^{190}Bi α decay: low spin 2003An26,1988Hu03,1991Va04

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. C. Batchelder and A. M. Hurst, M. S. Basunia	NDS 183, 1 (2022)	1-Mar-2022

Parent: ^{190}Bi: E=0; J^π=(3^+); $T_{1/2}$=6.3 s *1*; Q(α)=6862 *3*; %α decay=80 *20*

^{190}Bi-E,J^π,$T_{1/2}$: From 2020Si26.

^{190}Bi-%α decay: From: 0.90 *+10−30* (1991Va04).

Others: 1993An19, 2009An11, 2013Ny01, 2013Uu01.

See also 1985HuZY (earlier report from 1988Hu03).

1991Va04, 1988Hu03: mass separated samples. Measured Eα, Iα, $\alpha\gamma$ coin, Iγ, I(K x ray), I(L x ray), α(K)exp.

2003An26: ^{190}Bi was produced from ^{142}Nd(^{52}Cr,p3n), E=256 MeV, and a total of 10^6 α decays observed. Enriched (99.8%) $^{142}NdF_3$ target (thickness 290 μg/cm^2). Separated isotopes were implanted into a 16-strip positron-sensitive Si detector (PSDD), a 4-segment clover HPGe detector. Measured Eα, Iα, Eγ, α-γ-γ coincidences (sorted within a fixed interval of 0 to 5 μs). Deduce level scheme and α decay hindrance factors. Also ^{190}Bi was produced by ^{142}Nd(^{50}Cr,pn) reaction (using enriched ^{52}Cr).

2013Uu01 observed ^{190}Bi as the daughter product of the ^{198}Fr – ^{194}At -^{190}Bi α-α-α decay chain.

2013Ny01 observed ^{190}Bi as the daughter product of the ^{194}At -^{190}Bi α-α decay chain.

^{186}Tl Levels

E(level)[†]	J^π[‡]	$T_{1/2}$	Comments
0.0	(2^-)	3.4 s *+5−4*	Additional information 1. $T_{1/2}$: From Adopted Levels.
104.6 *9*	(4^+)		J^π: 105γ M2 to (2^-), α from (3^+).
215.2 *9*	(2^-)		J^π: Based on (E1) from (3^+), proposed by evaluators.
293.7 *3*	(3^+)	11 ns *4*	$T_{1/2}$: From 1991Va04.
314.0 *10*			
506.7 *11*			

[†] From a least-squares fit to γ-ray energies.

[‡] From Adopted Levels.

α radiations

Eα[†]	E(level)	Iα[#&]	HF[@]	Comments
6225[‡] *10*	506.7	0.058[‡] *10*	248 *77*	Iα: 0.06 *1* (2003An26).
6412[‡] *10*	314.0	0.096[‡] *19*	8.6×10^2 *28*	Iα: 0.10 *2* (2003An26).
6429 *5*	293.7	96.1	1.00	Eα: Weighted ave. of 6429 keV *5* (1988Hu03), 6431 keV *5* (1991Va04), 6431 keV *5* (2003An26), 6428 keV *6* (2013Ny01), 6422 keV *10* (2013Uu01 – also 6427 *10*). Uncertainty lowest input value. Other: 6429 (1993An19). Iα: 100 (2003An26).
6507 *5*	215.2	0.23 *8*	8.4×10^2 *36*	Eα,Iα: Not observed by 2003An26 due to α-e$^-$ summing effect. Iα from 1991Va04.
6611[‡] *10*	104.6	2.1[‡] *3*	229 *67*	Eα: Other: 6617 (1991Va04 – unplaced). Iα: 2.2 *3* (2003An26).
6716 *5*	0.0	1.44 *19*	8.2×10^2 *24*	Eα: Other: 6716 keV *10* (2003An26). Iα: 1.5 *2* (2003An26).

[†] From 1991Va04, except otherwise noted.

[‡] From 2003An26.

[#] Normalized value ΣIα=100 by the evaluators listed in column and relative values from references in the column section.

[@] For $r_0(^{186}Tl)$=1.502 *7*, based on ^{184}Hg=1.4885 *32*, ^{186}Hg=1.4923 *55*, ^{186}Pb=1.5114 *26*, ^{188}Pb=1.5137 *13* (2020Si16).

[&] For absolute intensity per 100 decays, multiply by 0.80 *20*.

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γ(^{186}Tl)

E_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α#	Comments
79 *1*	293.7	(3$^+$)	215.2	(2$^-$)	(E1)	0.167 *7*	α(L)=0.128 *5*; α(M)=0.0301 *12* α(N)=0.0074 *3*; α(O)=0.00134 *5*; α(P)=8.6×10^{-5} *3* E_γ: Other: 78.5 (1991Va04). Mult.: From α_{tot}=0.3 *2*, deduced by authors of 2003An26, assuming cascade character of 105γ and 79γ. α_{theo}=0.17 *1* (E1), 3.1 *1* (M1), and 16 *1* (E2).
105 *1*	104.6	(4$^+$)	0.0	(2$^-$)	M2	60.5 *24*	α(K)=39.5 *15*; α(L)=15.7 *7*; α(M)=4.03 *18* α(N)=1.03 *5*; α(O)=0.196 *9*; α(P)=0.0156 *7* Mult.: From α(K)exp=36 *5* (2003An26).
111 *1*	215.2	(2$^-$)	104.6	(4$^+$)			
213 *1*	506.7		293.7	(3$^+$)			
293.7‡ *3*	293.7	(3$^+$)	0.0	(2$^-$)	E1	0.0301	α(K)=0.0247 *4*; α(L)=0.00414 *6*; α(M)=0.000962 *14* α(N)=0.000241 *4*; α(O)=4.55×10^{-5} *7*; α(P)=3.72×10^{-6} *6* Mult.: from α(K)exp=0.042 *8* (1991Va04 – deduced from balance of Iγ, I(K x ray) and I(L x ray) coincident with feeding α group; corrected for fluorescence.
314 *1*	314.0		0.0	(2$^-$)			

† From 2003An26, except otherwise noted.
‡ From 1991Va04.
# Additional information 2.

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Legend

● Coincidence

Decay Scheme