Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	K. Auranen and E. A. Mccutchan	NDS 168, 117 (2020)	1-Aug-2020

Q(β^-)=2251.5 *17*; S(n)=4330 *6*; S(p)=4914.0 *27*; Q(α)=6207.26 *3* 2017Wa10
S(2n)=9468.6 *18*; S(2p)=13449 *12* (2017Wa10).
α: Additional information 1.

^{212}Bi Levels

Cross Reference (XREF) Flags

- A ^{212}Pb β^- decay
- B ^{216}At α decay (0.30 ms)
- C ^{216}At α decay:J=9
- D ^{216}At α decay:J=4

E(level)†	J$^\pi$	$T_{1/2}$	XREF	Comments
0.0	1$^{(-)}$	60.55 min *6*	AB	%β^-=64.06 *6*; %α=35.94 *6* Q=+0.1 *4*; μ=+0.32 *4* μ: from laser resonance fluorescence spectroscopy (1997Ki15). Other: 0.41 *5* from static low-temperature nuclear orientation (1997Ki15). Q: from laser resonance fluorescence spectroscopy (1997Ki15,2000Pe30,2001Bi23,2016St14). Isotope shifts: 1997Ki15, 2000Pe30. J$^\pi$: log *ft* from 0$^+$ suggests J=0 or 1; $\alpha\gamma(\theta)$ rules out J=0 (1986Ma17); π=− from shell model. $T_{1/2}$: weighted average of 60.480 min *52* (1914Le01) and 60.600 min *43* (1961Ap03). Other: 60.5 min (1949Me54,1948Gh01). %α: weighted average of 36.00 *3* (1965Wa09), 35.81 *4* (1962Be09), and 35.96 *6* (1960Sc07). configuration=(π1h$_{9/2}$)(ν2g$_{9/2}$). RMS charge radius <r^2>$^{1/2}$=5.5489 fm *54* (2013An02).
115.183 *5*	2$^{(-)}$	8 ps *4*	AB	J$^\pi$: J=2 from $\gamma\gamma(\theta)$ in ^{212}Pb β^- decay, M1 115.2γ to 1$^{(-)}$ g.s. $T_{1/2}$: from (ce)(ce)(t) in ^{212}Pb β^- decay.
196‡ *16*			B	
213.1 *2*	(3$^-$)		B	J$^\pi$: M1(+E2) 97.9γ to 2$^{(-)}$, large HF=339 for alpha decay from ^{216}At(J$^\pi$=1$^-$) suggests L=2 α transition, favoring J$^\pi$=3$^-$.
238.632 *2*	0$^{(-)}$	1.0 ps *2*	AB	J$^\pi$: M1 238.6γ to 1$^{(-)}$, isotropic $\beta\gamma(\theta)$ in ^{212}Pb β^- decay favors J=0. $T_{1/2}$: from $\beta\gamma$(t) in ^{212}Pb β^- decay.
239 *30*	(8$^-$,9$^-$)	25.0 min *2*	C	%β^-=33 *1*; %$\beta^-\alpha$=30 *1*; %α=67 *1* E(level): from Schottky mass spectrometry (2013Ch12). Other: 250 from Eα=6.34 MeV to ^{208}Tl g.s. (1978Ba44). J$^\pi$: J$^\pi$=(9$^-$) suggested by analogy with ^{210}Bi. Possible configuration=((^{210}Bi 9$^-$)(ν2g$_{9/2}$)$^{+2}$0$^+$) (1978Ba44). J$^\pi$=(8$^-$) suggested by log ft value for β^- decay to J$^\pi$=8$^+$ state in ^{212}Po (1991Wa18). $T_{1/2}$: from 1984Es01. Others: 28 min *1* (1980Le27), 25 min *1* (1978Ba44). %α,%β^-: from Iα(25 min ^{212}Bi)/Iα(^{212}Po) (1984Es01), see ^{212}Bi β^- decay (25.0 min) data set. %$\beta^-\alpha$: from Iα(^{212}Po excited states) (see ^{212}Bi β^- decay (25.0 min) data set).
250.7 *5*	(4$^-$)		B	J$^\pi$: J$^\pi$=(2$^-$,3$^-$,4$^-$) from 37.6γ M1 to (3$^-$). Absence of γ-ray decay to 115-keV level (J$^\pi$=2$^{(-)}$) and ground state (J$^\pi$=1$^{(-)}$) suggests J$^\pi$=(4$^-$).
338‡ *16*			B	
415.272 *11*	1$^{(-)}$	≤10 ps	AB	J$^\pi$: M1 176.7γ to 0$^{(-)}$, 300.1γ to 2$^{(-)}$, absence of γ-ray to (3$^-$). $T_{1/2}$: from β(ce)(t) in ^{212}Pb β^- decay.

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Adopted Levels, Gammas (continued)

^{212}Bi Levels (continued)

E(level)†	Jπ	$T_{1/2}$	XREF	Comments
417.9 *2*			B	
494.5 *3*			B	
573?‡ *16*			B	
1478 *38*	(18⁻)	7.0 min *3*		%β⁻<25; %IT>75 E(level): from Schottky mass spectrometry (2013Ch12). Jπ: from β⁻ decay to (18⁺) level in ^{212}Po, comparison to shell model calculations (2013Ch12, 1991Wa18). $T_{1/2}$: neutron atom half-life from 1984Es01. Others: 7 min *1* (1980Le27), 9 min *1* (1978Ba44). For highly-charged atoms (charge states of 80⁺,81⁺, and 82⁺), $T_{1/2}$ > 30 min (2013Ch12). %IT,%β⁻: only a β⁻ delayed 11.65 MeV α (from 45.1 s ^{212}Po) with $T_{1/2}$=7.0 m has been observed. Taking log *ft* for this transition as 5.1 (lower limit for allowed β⁻ transition) and E_{level}=1478 keV, the %IT branch must be >75%, as deduced by the evaluators. Produced by ^{204}Hg(^{18}O,^{10}B), ^{205}Tl(^{18}O,^{11}C), ^{208}Pb(^{18}O,^{14}N) with E(^{18}O)=99-195 MeV (1984Es01) and ^{9}Be(^{238}U,X) with E(^{238}U)=750 MeV/nucleon (2013Ch12).

† From least squares fit to Eγ, except where noted.
‡ From ^{212}At α decay (0.30 ms).

γ(^{212}Bi)

E_i(level)	J_i^π	E_γ†	I_γ†	E_f	J_f^π	Mult.‡	α	Comments
115.183	2(−)	115.183 *5*	100	0.0	1(−)	M1	6.80	α(K)=5.53 *8*; α(L)=0.972 *14*; α(M)=0.229 *4*; α(N)=0.0585 *9*; α(O)=0.01196 *17* α(P)=0.001423 *20* B(M1)(W.u.)=0.23 *+20−8*
213.1	(3⁻)	97.9 *2*	100	115.183	2(−)	M1(+E2)	9.1 *17*	α(K)=4.6 *42*; α(L)=3.4 *18*; α(M)=0.87 *51*; α(N)=0.22 *13*; α(O)=0.042 *23*; α(P)=0.0036 *14* E_γ,I_γ,Mult.: from ^{216}At α decay (0.30 ms).
238.632	0(−)	123.5#		115.183	2(−)			
		238.632 *2*	100	0.0	1(−)	M1	0.872	α(K)=0.710 *10*; α(L)=0.1232 *18*; α(M)=0.0290 *4*; α(N)=0.00741 *11*; α(O)=0.001514 *22* α(P)=0.000180 *3* B(M1)(W.u.)=0.87 *+21−15*
250.7	(4⁻)	37.6 *4*	100	213.1	(3⁻)	M1	33.5 *12*	α(L)=25.6 *9*; α(M)=6.02 *21*; α(N)=1.54 *6*; α(O)=0.315 *11*; α(P)=0.0374 *14* E_γ,I_γ,Mult.: from ^{216}At α decay (0.30 ms).
415.272	1(−)	176.68 *5*	1.6 *2*	238.632	0(−)	M1	2.02	α(K)=1.645 *23*; α(L)=0.287 *4*; α(M)=0.0674 *10*; α(N)=0.01725 *25*; α(O)=0.00352 *5* α(P)=0.000419 *6* B(M1)(W.u.)≥0.0036
		300.087 *10*	100 *1*	115.183	2(−)	M1	0.464	α(K)=0.378 *6*; α(L)=0.0653 *10*; α(M)=0.01535 *22*; α(N)=0.00392 *6*; α(O)=0.000802 *12* α(P)=9.55×10⁻⁵ *14* B(M1)(W.u.)≥0.053
		415.2	0.40 *7*	0.0	1(−)	(M1)	0.192	α(K)=0.1572 *22*; α(L)=0.0269 *4*; α(M)=0.00632 *9*; α(N)=0.001617 *23*; α(O)=0.000330 *5*

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Adopted Levels, Gammas (continued)

$\gamma(^{212}Bi)$ (continued)

E_i(level)	E_γ[†]	I_γ[†]	E_f	J^π_f	Comments
					α(P)=3.94×10^{-5} *6* B(M1)(W.u.)≥6.6×10^{-5}
417.9	204.8 *3*	7.7 *23*	213.1	(3$^-$)	E_γ,I_γ: from ^{216}At α decay (0.30 ms).
	417.9 *2*	100 *15*	0.0	1$^{(-)}$	E_γ,I_γ: from ^{216}At α decay (0.30 ms).
494.5	379.3 *3*	100	115.183	2$^{(-)}$	E_γ,I_γ: from ^{216}At α decay (0.30 ms).

[†] From ^{212}Pb β^- decay, except where noted.
[‡] From internal conversion data in ^{212}Pb β^- decay, except where noted.
[#] Placement of transition in the level scheme is uncertain.

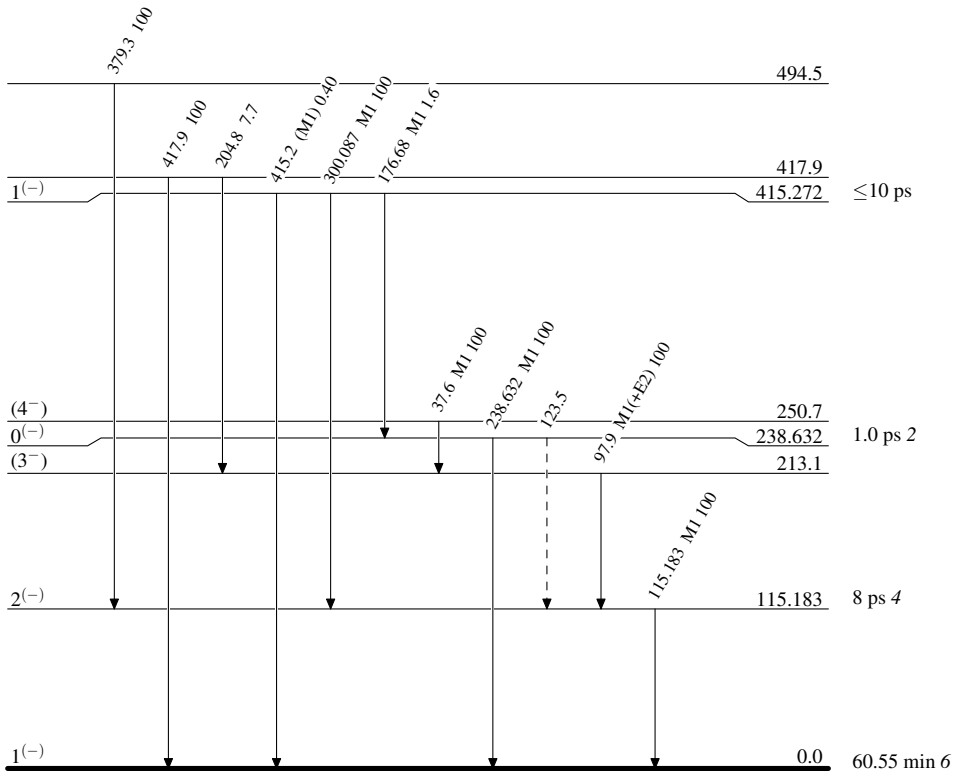
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)



$^{212}_{83}Bi_{129}$