^{81}Ge β^- decay (6.4 s) 2022De07,1981Ho24

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia	NDS 199,271 (2025)	1-Sep-2024

Parent: ^{81}Ge: E=0; J^π=(9/2$^+$); $T_{1/2}$=6.4 s *2*; Q(β^-)=6242 *3*; %β^- decay=100

^{81}Ge-Q(β^-): from 2021Wa16.

Others: 1972De43, 1980HoZN, 1981Al20, 1981ZeZY, 1990Ru05.

2022De07: ^{81}Ge was obtained at the IGISOL facility of the University of Jyvaskyla exposing ^{232}Th target (15 mg/cm^2) with proton beam, E=35−MeV. ^{81}Ge ions were selected in the first trap (also called purification trap). Only J^π=9/2$^+$ g.s. of ^{81}Ge was observed − confirmed by a TOF Ion-Cyclotron-Resonance measurement in a second measurement trap. Direct population of J^π=1/2$^+$ isomeric state was negligible. Two coaxial detectors GC7020, two EUROGAM-2-like CLOVER detectors, a BEGe2020 detector with a Be entrance window. Measured Eγ, Iγ, γ-γ coin; deduce level scheme, β feeding.

Source: from mass-separated fission products.

1981Ho24, 1980HoZN: single γ and $\gamma\gamma$-coin measured with Ge(Li); x-ray detector for low energy γ search (E$\gamma\geq$15 keV); Si(Li) detector for simultaneous measurement of ce and γ spectra (for α(K)exp determination).

In 1980HoZN (lab report of 1981Ho24), Eγ, Iγ and $\gamma\gamma$ coin data are tabulated without differentiation between their ^{81}Ge parentages.

From analysis of ^{81}Ga decay and $\beta\gamma$-coin measurements, it is evident that there are two β^- decaying isomers of ^{81}Ge; but, in a multispectrum analysis of mass number 81, 1981Ho24 were unable to differentiate between their half-lives. Hence, 1981Ho24 conclude that there exist two isomers of ^{81}Ge which possess similar $T_{1/2}$ values. Presumably other authors also report $T_{1/2}$ relevant to a mixture of these isomers.

1981Ho24 propose tentative decay schemes for the two isomers, consistent with $\gamma\gamma$ and $\beta\gamma$ coin data and supported by arguments based on the large spin differences of the decaying isomers and on analogies with ^{83}Se decay. However, J^π based on the resulting log *ft* values and observed γ deexcitation patterns are in conflict with L(t,α) for the 758 and 1613 levels unless separate levels with almost identical energies are assumed to be excited in β^- decay and in (t,α).

^{81}As Levels

E(level)[†]	J^π[‡]	$T_{1/2}$	Comments
0	3/2$^-$	33.3 s *10*	$T_{1/2}$: from Adopted Levels.
93.07 *5*	(3/2)$^-$		Total intensity balance yields Iβ=−1 *5*. For I$\beta\leq$4 yields log *ft*≥12.8.
290.40 *4*	(3/2)$^-$		
335.96 *4*	(5/2)$^-$	<0.7 ns	Total intensity balance yields Iβ=4 *6* at the level. $T_{1/2}$: from $\gamma\gamma$(t) (1981Ho24).
737.71 *4*	(5/2)$^-$		
758.45 *7*	(5/2$^-$,3/2$^+$)		
864.34 *16*	(1/2$^-$,3/2$^-$,5/2$^-$)		E(level): this level assigned in ^{81}Ge β- decay (6.4 s) (2022De07). In 1981Ho24, assigned in isomeric ^{81}Ge β- decay (7.6 s). J^π: proposed in 2022De07, based on insignificant β feeding from (9/2$^+$).
1042.00 *7*	(7/2$^-$)		
1083.36 *6*	(3/2$^+$,5/2,7/2$^-$)		J^π: other: (3/2$^-$) in 2022De07.
1128.94 *6*	(9/2$^-$)		
1195.03 *9*	7/2		
1613.55 *9*	(9/2$^+$)		
1870.0 *3*	(5/2$^-$,7/2$^-$,9/2$^-$)		E(level): this level assigned in ^{81}Ge β- decay (6.4 s) (2022De07). In 1981Ho24, assigned in isomeric ^{81}Ge β- decay (7.6 s). J^π: (5/2$^-$,7/2$^-$,9/2$^-$,11/2$^-$) proposed in 2022De07. (1/2,3/2) as of the assignment in 1981Ho24 from isomeric ^{81}Ge β- decay (7.6 s) (1/2$^+$).
1914.91 *13*	(7/2,9/2$^-$)		J^π: (1/2$^-$,3/2$^-$) in 2022De07 based on log $f^u t\geq$8.3.
2008.28 *21*	(7/2,5/2$^-$,9/2$^-$)		
2142.07 *9*	(7/2$^+$)		J^π: (7/2$^-$) in 2022De07, based on log *ft*≥6.5.
2197.1 *4*	(7/2$^-$)		J^π: (5/2$^-$,7/2$^-$,9/2$^-$,11/2$^-$) in 2022De07.
2250.85 *16*	(13/2$^+$)		From total intensity balance Iβ=1.0 *6* gives log *ft*=6.4 *3*. For J^π=(13/2$^+$), it should be a negligible branch from (9/2$^+$).

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^{81}Ge β^- decay (6.4 s) 2022De07,1981Ho24 (continued)

^{81}As Levels (continued)

E(level)[†]	J$^\pi$[‡]	Comments
		J$^\pi$: (5/2$^-$,7/2$^-$,9/2$^-$,11/2$^-$) in 2022De07, based on log *ft*=6.2 *1*.
2624.50 *6*	(9/2$^+$)	J$^\pi$: (7/2$^+$) in 2022De07.
2758.25 *8*	(11/2$^+$)	J$^\pi$: (7/2$^+$,9/2$^+$,11/2$^+$) in 2022De07.
2777.4 *3*	(7/2,9/2$^-$)	J$^\pi$: 5/2$^-$,7/2$^-$,9/2$^-$,11/2$^-$ in 2022De07.
2862.50 *21*	(7/2,9/2$^-$)	E(level): this level assigned in ^{81}Ge β- decay (6.4 s) (2022De07). In 1981Ho24, assigned in isomeric ^{81}Ge β- decay (7.6 s). J$^\pi$: (7/2$^+$,9/2$^+$,11/2$^+$) in 2022De07.
2911.83 *21*	(7/2$^+$,9/2$^+$)	E(level): this level assigned in ^{81}Ge β- decay (6.4 s) (2022De07). In 1981Ho24, assigned in isomeric ^{81}Ge β- decay (7.6 s). J$^\pi$: (7/2$^+$,9/2$^+$,11/2$^+$) in 2022De07.
2965.85 *9*	(7/2$^+$)	In 1981Ho24, 1352.3γ *1* placed from this level, absent in their 1980HoZN and not reported in 2022De07. Also 2228.2γ *5* with Iγ=2.4 *5* (from 2.0 *4*) is reported in 1980HoZN, 1981Ho24, but not reported in 2022De07. The evaluator avoids to list these Eγ.
3290.2 *3*	(7/2,9/2,11/2)	J$^\pi$: other: (5/2$^-$,7/2$^-$,9/2$^-$,11/2$^-$) in 2022De07.
3367.98 *16*	(7/2$^+$,9/2$^+$,11/2$^+$)	E(level): this level assigned in ^{81}Ge β- decay (6.4 s) (2022De07). In 1981Ho24, assigned in isomeric ^{81}Ge β- decay (7.6 s). J$^\pi$: (7/2$^+$,9/2$^+$,11/2$^+$) in 2022De07.

[†] From a least-squares fit to Eγ.
[‡] From Adopted Levels.

β^- radiations

From γ gated β^- endpoint measurements, 1981Al20 determine Q(β) values of 6220 *130* and 6930 *280* for g.s. and isomeric state β^- decay, respectively. These imply E(isomeric state, ^{81}Ge)=710 *310*.
Measured average Eβ=1580 *150* (1990Ru05).
β^- av Eβ: Additional information 3.
av Eβ: Additional information 4.

E(decay)	E(level)	Iβ^-[†]	Log *ft*	Comments
(2874.0 *32*)	3367.98	4.3 *6*	5.19 *6*	av Eβ=1214.5 *14*
(2951.8 *32*)	3290.2	0.55 *23*	6.13 *18*	av Eβ=1251.4 *14*
(3276.2 *32*)	2965.85	15.6 *25*	4.87 *7*	av Eβ=1405.8 *14*
(3330.2 *32*)	2911.83	3.2 *8*	5.59 *11*	av Eβ=1431.5 *14*
(3379.5 *32*)	2862.50	1.7 *4*	5.9 *1*	av Eβ=1455.1 *14*
(3464.6 *32*)	2777.4	0.89 *23*	6.22 *11*	av Eβ=1495.8 *14*
(3483.8 *32*)	2758.25	18 *3*	4.93 *7*	av Eβ=1504.9 *14*
(3617.5 *32*)	2624.50	33 *4*	4.74 *5*	av Eβ=1568.9 *14*
(3991.2 *32*)	2250.85	1.0 *6*	8.07 *26*	av Eβ=1748.2 *14*
(4044.9 *32*)	2197.1	1.7 *4*	6.24 *10*	av Eβ=1774.0 *14*
(4099.9 *32*)	2142.07	3.0 *16*	6.02 *23*	av Eβ=1800.5 *14*
(4233.7 *32*)	2008.28	0.55 *17*	6.82 *13*	av Eβ=1864.8 *14*
(4327.1 *32*)	1914.91	1.8 *17*	6.34 *41*	av Eβ=1909.8 *14* Additional information 1.
(4372.0 *32*)	1870.0	0.9 *2*	6.67 *10*	av Eβ=1931.4 *14*
(5113.1 *32*)	1128.94	≤5	≥6.2	av Eβ=2288.9 *14* av Eβ=2294.6 *20* Iβ^-: from total intensity balance of −1 *6*.
(5200.0 *32*)	1042.00	1.9 *18*	6.68 *41*	av Eβ=2330.9 *14* Additional information 2.
(5483.6 *32*)	758.45	4.5 *21*	6.41 *20*	av Eβ=2468.0 *15*

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^{81}Ge β^- decay (6.4 s) 2022De07,1981Ho24 (continued)

β^- radiations (continued)

E(decay)	E(level)	Iβ^-[†]	Log *ft*	Comments
(5951.6[‡] *32*)	290.40	3.0 *23*	10.73 *33*	av Eβ=2693.7 *14* For a second forbidden transition − expected $\Delta\pi$=no.

[†] Absolute intensity per 100 decays.
[‡] Existence of this branch is questionable.

^{81}Ge β^- decay (6.4 s) 2022De07,1981Ho24 (continued)

$\gamma(^{81}As)$

Iγ normalization: from ΣI(γ+ce) to g.s.=100% (no g.s. β feeding expected because ΔJ=(3), Δπ=(yes)).
Measured average Eγ=2000 *222* (1990Ru05).

E_γ [†]	I_γ [‡ b]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	δ	α [a]	Comments
93.10 *10*	30 *7*	93.07	(3/2)$^-$	0	3/2$^-$	M1+E2	0.24 *6*	0.160 *26*	%Iγ=16.6 *32* α(K)exp=0.141 *21* (1981Ho24) α(K)=0.140 *22*; α(L)=0.0166 *31*; α(M)=0.0025 *5* α(N)=0.000182 *31* E_γ: other: 93.0 *2* (2022De07). I_γ: weighted average of 36 *5* (from Iγ(1+α)=40 6 (2022De07) for M1, where α(93.0)(M1)=0.1097 *17*), and 23 *5* (from 19 *4* in 1980HoZN). %Iγ=13.4 *24* based on proposed decay-scheme normalization. δ: from α(K)exp.
133.70 *6*	9.8 *23*	2758.25	(11/2$^+$)	2624.50	(9/2$^+$)				%Iγ=5.4 *13* E_γ: other: 133.6 *2* (2022De07). I_γ: unweighted average of 7.5 *5* (from 6.2 *4* in 1980HoZN) and 12 *2* (2022De07).
197.30 *5*	16.5 *19*	290.40	(3/2)$^-$	93.07	(3/2)$^-$	(M1)		0.01490 *21*	%Iγ=9.1 *12* α(K)exp=0.010 *5* (1981Ho24) α(K)=0.01326 *19*; α(L)=0.001411 *20*; α(M)=0.0002153 *30* α(N)=1.633×10^{-5} *23* E_γ: other: 197.1 *2* (2022De07). I_γ: weighted average of 26 *6* (2022De07) and 16.1 *12* (from 13.4 *10* in 1980HoZN). Mult.: M1 or E1 from α(K)exp.
242.84 *9*	4.4 *5*	335.96	(5/2)$^-$	93.07	(3/2)$^-$				%Iγ=2.44 *31* E_γ: other: 242.7 *2* (2022De07). I_γ: weighted average of 5.3 *9* (2022De07) and 4.1 *5* (from 3.4 *4* in 1980HoZN).
290.35 *5*	11.2 *28*	290.40	(3/2)$^-$	0	3/2$^-$				%Iγ=6.2 *15* E_γ: other: 290.3 *2* (2022De07). I_γ: unweighted average of 14 *2* (2022De07) and 8.4 *8* (from 7.0 *7* in 1980HoZN).
335.98 *5*	100 *4*	335.96	(5/2)$^-$	0	3/2$^-$	M1,E2		0.0067 *27*	%Iγ=55.4 *29* α(K)exp=0.0064 *32* (1981Ho24) α(K)=0.0059 *24*; α(L)=6.4×10^{-4} *27*; α(M)=1.0×10^{-4} *4* α(N)=7.2×10^{-6} *29* E_γ: other: 335.9 *2* (2022De07). I_γ: from 83 *3* (1980HoZN). Other: 100 *5* (2022De07). %Iγ=58.6 *23* based on proposed decay-scheme normalization.

$^{81}_{33}As_{48}$-4

^{81}Ge β^- decay (6.4 s) 2022De07,1981Ho24 (continued)

$\gamma(^{81}As)$ (continued)

E_γ[†]	I_γ[‡b]	E_i(level)	J_i^π	E_f	J_f^π	Comments
						δ: both α(K)(M1) and α(K)(E2) lie within limits of experimental uncertainty.
391.34 *11*	4.1 *4*	1128.94	$(9/2^-)$	737.71	$(5/2)^-$	%Iγ=2.27 *25* E_γ: other: 391.3 *2* (2022De07). I_γ: weighted average of 4.6 *8* (2022De07) and 4.0 *4* (from 3.3 *3* in 1980HoZN).
401.75 *5*	10 *3*	737.71	$(5/2)^-$	335.96	$(5/2)^-$	%Iγ=5.5 *17* E_γ: other: 401.6 *2* (2022De07). I_γ: unweighted average of 13 *2* (2022De07) and 7.1 *6* (from 5.9 *5* in 1980HoZN).
456.2[&] *2*	2.8[&] *5*	3367.98	$(7/2^+,9/2^+,11/2^+)$	2911.83	$(7/2^+,9/2^+)$	%Iγ=1.55 *29* E_γ: other: 456.3 *2* (1981Ho24). In 1981Ho24, assigned in isomeric ^{81}Ge β- decay (7.6 s).
[x]463.1[#] *3*	2.3[#] *5*					I_γ: from 1.9 *4* (1980HoZN).
467.98 *6*	5.0 *12*	758.45	$(5/2^-,3/2^+)$	290.40	$(3/2)^-$	%Iγ=2.8 *7* E_γ: other: 467.8 *2* (2022De07). I_γ: weighted average of 8 *3* (2022De07 – corrected for ^{81}Se transition) and 4.5 *12* (from 3.7 *10* in 1980HoZN).
482.4 *1*	13.0 *12*	2624.50	$(9/2^+)$	2142.07	$(7/2^+)$	%Iγ=7.2 *8* E_γ: other: 482.5 *2* (2022De07). I_γ: weighted average of 13.3 *12* (from 11 *1* in 1980HoZN) and 12 *2* (2022De07).
507.3 *2*	1.6 *8*	2758.25	$(11/2^+)$	2250.85	$(13/2^+)$	%Iγ=0.9 *4* E_γ: other: 507.4 *3* (1980HoZN, E=507.2 in Fig in 1981Ho24). I_γ: unweighted average of 2.4 *6* (from 2.0 *5* in 1980HoZN) and 0.8 *3* (2022De07).
[x]609.1[#] *3*	2.3[#] *5*					I_γ: from 1.9 *4* (1980HoZN).
616.3 *2*	2.7 *5*	2758.25	$(11/2^+)$	2142.07	$(7/2^+)$	%Iγ=1.50 *29* E_γ: other: 616.4 *4* (2022De07). I_γ: weighted average of 3.1 *6* (from 2.6 *5* – 1980HoZN) and 2.4 *5* (2022De07).
637.2 *2*	3.4 *6*	2250.85	$(13/2^+)$	1613.55	$(9/2^+)$	%Iγ=1.88 *35* E_γ: other: 637.3 *3* (1980HoZN). I_γ: weighted average of 2.9 *6* (from 2.4 *5* in 1980HoZN) and 4.0 *7* (2022De07).
665.7[c] *3*	1.0[c] *4*	3290.2	(7/2,9/2,11/2)	2624.50	$(9/2^+)$	%Iγ=0.55 *22* E_γ: weighted average of 665.5 *3* (2022De07) and 665.9 *3* (1980HoZN). I_γ: estimated value from γ-γ coin for the doublet (2022De07). Other: 6 from 5 (from Fig. in 1981Ho24. Iγ=11.0 *20* for multiplet in 1980HoZN, both isomers combined).
665.9[c] *2*	9[c] *2*	758.45	$(5/2^-,3/2^+)$	93.07	$(3/2)^-$	%Iγ=5.0 *11* E_γ: also same 665.9 *2* (1980HoZN – table 11). I_γ: estimated value from γ-γ coin for the doublet (2022De07). Other: 3.6 from 3 (from Fig. in 1981Ho24. Iγ=11.0 *20* for multiplet in 1980HoZN, both isomers combined).
706.07 *10*	8.3 *23*	1042.00	$(7/2^-)$	335.96	$(5/2)^-$	%Iγ=4.6 *13* E_γ: other: 705.8 *2* (2022De07). I_γ: unweighted average of 6 *1* (2022De07) and 10.5 *8* (from 8.7 *7* in 1980HoZN).

$^{81}_{33}As_{48}$-5

^{81}Ge β^- decay (6.4 s) 2022De07,1981Ho24 (continued)

$\gamma(^{81}As)$ (continued)

E_γ [†]	I_γ [‡b]	E_i(level)	J_i^π	E_f	J_f^π	Comments
709.3 *3*	6.3 *15*	2624.50	$(9/2^+)$	1914.91	$(7/2,9/2^-)$	%Iγ=3.5 *9* E_γ: weighted average of 709.6 *4* (2022De07) and 709.1 *3* (1980HoZN). I_γ: other: 8 *1* (2022De07).
737.74 *5*	20.9 *12*	737.71	$(5/2)^-$	0	$3/2^-$	%Iγ=11.6 *9* E_γ: other: 737.7 *2* (2022De07). I_γ: weighted average of 25 *4* (2022De07) and 20.5 *12* (from 17 *1* in 1980HoZN).
747.41 *10*	11.8 *15*	1083.36	$(3/2^+,5/2,7/2^-)$	335.96	$(5/2)^-$	%Iγ=6.5 *9* E_γ: other: 747.3 *2* (2022De07). I_γ: weighted average of 8 *2* (2022De07) and 12.4 *8* (from 10.3 *7* in 1980HoZN).
751.51 *10*	11.5 *8*	1042.00	$(7/2^-)$	290.40	$(3/2)^-$	%Iγ=6.4 *6* E_γ: other: 751.4 *2* (2022De07). I_γ: weighted average of 10 *2* (2022De07) and 11.7 *8* (from 9.7 *7* in 1980HoZN).
758.4 *2*	9.5 *8*	758.45	$(5/2^-,3/2^+)$	0	$3/2^-$	%Iγ=5.3 *5* E_γ: other: 758.5 *6* (1980HoZN). I_γ: weighted average of 9 *2* (2022De07) and 9.6 *8* (from 8.0 *7* in 1980HoZN).
771.26 *15*	1.9 *4*	864.34	$(1/2^-,3/2^-,5/2^-)$	93.07	$(3/2)^-$	%Iγ=1.05 *23* E_γ: from 1981Ho24, assigned in isomeric ^{81}Ge β- decay (7.6 s) Other: 771.3 *2* (2022De07).
792.94[c] *6*	6[c] *2*	1083.36	$(3/2^+,5/2,7/2^-)$	290.40	$(3/2)^-$	%Iγ=3.3 *11* E_γ: other: 792.8 *2* (2022De07), 792.9 *3* in Table 1. I_γ: estimated value from γ-γ coin for the doublet (2022De07). Other: 8.4 from 7 (From Fig in 1981Ho24. Iγ=55 *2* for doublet in 1980HoZN).
792.94[c] *6*	44[c] *8*	1128.94	$(9/2^-)$	335.96	$(5/2)^-$	%Iγ=24 *5* E_γ: other: 792.8 *2* (2022De07). I_γ: estimated value from γ-γ coin for the doublet (2022De07). Other: 58 from 48 (From Fig in 1981Ho24. Iγ=55 *2* for doublet in 1980HoZN).
859.13 *10*	11.3 *23*	1195.03	7/2	335.96	$(5/2)^-$	%Iγ=6.9 *12* E_γ: other: 859.0 *2* (2022De07). I_γ: unweighted average of 13.6 *11* (from 11.3 *9* in 1980HoZN) and 9 *2* (2022De07).
875.84 *10*	18.4 *20*	1613.55	$(9/2^+)$	737.71	$(5/2)^-$	%Iγ=10.2 *12* E_γ: other: 875.9 *2* (2022De07). I_γ: weighted average of 19.3 *14* from (from 16.0 *12* in 1980HoZN) and 14 *3* (2022De07).
990.5 *2*	1.6 *3*	1083.36	$(3/2^+,5/2,7/2^-)$	93.07	$(3/2)^-$	%Iγ=0.89 *17* E_γ: weighted average of 990.5 *2* (2022De07) and 990.3 *4* (1980HoZN). I_γ: weighted average of 1.5 *3* (2022De07) and 2.4 *12* (from 2 *1* in 1980HoZN).
1005.7 *2*	1.6 *3*	1870.0	$(5/2^-,7/2^-,9/2^-)$	864.34	$(1/2^-,3/2^-,5/2^-)$	%Iγ=0.89 *17* E_γ: in 1981Ho24 (1005.7 *3*), assigned in isomeric ^{81}Ge β- decay (7.6 s).
1013.0 *2*	13.6 *26*	2142.07	$(7/2^+)$	1128.94	$(9/2^-)$	%Iγ=8.1 *13* E_γ: other: 1012.9 *2* (2022De07).

$^{81}_{33}As_{48}$-6

^{81}Ge β^- decay (6.4 s) 2022De07,1981Ho24 (continued)

$\gamma(^{81}As)$ (continued)

E_γ [†]	I_γ [‡b]	E_i(level)	J_i^π	E_f	J_f^π	Comments
						I_γ: unweighted average of 16.1 *13* (from 13.4 *11* in 1980HoZN) and 11 *2* (2022De07).
x1038.5# *4*	2.0# *6*					I_γ: from 1.7 *5* (1980HoZN).
x1056.5# *2*	5.1# *5*					I_γ: from 4.2 *4* (1980HoZN).
1058.6 *2*	5.8 *6*	2142.07	$(7/2^+)$	1083.36	$(3/2^+,5/2,7/2^-)$	%Iγ=3.2 *4* E_γ: other: Also 1058.6 *2* (2022De07). I_γ: weighted average of 6.1 *4* (from 5.1 *3* in 1980HoZN) and 4.5 *9* (2022De07).
1083.3 *2*	3.4 *15*	1083.36	$(3/2^+,5/2,7/2^-)$	0	$3/2^-$	%Iγ=1.9 *8* E_γ: other: 1083.2 *3* (1980HoZN). I_γ: unweighted average of 1.9 *4* (2022De07) and 4.8 *12* (from 4 *1* in 1980HoZN).
x1095.5# *3*	3.6# *4*					I_γ: from 3.0 *4* (1980HoZN).
1100.2 *2*	3.6 *4*	2142.07	$(7/2^+)$	1042.00	$(7/2^-)$	%Iγ=1.99 *25* E_γ: weighted average of 1100.1 *2* (2022De07) and 1100.3 *2* (1980HoZN). I_γ: weighted average of 3.9 *5* (from 3.2 *4* in 1980HoZN) and 3.1 *6* (2022De07).
1144.75 *15*	10 *4*	2758.25	$(11/2^+)$	1613.55	$(9/2^+)$	%Iγ=5.5 *22* E_γ: other: 1144.7 *2* (2022De07). I_γ: unweighted average of 13.9 *10* (from 11.5 *8* in 1980HoZN) and 6 *1* (2022De07).
1156.41 *15*	11.6 *26*	1914.91	$(7/2,9/2^-)$	758.45	$(5/2^-,3/2^+)$	%Iγ=6.4 *15* E_γ: other: 1156.3 *2* (2022De07). I_γ: unweighted average of 14.2 *10* from (from 11.8 *8* in 1980HoZN) and 9 *2* (2022De07).
1225.8& *2*	2.9& *6*	3367.98	$(7/2^+,9/2^+,11/2^+)$	2142.07	$(7/2^+)$	%Iγ=1.61 *34* E_γ,I_γ: unplaced in 1980HoZN with Iγ=4.1 *5*.
x1238.9# *3*	2.9# *5*					I_γ: from 2.4 *4* (1980HoZN).
x1256.1# *2*	1.3# *4*					I_γ: from 1.1 *3* (1980HoZN).
x1297.4# *3*	3.4# *5*					I_γ: from 2.8 *4* (1980HoZN).
x1352.3#	1.2#					E_γ: not in table 11 (1980HoZN) but shown in drawing (1981Ho24) from 2966 keV level. Not reported in 2022De07. Evaluator list it as unplaced.
1429.53 *10*	11.3 *23*	2624.50	$(9/2^+)$	1195.03	7/2	I_γ: from 1 (1980HoZN). %Iγ=6.3 *13* E_γ: other: 1429.6 *5* (2022De07). I_γ: unweighted average of 13.6 *7* (from 11.3 *6* in 1980HoZN) and 9 *2* (2022De07).
x1435.7# *2*	5.4# *6*					I_γ: from 4.5 *5* (1980HoZN).
1453.1& *2*	2.0& *4*	3367.98	$(7/2^+,9/2^+,11/2^+)$	1914.91	$(7/2,9/2^-)$	%Iγ=1.11 *23*
1495.53 *5*	28 *5*	2624.50	$(9/2^+)$	1128.94	$(9/2^-)$	%Iγ=15.5 *29* E_γ: other: 1495.7 *2* (2022De07).

$^{81}_{33}As_{48}$-7

^{81}Ge β^- decay (6.4 s) 2022De07,1981Ho24 (continued)

$\gamma(^{81}As)$ (continued)

E_γ [†]	I_γ [‡b]	E_i(level)	J_i^π	E_f	J_f^π	Comments
						I_γ: unweighted average of 33.7 *11* (from 28.0 *9* in 1980HoZN) and 23 *4* (2022De07).
1582.27 *15*	8.9 *19*	2624.50	$(9/2^+)$	1042.00	$(7/2^-)$	%Iγ=4.9 *11* E_γ: other: 1582.7 *8* (2022De07). I_γ: unweighted average of 10.7 *7* (from 8.9 *6* in 1980HoZN) and 7 *1* (2022De07).
1629.45 *13*	7.5 *9*	2758.25	$(11/2^+)$	1128.94	$(9/2^-)$	%Iγ=4.2 *5* E_γ: other: 1629.5 *2* (2022De07). I_γ: weighted average of 8.0 *6* (from 6.6 *5* in 1980HoZN) and 6 *1* (2022De07).
1672.3[&] *2*	1.0[&] *3*	2008.28	$(7/2,5/2^-,9/2^-)$	335.96	$(5/2)^-$	%Iγ=0.55 *17*
[x]1686.5[#] *3*	1.3[#] *2*					I_γ: from 1.1 *2* (1980HoZN).
1869.9[&] *5*	3.8[&] *7*	2911.83	$(7/2^+,9/2^+)$	1042.00	$(7/2^-)$	%Iγ=2.1 *4* E_γ: other: 1869.8γ *2* multiply placed including from 1869.8 keV level in 1980HoZN in the isomeric ^{81}Ge β- decay (7.6 s).
1882.51 *8*	18 *4*	2965.85	$(7/2^+)$	1083.36	$(3/2^+,5/2,7/2^-)$	%Iγ=10.0 *23* E_γ: other: 1882.5 *2* (2022De07). I_γ: unweighted average of 22.2 *10* from (from 18.4 *8* in 1980HoZN) and 14 *3* (2022De07).
1886.8 *2*	2.0 *3*	2624.50	$(9/2^+)$	737.71	$(5/2)^-$	%Iγ=1.11 *18* E_γ: other: 1886.9 *5* (2022De07). I_γ: weighted average of 1.9 *2* (from 1.6 *2* in 1980HoZN) and 2.8 *6* (2022De07).
2104.0[&] *4*	3.0[&] *6*	2197.1	$(7/2^-)$	93.07	$(3/2)^-$	%Iγ=1.66 *34* E_γ: in 1980HoZN, a comparable 2103.9γ *3* placed from 2862 keV level in the isomeric ^{81}Ge β- decay (7.6 s).
2174.3[&] *5*	4.7[&] *9*	2911.83	$(7/2^+,9/2^+)$	737.71	$(5/2)^-$	%Iγ=2.6 *5* E_γ: other: 2174.32 *15* (1980HoZN) assigned in isomeric ^{81}Ge β- decay (7.6 s) (1981Ho24).
2207.2 *2*	3.7 *5*	2965.85	$(7/2^+)$	758.45	$(5/2^-,3/2^+)$	%Iγ=2.05 *30* E_γ: weighted average of 2207.1 *2* (2022De07) and 2207.5 *3* (1980HoZN). I_γ: weighted average of 3.6 *5* from (from 3.0 *4* in 1980HoZN) and 3.9 *8* (2022De07).
[x]2228.2[#] *5*	2.4[#] *5*					E_γ: placement from 2966 keV level in 1980HoZN. Not reported in 2022De07. Evaluator list it as unplaced. I_γ: from 2.0 *4* (1980HoZN).
2441.4[&] *3*	1.6[&] *4*	2777.4	$(7/2,9/2^-)$	335.96	$(5/2)^-$	%Iγ=0.89 *23*
2526.5 *2*	3.1 *6*	2862.50	$(7/2,9/2^-)$	335.96	$(5/2)^-$	%Iγ=1.72 *35* E_γ: in 1981Ho24, assigned in isomeric ^{81}Ge β- decay (7.6 s). Other: 2526.5 *3* (2022De07).
2629.8 *2*	6.4 *10*	2965.85	$(7/2^+)$	335.96	$(5/2)^-$	%Iγ=3.5 *6* E_γ: weighted average of 2629.7 *2* (2022De07) and 2629.9 *2* (1980HoZN). I_γ: weighted average of 7.1 *7* from (from 5.9 *6* in 1980HoZN) and 5 *1* (2022De07).

$^{81}_{33}As_{48}$-8

^{81}Ge β^- decay (6.4 s) 2022De07,1981Ho24 (continued)

$\gamma(^{81}As)$ (continued)

E_γ [†]	I_γ [‡ b]	E_i(level)	Comments
[x]2754.8 *3*	5.4 *6*		I_γ: from 4.5 *5* (1980HoZN).

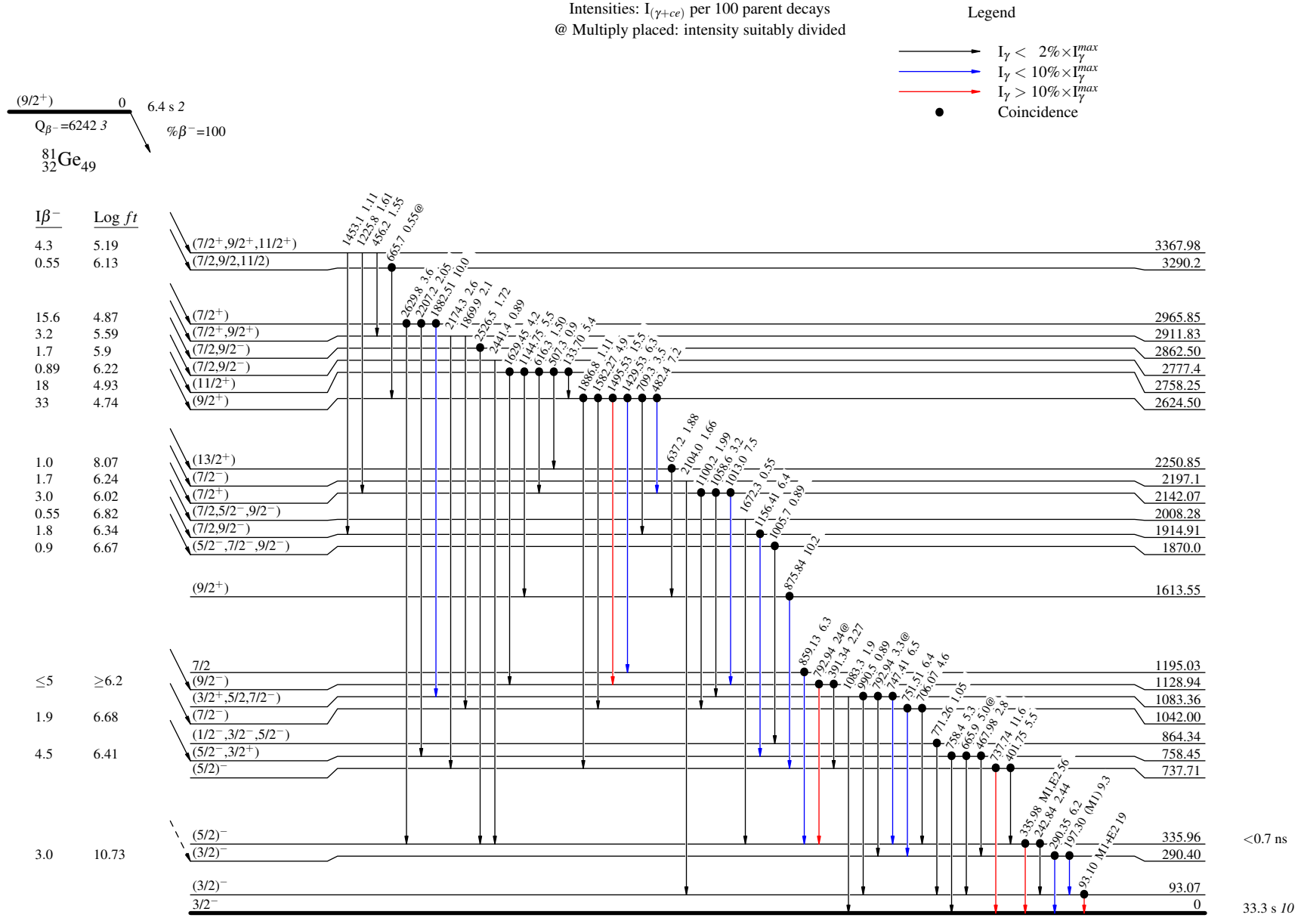
[†] From 1981Ho24, except where otherwise noted. $\Delta E\gamma$ are listed in 1980HoZN, not in 1981Ho24. Unplaced γs are from 1980HoZN.
[‡] From 2022De07, except where otherwise noted. In 1980HoZN, total $I\gamma(335)=100$ *4* for g.s. and isomeric decays [from 83 *3* and 17 *3*]. Scaling factor of 100/83 was used to normalize the 1980HoZN data listed in the comments. $I\gamma$ were divided for common γ rays. In 2022De07, reported $I\gamma$ for the purified g.s. decay only.
[#] Unplaced $E\gamma$ and uncertainties for all $E\gamma$ are from 1980HoZN (table 11).
[@] From Adopted Gammas. Assignments from α(K)exp (1981Ho24) of this dataset are listed in the comments.
[&] From 2022De07.
[a] Additional information 5.
[b] For absolute intensity per 100 decays, multiply by 0.554 *30*.
[c] Multiply placed with intensity suitably divided.
[x] γ ray not placed in level scheme.

$^{81}_{33}As_{48}$-9

^{81}Ge β^- decay (6.4 s) 2022De07,1981Ho24

Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays
@ Multiply placed: intensity suitably divided



$^{81}_{33}As_{48}$

$^{81}_{33}As_{48}$-10