

$^{216}\text{At}$   $\alpha$  decay: J=4 [1994Li10](#)

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

Parent:  $^{216}\text{At}$ : E=57.11 15;  $J^\pi=(4)^-$ ;  $Q(\alpha)=7950$  3; % $\alpha$  decay=100.0

$^{216}\text{At}$ - $T_{1/2}$ : proposed by [1994Li10](#) to be isomeric, however, lifetime of level has not been determined.

[1994Li10](#):  $^{224}\text{Ac}$  activity produced by bombarding targets of  $^{232}\text{Th}$  with 200-MeV protons followed by mass separation. Sources of  $^{216}\text{At}$  were produced in secular equilibrium with  $^{220}\text{Fr}$  and  $^{224}\text{Ac}$ . Measured  $E\alpha$ ,  $I\alpha$ ,  $E\gamma$ ,  $I\gamma$ ,  $\alpha\gamma$  coin, ce,  $\alpha$ -ce coin, ce- $\gamma$  coin using Ge detectors for  $\gamma$  rays and Si(Li) for conversion electrons.

The 7486-keV  $\alpha$  group and the 103.4-keV  $\gamma$  ray are very tentatively placed in the decay scheme. [1994Li10](#) speculatively suggested an isomer at 57 keV ( $J^\pi=4^-$ ) in  $^{216}\text{At}$  that decays by an 7486-keV  $\alpha$ -particle group to a  $J^\pi=(6^-)$  state at 380 keV in  $^{212}\text{Bi}$ . This level deexcites by a 103.4-keV M1(+E2)  $\gamma$  ray to a possible  $J^\pi=(7^-)$  state at 277 keV, which in turn populates the 27-min  $^{212}\text{Bi}$  isomer by a strongly converted 38 keV M1 (or E2)  $\gamma$ -ray transition ([1994Li10](#)). See [1994Li10](#) for a tentative decay scheme.

Due to tentative nature of this decay scheme, the excited levels built on the 239-keV isomer are not included in the Adopted Levels.

 $^{212}\text{Bi}$  Levels

E(level)	$J^\pi^\dagger$	$T_{1/2}^\dagger$	Comments
239 30	(8 <sup>-</sup> ,9 <sup>-</sup> )	25.0 min 2	E(level): from the Adopted Levels.
277?			E(level): very tentatively assigned level, see general comment above. $J^\pi$ : (7 <sup>-</sup> ) is proposed by <a href="#">1994Li10</a> .
380? 3			E(level): very tentatively assigned level, see general comment above. $J^\pi$ : (6 <sup>-</sup> ) is proposed by <a href="#">1994Li10</a> .

<sup>†</sup> From the Adopted Levels.

 $\alpha$  radiations

$E\alpha$	E(level)	Comments
7486	380?	$I\alpha$ : 0.20 3 relative to $I\alpha=97.5$ for 7802-keV $\alpha$ from $^{216}\text{At}$ (0.30 ms) decay.

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

$E_\gamma$	$E_i(\text{level})$	$E_f$	$J^\pi_f$	Mult.	Comments
(38)	277?	239	(8 <sup>-</sup> ,9 <sup>-</sup> )		$E_\gamma$ : unobserved, strongly converted transition postulated by <a href="#">1994Li10</a> to account for the decay of the 380-keV level eventually to the 239-keV isomer in $^{212}\text{Bi}$ ( <a href="#">1994Li10</a> ).
103.4 <sup>†</sup> 2	380?	277?		M1(+E2)	$E_\gamma$ : see general comment above for placement of this transition in the decay scheme. $I_\gamma$ : 0.23 relative to 0.27 for 115.2 $\gamma$ from $^{216}\text{At}$ (0.30 ms) decay ( <a href="#">1994Li10</a> ).

<sup>†</sup> Placement of transition in the level scheme is uncertain.

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Legend

Decay Scheme

