Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, [1] and Jun Chen[2]	NDS 169, 1 (2020)	15-Oct-2020

Q(β^-)=−6036 *26*; S(n)=8610 *30*; S(p)=45 *27*; Q(α)=6862 *3* 2017Wa10
S(2n)=19548 *25*, S(2p)=2840 *40*, Q(εp)=6728 *24* (2017Wa10).
Mass measurements: 2008We02, 1999Sc46.
Theory references: consult the NSR database (www.nndc.bnl.gov/nsr/) for about 16 primary references dealing with nuclear structure and other calculations.
Additional information 1.

^{190}Bi Levels

Cross Reference (XREF) Flags

A ^{194}At α decay (286 ms)
B ^{194}At α decay (323 ms)

E(level)	J$^\pi$	T$_{1/2}$	XREF	Comments
0	(3$^+$)	6.3 s *1*	A	%α=90 *+10−30* (1991Va04); %ε+%β^+=10 *+30−10* %β^+F=2.3×10^{-5} *+69−19* μ=3.85 *9* (2017Ba12,2019StZV) Beta-delayed fission mode has been observed by 2020An12, with measured partial T$_{1/2}$=2.8×10^7 s *+134−21*. Evaluators deduce %β^+F=2.3×10^{-5} *+69−19*. E(level): determined to be g.s. by 2020St11 based on spacing=182 *57*, and 171 *62* deduced by the evaluators, between the (10$^-$) and the (3$^+$) states. J$^\pi$: from syst of neighboring Bi nuclides. Probable configuration=π1h$_{9/2}\otimes\nu$3p$_{3/2}$ (2001An11). T$_{1/2}$: from decay curve for 6430α (1988Hu03). Others: 7.7 s *+10−8* (2013Ny01), 6 s *+4−2*, 5.7 s *8* (1991Va04). Weighted average of all the results is also 6.3 s *1*. The α decay peak at 6431 from ^{190}Bi decay is also shown by 2001An11. μ: from in-source laser spectroscopy (2017Ba12), using μ(^{209}Bi)=4.1103 μ_N *5* as a reference. Statistical and systematic uncertainties of 0.092 and 0.077, respectively in 2017Ba12, combined in quadrature by the evaluators. δ<r^2>^{190m}Bi,^{209}Bi=−0.839 fm^2 *19*(stat) *59*(syst) (2017Ba12). α-decay energy=6422 *10* (2013Uu01), 6428 *6* (2013Ny01), 6431 *5* (1991Va04, 2003An26), 6429 *5* (1988Hu03), 6429 (1993An19).
45 *15*	(4$^+$)#		A	
121.5† *3*	(5$^-$)#	175 ns *8*	A	%IT≈100 T$_{1/2}$: measured by 2009An11 using $\alpha\gamma$(t).
168.0† *5*	(6$^+$)#		A	
191 *65*	(10$^-$)	6.2 s *1*	B	%α=70 *9* (1991Va04); %ε+%β^+=30 *9* %β^+F=1.3×10^{-5} *+39−11* μ=2.39 *12* (2017Ba12,2019StZV) Beta-delayed fission mode has been observed by 2020An12, with measured partial T$_{1/2}$=4.7×10^7 s *+226−35*. Evaluators deduce %β^+F=1.3×10^{-5} *+39−11*. E(level): from Q$_\alpha$(^{190}Bi 10$^-$ isomer to ^{186}Tl 7$^+$ isomer)- Q$_\alpha$(^{190}Bi 3$^+$ g.s. to ^{186}Tl 2$^-$ g.s.)+E(^{186}Tl 7$^+$). The two Q$_\alpha$ values of 6966 *5* and 6861 *5* are deduced from measured E$_\alpha$=6819 *5* and 6716 *5* in 2003An26, respectively, for corresponding α decays. E(^{186}Tl,7$^+$)=86 *65* is from measured mass excess=−19491 *32* (2014Bo26) for ^{186}Tl 10$^-$ isomer with known Eγ=374.2 keV from the 10$^-$ isomer to 7$^+$ isomer, and mass excess=−19951 *56* for ^{186}Tl 2$^-$ g.s. from deduced ^{186}Tl g.s. mass=185978582 μu *60* by 2020ST11 from measured Q(alpha)(^{186}Tl g.s. to ^{182}Au g.s.)=5924 *52*, and

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{190}Bi Levels (continued)

E(level)	J^π	$T_{1/2}$	XREF	Comments
				known masses of ^{182}Au and ^{4}He. The value of 191 *65* is in agreement with 182 *57* in 2020St11. Other: 130 keV *40* (2017Au03). J^π: from 1988Hu03 with probable configuration=$\pi h_{9/2}\otimes\nu i_{13/2}$. $T_{1/2}$: from timing of 6455α (1988Hu03). Others: 5.9 s *+10−8* (2013Ny01), 5.9 s *6* (1991Va04), 5.4 s *5* (1972Ga27, 1974Le02). A 14 s activity reported by 1967Tr06 probably belongs to ^{191}Bi. Weighted average of all the four results is 6.16 s *10*. %α: others: ≈90 (1974Le02), ≈32 (1972Ga27), based on observation of a single α group at 6450 *10*. The α decay peak at 6456 from ^{190}Bi decay is also shown by 2001An11. μ: from in-source laser spectroscopy (2017Ba12). Value given in 2017Ba12 is 2.40 μ_N *12*(stat) *5*(syst). Value of $\mu(^{209}Bi)$=4.1103 μ_N *5* was used as a reference. $\delta<r^2>^{190m}Bi,^{209}Bi$=−0.860 fm^2 *10*(stat) *60*(syst) (2017Ba12). α-decay energy=6450 *5* (2013Ny01), 6456 *5* (1991Va04, 2003An26), 6455 *5* (1988Hu03), 6455 (1993An19).
231.3‡ *5*	$(9^+,10^+,11^+)$		B	J^π: 40.3γ (E1) to (10^-).
287.7‡ *5*	$(9^-,10^-,11^-)$		B	J^π: 96.7γ (M1) to (10^-).
465.0‡ *5*	$(^-)$	1.0 μs *+10−5*	B	%IT≈100 J^π: 274.0γ (E2+M1) to (10^-). $T_{1/2}$: measured by 2009An11 using $\alpha\gamma$(t).

† From Eγ data, relative to the energy of the 45-keV level kept as fixed. Absolute uncertainty is 15 keV, as for the 45-keV level.
‡ From Eγ data, relative to the energy of the 171-keV level kept as fixed. Absolute uncertainty is 57 keV, as for the 171-keV level.
# Tentatively assigned from (46.5γ, (E1))-(76.5γ, E1)-(possible 45γ, [M1]) cascade to (3^+).

$\gamma(^{190}Bi)$

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.†	α‡	Comments
45	(4^+)	(45 *15*)		0	(3^+)	[M1]	16×10^1 *14*	E_γ: not observed, γ probably totally converted (2009An11). Mult.: M1 is required from the intensity balance (2009An11).
121.5	(5^-)	76.5 *3*	100	45	(4^+)	E1	0.194 *4*	B(E1)(W.u.)=2.18×10^{-6} *10*
168.0	(6^+)	46.5 *5*	100	121.5	(5^-)	(E1)	0.744 *25*	
231.3	$(9^+,10^+,11^+)$	40.3 *5*	100	191	(10^-)	(E1)	1.09 *4*	
287.7	$(9^-,10^-,11^-)$	96.7 *5*	100	191	(10^-)	(M1)	11.2 *2*	
465.0	$(^-)$	274.0 *5*	100	191	(10^-)	(E2+M1)	0.38 *22*	Mult.: α(K)exp=0.20 *5* determined from (γ)(K x-ray)-coin (2001An11) gives E2 or M1+E2 with δ≈1.5.

† From ^{194}At α decay (2009An11), based on measured ce data.
‡ 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.

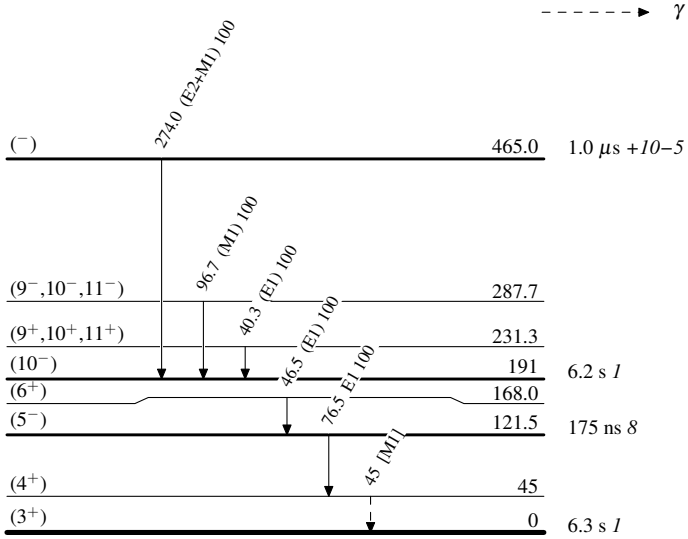
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

– – – – – – ► γ Decay (Uncertain)



$^{190}_{83}Bi_{107}$