^{160}Eu β^- decay (42.6 s) 2020Ha13,2018Ha19

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 176, 1 (2021)	1-May-2021

Parent: ^{160}Eu: E=0.0; $J^\pi=(5^-)$; $T_{1/2}$=42.6 s *5*; Q(β^-)=4448.6 *14*; %β^- decay=100.0

^{160}Eu-J^π,$T_{1/2}$: From 2018Ha19 (from summed β-γ(t) spectra).

^{160}Eu-Q(β^-): From 2021Wa16.

2020Ha13 compiled for XUNDL by N. Nica (TAMU).

2018Ha19 compiled for XUNDL by F.G. Kondev (ANL).

2020Ha13: isotopically separated ^{160}Eu nuclei from ^{252}Cf spontaneous fission source at CARIBU facility (ANL) implanted in SATURN moving tape system surrounded by four Ge clover detectors and four plastic scintillators. Measured γ and β singles, β-gated γ time coin, β-gated $\gamma\gamma$ coin and proposed level schemes for the 42.6 s g.s. and 30.8 s isomer β decays of ^{160}Eu. Assigned high-spin K^π two-quasiparticle configurations to experimentally identified states.

2018Ha19: ^{160}Eu nuclide produced in spontaneous fission of 1.7−Ci ^{252}Cf source from the CAlifornium Rare Ion Breeder Upgrade (CARIBU) facility at Argonne National Laboratory. The fission fragments were thermalized in a He gas catcher, separated with an isobar separator and implanted on a moving tape system. Measured Eγ, Iγ, Eβ, $\gamma\gamma$(t), $\beta\gamma$(t), and $\beta\gamma\gamma$(t) coincidences using the SATURN (Scintillator and Tape Using Radioactive Nuclei) system composed of four plastic scintillator paddles and the X-Array composed of four HPGe Clover detectors and one LEPS. A tape cycle of 180 s growth and 180 s decay time was used in the data collection. The masses were determined from the measured cyclotron frequency ratios (relative to $^{84}Kr^+$) using the Canadian Penning Trap spectrometer. Deformed shell model calculations using the Woods-Saxon mean-field potential and Lipkin-Nogami treatment of pairing.

2020Ha13 and 2018Ha19 are related (done by the same experimental setup and main authors' group). 2018Ha19 discovered two β^- activities of ^{160}Eu: $T_{1/2}$=42.6 *5* s associated with the (5^-) g.s. decay, and $T_{1/2}$=30.8 *5* s associated with the (1^-) 93-keV isomer decay. 2020Ha13 proposed extended level schemes for both β^- decays.

Level scheme is incomplete.

^{160}Gd Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]	Comments
0.0[&]	0^+	stable	
75.40[&] *10*	2^+	2.72 ns *1*	
248.72[&] *13*	4^+		
515.10[&] *16*	6^+		
1070.70[b] *13*	4^+[#]		J^π: adopted by 2020Ha13 based on M1 γ from 5^+, 1173.
1173.33[b] *15*	$(5)^+$		
1261.35[a] *18*	5^+	243 fs +*83*−*55*	
1295.75[b] *17*	(6^+)		
1393.38[a] *22*	6^+		
1437.70[b] *23*	(7^+)		
1483.36[c] *14*	(4^+)[#]		
1548.35[a] *23*	(7^+)		
1582.08[c] *19*	(5^+)		
1698.5 *3*	$(5,6^+)$[@]		
1999.00 *15*	(5^-)		$T_{1/2}$: no indication of substantial lifetime was found despite being expected by assumed M2, 450.7γ to (7^+), 1548. Possible $K^\pi=5^-$ bandhead. Proposed π^2(5/2[413],5/2[532]) configuration (2018Ha19, 2020Ha13).
2253.0 *4*			
2344.8 *4*			
2489.92 *19*	$(5^+,6^+)$[@]		
2559.86 *19*	$(5^+,6^+)$[@]		

Continued on next page (footnotes at end of table)

^{160}Eu β^- decay (42.6 s) 2020Ha13,2018Ha19 (continued)

^{160}Gd Levels (continued)

† From least-squares fit to Eγ′s.
‡ From Adopted Levels.
# Possible two-state mixing in between ν^2(3/2[521],5/2[523]) and π^2(5/2[413],5/2[532]) $K^\pi=4^+$ configurations.
@ Adopted by 2020Ha13 based on direct β feeding from (5^-) parent.
& Band(A): $K^\pi=0^+$ g.s. band.
a Band(B): $K^\pi=2^+$ γ-vibration band.
b Band(C): First $K^\pi=4^+$ band. Hexadecapole-vibrational band. Dominant 2-qp ν^2(3/2[521],5/2[523]) configuration (2018Ha19, 2020Ha13).
c Band(D): Second $K^\pi=4^+$ band. Dominant 2-qp π^2(3/2[411],5/2[413]) configuration (2018Ha19, 2020Ha13).

β^- radiations

E(decay)	E(level)	Iβ^-†‡	Log *ft*†	Comments
(1888.7 *14*)	2559.86	8.7	5.5	av Eβ=714.58 *62*
(1958.7 *14*)	2489.92	6.8	5.6	av Eβ=745.33 *63*
(2103.8 *15*)	2344.8	2.2	6.2	av Eβ=809.50 *65*
(2195.6 *15*)	2253.0	2.2	6.3	av Eβ=850.31 *65*
(2449.6 *14*)	1999.00	61	5.1	av Eβ=964.00 *64*
(2750.1 *14*)	1698.5	0.53	7.3	av Eβ=1099.65 *65*
(2866.5 *14*)	1582.08	2.2	6.8	av Eβ=1152.46 *65*
(2900.3 *14*)	1548.35	0.5	7.4	av Eβ=1167.79 *65*
(2965.2 *14*)	1483.36	4	6.6	av Eβ=1197.35 *64*
(3010.9 *14*)	1437.70	0.38	7.6	av Eβ=1218.14 *65*
(3055.2 *14*)	1393.38	0.2	7.9	av Eβ=1238.33 *65*
(3152.9 *14*)	1295.75	2.9	6.8	av Eβ=1282.86 *65*
(3187.3 *14*)	1261.35	0.9	7.4	av Eβ=1298.57 *65*
(3275.3 *14*)	1173.33	2.9	6.9	av Eβ=1338.79 *65*
(3377.9 *14*)	1070.70	5	6.7	av Eβ=1385.75 *65*

† Due to the incompletness of the level scheme the values listed in these columns are provided for illustrative purposes.
‡ Absolute intensity per 100 decays.

^{160}Eu β^- decay (42.6 s) 2020Ha13,2018Ha19 (continued)

$\gamma(^{160}Gd)$

Iγ normalization: Total $I_{(\gamma+ce)}$ feeding to g.s. is 100%. Due to the incompletness of the level scheme the $\%I_\gamma$ values listed in comments are provided for illustrative purposes.

E_γ[†]	I_γ[‡c]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[a]	Comments
75.4 *1*	231[@] *12*	75.40	2^+	0.0	0^+	[E2]	7.28	%Iγ=12.1 *6* α(K)=2.25 *4*; α(L)=3.88 *6*; α(M)=0.917 *14* α(N)=0.204 *4*; α(O)=0.0265 *4*; α(P)=0.0001119 *16*
98.8 *3*	16 *4*	1582.08	(5^+)	1483.36	(4^+)	M1	2.08 *4*	%Iγ=0.84 *4* α(K)=1.76 *3*; α(L)=0.254 *5*; α(M)=0.0552 *10* α(N)=0.01271 *21*; α(O)=0.00197 *4*; α(P)=0.0001313 *22* Mult.: from α(exp)(98.8γ)=1.6 *3* (deduced from intensity balance at 1483 level from coincidence gate on γ populating 1582 level (2020Ha13)).
102.7 *2*	62 *4*	1173.33	$(5)^+$	1070.70	4^+	M1	1.87	%Iγ=3.24 *17* α(K)=1.575 *24*; α(L)=0.227 *4*; α(M)=0.0494 *8* α(N)=0.01137 *18*; α(O)=0.00176 *3*; α(P)=0.0001175 *18* Mult.: from α(exp)(102.7γ)=2.5 *3* (deduced from intensity balance at 1070 level from coincidence gate on γ populating 1173 level (2020Ha13)).
123[d]	<4.4	1295.75	(6^+)	1173.33	$(5)^+$	[M1]	1.115	%Iγ<0.230 α(K)=0.942 *14*; α(L)=0.1357 *19*; α(M)=0.0295 *5* α(N)=0.00678 *10*; α(O)=0.001052 *15*; α(P)=7.02×10^{-5} *10*
173.3 *1*	1000[@] *50*	248.72	4^+	75.40	2^+	E2	0.360	%Iγ=52.3 *28* α(K)=0.239 *4*; α(L)=0.0941 *14*; α(M)=0.0218 *3* α(N)=0.00490 *7*; α(O)=0.000665 *10*; α(P)=1.325×10^{-5} *19*
187.5 *3*	17 *6*	1483.36	(4^+)	1295.75	(6^+)	[E2]	0.276	%Iγ=0.89 *5* α(K)=0.188 *3*; α(L)=0.0680 *11*; α(M)=0.01570 *25* α(N)=0.00353 *6*; α(O)=0.000482 *8*; α(P)=1.064×10^{-5} *16*
215[d]	6.1 *13*	1698.5	$(5,6^+)$	1483.36	(4^+)			%Iγ=0.319 *17*
225.1 *3*	40.7 *24*	1295.75	(6^+)	1070.70	4^+	[E2]	0.1502	%Iγ=2.13 *11* α(K)=0.1082 *16*; α(L)=0.0326 *5*; α(M)=0.00749 *12* α(N)=0.00169 *3*; α(O)=0.000234 *4*; α(P)=6.38×10^{-6} *10*
264.5 *3*	21 *3*	1437.70	(7^+)	1173.33	$(5)^+$	[E2]	0.0893	%Iγ=1.10 *6* α(K)=0.0667 *10*; α(L)=0.0176 *3*; α(M)=0.00400 *6* α(N)=0.000903 *14*; α(O)=0.0001269 *19*; α(P)=4.07×10^{-6} *6*
266.4 *2*	173 *9*	515.10	6^+	248.72	4^+	E2	0.0873	%Iγ=9.0 *5* α(K)=0.0653 *10*; α(L)=0.01709 *25*; α(M)=0.00389 *6* α(N)=0.000879 *13*; α(O)=0.0001236 *18*; α(P)=3.99×10^{-6} *6*
286[d]	<2.5	1582.08	(5^+)	1295.75	(6^+)	[M1]	0.1086	%Iγ<0.131 α(K)=0.0920 *13*; α(L)=0.01301 *19*; α(M)=0.00282 *4* α(N)=0.000649 *9*; α(O)=0.0001009 *15*; α(P)=6.80×10^{-6} *10*
286.9 *3*	5.3 *26*	1548.35	(7^+)	1261.35	5^+	[E2]	0.0692	%Iγ=0.277 *15*

$^{160}_{64}Gd_{96}$-3

^{160}Eu β^- decay (42.6 s) 2020Ha13,2018Ha19 (continued)

$\gamma(^{160}Gd)$ (continued)

E_γ[†]	I_γ[‡c]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#b]	α[a]	Comments
									α(K)=0.0525 *8*; α(L)=0.01298 *19*; α(M)=0.00295 *5* α(N)=0.000666 *10*; α(O)=9.43×10^{-5} *14*; α(P)=3.26×10^{-6} *5*
300.6 *3*	4.9 *20*	1999.00	(5$^-$)	1698.5	(5,6$^+$)				%Iγ=0.256 *14*
310.0 *2*	64 *4*	1483.36	(4$^+$)	1173.33	(5)$^+$	[E2]		0.0545	%Iγ=3.35 *18* α(K)=0.0419 *6*; α(L)=0.00981 *14*; α(M)=0.00222 *4* α(N)=0.000502 *8*; α(O)=7.15×10^{-5} *11*; α(P)=2.63×10^{-6} *4*
408.9 *2*	179 *9*	1582.08	(5$^+$)	1173.33	(5)$^+$	[M1]		0.0424	%Iγ=9.4 *5* α(K)=0.0360 *5*; α(L)=0.00503 *7*; α(M)=0.001090 *16* α(N)=0.000251 *4*; α(O)=3.90×10^{-5} *6*; α(P)=2.64×10^{-6} *4*
412.7 *1*	845 *43*	1483.36	(4$^+$)	1070.70	4$^+$	[M1]		0.0414	%Iγ=44.2 *24* α(K)=0.0351 *5*; α(L)=0.00491 *7*; α(M)=0.001063 *15* α(N)=0.000245 *4*; α(O)=3.81×10^{-5} *6*; α(P)=2.58×10^{-6} *4*
417.1 *2*	151 *8*	1999.00	(5$^-$)	1582.08	(5$^+$)	[E1]		0.00715	%Iγ=7.9 *4* α(K)=0.00609 *9*; α(L)=0.000829 *12*; α(M)=0.000179 *3* α(N)=4.09×10^{-5} *6*; α(O)=6.26×10^{-6} *9*; α(P)=3.97×10^{-7} *6*
450.7 *3*	20 *4*	1999.00	(5$^-$)	1548.35	(7$^+$)	[M2]		0.1109	%Iγ=1.05 *6* α(K)=0.0918 *13*; α(L)=0.01498 *22*; α(M)=0.00331 *5* α(N)=0.000763 *11*; α(O)=0.0001177 *17*; α(P)=7.60×10^{-6} *11*
491.1 *2*	51 *3*	2489.92	(5$^+$,6$^+$)	1999.00	(5$^-$)	[E1]		0.00491	Mult.: possible M2 γ based on ΔJ^π(levels). %Iγ=2.67 *14* α(K)=0.00419 *6*; α(L)=0.000565 *8*; α(M)=0.0001218 *17* α(N)=2.79×10^{-5} *4*; α(O)=4.28×10^{-6} *6*; α(P)=2.75×10^{-7} *4*
515.7 *1*	879 *44*	1999.00	(5$^-$)	1483.36	(4$^+$)	[E1]		0.00440	%Iγ=46.0 *25* α(K)=0.00375 *6*; α(L)=0.000506 *7*; α(M)=0.0001089 *16* α(N)=2.49×10^{-5} *4*; α(O)=3.83×10^{-6} *6*; α(P)=2.47×10^{-7} *4*
555.6 *4*	9.7 *23*	1070.70	4$^+$	515.10	6$^+$	[E2]		0.01062	%Iγ=0.507 *27* α(K)=0.00871 *13*; α(L)=0.001494 *22*; α(M)=0.000330 *5* α(N)=7.53×10^{-5} *11*; α(O)=1.122×10^{-5} *16*; α(P)=5.89×10^{-7} *9*
560.8 *2*	74 *4*	2559.86	(5$^+$,6$^+$)	1999.00	(5$^-$)	[E1]		0.00366	%Iγ=3.87 *21* α(K)=0.00312 *5*; α(L)=0.000419 *6*; α(M)=9.02×10^{-5} *13* α(N)=2.07×10^{-5} *3*; α(O)=3.18×10^{-6} *5*; α(P)=2.07×10^{-7} *3*
605.7 *3*	22 *5*	1999.00	(5$^-$)	1393.38	6$^+$	[E1]		0.00310	%Iγ=1.15 *6* α(K)=0.00265 *4*; α(L)=0.000353 *5*; α(M)=7.61×10^{-5} *11* α(N)=1.744×10^{-5} *25*; α(O)=2.68×10^{-6} *4*; α(P)=1.755×10^{-7} *25*
646[d]	2.5 *13*	2344.8		1698.5	(5,6$^+$)				%Iγ=0.131 *7*
658.2 *3*	27.8 *19*	1173.33	(5)$^+$	515.10	6$^+$	[M1]		0.01267	%Iγ=1.45 *8* α(K)=0.01078 *16*; α(L)=0.001483 *21*; α(M)=0.000321 *5* α(N)=7.38×10^{-5} *11*; α(O)=1.150×10^{-5} *17*; α(P)=7.85×10^{-7} *11*
737.6 *2*	144 *8*	1999.00	(5$^-$)	1261.35	5$^+$	[E1]		0.00205	%Iγ=7.5 *4* α(K)=0.001758 *25*; α(L)=0.000233 *4*; α(M)=5.00×10^{-5} *7* α(N)=1.147×10^{-5} *16*; α(O)=1.772×10^{-6} *25*; α(P)=1.174×10^{-7} *17*
746.1 *3*	30.8 *20*	1261.35	5$^+$	515.10	6$^+$	M1+E2	+8 +*13*−*4*	0.00528 *20*	%Iγ=1.61 *9*

$^{160}_{64}Gd_{96}$-4

^{160}Eu β^- decay (42.6 s) 2020Ha13,2018Ha19 (continued)

$\gamma(^{160}Gd)$ (continued)

E_γ[†]	I_γ[‡c]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#b]	α[a]	Comments
									α(K)=0.00441 *17*; α(L)=0.000683 *21*; α(M)=0.000149 *5* α(N)=3.42×10^{-5} *10*; α(O)=5.18×10^{-6} *16*; α(P)=3.04×10^{-7} *13*
762.7 *3*	41.4 *25*	2344.8		1582.08	(5$^+$)				%Iγ=2.16 *12*
769.6 *3*	42.0 *25*	2253.0		1483.36	(4$^+$)				%Iγ=2.20 *12*
780.7 *3*	19 *4*	1295.75	(6$^+$)	515.10	6$^+$	[M1]		0.00832	%Iγ=0.99 *5* α(K)=0.00709 *10*; α(L)=0.000969 *14*; α(M)=0.000209 *3* α(N)=4.82×10^{-5} *7*; α(O)=7.51×10^{-6} *11*; α(P)=5.14×10^{-7} *8*
822.0 *1*	661 *33*	1070.70	4$^+$	248.72	4$^+$	M1+E2	−0.71 *3*	0.00629 *11*	%Iγ=34.6 *18* α(K)=0.00534 *9*; α(L)=0.000746 *12*; α(M)=0.000161 *3* α(N)=3.71×10^{-5} *6*; α(O)=5.75×10^{-6} *10*; α(P)=3.83×10^{-7} *7*
825.6 *3*	19.6 *18*	1999.00	(5$^-$)	1173.33	(5)$^+$	[E1]		1.64×10^{-3}	%Iγ=1.02 *5* α(K)=0.001405 *20*; α(L)=0.000185 *3*; α(M)=3.97×10^{-5} *6* α(N)=9.12×10^{-6} *13*; α(O)=1.410×10^{-6} *20*; α(P)=9.41×10^{-8} *14*
878.3 *3*	11 *4*	1393.38	6$^+$	515.10	6$^+$	M1+E2	+14 *16*	0.0036 *6*	%Iγ=0.575 *31* α(K)=0.0031 *5*; α(L)=0.00046 *6*; α(M)=9.9×10^{-5} *12* α(N)=2.3×10^{-5} *3*; α(O)=3.5×10^{-6} *5*; α(P)=2.1×10^{-7} *4*
924.6 *1*	207 *11*	1173.33	(5)$^+$	248.72	4$^+$	M1+E2	+40 *+23−11*	0.00325	%Iγ=10.8 *6* α(K)=0.00274 *4*; α(L)=0.000403 *6*; α(M)=8.77×10^{-5} *13* α(N)=2.01×10^{-5} *3*; α(O)=3.07×10^{-6} *5*; α(P)=1.89×10^{-7} *3*
928.0 *3*	18[&] *6*	1999.00	(5$^-$)	1070.70	4$^+$	[E1]		1.31×10^{-3}	%Iγ=0.94 *5* α(K)=0.001121 *16*; α(L)=0.0001468 *21*; α(M)=3.15×10^{-5} *5* α(N)=7.24×10^{-6} *11*; α(O)=1.121×10^{-6} *16*; α(P)=7.52×10^{-8} *11*
968.4 *3*	39[&] *5*	1483.36	(4$^+$)	515.10	6$^+$	[E2]		0.00294	%Iγ=2.04 *11* α(K)=0.00248 *4*; α(L)=0.000362 *5*; α(M)=7.87×10^{-5} *11* α(N)=1.80×10^{-5} *3*; α(O)=2.76×10^{-6} *4*; α(P)=1.719×10^{-7} *24*
995.3 *1*	541 *27*	1070.70	4$^+$	75.40	2$^+$	E2		0.00278	%Iγ=28.3 *15* α(K)=0.00235 *4*; α(L)=0.000340 *5*; α(M)=7.39×10^{-5} *11* α(N)=1.694×10^{-5} *24*; α(O)=2.59×10^{-6} *4*; α(P)=1.625×10^{-7} *23*

$^{160}_{64}Gd_{96}$-5

^{160}Eu β^- decay (42.6 s) 2020Ha13,2018Ha19 (continued)

$\gamma(^{160}Gd)$ (continued)

E_γ [†]	I_γ [‡c]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[#b]	α[a]	Comments
1006.5 *3*	35.5 *22*	2489.92	$(5^+,6^+)$	1483.36	(4^+)	[M1,E2]		0.0036 *9*	%Iγ=1.86 *10* α(K)=0.00307 *78*; α(L)=0.00043 *10*; α(M)=9.2×10^{-5} *21* α(N)=2.1×10^{-5} *5*; α(O)=3.3×10^{-6} *8*; α(P)=2.18×10^{-7} *60*
1012.6 *2*	135 *7*	1261.35	5^+	248.72	4^+	M1+E2	+15 *+17–64*	0.00269	%Iγ=7.1 *4* α(K)=0.00227 *4*; α(L)=0.000328 *5*; α(M)=7.12×10^{-5} *11* α(N)=1.633×10^{-5} *24*; α(O)=2.50×10^{-6} *4*; α(P)=1.573×10^{-7} *23*
1033.4 *3*	26.6 *18*	1548.35	(7^+)	515.10	6^+	[M1]		0.00423	%Iγ=1.39 *7* α(K)=0.00361 *5*; α(L)=0.000488 *7*; α(M)=0.0001054 *15* α(N)=2.43×10^{-5} *4*; α(O)=3.78×10^{-6} *6*; α(P)=2.60×10^{-7} *4*
1046.9 *2*	25 *8*	1295.75	(6^+)	248.72	4^+	[E2]		0.00250	%Iγ=1.31 *7* α(K)=0.00212 *3*; α(L)=0.000303 *5*; α(M)=6.59×10^{-5} *10* α(N)=1.511×10^{-5} *22*; α(O)=2.32×10^{-6} *4*; α(P)=1.465×10^{-7} *21*
1052.1 *3*	8.5 *12*	2489.92	$(5^+,6^+)$	1437.70	(7^+)	[M1,E2]		0.0033 *8*	%Iγ=0.444 *24* α(K)=0.0028 *7*; α(L)=0.00038 *9*; α(M)=8.3×10^{-5} *18* α(N)=1.9×10^{-5} *5*; α(O)=3.0×10^{-6} *7*; α(P)=1.97×10^{-7} *53*
1076.4 *3*	42 *3*	2559.86	$(5^+,6^+)$	1483.36	(4^+)	[M1,E2]		0.0031 *8*	%Iγ=2.20 *12* α(K)=0.0026 *7*; α(L)=0.00036 *8*; α(M)=7.9×10^{-5} *17* α(N)=1.8×10^{-5} *4*; α(O)=2.8×10^{-6} *7*; α(P)=1.87×10^{-7} *49*
1122.4 *3*	7.0 *8*	2559.86	$(5^+,6^+)$	1437.70	(7^+)	[M1,E2]		0.0028 *7*	%Iγ=0.366 *20* α(K)=0.0024 *6*; α(L)=0.00033 *7*; α(M)=7.1×10^{-5} *15* α(N)=1.6×10^{-5} *4*; α(O)=2.5×10^{-6} *6*; α(P)=1.71×10^{-7} *44*; α(IPF)=7.2×10^{-7} *4*
1144.7 *3*	15 *9*	1393.38	6^+	248.72	4^+	E2		0.00209	%Iγ=0.78 *4* α(K)=0.001767 *25*; α(L)=0.000250 *4*; α(M)=5.41×10^{-5} *8* α(N)=1.241×10^{-5} *18*; α(O)=1.91×10^{-6} *3*; α(P)=1.225×10^{-7} *18*; α(IPF)=1.415×10^{-6} *24*
1183.5 *3*	15 *4*	1698.5	$(5,6^+)$	515.10	6^+				%Iγ=0.78 *4*
1194.1 *3*	2.5 *9*	2489.92	$(5^+,6^+)$	1295.75	(6^+)	[M1]		0.00301	%Iγ=0.131 *7* α(K)=0.00256 *4*; α(L)=0.000345 *5*; α(M)=7.45×10^{-5} *11* α(N)=1.714×10^{-5} *24*; α(O)=2.67×10^{-6} *4*; α(P)=1.84×10^{-7} *3*; α(IPF)=5.44×10^{-6} *9*
1234.6 *2*	113 *6*	1483.36	(4^+)	248.72	4^+	[M1]		0.00278	%Iγ=5.91 *32* α(K)=0.00237 *4*; α(L)=0.000319 *5*; α(M)=6.88×10^{-5} *10* α(N)=1.583×10^{-5} *23*; α(O)=2.47×10^{-6} *4*; α(P)=1.704×10^{-7} *24*; α(IPF)=1.079×10^{-5} *16*
1264.1 *3*	11.8 *16*	2559.86	$(5^+,6^+)$	1295.75	(6^+)	[M1]		0.00264	%Iγ=0.617 *33* α(K)=0.00224 *4*; α(L)=0.000301 *5*; α(M)=6.50×10^{-5} *10* α(N)=1.497×10^{-5} *21*; α(O)=2.34×10^{-6} *4*; α(P)=1.612×10^{-7} *23*; α(IPF)=1.555×10^{-5} *23*
1316.4 *3*	32.0 *20*	2489.92	$(5^+,6^+)$	1173.33	$(5)^+$	[M1]		0.00241	%Iγ=1.67 *9*

$^{160}_{64}Gd_{96}$-6

^{160}Eu β^- decay (42.6 s) 2020Ha13,2018Ha19 (continued)

$\gamma(^{160}Gd)$ (continued)

E_γ[†]	I_γ[‡c]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[a]	Comments
								α(K)=0.00204 *3*; α(L)=0.000274 *4*; α(M)=5.90×10^{-5} *9* α(N)=1.359×10^{-5} *19*; α(O)=2.12×10^{-6} *3*; α(P)=1.465×10^{-7} *21*; α(IPF)=2.58×10^{-5} *4*
1386.5 *3*	31 *4*	2559.86	(5$^+$,6$^+$)	1173.33	(5)$^+$	[M1]	0.00216	%Iγ=1.62 *9* α(K)=0.00181 *3*; α(L)=0.000242 *4*; α(M)=5.22×10^{-5} *8* α(N)=1.203×10^{-5} *17*; α(O)=1.88×10^{-6} *3*; α(P)=1.297×10^{-7} *19*; α(IPF)=4.44×10^{-5} *7*
1408.1 *3*	11 *5*	1483.36	(4$^+$)	75.40	2$^+$	[E2]	1.43×10^{-3}	%Iγ=0.575 *31* α(K)=0.001178 *17*; α(L)=0.0001617 *23*; α(M)=3.49×10^{-5} *5* α(N)=8.02×10^{-6} *12*; α(O)=1.240×10^{-6} *18*; α(P)=8.18×10^{-8} *12*; α(IPF)=4.57×10^{-5} *7*
1483.6 *3*	5.6 *26*	1999.00	(5$^-$)	515.10	6$^+$	[E1]	7.55×10^{-4}	%Iγ=0.293 *16* α(K)=0.000483 *7*; α(L)=6.22×10^{-5} *9*; α(M)=1.334×10^{-5} *19* α(N)=3.06×10^{-6} *5*; α(O)=4.76×10^{-7} *7*; α(P)=3.26×10^{-8} *5*; α(IPF)=0.000193 *3*
1750.2 *3*	11[&] *4*	1999.00	(5$^-$)	248.72	4$^+$	[E1]	8.18×10^{-4}	%Iγ=0.575 *31* α(K)=0.000367 *6*; α(L)=4.70×10^{-5} *7*; α(M)=1.007×10^{-5} *15* α(N)=2.31×10^{-6} *4*; α(O)=3.60×10^{-7} *5*; α(P)=2.48×10^{-8} *4*; α(IPF)=0.000391 *6*

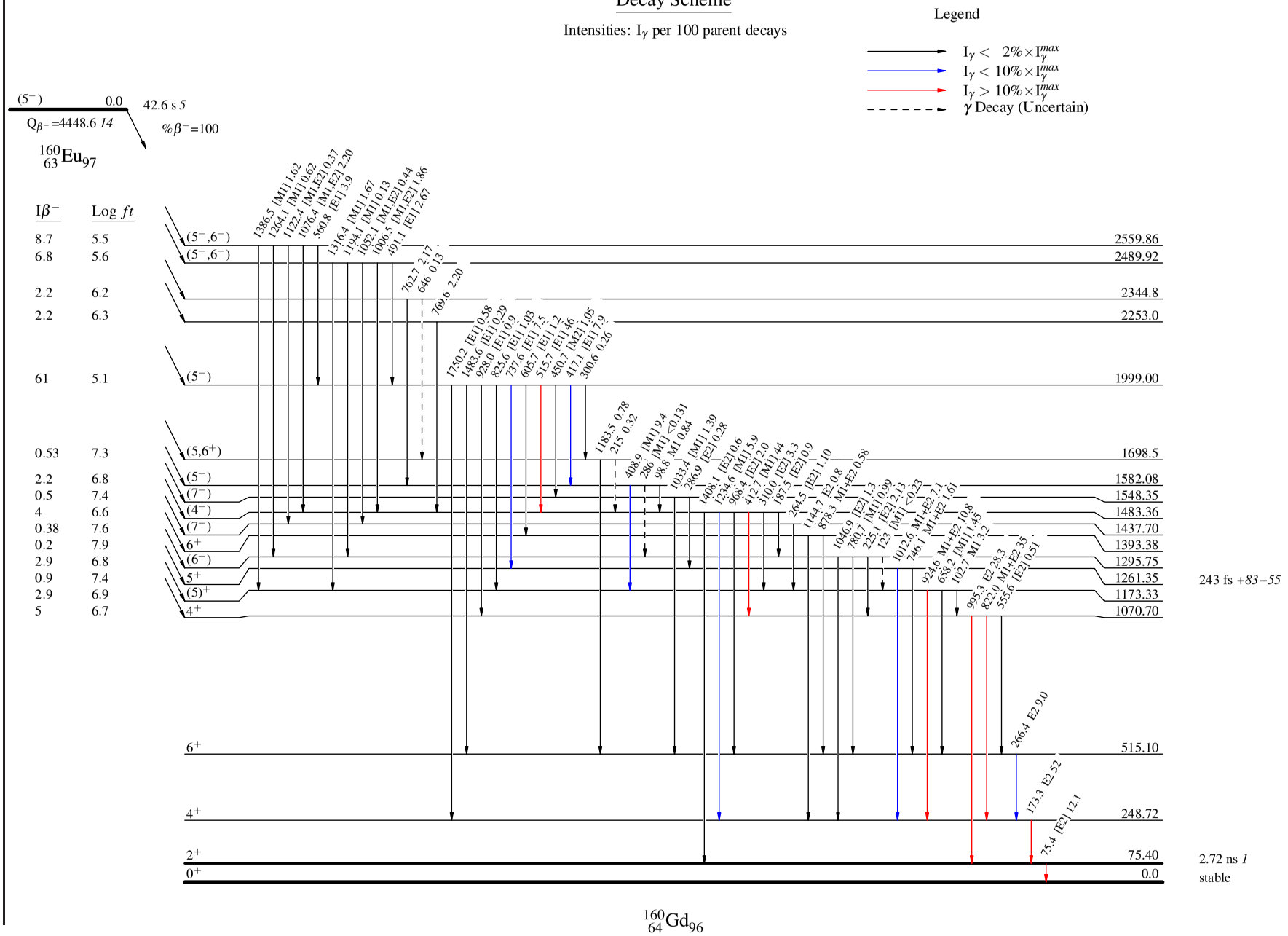
† From 2020Ha13.
‡ Intensities relative to $I_{173.3\gamma}$=1000.
# From Adopted Gammas.
@ Due to contamination from population from (1$^-$) isomer β^- decay 2020Ha13 adopted this I_γ value from intensity balance assuming no β feeding.
& Possibly contaminated by intensity coming from the summing of the strongest transitions observed in the data.
a Additional information 1.
b Additional information 2.
c For absolute intensity per 100 decays, multiply by 0.0523 *28*.
d Placement of transition in the level scheme is uncertain.

$^{160}_{64}Gd_{96}$-7

^{160}Eu β^- decay (42.6 s) 2020Ha13,2018Ha19

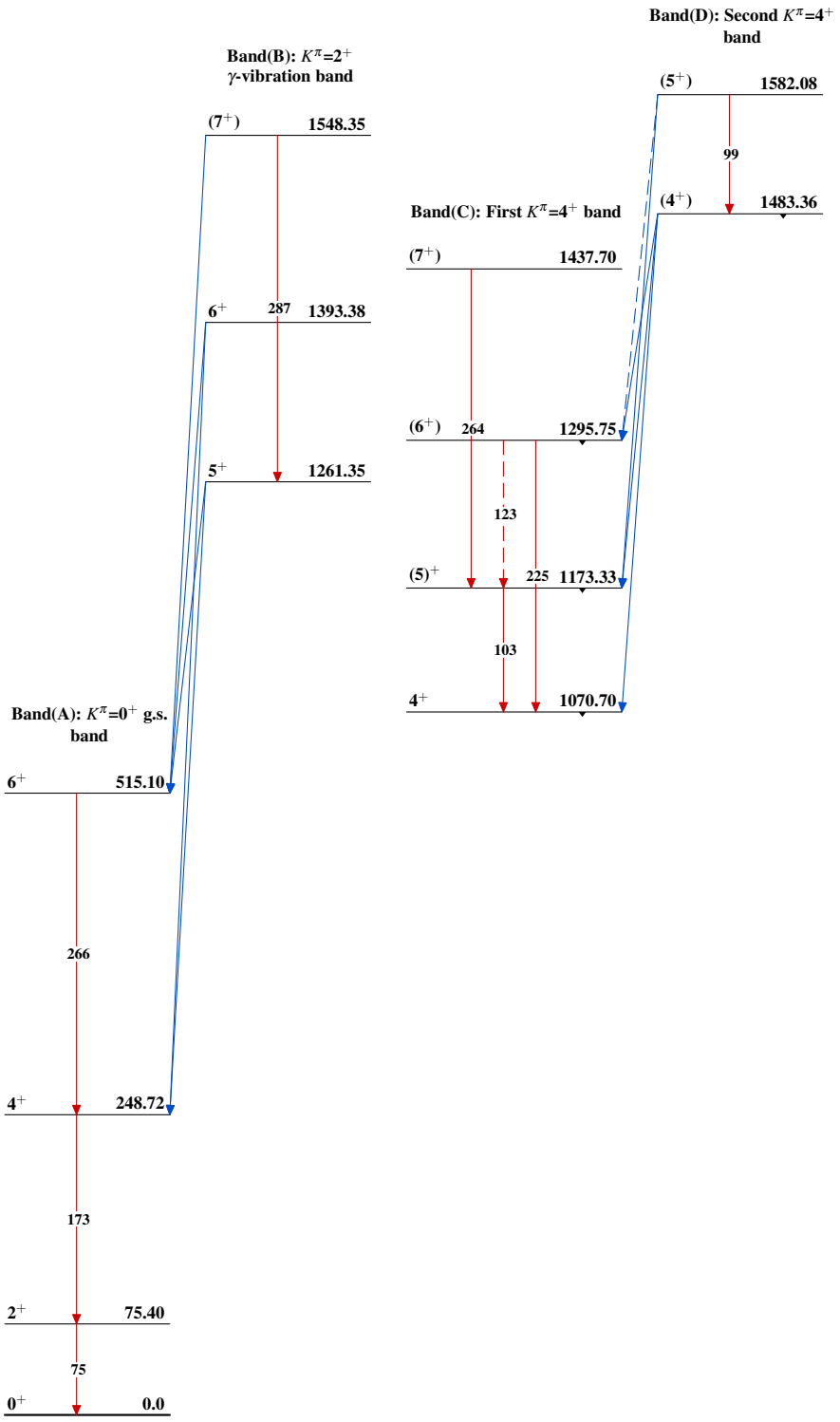
Decay Scheme

Intensities: I_γ per 100 parent decays



$^{160}_{64}Gd_{96}$

^{160}Eu β^- decay (42.6 s) 2020Ha13,2018Ha19



$^{160}_{64}Gd_{96}$