^{201}Au β^- decay 1972Pa24

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev	NDS 187,355 (2023)	20-Sep-2022

Parent: ^{201}Au: E=0; J^π=3/2$^+$; $T_{1/2}$=26.0 min *8*; Q(β^-)=1262 *3*; %β^- decay=100

1972Pa24: Source produced by irradiating natural mercury targets of 10-100 g with 14.5 MeV neutrons; Detectors: Ge(Li), Si(Li) and NaI(Tl); Measured: γ singles, $\gamma\gamma$ coin, β^-, Eγ, Iγ.

^{201}Hg Levels

E(level)†	J^π‡	$T_{1/2}$
0.0	3/2$^-$	
1.5648 *10*	1/2$^-$	81 ns *5*
26.2738 *3*	5/2$^-$	629 ps *18*
32.168 *14*	3/2$^-$	55 ps *24*
167.48 *4*	1/2$^-$	<44 ps
384.605 *17*	(5/2)$^-$	
464.41 *4*	5/2$^-$	2.6 ps +*10*−*11*
542.81 *17*	1/2$^-$,3/2,5/2	
552.89 *13*	1/2$^-$,3/2$^-$,5/2$^-$	
645.4 *3*	(5/2)$^-$	
732.3 *4*	1/2$^-$,3/2$^-$	
1187.8 *5*		

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

β^- radiations

E(decay)	E(level)	Iβ^-†‡	Log *ft*	Comments
(529.7 *30*)	732.3	0.43 *10*	6.67 *11*	av Eβ=158.6 *11*
(616.6 *30*)	645.4	1.23 *19*	6.43 *7*	av Eβ=188.6 *11*
(709.1 *30*)	552.89	3.0 *5*	6.25 *8*	av Eβ=221.4 *11*
(719.2 *30*)	542.81	3.3 *5*	6.23 *7*	av Eβ=225.0 *11*
(797.6 *30*)	464.41	0.47 *11*	7.23 *11*	av Eβ=253.6 *11*
(877.4 *30*)	384.605	0.96 *17*	7.07 *8*	av Eβ=283.2 *12*
(1094.5 *30*)	167.48	3.5 *6*	6.85 *8*	av Eβ=366.1 *12*
(1229.8 *30*)	32.168	≈8	≈6.7	av Eβ=419.3 *12*
(1262.0 *30*)	0.0	79 *3*	≥5.717	av Eβ=432.1 *12* Iβ^-: An upper limit which includes contribution to the 0.0-keV, 1.5648-keV and 26.2738-keV levels.

† From intensity balances, as explained in the text.
‡ Absolute intensity per 100 decays.

γ(^{201}Hg)

Iγ normalization: From Iβ(167.47 keV level)=3.5% (1972Pa24) and I(γ+ce) deduced from the decay scheme. Evaluator assigns 10% uncertainty to the Iβ(167.47-keV level) value.

E_γ[‡]	I_γ[‡@]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	δ[#]	α[†]	Comments
1.5648[#] 10		1.5648	1/2⁻	0.0	3/2⁻	M1+E2	0.0105 14	4.7×10^4 7	α: From adopted gammas.
(5.895 20)	≈0.002	32.168	3/2⁻	26.2738	5/2⁻	[M1]		1441 25	%Iγ≈3.6×10^{-5} α(M)=1106 19 α(N)=279 5; α(O)=52.6 9; α(P)=4.02 7 I_γ: From Iγ(5.895γ)/Iγ(30.60γ) from adopted gammas and Iγ(30.60γ)=6.9.
26.2738[#] 3		26.2738	5/2⁻	0.0	3/2⁻	M1+E2	0.012 8	72.9 13	α(L)=55.9 10; α(M)=13.05 24 α(N)=3.27 6; α(O)=0.618 11; α(P)=0.0470 7
30.60[#] 3	≈6.9	32.168	3/2⁻	1.5648	1/2⁻	M1+E2	0.013 5	46.4 7	%Iγ≈0.126 α(L)=35.6 5; α(M)=8.30 13 α(N)=2.082 32; α(O)=0.393 6; α(P)=0.0299 4 I_γ: From I(γ+ce) and α.
32.19[#] 3	≈7.4	32.168	3/2⁻	0.0	3/2⁻	M1+E2	0.0204 25	40.2 6	%Iγ≈0.135 α(L)=30.8 4; α(M)=7.20 11 α(N)=1.804 26; α(O)=0.341 5; α(P)=0.0257 4 I_γ: From I(γ+ce) and α.
135.34[#] 4	13.8 13	167.48	1/2⁻	32.168	3/2⁻	M1+E2	−0.07 4	3.32 5	%Iγ=0.25 4 α(K)=2.71 4; α(L)=0.463 7; α(M)=0.1080 18 α(N)=0.0271 4; α(O)=0.00512 8; α(P)=0.000388 6 I_γ: From Iγ(135.34γ)/Iγ(167.43γ) in adopted gammas and Iγ(167.43γ)=53 5; Other: 18 5 in 1972Pa24.
141.1[#] 2	≈0.014	167.48	1/2⁻	26.2738	5/2⁻	[E2]		1.389 21	%Iγ≈0.000255 α(K)=0.374 5; α(L)=0.760 12; α(M)=0.1980 30 α(N)=0.0491 8; α(O)=0.00821 13; α(P)=4.92×10^{-5} 7 I_γ: From Iγ(141.1γ)/Iγ(167.43γ) in adopted gammas and Iγ(167.43γ)=53 5.
165.88[#] 7	0.78 7	167.48	1/2⁻	1.5648	1/2⁻	M1		1.869 26	%Iγ=0.0142 21 α(K)=1.532 22; α(L)=0.258 4; α(M)=0.0602 8 α(N)=0.01509 21; α(O)=0.00286 4; α(P)=0.0002184 31 I_γ: From Iγ(165.88γ)/Iγ(167.43γ) in adopted gammas and Iγ(167.43γ)=53 5; Other: 0.7 from I(γ+ce) in 1972Pa24 and α.
167.43[#] 7	53 5	167.48	1/2⁻	0.0	3/2⁻	M1+E2	0.07 6	1.815 29	%Iγ=0.96 15 α(K)=1.486 25; α(L)=0.252 4; α(M)=0.0588 9 α(N)=0.01474 23; α(O)=0.00279 4; α(P)=0.000212 4

$^{201}_{80}$Hg$_{121}$-2

^{201}Au β^- decay 1972Pa24 (continued)

$\gamma(^{201}Hg)$ (continued)

E_γ‡	I_γ‡@	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	δ#	α†	Comments
352.42# *5*	19 *4*	384.605	(5/2)$^-$	32.168	3/2$^-$	M1(+E2)	+0.07 *7*	0.232 *4*	%Iγ=0.35 *8* α(K)=0.1909 *34*; α(L)=0.0318 *5*; α(M)=0.00739 *11* α(N)=0.001853 *28*; α(O)=0.000351 *5*; α(P)=2.69×10^{-5} *5*
358.36# *4*	10.3 *22*	384.605	(5/2)$^-$	26.2738	5/2$^-$	M1+E2		0.14 *8*	%Iγ=0.19 *5* α(K)=0.11 *7*; α(L)=0.024 *7*; α(M)=0.0057 *14* α(N)=0.00142 *35*; α(O)=2.6×10^{-4} *8*; α(P)=1.6×10^{-5} *10* I_γ: Iγ(358.36γ)/Iγ(352.42γ) in adopted gammas and Iγ(352.42γ)=19 *4*.
384.60# *2*	15 *3*	384.605	(5/2)$^-$	0.0	3/2$^-$	M1+E2		0.12 *7*	%Iγ=0.27 *6* α(K)=0.146 *5*; α(L)=0.0245 *6*; α(M)=0.00571 *13* α(N)=0.001432 *34*; α(O)=0.000271 *7*; α(P)=2.05×10^{-5} *8* I_γ: From Iγ(384.60γ)/Iγ(352.42γ) in adopted gammas and Iγ(352.42γ)=19 *4*.
385.1 *2*	19 *5*	552.89	1/2$^-$,3/2$^-$,5/2$^-$	167.48	1/2$^-$				%Iγ=0.35 *10* I_γ: From Iγ(385.1γ)/Iγ(552.8γ) in adopted gammas and Iγ(552.8γ)=44 *5*.
432.32 *7*	0.99 *6*	464.41	5/2$^-$	32.168	3/2$^-$	M1+E2	+1.4 *6*	0.071 *26*	%Iγ=0.0180 *24* α(K)=0.055 *23*; α(L)=0.0121 *25*; α(M)=0.0029 *6* α(N)=0.00073 *14*; α(O)=0.000133 *28*; α(P)=7.6×10^{-6} *33* E_γ,I_γ,Mult.,δ: From adopted gammas.
438.11# *6*	17 *4*	464.41	5/2$^-$	26.2738	5/2$^-$	M1(+E2)	≤0.1	0.1297 *19*	%Iγ=0.31 *8* α(K)=0.1067 *15*; α(L)=0.01765 *25*; α(M)=0.00410 *6* α(N)=0.001028 *15*; α(O)=0.0001946 *28*; α(P)=1.495×10^{-5} *22*
464.39# *5*	5.4 *13*	464.41	5/2$^-$	0.0	3/2$^-$	M1+E2	+1.4 *+13−6*	0.059 *22*	%Iγ=0.098 *26* α(K)=0.046 *19*; α(L)=0.0098 *22*; α(M)=0.0024 *5* α(N)=0.00059 *12*; α(O)=0.000108 *24*; α(P)=6.3×10^{-6} *27*
517.0 *3*	69 *7*	542.81	1/2$^-$,3/2,5/2	26.2738	5/2$^-$	[M1,E2]		0.054 *30*	%Iγ=1.26 *20* α(K)=0.044 *26*; α(L)=0.0082 *31*; α(M)=0.0019 *7* α(N)=4.9×10^{-4} *17*; α(O)=9.1×10^{-5} *35*; α(P)=6.E−6 *4*
521.0 *4*	51 *5*	552.89	1/2$^-$,3/2$^-$,5/2$^-$	32.168	3/2$^-$	[M1]		0.0823 *12*	%Iγ=0.93 *14* α(K)=0.0678 *10*; α(L)=0.01114 *16*; α(M)=0.00259 *4* α(N)=0.000648 *9*; α(O)=0.0001228 *17*; α(P)=9.46×10^{-6} *13* I_γ: From Iγ(521.0γ)/Iγ(552.8γ) in adopted gammas and Iγ(552.8γ)=44 *5*.
526.9 *2*	43 *5*	552.89	1/2$^-$,3/2$^-$,5/2$^-$	26.2738	5/2$^-$	[M1,E2]		0.052 *28*	%Iγ=0.78 *13* α(K)=0.042 *24*; α(L)=0.0078 *30*; α(M)=0.0018 *7* α(N)=4.6×10^{-4} *17*; α(O)=8.6×10^{-5} *33*; α(P)=5.7×10^{-6}

$^{201}_{80}Hg_{121}$-3

γ(^{201}Hg) (continued)

E_γ ‡	I_γ ‡@	E_i(level)	J^π_i	E_f	J^π_f	Mult.#	α†	Comments
								34 I_γ: From Iγ(526.9γ)/Iγ(552.8γ) in adopted gammas and Iγ(552.8γ)=44 *5*. I_γ: From adopted gammas, normalized to Iγ(553γ).
542.6 *2*	100	542.81	$1/2^-$,3/2,5/2	0.0	$3/2^-$	[M1,E1]	0.0739 *10*	%Iγ=1.82 *22* α(K)=0.0609 *9*; α(L)=0.01000 *14*; α(M)=0.002321 *33* α(N)=0.000582 *8*; α(O)=0.0001102 *15*; α(P)=8.50×10^{-6} *12* E_γ,I_γ: Probably includes components to g.s. and 1.5648 keV levels.
552.8 *3*	44 *5*	552.89	$1/2^-$,$3/2^-$,$5/2^-$	0.0	$3/2^-$	[M1]	0.0704 *10*	%Iγ=0.80 *13* α(K)=0.0580 *8*; α(L)=0.00952 *13*; α(M)=0.002209 *31* α(N)=0.000554 *8*; α(O)=0.0001049 *15*; α(P)=8.09×10^{-6} *11*
613.2 *3*	64 *6*	645.4	$(5/2)^-$	32.168	$3/2^-$	[M1]	0.0537 *8*	%Iγ=1.16 *18* α(K)=0.0443 *6*; α(L)=0.00724 *10*; α(M)=0.001679 *24* α(N)=0.000421 *6*; α(O)=7.98×10^{-5} *11*; α(P)=6.16×10^{-6} *9*
645.0& *4*	35 *4*	645.4	$(5/2)^-$	0.0	$3/2^-$	[M1]	0.0471 *7*	%Iγ=0.64 *11* α(K)=0.0388 *5*; α(L)=0.00634 *9*; α(M)=0.001470 *21* α(N)=0.000369 *5*; α(O)=6.98×10^{-5} *10*; α(P)=5.40×10^{-6} *8*
645.0 *4*		1187.8		542.81	$1/2^-$,3/2,5/2			I_γ: a value of 35 *4* in 1972Pa24 would lead to Iβ=0.64% *11* and log *ft*=3.80 which seem too low.
732.3 *4*	23 *4*	732.3	$1/2^-$,$3/2^-$	0.0	$3/2^-$	[M1]	0.0339 *5*	%Iγ=0.42 *9* α(K)=0.0280 *4*; α(L)=0.00455 *6*; α(M)=0.001054 *15* α(N)=0.000264 *4*; α(O)=5.01×10^{-5} *7*; α(P)=3.88×10^{-6} *5*

† Additional information 1.
‡ From 1972Pa24, unless otherwise stated. Kα x ray ≈90, L_α x ray ≈85 and L_β x ray ≈55 (1972Pa24).
# From adopted gammas.
@ For absolute intensity per 100 decays, multiply by 0.0182 *22*.
& Placement of transition in the level scheme is uncertain.

^{201}Au β^- decay 1972Pa24

Decay Scheme

Intensities: I_γ per 100 parent decays