *14*	5.99 *4*	1.67 *14*	εK=0.8839; εL=0.09855; εM+=0.01756
(1293 *3*)	3882.424	1.6×10^{-5} *11*	0.0014 *9*	9.2 *3*	0.0014 *9*	av Eβ=118.9 *13*; εK=0.8737; εL=0.09718; εM+=0.01731
(1350 *3*)	3825.0	7.3×10^{-5} *15*	0.0029 *6*	8.93 *9*	0.0030 *6*	av Eβ=142.9 *13*; εK=0.8627; εL=0.09589; εM+=0.01708
1420 *50*	3791.123	0.94 *8*	26.0 *21*	5.00 *4*	26.9 *22*	av Eβ=157.0 *13*; εK=0.8534 *10*; εL=0.09483 *11*; εM+=0.016887 *19* E(decay): from β^{+} endpoint energy=400 *50* (1952Mu35). Eβ+≈400, no uncertainty given (1950La55).
(1437 *3*)	3738.207	0.00041 *9*	0.0068 *15*	8.62 *10*	0.0072 *16*	av Eβ=179.2 *13*; εK=0.8342 *13*; εL=0.09266 *15*; εM+=0.01650 *3*
(1743 *3*)	3432.408	0.16 *2*	0.39 *4*	7.03 *4*	0.55 *5*	av Eβ=308.9 *13*; εK=0.620 *3*; εL=0.0688 *3*; εM+=0.01224 *6*
(1748 *3*)	3427.406	0.0020 *5*	0.0047 *11*	8.95 *11*	0.0067 *16*	av Eβ=311.1 *13*; εK=0.616 *3*; εL=0.0683 *3*; εM+=0.01215 *6*
(1794 *3*)	3380.944	0.70 *6*	1.31 *11*	6.53 *4*	2.01 *17*	av Eβ=331.1 *13*; εK=0.575 *3*; εL=0.0637 *3*; εM+=0.01134 *6*
1920 *50*	3228.885	3.7 *3*	3.7 *3*	6.14 *4*	7.4 *6*	av Eβ=397.1 *14*; εK=0.4458 *24*; εL=0.0494 *3*; εM+=0.00879 *5* E(decay): from β^{+} endpoint energy=900 *50* (1952Mu35) Eβ+≈880 (1950La55).

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^{66}Ga ε decay 2004BeZR,2002Ba38 (continued)

ϵ,β^+ radiations (continued)

E(decay)	E(level)	Iβ^+ † ‡	Iε† ‡	Log *ft*	I($\varepsilon+\beta^+$)‡	Comments
(2348 *3*)	2826.69	0.0053 *8*	0.0017 *3*	9.66 *7*	0.0070 *11*	av Eβ=575.3 *14*; εK=0.2112 *12*; εL=0.02335 *13*; εM+=0.004156 *23*
2860 *50*	2372.353	0.30 *3*	0.038 *3*	8.46 *4*	0.34 *3*	av Eβ=781.6 *14*; εK=0.0977 *5*; εL=0.01079 *5*; εM+=0.001920 *9* E(decay): from β^+ endpoint energy of 1840 *50* (1963Ca03).
5175 *3*	0	51 *4*	0.48 *4*	7.88 *4*	51 *4*	av Eβ=1904.1 *15*; εK=0.008365 *18*; εL=0.00092; εM+=0.0001639 *4* E(decay): from endpoint of β^+ spectrum=4153 *3* (1963Ca03).

† From I($\varepsilon+\beta^+$) and theoretical ε/β^+ ratios, except for the g.s.

‡ Absolute intensity per 100 decays.

γ(^{66}Zn)

Iγ normalization: The decay scheme normalization has been deduced as in 2004BeZR, based on the following results: Ice(1039γ)/Iβ^+(g.s.)= 2.08×10^{-4} *10* (1960Sc06). Iβ^+(g.s.)/Σ Iβ_i^+= 0.8697 (1960Sc06). Ice(1039γ, E2)/Iγ(1039γ)= 2.69×10^{-4} *4*, and using theoretical conversion coefficients interpolated using the BRICC computer code. Therefore, Iγ(1039γ)/Σ Iβ_i^+= 2.08×10^{-4} *10* x 0.8697/2.69×10^{-4} *4* =0.67 *3*. Also Σ Iβ_i^+/Σ Iε_i= 1.265 from decay scheme and theoretical values of Iβ_i^+/Iε_i for each level. Using Σ Iβ_i^+ + Σ Iε_i= 100% gives Σ Iβ_i^+= 55.8% 24 and Iγ(1069γ)= 0.67 *3* x 55.8% 24= 37% 2, thus Iγ normalization=0.37 *2*.

E_γ [@]	I_γ [†&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ	α [a]	Comments
[x]171.9 *2*	0.028 *1*								
283.87 *3*	0.0097 *21*	3791.123	1^+	3507.249	2^+				
290.8105 *11*	0.133 *4*	3228.885	1^+	2938.074	2^+				
347.77 *5*	0.0048 *15*	4085.983	1^+	3738.207	$^+$				
375.398 *17*	0.0058 *16*	4461.409	1^+	4085.983	1^+				
410.178 *12*	0.177 *7*	3791.123	1^+	3380.944	1^-				
412.916 *16*	0.0091 *13*	4295.339	1^+	3882.424	$(2)^+$				
442.873 *14*	0.042 *3*	3380.944	1^-	2938.074	2^+				
448.73 *2*	0.290 *10*	3228.885	1^+	2780.157	2^+	M1(+E2)	−0.02[‡] *3*	0.001419 *20*	α=0.001419 *20*; α(K)=0.001272 *18*; α(L)=0.0001283 *19*; α(M)=1.84×10^{-5} *3*; α(N+..)=7.39×10^{-7} α(N)=7.39×10^{-7} *11*
459.683 *14*	0.237 *10*	3791.123	1^+	3331.441	2^+				
494.336 *13*	0.0152 *20*	3432.408	1^-	2938.074	2^+				
499.590 *6*	0.013 *3*	2372.353	0^+	1872.7653	2^+	E2		0.00199 *3*	α=0.00199 *3*; α(K)=0.001782 *25*; α(L)=0.000182 *3*; α(M)=2.61×10^{-5} *4* α(N)=1.013×10^{-6} *15*
551.284 *22*	0.0189 *16*	3331.441	2^+	2780.157	2^+				
554.28 *3*	0.0122 *13*	4085.983	1^+	3531.692	0^+				
557.13 *5*	0.0166 *17*	4295.339	1^+	3738.207	$^+$	M1+E2		0.0011 *3*	α=0.0011 *3*; α(K)=0.00103 *25*; α(L)=0.00010 *3*; α(M)=1.5×10^{-5} *4*; α(N+..)=5.9×10^{-7} *14* α(N)=5.9×10^{-7} *14*
562.241 *10*	0.0179 *17*	3791.123	1^+	3228.885	1^+				
578.540 *19*	0.159 *20*	3791.123	1^+	3212.582	2^+				
600.788 *21*	0.0365 *23*	3380.944	1^-	2780.157	2^+				
653.568 *14*	0.0036 *12*	4085.983	1^+	3432.408	1^-				
658.57 *3*	0.0203 *21*	4085.983	1^+	3427.406	$1,2^-$				
670.251 *14*	0.0110 *18*	4461.409	1^+	3791.123	1^+				
680.56 *10*	0.0040 *11*	3507.249	2^+	2826.69	3^-				
686.080[#] *6*	0.681 *20*	3791.123	1^+	3105.040	0^+				
705.031 *15*	0.0102 *11*	4085.983	1^+	3380.944	1^-				
708.36 *5*	0.0234 *19*	4461.409	1^+	3753.01	4^+				
718.97 *5*	0.0268 *20*	4295.339	1^+	3576.370	4^+				
723.17 *5*	0.0093 *13*	4461.409	1^+	3738.207	$^+$				

γ(^{66}Zn) (continued)

$\mathrm{E}_{\gamma}^{@}$	$\mathrm{I}_{\gamma}^{\dagger\&}$	E_i(level)	J_i^{π}	E_f	J_f^{π}	Mult.	δ	α^{a}	Comments
749.68 *10*	0.0037 *11*	3576.370	4^+	2826.69	3^-				
763.64 *3*	0.0240 *20*	4295.339	1^+	3531.692	0^+				
796.21 *5*	0.0079 *17*	3576.370	4^+	2780.157	2^+				
800.13 *5*	0.0027 *14*	3738.207	$^+$	2938.074	2^+				
833.5324$^{\#}$ *21*	15.93 *6*	1872.7653	2^+	1039.2279	2^+	M1+E2	−1.6‡ *2*	0.000434 *9*	α=0.000434 *9*; α(K)=0.000389 *8*; α(L)=3.91×10^{-5} *8*; α(M)=5.60×10^{-6} *11*; α(N+..)=2.24×10^{-7} *5* α(N)=2.24×10^{-7} *5* α(K)exp+α(L)exp=4.3×10^{-4} *6* (1960Sc06). Mult.: D+Q from $\gamma\gamma(\theta)$; M1,E2 from ce data (1960Sc06). δ: Other value: −1.9 *3* (1974Kr16).
853.038$^{\#}$ *8*	0.205 *5*	3791.123	1^+	2938.074	2^+	M1+E2	0.37‡ *18*	0.000357 *11*	α=0.000357 *11*; α(K)=0.000321 *10*; α(L)=3.20×10^{-5} *11*; α(M)=4.59×10^{-6} *15*; α(N+..)=1.85×10^{-7} *6* α(N)=1.85×10^{-7} *6*
856.527 *10*	0.301 *17*	3228.885	1^+	2372.353	0^+				
857.093 *9*	0.040 *12*	4085.983	1^+	3228.885	1^+				
862.926 *13*	0.0410 *20*	4295.339	1^+	3432.408	1^-				
867.93 *3*	0.0117 *14*	4295.339	1^+	3427.406	$1,2^-$				
873.392 *21*	0.046 *3*	4085.983	1^+	3212.582	2^+				
885.00 *5*	0.0051 *13*	4461.409	1^+	3576.370	4^+				
907.390 *19*	0.059 *4*	2780.157	2^+	1872.7653	2^+	M1+E2	0.13‡ *24*	0.000306 *9*	α=0.000306 *9*; α(K)=0.000275 *8*; α(L)=2.74×10^{-5} *8*; α(M)=3.93×10^{-6} *11*; α(N+..)=1.59×10^{-7} *5* α(N)=1.59×10^{-7} *5* δ: Other value: −3 *+1-9* (2002Ga20).
914.388 *14*	0.073 *4*	4295.339	1^+	3380.944	1^-				
929.68 *3*	0.0123 *15*	4461.409	1^+	3531.692	0^+				
953.93 *9*	0.0027 *3*	2826.69	3^-	1872.7653	2^+				
954.12 *7*	0.0121 *17*	4461.409	1^+	3507.249	2^+				
963.892 *15*	0.039 *3*	4295.339	1^+	3331.441	2^+				
980.934 *13*	0.131 *5*	4085.983	1^+	3105.040	0^+				
1008.588 *12*	0.160 *20*	3380.944	1^-	2372.353	0^+				
1010.957 *19*	0.073 *4*	3791.123	1^+	2780.157	2^+				
1015.081 *18*	0.033 *8*	4806.199	1^+	3791.123	1^+				
1039.220$^{\#}$ *3*	100.0 *3*	1039.2279	2^+	0	0^+	E2		0.000269 *4*	α=0.000269 *4*; α(K)=0.000241 *4*; α(L)=2.41×10^{-5} *4*; α(M)=3.46×10^{-6} *5*; α(N+..)=1.384×10^{-7} *20* α(N)=1.384×10^{-7} *20* α(K)exp+α(L)exp=2.7×10^{-4} *4* (1960Sc06). Mult.: M1,E2 from ce data (1960Sc06).
1060.051 *11*	0.042 *3*	3432.408	1^-	2372.353	0^+				
1065.305 *9*	0.0063 *12*	2938.074	2^+	1872.7653	2^+				
1066.450 *12*	0.0064 *12*	4295.339	1^+	3228.885	1^+				
1082.75 *2*	0.0358 *20*	4295.339	1^+	3212.582	2^+				

γ(^{66}Zn) (continued)

E_{γ}[@]	I_{γ}[†&]	E_i(level)	J^{π}_i	E_f	J^{π}_f	Mult.	δ	α[a]	Comments
1106.53 *24*	0.0033 *10*	4638.24	1	3531.692	0^+				
1129.923 *18*	0.0367 *21*	4461.409	1^+	3331.441	2^+				
1135.47 *9*	0.0128 *13*	4806.199	1^+	3670.72	2^+				
1147.896 *10*	0.212 *7*	4085.983	1^+	2938.074	2^+	M1+E2	−0.18[‡] *5*	0.000192 *3*	α=0.000192 *3*; α(K)=0.0001708 *25*; α(L)=1.700×10^{-5} *25*; α(M)=2.44×10^{-6} *4*; α(N+..)=2.28×10^{-6} *4* α(N)=9.87×10^{-8} *14*; α(IPF)=2.18×10^{-6} *4*
1190.287 *7*	0.345 *19*	4295.339	1^+	3105.040	0^+				
1195.32 *9*	0.0025 *9*	4866.056	1^+	3670.72	2^+				
1232.264 *8*	1.35 *5*	3105.040	0^+	1872.7653	2^+				
1232.480 *15*	0.15 *5*	4461.409	1^+	3228.885	1^+				
1248.779 *22*	0.0027 *9*	4461.409	1^+	3212.582	2^+				
1274.50 *3*	0.0189 *15*	4806.199	1^+	3531.692	0^+				
1298.95 *7*	0.0103 *12*	4806.199	1^+	3507.249	2^+				
1305.807 *21*	0.0107 *12*	4085.983	1^+	2780.157	2^+				
1333.112[#] *5*	3.175 *13*	2372.353	0^+	1039.2279	2^+	E2		0.000190 *3*	α=0.000190 *3*; α(K)=0.0001383 *20*; α(L)=1.379×10^{-5} *20*; α(M)=1.98×10^{-6} *3*; α(N+..)=3.61×10^{-5} *5* α(N)=7.96×10^{-8} *12*; α(IPF)=3.61×10^{-5} *5* α(K)exp+α(L)exp=1.1×10^{-4} *4* (1960Sc06).
1356.104 *9*	0.96 *10*	3228.885	1^+	1872.7653	2^+				
1356.320 *15*	0.33 *5*	4461.409	1^+	3105.040	0^+				
1357.250 *12*	0.44 *13*	4295.339	1^+	2938.074	2^+	M1+E2	−0.18[‡] *5*	0.0001689 *24*	α=0.0001689 *24*; α(K)=0.0001231 *18*; α(L)=1.223×10^{-5} *18*; α(M)=1.753×10^{-6} *25* α(N)=7.11×10^{-8} *10*; α(IPF)=3.18×10^{-5} *5* δ: Other value: 5$^+$ *2-1* (2002Ga20).
1409.35 *24*	0.0043 *18*	4638.24	1	3228.885	1^+				
1418.754[#] *5*	1.657 *8*	3791.123	1^+	2372.353	0^+				
1425.25 *2*	0.0163 *13*	4806.199	1^+	3380.944	1^-				
1433.63 *4*	0.0050 *10*	4866.056	1^+	3432.408	1^-				
1458.662[#] *12*	0.261 *6*	3331.441	2^+	1872.7653	2^+	(M1+E2)	−0.01[‡] *9*	0.0001741 *25*	α=0.0001741 *25*; α(K)=0.0001070 *15*; α(L)=1.062×10^{-5} *15*; α(M)=1.523×10^{-6} *22* α(N)=6.18×10^{-8} *9*; α(IPF)=5.49×10^{-5} *8*
1468.97 *5*	0.0037 *10*	4849.93	1^+	3380.944	1^-				
1508.158[#] *7*	1.497 *7*	3380.944	1^-	1872.7653	2^+				
1515.162 *20*	0.0167 *15*	4295.339	1^+	2780.157	2^+				
1523.279 *15*	0.0148 *13*	4461.409	1^+	2938.074	2^+				
1534.60 *4*	0.016 *4*	4866.056	1^+	3331.441	2^+				
1554.62 *3*	0.050 *3*	3427.406	$1,2^-$	1872.7653	2^+				
1559.627 *10*	0.059 *4*	3432.408	1^-	1872.7653	2^+				
1577.308 *20*	0.0108 *16*	4806.199	1^+	3228.885	1^+				
1634.46 *7*	0.0095 *15*	3507.249	2^+	1872.7653	2^+				
1703.59 *5*	0.015 *5*	3576.370	4^+	1872.7653	2^+				

From ENSDF

γ(^{66}Zn) (continued)

E$_\gamma$[@]	I$_\gamma$[†&]	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.	δ	α[a]	Comments
1713.602 *12*	0.066 *3*	4085.983	1$^+$	2372.353	0$^+$				
1740.904 *16*	0.0773 *10*	2780.157	2$^+$	1039.2279	2$^+$	M1+E2	0.33[‡] *28*	0.000241 *8*	α=0.000241 *8*; α(K)=7.74×10^{-5} *13*; α(L)=7.67×10^{-6} *13*; α(M)=1.100×10^{-6} *19*; α(N+..)=0.000155 *7* α(N)=4.47×10^{-8} *8*; α(IPF)=0.000155 *7*
1787.44 *9*	0.0240 *20*	2826.69	3$^-$	1039.2279	2$^+$	(E1)		0.000526 *8*	α=0.000526 *8*; α(K)=4.21×10^{-5} *6*; α(L)=4.16×10^{-6} *6*; α(M)=5.95×10^{-7} *9*; α(N+..)=0.000479 *7* α(N)=2.41×10^{-8} *4*; α(IPF)=0.000479 *7* δ(M2/E1)=−0.04 *5* (1977Ne04).
1797.94 *9*	0.0051 *14*	3670.72	2$^+$	1872.7653	2$^+$				
1868.105 *20*	0.073 *15*	4806.199	1$^+$	2938.074	2$^+$				
1872.740 *6*	0.062 *4*	1872.7653	2$^+$	0	0$^+$	[E2]		0.000328 *5*	α=0.000328 *5*; α(K)=7.04×10^{-5} *10*; α(L)=6.99×10^{-6} *10*; α(M)=1.001×10^{-6} *14*; α(N+..)=0.000250 *4* α(N)=4.05×10^{-8} *6*; α(IPF)=0.000250 *4*
1898.823[#] *8*	1.051 *8*	2938.074	2$^+$	1039.2279	2$^+$	(M1+E2)	0.03 *1*	0.000288 *4*	α=0.000288 *4*; α(K)=6.58×10^{-5} *10*; α(L)=6.52×10^{-6} *10*; α(M)=9.35×10^{-7} *13*; α(N+..)=0.000215 *3* α(N)=3.80×10^{-8} *6*; α(IPF)=0.000215 *3* δ: From $\gamma(\theta)$ in ^{66}Zn(n,n$'\gamma$) (1980KaZD). Other value: 0.00 *6* (2002Ga20).
1918.329[#] *5*	5.368 *23*	3791.123	1$^+$	1872.7653	2$^+$	M1+E2	−0.07[‡] *3*	0.000295 *5*	α=0.000295 *5*; α(K)=6.47×10^{-5} *9*; α(L)=6.40×10^{-6} *9*; α(M)=9.18×10^{-7} *13*; α(N+..)=0.000223 *4* α(N)=3.73×10^{-8} *6*; α(IPF)=0.000223 *4* α(K)exp+α(L)exp=1.1×10^{-4} *4* (1960Sc06).
1927.96 *4*	0.0061 *20*	4866.056	1$^+$	2938.074	2$^+$				
2009.628 *16*	0.0083 *17*	3882.424	(2)$^+$	1872.7653	2$^+$				
2026.016 *25*	0.0070 *16*	4806.199	1$^+$	2780.157	2$^+$				
2065.778[#] *7*	0.084 *4*	3105.040	0$^+$	1039.2279	2$^+$				
2085.86 *4*	0.006 *4*	4866.056	1$^+$	2780.157	2$^+$				
2088.985 *13*	0.031 *7*	4461.409	1$^+$	2372.353	0$^+$				
2173.319[#] *15*	0.228 *12*	3212.582	2$^+$	1039.2279	2$^+$				
2189.616[#] *6*	14.42 *6*	3228.885	1$^+$	1039.2279	2$^+$	M1+E2	0.12[‡] *2*	0.000398 *6*	α=0.000398 *6*; α(K)=5.12×10^{-5} *8*; α(L)=5.07×10^{-6} *7*; α(M)=7.26×10^{-7} *11*; α(N+..)=0.000341 *5* α(N)=2.95×10^{-8} *5*; α(IPF)=0.000341 *5* α(K)exp+α(L)exp=0.49×10^{-4} *8* (1960Sc06). Mult.: M1+E2 from ce data (1969Sc06).
2213.181[#] *9*	0.354 *12*	4085.983	1$^+$	1872.7653	2$^+$	M1+E2	−0.23[‡] *5*	0.000410 *6*	α=0.000410 *6*; α(K)=5.03×10^{-5} *7*; α(L)=4.98×10^{-6} *7*; α(M)=7.14×10^{-7} *10*; α(N+..)=0.000354 *6* α(N)=2.90×10^{-8} *4*; α(IPF)=0.000354 *6* δ: Other value: 4.9+*16*-*9* (2002Ga20).
2265.84 *24*	0.0037 *14*	4638.24	1	2372.353	0$^+$				
2292.171 *13*	0.046 *3*	3331.441	2$^+$	1039.2279	2$^+$				

^{66}Ga ε decay **2004BeZR,2002Ba38** (continued)

γ(^{66}Zn) (continued)

E_γ[@]	I_γ[†&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ	α[a]	Comments
2341.673 *11*	0.0086 *17*	3380.944	1^-	1039.2279	2^+				
2393.129[#] *7*	0.635 *20*	3432.408	1^-	1039.2279	2^+	E1		0.000924 *13*	α=0.000924 *13*; α(K)=2.73×10^{-5} *4*; α(L)=2.70×10^{-6} *4*; α(M)=3.86×10^{-7} *6*; α(N+..)=0.000894 *13* α(N)=1.569×10^{-8} *22*; α(IPF)=0.000894 *13* δ=−0.04 *5*, γγ(θ) (2002Ga20).
2422.525[#] *7*	5.085 *24*	4295.339	1^+	1872.7653	2^+	M1(+E2)	0.01[‡] *3*	0.000491 *7*	α=0.000491 *7*; α(K)=4.30×10^{-5} *6*; α(L)=4.25×10^{-6} *6*; α(M)=6.10×10^{-7} *9*; α(N+..)=0.000443 *7* α(N)=2.48×10^{-8} *4*; α(IPF)=0.000443 *7* δ: Other value: 2.2 *2* (2002Ga20).
2433.807 *18*	0.0201 *17*	4806.199	1^+	2372.353	0^+				
2467.97 *7*	0.0228 *19*	3507.249	2^+	1039.2279	2^+				
2492.42 *3*	0.060 *4*	3531.692	0^+	1039.2279	2^+				
2537.09 *5*	0.014 *3*	3576.370	4^+	1039.2279	2^+				
2588.553 *13*	0.071 *4*	4461.409	1^+	1872.7653	2^+	M1+E2	0.35[‡] *27*	0.000568 *16*	α=0.000568 *16*; α(K)=3.86×10^{-5} *6*; α(L)=3.81×10^{-6} *6*; α(M)=5.47×10^{-7} *9*; α(N+..)=0.000525 *16* α(N)=2.22×10^{-8} *4*; α(IPF)=0.000525 *16*
2631.44 *9*	0.008 *3*	3670.72	2^+	1039.2279	2^+				
2698.92 *5*	0.0100 *17*	3738.207	$^+$	1039.2279	2^+				
2713.73 *5*	0.017 *5*	3753.01	4^+	1039.2279	2^+				
2751.835[#] *5*	61.3 *3*	3791.123	1^+	1039.2279	2^+	(M1+E2)	−0.12[‡] *2*	0.000626 *9*	α=0.000626 *9*; α(K)=3.48×10^{-5} *5*; α(L)=3.43×10^{-6} *5*; α(M)=4.92×10^{-7} *7*; α(N+..)=0.000588 *9* α(N)=2.00×10^{-8} *3*; α(IPF)=0.000588 *9* α(K)exp+α(L)exp=0.38×10^{-4} *5* (1960Sc06). Mult.: D+Q from γγ(θ); M1+E2 from ce data (1960Sc06). δ: Other values: −0.09 *3* or +3.5 *4*, γγ(θ) (1960Sc06).
2780.095[#] *16*	0.334 *8*	2780.157	2^+	0	0^+	E2		0.000722 *11*	α=0.000722 *11*; α(K)=3.51×10^{-5} *5*; α(L)=3.47×10^{-6} *5*; α(M)=4.98×10^{-7} *7*; α(N+..)=0.000683 *10* α(N)=2.02×10^{-8} *3*; α(IPF)=0.000683 *10*
2785.7 *3*	0.0080 *14*	3825.0	0^+	1039.2279	2^+				
2802.8 *5*	0.0040 *11*	4675.6	1^+	1872.7653	2^+				
2843.130 *16*	0.0045 *9*	3882.424	$(2)^+$	1039.2279	2^+				
2933.358 *9*	0.576 *8*	4806.199	1^+	1872.7653	2^+	M1+E2	1.6[‡] *2*	0.000762 *12*	α=0.000762 *12*; α(K)=3.19×10^{-5} *5*; α(L)=3.15×10^{-6} *5*; α(M)=4.52×10^{-7} *7*; α(N+..)=0.000727 *12* α(N)=1.84×10^{-8} *3*; α(IPF)=0.000727 *12*
2977.08 *4*	0.062 *6*	4849.93	1^+	1872.7653	2^+				
2993.21 *3*	0.085 *8*	4866.056	1^+	1872.7653	2^+				
3046.684 *9*	0.154 *6*	4085.983	1^+	1039.2279	2^+	M1+E2	−0.8[‡] *2*	0.000778 *16*	α=0.000778 *16*; α(K)=2.97×10^{-5} *5*; α(L)=2.94×10^{-6} *5*; α(M)=4.21×10^{-7} *6*; α(N+..)=0.000745 *16* α(N)=1.712×10^{-8} *25*; α(IPF)=0.000745 *16*
3085.4 *4*	0.0053 *13*	4958.2	1^+	1872.7653	2^+				

γ(^{66}Zn) (continued)

E_γ[@]	I_γ[†&]	E_i(level)	J^π_i	E_f	J^π_f	Mult.	δ	α[a]	Comments
3212.499 *19*	0.0050 *10*	3212.582	2$^+$	0	0$^+$				
3228.800[#] *6*	4.082 *22*	3228.885	1$^+$	0	0$^+$	M1		0.000812 *12*	α=0.000812 *12*; α(K)=2.68×10^{-4} *6*; α(L)=2.64×10^{-6} *4*; α(M)=3.79×10^{-7} *6* α(N)=1.544×10^{-8} *22*; α(IPF)=0.000782 *11*
3256.021 *9*	0.254 *10*	4295.339	1$^+$	1039.2279	2$^+$	M1+E2	1.5[‡] *2*	0.000889 *14*	α=0.000889 *14*; α(K)=2.70×10^{-5} *4*; α(L)=2.66×10^{-6} *4*; α(M)=3.81×10^{-7} *6*; α(N+..)=0.000859 *14* α(N)=1.552×10^{-8} *22*; α(IPF)=0.000859 *14*
3331.351 *14*	0.061 *8*	3331.441	2$^+$	0	0$^+$				
3380.850[#] *6*	3.960 *23*	3380.944	1$^-$	0	0$^+$				
3422.040[#] *8*	2.314 *16*	4461.409	1$^+$	1039.2279	2$^+$	M1+E2	−0.06[‡] *2*	0.000885 *13*	α=0.000885 *13*; α(K)=2.44×10^{-5} *4*; α(L)=2.41×10^{-6} *4*; α(M)=3.46×10^{-7} *5*; α(N+..)=0.000858 *12* α(N)=1.408×10^{-8} *20*; α(IPF)=0.000858 *12*
3432.309[#] *7*	0.777 *10*	3432.408	1$^-$	0	0$^+$				
^{x}3724.8 *10*	0.0065 *10*								
3738.10 *5*	0.0374 *20*	3738.207	$^+$	0	0$^+$				
3766.850[#] *9*	0.403 *15*	4806.199	1$^+$	1039.2279	2$^+$	M1+E2	0.11[‡] *4*	0.001009 *15*	α=0.001009 *15*; α(K)=2.11×10^{-5} *3*; α(L)=2.08×10^{-6} *3*; α(M)=2.98×10^{-7} *5*; α(N+..)=0.000986 *14* α(N)=1.212×10^{-8} *17*; α(IPF)=0.000986 *14*
3791.004 *8*	2.941 *24*	3791.123	1$^+$	0	0$^+$	M1		0.001017 *16*	α=0.001017 *16*; α(K)=2.08×10^{-5} *3*; α(L)=2.05×10^{-6} *3*; α(M)=2.95×10^{-7} *5* α(N)=1.200×10^{-8} *17*; α(IPF)=0.000994 *14*
^{x}3806.3 *10*	0.0066 *11*								
3810.59 *5*	0.0248 *22*	4849.93	1$^+$	1039.2279	2$^+$				
^{x}3827.5 *8*	0.0190 *22*								
4085.853[#] *9*	3.445 *20*	4085.983	1$^+$	0	0$^+$	M1		0.001117 *16*	α=0.001117 *16*; α(K)=1.86×10^{-5} *3*; α(L)=1.83×10^{-6} *3*; α(M)=2.63×10^{-7} *4* α(N)=1.070×10^{-8} *15*; α(IPF)=0.001096 *16*
4295.187 *10*	10.30 *8*	4295.339	1$^+$	0	0$^+$				α(K)exp+α(L)exp=0.18×10^{-4} *6* (1960Sc06).
4461.202[#] *9*	2.26 *3*	4461.409	1$^+$	0	0$^+$				
4806.007[#] *9*	5.03 *3*	4806.199	1$^+$	0	0$^+$				E_γ: γ-ray often used for the efficiency calibration of germanium detectors.
4865.87 *4*	0.0075 *6*	4866.056	1$^+$	0	0$^+$				
5005.6 *3*	0.0033 *4*	5005.8	1$^+$	0	0$^+$				

[†] The relative intensities of the strongest γ rays are values recommended in 2004BeZR and 2002Ba38. These are weighted averages of results from Berkeley, Budapest, and from those reported in 2000Ra36. The relative intensities of weaker γ rays are weighted averages of values reported in 1970Ph01, 1971Ca14, and 1994En02. Relative γ-ray intensities in 1970Ph01 have been corrected for a systematic inaccuracy in the detector efficiency calibration above 1050 keV. Correction factor f=1.116 − 0.155 Eγ (MeV) + 0.0397 Eγ (MeV) x Eγ (MeV) (2002Ba38). Uncertainties in Iγ are statistical values given by authors.

$\gamma(^{66}$Zn) (continued)

[‡] From $\gamma\gamma(\theta)$ in ^{66}Ga ε decay (2002Ga20).

[#] From 2000He14. These values are based on a revised energy scale that uses the new adjusted fundamental constants and wave lengths deduced from an updated value of the lattice spacing of Si crystals [Cohen and Taylor 1987Co39]. Helmer and van der Leun (2000He14) fitted the adjusted γ-ray energies of ^{66}Ga to a level scheme and deduced their recommended values from level-energy differences.

[@] γ rays with precise energies are from 2000He14. Those with less precise energies are from 1993Al15 and 1994En02, but adjusted to those in 2000He14 using a least-squares procedure (2004BeZR). The difference between these two energy scales has been used as a systematic adjustment, and applied to the the energies given here. Thus, the uncertainties in the γ-ray energies presented in this evaluation are just statistical, as reported by authors.

[&] For absolute intensity per 100 decays, multiply by 0.37 *2*.

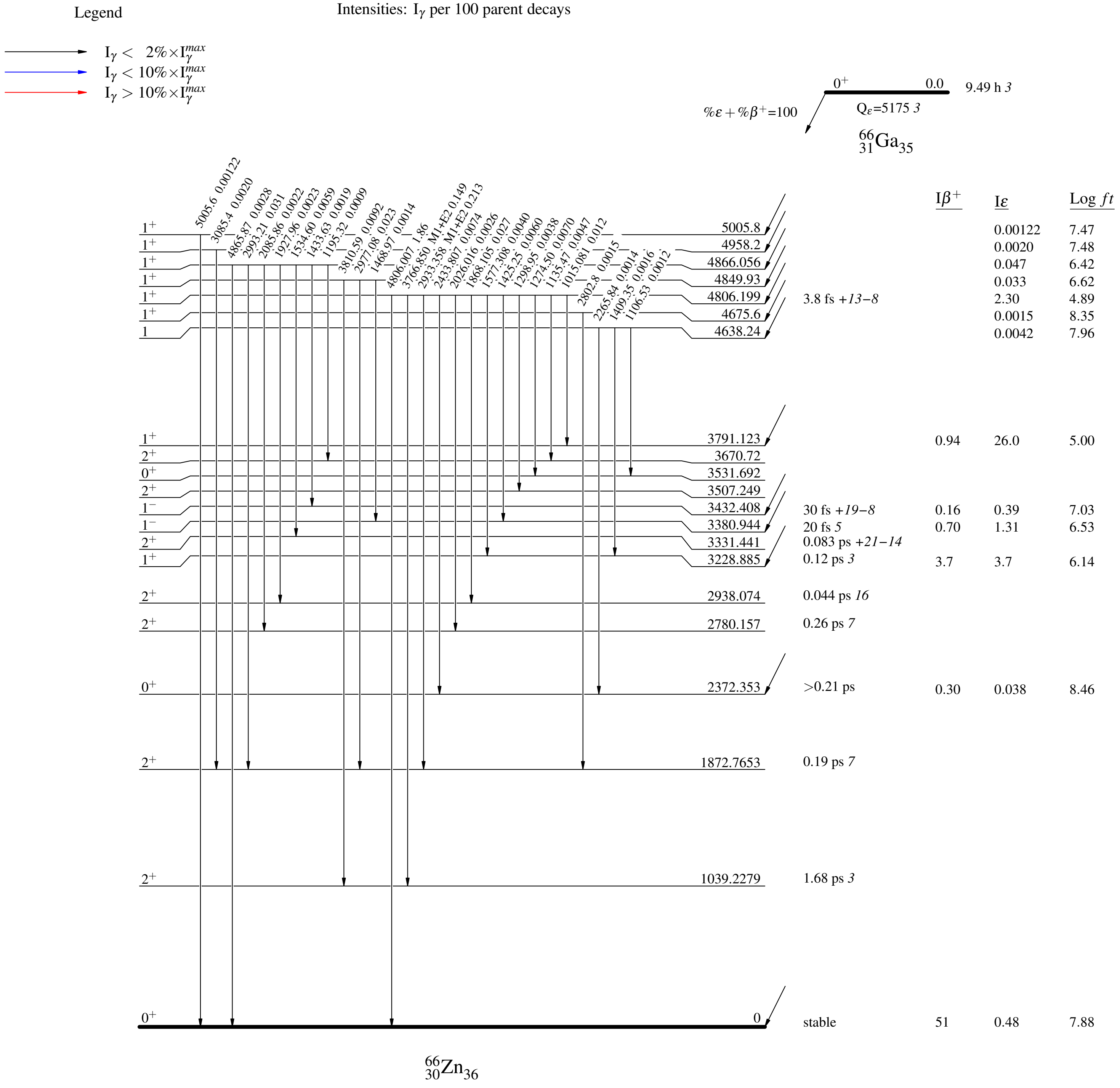
[a] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

[x] γ ray not placed in level scheme.

^{66}Ga ε decay 2004BeZR,2002Ba38

Decay Scheme

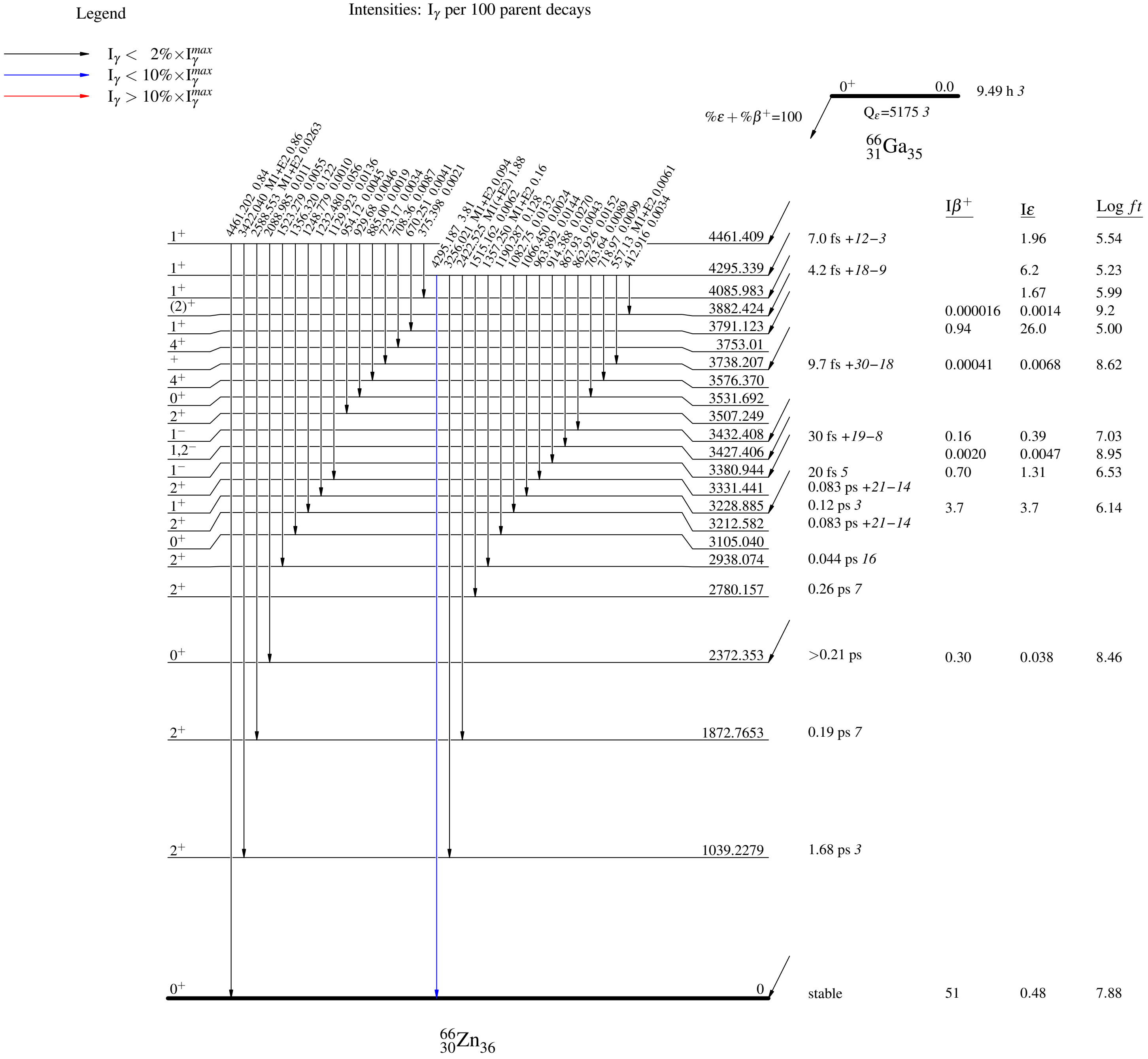
Intensities: I_γ per 100 parent decays



^{66}Ga ε decay 2004BeZR,2002Ba38

Decay Scheme (continued)

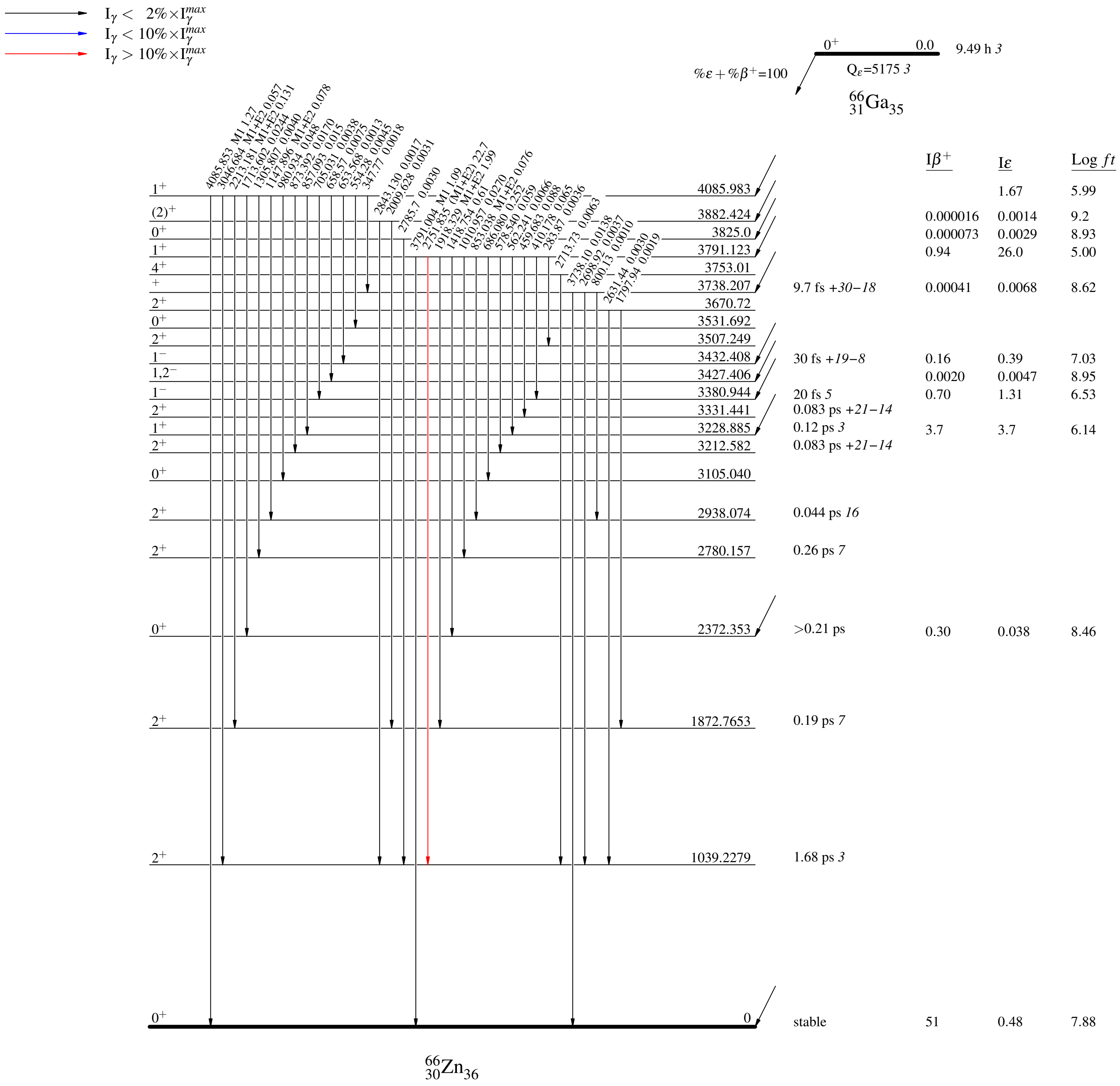
Intensities: I_γ per 100 parent decays



^{66}Ga ε decay 2004BeZR,2002Ba38

Decay Scheme (continued)

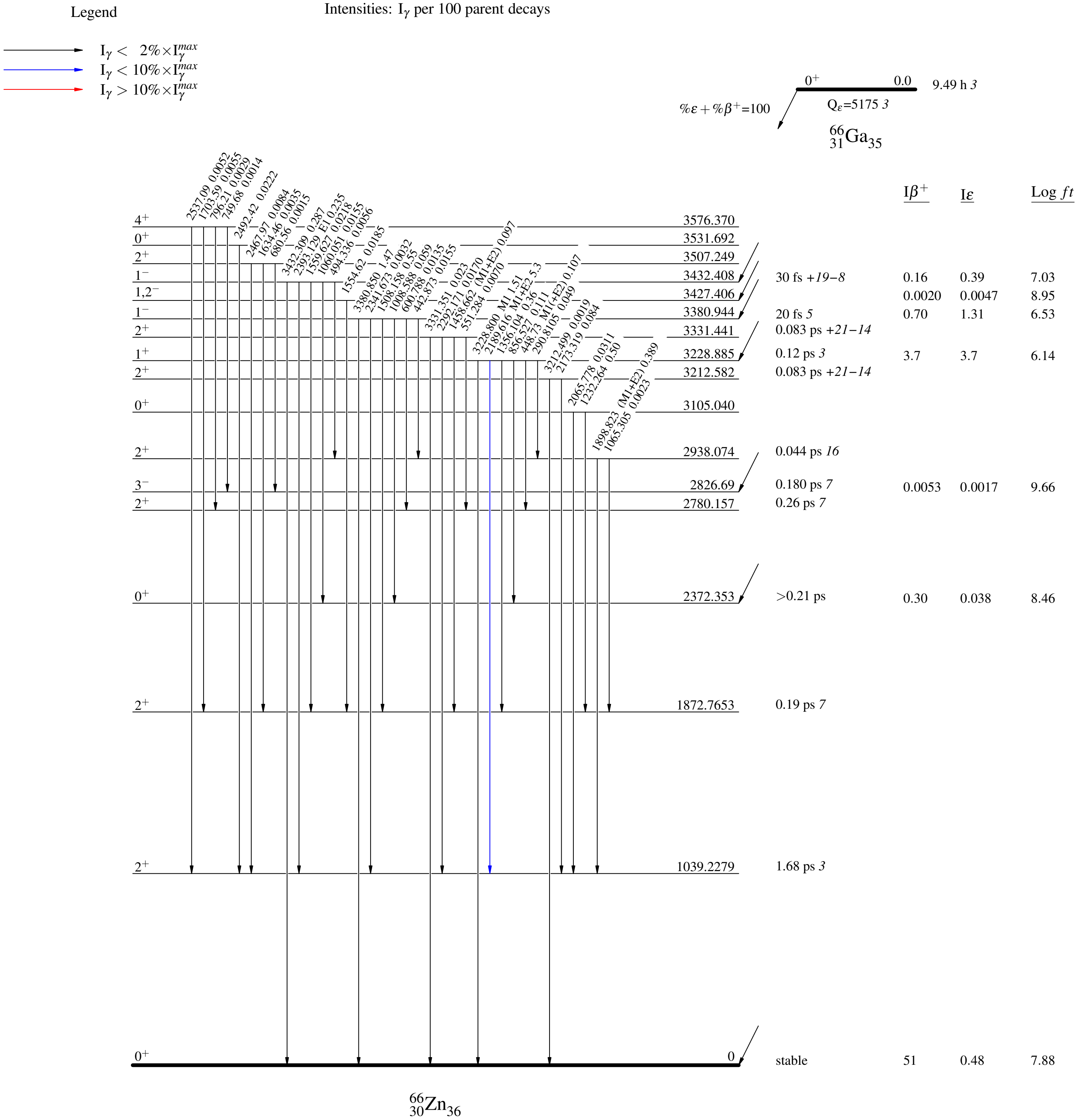
Intensities: I_γ per 100 parent decays



^{66}Ga ε decay 2004BeZR,2002Ba38

Decay Scheme (continued)

Intensities: I_γ per 100 parent decays



^{66}Ga ε decay 2004BeZR,2002Ba38

Decay Scheme (continued)

Intensities: I_γ per 100 parent decays