

Adopted Levels, Gammas

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	ENSDF		01-Dec-2015

$Q(\beta^-) = -6391$ 24; $S(n) = 7812$ 29; $S(p) = 3130$ 40; $Q(\alpha) = 6074.2$ 19 [2012Wa38](#)

$S(2n) = 18000$ 50, $S(2p) = 5043$ 24, $Q(\epsilon p) = 3547$ 28 ([2012Wa38](#)).

Measurement and nuclear structure effects of α anisotropy (^{199}Po α decay): [1988Wo11](#), [1988Be44](#), [1987Wo04](#), [1986Wo03](#), [1985Wo09](#).

Mass measurement: [2000Ra23](#).

[Additional information 1](#).

Charge state measured in heavy-ion fusion reaction $^{164}\text{Dy}(^{40}\text{Ar}, 5n)$ at 195 MeV: [1979Sk03](#).

 ^{199}Po LevelsCross Reference (XREF) Flags

A	^{199}Po IT decay (4.17 min)	D	$^{176}\text{Yb}(^{28}\text{Si}, 5n\gamma)$
B	^{203}Rn α decay (44 s)	E	$^{183}\text{W}(^{20}\text{Ne}, 4n\gamma)$, $^{194}\text{Pt}(^{12}\text{C}, 7n\gamma)$
C	^{203}Rn α decay (26.9 s)		

E(level) [†]	J ^π [#]	T _{1/2}	XREF	Comments
0.0	(3/2 ⁻) [‡]	5.47 min 15	AB	$\% \epsilon + \% \beta^+ = 92.5$ 3; $\% \alpha = 7.5$ 3 (1993Wa04) $\mu = -0.912$ 65 (2014Se07) $Q = -0.27$ 12 (2014Se07) Configuration = $p_{3/2}$. $\delta \nu(^{199}\text{Po}, ^{196}\text{Po}) = 0.11$ GHz 15; $\delta \langle r^2 \rangle(^{199}\text{Po}, ^{210}\text{Po}) = -0.644$ fm ² 13 (2013Se03). $\langle \beta_2^2 \rangle^{1/2} = 0.09$ (2013Se03 , 2014Se07). μ, Q : hyperfine structure studies using in-source resonance ionization spectroscopy at CERN-ISOLDE facility (2014Se07). Total (statistical uncertainties = 0.010 for μ and 0.12 for Q , and systematic) uncertainties are given. T _{1/2} : weighted average of 4.6 min +6-5 (1996Ta18), 5.9 min 1 (1982Bo04), 5.2 min 3 (1976Ko13), 5.4 min 3 (1971Ho01), 5.0 min 2 (1967Ti04 , 1965Ti03), 6.0 min 5 (1967Si09), 5.2 min 1 (1967Le21 , 1967Le08). Other: 5.2 min (1965Br17 , 1964Br23). Additional information 2 .
72 2 310 @ 2	(5/2 ⁻) [‡] (13/2 ⁺) [‡]	4.17 min 5	AB A CDE	Configuration = $2f_{5/2}$. $\% \alpha = 24$ 1 (1993Wa04); $\% \epsilon + \% \beta^+ = 73.5$ 10; $\% \text{IT} = 2.5$ 10 $\mu = 0.99$ 7 (1991Wo04) $\mu = -1.005$ 70 (2014Se07) $Q = +1.40$ 35 (2014Se07) Additional information 3 . Configuration = $i_{13/2}$. $\delta \nu(^{199}\text{Po}, ^{196}\text{Po}) = -0.72$ GHz 15; $\delta \langle r^2 \rangle(^{199}\text{Po}, ^{210}\text{Po}) = -0.574$ fm ² 13 (2013Se03). $\langle \beta_2^2 \rangle^{1/2} = 0.12$ (2013Se03 , 2014Se07). μ, Q : hyperfine structure studies using in-source resonance ionization spectroscopy at CERN-ISOLDE facility (2014Se07). Total (statistical uncertainties = 0.040 for μ and 0.20 for Q , and systematic) uncertainties are given. J ^π : spin consistent with optical hyperfine spectrum shown in Fig. 6 of 2014Se07 . T _{1/2} : weighted average of 4.3 min 5, 3.7 min 8 (1996Ta18), 4.3 min 2 (1985St02), 4.2 min 3 (1976Ko13), 4.25 min 25 (1971Ho01), 4.1 min 1 (1967Le21 , 1967Le08), 4.20 min 5 (1967Si09), 4.1 min 1 (1967Ti04 , 1965Ti03). Other: 4.1 min (1965Br17 , 1964Br23). $\% \epsilon + \% \beta^+, \% \text{IT}$: from $\text{it}/(\epsilon + \beta^+) = 0.034$ (1985St02) and $\% \alpha = 24$ 1 (1993Wa04). μ : static nuclear orientation (1991Wo04 , 1988Wo12 , 2005St24).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{199}Po Levels (continued)

E(level) [†]	J ^π [#]	XREF	Comments
909.20 [@] 10	(17/2 ⁺)	DE	
1024.95 22	(15/2 ⁺)	DE	
1471.50 [@] 13	(21/2 ⁺)	DE	
1601.88 13	(19/2 ⁺)	DE	
1728.02 20		E	
1870.50 [@] 19	(25/2 ⁺)	DE	
1891.57 15	(21/2 ⁺)	DE	
2104.18 17	(25/2 ⁺)	DE	
2176.97 17	(23/2)	DE	
2271.14 22	(27/2)	DE	
2297.59 23	(25/2 ⁺)	DE	
2352.57 19	(27/2)	DE	
2699.6 3		DE	J ^π : γs to (25/2 ⁺) and (27/2).
2720.73 [@] 22	(29/2 ⁺)	DE	
2721.8? 3	(27/2 ⁺)	D	
2762.32 22	(29/2 ⁺)	DE	
2978.0 3	(31/2 ⁺ , 29/2 ⁻)	DE	
3008.3 3	(31/2)	DE	
3145.9 [@] 3	(33/2 ⁺)	DE	
3409.08 25	(33/2 ⁺)	DE	
3556.7 4	(35/2 ⁺ , 33/2 ⁻)	DE	
3646.8 4		DE	
3686.3 [@] 4	(37/2 ⁺)	DE	
3931.0 5		DE	

[†] Deduced from adopted E_γ.

[‡] p_{3/2}, i_{13/2}, p_{1/2} and f_{5/2} levels are expected from shell model for low-lying single particle states in a N=115 nucleus. The only particle states available for an M4 transitions are, therefore, i_{13/2} and f_{5/2}. Measured μ supports the 13/2⁺ assignment for the isomeric state. Analogy with N=115, 117 nuclei suggests a 3/2⁻ g.s.

[#] Above 13/2, the assignments are from $^{183}\text{W}(^{20}\text{Ne}, 4n\gamma)$, $^{194}\text{Pt}(^{12}\text{C}, 7n\gamma)$ based on $\gamma\gamma(\theta)$ (DCO) data, γ cascade structures and analogy to heavier Po isotopes.

[@] Band(A): νi_{13/2} structure.

Adopted Levels, Gammas (continued)

$\gamma(^{199}\text{Po})$										
$E_i(\text{level})$	J_i^π	$E_\gamma^\dagger$	$I_\gamma^\dagger$	E_f	J_f^π	Mult. [†]	$\delta^\#$	$\alpha^@$	$I_{(\gamma+ce)}$	Comments
72	(5/2 ⁻)	72 1	100	0.0	(3/2 ⁻)	[M1,E2]		19 13		
310	(13/2 ⁺)	238 1	100	72	(5/2 ⁻)	M4		65.2 17		$\alpha(\text{K})=22.3\ 5$; $\alpha(\text{L})=30.7\ 9$; $\alpha(\text{M})=9.2\ 3$; $\alpha(\text{N})=2.45\ 7$; $\alpha(\text{O})=0.484\ 14$; $\alpha(\text{P})=0.0500\ 14$; $\text{B}(\text{M4})(\text{W.u.})=3.3\ 14$
909.20	(17/2 ⁺)	599.2 1	100	310	(13/2 ⁺)	Q				
1024.95	(15/2 ⁺)	(116)		909.20	(17/2 ⁺)				30 10	
		714.9 3	100 20	310	(13/2 ⁺)	D+Q				$\delta: -1.9\ +6-11\ \text{or}\ -0.41\ +16-42.$
1471.50	(21/2 ⁺)	562.3 1	100	909.20	(17/2 ⁺)	Q				
1601.88	(19/2 ⁺)	(130)		1471.50	(21/2 ⁺)				12 4	
		576.9 3	37 6	1024.95	(15/2 ⁺)	Q				
		692.7 1	100 6	909.20	(17/2 ⁺)	D+Q				$\delta: -0.48\ +8-13\ \text{or}\ -1.6\ 3.$
1728.02		818.8 2	100	909.20	(17/2 ⁺)					
1870.50	(25/2 ⁺)	399.0 2	100	1471.50	(21/2 ⁺)	Q				
1891.57	(21/2 ⁺)	289.7 1	100 5	1601.88	(19/2 ⁺)	D(+Q)	-0.01 +6-5			
		419.9 2	53 4	1471.50	(21/2 ⁺)	D+Q				$\delta: -0.98\ 42\ \text{or}\ +2.4\ 10.$
2104.18	(25/2 ⁺)	632.7 1	100	1471.50	(21/2 ⁺)	Q				
2176.97	(23/2)	285.3 2	33 4	1891.57	(21/2 ⁺)	D(+Q)	0.00 +15-12			
		448.9 3	50 6	1728.02						
		705.5 2	100 10	1471.50	(21/2 ⁺)	D+Q				$\delta: +0.20\ +13-9\ \text{or}\ +6.5\ 38.$
2271.14	(27/2)	400.6 2	100	1870.50	(25/2 ⁺)	D+Q				$\delta: -5.7\ 30\ \text{or}\ -0.14\ +7-20.$
2297.59	(25/2 ⁺)	406.0 2	100	1891.57	(21/2 ⁺)	(Q)				
2352.57	(27/2)	175.5 2	23.7 21	2176.97	(23/2)	(Q)				
		482.1 1	100 5	1870.50	(25/2 ⁺)	D(+Q)	+0.05 +9-10			
2699.6		347.1 3		2352.57	(27/2)					
		402.0 3	100 20	2297.59	(25/2 ⁺)					
2720.73	(29/2 ⁺)	449.4 [‡] 2	100 [‡] 11	2271.14	(27/2)	(D+Q) [‡]				
		616.7 3	72 14	2104.18	(25/2 ⁺)					
		850.0 [‡] 5	39 [‡] 9	1870.50	(25/2 ⁺)	(Q)				
2721.8?	(27/2 ⁺)	450.7 [‡] 2	100 [‡] 12	2271.14	(27/2)	(D+Q) [‡]				
		851.0 [‡] 5	76 [‡] 12	1870.50	(25/2 ⁺)					
2762.32	(29/2 ⁺)	491.3 2	65 5	2271.14	(27/2)	D+Q [‡]				
		658.2 2	100 8	2104.18	(25/2 ⁺)	Q				
2978.0	(31/2 ⁺ ,29/2 ⁻)	625.4 2	100	2352.57	(27/2)					
3008.3	(31/2)	655.7 2	100	2352.57	(27/2)	(Q)				
3145.9	(33/2 ⁺)	383.6 2	100 5	2762.32	(29/2 ⁺)	Q				
		425.1 3	50 5	2720.73	(29/2 ⁺)	Q [‡]				
3409.08	(33/2 ⁺)	646.9 2	100 11	2762.32	(29/2 ⁺)	Q [‡]				
		688.2 [‡] 2	<48 [‡]	2720.73	(29/2 ⁺)					
3556.7	(35/2 ⁺ ,33/2 ⁻)	578.7 2	100	2978.0	(31/2 ⁺ ,29/2 ⁻)	(Q)				
3646.8		668.8 3	100	2978.0	(31/2 ⁺ ,29/2 ⁻)					

Adopted Levels, Gammas (continued)

$\gamma(^{199}\text{Po})$ (continued)

<u>E_i(level)</u>	<u>J^{π}_i</u>	<u>E_{γ}[†]</u>	<u>I_{γ}[†]</u>	<u>E_f</u>	<u>J^{π}_f</u>	<u>Mult.[†]</u>
3686.3	(37/2 ⁺)	540.4	2	3145.9	(33/2 ⁺)	Q [‡]
3931.0		374.3	3	3556.7	(35/2 ⁺ ,33/2 ⁻)	

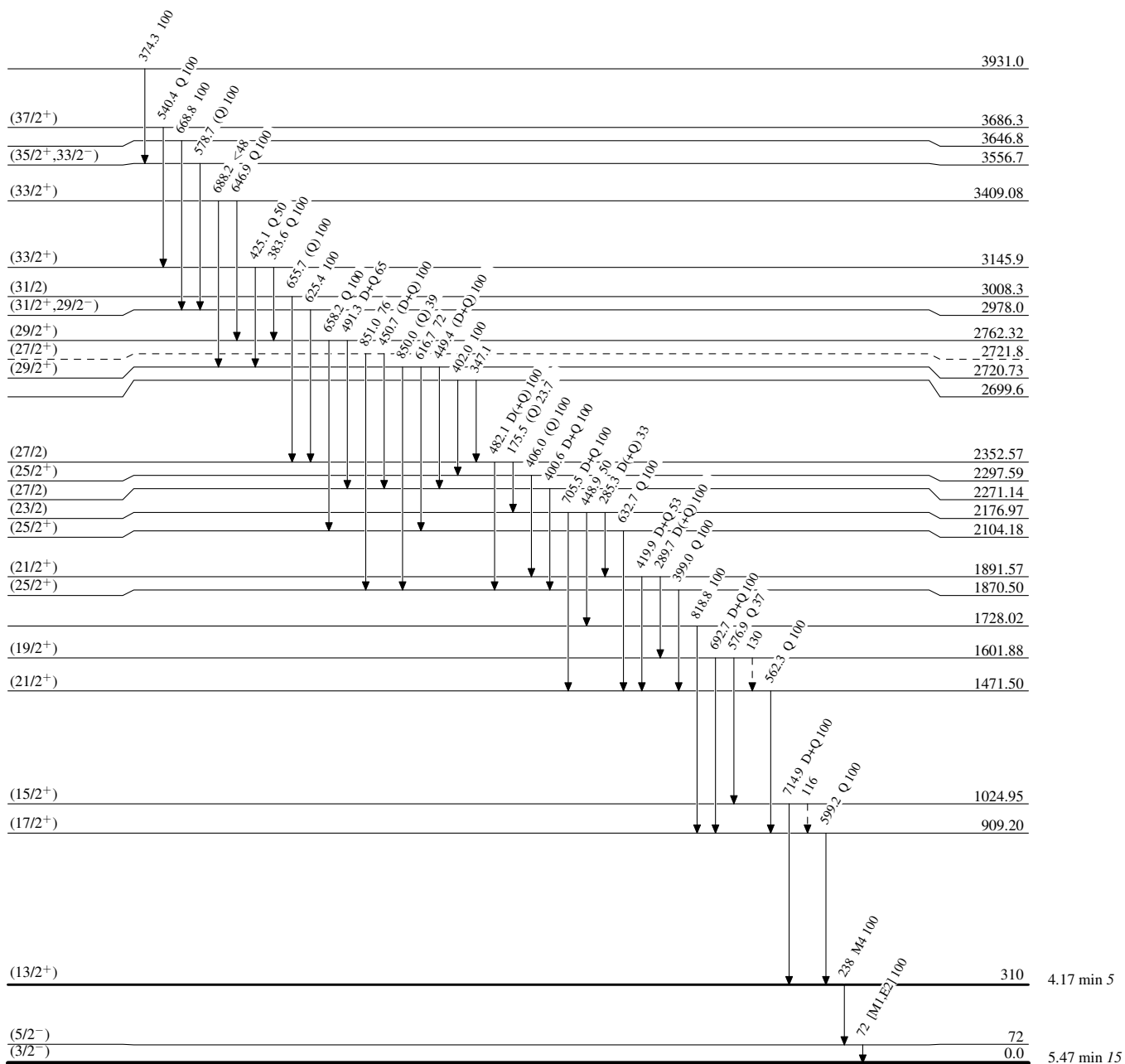
† Gammas from levels with E γ >500 are from ¹⁸³W(²⁰Ne,4n γ), ¹⁹⁴Pt(¹²C,7n γ), unless otherwise stated.
‡ From ¹⁷⁶Yb(²⁸Si,5n γ).
From $\gamma\gamma(\theta)$ data in ¹⁸³W(²⁰Ne,4n γ), ¹⁹⁴Pt(¹²C,7n γ).
@ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ -ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

Adopted Levels, Gammas

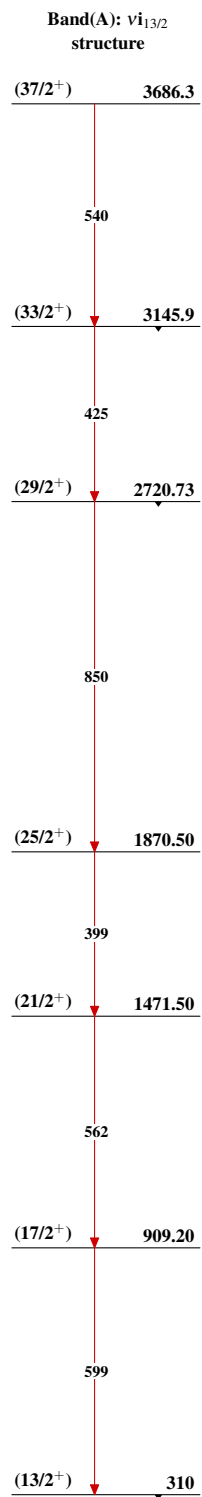
Legend

Level Scheme

Intensities: Relative photon branching from each level

-----► γ Decay (Uncertain)

Adopted Levels, Gammas


 $^{199}_{84}\text{Po}_{115}$