

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	C. J. Chiara and F. G. Kondev		NDS 111,141 (2010)	1-Oct-2009

$Q(\beta^-) = -3.89 \times 10^3$ 3; S(n)=7784 25; S(p)=1854 24; Q(α)=6070.3 13 [2012Wa38](#)

Note: Current evaluation has used the following Q record -3890 30 7780 30 1860 40 6069.8 15 [2003Au03](#).

 ^{204}At LevelsCross Reference (XREF) Flags

- A** ^{204}At IT decay (108 ms)
B ^{208}Fr α decay
C $^{181}\text{Ta}(^{30}\text{Si}, X\gamma)$

E(level) [†]	J ^{π}	T _{1/2}	XREF	Comments
0	7 ⁺	9.12 min 11	ABC	$\% \epsilon + \% \beta^+ = 96.09$ 16; $\% \alpha = 3.91$ 16 $\% \alpha$: Weighted average of 3.8% 2 (1993Wa04), 4.5% 13 (1961La02), 4.2% 3 (1974Ho27), and 3.0% 10 (1981Va27). $E\alpha = 5948$ keV 5 (1974Ho27), 5952 keV 2 (1968Go12), 5948 keV 3 (1963Ho18), 5947 keV 3 (1967Tr06), 5953 keV 3 (1981Va27), and 5900 keV 30 (1961Fo04). $T_{1/2}$: Weighted average of 9.3 min 3 (1961La02), 9.3 min 2 (1963Ho18), 8.9 min 2 (1964Th07), and 9.1 min 2 (1970DaZM). Other: 7.9 min 6 (1968Go12) and 9 min 3 (1961Fo04). J^π : Favored α decay to the ^{200}Bi ground state ($J^\pi = 7^+$). Shell model allows $J \leq 7$ $\pi = +$. Significant ϵ decay feeding of the 2227-keV, 9- and 2248-keV, 8 ⁺ levels in ^{204}Po , however, excludes $J < 7$ (1970DaZM). Configuration = $((\pi h_{9/2})^{+1}(\nu f_{5/2})^{-1})$.
587.30 20	10 ⁻	108 ms 10	A	$\% \text{IT} = 100$ J^π : 587.3 γ E3 to 7 ⁺ . The measured isomeric ratios in 1975Gi02 suggest that the spin of this state is higher than that for the ground state ($J^\pi = 7^+$). $T_{1/2}$: From 1969MoZU in ^{204}At IT decay (108 ms) (misassigned to ^{203}At). A consistent result was obtained in 1975Gi02 (^{204}At IT decay (108 ms)) but the measured value was not reported by the authors. Configuration = $((\pi h_{9/2})^{+1}(\nu i_{13/2})^{-1})$.
587.30+x [‡] 20			C	Additional information 1.
600.9 5	(8)		C	J^π : 600.9 γ D to 7 ⁺ .
718.7+x [‡] 5			C	
1003.1+x [‡] 7			C	
1091.6 7	(10)		C	J^π : 490.7 γ E2 to (8).
1301.7+x [‡] 9			C	
1596.8+x [‡] 10			C	
1680.1 9			C	
1808.8 9	(12)		C	J^π : 717.2 γ E2 to (10).
1842.7+x [‡] 12			C	
2020.1+x [‡] 13			C	
2216.3+x [‡]			C	
2346.2 10			C	

[†] From a least-squares fit to E_γ .

[‡] Band(A): Possibly a shears band that involves one or more $h_{9/2}$ and/or $i_{13/2}$ protons coupled to $i_{13/2}$ neutron(s).

Adopted Levels, Gammas (continued)

$\gamma(^{204}\text{At})$								Comments
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π	Mult. [†]	$\alpha^\ddagger$	
587.30	10^-	587.3 2	100	0	7^+	E3	0.0714 10	$\alpha(\text{K})=0.0402$ 6; $\alpha(\text{L})=0.0232$ 4; $\alpha(\text{M})=0.00607$ 9; $\alpha(\text{N}+..)=0.00194$ 3 $\alpha(\text{N})=0.001577$ 23; $\alpha(\text{O})=0.000321$ 5; $\alpha(\text{P})=3.76\times 10^{-5}$ 6 $\text{B}(\text{E3})(\text{W.u.})=0.000176$ 17 E_γ : From 1975Gi02 (^{204}At IT decay (108 ms)). Other: 585.3 keV 2 in 1969MoZU (^{204}At IT decay (108 ms)). Mult.: $\alpha(\text{K})\exp<0.13$, $\text{K/LM}=1.5$ 1 from ^{204}At IT decay (108 ms) (1969MoZU). Mult.: $A_2=-0.04$ 4. It is stated in 2008Ha36 that E_γ was part of an unresolved doublet.
600.9	(8)	600.9 5	100	0	7^+	D		
718.7+x		131.4 5	100	587.30+x				
1003.1+x		284.4 5	100	718.7+x		D		Mult.: $A_2=-0.38$ 8.
1091.6	(10)	490.7 5	100	600.9	(8)	E2		Mult.: $A_2=+0.20$ 4.
1301.7+x		298.6 5	100	1003.1+x		D		Mult.: $A_2=-0.11$ 9.
1596.8+x		295.1 5	100	1301.7+x		D		Mult.: $A_2=-0.44$ 5. It is stated in 2008Ha36 that E_γ was part of an unresolved doublet.
1680.1		588.5 5	100	1091.6	(10)			
1808.8	(12)	717.2 5	100	1091.6	(10)	E2		Mult.: $A_2=+0.36$ 6.
1842.7+x		245.9 5	100	1596.8+x		D		Mult.: $A_2=-0.23$ 8.
2020.1+x		177.4 5	100	1842.7+x				
2216.3+x?		196.2 [#] 5	100	2020.1+x				
2346.2		537.4 5	100	1808.8	(12)			

[†] From $^{181}\text{Ta}(^{30}\text{Si},\text{X}\gamma)$ ([2008Ha39](#)), unless otherwise specified.

[‡] 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.

[#] Placement of transition in the level scheme is uncertain.

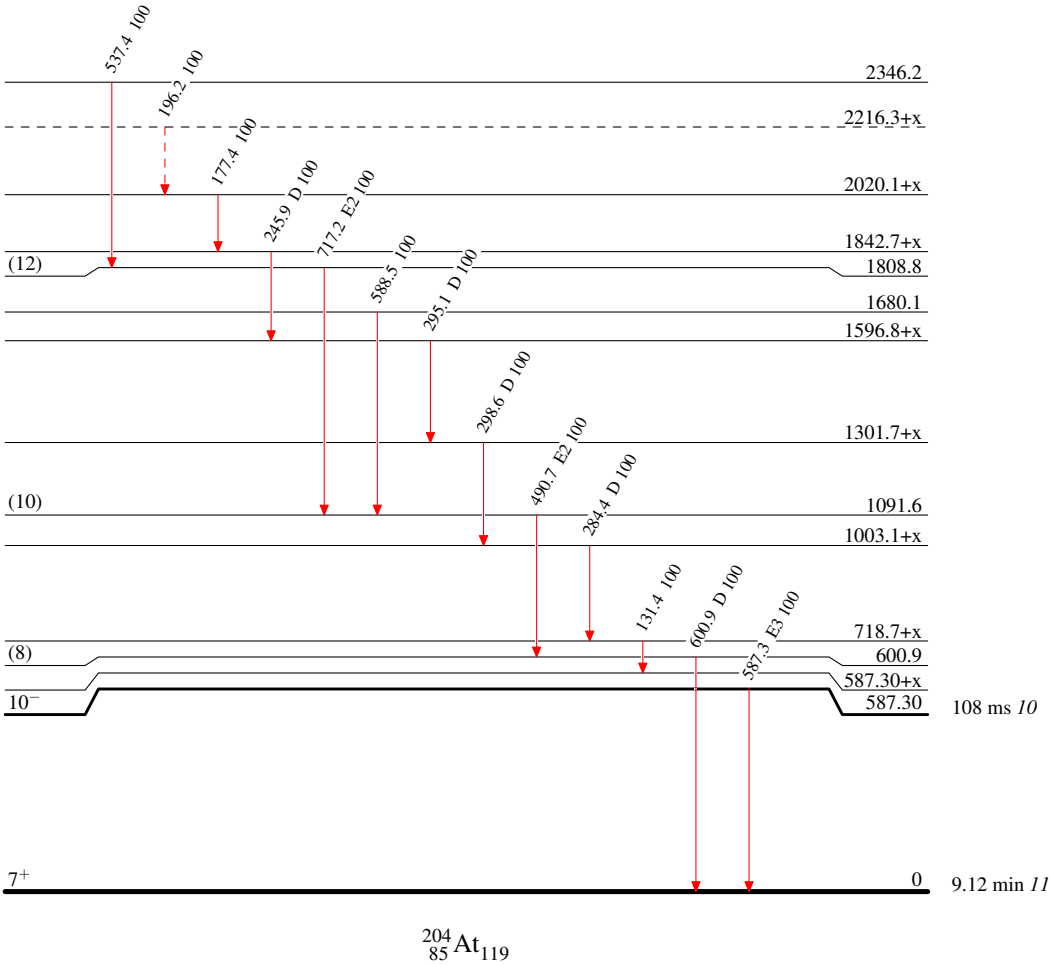
Adopted Levels, Gammas

Legend

Level Scheme

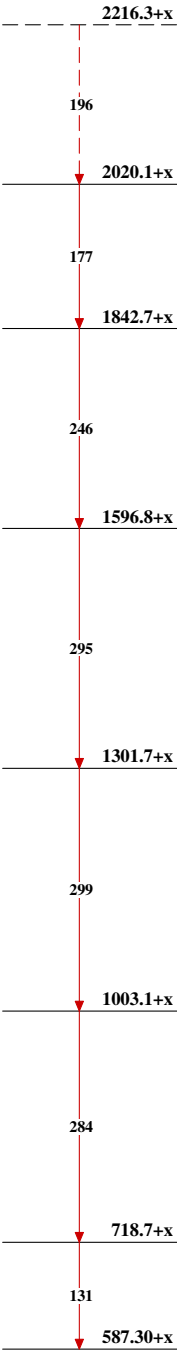
Intensities: Type not specified

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



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Band(A): Possibly a shears band that involves one or more $h_{9/2}$ and/or $i_{13/2}$ protons coupled to $i_{13/2}$ neutron(s)



$^{204}_{85}\text{At}_{119}$