

$^{158}\text{Gd}(^{36}\text{Ar},5n\gamma), ^{164}\text{Er}(^{29}\text{Si},4n\gamma)$ **2005Ba51**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	T. D. Johnson, Balraj Singh		NDS 142, 1 (2017)	15-Apr-2017

Includes $^{157}\text{Gd}(^{36}\text{Ar},4n\gamma)$ from 1995Sp01.

First experiment: $^{158}\text{Gd}(^{36}\text{Ar},5n\gamma)$: E=178 MeV. Measured E_γ , I_γ , $\gamma\gamma$, particle- γ coin with 10 Compton-suppressed Ge detectors and parallel-grid avalanche counter (PGAC). Fragment mass analyzer (FMA) used to accept evaporation residues recoiling from target according to their mass/charge ratio. Reaction products detected by PGAC via energy loss (ΔE) and focal-plane-position signals.

Second experiment: $^{164}\text{Er}(^{29}\text{Si},4n\gamma)$: E=140 MeV. Measured E_γ , I_γ , $\gamma\gamma$, $\gamma\gamma(t)$, lifetimes with six Compton-suppressed Ge detectors and two planar low-energy photon spectrometer (LEPS) detectors of the CAESAR array.

1995Sp01: $^{157}\text{Gd}(^{36}\text{Ar},4n\gamma)$ E=173 MeV. Measured E_γ and $\gamma\gamma$ using EUROBALL array. 609-538-468-818 γ cascade reported.

^{189}Pb Levels

E(level) [†]	J^π [‡]	$T_{1/2}$	Comments
40 ^{&} 4	(13/2 ⁺)		Additional information 1. E(level): from Adopted Levels.
677.51 23	(13/2 ⁺)		
858.82 ^{&} 10	(17/2 ⁺)		
950.46 [@] 17	(15/2 ⁺)		
1181.42 [#] 16	(17/2 ⁺)	<6.9 ns	
1327.23 ^{&} 13	(21/2 ⁺)	<2.1 ns	
1340.04 [@] 13	(19/2 ⁺)		
1607.33 [#] 15	(21/2 ⁺)	<2.8 ns	
1865.41 ^{&} 16	(25/2 ⁺)		
2137.73 [#] 16	(25/2 ⁺)	<2.1 ns	
2280.1 3	(27/2)		
2476.4 5			
3142.4 7			

[†] Deduced by evaluators from least-squares fit to E_γ data, keeping the energy of the 40-keV level as fixed, its uncertainty of 4 keV is not carried over in the energies of the higher levels. Note that level in 2005Ba51 are given relative to the isomeric level at 40 keV.

[‡] Assignments are based on systematics of neighboring isotopes and isotones, multipolarities of transitions and related transition strengths.

[#] Band(A): Band based on (17/2⁺), $\alpha=+1/2$. 2005Ba51 compared this band with 9/2[624] band in ^{187}Pb .

[@] Band(a): Band based on (15/2⁺), $\alpha=-1/2$. 2005Ba51 compared this band with 9/2[624] band in ^{187}Pb .

[&] Band(B): $\nu_{13/2}^{-3}$ band.

$\gamma(^{189}\text{Pb})$

E_γ	I_γ ^{&}	$E_i(\text{level})$	J_i^π	E_f	J_f^π
142.4 2	7.0 24	2280.1	(27/2)	2137.73	(25/2 ⁺)
(230.9 ^{†#} 2)		1181.42	(17/2 ⁺)	950.46	(15/2 ⁺)
^x 264 ^{†#@}					
(267.4 ^{†#} 3)		1607.33	(21/2 ⁺)	1340.04	(19/2 ⁺)
(272.4 ^{†#} 2)		2137.73	(25/2 ⁺)	1865.41	(25/2 ⁺)
^x 279 ^{†@}					

Continued on next page (footnotes at end of table)

$^{158}\text{Gd}(^{36}\text{Ar},5\text{n}\gamma), ^{164}\text{Er}(^{29}\text{Si},4\text{n}\gamma)$ **2005Ba51** (continued) $\gamma(^{189}\text{Pb})$ (continued)

E_γ	I_γ &	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
(279.7 [†] # 2)		1607.33	(21/2 ⁺)	1327.23	(21/2 ⁺)	
389.7 2	≈8	1340.04	(19/2 ⁺)	950.46	(15/2 ⁺)	
^x 394 [‡] @						
425.9 1	≈8	1607.33	(21/2 ⁺)	1181.42	(17/2 ⁺)	
468.4 1	75 8	1327.23	(21/2 ⁺)	858.82	(17/2 ⁺)	Additional information 3.
^x 470 [@]						E_γ : seen in coin with a 854 line.
(481.2 [†] # 1)		1340.04	(19/2 ⁺)	858.82	(17/2 ⁺)	
(503.8 [†] # 3)		1181.42	(17/2 ⁺)	677.51	(13/2 ⁺)	E_γ : possibly masked by 502 transitions from ^{189}Tl in mass gate.
530.3 1	≈8	2137.73	(25/2 ⁺)	1607.33	(21/2 ⁺)	
538.2 1	24.0 24	1865.41	(25/2 ⁺)	1327.23	(21/2 ⁺)	Additional information 4.
^x 602 [‡] @						
611.0 4	20 4	2476.4		1865.41	(25/2 ⁺)	Additional information 5.
637.4 3	20 2	677.51	(13/2 ⁺)	40	(13/2 ⁺)	
666.0 5	12 4	3142.4		2476.4		
810.8 2	9 2	2137.73	(25/2 ⁺)	1327.23	(21/2 ⁺)	
818.8 1	100	858.82	(17/2 ⁺)	40	(13/2 ⁺)	Additional information 2.
^x 854 [†] #@						
910.6 3	22.0 22	950.46	(15/2 ⁺)	40	(13/2 ⁺)	
1142.1 6	20 6	1181.42	(17/2 ⁺)	40	(13/2 ⁺)	

[†] Prominent line in coin with A=189 recoils, but assignment to a nuclide could not be made. The 264 γ was seen in recoil- $\gamma\gamma$ data to be in coin with 279, 394 and 602 lines, but not seen in coin with any of the ^{189}Pb γ rays in the work of 2005Ba51. Possibly prompt transition feeding the isomer.

[‡] Seen in coin with 264 γ , but no coin with any of the other ^{189}Pb γ rays in the present study. This may be a prompt transition feeding the 22- μs isomer.

Observed in isomer decay.

@ Isotopic assignment uncertain.

& Values are from in-beam measurements. All values scaled down by a factor of five so as to renormalize the decay scheme to an intensity of 100 for the 818 γ -ray.

^x γ ray not placed in level scheme.

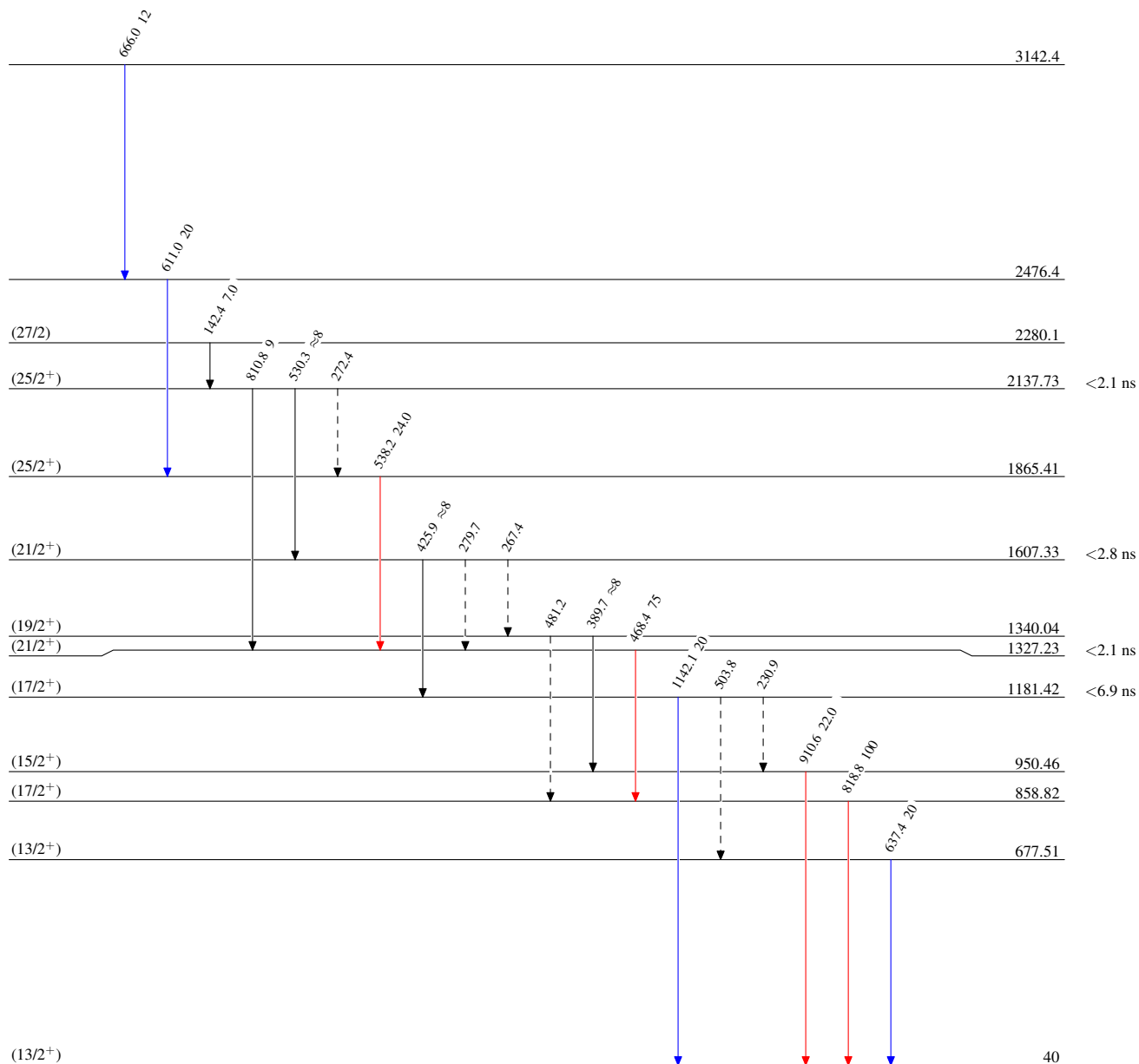
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Legend

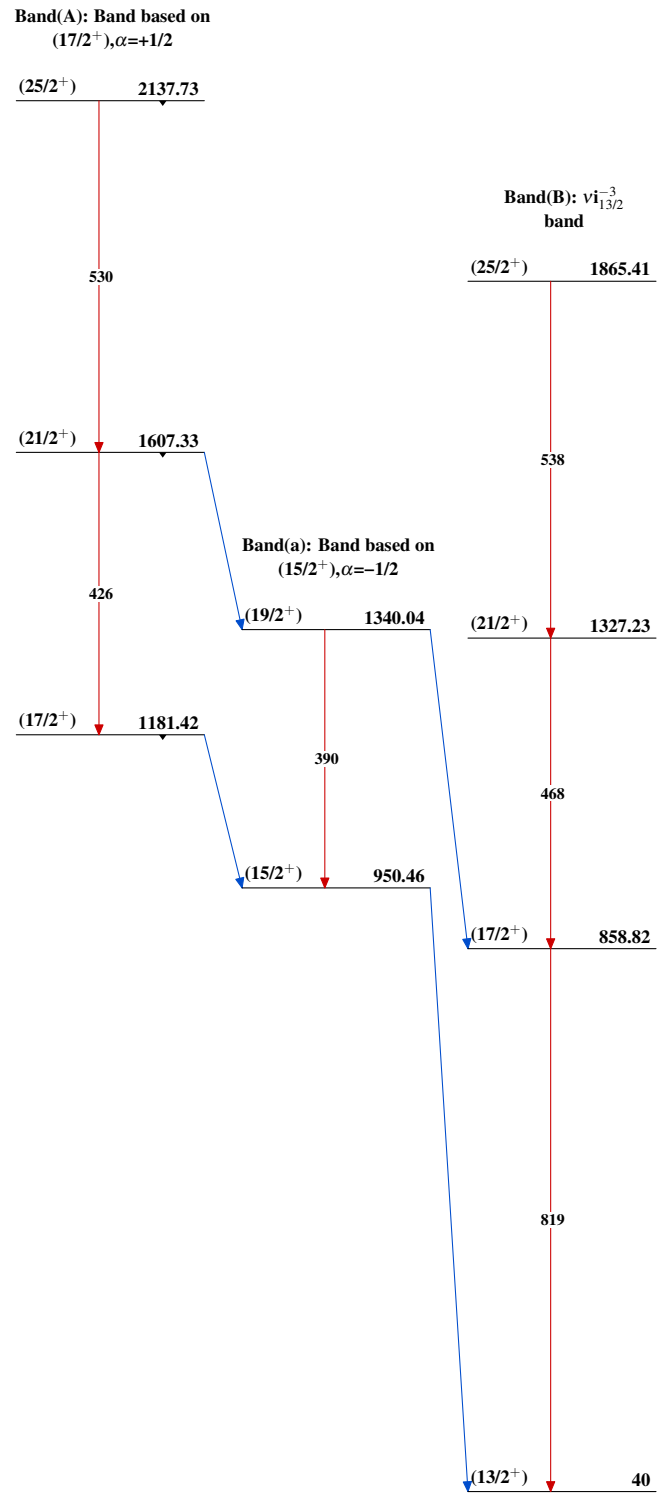
Level Scheme

Intensities: Relative I_γ

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



$^{189}_{82}\text{Pb}_{107}$

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