

^{217}Bi β^- decay (98.5 s) [2014Mo02](#),[2003Ku25](#)

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	B. Singh, T. Roy, K. Banerjee		NDS 147, 382 (2018)	1-Dec-2017

Parent: ^{217}Bi : $E=0.0$; $J^\pi=(9/2^-)$; $T_{1/2}=98.5$ s 13; $Q(\beta^-)=2846$ 19; $\% \beta^-$ decay=100.0

^{217}Bi - $J^\pi, T_{1/2}$: From ^{217}Bi Adopted Levels.

^{217}Bi - $Q(\beta^-)$: From [2017Wa10](#).

^{217}Bi - $\% \beta^-$ decay: $\% \beta^- = 100$. Only the beta decay has been observed. The α -decay branch is expected to be negligible. Calculations by [1997Mo25](#) give 1×10^9 s for its partial half-life for alpha decay, and >100 s for beta decay.

[2014Mo02](#): ^{217}Bi was produced by projectile fragmentation using $E(^{238}\text{U})=1$ GeV/nucleon beam provided by the UNILAC-SIS accelerator facilities at GSI with an intensity of 1.5×10^9 ions/spill (a repetition of 3 s and an extraction time of 1 s). The reaction products were separated and identified by the Fragment Separator (FRS). Separation of ^{217}Bi nuclei was based on $B\rho$ - ΔE - $B\rho$ scheme. At the focal plane, the recoils were slowed down in an Al degrader and implanted in a composite DSSSD detector system comprising of three layers, each with three DSSSD pads with 16×16 pixels, and dimensions of 5×5 cm² and 1 mm thick. The DSSSD detectors were surrounded by the RISING γ -ray spectrometer comprised of 105 HPGe crystals arranged as clusters of seven elements. Measured E_γ , I_γ , $\gamma\gamma$ -coin, (recoils) $\beta\gamma$ coin.

[2003Ku25](#): ^{217}Bi was produced in two experiments with $^{232}\text{ThC}_2$ and ^{238}U targets and pulsed beam of 1 and 1.4 GeV protons of 3×10^{13} particles in a bunch, successively at PS Booster ISOLDE-CERN facility. In both experiments, isotopes were implanted on a movable collection tape, and at the collection point three Ge detectors for γ radiation and a plastic scintillator for β^- particles were used for E_γ , I_γ and $\beta\gamma$ -coin measurements.

Other: [1998RyZY](#) (same group as [2003Ku25](#)): 254γ and 264γ reported with no intensities.

 ^{217}Po Levels

A 1591 level proposed by [2003Ku25](#) is omitted, as the 890γ from this level is assigned by [2014Mo02](#) from an 1154 level.

E(level) [†]	J^π [‡]	$T_{1/2}$ [‡]	Comments
0.0	(9/2 ⁺)	1.53 s 5	
254.1 1	(7/2 ⁺)		
264.6 1	(11/2 ⁺)		
376 1			
554 1			
632 1			
701.5 7			
757 1			
887.6? 10			
1095.6 18			
1154.5 6			
1281.6? 10			E(level): level proposed only by 2003Ku25 .
1314.5? 12			
1496.0? 15			

[†] From E_γ data, assuming 1 keV uncertainty for E_γ when not stated.

[‡] From Adopted Levels.

 $\gamma(^{217}\text{Po})$

The decay scheme seems incomplete and also uncertain in the placement of several γ transitions, thus no normalization is attempted here.

$^{217}\text{Bi}\beta^{-}$ decay (98.5 s) **2014Mo02,2003Ku25** (continued) $\gamma(^{217}\text{Po})$ (continued)

E_{γ}	I_{γ}	$E_i(\text{level})$	J_i^{π}	E_f	J_f^{π}	Mult. @	$\delta^{\text{@}}$	$\alpha^{\&}$	Comments
160 [‡] α	1.7 [‡] 8	1314.5?		1154.5					I_{γ} : from $\gamma\gamma$ coin (2014Mo02).
254.1 [†] 1	28.5 21	254.1	(7/2 ⁺)	0.0	(9/2 ⁺)	(E2)		0.210 3	$\alpha(\text{K})=0.0975$ 14; $\alpha(\text{L})=0.0841$ 13; $\alpha(\text{M})=0.0220$ 4 $\alpha(\text{N})=0.00565$ 9; $\alpha(\text{O})=0.001096$ 17; $\alpha(\text{P})=0.0001067$ 16 E_{γ} : 254 (2014Mo02). I_{γ} : weighted average of 27.9 12 (2003Ku25) and 29 4 (2014Mo02).
264.6 [†] 1	100 6	264.6	(11/2 ⁺)	0.0	(9/2 ⁺)	(M1(+E2))	<1.8	0.5 2	$\alpha(\text{K})=0.4$ 2; $\alpha(\text{L})=0.09$ 1; $\alpha(\text{M})=0.022$ 2; $\alpha(\text{N})=0.0056$ 6; $\alpha(\text{O})=0.00115$ 14 E_{γ} : 264 (2014Mo02). I_{γ} : 100 6 (2003Ku25), 100 11 (2014Mo02).
376 [‡]	16 [‡] 3	376		0.0	(9/2 ⁺)				E_{γ} : γ not confirmed in 2014Mo02, treated by evaluators as uncertain.
436 [#] α 3	4.7 [#] 14	701.5		264.6	(11/2 ⁺)				E_{γ} : 446 (2014Mo02). I_{γ} : weighted average of 2.0 3 (2003Ku25) and 3 1 (2014Mo02).
447.4 [†] 7	2.5 5	701.5		254.1	(7/2 ⁺)				E_{γ} : 446 (2014Mo02). I_{γ} : weighted average of 2.0 3 (2003Ku25) and 3 1 (2014Mo02).
554 [‡]	17 [‡] 3	554		0.0	(9/2 ⁺)				I_{γ} : from $\gamma\gamma$ coin (2014Mo02).
623 [‡] α	4 [‡] 2	887.6?		264.6	(11/2 ⁺)				
632 [‡]	10 [‡] 3	632		0.0	(9/2 ⁺)				
739 [‡] α	[‡]	1496.0?		757					
757 [‡]	16 [‡] 4	757		0.0	(9/2 ⁺)				
841.5 [†] 18	3.80 21	1095.6		254.1	(7/2 ⁺)				E_{γ} : 841 (2014Mo02). I_{γ} : weighted average of 3.4 6 (2003Ku25) and 4 2 (2014Mo02).
889.9 [†] 6	7.0 20	1154.5		264.6	(11/2 ⁺)				E_{γ} : 889 (2014Mo02), placed from a 1591.4 level by 2003Ku25. I_{γ} : weighted average of 5.7 7 (2003Ku25) and 7 2 (2014Mo02).
1017 [#] α 1	4.0 [#] 13	1281.6?		264.6	(11/2 ⁺)				

[†] From 2003Ku25.

[‡] The γ energy and intensity from 2014Mo02 only, energy uncertainty is within the intrinsic FWHM of the RISING array.

[#] From 2003Ku25 only, intensity from $\gamma\gamma$ coin.

[@] From Adopted Gammas.

[&] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ -ray energies, assigned multiplicities, and mixing ratios, unless otherwise specified.

^a Placement of transition in the level scheme is uncertain.

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Decay Scheme

Intensities: Relative I_γ

Legend

- $I_\gamma < 2\% \times I_\gamma^{\max}$
- $I_\gamma < 10\% \times I_\gamma^{\max}$
- $I_\gamma > 10\% \times I_\gamma^{\max}$
- - - - -→ γ Decay (Uncertain)
- Coincidence

$(9/2^-)$ 0.0 98.5 s 13
 $Q_{\beta^-} = 2846.19$ % $\beta^- = 100$
 $^{217}_{83}\text{Bi}_{134}$

