^{204}Hg(^{9}Be,4nγ) 2000Po03

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	J. Chen # and F. G. Kondev	NDS 126, 373 (2015)	30-Sep-2013

2000Po03: E=62 MeV ^{9}Be beam was produced from the ANU 14 UD Pelletron accelerator. A enriched target of ^{204}Hg. γ-rays were detected by the CAESAR array of Compton suppressed Ge detectors. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma(\theta)$, $\gamma\gamma$(t), γ(lin pol). Deduced levels, J^π, half-lives, γ-branchings, γ-multipolarities. Comparisons with shell-model calculations.

^{209}Po Levels

E(level)†	J$^\pi$‡	T$_{1/2}$#	Comments
0	1/2$^-$		configuration=$\nu(3p_{1/2})^{-1}$. J$^\pi$: from Adopted Levels.
545.10 *10*	5/2$^-$		configuration=$\nu(2f_{5/2})^{-1}$.
1327.10 *15*	9/2$^-$		configuration=$\pi(1h_{9/2})^{+2}\otimes\nu(3p_{1/2})^{-1}$.
1418.00 *25*	13/2$^-$		configuration=$\pi(1h_{9/2})^{+2}\otimes\nu(3p_{1/2})^{-1}$.
1472.9 *3*	17/2$^-$		configuration=$\pi(1h_{9/2})^{+2}\otimes\nu(3p_{1/2})^{-1}$.
1937.9 *3*	17/2$^-$		configuration=$\pi(1h_{9/2})^{+2}\otimes\nu(2f_{5/2})^{-1}$.
2030.1 *3*	19/2$^-$		configuration=$\pi(1h_{9/2})^{+2}\otimes\nu(2f_{5/2})^{-1}$.
2167.2 *3*	21/2$^-$		configuration=$\pi(1h_{9/2})^{+2}\otimes\nu(2f_{5/2})^{-1}$.
2770.2 *4*	23/2$^+$		configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(3p_{1/2})^{-1}$.
2976.7 *4*	25/2$^+$		configuration=$\pi(1h_{9/2})^{+2}\otimes\nu(1i_{13/2})^{-1}$.
3620.6 *4*	27/2$^+$	<7 ns	configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(2f_{5/2})^{-1}$.
4168.6 *4*	29/2$^+$		configuration=$\pi(1h_{9/2})^{+2}\otimes\nu(1i_{13/2})^{-1}$.
4265.6 *4*	31/2$^-$	119 ns *4*	T$_{1/2}$: from 1289.0γ(t), 206.5γ(t) and 603.0γ(t) (2000Po03). configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(2g^{+1}_{9/2}3p^{-2}_{1/2})^{3}$.
4354.3 *4*	31/2$^-$	<7 ns	configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(1i_{13/2})^{-1}$.
4531.1 *4*	33/2$^-$	<7 ns	configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(1i_{13/2})^{-1}$.
5355.6 *4*	35/2$^-$	<3.5 ns	configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(3p^{-1}_{1/2}2f^{-1}_{5/2}2g^{+1}_{9/2})^{3}$.
5503.6 *4*	37/2$^+$	<10 ns	configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(3p^{-2}_{1/2}1j^{+1}_{15/2})^{3}$.
6233.0 *4*	39/2$^+$		configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(3p^{-1}_{1/2}2f^{-1}_{5/2}1j^{+1}_{15/2})^{3}$.
6302.4 *4*	(39/2$^+$)		configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(3p^{-1}_{1/2}1i^{-1}_{13/2}2g^{+1}_{9/2})^{3}$.
6464.1 *4*	(41/2$^+$)		configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(3p^{-1}_{1/2}2f^{-1}_{5/2}1j^{+1}_{15/2})^{3}$.
6739.3 *5*	(43/2$^+$)	<7 ns	configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(3p^{-1}_{1/2}1i^{-1}_{13/2}2g^{+1}_{9/2})^{3}$.
6807.6 *5*	(41/2$^+$)		configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(3p^{-1}_{1/2}1i^{-1}_{13/2}2g^{+1}_{9/2})^{3}$.
7159.4 *5*	(45/2$^+$)		configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(3p^{-1}_{1/2}1i^{-1}_{13/2}2g^{+1}_{9/2})^{3}$.
7247.9 *5*	(43/2$^+$)		configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(3p^{-1}_{1/2}2f^{-1}_{5/2}1j^{+1}_{15/2})^{3}$.
7693.1 *5*	(47/2$^+$)		configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(2f^{-1}_{5/2}1i^{-1}_{13/2}2g^{+1}_{9/2})^{3}$.
8390.7 *6*	(47/2$^-$)		configuration=$\pi(1h_{9/2}1i_{13/2})^{+2}\otimes\nu(1i^{-2}_{13/2}2g^{+1}_{9/2})^{3}$.

† From a least-squares fit to γ-ray energies.
‡ From deduced γ transition multipolarities using $\gamma(\theta)$ and γ(lin pol) (for E$\gamma\geq$250 keV), unless otherwise noted.
# Limits from γ(t) in 2000Po03.

γ(^{209}Po)

E$_\gamma$	I$_\gamma$#	E$_i$(level)	J$^\pi_i$	E$_f$	J$^\pi_f$	Mult.†	Comments
54.9 *2*		1472.9	17/2$^-$	1418.00	13/2$^-$	(E2)‡	
88.6@ *2*		4354.3	31/2$^-$	4265.6	31/2$^-$	(M1)‡	I$_\gamma$: I(γ+ce)=37 *3*.
90.9 *2*		1418.00	13/2$^-$	1327.10	9/2$^-$	(E2)‡	
92.1@ *2*		2030.1	19/2$^-$	1937.9	17/2$^-$	(M1)‡	I$_\gamma$: I(γ+ce)=16 *2*.
96.9 *1*	70	4265.6	31/2$^-$	4168.6	29/2$^+$	(E1)‡	Mult.: A comparison of the Iγ and I(γ+ce) is consistent with mult=E1 not with M1. M1 given in the 2000Po03 could be a

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$^{204}Hg(^{9}Be,4n\gamma)$ 2000Po03 (continued)

$\gamma(^{209}Po)$ (continued)

E_γ	I_γ[#]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	δ	Comments
								typo since it is inconsistent with the spin-party assignments of the connecting levels.
								I_γ: I(γ+ce)=30 *5*.
137.1 *1*	350	2167.2	21/2⁻	2030.1	19/2⁻	M1		Mult.: A_2=−0.03 *22*.
148.0 *2*	47	5503.6	37/2⁺	5355.6	35/2⁻	E1		Mult.: α(exp)<0.37, from intensity balances.
161.5 *2*	35	6464.1	(41/2⁺)	6302.4	(39/2⁺)	E2(+M1)	>1.0	Mult.,δ: from α(exp)=1.4 *5*, from intensity balances.
176.8 *1*	109	4531.1	33/2⁻	4354.3	31/2⁻	M1		Mult.: A_2=+0.05 *1*, α(exp)=1.7 *6*, from intensity balances.
185.6 *1*	300	4354.3	31/2⁻	4168.6	29/2⁺	E1		Mult.: A_2=−0.24 *11*. I_γ: I(γ+ce)=58 *3*.
206.5 *1*	470	2976.7	25/2⁺	2770.2	23/2⁺	M1		Mult.: A_2=−0.12 *4*.
265.6 *2*	27	4531.1	33/2⁻	4265.6	31/2⁻	(M1)		Mult.: A_2=−0.02 *12*, pol=−0.7 *6*.
275.2 *1*	120	6739.3	(43/2⁺)	6464.1	(41/2⁺)	M1		Mult.: A_2=−0.26 *7*, pol=−0.83 *26*.
ˣ299.9 *2*	30							
420.1 *1*	52	7159.4	(45/2⁺)	6739.3	(43/2⁺)	(M1+E2)[‡]		
440.3 *2*	26	7247.9	(43/2⁺)	6807.6	(41/2⁺)	(M1+E2)[‡]		
ˣ444.7 *2*	40							
465.1 *2*	25	1937.9	17/2⁻	1472.9	17/2⁻	(M1)		Mult.: A_2=+0.01 *5*.
ˣ467.1 *2*	30							
519.9 *2*	40	1937.9	17/2⁻	1418.00	13/2⁻	(E2)[‡]		
545.1 *1*	1000	545.10	5/2⁻	0	1/2⁻	E2		Mult.: from Adopted Gammas. A_2=−0.03 *2*, pol=−0.8 *8*.
548.0 *1*	215	4168.6	29/2⁺	3620.6	27/2⁺	M1+E2		Mult.: A_2=−0.29 *5*, pol=−0.19 *23*.
557.2 *1*	450	2030.1	19/2⁻	1472.9	17/2⁻	M1+E2		Mult.: A_2=−0.32 *3*, pol=+0.15 *8*. I_γ: I(γ+ce)=84 *2*.
574.6 *2*	40	6807.6	(41/2⁺)	6233.0	39/2⁺	(M1)[‡]		
603.0 *1*	670	2770.2	23/2⁺	2167.2	21/2⁻	E1		Mult.: A_2=+0.28 *3*.
643.9 *1*	260	3620.6	27/2⁺	2976.7	25/2⁺	M1+E2		Mult.: A_2=−0.26 *4*, pol=−0.46 *17*.
ˣ654.0 *1*	60							
694.3 *1*	190	2167.2	21/2⁻	1472.9	17/2⁻	(E2)[‡]		
729.4 *1*	80	6233.0	39/2⁺	5503.6	37/2⁺	M1		Mult.: A_2=−0.46 *12*, pol=−0.86 *27*.
ˣ752.8 *2*	50							
782.0 *1*	980	1327.10	9/2⁻	545.10	5/2⁻	E2		Mult.: from Adopted Gammas. A_2=0.00 *1*, pol=+0.5 *5*.
824.6 *1*	145	5355.6	35/2⁻	4531.1	33/2⁻	M1		Mult.: A_2=−0.12 *7*, pol=−0.14 *24*.
953.8 *2*	45	7693.1	(47/2⁺)	6739.3	(43/2⁺)	(E2)		Mult.: A_2=+0.10 *36*, pol=−0.37 *116*.
ˣ1028.7 *4*	50							
1108.6 *2*	80	6464.1	(41/2⁺)	5355.6	35/2⁻	(E3)[‡]		
1231.3 *4*	25	8390.7	(47/2⁻)	7159.4	(45/2⁺)	(E1)		Mult.: A_2=−0.16 *22*.
1238.0 *2*	110	5503.6	37/2⁺	4265.6	31/2⁻	(E3)[‡]		
1289.0 *2*	230	4265.6	31/2⁻	2976.7	25/2⁺	E3		Mult.: A_2=+0.10 *7*, A_4=−0.18 *10*, pol=+0.48 *34*. I_γ: I(γ+ce)=70 *5*.
1297.3 *2*	90	2770.2	23/2⁺	1472.9	17/2⁻	E3		Mult.: A_2=+0.09 *18*, A_4=−0.30 *26*, pol=+0.4 *8*.
1304.1 *4*	27	6807.6	(41/2⁺)	5503.6	37/2⁺	(E2)[‡]		
1377.6 *4*	30	4354.3	31/2⁻	2976.7	25/2⁺	(E3)[‡]		I_γ: I(γ+ce)=5 *2*.
1771.2 *2*	95	6302.4	(39/2⁺)	4531.1	33/2⁻	(E3)		Mult.: A_2=0.00 *17*.

† From 2000Po03 based on γ(θ) and γ(lin pol), unless otherwise noted. The quoted α(exp) are from intensity balances.
‡ No γ(θ) or γ(lin pol) values are given by the authors.

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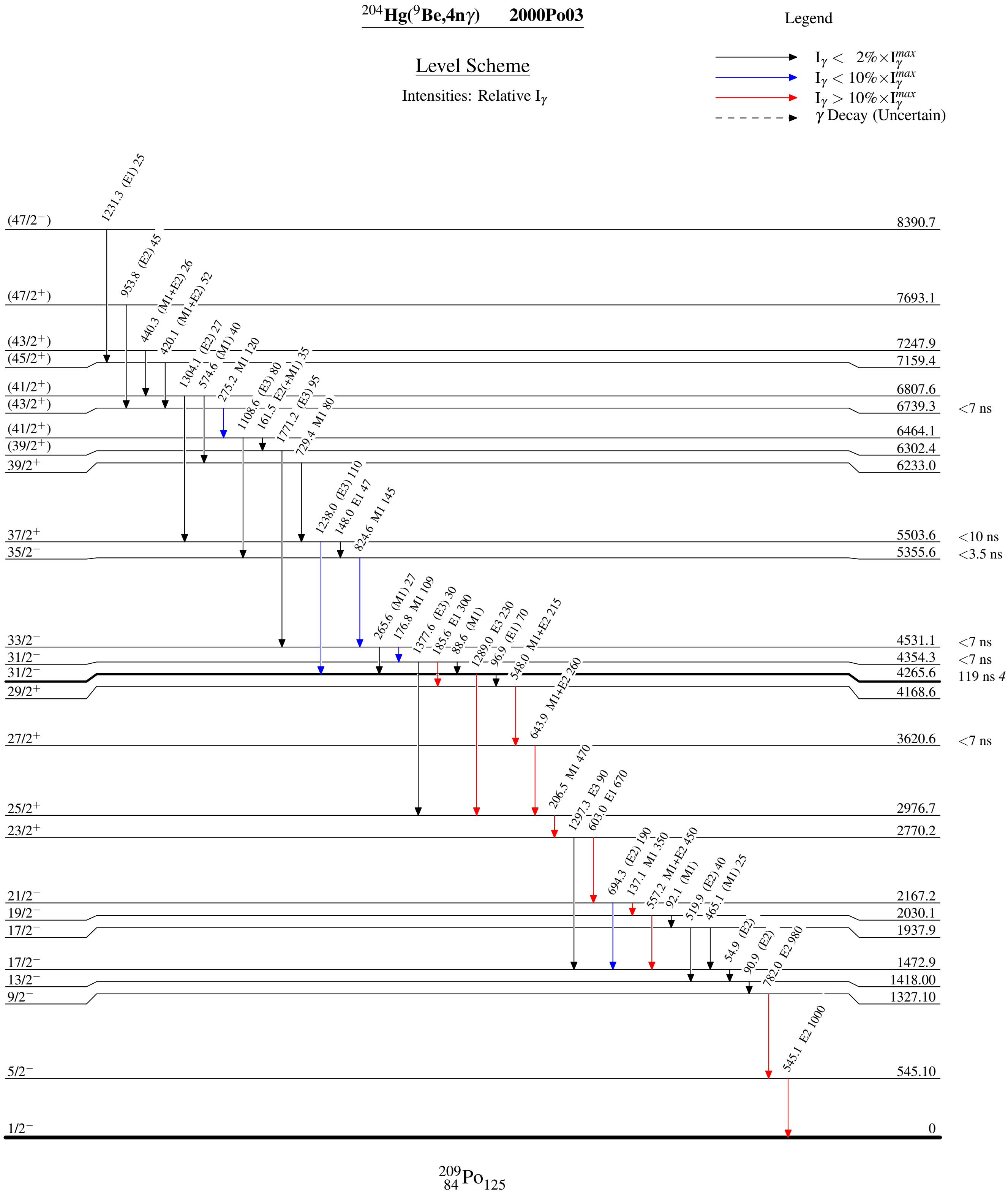
^{204}Hg(^{9}Be,4nγ) 2000Po03 (continued)

γ(^{209}Po) (continued)

From 2000Po03.
@ Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.


204Hg(9Be,4nγ) 2000Po03
Level Scheme
Intensities: Relative Iγ
Legend
Iγ < 2%×Iγmax
Iγ < 10%×Iγmax
Iγ > 10%×Iγmax
γ Decay (Uncertain)
(47/2−) 8390.7
(47/2+) 7693.1
(43/2+) 7247.9
(45/2+) 7159.4
(41/2+) 6807.6
(43/2+) 6739.3 <7 ns
(41/2+) 6464.1
(39/2+) 6302.4
39/2+ 6233.0
37/2+ 5503.6 <10 ns
35/2− 5355.6 <3.5 ns
33/2− 4531.1 <7 ns
31/2− 4354.3 <7 ns
31/2− 4265.6 119 ns 4
29/2+ 4168.6
27/2+ 3620.6 <7 ns
25/2+ 2976.7
23/2+ 2770.2
21/2− 2167.2
19/2− 2030.1
17/2− 1937.9
17/2− 1472.9
13/2− 1418.00
9/2− 1327.10
5/2− 545.10
1/2− 0
1231.3 (E1) 25
953.8 (E2) 45
440.3 (M1+E2) 26
420.1 (M1+E2) 52
1304.1 (E2) 27
574.6 (M1) 40
275.2 M1 120
1108.6 (E3) 80
161.5 E2(+M1) 35
1771.2 (E3) 95
729.4 M1 80
1238.0 (E3) 110
148.0 E1 47
824.6 M1 145
265.6 (M1) 27
176.8 M1 109
1377.6 (E3) 30
185.6 E1 300
88.6 (M1)
1289.0 E3 230
96.9 (E1) 70
548.0 M1+E2 215
643.9 M1+E2 260
206.5 M1 470
1297.3 E3 90
603.0 E1 670
694.3 (E2) 190
137.1 M1 350
557.2 M1+E2 450
92.1 (M1)
519.9 (E2) 40
465.1 (M1) 25
54.9 (E2)
90.9 (E2)
782.0 E2 980
545.1 E2 1000
209 84 Po 125