^{194}Bi ε decay (95 s) 1987Va09,1991Va04

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 177, 1 (2021)	3-Sep-2021

Parent: ^{194}Bi: E=0.0; J^π=(3$^+$); $T_{1/2}$=95 s *3*; Q(ε)=8185 *18*; %ε+%$β^+$ decay=99.54 *25*

^{194}Bi-J^π,$T_{1/2}$: From Adopted Levels of ^{194}Bi. Adopted value is from α(t) in 1991Va04. Other: 106 s *3* in 1987Va09 was obtained from 1308γ(t) and 931γ(t), which are seen in the decay of all three ^{194}Bi activities.

^{194}Bi-Q(ε): From 2021Wa16.

^{194}Bi-%ε+%$β^+$ decay: From Adopted Levels of ^{194}Bi, based on %α=0.46 *25* (1991Va04).

1987Va09: ^{194}Bi source ions were produced via ^{nat}Re(^{16}O,xnγ) with E<210 MeV beam with the Leuven Isotope Separator On-Line (LISOL) facility. γ rays were detected with two Ge detectors and conversion electrons were detected with a Si(Li) detector. Measured Eγ, Iγ, E(ce), I(ce), γγ-coin, ce-γ-coin, γ(t), γγ(t). Deduced levels, J, π, $T_{1/2}$, conversion coefficients, γ-ray multipolarities. Systematics of neighboring Pb isotopes and comparisons with theoretical calculations. See also 1984Va19 and 1984Va11 from the same research group.

Others: 1993St01, 1991Va04, 1984Va11, 1984Va19.

^{194}Bi(95 s and 115 s) α activities from ^{202}Fr α-decay chain, produced by Ir(^{20}Ne,xn), ^{181}Ta(^{32}S,2p9n), Re(^{20}Ne,xn) (1992Hu04), and directly by ^{181}Ta(^{20}Ne,xn), ^{182}W(^{20}Ne,pxn) (1991Va04), and Re(^{16}O,xn) (1987Va09).

^{194}Pb Levels

E(level)[†]	J^π[‡]
0.0	0$^+$
930.69 *22*	0$^+$
965.09 *15*	2$^+$
1308.26 *15*	(2$^+$)
1540.13 *20*	4$^+$
1636.89 *25*	(≤4)
1738.76 *20*	(1,2$^+$)
2019.16 *25*	(≤4)

† From least-squares fit to γ-ray energies.

‡ From Adopted Levels.

γ(^{194}Pb)

1987Va09 present a composite decay scheme for the ^{194}Bi isomers. The evaluators have attempted to separate the decay schemes assuming that the three isomers populate levels with different range of spins, the 95-s g.s. populating the low-spin levels (J≤4) and the 115-s and 125-s isomers populating the high-spin (J>4). The low lying levels, however, are seen in the decay of all the activities.

The decay scheme has not been normalized since several γ rays remain unplaced and separation of γ rays between different isomers is not established. See ^{194}Bi ε decay (125 s+115 s) for unplaced transitions.

E_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[@]	Comments
231.9 *2*	1540.13	4$^+$	1308.26	(2$^+$)	[E2]	0.259	α(K)=0.1192 *17*; α(L)=0.1046 *16*; α(M)=0.0272 *4* α(N)=0.00687 *10*; α(O)=0.001248 *18*; α(P)=6.72×10^{-5} *10*
343.2 *2*	1308.26	(2$^+$)	965.09	2$^+$	(E0+M1+E2)	0.72 *11*	Mult.: α(K)exp=0.6 *1*, α(L)exp=0.09 *2*. The uncertainties on α(K)exp and α(L)exp from 1987Va09 seem to be underestimated in view of 30% uncertainty on γ-ray intensity. α: α(K)exp+1.33(α(L)exp).
377.5 *3*	1308.26	(2$^+$)	930.69	0$^+$			

Continued on next page (footnotes at end of table)

^{194}Bi ε decay (95 s) 1987Va09,1991Va04 (continued)

γ(^{194}Pb) (continued)

E_γ †	I_γ †#	E_i(level)	J_i^π	E_f	J_f^π	Mult.‡	α@	Comments
575.0 *2*		1540.13	4^+	965.09	2^+	E2	0.0212	α(K)=0.01553 *22*; α(L)=0.00427 *6*; α(M)=0.001052 *15* α(N)=0.000266 *4*; α(O)=5.07×10^{-5} *8*; α(P)=4.19×10^{-6} *6* Mult.: α(L)exp=0.0037 *8*.
671.8 *2*	3.5 *5*	1636.89	(≤4)	965.09	2^+			I_γ: doublet. The other component assigned to the decay of the 115 s +125 s isomers. Total Iγ=5.6 *5* divided by 1987Va09, probably from γγ data.
710.9 *2*	1.0 *5*	2019.16	(≤4)	1308.26	(2^+)			
773.5 *3*	2.0 *10*	1738.76	($1,2^+$)	965.09	2^+			
808.1 *3*	0.4 *3*	1738.76	($1,2^+$)	930.69	0^+			
930.6 *4*		930.69	0^+	0.0	0^+	E0		I(γ+ce)=0.9 *2*, ce(K)/ce(L) exp=4.95 *34* (1990Tr01).
965.0 *2*		965.09	2^+	0.0	0^+	E2	0.00714	α(K)=0.00567 *8*; α(L)=0.001121 *16*; α(M)=0.000267 *4* α(N)=6.77×10^{-5} *10*; α(O)=1.322×10^{-5} *19*; α(P)=1.266×10^{-6} *18* Mult.: α(L)exp=0.0019 *4*.
1308.3 *2*		1308.26	(2^+)	0.0	0^+	(E2)	0.00400	α(K)=0.00324 *5*; α(L)=0.000573 *8*; α(M)=0.0001349 *19* α(N)=3.42×10^{-5} *5*; α(O)=6.74×10^{-6} *10*; α(P)=6.78×10^{-7} *10*; α(IPF)=1.693×10^{-5} *24* E_γ: 1987Va09 quote α(K)exp=0.0039 *8*; however, in the ce spectrum shown by the authors, the K-conversion line is not evident.
1738.9 *3*	0.6 *2*	1738.76	($1,2^+$)	0.0	0^+			

† From 1987Va09.
‡ From Adopted Gammas, supported by the ce data in 1987Va09 as given in comments where available, which are normalized to ce(K) lines of 965γ, 575γ and 421γ, all treated as E2 transitions.
# For total Iγ from all isomers, see ^{194}Bi(115 s + 125 s).
@ 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.

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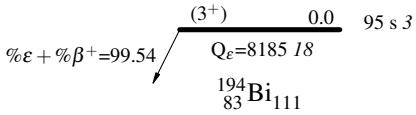
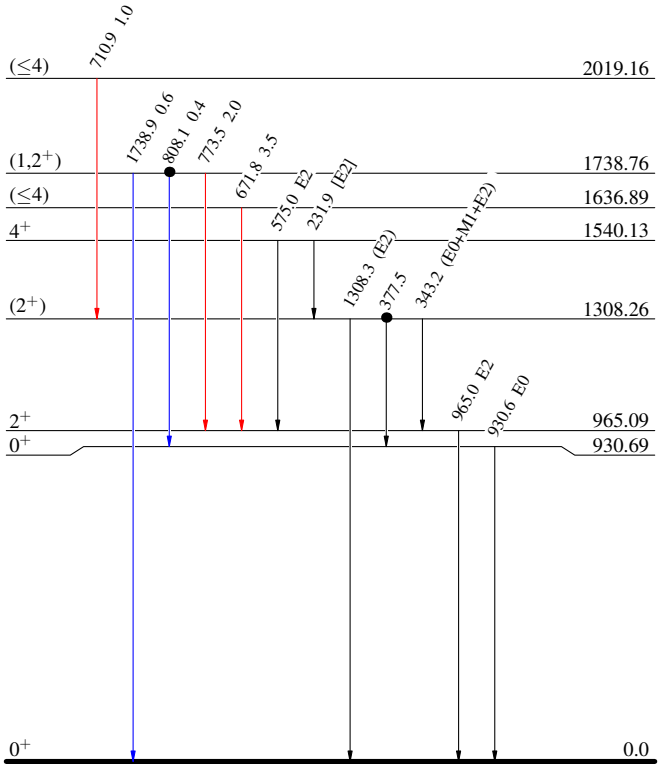
Decay Scheme

Intensities: Relative I_γ

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$
- Coincidence





$^{194}_{82}Pb_{112}$