^{210}At α decay 1981Va29,1975Ja09,1969Go23

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	F. G. Kondev	NDS 201,346 (2025)	21-Jan-2025

Parent: ^{210}At: E=0.0; $J^\pi=(5)^+$; $T_{1/2}$=8.1 h *4*; Q(α)=5631.2 *10*; %α decay=0.175 *20*

^{210}At-J^π,$T_{1/2}$: From 2014Ba41.

^{210}At-Q(α): From 2021Wa16.

^{210}At-Dominant configuration=$\pi(h^{+1}_{9/2})\otimes\nu(p^{-1}_{1/2})$.

^{210}At-%α decay: From 2014Ba41.

1981Va29,1969Go23: Sources produced by spallation of Th target by 660-MeV protons, followed by chemical separation; detectors: α-particle spectrograph; measured: Eα, Iα.

1975Ja09: Source produced via the ^{209}Bi(α,3n) reaction with Eα=39 MeV followed by chemical separation; detectors: 6 mm diameter Au-Si surface barrier detector (FWHM=16 keV at 5.3 MeV); Ge(Li) detector; measured: α-γ coin., α singles, Eα, Iα, Eγ, Iγ.

^{206}Bi Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[‡]	Comments
0.0	6^+	6.243 d *3*	configuration: $\pi(h^{+1}_{9/2})\otimes\nu(f^{-1}_{5/2})$.
59.908 *18*	4^+	7.7 μs *2*	
70.75 *3*	3^+		
82.802 *22*	5^+		Dominant configuration=$\pi(h^{+1}_{9/2})\otimes\nu(f^{-1}_{5/2})$.
141.2 *5*	7^+		
166.1 *9*	5^+		Dominant configuration=$\pi(h^{+1}_{9/2})\otimes\nu(p^{-1}_{1/2})$.
282 *4*			E(level): From Eα=5242 keV *3* and Q(α)=5631.2 keV *10*.
352.69 *3*	$(3,4)^+$		

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

α radiations

%α is from Iα(^{210}Po)/Iα(^{210}At) in 1969Go23.

Eα[†]	E(level)	Iα[‡@]	HF[#]	Comments
5131[&] *2*				Eα: unobserved in 1981Va29 and 1975Ja09.
5175 *4*	352.69	0.21 *6*	67 *21*	Eα: From 1981Va29.
5242 *3*	282	0.9 *1*	39 *7*	Eα: From 1981Va29.
5361 *1*	166.1	27.8 *20*	5.2 *8*	
5386 *1*	141.2	4.6 *3*	43 *7*	
5442.0 *15*	82.802	28.4 *15*	13.9 *20*	
5456 *2*	70.75	0.40 *6*	1.14×10^3 *23*	Eα: From 1981Va29.
5465.5 *15*	59.908	7.2 *3*	72 *10*	
5524.0 *15*	0.0	30.5 *9*	34 *5*	

[†] From 1969Go23, unless otherwise stated.
[‡] From 1981Va29.
[#] r_0=1.432 *10*, unweighted averages of 1.4568 *22* (^{206}Po), 1.4343 *25* (^{208}Po), 1.42967 *74* (^{204}Pb) and 1.408790 *38* (^{206}Pb) from 2020Si16.
[@] For absolute intensity per 100 decays, multiply by 0.00175 *20*.
[&] Existence of this branch is questionable.

γ(^{206}Bi)

Iγ normalization: from I(γ+ce)(141.2γ)=Iα(5386α), using α(141.2γ,M1)=3.77 *7* and %α=0.175 *20*.

E_γ[†]	I_γ[@ a]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α[&]	Comments
10.836[#‡] *22*		70.75	3^+	59.908	4^+	M1(+E2)	<0.0031	319 *5*	α(M)=242 *4* α(N)=62.1 *10*; α(O)=12.67 *19*; α(P)=1.506 *23*
59.908[#‡] *18*		59.908	4^+	0.0	6^+	E2		72.4 *10*	α(L)=53.8 *8*; α(M)=14.25 *20* α(N)=3.62 *5*; α(O)=0.663 *9*; α(P)=0.0500 *7*
82.802[‡] *22*	7.7×10^2 *15*	82.802	5^+	0.0	6^+	M1(+E2)	<0.05	3.32 *5*	α(L)=2.53 *4*; α(M)=0.597 *9* α(N)=0.1527 *22*; α(O)=0.0312 *4*; α(P)=0.00370 *5* E_γ: 82 keV *1* in 1975Ja09.
106 *1*	272 *54*	166.1	5^+	59.908	4^+	(M1)		8.63 *27*	α(K)=7.01 *22*; α(L)=1.24 *4*; α(M)=0.291 *9* α(N)=0.0744 *23*; α(O)=0.0152 *5*; α(P)=0.00181 *6* Mult.: consistent with Iα(5361α)=I(γ+ce)(106γ+167γ) from intensity balance measured in αγ coincidence (1975Ja09).
141.2[‡] *5*	100	141.2	7^+	0.0	6^+	M1+E2	−0.13 *3*	3.77 *7*	α(K)=3.05 *6*; α(L)=0.549 *10*; α(M)=0.1297 *25* α(N)=0.0332 *6*; α(O)=0.00676 *13*; α(P)=0.000796 *14* E_γ: 140 keV *1* in 1975Ja09.
167 *2*	174 *35*	166.1	5^+	0.0	6^+	(M1)		2.37 *9*	α(K)=1.93 *7*; α(L)=0.336 *13*; α(M)=0.0791 *30* α(N)=0.0202 *8*; α(O)=0.00413 *16*; α(P)=0.000492 *18*
281.923[#‡] *23*		352.69	$(3,4)^+$	70.75	3^+	M1(+E2)	<0.10	0.545 *9*	α(K)=0.444 *8*; α(L)=0.0773 *11*; α(M)=0.01817 *26* α(N)=0.00465 *7*; α(O)=0.000949 *14*; α(P)=0.0001127 *17*
292.799[#‡] *30*		352.69	$(3,4)^+$	59.908	4^+	M1(+E2)	<0.4	0.471 *26*	α(K)=0.404 *6*; α(L)=0.0699 *10*; α(M)=0.01642 *23* α(N)=0.00420 *6*; α(O)=0.000858 *12*; α(P)=0.0001022 *14*

[†] From αγ coincidence (1975Ja09), unless otherwise stated.
[‡] From adopted gammas.
[#] The transition was not observed in 1975Ja09.
[@] Relative to Iγ(140γ)=100 in 1975Ja09.
[&] Additional information 1.
[a] For absolute intensity per 100 decays, multiply by 1.68×10^{-5} *+31−29*.

$^{206}_{83}$Bi$_{123}$-2

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Decay Scheme

Intensities: $I_{(\gamma+ce)}$ per 100 parent decays