

(HI,xn γ) 2002An19,1999An36

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia	NDS 195,368 (2024)	1-Dec-2023

Others: [1999An10](#) (Same research group of [2002An19](#) and [1999An36](#)), [2001Ju09](#), [2001Le36](#), [2001Uu01](#) (all are from the same research facility), [2005An17](#) (^{191}Po production cross section was measured to be $1.6 \mu\text{b}$ 4 and $2.5 \mu\text{b}$ 8 in $^{142}\text{Nd}(^{52}\text{Cr},3\text{n})$, and $2.9 \mu\text{b}$ 9 in $^{144}\text{Sm}(^{50}\text{Ti},3\text{n})$ reactions).

[2002An19](#): Production via $^{142}\text{Nd}(^{52}\text{Cr},3\text{n}\gamma)$, $E(\text{lab})=236$ MeV. Gas-filled recoil fragment mass separator (RITU). Jurosphere Ge detector array around target; implantation of fusion-evaporation residues in position-sensitive Si strip detector after passage through multiwire proportional avalanche gas detector. RDT method for reaction product identification.

[1999An36](#): ^{36}Ar beam incident on $500 \mu\text{g}/\text{cm}^2$ ^{160}Dy target, $E(\text{lab})=196$ MeV, providing a range of 175-193 MeV in the target by using nickel degrader foils; RITU gas-filled recoil separator, position-sensitive Si strip detector. Identification using correlated α -decay chains, and excitation functions. Measured $E(\alpha)$, $T_{1/2}$. Evaluated correlated chains of α - α and α - γ coincidences.

 ^{191}Po Levels

Proposed level scheme in [2002An19](#), based on prompt γ -ray intensities (not listed by authors) and coincidence measurements $\Delta t(\text{Rec-}\alpha) < 300$ ms.

E(level) [†]	J^π [‡]	$T_{1/2}$	Comments
0	$(3/2^-)$	22 ms 1	From α -ray energy differences to levels in the daughter ^{187}Pb nucleus, the high-spin $(13/2^+)$ isomer should lie about 40 keV above the low-spin $(3/2^-)$ isomer, indicating that the latter is the ^{191}Po ground state. This is consistent with the systematics of the g.s. J^π values in neighboring light Po nuclides. J^π : From Adopted Levels. $T_{1/2}$: From $7334\alpha(t)$ (2002An19,1999An36).
60 [#] 11	$(13/2^+)$	93 ms 3	Additional information 1 . $E(\text{level})$: From 2021Ko07 (NUBASE) – based on $E\alpha$ difference. Other: 40 keV 15 in 2002An19 , based on differences between their measured α ray energies. J^π : From Adopted Levels. $T_{1/2}$: From $7376\alpha(t)$ (2002An19). Other: 98 ms 8 (1999An36).
309? [@]	$(15/2^+)$		2002An19 suggest this level as the lowest of a sequence of unfavored states.
322 [#]	$(17/2^+)$		
684? [@]	$(19/2^+)$		
689 [#]	$(21/2^+)$		
1153 [#]	$(25/2^+)$		
1164? [@]	$(23/2^+)$		
1691? [#]	$(29/2^+)$		

[†] From γ -ray energies, except where otherwise noted.

[‡] As proposed in [2002An19](#) (Fig. 6 and 8), except where otherwise noted.

[#] Band(A): Band 1A, favored sequence of γ transitions.

[@] Band(B): Band 1B, unfavored sequence of γ transitions.

(HI,xn γ) 2002An19,1999An36 (continued) $\gamma(^{191}\text{Po})$

E_γ [†]	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
^x 196 [‡]					
250 [@]	309?	(15/2 ⁺)	60	(13/2 ⁺)	
262	322	(17/2 ⁺)	60	(13/2 ⁺)	
^x 264 [#]					
^x 301 [#]					
^x 312 [#]					
362 [@]	684?	(19/2 ⁺)	322	(17/2 ⁺)	
367	689	(21/2 ⁺)	322	(17/2 ⁺)	
^x 375 [#]					
375 [@]	684?	(19/2 ⁺)	309?	(15/2 ⁺)	Similar 375 keV <i>I</i> γ ray is also reported in coincidence with 6966 α , assigned to $^{187\text{m}}\text{Pb}$ in 2002An19.
^x 431 [#]					
^x 439 [#]					
^x 456 [#]					
464	1153	(25/2 ⁺)	689	(21/2 ⁺)	
480 [@]	1164?	(23/2 ⁺)	684?	(19/2 ⁺)	
^x 521 [#]					
539 [@]	1691?	(29/2 ⁺)	1153	(25/2 ⁺)	
^x 709 [‡]					

[†] From 2002An19 (Fig. 6 and 8). Observed γ rays, $\Delta t(\text{Rec-}\alpha) < 300$ ms and 60 ms, fall into three groups, according to the information provided by α -ray tagged γ spectra. Two groups, associated with the $E=7376$ keV α -ray of the $^{191\text{m}}\text{Po}$ decay, are tentatively arranged into two bands: one based on the (13/2⁺) isomeric state, with partial support from prompt $\gamma\gamma$ coincidences; the other tentatively built on top of a (15/2⁺) state. The third group consists of a number of γ rays which are observed in $E=7334$ keV $^{191\text{g}}\text{Po}$ α -ray tagged γ spectra. These latter γ rays remain unplaced in the level scheme because the low statistics available did not allow the observation of $\gamma\gamma$ coincidences.

[‡] Unplaced γ ray, correlated with the $E=7376$ keV α -decay of $^{191\text{m}}\text{Po}$, $\Delta t(\text{Rec-}\alpha) < 300$ ms.

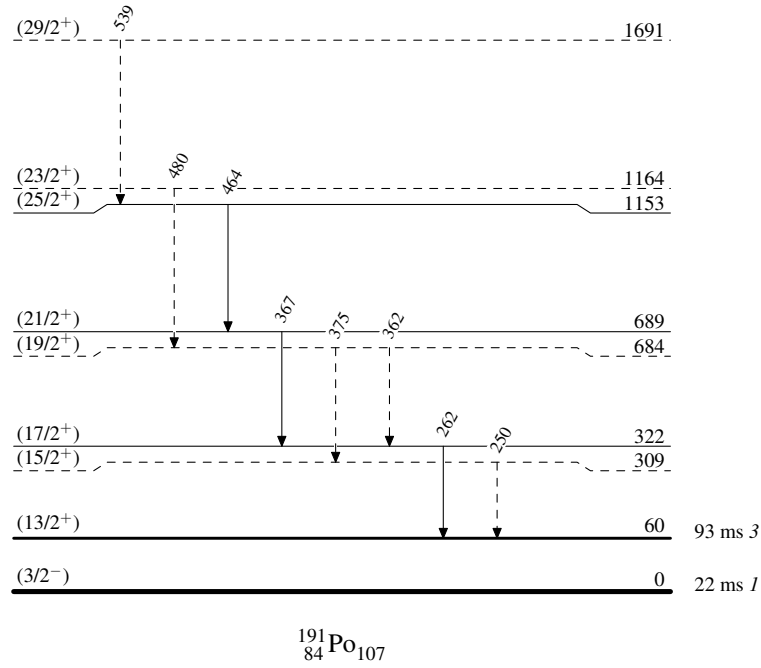
[#] Unplaced γ ray, correlated with the $E=7334$ keV α -decay of $^{191\text{g}}\text{Po}$, $\Delta t(\text{Rec-}\alpha) < 60$ ms.

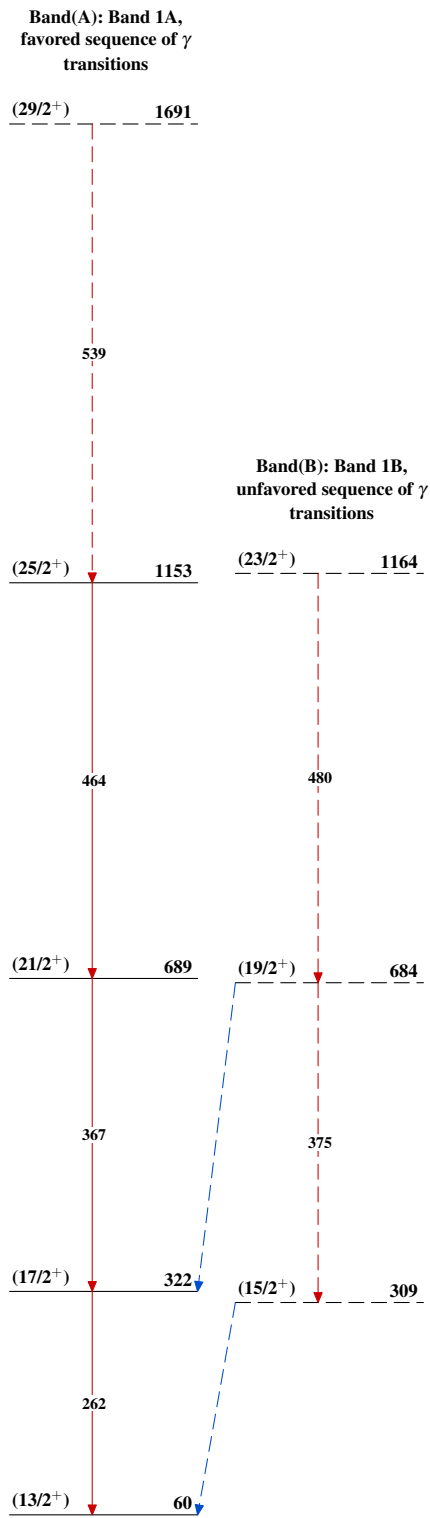
[@] Placement of transition in the level scheme is uncertain.

^x γ ray not placed in level scheme.

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Legend

Level Scheme----- \blacktriangleright γ Decay (Uncertain)

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