

$^{170}\text{Er}(^{28}\text{Si},5n\gamma)$ **2011Ba02,2005GI09,2004Io01**

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia		NDS 143, 1 (2017)	31-Mar-2017

Other: [2004Ba31](#).

[2011Ba02](#): E=143 MeV. Pulsed beam with a width of 1.5 ns and repetition rate of 800 ns. The ^{193}Pb nuclei recoiled out of ^{170}Er foil and deposited into solid 0.2 mm Hg layer mounted on a Cu finger cooled to 170.0 K. Quadrupole interaction was investigated in the electric field gradient of solid polycrystalline Hg by time-differential perturbed angular distribution (TDPAD) method. The γ rays were detected using planar HPGe detectors placed at angles of 0° and 90° . Measured E_γ , I_γ , $\gamma(\theta)$, half-lives of isomers by $\gamma(t)$, TDPAD spectra.

[2005GI09](#): E=149 MeV, γ -rays were detected using 4π γ -ray spectrometer GASP, consisting of 40 Compton-suppressed Ge detectors, grouped in seven rings covering backward and forward angles. Measured lifetime by recoil-distance (RDDM) and Doppler-shift attenuation method (DSAM).

[2004Io01](#): 97% enriched ^{170}Er target; Pulse ^{28}Si beam, E=143 MeV. The target was placed between pole tips of an electromagnet, γ rays were detected by two planar HPGe detectors and two HPGe detectors of 20% efficiency placed at 135° and 45° with respect to beam direction. The quadrupole interaction has been investigated in the electric field gradient (efg) of the polycrystalline lattice of metallic solid Hg. The excited lead nuclei recoiled out of the 0.5 mg/cm² target foil into a solid 0.2 mm Hg layer mounted on a Cu cold finger held at the temperature $T_{1/2}=170.0$ K. The γ rays were detected by the planar HPGe detectors placed at 0° and 90° to the beam direction. Measured isomer half-life and spectroscopic quadrupole moments.

 ^{193}Pb Levels

E(level) [†]	J^π @	$T_{1/2}$	Comments
0+x	(13/2 ⁺)	5.8 min 2	$\%E+\%\beta^+=100$ Configuration= $\nu(1i_{13/2}^{-2})$. $T_{1/2}$: From Adopted Levels.
882+x	(17/2 ⁺)		
1022+x	(15/2 ⁺)		
1402+x	(21/2 ⁺)		
1519+x	(19/2 ⁺)		
1550+x	(19/2 ⁺)		
1586+x	(21/2 ⁻)	20.5 ns 4	Configuration= $\nu(1i_{13/2}^{-2}, 3p_{3/2})$. $T_{1/2}$: From $184\gamma(t)$ (2004Io01).
1995+x	(25/2 ⁺)		
2059+x	(23/2 ⁻)		
2141+x	(23/2 ⁺)		
2142+x	(25/2 ⁻)		
2214+x	23/2 ⁺ &		J^π : (25/2 ⁺) in Adopted Levels.
2322+x	(27/2 ⁻)	5.3 ns 6	$Q \leq 0.5$ (2011Ba02) $g = +0.68$ 3 (2011Ba02) $T_{1/2}$: from time spectra of 180γ and 556γ (2011Ba02). Configuration= $\nu(1i_{13/2}^{-2}, 3p_{3/2})$ (2011Ba02). J^π : (27/2 ⁺) in Adopted Levels. See comments in Adopted Levels.
2427+x	25/2 ⁺ &		
2527+x	(29/2 ⁺)		
2585+x	27/2 ⁻ &	9.4 ns 5	$Q = 2.6$ 3 (2011Ba02) $T_{1/2}$: From time spectra of 213γ (2011Ba02). Configuration= $\nu(1i_{13/2}^{-1}) \otimes \pi(1h_{9/2} 1i_{13/2})_{11}$. Bandhead of a magnetic-dipole rotational (shears) band.
2613+x	(33/2 ⁺)	180 ns 15	Configuration= $\nu(1i_{13/2}^{-3})$. $T_{1/2}$: From $532\gamma(t)$, placement from 2527+x (2004Io01).
2686.9+x [#] 6	(31/2 ⁻)		
2939+x [‡]	(33/2 ⁻)	2.2 ps 6	$T_{1/2}$: From measured lifetime of 3.2 ps 8 (2005GI09).
3321+x [‡] 7	(35/2 ⁻)	≤ 0.7 ps	$T_{1/2}$: From measured lifetime of ≤ 1 ps (2005GI09).

Continued on next page (footnotes at end of table)

$^{170}\text{Er}(^{28}\text{Si},5n\gamma)$ **2011Ba02,2005GI09,2004Io01 (continued)** ^{193}Pb Levels (continued)

[†] From **2011Ba02** (except otherwise noted). An unknown quantity of "X" added to represent corresponding Adopted Levels.

[‡] From 20005GI09.

From Adopted Levels for γ ray placement from 2939+x and 3321+x levels (by the evaluator).

@ From Adopted Levels, unless otherwise stated.

& Spin-parity assigned by **2011Ba02** based on revised assignment of $\Delta J=1$, M1+E2 for the 812 γ from 2214+x level. The value is 1 $\hbar$ lower compared to those in the ($^{30}\text{Si},5n\gamma$) and ($^{16}\text{O},5n\gamma$) datasets, where 812 γ assigned as $\Delta J=2$, E2.

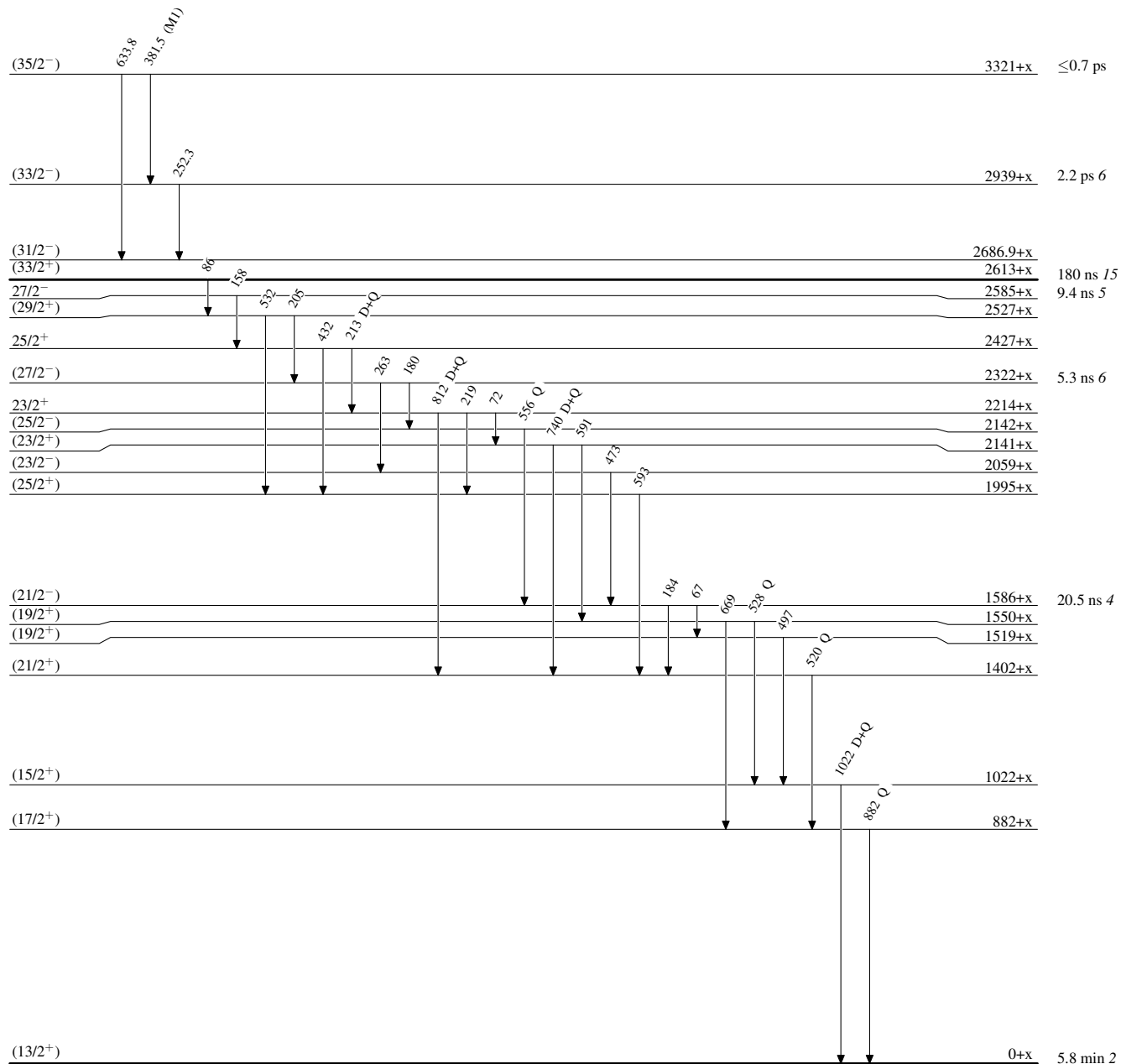
$\gamma(^{193}\text{Pb})$							Comments
E_γ [†]	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [‡]	δ	
67	1586+x	(21/2 ⁻)	1519+x	(19/2 ⁺)			
72	2214+x	23/2 ⁺	2141+x	(23/2 ⁺)			
86	2613+x	(33/2 ⁺)	2527+x	(29/2 ⁺)			
158	2585+x	27/2 ⁻	2427+x	25/2 ⁺			
180	2322+x	(27/2 ⁻)	2142+x	(25/2 ⁻)			
184	1586+x	(21/2 ⁻)	1402+x	(21/2 ⁺)			
205	2527+x	(29/2 ⁺)	2322+x	(27/2 ⁻)			
213	2427+x	25/2 ⁺	2214+x	23/2 ⁺	D+Q	-0.13 2	$A_2=-0.38$ 9 δ : From 2011Ba02 .
219	2214+x	23/2 ⁺	1995+x	(25/2 ⁺)			
252.3 3	2939+x	(33/2 ⁻)	2686.9+x	(31/2 ⁻)			E_γ : From Adopted Gammas.
263	2322+x	(27/2 ⁻)	2059+x	(23/2 ⁻)			
381.5 3	3321+x	(35/2 ⁻)	2939+x	(33/2 ⁻)	(M1)		E_γ , Mult.: From Adopted Gammas.
432	2427+x	25/2 ⁺	1995+x	(25/2 ⁺)			
473	2059+x	(23/2 ⁻)	1586+x	(21/2 ⁻)			
497	1519+x	(19/2 ⁺)	1022+x	(15/2 ⁺)			
520	1402+x	(21/2 ⁺)	882+x	(17/2 ⁺)	Q		$R_{\text{ADO}} \approx 1.3$.
528	1550+x	(19/2 ⁺)	1022+x	(15/2 ⁺)	Q		$R_{\text{ADO}} \approx 1.3$.
532	2527+x	(29/2 ⁺)	1995+x	(25/2 ⁺)			
556	2142+x	(25/2 ⁻)	1586+x	(21/2 ⁻)	Q		$R_{\text{ADO}} \approx 1.3$.
591	2141+x	(23/2 ⁺)	1550+x	(19/2 ⁺)			
593	1995+x	(25/2 ⁺)	1402+x	(21/2 ⁺)			
633.8 6	3321+x	(35/2 ⁻)	2686.9+x	(31/2 ⁻)			E_γ : From Adopted Gammas.
669	1550+x	(19/2 ⁺)	882+x	(17/2 ⁺)			
740	2141+x	(23/2 ⁺)	1402+x	(21/2 ⁺)	D+Q		$R_{\text{ADO}}=0.5$ I.
812	2214+x	23/2 ⁺	1402+x	(21/2 ⁺)	D+Q		Mult.: 2011Ba02 revised the assignment. E2 in earlier literature/evaluation (1991La07 , 2006Ac01). $R_{\text{ADO}}=1.0$ I.
882	882+x	(17/2 ⁺)	0+x	(13/2 ⁺)	Q		$R_{\text{ADO}} \approx 1.3$.
1022	1022+x	(15/2 ⁺)	0+x	(13/2 ⁺)	D+Q		$R_{\text{ADO}}=0.9$ I.

[†] From **2011Ba02**, except otherwise noted.

[‡] Assigned by evaluator based on $R_{\text{ADO}}=I_\gamma(0^\circ)/I_\gamma(90^\circ)$ values (**2011Ba02**). Values are ≈ 1.3 for $\Delta J=2$, Q transition, ≈ 0.8 for $\Delta J=1$, dipole, <0.8 for $\Delta J=1$, D+Q transition with $\delta < 0$, and >0.8 for $\Delta J=1$, D+Q transition with $\delta > 0$.

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Level Scheme

 $^{193}_{82}\text{Pb}_{111}$