^{180}Yb β^- decay 1995Me03,1987Ru04

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	E. A. Mccutchan	NDS 126, 151 (2015)	1-Feb-2015

Parent: ^{180}Yb: E=0.0; $J^\pi=0^+$; $T_{1/2}$=2.4 min *5*; Q(β^-)=2080 *SY*; %β^- decay=100.0

1995Me03: ^{180}Yb activity from ^{197}Au or ^{136}Xe at 11 MeV/nucleon on targets of natural W or Re. Channel selection using online mass separator, fast tape transport system, and the FEBIAD-B2-C ion source to suppress contamination from ^{180}Lu. Measured Eγ, Iγ, $\gamma\gamma$, $\beta\gamma$, and I(ce) using setups of two Ge detectors and a 4$\pi\beta$ counter or a low-energy Ge detector and a mini-orange electron spectrometer.

1987Ru04: ^{180}Yb activity from ^{186}W at 15 MeV/nucleon on targets of natural W or Ta. Channel selection with GSI online mass separator and fast transport tape system. Measured Eγ, Iγ, $\gamma\gamma$, and $\beta\gamma$ using a plastic 4$\pi\beta$ detector and γ and γ/X Ge detectors.

The level scheme is that of 1995Me03. The level scheme proposed by 1987Ru04 is in general agreement, except for the omission of the 13.9-keV level, which results in all the level energies in 1987Ru04 quoted as 13.9-keV lower than those in 1995Me03. Configuration assignments are from 1995Me03.

Total energy release is calculated as 2180 keV *130* by the RADLST code, in general agreement with the Q value of 2080 keV *210*, syst. However, due to large uncertainties on Iγ's, unknown multipolarities, and a difference of 1 MeV between the highest observed level and the decay Q value, the level scheme should be considered incomplete.

α: Additional information 1.

^{180}Lu Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]	Comments
0.0	5^+	5.7 min *1*	Configuration ($\nu 1/2^-[510]$)($\pi 9/2^-[514]$).
13.9 *3*	3^-		Configuration ($\nu 1/2^-[510]$)($\pi 7/2^+[404]$).
102.83 *17*	(4^+)		
186.8 *3*	$(2,3^+,1^-)$		
442.27 *17*	3^+		Configuration ($\nu 3/2^-[512]$)($\pi 9/2^-[514]$).
453.2 *3*	2^+		Configuration ($\nu 11/2^+[615]$)($\pi 7/2^+[404]$).
562.0 *3*	1^+		Configuration ($\nu 9/2^+[624]$)($\pi 7/2^+[404]$).
947.8 *4*	1^+[#]		
981.6 *4*	1^+[#]		

[†] From a least-squares fit to Eγ's by the evaluator. ΔEγ=0.3 keV is taken when no uncertainty is given.

[‡] From the Adopted Levels.

[#] Calculated two-quasiparticle spectrum predicts two closely lying 1^+ states around 1 MeV in excitation energy with configurations ($\nu 1/2^-[510]$)($\pi 1/2^-[514]$) and ($\nu 7/2^-[514]$)($\pi 9/2^-[514]$).

β^- radiations

E(decay)	E(level)	Iβ^-[†‡#]	Log *ft*[‡]	Comments
(1098 *SY*)	981.6	33	≈4.9	av Eβ=456 *38* Iβ^-: other: ≈37 in 1995Me03.
(1132 *SY*)	947.8	26	≈5.3	av Eβ=470 *38*
(1518 *SY*)	562.0	32	≈5.4	av Eβ=632 *39*
(1893[@] *SY*)	186.8	9	≈6.3	av Eβ=794 *40*

[†] From intensity balance at each level and assuming E1 multipolarity for the 172.9γ.

[‡] Large uncertainties on Iγ's and unknown multipolarities make a precise determination of Iβ^- difficult. Both Iβ^- and Log *ft* should be considered approximate.

[#] Absolute intensity per 100 decays.

[@] Existence of this branch is questionable.

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$\gamma(^{180}Lu)$

Iγ normalization: From ΣI(γ+ce)=100 for 103γ, 173γ, 439γ, and 442γ and assuming E1 multipolarity for the 173γ.

E_γ [†]	I_γ [‡&]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [@]	α	Comments
(14)		13.9	3^-	0.0	5^+	[M2]	7.11×10^4	α(L)=5.32×10^4 *8*; α(M)=1.406×10^4 *20*; α(N)=3.36×10^3 *5*; α(O)=463 *7*; α(P)=20.5 *3*
102.8[#]	9 *2*	102.83	(4^+)	0.0	5^+	(M1+E2)	3.21 *20*	α(K)=1.9 *10*; α(L)=1.0 *6*; α(M)=0.25 *15*; α(N)=0.06 *4*; α(O)=0.007 *4*; α(P)=0.00013 *9*
108.8 *3*	8 *2*	562.0	1^+	453.2	2^+	M1(+E2)	2.66 *24*	α(K)=1.6 *8*; α(L)=0.8 *5*; α(M)=0.19 *11*; α(N)=0.04 *3*; α(O)=0.006 *3*; α(P)=0.00011 *7* I_γ: other: 12 *4* (1987Ru04).
119.7[#]	16 *2*	562.0	1^+	442.27	3^+	(E2)	1.698	α(K)=0.657 *10*; α(L)=0.794 *12*; α(M)=0.196 *3*; α(N)=0.0452 *7*; α(O)=0.00551 *8* α(P)=3.46×10^{-5} *5*
172.9 *2*	100 *5*	186.8	$(2,3^+,1^-)$	13.9	3^-	(E1)	0.0834	α(K)=0.0695 *10*; α(L)=0.01082 *16*; α(M)=0.00243 *4*; α(N)=0.000565 *9*; α(O)=7.96×10^{-5} *12* α(P)=4.04×10^{-6} *6* Mult.: E1 assumed for intensity balance calculations.
266.4 *2*	15 *4*	453.2	2^+	186.8	$(2,3^+,1^-)$			I_γ: other: 24 *5* (1987Ru04).
339.4 *2*	47 *6*	442.27	3^+	102.83	(4^+)			I_γ: other: 44 *6* (1987Ru04).
375.2 *2*	71 *10*	562.0	1^+	186.8	$(2,3^+,1^-)$			I_γ: other: 87 *15* (1987Ru04).
385.8 *3*	41 *10*	947.8	1^+	562.0	1^+			I_γ: corrected for contribution from ^{180}Ir. I_γ: other: 25 *8* (1987Ru04).
419.6 *3*	52 *8*	981.6	1^+	562.0	1^+			I_γ: other: 56 *7* (1987Ru04).
439.3[#]	7 *3*	453.2	2^+	13.9	3^-			
442.3[#]	6 *2*	442.27	3^+	0.0	5^+	[E2]	0.0255	α(K)=0.0196 *3*; α(L)=0.00459 *7*; α(M)=0.001075 *15*; α(N)=0.000251 *4*; α(O)=3.42×10^{-5} *5* α(P)=1.302×10^{-6} *19*
547.9[a] *4*	31 *8*	562.0	1^+	13.9	3^-			E_γ,I_γ: from 1987Ru04 only. Not observed by 1995Me03 who propose line as originating from summing effects. E_γ: not included in Adopted Gammas.

[†] From 1987Ru04, except where noted. Eγ's were measured in coincidence with β^-.
[‡] From 1995Me03. Values from 1987Ru04 are included in the comments.
[#] From 1995Me03.
[@] Determined from conversion electron data (1995Me03); no specific details are given by authors.
[&] For absolute intensity per 100 decays, multiply by 0.63 *4*.
[a] Placement of transition in the level scheme is uncertain.

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Decay Scheme

Intensities: I_γ per 100 parent decays