

Adopted Levels, Gammas

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

$Q(\beta^-)=1489$  8;  $S(n)=3970$  7;  $S(p)=7279$  13;  $Q(\alpha)=6662.1$  24 [2017Wa10](#)  
 $S(2n)=9717$  7,  $S(2p)=13040$  50 (syst, [2017Wa10](#)).

$^{217}\text{Po}$  evaluated by B. Singh, T. Roy and K. Banerjee.

[1956Mo15](#): production and identification of  $^{217}\text{Po}$  nuclide as daughter of  $^{221}\text{Rn}$   $\alpha$  decay.

[2015Fi07](#): measured laser resonance spectrum with laser on and off; deduced spin, isotope shifts, mean-square charge radius, magnetic dipole moment and electric quadrupole moment at ISOLDE-CERN facility.  $^{217}\text{Po}$  produced in  $^{238}\text{U}(p,F),E=1.4$  GeV. Comparison with theoretical calculations using spherical droplet model and mean-field approach.

 $^{217}\text{Po}$  LevelsCross Reference (XREF) Flags

- A**  $^{217}\text{Bi}$   $\beta^-$  decay (98.5 s)  
**B**  $^{221}\text{Rn}$   $\alpha$  decay (25.7 min)

E(level) <sup>†</sup>	$J^\pi$ <sup>‡</sup>	$T_{1/2}$	XREF	Comments
0.0	(9/2 <sup>+</sup> )	1.53 s 5	AB	$\% \alpha > 95$ ; $\% \beta^- < 5$ ( <a href="#">1977Vy02</a> ) $Q=+0.06$ 44 ( <a href="#">2015Fi07</a> ); $\mu=-1.106$ 103 ( <a href="#">2015Fi07</a> ) Limit on $\beta^-$ decay was obtained by comparing the intensities of the $\alpha$ groups from $^{221}\text{Rn}$ , $^{221}\text{Fr}$ , $^{217}\text{Po}$ , and $^{217}\text{At}$ decays. Other measurement: $\% \alpha > 80$ , $\% \beta^- < 20$ ( <a href="#">1956Mo15</a> ). Gross $\beta^-$ -decay calculation of <a href="#">1973Ta30</a> gives $\% \beta^- < 1$ . $\mu, Q$ : for $J=9/2$ from in-source laser spectroscopy. The statistical and systematic uncertainties for $\mu$ and $Q$ given in Table II of <a href="#">2015Fi07</a> are combined here in quadrature. Other: $\mu=-1.126$ 105, $Q=0.00$ 44 for $J=11/2$ ( <a href="#">2015Fi07</a> ). $J^\pi$ : laser resonance spectrum shows several peaks, consistent with spin=9/2 or 11/2 for the ground state of $^{217}\text{Po}$ , but (9/2 <sup>+</sup> ) is supported by favored $\alpha$ decay of $^{217}\text{Po}$ to g.s. of $^{213}\text{Pb}$ , as well as by measured $g$ factor which is consistent with theoretical value for $\nu g_{9/2}$ , not with $\nu i_{11/2}$ ( <a href="#">2015Fi07</a> ). Measured isotopic shifts ( <a href="#">2015Fi07</a> ): $\delta\nu(^{217}\text{Po}, ^{216}\text{Po})=+1.060$ GHz 150 for 9/2, +1.165 GHz 150 for 11/2. $\delta\nu(^{217}\text{Po}, ^{210}\text{Po})=-9.880$ GHz 200 for 9/2, -9.985 GHz 200 for 11/2. Measured mean-square charge radius ( <a href="#">2015Fi07</a> ): $\delta \langle r^2 \rangle (^{217}\text{Po}, ^{210}\text{Po})=0.821$ fm <sup>2</sup> 17(stat) 6(syst) for 9/2; 0.830 fm <sup>2</sup> 17(stat) 6(syst) for 11/2. $T_{1/2}$ : weighted average of 1.53 s 5 ( <a href="#">2003Ku25</a> , from $\alpha$ -decay curve, their previous value was 1.48 s 5 in <a href="#">1998RyZY</a> same group as <a href="#">2003Ku25</a> ), 1.6 s 2 ( <a href="#">2004Li28</a> , from $\alpha$ -decay curve). Other: $< 10$ s ( <a href="#">1956Mo15</a> ). $J^\pi$ : (E2) $\gamma$ to (9/2 <sup>+</sup> ). $J^\pi$ : (M1(+E2)) $\gamma$ to (9/2 <sup>+</sup> ).
254.1 1	(7/2 <sup>+</sup> )		AB	
264.68 4	(11/2 <sup>+</sup> )		AB	
376 1			A	
554 1			A	
632 1			A	
701.5 7			A	
757 1			A	
887.7? 10			A	
1095.6 18			A	
1154.6 6			A	
1281.7? 10			A	
1314.6? 12			A	
1496.0? 15			A	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) $^{217}\text{Po}$  Levels (continued)

† From  $E_\gamma$  data, assuming 1 keV uncertainty for  $E_\gamma$  when not stated.

‡ From analogy to  $^{219}\text{Rn}$ . See also comments for each level.

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^\dagger$	$E_f$	$J_f^\pi$	$\gamma(^{217}\text{Po})$		$\alpha^\#$	Comments
						Mult.‡	$\delta^\ddagger$		
254.1	(7/2 <sup>+</sup> )	254.1 1	100	0.0	(9/2 <sup>+</sup> )	(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
264.68	(11/2 <sup>+</sup> )	264.68 4	100	0.0	(9/2 <sup>+</sup> )	(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 $E_\gamma$ : from $^{221}\text{Rn}$ $\alpha$ decay.
376		376	100	0.0	(9/2 <sup>+</sup> )				
554		554	100	0.0	(9/2 <sup>+</sup> )				
632		632	100	0.0	(9/2 <sup>+</sup> )				
701.5		436 @ 3	188 56	264.68	(11/2 <sup>+</sup> )				
		447.4 7	100 20	254.1	(7/2 <sup>+</sup> )				
757		757	100	0.0	(9/2 <sup>+</sup> )				
887.7?		623 @	100	264.68	(11/2 <sup>+</sup> )				
1095.6		841.5 18	100	254.1	(7/2 <sup>+</sup> )				
1154.6		889.9 6	100	264.68	(11/2 <sup>+</sup> )				
1281.7?		1017 @ 1	100	264.68	(11/2 <sup>+</sup> )				
1314.6?		160 @	100	1154.6					
1496.0?		739 @		757					

† From  $^{217}\text{Bi}$   $\beta^-$  decay unless stated otherwise.

‡ From ce data in  $^{221}\text{Rn}$   $\alpha$  decay.

# Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on  $\gamma$ -ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

@ Placement of transition in the level scheme is uncertain.

**Adopted Levels, Gammas**

Legend

Level Scheme

Intensities: Relative photon branching from each level

-----►  $\gamma$  Decay (Uncertain)