^{208}Pb(α,2nγ) 1971Fa18,1985Ka07,1985Be22

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	M. Shamsuzzoha Basunia	NDS 121, 561 (2014)	31-Mar-2014

1971Fa18: target: 95.06% enriched ^{208}Pb. E(α)=23-43 MeV. Measured Eγ, Iγ, $\gamma(\theta)$, excitation functions. Detectors:Ge(Li).

1985Ka07, 1985Be22: target: 99.5% enriched ^{208}Pb. This high enrichment was needed to suppress the interfering contribution from 686.5γ in ^{208}Po, originated from the ^{206}Pb(α,2n) and ^{207}Pb(α,3n) reactions. A γ ray with the same energy deexcites the $J^{\pi}=16^{+}$ isomer at 5057 keV in ^{210}Po. E(α)=35 MeV. Measured Eγ, Iγ, Ice, Ce(t), time-differential perturbed angular distributions (TDPAD). Deduced multipolarities, level g-factors and half-lives. Detectors:Ge(Li), electron spectrometer, in which conversion electrons are transported to a Si(Li) detector using a strong solenoidal magnetic field.

Others: 1967Ya01, 1968Is04, 1970Ya02, 1970Ya03, 1970Ya06, 1970BeZP, 1971Be55, 1971Bl07, 1972Fa25, 1972As04, 1973Ya06, 1973Ba14, 1973Na18, 1976Ha56, 1976Ha62, 1982Fi02, 1983Da01.

^{210}Po Levels

g-factors were measured by I$\gamma(\theta$,H,t) via ^{208}Pb(α,2nγ), and not corrected for Knight shift and diamagnetism, unless otherwise noted.

E(level)‡&	J^{π}#@	$T_{1/2}$†	Comments
0.0[a]	0^{+}	138.376 d *2*	
1181.4[a] *3*	2^{+}		
1426.7[a] *3*	4^{+}	1.53 ns *7*	$T_{1/2}$: From 1976Ha56 − $\gamma\gamma$(t). Other: 1.8 ns *2* (1963Fu02).
1473.2[a] *4*	6^{+}	42.6 ns *10*	$T_{1/2}$: from 1976Ha56 $\gamma\gamma$(t). Others: 38 ns *5* (1963Fu02), 40 ns *6* (1972Ja12), 40.9 ns *10* (1973Na21), 43.0 ns *15* (1973Be30) via ^{210}At ε decay. g-factor=0.913 *6* (1976Ha56) corrected for Knight shift (1.4% 4) and diamagnetism (−1.9% 2). g-factor(8^{+} state) − g-factor(6^{+} state)=−0.020 *7* (1973Ba14), 0.006 *3* (1976Ha56); 1973ArYJ, 1977To04 calc support 1976Ha56 value.
1556.9[a] *4*	8^{+}	96.0 ns *14*	$T_{1/2}$: from 1976Ha56. Others:≈150 ns (1967Ya01), 110 ns *8* (1968Is04), 115 ns *10* (1971Be55). E(level): 1310 keV calc (1978Ma38). g-factor=0.925 *11* (1970Ya02), 0.904 *14* (1970Ya06,1972Na33), 0.909 *7* (1973BaVA,1973Ba14), 0.901 *11* (1973Na18,1974Na02), 0.914 *1* (1976Ha56). Corrected g-factor=0.919 *5* (1976Ha56) corresponds to Configuration=(π $1h_{9/2}$) ^{209}Bi g.s. (g=0.9135 *1*) 1973Br14. Small deviation from additivity rule are discussed by 1976Ha56, 1977To04.
2188.0[b] *4*	8^{+}		
2325.8[b] *5*	6^{+}		
2382.5[b] *4*	4^{+}		
2403.1[b] *4*	5^{+}		
2438.3[b] *4*	7^{+}		
2849.2[c] *4*	11^{-}	20.4 ns *10*	$T_{1/2}$: from 1976Ha56. Others: 24 ns *5* (1967Ya01), 24 ns *3* (1971Fa18), 20.1 ns *13* (1976Ha62). E(level): 2710 keV calc (1978Ma38). g-factor=1.107 *16* (1970Ya06,1972Na33), 1.107 *10* (1976Re12), 1.102 *8* (1976Ha56). g-factor Configuration=(π $1i_{13/2}$)=1.24 *2* is obtained from corrected g=1.107 *12* (1976Ha56) for Configuration=((π $1h_{9/2}$) (π $1i_{13/2}$)) and g=0.9135 *1* (1973Br14) for ^{209}Bi g.s. Configuration=(π $2h_{9/2}$).
2910.0[d] *5*	5^{-}		
2999.5[c] *4*	$(9)^{-}$		
3016.6[c] *6*	$(7)^{-}$		
3026.3[c] *6*	5^{-}		

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^{208}Pb(α,2nγ) 1971Fa18,1985Ka07,1985Be22 (continued)

^{210}Po Levels (continued)

E(level)‡&	Jπ#@	$T_{1/2}$†	Comments
3137.9[c] 5	(8)⁻		
3182.7[c] 5	10⁻		
4324.3[e] 6	(11⁻)		
4372.1[f] 7	13⁻	51 ns 2	$T_{1/2}$: from γ(t), (1985Be22). Other values: 93 ns 6 (1971Bl07,1971Fa18), 78 ns (1970Ya03). E(level): 4300 keV calc (1978Ma38). Corrected g-factor=0.526 13 (1985Be22). Other value: corrected g-factor=0.546 12 (1973Ya06); configuration added g-factor=0.573 calc from 5⁻, ^{208}Pb (g=0.021 7) 1969Bo01, and 8⁺, ^{210}Po (g=0.919 5). See also 1976Ha56.
4777.4[g] 7	14⁻		
5057.7[h] 7	16⁺	263 ns 5	$T_{1/2}$: weighted average of 265 ns 10, γ(t) (1985Be22) and 262 ns 6, Ce(t) (1985Ka07). E(level): 5460 keV calc (1978Ma38). Corrected g-factor=0.615 5 (1985Be22).

† From γ(t) pulsed beam, except for g.s. and as noted.
‡ Deduced by evaluator from a least-squares fit to γ-ray energies.
# From Adopted Levels.
@ Configuration assignments are from 1971Fa18. See Adopted Levels for adopted configurations.
& Using deformed independent-particle model, 1978Ma38 calculated excitation energies of 8⁺,11⁻,13⁻,16⁺ isomers.
[a] Configuration=$(\pi\ 1h_{9/2})^2$.
[b] Configuration=$((\pi\ 1h_{9/2})(\pi\ 2f_{7/2}))$.
[c] Configuration=$((\pi\ 1h_{9/2})(\pi\ 1i_{13/2}))$.
[d] Configuration=$((208\pi B5^-)\ (\pi\ 1h_{9/2}0))5^-$ mixed with Configuration=$((\pi\ 1h_{9/2})(\pi\ 1i_{13/2}))$.
[e] Configuration=$((208\pi B3^-)(\pi\ 1h_{9/2}8^+))11^-$.
[f] Configuration=$((208\pi B5^-)(\pi\ 1h_{9/2}8^+))13^-$.
[g] Configuration=$((208\pi B5^-)(\pi\ 1h_{9/2}8^+))14^-$.
[h] Configuration=$((208\pi B5^-)(\pi\ 1h_{9/2})(\pi\ 1i_{13/2}))16^+$.

γ(^{210}Po)

δ(M1+E2) estimated from A_2,A_4 coef (1971Fa18); $\gamma(\theta=90°, 120°, 135°, 150°)$ measured at Eα=29 MeV.

E_γ†	I_γ†	E_i(level)	J_i^π	E_f	J_f^π	Mult.	Comments
46.5 2		1473.2	6⁺	1426.7	4⁺	E2‡	Mult.: I(ce L2)/I(ce L3) measurement (1975Sc45) supports E2. B(E2)(W.u.)=3.0 1.
47.8 CA	0.032	4372.1	13⁻	4324.3	(11⁻)	[E2]	Ti(48γ)/Ti(1523γ)=1.55 15 (1971Bl07) from delayed γ-spectra. I_γ: from Ti(48γ)/Ti(1523γ)=1.55 15 and α(48γ)=239. E_γ: from ΔE(levels). I_γ: from delayed γ-spectrum of 51-ns isomer.
83.7 1	4	1556.9	8⁺	1473.2	6⁺	E2‡	Mult.: I(ce L2)/I(ce L3) measurement (1975Sc45) supports E2. B(E2)(W.u.)=1.13 4.
245.3 1	80	1426.7	4⁺	1181.4	2⁺	E2‡	A_2=0.16 1. B(E2)(W.u.)=4.53 18.
250.3 2	1.0	2438.3	7⁺	2188.0	8⁺	M1‡	A_2=−0.32 16.
280.3 2	0.26	5057.7	16⁺	4777.4	14⁻	M2	I_γ: from Iγ(280γ)/Iγ(686γ)=0.064 14 (1985Ka07). Mult.: from ce(K)/ce(L) exp=3.9 7, α(K)exp=2.0 6 (1985Ka07).
333.5 2	2.9	3182.7	10⁻	2849.2	11⁻		A_2=−0.19 4.

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^{208}Pb(α,2nγ) 1971Fa18,1985Ka07,1985Be22 (continued)

$\gamma(^{210}Po)$ (continued)

E_γ †	I_γ †	E_i(level)	J_i^π	E_f	J_f^π	Mult.	δ	Comments
405.3 *2*	2.6	4777.4	14^-	4372.1	13^-	M1+E2	1.1 *3*	Mult.,δ: from ce(K)/ce(L) exp=3.9 *9*, α(K)exp=0.12 *2* (1985Ka07). I_γ: Iγ(405γ)/Iγ(686γ)=0.23 *2* (1985Ka07). A_2=0.43 *4*.
631.0 *2*	16	2188.0	8^+	1556.9	8^+	M1‡		A_2=0.31 *2*.
661.1 *3*	1.8	2849.2	11^-	2188.0	8^+			I_γ: Iγ(660.1γ) from ^{208}Po was subtracted. E_γ: Placement from the level scheme (1971Fa18). In the text some discussion of 661.1γ under section 3.2. and the 2187.9 keV level appears to be a typo.
685.6 *3*	4	5057.7	16^+	4372.1	13^-	E3		Mult.: from ce(K)/ce(L) exp=2.7 *5* (1985Ka07). I_γ: Iγ(686.5γ) from ^{208}Po was subtracted.
811.5 *2*	4.6	2999.5	$(9)^-$	2188.0	8^+	[E1]#		A_2=−0.17 *3*.
852.6 *3*	4.6	2325.8	6^+	1473.2	6^+	M1‡		A_2=0.16 *4*.
881.4 *3*	1.2	2438.3	7^+	1556.9	8^+	M1(+E2)‡		A_2=0.09 *15*.
929.8 *3*	0.9	2403.1	5^+	1473.2	6^+	M1‡		A_2=−0.21 *7*.
949.9 *4*	0.3	3137.9	$(8)^-$	2188.0	8^+			
955.8 *3*	1.3	2382.5	4^+	1426.7	4^+	M1‡		A_2=−0.01 *6*.
965.2 *5*	0.4	2438.3	7^+	1473.2	6^+			
976.4 *3*	1.0	2403.1	5^+	1426.7	4^+	M1‡		A_2=−0.62 *11*.
1181.4 *3*	100	1181.4	2^+	0.0	0^+	E2‡		A_2=0.16 *1*. B(E2)(W.u.)=0.56 *11*.
1292.2 *3*	33	2849.2	11^-	1556.9	8^+			A_2=0.48 *2*.
1436.7 *5*	0.9	2910.0	5^-	1473.2	6^+	E1‡		α(K)=0.00121; α(L)=0.00018 A_2=−0.41 *8*.
1442.8 *5*	1.2	2999.5	$(9)^-$	1556.9	8^+			α(L)= 11.98; α(M)= 3.19; α(N+..)= 1.083 A_2=−0.01 *6*.
1460 *1*	<0.5	3016.6	$(7)^-$	1556.9	8^+			
1475.1 *5*	11	4324.3	(11^-)	2849.2	11^-			A_2=0.36 *2*.
1483.4 *5*	1.5	2910.0	5^-	1426.7	4^+	E1‡		A_2=−0.76 *7*.
1522.9 *5*	5.0	4372.1	13^-	2849.2	11^-	(E2)		Mult.: from $\gamma(\theta)$ A_2=0.30 *3*.
1543.3 *5*	0.9	3016.6	$(7)^-$	1473.2	6^+			A_2=−0.45 *8*.
1580.9 *5*	0.4	3137.9	$(8)^-$	1556.9	8^+			
1599.6 *5*	0.7	3026.3	5^-	1426.7	4^+	E1‡		
1626.0 *5*	0.4	3182.7	10^-	1556.9	8^+			
2767.3 *10*	0.4	4324.3	(11^-)	1556.9	8^+			

† From 1971Fa18, unless otherwise specified.
‡ From α(K)exp, K/L, L-subshell ratio data of 1972Ja12 in ^{210}At ε decay.
# Dipole inferred from A_2<0.

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Level Scheme

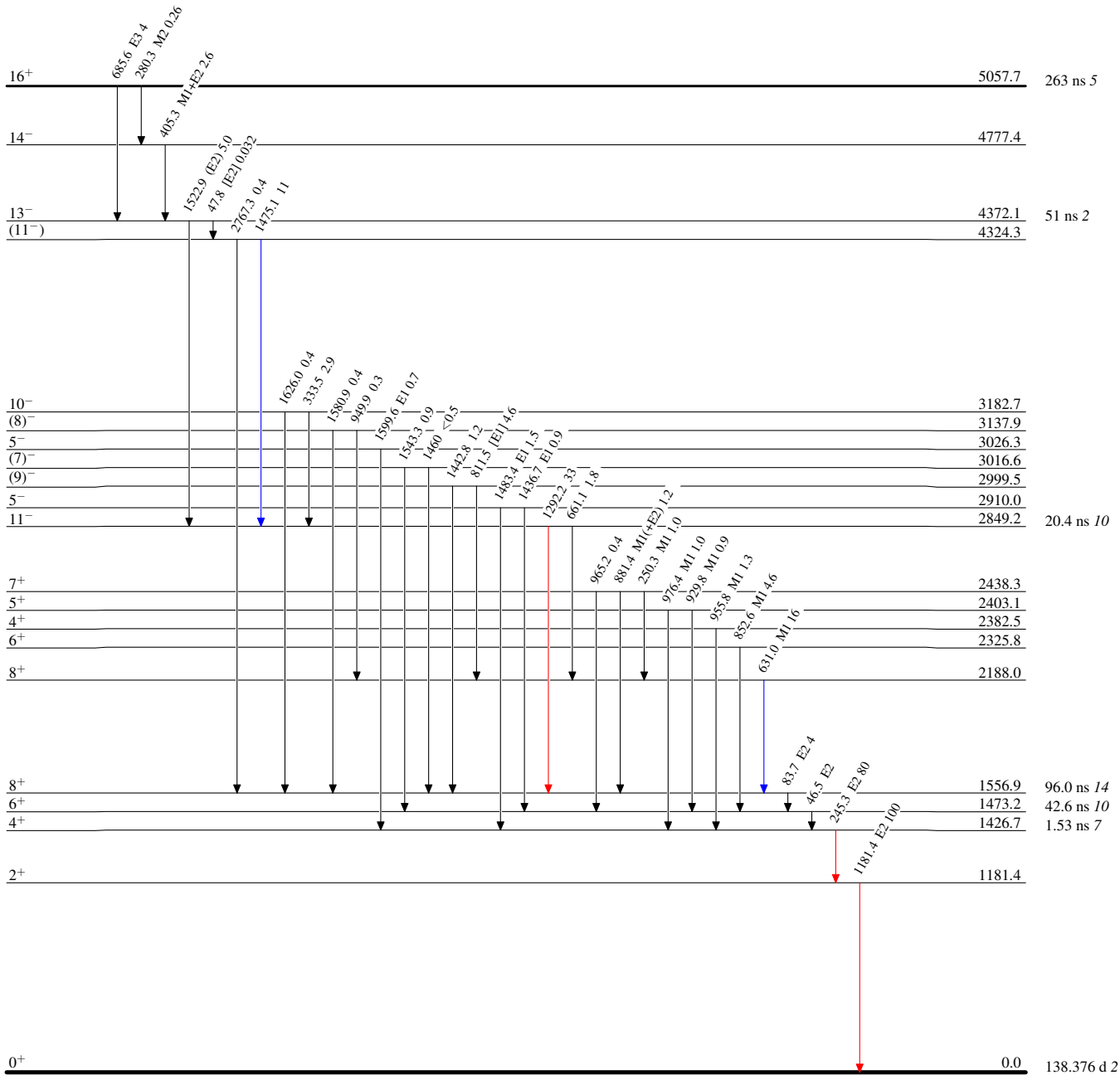
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



$^{210}_{84}Po_{126}$