^{195}At α decay (290 ms) 2013Ny01,2003Ke04,1999Ta20

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia	NDS 195,368 (2024)	1-Dec-2023

Parent: ^{195}At: E=0.0; J^π=(1/2$^+$); $T_{1/2}$=290 ms *20*; Q(α)=7344 *6*; %α decay=100

^{195}At-J^π: From 2014Hu18 (evaluation).

^{195}At-$T_{1/2}$: From 2013Ny01,2014Hu18. Other values: 328 ms *20* (2003Ke04, same lab of 2013Ny01), 385 ms *+69−51* (1999Ta20, also 1996PuZZ from the same research group), 0.63 s *+32−16* (1995Le15). $T_{1/2}$ values measured much less precisely, mainly for decay chain identification purpose: 350 ms *+240−160* (2013Ka16), 430 ms *+590−160* (2013Uu01).

^{195}At-Q(α): From 2021Wa16.

Other references: 2005Ke10, 2005Uu03, 2013Ka16, 2013Uu01.

2013Ny01: Measured half-life, Eα, and IT branching, recoil-α correlated decay measurements at Jyvaskyla cyclotron facility using RITU separator.

2003Ke04,2005Ke10: Production of ^{195}At by ^{142}Nd(^{56}Fe,p2n), E(lab)=255-268 MeV. The evaporation residues formed in the fusion reaction were separated using the RITU gas-filled mass separator and implanted into a position-sensitive Si strip detector. A multiwire proportional avalanche gas counter was used to discriminate α-ray particles from other signals in the Si detector. A Compton-suppressed, 40% relative efficiency, Ge detector was used for prompt α-γ coincidence measurements.

1995Le15: Production of ^{195}At from ^{141}Pr(^{56}Fe,2n), E=249 MeV. Reaction fragment separation using gas-filled mass separator RITU. Used parent-daughter, and time and position-correlated event evaluation.

1999Ta20: Used reaction ^{169}Tm(^{36}Ar,α6n), E=215 MeV. RIKEN ring cyclotron. Recoil reaction products separated with the gas-filled recoil separator GARIS. Detection of recoil fragments and decay α rays using two-dimensional position-sensitive Si detector at the focal plane. Microchannel plate placed before this detector allows to distinguish evaporation residues from alpha particles. RDT method, analyzed correlated recoil-α1−α2 decay chains.

^{191}Bi Levels

E(level)[†]	J^π[†]	$T_{1/2}$[†]	Comments
148.7 *5*	(7/2$^-$)	<10 ns	E(level),J^π,$T_{1/2}$: From Adopted Levels.
242 *4*	(1/2$^+$)	125 ms *8*	%IT=22 *6* (2013Ny01) E(level),J^π,$T_{1/2}$: From Adopted Levels. Also 242 keV *4* (2021Ko07 − NUBASE). Adopted Eα=6953 *3* and Qα^{195}At=7344 *6* (2021Wa16) yields 245 keV *7*.

[†] From Adopted Levels.

α radiations

Eα	E(level)	Iα[‡]	HF[†]	Comments
6953 *3*	242	100	1.49 *12*	This α-ray is seen in time-correlated α_1-α_2 measurements in coincidence with the 6870 keV *3* α ray which deexcites the ^{191}Bi (1/2$^+$) isomeric level (2003Ke04,1999Ta20). Eα: from 2003Ke04. Others: 6955 *8* (2013Ka16), 6960 *20* (1999Ta20), 6950 *20* (1995Le15). The reduced α width is estimated as 70 keV *5* by 2003Ke04, calculated by the method of Rasmussen, ΔL=0, as well as an estimated hindrance factor of 0.92 *7*.

[†] A r_0(^{191}Bi)=1.548 *10* is obtained is deduced from interpolation (or unweighted average) of the r_0 values for the neighboring even-Z, N=108 isotones: r_0(^{190}Pb)=1.511 *4*, from 2020Si16, and r_0(^{192}Po)=1.585 *15*.

[‡] Absolute intensity per 100 decays.

^{195}At α decay (290 ms) 2013Ny01,2003Ke04,1999Ta20 (continued)

γ(^{191}Bi)

E_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.	α†	Comments
(93 *4*)	242	(1/2$^+$)	148.7	(7/2$^-$)	[E3]	2.6×10^2 *7*	α(L)=1.9×10^2 *5*; α(M)=55 *16* α(N)=14 *4*; α(O)=2.6 *8*; α(P)=0.20 *6* E_γ: From level energy difference. The existence of this γ ray has strong support from α-α coincidence measurements showing that the 6953-keV α ray from ^{195}At g.s. decay to the (≈242 keV, 1/2$^+$) level in ^{191}Bi is in coincidence with the 6308-keV α ray from the ^{191}Bi g.s. decay to the 335-keV (9/2$^-$) level in ^{187}Tl. Mult.: Multipolarity suggested on the basis of the J^π values for the connected levels, and from similar transitions in neighboring nuclei.

† Additional information 1.

^{195}At α decay (290 ms) 2013Ny01,2003Ke04,1999Ta20

Legend

γ Decay (Uncertain)

Decay Scheme