^{206}Pb(^{13}C,4nγ) 1998St24

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	S. Kumar, B. Singh, K. Rojeeta Devi, A. Rohilla	NDS 114, 2023 (2013)	23-Sep-2013

Includes reactions: ^{206}Pb(^{12}C,3nγ); ^{208}Pb(^{12}C,5nγ); and ^{208}Pb(^{13}C,6nγ).

1998St24: target: 92% enriched ^{206}Pb. E=78 MeV. Measured Eγ, Iγ, $\gamma\gamma$ coin, $\gamma\gamma$(t), $\gamma\gamma(\theta)$, ce, differential perturbed angular distributions, excitation functions for E=66-84 MeV. Deduced γ-ray multipolarities, angular distribution coefficients, levels half-life (pulsed-beam measurements), gyromagnetic factors, detectors: hyperpure Ge, superconducting solenoidal electron spectrometer with a cooled Si(Li) detector (1998St24). See 1989Dr02 from the same group for measurement of lifetime of 773-keV level and E3 multipolarity of 773γ by ce measurements using ^{208}Pb(^{12}C,5nγ), E=80 MeV; and ^{206}Pb(^{13}C, 4nγ), E=78 MeV reactions.

2004He25: ^{208}Pb(^{12}C,5nγ): measured Eγ, half-life of 1878-keV isomer.

1988Fu10: ^{206}Pb(^{12}C,3nγ), E=67 MeV, ≥90% enriched ^{206}Pb target. Measured Eγ, Iγ, $\gamma\gamma$ coin, $\gamma(\theta)$ for 9 angles between θ=80° and 160°, γ-ray linear polarization, $\gamma\gamma$(t). Deduced transition multipolarities. Measured levels half-life using a pulsed beam method, and also $\gamma\gamma$(t). Eγ, Iγ data reported for eight γ rays; $\gamma(\theta)$ and γ(lin pol) for four of these.

1987AdZU: ^{206}Pb(^{13}C,4nγ), E=80 MeV. Measured Eγ, $\gamma\gamma$ coin, $\gamma\gamma$(t). Measured levels half-life, Measured g-factor by stroboscopic observation of γ-ray perturbed angular distributions. A detailed level scheme reported with 24 γ transitions and 20 excited states.

1983Lo16: ^{208}Pb(^{13}C,6nγ), E=95 MeV, 99% enriched ^{208}Pb target. Measured Eγ, Iγ, $\gamma(\theta)$ for 8 angles between 60° and 158°, $\gamma\gamma$ coin, $\gamma(\theta)$, $\gamma\gamma$(t). Deduced transition multipolarities. Measured level half-life using a pulsed beam method. Data reported for three γ rays in a cascade: 196, 772 and 850 keV.

The nucleus of ^{215}Ra has six valence protons and a single valence neutron outside the Z=82, N=126 closed shells. Most of the states up to about 6 MeV have configurations involving four to six protons in the $h_{9/2}$ orbital, for which E2 decays are retarded or forbidden, and dipole and octupole transitions are prominent. The authors have explained the strength of E3 transitions as well as the measured gyromagnetic factors in terms of the multi-particle octupole coupling mechanism (1998St24).

2013Ba29: measured experimental isomer production ratio in ^{9}Be(^{238}U,X) reaction at E=1 GeV/nucleon (2013Ba29) using the FRS, RISING gamma detector array, and TOF arrangement at GSI facility.

^{215}Ra Levels

The level scheme presented here is from 1998St24. First level scheme for ^{215}Ra was proposed by 1983Lo16 with four excited states and 195-851-772 γ cascade depopulated from a (25/2), μs isomer at an unknown energy slightly above this cascade. 1988Fu10 confirmed this cascade and an isomer of 7.2 μs above this cascade, they added another transition in the level scheme at 1048 keV parallel to 195-keV transition. Four weaker γ rays were unplaced in this work. A more extensive level scheme was proposed in annual laboratory reports (1987AdZU,1986AdZV) with 20 levels up to 5.6 MeV and 24 gamma rays. However, no other details were provided in this study. Except for some differences in placement of γ rays, most features of the level scheme and gamma-ray energies in 1987AdZU have been confirmed by 1998St24.

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$[#]	Comments
0.0[@]	9/2$^+$	1.66 ms *2*	$T_{1/2}$: from Adopted Levels.
773.0[&] *2*	15/2$^-$	67.2 ns *14*	$T_{1/2}$: from $\gamma\gamma$(t) (1998St24; also 68.6 ns *21* in 1989Dr02). Others: 77 ns *2* (1988Fu10), 67 ns *3* (1987AdZU). Value from 1988Fu10 is considered by the evaluators as discrepant. From pulsed-beam method, values are 110 ns *8* (1989Dr02), 120 ns *10* (1983Lo16). The higher values in pulsed-beam experiments are likely due to much longer half-life (7.3 μs) of the 1877 level, which will affect the observed decay rate of 773γ, thus making it more difficult to measure lifetime in the ns range with this method.
1625.3[@] *3*	17/2$^+$		
1821.2[@] *3*	21/2$^+$	25.0 ns *14*	$T_{1/2}$: other: 23 ns *5* (1983Lo16).
1877.8[a] *3*	25/2$^+$	7.29 μs *20*	$T_{1/2}$: weighted average of 7.6 μs *2* (2004He25), 6.86 μs *28* (1998St24), 7.2 μs *2* (1988Fu10). Other: ≥2 μs (1983Lo16). Mixed with 2053.8 level by particle octupole coupling.
1994.5[a] *3*	23/2$^+$		

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^{206}Pb(^{13}C,4nγ) 1998St24 (continued)

^{215}Ra Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	Comments
2053.8[@] *4*	25/2+		Mixed with 1877.8 level by particle octupole coupling.
2214.4[b] *4*	27/2(−)		
2246.9[c] *4*	29/2−	1.39 μs *7*	
2246.9+x[c]	31/2−		Additional information 1. E(level): x ≤35 keV.
3088.8+x[d] *2*	33/2+		
3143.7+x[e] *3*	35/2+		
3331.1+x[e] *4*	37/2+		
3413.4+x[c] *4*	37/2−		
3415.6+x[e] *4*	37/2+		
3586.4+x[f] *4*	37/2+		
3738.6+x[c] *4*	39/2−		
3756.6+x[c] *4*	43/2−	555 ns *10*	g=+0.726 *3* (1998St24) $T_{1/2}$: other: 0.59 μs *18* (1987AdZU). Octupole-mixed state. g: TDPAD method (1998St24). Other measurement: +0.734 *7* (1987AdZU, stroboscopic observation of perturbed angular distribution). Theoretical value=+0.73 (1998St24). Measured isomer yield ratio: R_{exp}=7.9 *8* (2013Ba29) in ^{9}Be(^{238}U,X) reaction at 1 GeV/nucleon, where $R_{exp}=Y/(N_{imp}FG)$, N_{imp} is number of implanted ions, Y is the isomeric yield, F and G are correction factors for in-flight isomer decay losses and the finite detection time of the γ radiation, respectively. Comparison of measured yield ratios with theoretical values calculated by using ABRABLA Monte-Carlo code.
3765.7+x *4*			
3855.0+x *4*			
3935.4+x[b] *4*	43/2−		Octupole-mixed state.
4207.3+x *5*			
4366.8+x[d] *4*	45/2+		
4553.5+x[c] *4*	47/2−		
4567.0+x[d] *4*	49/2+	10.47 ns *14*	g=+0.77 *1* (1998St24) $T_{1/2}$: other: ≈10 ns (1987AdZU). g: TDPAD method. Theoretical value=+0.80 (1998St24).
4686.2+x[b] *5*	47/2−		
4882.7+x[b] *4*	51/2−		
5372.7+x[d] *5*	53/2+		
5608.6+x[g] *5*	55/2−		
5608.7+x[d] *5*	57/2+	1.66 ns *14*	
6033.5+x[h] *5*	(57/2+)		
6076.4+x[h] *5*	(59/2+)		
6283.2+x[h] *6*	(61/2+)		

[†] From a least-squares fit to Eγ values from 1998St24.
[‡] As proposed by 1998St24, based on γ-ray multipolarities, angular distributions, transition strengths, and excitation functions. These assignments are the same in Adopted Levels, except that all are placed in parentheses since J^{π} assignment for the ground state is still tentative. Shell model configurations (1998St24) are based on level energies and γ-transition rates.
[#] From pulsed beam method (1998St24), unless otherwise stated. Values from previous measurements are given under comments.
[@] Member of configuration=$\pi h^{6}_{9/2}\otimes\nu g_{9/2}$.
[&] Member of configuration=$\pi h^{6}_{9/2}\otimes\nu j_{15/2}$.
[a] Member of configuration=$\pi h^{5}_{9/2}\otimes\pi f_{7/2}\otimes\nu g_{9/2}$.

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^{206}Pb(^{13}C,4nγ) 1998St24 (continued)

^{215}Ra Levels (continued)

[b] Member of configuration=$\pi h^4_{9/2}\otimes\pi f_{7/2}\otimes\pi i_{13/2}\otimes\ \nu_{9/2}$.

[c] Member of configuration=$\pi h^5_{9/2}\otimes\pi i_{13/2}\otimes\nu g_{9/2}$.

[d] Member of configuration=$\pi h^4_{9/2}\otimes\pi i^2_{13/2}\otimes\nu g_{9/2}$.

[e] Member of configuration=$\pi h^5_{9/2}\otimes\pi f_{7/2}\otimes\nu g_{9/2}$.

[f] Member of configuration=$\pi h^4_{9/2}\otimes\pi f^2_{7/2}\otimes\nu g_{9/2}$.

[g] Member of configuration=$\pi h^3_{9/2}\otimes\pi f^2_{7/2}\otimes\ \pi i_{13/2}\otimes\nu g_{9/2}$.

[h] Member of configuration=$\pi h^3_{9/2}\otimes\pi f_{7/2}\otimes\ \pi i^2_{13/2}\otimes\nu g_{9/2}$.

γ(^{215}Ra)

All γ-ray data are from 1998St24, unless otherwise stated.

E_γ‡	I_γ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.&	α†	Comments
x		2246.9+x	31/2⁻	2246.9	29/2⁻			E_γ: no transition seen, but required for current level scheme. Estimated value of x ≤ 35 keV.
(13.5@)	0.57 3	4567.0+x	49/2⁺	4553.5+x	47/2⁻	[E1]	5.74	α(M)=4.41 7 α(N)=1.107 16; α(O)=0.207 3; α(P)=0.0218 3; α(Q)=0.000516 8 I_γ: from Iγ(13.5)/Iγ(200)=6.4 3/61 1 (1998St24).
(18.0@)	0.0020 2	3756.6+x	43/2⁻	3738.6+x	39/2⁻	[E2]	2.54×10^4	α(L)=1.498×10^4 21; α(M)=7.85×10^3 11 α(N)=2.06×10^3 3; α(O)=436 7; α(P)=62.1 9; α(Q)=0.0875 13 I_γ: from Iγ(18.0)/Iγ(425)=0.029 2/99.97 (1998St24).
(32.5@ 6)	0.059 1	2246.9	29/2⁻	2214.4	27/2$^{(-)}$	[M1]	84 5	I_γ: from Iγ(32.5)/Iγ(193)=0.79 1/79.2 2 (1998St24).
54.9 2	2.1 2	3143.7+x	35/2⁺	3088.8+x	33/2⁺	M1	17.9 4	α(L)=13.54 24; α(M)=3.24 6 α(N)=0.854 15; α(O)=0.195 4; α(P)=0.0340 6; α(Q)=0.00267 5 α(exp)=11 4 Additional information 11.
56.5 2	0.8# 1	1877.8	25/2⁺	1821.2	21/2⁺	E2	145 4	α(exp)=94 40 α(L)=106.3 24; α(M)=28.8 7 α(N)=7.61 17; α(O)=1.61 4; α(P)=0.231 6; α(Q)=0.000514 11
59.3 2	1.6 2	2053.8	25/2⁺	1994.5	23/2⁺	M1	14.25 25	α(exp)=15 7 α(L)=10.80 19; α(M)=2.58 5 α(N)=0.681 12; α(O)=0.155 3; α(P)=0.0271 5; α(Q)=0.00213 4 Additional information 7.
152.2 2	9.4 1	3738.6+x	39/2⁻	3586.4+x	37/2⁺	E1	0.1740	α(K)=0.1372 20; α(L)=0.0279 4; α(M)=0.00669 10 α(N)=0.00174 3; α(O)=0.000385 6; α(P)=6.20×10^{-5} 9; α(Q)=3.46×10^{-6} 5 α(exp)<0.42; A_2=−0.12 4 Additional information 16.
170.8 2	1.0 2	3586.4+x	37/2⁺	3415.6+x	37/2⁺	M1	3.41	α(exp)=5.2 33 α(K)=2.74 4; α(L)=0.508 8; α(M)=0.1214 18 α(N)=0.0320 5; α(O)=0.00730 11; α(P)=0.001273 19; α(Q)=9.98×10^{-5} 15
173.3 2	3.9 1	1994.5	23/2⁺	1821.2	21/2⁺	M1	3.27	α(K)=2.63 4; α(L)=0.488 7; α(M)=0.1165 17 α(N)=0.0307 5; α(O)=0.00701 10; α(P)=0.001222 18; α(Q)=9.58×10^{-5} 14 α(exp)=3.6 14; A_2=+0.03 6 Additional information 6. I_γ: 2 1 (1988Fu10) in ^{206}Pb(^{12}C,3nγ), E=67 MeV.
176.0 2	9.9 2	2053.8	25/2⁺	1877.8	25/2⁺	M1	3.13	α(K)=2.52 4; α(L)=0.467 7; α(M)=0.1115 16 α(N)=0.0294 5; α(O)=0.00671 10; α(P)=0.001169 17; α(Q)=9.17×10^{-5} 14

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γ(^{215}Ra) (continued)

E_γ[‡]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	δ[a]	α[†]	Comments
									α(exp)=5.0 *5*; α(L)exp=0.40 *3*; A_2=+0.16 *4* Additional information 8. I_γ: 5 *2* (1988Fu10) in ^{206}Pb(^{12}C,3nγ), E=67 MeV.
178.6 *2*	1.6 *2*	3935.4+x	43/2$^-$	3756.6+x	43/2$^-$	M1		3.01	α(K)=2.42 *4*; α(L)=0.448 *7*; α(M)=0.1070 *16* α(N)=0.0282 *4*; α(O)=0.00644 *10*; α(P)=0.001122 *17*; α(Q)=8.79×10^{-5} *13* α(exp)=3.6 *3*; A_2=+0.38 *34* Additional information 19.
187.4 *2*	9.8 *2*	3331.1+x	37/2$^+$	3143.7+x	35/2$^+$	M1		2.63	α(K)=2.11 *3*; α(L)=0.391 *6*; α(M)=0.0933 *14* α(N)=0.0246 *4*; α(O)=0.00562 *8*; α(P)=0.000979 *14*; α(Q)=7.67×10^{-5} *11* α(exp)=2.7 *7* Additional information 12.
193.1 *2*	5.9 *1*	2246.9	29/2$^-$	2053.8	25/2$^+$	M2(+E3)	<0.2	10.99	α(K)=7.38 *11*; α(L)=2.68 *4*; α(M)=0.699 *11* α(N)=0.187 *3*; α(O)=0.0422 *7*; α(P)=0.00709 *11*; α(Q)=0.000471 *7* α(exp)=9.1 *6*; α(L)exp=3 *1*; α(M)exp=0.63 *6*; A_2=+0.13 *6* Additional information 9. δ: ce data gives δ(E3/M2)<0.45, but RUL(E3)=100 gives δ<0.2.
196.0 *2*	46.7[#] *3*	1821.2	21/2$^+$	1625.3	17/2$^+$	E2		0.629	α(K)=0.1681 *24*; α(L)=0.340 *5*; α(M)=0.0917 *14* α(N)=0.0242 *4*; α(O)=0.00519 *8*; α(P)=0.000768 *12*; α(Q)=7.84×10^{-6} *12* α(exp)=0.56 *3*; α(L)exp=0.201 *11*; α(M)exp=0.084 *5*; A_2=+0.09 *1* A_2=+0.070 *13*; A_4=−0.002 *21* (1988Fu10) A_2=+0.22 *6*; A_4=−0.12 *5* (1983Lo16) Additional information 4. I_γ: 42 *12* (1988Fu10) in ^{206}Pb(^{12}C,3nγ), E=67 MeV; 30 *3* (1983Lo16) in ^{208}Pb(^{13}C,6nγ), E=95 MeV. POL=−0.08 *7* (1988Fu10).
196.3 *2*	2.8[#] *4*	4882.7+x	51/2$^-$	4686.2+x	47/2$^-$	[E2]		0.626	α(K)=0.1676 *24*; α(L)=0.337 *5*; α(M)=0.0911 *14* α(N)=0.0241 *4*; α(O)=0.00515 *8*; α(P)=0.000763 *12*; α(Q)=7.81×10^{-6} *12* Additional information 24.
200.1 *2*	5.4 *1*	4567.0+x	49/2$^+$	4366.8+x	45/2$^+$	(E2)		0.584	α(K)=0.1616 *23*; α(L)=0.311 *5*; α(M)=0.0839 *13* α(N)=0.0222 *4*; α(O)=0.00475 *7*; α(P)=0.000704 *11*; α(Q)=7.44×10^{-6} *11* A_2=+0.29 *4* Additional information 23.
236.0 *2*	5.5 *1*	5608.7+x	57/2$^+$	5372.7+x	53/2$^+$	E2		0.328	α(K)=0.1164 *17*; α(L)=0.1559 *23*; α(M)=0.0418 *6* α(N)=0.01105 *16*; α(O)=0.00238 *4*; α(P)=0.000356 *6*; α(Q)=4.96×10^{-6} *7* α(exp)<0.70; A_2=+0.36 *6* Additional information 27.
249.7 *2*	1.3 *4*	6283.2+x	(61/2$^+$)	6033.5+x	(57/2$^+$)				

From ENSDF

γ(^{215}Ra) (continued)

E_γ[‡]	I_γ[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[&]	δ[a]	α[†]	Comments
255.4 2	5.2[#] 6	3586.4+x	37/2$^+$	3331.1+x	37/2$^+$	M1		1.106	α(K)=0.890 13; α(L)=0.1638 24; α(M)=0.0391 6 α(N)=0.01031 15; α(O)=0.00235 4; α(P)=0.000410 6; α(Q)=3.21×10^{-5} 5 α(exp)=1.6 7; A_2=+0.33 12 Additional information 15.
269.7 2	9.8 1	3413.4+x	37/2$^-$	3143.7+x	35/2$^+$	D			A_2=−0.20 3 Additional information 13. I_γ: 5 2 (1988Fu10) in ^{206}Pb(^{12}C,3nγ), E=67 MeV.
271.9 2	4.2 2	3415.6+x	37/2$^+$	3143.7+x	35/2$^+$	M1		0.930	α(K)=0.748 11; α(L)=0.1376 20; α(M)=0.0328 5 α(N)=0.00866 13; α(O)=0.00198 3; α(P)=0.000345 5; α(Q)=2.70×10^{-5} 4 α(exp)=1.4 4; A_2=−0.06 5 Additional information 14.
315.6 2	12.0[#] 5	4882.7+x	51/2$^-$	4567.0+x	49/2$^+$				Additional information 25.
323.1 2	6.2 2	3738.6+x	39/2$^-$	3415.6+x	37/2$^+$	E1		0.0298	α(K)=0.0241 4; α(L)=0.00435 7; α(M)=0.001036 15 α(N)=0.000271 4; α(O)=6.07×10^{-5} 9; α(P)=1.016×10^{-5} 15; α(Q)=6.67×10^{-7} 10 α(exp)<0.48; A_2=−0.15 9 Additional information 17.
325.3 2	0.8 2	3738.6+x	39/2$^-$	3413.4+x	37/2$^-$				
329.5 2	1.4 3	4882.7+x	51/2$^-$	4553.5+x	47/2$^-$				
336.6 2	4.2 2	2214.4	27/2$^{(-)}$	1877.8	25/2$^+$	(E1)		0.0272	α(K)exp<0.27 α(K)=0.0220 3; α(L)=0.00396 6; α(M)=0.000942 14 α(N)=0.000247 4; α(O)=5.53×10^{-5} 8; α(P)=9.26×10^{-6} 13; α(Q)=6.12×10^{-7} 9
352.3 2	1.0[#] 2	4207.3+x		3855.0+x					
369.1 2	1.9 2	2246.9	29/2$^-$	1877.8	25/2$^+$	M2+E3	1.07 +25−20	0.81 9	α(K)=0.50 9; α(L)=0.226 5; α(M)=0.0593 10 α(N)=0.01577 25; α(O)=0.00349 7; α(P)=0.000566 16; α(Q)=2.6×10^{-5} 4 α(K)exp=0.51 6; α(L)exp=0.19 3; α(M)exp=0.08 2
407.4 2	20.2 2	3738.6+x	39/2$^-$	3331.1+x	37/2$^+$	E1		0.0180	α(K)=0.01463 21; α(L)=0.00257 4; α(M)=0.000611 9 α(N)=0.0001600 23; α(O)=3.60×10^{-5} 5; α(P)=6.07×10^{-6} 9; α(Q)=4.14×10^{-7} 6 α(K)exp=0.024 5; A_2=−0.11 2 Additional information 18.
424.8 2	1.8[#] 4	6033.5+x	(57/2$^+$)	5608.7+x	57/2$^+$				
425.5 2	6.9 2	3756.6+x	43/2$^-$	3331.1+x	37/2$^+$	E3		0.240	α(K)exp=0.126 14; α(L)exp=0.08 1; α(M)exp=0.04 1; A_2=+0.20 8 α(K)=0.0887 13; α(L)=0.1113 16; α(M)=0.0303 5 α(N)=0.00806 12; α(O)=0.001748 25; α(P)=0.000269 4; α(Q)=5.66×10^{-6} 8
431.5 2	7.9 2	4366.8+x	45/2$^+$	3935.4+x	43/2$^-$	E1		0.01597	α(K)=0.01298 19; α(L)=0.00227 4; α(M)=0.000538 8

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γ(^{215}Ra) (continued)

E_γ‡	I_γ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.&	α†	Comments
								α(N)=0.0001409 *20*; α(O)=3.17×10^{-5} *5*; α(P)=5.36×10^{-6} *8*; α(Q)=3.69×10^{-7} *6* α(exp)<0.07; A_2=−0.20 *5* Additional information 20.
434.6 *2*	1.3# *2*	3765.7+x		3331.1+x	37/2+			
439.4 *2*	1.4# *2*	3855.0+x		3415.6+x	37/2+			
442.6 *2*	0.5# *2*	3586.4+x	37/2+	3143.7+x	35/2+			
467.7 *2*	1.0 *2*	6076.4+x	(59/2+)	5608.7+x	57/2+			
490.1 *2*	6.3 *2*	5372.7+x	53/2+	4882.7+x	51/2−	D		A_2=−0.30 *6* Additional information 26.
610.2 *2*	8.0 *4*	4366.8+x	45/2+	3756.6+x	43/2−			Additional information 21.
725.9 *2*	2.3# *4*	5608.6+x	55/2−	4882.7+x	51/2−			
750.7 *2*	2.2 *1*	4686.2+x	47/2−	3935.4+x	43/2−	(Q)		A_2=+0.25 *12*
773.0 *2*	100.0	773.0	15/2−	0.0	9/2+	E3	0.0404	α(K)exp=0.0239 *7*; α(L)exp=0.0091 *3*; α(M)exp=0.0028 *2*; A_2=+0.12 *2* A_2=+0.227 *10*; A_4=+0.002 *16* (1988Fu10) α(K)=0.0255 *4*; α(L)=0.01105 *16*; α(M)=0.00287 *4* α(N)=0.000760 *11*; α(O)=0.0001679 *24*; α(P)=2.71×10^{-5} *4*; α(Q)=1.145×10^{-6} *16* A_2=+0.35 *13*; A_4=−0.26 *22* (1983Lo16) Additional information 2. POL=−0.13 *1* (1988Fu10).
797.3 *2*	8.3 *2*	4553.5+x	47/2−	3756.6+x	43/2−	(Q)		A_2=+0.39 *6* Additional information 22.
805.7 *2*	3.0 *1*	5372.7+x	53/2+	4567.0+x	49/2+	(Q)		A_2=+0.20 *10*
810.2 *2*	3.2 *1*	4567.0+x	49/2+	3756.6+x	43/2−	(E3)	0.0359	A_2=+0.74 *9* α(K)=0.0232 *4*; α(L)=0.00945 *14*; α(M)=0.00244 *4* α(N)=0.000647 *9*; α(O)=0.0001431 *20*; α(P)=2.32×10^{-5} *4*; α(Q)=1.021×10^{-6} *15*
841.9 *2*	55.4 *4*	3088.8+x	33/2+	2246.9+x	31/2−	E1	0.00435	α(K)=0.00358 *5*; α(L)=0.000586 *9*; α(M)=0.0001377 *20* α(N)=3.61×10^{-5} *5*; α(O)=8.19×10^{-6} *12*; α(P)=1.410×10^{-6} *20*; α(Q)=1.060×10^{-7} *15* α(K)exp<0.013; A_2=−0.21 *1* Additional information 10. I_γ: 18 *2* (1988Fu10) in ^{206}Pb(^{12}C,3nγ), E=67 MeV.
852.3 *2*	74.2 *5*	1625.3	17/2+	773.0	15/2−	E1	0.00425	α(K)=0.00350 *5*; α(L)=0.000572 *8*; α(M)=0.0001346 *19* α(N)=3.53×10^{-5} *5*; α(O)=8.00×10^{-6} *12*; α(P)=1.378×10^{-6} *20*; α(Q)=1.037×10^{-7} *15* α(K)exp=0.0046 *4*; α(L)exp=0.0010 *2*; α(M)exp=0.00016 *11*; A_2=−0.09 *1* A_2=−0.092 *13*; A_4=+0.001 *21* (1988Fu10) A_2=−0.18 *2*; A_4=−0.05 *3* (1983Lo16) Additional information 3. I_γ: 64 *3* (1988Fu10) in ^{206}Pb(^{12}C,3nγ), E=67 MeV; 86 *9* (1983Lo16) in ^{208}Pb(^{13}C,6nγ), E=95 MeV. POL=−0.04 *2* (1988Fu10).

γ(^{215}Ra) (continued)

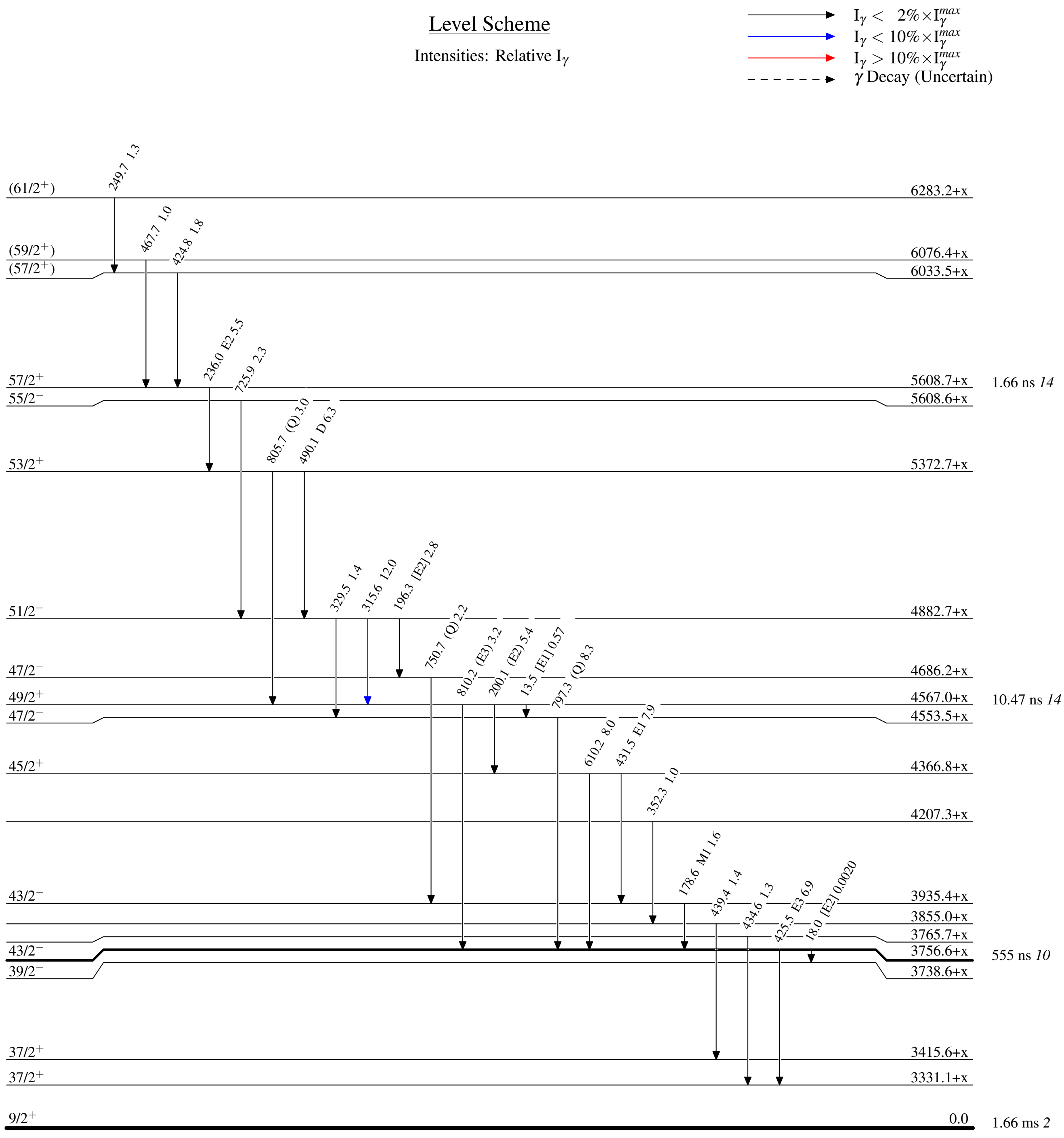
E_γ[‡]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[&]	α[†]	Comments
1048.2 *2*	22.7 *2*	1821.2	21/2$^+$	773.0	15/2$^-$	E3	0.0195	α(K)=0.01382 *20*; α(L)=0.00425 *6*; α(M)=0.001074 *15* α(N)=0.000284 *4*; α(O)=6.33×10^{-5} *9*; α(P)=1.047×10^{-5} *15*; α(Q)=5.59×10^{-7} *8* α(K)exp=0.0127 *7*; α(L)exp=0.0059 *5*; α(M)exp=0.0037 *10*; A_2=+0.06 *2* A_2=+0.13 *4*; A_4=+0.05 *7* (1988Fu10) Additional information 5. I_γ: 18 *2* (1988Fu10) in ^{206}Pb(^{12}C,3nγ), E=67 MeV. POL=−0.04 *5* (1988Fu10).

[†] Additional information 28.
[‡] From ^{206}Pb(^{13}C,4nγ) (1998St24). Energy uncertainty of 0.2 keV is assigned based on e-mail reply of Nov. 22, 2012 from T. Kibedi (in consultation with A.E. Stuchbery).
[#] From $\gamma\gamma$ coin data. Transition is weak or contaminated in singles data (1998St24).
[@] Transition implied by $\gamma\gamma$ coin data (1998St24). The transition energy is from level-energy difference.
[&] From ce, $\gamma(\theta)$ and linear polarization data.
[a] Deduced by the evaluators from ce data in 1998St24.

$^{206}Pb(^{13}C,4n\gamma)$ 1998St24

Level Scheme

Intensities: Relative I_γ



$^{215}_{88}Ra_{127}$

$^{206}Pb(^{13}C,4n\gamma)$ 1998St24

Level Scheme (continued)

Intensities: Relative I_γ