

$^{204}\text{Bi}$   $\varepsilon$  decay [1970CrZY](#),[1977KaXO](#),[1984Dz05](#)

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. J. Chiara and F. G. Kondev	NDS 111,141 (2010)	1-Oct-2009

Parent:  $^{204}\text{Bi}$ :  $E=0.0$ ;  $J^\pi=6^+$ ;  $T_{1/2}=11.22$  h  $10$ ;  $Q(\varepsilon)=4.44\times 10^3$  3;  $\% \varepsilon + \% \beta^+$  decay=100.0

[1970CrZY](#):  $^{204}\text{Bi}$  source produced via  $^{206}\text{Pb}(p,3n)$ ;  $\text{Pb}(\text{NO}_3)_2$  target enriched to 97.2%  $^{206}\text{Pb}$ ;  $E(p)=30$  MeV;  $\gamma$  singles with  $\text{Ge}(\text{Li})$ ,  $\gamma\gamma$ -coin with  $\text{Ge}(\text{Li})\text{-NaI}(\text{Tl})$  and  $\text{Ge}(\text{Li})\text{-Ge}(\text{Li})$ ;  $\text{Ge}(\text{Li})$ 's had 2.0% and 2.5% efficiency and FWHM=3.0 and 2.4 keV at 1.33 MeV, overall resolution $\approx$ 4.0 keV at 1.33 MeV due to a slight gain drift; measured  $E\gamma$ ,  $I\gamma$ ,  $\text{Ice}(\text{K})$ .

[1984Dz05](#):  $^{204}\text{Po}$  produced by irradiating thorium target with 660-MeV protons, chemically separating Po from Th, and separating by mass;  $^{204}\text{Bi}$  decay spectra measured 10-20 h after  $^{204}\text{Po}$  preparation;  $\text{Ge}(\text{Li})$  detector for measuring  $\gamma$ 's, FWHM=0.57 keV at 100 keV and 2.3 keV at 1.3 MeV;  $\text{Si}(\text{Li})$  detector for measuring  $\text{ce}$ 's, FWHM=2.1 to 2.5 keV; toroidal  $\beta$  spectrometer for low-energy electrons; measured  $E\gamma$ ,  $I\gamma$ ,  $\text{Ice}(\text{K})$ .

[1972Hn01](#):  $^{204}\text{Bi}$  produced via  $^{206}\text{Pb}(p,3n)$ ; target enriched to >99%  $^{206}\text{Pb}$ ; decays from  $^{204}\text{Bi}$  distinguished from  $^{203}\text{Bi}$  by comparing  $E(p)=30$ - and 40-MeV bombarding energies;  $\text{Ge}(\text{Li})$  x-ray detector with FWHM=500 eV at 100 keV for low-energy  $\gamma$ 's;  $\text{Ge}(\text{Li})$  with FWHM=3 keV at 1.33 MeV for higher energies; measured  $E\gamma$ ,  $I\gamma$ , deduced  $\alpha(\text{K})_{\text{exp}}$ .

[1958St99](#):  $^{204}\text{Bi}$  produced via  $^{206}\text{Pb}(p,3n)$ ; target enriched to 88%  $^{206}\text{Pb}$ ; decays from  $^{204}\text{Bi}$  distinguished from  $^{203}\text{Bi}$  by comparing  $E(p)=30$ - to 60-MeV bombarding energies; permanent magnet  $\beta$  spectrometer, double-focusing  $\beta$  spectrometer with FWHM=0.15 to 0.5% for  $E(\text{ce})$ ,  $\text{Ice}(\text{K})$  measurements.

Others: [1978So02](#), [1977VaYS](#), [1977VaYT](#).

The decay scheme is based mostly on the extensive  $\gamma\gamma$ -coin results of [1970CrZY](#) and [1977KaXO](#), as adopted in [1994Sc24](#), with weak transitions placed on the bases of energy fit and mult consistency.  $I(\varepsilon+\beta^+)$  were calculated from  $\gamma+\text{ce}$  intensity balance. Evaluators expect that most of the more intense unplaced  $\gamma$ 's feed either the g.s. or the isomeric 66.93-min state because such  $\gamma$ 's are not observed in  $\gamma\gamma$  coincidences. The uncertainties in  $\log ft$ 's do not include the errors caused by unplaced or unobserved transitions.

New levels proposed by evaluators: 1351.17, 1582.54, 1665.41, 1948.23, 2157.98, 2490.99, 2627.30, 2720.0, 2887.2, 4039.0, 4067.87, 4076.16, 4111.23, 4172.19, 4229.57, 4243.77, 4285.89 keV. Some of these levels were observed in  $(n,n'\gamma)$ .

K x ray/ $I\gamma(899)=0.8$  3, L x ray/ $I\gamma(899)=0.057$  19 ([1972Hn01](#)).

[Additional information 1](#).

 $^{204}\text{Pb}$  Levels

E(level) <sup>†</sup>	$J^\pi$ <sup>‡</sup>	$T_{1/2}$ <sup>#</sup>	Comments
0	$0^+$		
899.15 3	$2^+$	2.88 ps 3	
1273.99 6	$4^+$	265 ns 6	
1351.28 6	$2^+$		
1563.22 7	$4^+$		
1582.79 7	$2^+$		
1604.73 8	$3^+$		
1665.28? 8	$2^+$		
1817.40 6	$4^+$		
1948.31 6	$3^+$		
2065.17 7	$5^+$		
2157.94 8	$(4^+)$		
2185.73 8	$9^-$	66.93 min 10	From the adopted decay scheme there is a 5.4% 21 $\gamma+\text{ce}$ imbalance; this is probably due to unplaced gammas. Feeding to this isomeric level cannot be detected by $\gamma\gamma$ -coin measurements across the isomer because of its long lifetime.
2238.33? 16	5,6		
2258.01 6	$5^-$		
2264.28 6	$7^-$	0.45 $\mu\text{s}$ +10-3	$T_{1/2}$ : From <a href="#">1978So02</a> .
2338.30 6	$(4)^-$		
2386.02 11	$5^+$		
2405.13 7	$7^-$		

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$^{204}\text{Bi}$   $\varepsilon$  decay **1970CrZY,1977KaXO,1984Dz05 (continued)**

$^{204}\text{Pb}$  Levels (continued)

E(level) <sup>†</sup>	J <sup>π‡</sup>	E(level) <sup>†</sup>	J <sup>π‡</sup>	E(level) <sup>†</sup>	J <sup>π‡</sup>	E(level) <sup>†</sup>	J <sup>π‡</sup>
2434.10 7	6 <sup>-</sup>	2927.58 9	(5,6,7) <sup>-</sup>	3637.91 7	6 <sup>-</sup>	4094.29 9	6 <sup>-</sup>
2480.29 7	6 <sup>-</sup>	2928.76 6	5 <sup>-</sup>	3733.25? 10	6 <sup>-</sup> ,7 <sup>-</sup>	4111.33 10	(5) <sup>-</sup>
2491.28 8	3 <sup>+</sup>	2941.7? 3	(4 <sup>-</sup> ,5 <sup>-</sup> ,6 <sup>-</sup> )	3768.52 7	5 <sup>-</sup> ,6 <sup>-</sup>	4115.07 14	6 <sup>-</sup>
2507.02 7	5 <sup>-</sup>	3023.31 10	(5,6) <sup>-</sup>	3782.14 8	5 <sup>-</sup>	4129.38 11	(5,6)
2513.55? 17		3029.14 6	5 <sup>-</sup>	3842.6? 5	(5,6 <sup>+</sup> )	4165.88 10	5 <sup>-</sup>
2627.33 10	(5 <sup>+</sup> )	3092.11 6	5 <sup>-</sup>	3876.38? 23	(5 <sup>-</sup> ,6 <sup>+</sup> )	4172.28? 14	(5,6 <sup>+</sup> )
2696.57 10	7 <sup>-</sup>	3105.15 7	6 <sup>-</sup>	3891.60? 13	5 <sup>-</sup> ,6 <sup>-</sup>	4183.88 8	6 <sup>-</sup>
2719.16 9	5 <sup>+</sup>	3170.23 7	5 <sup>-</sup>	3996.17 19	(5,6 <sup>+</sup> )	4229.67? 20	(5,6)
2731.77? 18	5 <sup>-</sup> ,6 <sup>-</sup> ,7 <sup>-</sup>	3198.46? 16	5 <sup>-</sup> ,6,7 <sup>-</sup>	3997.75? 14	(5,6,7) <sup>-</sup>	4243.86? 17	(5,6 <sup>+</sup> )
2861.49? 18	(5 <sup>-</sup> ,6,7)	3215.21 8	5 <sup>+</sup>	4032.69? 23	(5,6 <sup>+</sup> )	4250.04 12	(5,6 <sup>+</sup> )
2887.16 11	2,3	3232.13 8	5 <sup>-</sup>	4039.1? 4	(5,6 <sup>+</sup> )	4285.98 15	6 <sup>-</sup>
2889.89? 16	(5 <sup>-</sup> ,6 <sup>-</sup> )	3301.60 9	5 <sup>-</sup>	4067.95 16	(5 <sup>-</sup> ,6 <sup>+</sup> )		
2912.84 9	5 <sup>-</sup>	3397.48 7	6 <sup>-</sup>	4076.24 13	(5) <sup>-</sup>		
2919.55 7	5 <sup>-</sup>	3425.0? 3	5 <sup>-</sup> ,6 <sup>-</sup>	4080.88 9	(5,6 <sup>+</sup> )		

<sup>†</sup> From a least-squares fit to E<sub>γ</sub>.

<sup>‡</sup> From Adopted Levels.

# From Adopted Levels, except as noted.

$\varepsilon, \beta^+$  radiations

No  $\beta^+$  found,  $\Sigma(I\beta^+)/\text{Ti}(374) < 5 \times 10^{-4}$  (1958St99).

According to intensity balances, several low-energy levels with  $J \leq 4$  may have  $\varepsilon + \beta^+$  feeding, but the corresponding  $\log ft$  values are considerably lower than expected for such decays and have been rejected by the evaluators. This may indicate that not all  $\gamma$  intensity to these levels has been accounted for.

[Additional information 2.](#)

E(decay)	E(level)	I $\varepsilon^{\dagger}$	Log $ft$	I( $\varepsilon + \beta^+$ ) <sup>†</sup>	Comments
(1.5×10 <sup>2</sup> 3)	4285.98	0.57 8	6.25 25	0.57 8	$\varepsilon\text{K}=0.48$ 12; $\varepsilon\text{L}=0.38$ 9; $\varepsilon\text{M}+=0.14$ 4
(1.9×10 <sup>2</sup> 3)	4250.04	0.32 5	6.80 19	0.32 5	$\varepsilon\text{K}=0.59$ 6; $\varepsilon\text{L}=0.30$ 4; $\varepsilon\text{M}+=0.112$ 17
(2.0×10 <sup>2</sup> 3)	4243.86?	0.50 7	6.65 18	0.50 7	$\varepsilon\text{K}=0.60$ 5; $\varepsilon\text{L}=0.29$ 4; $\varepsilon\text{M}+=0.108$ 16
(2.1×10 <sup>2</sup> 3)	4229.67?	0.090 14	7.48 17	0.090 14	$\varepsilon\text{K}=0.62$ 4; $\varepsilon\text{L}=0.28$ 3; $\varepsilon\text{M}+=0.101$ 12
(2.6×10 <sup>2</sup> 3)	4183.88	1.56 17	6.49 12	1.56 17	$\varepsilon\text{K}=0.673$ 21; $\varepsilon\text{L}=0.241$ 15; $\varepsilon\text{M}+=0.086$ 7
(2.7×10 <sup>2</sup> 3)	4172.28?	0.55 9	7.00 13	0.55 9	$\varepsilon\text{K}=0.682$ 19; $\varepsilon\text{L}=0.234$ 13; $\varepsilon\text{M}+=0.083$ 6
(2.7×10 <sup>2</sup> 3)	4165.88	1.8 3	6.51 13	1.8 3	$\varepsilon\text{K}=0.687$ 17; $\varepsilon\text{L}=0.231$ 12; $\varepsilon\text{M}+=0.082$ 5
(3.1×10 <sup>2</sup> 3)	4129.38	0.149 24	7.73 11	0.149 24	$\varepsilon\text{K}=0.708$ 12; $\varepsilon\text{L}=0.217$ 9; $\varepsilon\text{M}+=0.076$ 4
(3.2×10 <sup>2</sup> 3)	4115.07	0.66 8	7.14 10	0.66 8	$\varepsilon\text{K}=0.714$ 11; $\varepsilon\text{L}=0.212$ 8; $\varepsilon\text{M}+=0.074$ 3
(3.3×10 <sup>2</sup> 3)	4111.33	0.52 8	7.25 11	0.52 8	$\varepsilon\text{K}=0.716$ 10; $\varepsilon\text{L}=0.211$ 7; $\varepsilon\text{M}+=0.074$ 3
(3.5×10 <sup>2</sup> 3)	4094.29	1.02 11	7.02 9	1.02 11	$\varepsilon\text{K}=0.722$ 9; $\varepsilon\text{L}=0.206$ 6; $\varepsilon\text{M}+=0.0717$ 25
(3.6×10 <sup>2</sup> 3)	4080.88	0.50 7	7.37 10	0.50 7	$\varepsilon\text{K}=0.727$ 8; $\varepsilon\text{L}=0.203$ 6; $\varepsilon\text{M}+=0.0704$ 23
(3.6×10 <sup>2</sup> 3)	4076.24	0.45 5	7.43 9	0.45 5	$\varepsilon\text{K}=0.728$ 8; $\varepsilon\text{L}=0.202$ 6; $\varepsilon\text{M}+=0.0699$ 22
(3.7×10 <sup>2</sup> 3)	4067.95	0.088 15	8.16 10	0.088 15	$\varepsilon\text{K}=0.731$ 7; $\varepsilon\text{L}=0.200$ 5; $\varepsilon\text{M}+=0.0692$ 21
(4.0×10 <sup>2</sup> 3)	4039.1?	0.048 12	8.51 13	0.048 12	$\varepsilon\text{K}=0.738$ 6; $\varepsilon\text{L}=0.195$ 4; $\varepsilon\text{M}+=0.0670$ 17
(4.1×10 <sup>2</sup> 3)	4032.69?	0.150 23	8.03 9	0.150 23	$\varepsilon\text{K}=0.740$ 6; $\varepsilon\text{L}=0.194$ 4; $\varepsilon\text{M}+=0.0666$ 16
(4.4×10 <sup>2</sup> 3)	3997.75?	0.37 6	7.72 9	0.37 6	$\varepsilon\text{K}=0.747$ 5; $\varepsilon\text{L}=0.188$ 4; $\varepsilon\text{M}+=0.0645$ 13
(4.4×10 <sup>2</sup> 3)	3996.17	0.168 21	8.07 8	0.168 21	$\varepsilon\text{K}=0.747$ 5; $\varepsilon\text{L}=0.188$ 4; $\varepsilon\text{M}+=0.0644$ 13
(5.5×10 <sup>2</sup> 3)	3891.60?	0.56 8	7.76 8	0.56 8	$\varepsilon\text{K}=0.763$ 3; $\varepsilon\text{L}=0.1775$ 19; $\varepsilon\text{M}+=0.0600$ 8

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$^{204}\text{Bi}$   $\epsilon$  decay [1970CrZY](#), [1977KaXO](#), [1984Dz05](#) (continued) $\epsilon, \beta^+$  radiations (continued)

E(decay)	E(level)	$I\beta^+$ †	$I\epsilon^\ddagger$	Log $ft$	$I(\epsilon + \beta^+)^\ddagger$	Comments
( $5.6 \times 10^2$ ‡ 3)	3876.38?		0.27 9	8.11 15	0.27 9	$\epsilon\text{K}=0.7642$ 24; $\epsilon\text{L}=0.1763$ 18; $\epsilon\text{M}+=0.0596$ 7
( $6.0 \times 10^2$ ‡ 3)	3842.6?		0.040 9	8.99 11	0.040 9	$\epsilon\text{K}=0.7674$ 21; $\epsilon\text{L}=0.1739$ 15; $\epsilon\text{M}+=0.0586$ 6
( $6.6 \times 10^2$ 3)	3782.14		1.76 19	7.45 6	1.76 19	$\epsilon\text{K}=0.7723$ 17; $\epsilon\text{L}=0.1704$ 12; $\epsilon\text{M}+=0.0572$ 5
( $6.7 \times 10^2$ 3)	3768.52		3.6 6	7.15 8	3.6 6	$\epsilon\text{K}=0.7733$ 16; $\epsilon\text{L}=0.1697$ 12; $\epsilon\text{M}+=0.0570$ 5
( $7.1 \times 10^2$ ‡ 3)	3733.25?		0.88 23	7.82 12	0.88 23	$\epsilon\text{K}=0.7756$ 14; $\epsilon\text{L}=0.1681$ 10; $\epsilon\text{M}+=0.0563$ 4
( $8.0 \times 10^2$ 3)	3637.91		9.8 10	6.89 6	9.8 10	$\epsilon\text{K}=0.7807$ 11; $\epsilon\text{L}=0.1645$ 8; $\epsilon\text{M}+=0.0549$ 3
( $1.02 \times 10^3$ ‡ 3)	3425.0?		0.19 3	8.83 8	0.19 3	$\epsilon\text{K}=0.7882$ 7; $\epsilon\text{L}=0.1591$ 5; $\epsilon\text{M}+=0.05272$ 18
( $1.04 \times 10^3$ 3)	3397.48		1.68 20	7.91 6	1.68 20	$\epsilon\text{K}=0.7889$ 6; $\epsilon\text{L}=0.1586$ 5; $\epsilon\text{M}+=0.05252$ 17
( $1.14 \times 10^3$ 3)	3301.60		2.3 3	7.85 6	2.3 3	$\epsilon\text{K}=0.7911$ 5; $\epsilon\text{L}=0.1570$ 4; $\epsilon\text{M}+=0.05189$ 14
( $1.21 \times 10^3$ 3)	3232.13		3.2 4	7.76 6	3.2 4	$\epsilon\text{K}=0.7925$ 5; $\epsilon\text{L}=0.1560$ 3; $\epsilon\text{M}+=0.05150$ 12
( $1.22 \times 10^3$ 3)	3215.21		1.35 17	8.15 6	1.35 17	$\epsilon\text{K}=0.7928$ 4; $\epsilon\text{L}=0.1558$ 3; $\epsilon\text{M}+=0.05141$ 12
( $1.24 \times 10^3$ ‡ 3)	3198.46?		0.40 8	8.69 9	0.40 8	$\epsilon\text{K}=0.7931$ 4; $\epsilon\text{L}=0.1556$ 3; $\epsilon\text{M}+=0.05133$ 12
( $1.27 \times 10^3$ 3)	3170.23		14.7 21	7.15 7	14.7 21	$\epsilon\text{K}=0.7936$ 4; $\epsilon\text{L}=0.1552$ 3; $\epsilon\text{M}+=0.05119$ 11
( $1.35 \times 10^3$ 3)	3092.11		6.3 7	7.57 5	6.3 7	$\epsilon\text{K}=0.7947$ 3; $\epsilon\text{L}=0.15434$ 24; $\epsilon\text{M}+=0.05084$ 10
( $1.41 \times 10^3$ 3)	3029.14	0.0022 7	10.0 12	7.41 6	10.0 12	av $E\beta=196$ 11; $\epsilon\text{K}=0.7955$ 3; $\epsilon\text{L}=0.15370$ 22; $\epsilon\text{M}+=0.05059$ 9
( $1.42 \times 10^3$ 3)	3023.31		<0.39	>8.8	<0.39	$\epsilon\text{K}=0.7956$ 3; $\epsilon\text{L}=0.15364$ 22; $\epsilon\text{M}+=0.05057$ 9
( $1.51 \times 10^3$ 3)	2928.76	0.0066 16	11.3 14	7.42 6	11.3 14	av $E\beta=242$ 10; $\epsilon\text{K}=0.7964$ 2; $\epsilon\text{L}=0.15275$ 20; $\epsilon\text{M}+=0.05022$ 8
( $1.52 \times 10^3$ 3)	2919.55	0.0017 6	2.7 8	8.05 13	2.7 8	av $E\beta=246$ 10; $\epsilon\text{K}=0.7965$ 2; $\epsilon\text{L}=0.15267$ 20; $\epsilon\text{M}+=0.05019$ 8
( $1.53 \times 10^3$ ‡ 3)	2912.84		<0.12	>9.4	<0.12	$\epsilon\text{K}=0.7966$ 2; $\epsilon\text{L}=0.15261$ 20; $\epsilon\text{M}+=0.05017$ 8
( $1.55 \times 10^3$ ‡ 3)	2889.89?		0.084 19	9.57 10	0.084 19	$\epsilon\text{K}=0.7967$ 2; $\epsilon\text{L}=0.15241$ 20; $\epsilon\text{M}+=0.05009$ 8
( $1.58 \times 10^3$ ‡ 3)	2861.49?		0.14 4	9.37 13	0.14 4	$\epsilon\text{K}=0.7968$ 2; $\epsilon\text{L}=0.15216$ 19; $\epsilon\text{M}+=0.04999$ 8
( $1.71 \times 10^3$ ‡ 3)	2731.77?	0.00023 10	0.10 4	9.59 18	0.10 4	av $E\beta=329.4$ 98; $\epsilon\text{K}=0.7971$ ; $\epsilon\text{L}=0.15108$ 19; $\epsilon\text{M}+=0.04958$ 7
( $1.72 \times 10^3$ 3)	2719.16	0.00031 6	0.128 20	9.49 7	0.128 20	av $E\beta=335.0$ 98; $\epsilon\text{K}=0.7970$ ; $\epsilon\text{L}=0.15097$ 19; $\epsilon\text{M}+=0.04954$ 7
( $1.74 \times 10^3$ 3)	2696.57	0.0036 9	1.3 3	8.49 10	1.3 3	av $E\beta=344.9$ 98; $\epsilon\text{K}=0.79697$ 9; $\epsilon\text{L}=0.15079$ 19; $\epsilon\text{M}+=0.04947$ 7
( $1.81 \times 10^3$ 3)	2627.33	0.0026 8	0.66 18	8.82 12	0.66 18	av $E\beta=376$ 10; $\epsilon\text{K}=0.7966$ 2; $\epsilon\text{L}=0.15021$ 19; $\epsilon\text{M}+=0.04925$ 7
( $1.93 \times 10^3$ ‡ 3)	2513.55?	0.0010 2	0.16 3	9.49 9	0.16 3	av $E\beta=425.4$ 97; $\epsilon\text{K}=0.7954$ 4; $\epsilon\text{L}=0.14924$ 20; $\epsilon\text{M}+=0.04890$ 7
( $1.96 \times 10^3$ 3)	2480.29	<0.0073	<0.99	>8.7	<1.0	av $E\beta=440.0$ 97; $\epsilon\text{K}=0.7949$ 4; $\epsilon\text{L}=0.14895$ 20; $\epsilon\text{M}+=0.04879$ 8
( $2.01 \times 10^3$ 3)	2434.10	0.015 6	1.7 7	8.50 18	1.7 7	av $E\beta=460.2$ 97; $\epsilon\text{K}=0.7941$ 5; $\epsilon\text{L}=0.14853$ 21; $\epsilon\text{M}+=0.04864$ 8
( $2.03 \times 10^3$ ‡ 3)	2405.13	<0.016	<1.7	>8.5	<1.7	av $E\beta=472.9$ 97; $\epsilon\text{K}=0.7935$ 5; $\epsilon\text{L}=0.14826$ 21; $\epsilon\text{M}+=0.04854$ 8
( $2.05 \times 10^3$ 3)	2386.02	0.0035 12	0.34 11	9.23 14	0.34 11	av $E\beta=481.3$ 97; $\epsilon\text{K}=0.7931$ 5; $\epsilon\text{L}=0.14808$ 21; $\epsilon\text{M}+=0.04848$ 8
( $2.10 \times 10^3$ ‡ 3)	2338.30	0.0027 14	1.0 5	9.97 <sup>1u</sup> 22	1.0 5	av $E\beta=510.5$ 94; $\epsilon\text{K}=0.7867$ 2; $\epsilon\text{L}=0.15816$ 24; $\epsilon\text{M}+=0.05242$ 10
( $2.18 \times 10^3$ ‡ 3)	2264.28	0.030 20	2.0 13	8.5 3	2.0 13	av $E\beta=534.5$ 97; $\epsilon\text{K}=0.7899$ 7; $\epsilon\text{L}=0.14687$ 24; $\epsilon\text{M}+=0.04805$ 8
( $2.18 \times 10^3$ 3)	2258.01	0.15 6	10 4	7.81 18	10 4	av $E\beta=537.2$ 97; $\epsilon\text{K}=0.7897$ 7; $\epsilon\text{L}=0.14681$ 24; $\epsilon\text{M}+=0.04803$ 9

$I(\epsilon + \beta^+)$ : based on experimental  $\Sigma(I\beta^+) < 0.04\%$  ([1958St99](#)) and theoretical  $I\epsilon/I\beta^+$  for the adopted level scheme,  $I(\epsilon + \beta^+) < 3\%$  to the

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$^{204}\text{Bi}$   $\epsilon$  decay [1970CrZY](#),[1977KaXO](#),[1984Dz05](#) (continued) $\epsilon, \beta^+$  radiations (continued)

<u>E(decay)</u>	<u>E(level)</u>	<u><math>I\beta^+</math> †</u>	<u><math>I\epsilon</math> †</u>	<u>Log <math>ft</math></u>	<u><math>I(\epsilon + \beta^+)</math> †</u>	<u>Comments</u>
						2258.01-keV level is expected; $I(\epsilon + \beta^+)$ determined from $I(\gamma + ce)$ balance for this level is inconsistent with this. <a href="#">Additional information 3.</a>
$(2.20 \times 10^3 \text{ } ^3)$	2238.33?	0.0077 14	0.46 8	9.15 8	0.47 8	av $E\beta=545.9 \text{ } ^9$ ; $\epsilon K=0.7891 \text{ } ^8$ ; $\epsilon L=0.14660 \text{ } ^{24}$ ; $\epsilon M+=0.04796 \text{ } ^9$
$(2.28 \times 10^3 \text{ } ^3)$	2157.94	0.0061 19	0.29 9	9.38 13	0.30 9	av $E\beta=581.0 \text{ } ^9$ ; $\epsilon K=0.7862 \text{ } ^9$ ; $\epsilon L=0.1457 \text{ } ^3$ ; $\epsilon M+=0.04765 \text{ } ^9$
$(2.37 \times 10^3 \text{ } ^{\ddagger} \text{ } ^3)$	2065.17	<0.02	<0.7	>9.0	<0.7	av $E\beta=621.6 \text{ } ^9$ ; $\epsilon K=0.7824 \text{ } ^{11}$ ; $\epsilon L=0.1446 \text{ } ^3$ ; $\epsilon M+=0.04727 \text{ } ^{10}$

† Absolute intensity per 100 decays.

‡ Existence of this branch is questionable.

γ(<sup>204</sup>Pb)

I<sub>γ</sub> normalization: From Σ(I<sub>γ</sub>+ce to g.s.) = 100 % and by assuming that there is no direct ε feeding to g.s..

α(K)exp=Ice(K)/I<sub>γ</sub> calculated by evaluators from Ice(K) and I<sub>γ</sub> values quoted in [1984Dz05](#), except as noted. In a few cases, conversion coefficients for different shells are given. The electron intensities were normalized by [1984Dz05](#) such that α(K)exp=0.00653 for 899γ, the theoretical value for an (assumed) E2 transition. The total average radiation energy calculated with the RADLST program, excluding unplaced γ's, is 4613 keV *183* that compares to 4438 keV *22* from [2003Au03](#).

$E_\gamma$ ‡	$I_\gamma$ #h	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult.&	$\delta^a$	$\alpha^\dagger$	Comments
(6.26 3)	$5.5 \times 10^{-6}$	2264.28	7 <sup>-</sup>	2258.01	5 <sup>-</sup>	[E2]		$1.19 \times 10^6$ 4	α(M)= $9.2 \times 10^5$ 3; α(N+..)= $2.72 \times 10^5$ 8 α(N)= $2.30 \times 10^5$ 7; α(O)= $4.05 \times 10^4$ 12; α(P)= $1.19 \times 10^3$ 4 α(N)= $2.21 \times 10^5$ 21; α(O)= $3.9 \times 10^4$ 4; α(P)= $1.15 \times 10^3$ 11 ce(N)/(γ+ce)=0.193 23; ce(O)/(γ+ce)=0.034 5; ce(P)/(γ+ce)=0.00100 13 E <sub>γ</sub> : From adopted gammas. Existence inferred from I <sub>γ</sub> (984) in delayed spectra of <a href="#">1978So02</a> . I <sub>γ</sub> : From I(γ+ce)=6.3, deduced from intensity balance in <a href="#">1978So02</a> .
29.0 <sup>f</sup> 2	0.039 14	2434.10	6 <sup>-</sup>	2405.13	7 <sup>-</sup>	[M1]		65.5 17	α(L)=50.1 13; α(M)=11.8 3; α(N+..)=3.65 10 α(N)=2.99 8; α(O)=0.596 15; α(P)=0.0636 16 ce(N)/(γ+ce)=0.0450 16; ce(O)/(γ+ce)=0.0090 4; ce(P)/(γ+ce)=0.00096 4 I <sub>γ</sub> : From I(γ+ce)=2.6 6 deduced using intensity balance.
78.54 8	0.41 6	2264.28	7 <sup>-</sup>	2185.73	9 <sup>-</sup>	E2		18.2	α(L)=13.52 20; α(M)=3.57 6; α(N+..)=1.066 16 α(N)=0.900 14; α(O)=0.1599 24; α(P)=0.00593 9 α(M)exp = 1.19 18/0.33 5 = 3.6 8.
80.15 7	0.95 10	2338.30	(4) <sup>-</sup>	2258.01	5 <sup>-</sup>	M1(+E2)	0.19 3	3.76 16	α(L)=2.87 12; α(M)=0.68 4; α(N+..)=0.211 10 α(N)=0.174 8; α(O)=0.0340 14; α(P)=0.00328 6 α(N)=0.174 11; α(O)=0.0340 19; α(P)=0.00328 6 α(L1)exp = 1.6 3/0.78 13 = 2.1 5, α(L3)exp = 0.17 4/0.78 13 = 0.22 6. δ: From α(L3)exp. Other:<0.7 from α(L1)exp.
<sup>x</sup> 90.9 1	≤0.03					(E1)		0.549	α(K)=0.431 7; α(L)=0.0901 13; α(M)=0.0213 3; α(N+..)=0.00638 10 α(N)=0.00531 8; α(O)=0.000992 15; α(P)= $7.45 \times 10^{-5}$ 11
<sup>x</sup> 92.2 1	≤0.03					(E1)		0.531	α(K)=0.418 6; α(L)=0.0867 13; α(M)=0.0205 3; α(N+..)=0.00614 9 α(N)=0.00511 8; α(O)=0.000955 14; α(P)= $7.20 \times 10^{-5}$ 11
<sup>x</sup> 96.54 15 100.32 10	0.04 1 0.23 2	3029.14	5 <sup>-</sup>	2928.76	5 <sup>-</sup>	M1(+E2)	<0.6	8.9 5	α(K)=6.6 10; α(L)=1.7 4; α(M)=0.42 11; α(N+..)=0.13 4 α(N)=0.11 3; α(O)=0.020 5; α(P)=0.00171 5 α(N)=0.11 4; α(O)=0.021 6; α(P)=0.00172 6 α(L1)exp=0.26 7/0.20 3 = 1.3 4.

<sup>204</sup>Bi ε decay [1970CrZY,1977KaXO,1984Dz05](#) (continued)

$\gamma(^{204}\text{Pb})$  (continued)

$E_\gamma$ <sup>‡</sup>	$I_\gamma$ <sup>#h</sup>	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult.&	$\delta^a$	$\alpha^\dagger$	Comments
109.1 3	0.15 10	3029.14	5 <sup>-</sup>	2919.55	5 <sup>-</sup>	[M1]		7.29 12	$\alpha(\text{K})=5.94$ 10; $\alpha(\text{L})=1.034$ 17; $\alpha(\text{M})=0.242$ 4; $\alpha(\text{N+..})=0.0752$ 13 $\alpha(\text{N})=0.0616$ 10; $\alpha(\text{O})=0.01228$ 20; $\alpha(\text{P})=0.001312$ 22
119.8 <sup>k</sup> 3	≤0.1	2185.73	9 <sup>-</sup>	2065.17	5 <sup>+</sup>	[M4]		2.55×10 <sup>3</sup> 6	$\alpha(\text{K})=145.4$ 21; $\alpha(\text{L})=1.66\times 10^3$ 4; $\alpha(\text{M})=560$ 13; $\alpha(\text{N+..})=177$ 4 $\alpha(\text{N})=149$ 4; $\alpha(\text{O})=26.8$ 6; $\alpha(\text{P})=0.907$ 19 $E_\gamma$ : Observed $\gamma$ reported only by <a href="#">1958Fr53</a> ; seen in ce spectrum by <a href="#">1972Hn01</a> . $I_{(\gamma+ce)}$ : <0.5% from ce data of <a href="#">1958Fr53</a> .
<sup>x</sup> 139.6 3 140.80 10	0.17 5 1.18 12	2405.13	7 <sup>-</sup>	2264.28	7 <sup>-</sup>	M1+E2 <sup>g</sup>	1.0 5	2.5 6	$\alpha(\text{K})=1.6$ 8; $\alpha(\text{L})=0.70$ 12; $\alpha(\text{M})=0.18$ 4; $\alpha(\text{N+..})=0.054$ 11 $\alpha(\text{N})=0.045$ 9; $\alpha(\text{O})=0.0083$ 15; $\alpha(\text{P})=0.00055$ 5 $\delta$ : From <a href="#">1977KaXO</a> .
141.00 <sup>f</sup> 20	0.06 2	3170.23	5 <sup>-</sup>	3029.14	5 <sup>-</sup>	[M1]		3.51	$\alpha(\text{K})=2.86$ 5; $\alpha(\text{L})=0.495$ 8; $\alpha(\text{M})=0.1161$ 17; $\alpha(\text{N+..})=0.0360$ 6 $\alpha(\text{N})=0.0295$ 5; $\alpha(\text{O})=0.00588$ 9; $\alpha(\text{P})=0.000628$ 10 $\alpha(\text{N})=0.0295$ 5; $\alpha(\text{O})=0.00588$ 9; $\alpha(\text{P})=0.000628$ 9
<sup>x</sup> 145.4 3 147.36 15	0.04 1 0.17 4	2405.13	7 <sup>-</sup>	2258.01	5 <sup>-</sup>	[E2]		1.309	$\alpha(\text{K})=0.326$ 5; $\alpha(\text{L})=0.732$ 11; $\alpha(\text{M})=0.193$ 3; $\alpha(\text{N+..})=0.0577$ 9 $\alpha(\text{N})=0.0486$ 8; $\alpha(\text{O})=0.00872$ 13; $\alpha(\text{P})=0.000386$ 6
<sup>x</sup> 149.6 3 164.92 15 168.4 3	0.09 3 0.17 4 0.16 5	2861.49? 2507.02	(5 <sup>-</sup> ,6,7) 5 <sup>-</sup>	2696.57 2338.30	7 <sup>-</sup> (4) <sup>-</sup>	(M1)		2.12	$\alpha(\text{K})=1.73$ 3; $\alpha(\text{L})=0.299$ 5; $\alpha(\text{M})=0.0700$ 11; $\alpha(\text{N+..})=0.0217$ 4 $\alpha(\text{N})=0.0178$ 3; $\alpha(\text{O})=0.00355$ 6; $\alpha(\text{P})=0.000379$ 6
169.83 15	0.35 5	2434.10	6 <sup>-</sup>	2264.28	7 <sup>-</sup>	M1+E2	0.5 <sup>b</sup> 3	1.81 25	$\alpha(\text{K})=1.4$ 3; $\alpha(\text{L})=0.312$ 20; $\alpha(\text{M})=0.075$ 7; $\alpha(\text{N+..})=0.0231$ 19 $\alpha(\text{N})=0.0191$ 17; $\alpha(\text{O})=0.00370$ 24; $\alpha(\text{P})=0.00034$ 3
176.09 5	1.41 10	2434.10	6 <sup>-</sup>	2258.01	5 <sup>-</sup>	M1(+E2)	<0.6	1.71 16	$\alpha(\text{K})=1.36$ 18; $\alpha(\text{L})=0.273$ 11; $\alpha(\text{M})=0.065$ 4; $\alpha(\text{N+..})=0.0201$ 10 $\alpha(\text{N})=0.0165$ 9; $\alpha(\text{O})=0.00324$ 13; $\alpha(\text{P})=0.000315$ 20 $\alpha(\text{N})=0.0167$ 11; $\alpha(\text{O})=0.00327$ 15; $\alpha(\text{P})=0.000310$ 25 $\alpha(\text{K})_{\text{exp}} = 1.50$ 18/1.10 10 = 1.36 21.
<sup>x</sup> 211.2 <sup>e</sup> 3 212.70 15	0.37 7	1817.40	4 <sup>+</sup>	1604.73	3 <sup>+</sup>	(M1)		1.103	$\alpha(\text{K})=0.900$ 13; $\alpha(\text{L})=0.1547$ 22; $\alpha(\text{M})=0.0362$ 6; $\alpha(\text{N+..})=0.01125$ 16 $\alpha(\text{N})=0.00921$ 13; $\alpha(\text{O})=0.00184$ 3; $\alpha(\text{P})=0.000196$ 3
216.11 15	1.8 2	2480.29	6 <sup>-</sup>	2264.28	7 <sup>-</sup>	M1		1.055	$\alpha(\text{K})=0.861$ 13; $\alpha(\text{L})=0.1479$ 21; $\alpha(\text{M})=0.0347$ 5; $\alpha(\text{N+..})=0.01076$ 16 $\alpha(\text{N})=0.00881$ 13; $\alpha(\text{O})=0.001756$ 25; $\alpha(\text{P})=0.000188$ 3
216.40 <sup>f</sup> 20	0.45 4	2696.57	7 <sup>-</sup>	2480.29	6 <sup>-</sup>	[M1]		1.051	$\alpha(\text{K})=0.858$ 13; $\alpha(\text{L})=0.1474$ 21; $\alpha(\text{M})=0.0345$ 5;

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<sup>204</sup>Bi ε decay **1970CrZY,1977KaXO,1984Dz05** (continued)

γ(<sup>204</sup>Pb) (continued)

<u>E<sub>γ</sub><sup>‡</sup></u>	<u>I<sub>γ</sub><sup>#h</sup></u>	<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>Mult.&amp;</u>	<u>δ<sup>a</sup></u>	<u>α<sup>†</sup></u>	<u>Comments</u>
219.41 9	2.9 2	2405.13	7 <sup>-</sup>	2185.73	9 <sup>-</sup>	E2		0.312	α(N+..)=0.01071 16 α(N)=0.00878 13; α(O)=0.001750 25; α(P)=0.000187 3 α(K)=0.1358 19; α(L)=0.1314 19; α(M)=0.0342 5; α(N+..)=0.01029 15
222.15 15	1.19 13	2480.29	6 <sup>-</sup>	2258.01	5 <sup>-</sup>	M1(+E2)	<0.3	0.95 4	α(N)=0.00864 13; α(O)=0.001567 23; α(P)=8.22×10 <sup>-5</sup> 12 α(K)exp = 0.33 5/2.30 23 = 0.14 3. α(K)=0.77 3; α(L)=0.1365 20; α(M)=0.0321 5; α(N+..)=0.00995 14 α(N)=0.00816 12; α(O)=0.001620 24; α(P)=0.000170 5 α(N)=0.00816 12; α(O)=0.00161 3; α(P)=0.000164 10 α(K)exp = 0.86 9/1.00 10 = 0.86 12.
<sup>x</sup> 224.8 <sup>e</sup> 3	≤0.15								I <sub>γ</sub> : 0.093 12 (1977KaXO, as adopted in 1994Sc24), ≤0.15 (1972Hn01).
<sup>x</sup> 227.46 15	≤0.27								
240.40 15	0.39 5	3637.91	6 <sup>-</sup>	3397.48	6 <sup>-</sup>	M1(+E2)	<0.51	0.73 6	α(K)=0.59 6; α(L)=0.108 3; α(M)=0.0255 5; α(N+..)=0.00789 15 α(N)=0.00648 12; α(O)=0.00128 3; α(P)=0.000131 9 α(N)=0.00646 13; α(O)=0.00127 4; α(P)=0.000129 11 α(K)exp = 0.23 5/0.32 5 = 0.72 19.
248.95 5	2.7 2	2507.02	5 <sup>-</sup>	2258.01	5 <sup>-</sup>	M1(+E2)	<0.45	0.67 5	α(K)=0.54 5; α(L)=0.0979 23; α(M)=0.0231 5; α(N+..)=0.00715 14 α(N)=0.00587 11; α(O)=0.00116 3; α(P)=0.000120 7 α(N)=0.00583 14; α(O)=0.00115 4; α(P)=0.000117 10 α(K)exp = 1.24 12/2.15 21 = 0.58 8.
251.70 <sup>f</sup> 20	0.19 2	2731.77?	5 <sup>-</sup> ,6 <sup>-</sup> ,7 <sup>-</sup>	2480.29	6 <sup>-</sup>	M1		0.691	α(K)=0.564 8; α(L)=0.0967 14; α(M)=0.0227 4; α(N+..)=0.00703 10 α(N)=0.00576 9; α(O)=0.001148 17; α(P)=0.0001227 18 α(N)=0.00576 8; α(O)=0.001148 16; α(P)=0.0001227 18
257.50 15	0.10 2	3170.23	5 <sup>-</sup>	2912.84	5 <sup>-</sup>	[M1]		0.649	α(K)=0.530 8; α(L)=0.0908 13; α(M)=0.0213 3; α(N+..)=0.00660 10 α(N)=0.00540 8; α(O)=0.001077 16; α(P)=0.0001152 17
289.30 5	3.6 3	1563.22	4 <sup>+</sup>	1273.99	4 <sup>+</sup>	M1+E2	+0.09 <sup>c</sup> 2	0.468	α(K)=0.383 6; α(L)=0.0656 10; α(M)=0.01537 22; α(N+..)=0.00477 7 α(N)=0.00391 6; α(O)=0.000778 11; α(P)=8.31×10 <sup>-5</sup> 12
291.36 15	1.20 15	2696.57	7 <sup>-</sup>	2405.13	7 <sup>-</sup>	M1+E2	0.84	0.323	α(K)exp = 1.18 12/2.9 3 = 0.41 6. α(K)=0.250 4; α(L)=0.0553 8; α(M)=0.01336 19; α(N+..)=0.00411 6 α(N)=0.00339 5; α(O)=0.000658 10; α(P)=6.06×10 <sup>-5</sup> 9 α(N)=0.00362 22; α(O)=0.00071 5; α(P)=7.2×10 <sup>-5</sup> 10
304.45 15	0.16 3	3232.13	5 <sup>-</sup>	2927.58	(5,6,7) <sup>-</sup>	[M1,E2]		0.26 15	α(K)exp = 0.30 5/0.95 15 = 0.32 7. α(K)=0.20 14; α(L)=0.046 11; α(M)=0.0113 21; α(N+..)=0.0035 7 α(N)=0.0029 6; α(O)=0.00055 13; α(P)=4.9×10 <sup>-5</sup> 24

<sup>204</sup>Bi ε decay [1970CrZY](#),[1977KaXO](#),[1984Dz05](#) (continued)

γ(<sup>204</sup>Pb) (continued)

<u>E<sub>γ</sub><sup>‡</sup></u>	<u>I<sub>γ</sub><sup>#h</sup></u>	<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>Mult.&amp;</u>	<u>δ<sup>α</sup></u>	<u>α<sup>†</sup></u>	<u>Comments</u>
320.85 <sup>15</sup>	0.17 <sup>3</sup>	2386.02	5 <sup>+</sup>	2065.17	5 <sup>+</sup>	[M1]		0.355	α(K)=0.290 4; α(L)=0.0495 7; α(M)=0.01159 17; α(N+..)=0.00359 5
330.6 <sup>@ 1</sup>	0.47 <sup>@ 10</sup>	1604.73	3 <sup>+</sup>	1273.99	4 <sup>+</sup>	M1(+E2)	≈+0.1 <sup>c</sup>	≈0.325	α(N)=0.00294 5; α(O)=0.000587 9; α(P)=6.28×10 <sup>-5</sup> 9 α(K)≈0.266; α(L)≈0.0454; α(M)≈0.01064; α(N+..)≈0.00330 α(N)≈0.00270; α(O)≈0.000539; α(P)≈5.75×10 <sup>-5</sup> α(N)≈0.00269; α(O)≈0.000537; α(P)≈5.73×10 <sup>-5</sup> α(K)exp = 0.20 5, normalized to α(K)exp(374 E2)=0.040 (1972Hn01).
332.20 <sup>f 20</sup>	0.19 2	3029.14	5 <sup>-</sup>	2696.57	7 <sup>-</sup>	[E2]		0.0858	α(K)=0.0513 8; α(L)=0.0259 4; α(M)=0.00661 10; α(N+..)=0.00200 3
336.38 <sup>f 20</sup>	0.073 <sup>15</sup>	3637.91	6 <sup>-</sup>	3301.60	5 <sup>-</sup>	[M1]		0.312	α(N)=0.001671 24; α(O)=0.000309 5; α(P)=1.99×10 <sup>-5</sup> 3 α(K)=0.255 4; α(L)=0.0435 7; α(M)=0.01018 15; α(N+..)=0.00316 5
<sup>x</sup> 340.59 <sup>15</sup>	0.15 3					(M1)		0.302	α(N)=0.00259 4; α(O)=0.000516 8; α(P)=5.52×10 <sup>-5</sup> 8 α(K)=0.247 4; α(L)=0.0420 6; α(M)=0.00984 14; α(N+..)=0.00305 5
∞ 365.5 <sup>@ 1</sup>	0.19 <sup>@</sup>	1948.31	3 <sup>+</sup>	1582.79	2 <sup>+</sup>	(M1+E2)		0.16 <sup>10</sup>	α(N)=0.00250 4; α(O)=0.000499 7; α(P)=5.33×10 <sup>-5</sup> 8 α(K)=0.12 9; α(L)=0.027 9; α(M)=0.0064 18; α(N+..)=0.0020 6 α(N)=0.0016 5; α(O)=0.00032 10; α(P)=2.9×10 <sup>-5</sup> 15
368.0 <sup>k 4</sup>	<0.09	2185.73	9 <sup>-</sup>	1817.40	4 <sup>+</sup>	[E5]		5.80	α(K)=0.748 11; α(L)=3.66 6; α(M)=1.063 17; α(N+..)=0.326 5 α(N)=0.274 5; α(O)=0.0494 8; α(P)=0.00292 5 I <sub>γ</sub> : Calculated from ce(K)(368)/ce(K)(375)=0.02 (1958St99), assuming that 368.3γ is E1 and 368.45γ is E2; 1958St99's measured ce(K)(368) would contain unresolved contributions from each of the 368γ decays. <b>Additional information 4.</b>
368.30 <sup>f 20</sup>	0.62 <sup>12</sup>	2434.10	6 <sup>-</sup>	2065.17	5 <sup>+</sup>	[E1]		0.0185	α(K)=0.01522 22; α(L)=0.00252 4; α(M)=0.000587 9; α(N+..)=0.000180 3
<sup>x</sup> 368.45 <sup>fk 20</sup>	0.20 2								α(N)=0.0001481 21; α(O)=2.89×10 <sup>-5</sup> 4; α(P)=2.75×10 <sup>-6</sup> 4
374.76 <sup>7</sup>	103 <sup>5</sup>	1273.99	4 <sup>+</sup>	899.15	2 <sup>+</sup>	E2		0.0613	α(K)=0.0390 6; α(L)=0.01681 24; α(M)=0.00426 6; α(N+..)=0.001291 18
<sup>x</sup> 386.72 <sup>f 20</sup>	0.08 2								α(N)=0.001077 15; α(O)=0.000200 3; α(P)=1.370×10 <sup>-5</sup> 20 α(K)exp = 3.24 23/82.5 6 = 0.039 3.
405.82 <sup>15</sup>	0.30 <sup>4</sup>	2912.84	5 <sup>-</sup>	2507.02	5 <sup>-</sup>	(M1)		0.188	α(K)=0.1541 22; α(L)=0.0261 4; α(M)=0.00611 9; α(N+..)=0.00190 3
412.30 <sup>12</sup>	0.44 <sup>6</sup>	2919.55	5 <sup>-</sup>	2507.02	5 <sup>-</sup>	M1(+E2)	<0.42	0.170 <sup>11</sup>	α(N)=0.001553 22; α(O)=0.000310 5; α(P)=3.31×10 <sup>-5</sup> 5 α(K)exp = 0.065 16/0.25 5 = 0.26 8. α(K)=0.139 9; α(L)=0.0241 11; α(M)=0.00564 23; α(N+..)=0.00175 8



<sup>204</sup>Bi ε decay [1970CrZY,1977KaXO,1984Dz05](#) (continued)

$\gamma(^{204}\text{Pb})$ (continued)									
$E_\gamma$ ‡	$I_\gamma$ #h	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult. &	$\delta^a$	$\alpha^\dagger$	Comments
421.61 8	1.42 10	2928.76	5 <sup>-</sup>	2507.02	5 <sup>-</sup>	M1(+E2)	<0.6	0.153 17	$\alpha(\text{N})=0.00143$ 6; $\alpha(\text{O})=0.000285$ 13; $\alpha(\text{P})=3.01\times 10^{-5}$ 17 $\alpha(\text{N})=0.00147$ 3; $\alpha(\text{O})=0.000292$ 6; $\alpha(\text{P})=3.11\times 10^{-5}$ 8 $\alpha(\text{K})_{\text{exp}} = 0.064$ 10/0.40 6 = 0.16 3. $\alpha(\text{K})=0.125$ 15; $\alpha(\text{L})=0.0219$ 17; $\alpha(\text{M})=0.0052$ 4; $\alpha(\text{N}+..)=0.00160$ 12
432.53 15	0.06 2	2912.84	5 <sup>-</sup>	2480.29	6 <sup>-</sup>	[M1]		0.1587	$\alpha(\text{N})=0.00131$ 10; $\alpha(\text{O})=0.000260$ 20; $\alpha(\text{P})=2.7\times 10^{-5}$ 3 $\alpha(\text{K})_{\text{exp}} = 0.160$ 18/1.20 13 = 0.133 21. $\alpha(\text{K})=0.1300$ 19; $\alpha(\text{L})=0.0220$ 3; $\alpha(\text{M})=0.00514$ 8; $\alpha(\text{N}+..)=0.001595$ 23
438.46 <sup>k</sup> 15	1.0 2	2696.57	7 <sup>-</sup>	2258.01	5 <sup>-</sup>	[E2]		0.0406	$\alpha(\text{N})=0.001307$ 19; $\alpha(\text{O})=0.000261$ 4; $\alpha(\text{P})=2.79\times 10^{-5}$ 4 $\alpha(\text{K})=0.0275$ 4; $\alpha(\text{L})=0.00987$ 14; $\alpha(\text{M})=0.00248$ 4; $\alpha(\text{N}+..)=0.000752$ 11 $\alpha(\text{N})=0.000626$ 9; $\alpha(\text{O})=0.0001175$ 17; $\alpha(\text{P})=8.65\times 10^{-6}$ 13
440.46 10	3.1 5	2258.01	5 <sup>-</sup>	1817.40	4 <sup>+</sup>	E1		0.01251	$\alpha(\text{N})=0.001260$ 18; $\alpha(\text{O})=0.000251$ 4; $\alpha(\text{P})=2.69\times 10^{-5}$ 4 $\alpha(\text{K})=0.01032$ 15; $\alpha(\text{L})=0.001679$ 24; $\alpha(\text{M})=0.000390$ 6; $\alpha(\text{N}+..)=0.0001197$ 17 $\alpha(\text{N})=9.85\times 10^{-5}$ 14; $\alpha(\text{O})=1.93\times 10^{-5}$ 3; $\alpha(\text{P})=1.87\times 10^{-6}$ 3
447.08 15	0.60 8	2927.58	(5,6,7) <sup>-</sup>	2480.29	6 <sup>-</sup>	[M1]		0.1453	$\alpha(\text{K})=0.1190$ 17; $\alpha(\text{L})=0.0201$ 3; $\alpha(\text{M})=0.00470$ 7; $\alpha(\text{N}+..)=0.001459$ 21
452.0 <sup>@</sup> 1	≈0.17 <sup>@</sup>	1351.28	2 <sup>+</sup>	899.15	2 <sup>+</sup>	M1+E2	+0.80 <sup>c</sup> 12	0.101 8	$\alpha(\text{N})=0.001195$ 17; $\alpha(\text{O})=0.000238$ 4; $\alpha(\text{P})=2.55\times 10^{-5}$ 4 $\alpha(\text{K})=0.081$ 7; $\alpha(\text{L})=0.0154$ 9; $\alpha(\text{M})=0.00366$ 18; $\alpha(\text{N}+..)=0.00113$ 6
455.92 <sup>k</sup> 15	0.16 3	3397.48	6 <sup>-</sup>	2941.7?	(4 <sup>-</sup> ,5 <sup>-</sup> ,6 <sup>-</sup> )	[M1,E2]		0.09 5	$\alpha(\text{N})=0.00093$ 5; $\alpha(\text{O})=0.000183$ 10; $\alpha(\text{P})=1.82\times 10^{-5}$ 13 $\alpha(\text{K})=0.07$ 5; $\alpha(\text{L})=0.014$ 6; $\alpha(\text{M})=0.0033$ 12; $\alpha(\text{N}+..)=0.0010$ 4 $\alpha(\text{N})=0.0008$ 3; $\alpha(\text{O})=0.00016$ 7; $\alpha(\text{P})=1.6\times 10^{-5}$ 9
461.70 15 468.22 12	0.15 3 0.65 5	4243.86? 3397.48	(5,6 <sup>+</sup> ) 6 <sup>-</sup>	3782.14 5 <sup>-</sup> 2928.76 5 <sup>-</sup>		M1(+E2)	<0.58	0.117 12	$\alpha(\text{K})=0.095$ 11; $\alpha(\text{L})=0.0165$ 13; $\alpha(\text{M})=0.0039$ 3; $\alpha(\text{N}+..)=0.00120$ 9 $\alpha(\text{N})=0.00099$ 7; $\alpha(\text{O})=0.000196$ 15; $\alpha(\text{P})=2.06\times 10^{-5}$ 20 $\alpha(\text{N})=0.00097$ 10; $\alpha(\text{O})=0.000192$ 20; $\alpha(\text{P})=2.0\times 10^{-5}$ 3 $\alpha(\text{K})_{\text{exp}} = 0.052$ 5/0.52 6 = 0.100 15.
473.40 15	0.15 3	4111.33	(5) <sup>-</sup>	3637.91	6 <sup>-</sup>	M1(+E2)	<0.83	0.106 19	$\alpha(\text{K})=0.086$ 17; $\alpha(\text{L})=0.0153$ 20; $\alpha(\text{M})=0.0036$ 5; $\alpha(\text{N}+..)=0.00112$ 14 $\alpha(\text{N})=0.00092$ 11; $\alpha(\text{O})=0.000181$ 24; $\alpha(\text{P})=1.9\times 10^{-5}$ 3 $\alpha(\text{N})=0.00092$ 11; $\alpha(\text{O})=0.000182$ 23; $\alpha(\text{P})=1.9\times 10^{-5}$ 3 $\alpha(\text{K})_{\text{exp}} = 0.0124$ 15/0.12 3 = 0.10 3.
477.80 15	0.22 3	3397.48	6 <sup>-</sup>	2919.55	5 <sup>-</sup>	M1(+E2)	<0.63	0.109 13	$\alpha(\text{K})=0.089$ 11; $\alpha(\text{L})=0.0155$ 14; $\alpha(\text{M})=0.0036$ 3; $\alpha(\text{N}+..)=0.00113$ 10 $\alpha(\text{N})=0.00092$ 8; $\alpha(\text{O})=0.000184$ 16; $\alpha(\text{P})=1.93\times 10^{-5}$ 21

<sup>204</sup>Bi ε decay **1970CrZY,1977KaXO,1984Dz05** (continued)

γ(<sup>204</sup>Pb) (continued)

<u>E<sub>γ</sub><sup>‡</sup></u>	<u>I<sub>γ</sub><sup>#h</sup></u>	<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>Mult. &amp;</u>	<u>δ<sup>a</sup></u>	<u>α<sup>†</sup></u>	<u>Comments</u>
501.72 <i>10</i>	1.06 <i>10</i>	2065.17	5 <sup>+</sup>	1563.22	4 <sup>+</sup>	M1(+E2)	+0.1 <sup>c</sup> <i>1</i>	0.106 <i>3</i>	α(N)=0.00090 <i>11</i> ; α(O)=0.000178 <i>22</i> ; α(P)=1.9×10 <sup>-5</sup> <i>3</i> α(K) <sub>exp</sub> = 0.0180 <i>4</i> /0.18 <i>4</i> = 0.100 <i>22</i> . α(K)=0.0870 <i>23</i> ; α(L)=0.0147 <i>4</i> ; α(M)=0.00343 <i>8</i> ; α(N+..)=0.001065 <i>23</i>
510.67 <i>15</i>	0.54 <i>8</i>	2696.57	7 <sup>-</sup>	2185.73	9 <sup>-</sup>	[E2]		0.0279	α(N)=0.000873 <i>19</i> ; α(O)=0.000174 <i>4</i> ; α(P)=1.86×10 <sup>-5</sup> <i>5</i> α(K) <sub>exp</sub> = 0.094 <i>9</i> /0.90 <i>10</i> = 0.104 <i>15</i> . α(K)=0.0199 <i>3</i> ; α(L)=0.00609 <i>9</i> ; α(M)=0.001510 <i>22</i> ; α(N+..)=0.000460 <i>7</i>
514.4 <i>2</i>	0.37 <i>3</i>	2919.55	5 <sup>-</sup>	2405.13	7 <sup>-</sup>	(E2)		0.0274	α(N)=0.000382 <i>6</i> ; α(O)=7.23×10 <sup>-5</sup> <i>11</i> ; α(P)=5.70×10 <sup>-6</sup> <i>8</i> α(K)=0.0196 <i>3</i> ; α(L)=0.00595 <i>9</i> ; α(M)=0.001476 <i>21</i> ; α(N+..)=0.000450 <i>7</i>
522.22 <i>15</i>	0.80 <i>10</i>	3029.14	5 <sup>-</sup>	2507.02	5 <sup>-</sup>	M1		0.0962	α(N)=0.000374 <i>6</i> ; α(O)=7.08×10 <sup>-5</sup> <i>10</i> ; α(P)=5.59×10 <sup>-6</sup> <i>8</i> <b>Additional information 7.</b> α(K)=0.0789 <i>11</i> ; α(L)=0.01327 <i>19</i> ; α(M)=0.00310 <i>5</i> ; α(N+..)=0.000962 <i>14</i>
522.70 <sup>f</sup> <i>20</i>	0.19 <i>2</i>	2927.58	(5,6,7) <sup>-</sup>	2405.13	7 <sup>-</sup>	[E2,M1]		0.06 <i>4</i>	α(N)=0.000788 <i>11</i> ; α(O)=0.0001572 <i>22</i> ; α(P)=1.685×10 <sup>-5</sup> <i>24</i> α(K)=0.05 <i>3</i> ; α(L)=0.009 <i>4</i> ; α(M)=0.0022 <i>9</i> ; α(N+..)=0.0007 <i>3</i>
532.72 <i>10</i>	1.7 <i>2</i>	3637.91	6 <sup>-</sup>	3105.15	6 <sup>-</sup>	M1(+E2)	<0.65	0.082 <i>10</i>	α(N)=0.00057 <i>22</i> ; α(O)=0.00011 <i>5</i> ; α(P)=1.1×10 <sup>-5</sup> <i>6</i> α(K)=0.066 <i>9</i> ; α(L)=0.0115 <i>11</i> ; α(M)=0.00270 <i>25</i> ; α(N+..)=0.00084 <i>8</i>
543.27 <sup>jd</sup> <i>15</i>	0.170 <sup>j</sup> <i>17</i>	1817.40	4 <sup>+</sup>	1273.99	4 <sup>+</sup>	(M1)		0.0867	α(N)=0.00069 <i>7</i> ; α(O)=0.000136 <i>13</i> ; α(P)=1.44×10 <sup>-5</sup> <i>17</i> α(N)=0.00067 <i>8</i> ; α(O)=0.000132 <i>17</i> ; α(P)=1.39×10 <sup>-5</sup> <i>22</i> α(K) <sub>exp</sub> = 0.097 <i>13</i> /1.39 <i>15</i> = 0.070 <i>12</i> . α(K)=0.0711 <i>10</i> ; α(L)=0.01195 <i>17</i> ; α(M)=0.00279 <i>4</i> ; α(N+..)=0.000866 <i>13</i>
543.27 <sup>jd</sup> <i>15</i>	0.17 <sup>j</sup> <i>17</i>	3023.31	(5,6) <sup>-</sup>	2480.29	6 <sup>-</sup>	M1		0.0867	α(N)=0.000709 <i>10</i> ; α(O)=0.0001415 <i>20</i> ; α(P)=1.517×10 <sup>-5</sup> <i>22</i> α(K)=0.0711 <i>10</i> ; α(L)=0.01195 <i>17</i> ; α(M)=0.00279 <i>4</i> ; α(N+..)=0.000866 <i>13</i>
548.74 <i>15</i>	0.56 <i>9</i>	3029.14	5 <sup>-</sup>	2480.29	6 <sup>-</sup>	M1(+E2)	<0.58	0.077 <i>8</i>	α(N)=0.000709 <i>10</i> ; α(O)=0.0001415 <i>20</i> ; α(P)=1.517×10 <sup>-5</sup> <i>22</i> α(K)=0.063 <i>7</i> ; α(L)=0.0108 <i>9</i> ; α(M)=0.00253 <i>20</i> ; α(N+..)=0.00078 <i>6</i>
585.02 <i>15</i>	0.40 <i>6</i>	3092.11	5 <sup>-</sup>	2507.02	5 <sup>-</sup>	M1(+E2)	<0.75	0.062 <i>10</i>	α(N)=0.00064 <i>5</i> ; α(O)=0.000128 <i>11</i> ; α(P)=1.35×10 <sup>-5</sup> <i>13</i> α(N)=0.00063 <i>7</i> ; α(O)=0.000125 <i>14</i> ; α(P)=1.31×10 <sup>-5</sup> <i>17</i> α(K) <sub>exp</sub> = 0.031 <i>3</i> /0.46 <i>6</i> = 0.067 <i>11</i> . α(K)=0.051 <i>8</i> ; α(L)=0.0088 <i>11</i> ; α(M)=0.00206 <i>24</i> ; α(N+..)=0.00064 <i>8</i>
592.5 <sup>@k</sup> <i>1</i>	≈2.2 <sup>@</sup>	2258.01	5 <sup>-</sup>	1665.28?	2 <sup>+</sup>	[E3]		0.0587	α(N)=0.00052 <i>6</i> ; α(O)=0.000104 <i>13</i> ; α(P)=1.09×10 <sup>-5</sup> <i>16</i> α(N)=0.00054 <i>5</i> ; α(O)=0.000107 <i>10</i> ; α(P)=1.13×10 <sup>-5</sup> <i>12</i> α(K) <sub>exp</sub> = 0.020 <i>4</i> /0.35 <i>5</i> = 0.057 <i>14</i> . α(K)=0.0353 <i>5</i> ; α(L)=0.01758 <i>25</i> ; α(M)=0.00452 <i>7</i> ;

<sup>204</sup>Bi ε decay [1970CrZY](#),[1977KaXO](#),[1984Dz05](#) (continued)

γ(<sup>204</sup>Pb) (continued)

<u>E<sub>γ</sub><sup>‡</sup></u>	<u>I<sub>γ</sub><sup>#h</sup></u>	<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>Mult.&amp;</u>	<u>δ<sup>a</sup></u>	<u>α<sup>†</sup></u>	<u>Comments</u>
595.13 <sup>15</sup>	0.47 <sup>7</sup>	3029.14	5 <sup>-</sup>	2434.10	6 <sup>-</sup>	[M1]		0.0682	α(N+..)=0.001379 <sup>20</sup> α(N)=0.001148 <sup>16</sup> ; α(O)=0.000215 <sup>3</sup> ; α(P)=1.624×10 <sup>-5</sup> <sup>23</sup> α(K)=0.0560 <sup>8</sup> ; α(L)=0.00938 <sup>14</sup> ; α(M)=0.00219 <sup>3</sup> ; α(N+..)=0.000680 <sup>10</sup>
597.2 <sup>j@</sup> <sup>1</sup>	0.27 <sup>j@</sup>	1948.31	3 <sup>+</sup>	1351.28	2 <sup>+</sup>	(M1+E2)		0.044 <sup>24</sup>	α(N)=0.000557 <sup>8</sup> ; α(O)=0.0001111 <sup>16</sup> ; α(P)=1.191×10 <sup>-5</sup> <sup>17</sup> α(K)=0.035 <sup>21</sup> ; α(L)=0.007 <sup>3</sup> ; α(M)=0.0016 <sup>7</sup> ; α(N+..)=0.00048 <sup>20</sup> α(N)=0.00039 <sup>16</sup> ; α(O)=8.E-5 <sup>4</sup> ; α(P)=8.E-6 <sup>4</sup> I <sub>γ</sub> : I <sub>γ</sub> (597.83γ doublet)=0.52 <sup>8</sup> in <a href="#">1970CrZY</a> . Mult.: From adopted gammas.
597.83 <sup>j</sup> <sup>15</sup>	≈0.26 <sup>j</sup>	3105.15	6 <sup>-</sup>	2507.02	5 <sup>-</sup>	(M1)		0.0674	α(K)=0.0553 <sup>8</sup> ; α(L)=0.00927 <sup>13</sup> ; α(M)=0.00217 <sup>3</sup> ; α(N+..)=0.000672 <sup>10</sup>
604.73 <sup>15</sup>	0.27 <sup>4</sup>	3232.13	5 <sup>-</sup>	2627.33	(5 <sup>+</sup> )	[E1]		0.00649 <sup>9</sup>	α(N)=0.000550 <sup>8</sup> ; α(O)=0.0001097 <sup>16</sup> ; α(P)=1.177×10 <sup>-5</sup> <sup>17</sup> α=0.00649 <sup>9</sup> ; α(K)=0.00538 <sup>8</sup> ; α(L)=0.000850 <sup>12</sup> ; α(M)=0.000197 <sup>3</sup> ; α(N+..)=6.06×10 <sup>-5</sup> <sup>9</sup>
611.88 <sup>id</sup> <sup>15</sup>	0.32 <sup>i</sup> <sup>5</sup>	3092.11	5 <sup>-</sup>	2480.29	6 <sup>-</sup>	[M1]		0.0634	α(N)=4.98×10 <sup>-5</sup> <sup>7</sup> ; α(O)=9.81×10 <sup>-6</sup> <sup>14</sup> ; α(P)=9.78×10 <sup>-7</sup> <sup>14</sup> α(K)=0.0521 <sup>8</sup> ; α(L)=0.00872 <sup>13</sup> ; α(M)=0.00204 <sup>3</sup> ; α(N+..)=0.000632 <sup>9</sup>
611.88 <sup>i</sup> <sup>15</sup>	0.32 <sup>i</sup> <sup>5</sup>	3782.14	5 <sup>-</sup>	3170.23	5 <sup>-</sup>	[M1]		0.0634	α(N)=0.000517 <sup>8</sup> ; α(O)=0.0001032 <sup>15</sup> ; α(P)=1.107×10 <sup>-5</sup> <sup>16</sup> α(K)=0.0521 <sup>8</sup> ; α(L)=0.00872 <sup>13</sup> ; α(M)=0.00204 <sup>3</sup> ; α(N+..)=0.000632 <sup>9</sup>
617.80 <sup>f</sup> <sup>20</sup> 622.2 <sup>2</sup>	0.37 <sup>4</sup> 0.036 <sup>5</sup>	3023.31 2185.73	(5,6) <sup>-</sup> 9 <sup>-</sup>	2405.13 1563.22	7 <sup>-</sup> 4 <sup>+</sup>	E5		0.417	α(K)=0.1596 <sup>23</sup> ; α(L)=0.190 <sup>3</sup> ; α(M)=0.0519 <sup>8</sup> ; α(N+..)=0.01592 <sup>23</sup> α(N)=0.01329 <sup>19</sup> ; α(O)=0.00246 <sup>4</sup> ; α(P)=0.0001725 <sup>25</sup> α(N)=0.01329 <sup>21</sup> ; α(O)=0.00246 <sup>4</sup> ; α(P)=0.000173 <sup>3</sup> E <sub>γ</sub> : From adopted gammas. I <sub>γ</sub> : upper limit calculated from ce(K)(622)/ce(K)(375)<0.01 ( <a href="#">1958St99</a> ).
631.88 <sup>15</sup>	0.10 <sup>2</sup>	2889.89?	(5 <sup>-</sup> ,6 <sup>-</sup> )	2258.01	5 <sup>-</sup>	(M1+E2)	<0.8	0.050 <sup>8</sup>	α(K)=0.041 <sup>7</sup> ; α(L)=0.0071 <sup>10</sup> ; α(M)=0.00166 <sup>21</sup> ; α(N+..)=0.00051 <sup>7</sup> α(N)=0.00042 <sup>6</sup> ; α(O)=8.4×10 <sup>-5</sup> <sup>11</sup> ; α(P)=8.8×10 <sup>-6</sup> <sup>14</sup> <a href="#">Additional information 5</a> .
654.88 <sup>15</sup>	0.16 <sup>3</sup>	2912.84	5 <sup>-</sup>	2258.01	5 <sup>-</sup>	(M1+E2)	<0.8 <sup>b</sup>	0.046 <sup>8</sup>	α(K)=0.037 <sup>7</sup> ; α(L)=0.0064 <sup>9</sup> ; α(M)=0.00151 <sup>20</sup> ; α(N+..)=0.00047 <sup>6</sup> α(N)=0.00038 <sup>5</sup> ; α(O)=7.6×10 <sup>-5</sup> <sup>10</sup> ; α(P)=8.0×10 <sup>-6</sup> <sup>13</sup> <a href="#">Additional information 6</a> .
661.58 <sup>12</sup>	3.2 <sup>3</sup>	2919.55	5 <sup>-</sup>	2258.01	5 <sup>-</sup>	M1(+E2)	<0.22	0.0509 <sup>11</sup>	α(K)=0.0418 <sup>10</sup> ; α(L)=0.00700 <sup>14</sup> ; α(M)=0.00163 <sup>4</sup> ; α(N+..)=0.000507 <sup>10</sup> α(N)=0.000415 <sup>8</sup> ; α(O)=8.28×10 <sup>-5</sup> <sup>17</sup> ; α(P)=8.87×10 <sup>-6</sup> <sup>19</sup>

γ(<sup>204</sup>Pb) (continued)

<u>E<sub>γ</sub><sup>‡</sup></u>	<u>I<sub>γ</sub><sup>#h</sup></u>	<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>Mult.&amp;</u>	<u>δ<sup>a</sup></u>	<u>α<sup>†</sup></u>	<u>Comments</u>
663.43 <sup>@</sup> 15	<0.064 <sup>@</sup>	1563.22	4 <sup>+</sup>	899.15	2 <sup>+</sup>	[E2]		0.01542	α(N)=0.000416 8; α(O)=8.30×10 <sup>-5</sup> 15; α(P)=8.89×10 <sup>-6</sup> 17 α(K)exp = 0.126 19/2.4 4 = 0.053 12.
663.43 <sup>jd</sup> 15	≈0.50 <sup>j</sup>	2927.58	(5,6,7) <sup>-</sup>	2264.28	7 <sup>-</sup>	(E2,M1)		0.033 18	α(K)=0.01165 17; α(L)=0.00286 4; α(M)=0.000697 10; α(N+..)=0.000213 3 α(N)=0.0001766 25; α(O)=3.39×10 <sup>-5</sup> 5; α(P)=2.94×10 <sup>-6</sup> 5 α(N)=0.0001765 25; α(O)=3.39×10 <sup>-5</sup> 5; α(P)=2.94×10 <sup>-6</sup> 5
663.43 <sup>j</sup> 7	0.50 <sup>j</sup> 50	3768.52	5 <sup>-</sup> ,6 <sup>-</sup>	3105.15	6 <sup>-</sup>	[M1]		0.0514	α(K)=0.027 16; α(L)=0.0050 21; α(M)=0.0012 5; α(N+..)=0.00036 15 α(N)=0.00030 12; α(O)=5.9×10 <sup>-5</sup> 25; α(P)=6.E-6 3
670.72 3	14.3 10	2928.76	5 <sup>-</sup>	2258.01	5 <sup>-</sup>	M1(+E2)	<0.66	0.045 6	α(K)=0.0422 6; α(L)=0.00704 10; α(M)=0.001644 23; α(N+..)=0.000510 8 α(N)=0.000418 6; α(O)=8.33×10 <sup>-5</sup> 12; α(P)=8.94×10 <sup>-6</sup> 13 α(K)=0.036 5; α(L)=0.0062 7; α(M)=0.00146 15; α(N+..)=0.00045 5
674.1 <sup>@</sup> 1	0.16 <sup>@</sup>	1948.31	3 <sup>+</sup>	1273.99	4 <sup>+</sup>	(M1+E2)		0.032 18	α(N)=0.00037 4; α(O)=7.4×10 <sup>-5</sup> 8; α(P)=7.8×10 <sup>-6</sup> 9 α(N)=0.00036 5; α(O)=7.2×10 <sup>-5</sup> 10; α(P)=7.6×10 <sup>-6</sup> 12 α(K)exp = 0.46 5/12.2 13 = 0.038 6.
683.39 <sup>ik</sup> 15	0.28 <sup>i</sup> 4	2941.7?	(4 <sup>-</sup> ,5 <sup>-</sup> ,6 <sup>-</sup> )	2258.01	5 <sup>-</sup>	(M1)		0.0475	α(K)=0.026 15; α(L)=0.0047 20; α(M)=0.0011 5; α(N+..)=0.00035 15 α(N)=0.00028 12; α(O)=5.6×10 <sup>-5</sup> 24; α(P)=6.E-6 3
683.6 <sup>@</sup> 1	0.28 <sup>@</sup> 4	1582.79	2 <sup>+</sup>	899.15	2 <sup>+</sup>	M1+E2	-0.18 2	0.0465	α(K)=0.0390 6; α(L)=0.00651 10; α(M)=0.001521 22; α(N+..)=0.000472 7 α(N)=0.000386 6; α(O)=7.71×10 <sup>-5</sup> 11; α(P)=8.27×10 <sup>-6</sup> 12 α(K)=0.0381 6; α(L)=0.00639 10; α(M)=0.001492 22; α(N+..)=0.000463 7
690.74 7	1.20 11	3029.14	5 <sup>-</sup>	2338.30	(4) <sup>-</sup>	M1+E2	0.6 3	0.038 6	α(N)=0.000379 6; α(O)=7.56×10 <sup>-5</sup> 11; α(P)=8.09×10 <sup>-6</sup> 12 α(N)=0.000379 6; α(O)=7.56×10 <sup>-5</sup> 11; α(P)=8.10×10 <sup>-6</sup> 12 Mult.,δ: From adopted gammas.
705.7 <sup>@</sup> 1	0.25 <sup>@</sup> 3	1604.73	3 <sup>+</sup>	899.15	2 <sup>+</sup>	M1+E2	+0.30 <sup>c</sup> 4	0.0412 9	α(K)=0.031 5; α(L)=0.0053 7; α(M)=0.00125 16; α(N+..)=0.00039 5 α(N)=0.00032 4; α(O)=6.3×10 <sup>-5</sup> 9; α(P)=6.6×10 <sup>-6</sup> 10 α(N)=0.000287 23; α(O)=5.7×10 <sup>-5</sup> 5; α(P)=5.9×10 <sup>-6</sup> 6 α(K)exp = 0.029 3/0.96 14 = 0.030 5.
709.13 15	1.8 3	3637.91	6 <sup>-</sup>	2928.76	5 <sup>-</sup>	(M1)		0.0432	α(K)=0.0338 8; α(L)=0.00569 11; α(M)=0.00133 3; α(N+..)=0.000413 8 α(N)=0.000338 7; α(O)=6.74×10 <sup>-5</sup> 13; α(P)=7.19×10 <sup>-6</sup> 15 α(N)=0.000339 7; α(O)=6.75×10 <sup>-5</sup> 13; α(P)=7.20×10 <sup>-6</sup> 15 α(K)exp = 0.0066 13/0.202 24 = 0.033 8.
									α(K)=0.0355 5; α(L)=0.00591 9; α(M)=0.001380 20; α(N+..)=0.000428 6 α(N)=0.000351 5; α(O)=6.99×10 <sup>-5</sup> 10; α(P)=7.51×10 <sup>-6</sup> 11

γ(<sup>204</sup>Pb) (continued)

$E_\gamma$ ‡	$I_\gamma$ #h	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult.&	$\delta^a$	$\alpha^\dagger$	Comments
710.48 15	1.8 3	3637.91	6 <sup>-</sup>	2927.58	(5,6,7) <sup>-</sup>	(M1)		0.0430	$\alpha(K)=0.0353$ 5; $\alpha(L)=0.00588$ 9; $\alpha(M)=0.001373$ 20; $\alpha(N+..)=0.000426$ 6
718.41 7	1.14 8	3637.91	6 <sup>-</sup>	2919.55	5 <sup>-</sup>	M1(+E2)	<0.53	0.039 4	$\alpha(N)=0.000349$ 5; $\alpha(O)=6.96\times 10^{-5}$ 10; $\alpha(P)=7.47\times 10^{-6}$ 11 $\alpha(K)=0.032$ 3; $\alpha(L)=0.0053$ 4; $\alpha(M)=0.00125$ 9; $\alpha(N+..)=0.00039$ 3
725.15 11	1.17 6	3232.13	5 <sup>-</sup>	2507.02	5 <sup>-</sup>	M1+E2	1.3 4	0.023 5	$\alpha(N)=0.000317$ 22; $\alpha(O)=6.3\times 10^{-5}$ 5; $\alpha(P)=6.7\times 10^{-6}$ 6 $\alpha(N)=0.00031$ 3; $\alpha(O)=6.2\times 10^{-5}$ 6; $\alpha(P)=6.6\times 10^{-6}$ 7 $\alpha(K)_{\text{exp}} = 0.032$ 3/0.94 10 = 0.034 5.
736.07 15	0.86 10	3170.23	5 <sup>-</sup>	2434.10	6 <sup>-</sup>	M1(+E2)	<0.55	0.036 4	$\alpha(K)=0.019$ 5; $\alpha(L)=0.0035$ 6; $\alpha(M)=0.00083$ 14; $\alpha(N+..)=0.00026$ 5 $\alpha(N)=0.00021$ 4; $\alpha(O)=4.1\times 10^{-5}$ 8; $\alpha(P)=4.1\times 10^{-6}$ 9 $\alpha(N)=0.00020$ 4; $\alpha(O)=3.9\times 10^{-5}$ 8; $\alpha(P)=3.8\times 10^{-6}$ 9 $\alpha(K)_{\text{exp}} = 0.0183$ 18/0.95 10 = 0.019 3.
745.28 12	0.93 12	3768.52	5 <sup>-</sup> ,6 <sup>-</sup>	3023.31	(5,6) <sup>-</sup>	M1(+E2)	<0.24	0.0372 9	$\alpha(K)=0.030$ 3; $\alpha(L)=0.0050$ 4; $\alpha(M)=0.00117$ 9; $\alpha(N+..)=0.00036$ 3 $\alpha(N)=0.000296$ 22; $\alpha(O)=5.9\times 10^{-5}$ 5; $\alpha(P)=6.3\times 10^{-6}$ 6 $\alpha(N)=0.000293$ 25; $\alpha(O)=5.8\times 10^{-5}$ 5; $\alpha(P)=6.2\times 10^{-6}$ 6 $\alpha(K)_{\text{exp}} = 0.0230$ 23/0.70 11 = 0.033 6.
753.79 12	1.36 10	3092.11	5 <sup>-</sup>	2338.30	(4) <sup>-</sup>	M1(+E2)	<0.72	0.033 5	$\alpha(K)=0.0306$ 8; $\alpha(L)=0.00510$ 11; $\alpha(M)=0.00119$ 3; $\alpha(N+..)=0.000370$ 8 $\alpha(N)=0.000303$ 7; $\alpha(O)=6.04\times 10^{-5}$ 13; $\alpha(P)=6.47\times 10^{-6}$ 15 $\alpha(N)=0.000295$ 13; $\alpha(O)=5.9\times 10^{-5}$ 3; $\alpha(P)=6.3\times 10^{-6}$ 4 $\alpha(K)_{\text{exp}} = 0.030$ 6/0.75 11 = 0.040 10.
765.37 15	0.63 8	3023.31	(5,6) <sup>-</sup>	2258.01	5 <sup>-</sup>	(M1)		0.0354	$\alpha(K)=0.027$ 4; $\alpha(L)=0.0045$ 6; $\alpha(M)=0.00106$ 12; $\alpha(N+..)=0.00033$ 4 $\alpha(N)=0.00027$ 3; $\alpha(O)=5.4\times 10^{-5}$ 6; $\alpha(P)=5.7\times 10^{-6}$ 8 $\alpha(N)=0.00026$ 4; $\alpha(O)=5.3\times 10^{-5}$ 7; $\alpha(P)=5.6\times 10^{-6}$ 9 $\alpha(K)_{\text{exp}} = 0.035$ 9/1.10 12 = 0.032 9.
766.1 @ 1	0.079 @	1665.28?	2 <sup>+</sup>	899.15	2 <sup>+</sup>	M1(+E2)	+0.11 4	0.0350 6	$\alpha(K)=0.0291$ 4; $\alpha(L)=0.00484$ 7; $\alpha(M)=0.001129$ 16; $\alpha(N+..)=0.000350$ 5 $\alpha(N)=0.000287$ 4; $\alpha(O)=5.73\times 10^{-5}$ 8; $\alpha(P)=6.15\times 10^{-6}$ 9 $\alpha(K)_{\text{exp}} = 0.0190$ 20/0.53 6 = 0.036 6.
771.31 15	0.50 8	3029.14	5 <sup>-</sup>	2258.01	5 <sup>-</sup>	(E2+M1)	>0.35 <sup>b</sup>	0.022 11	$\alpha(K)=0.0288$ 5; $\alpha(L)=0.00479$ 8; $\alpha(M)=0.001119$ 17; $\alpha(N+..)=0.000347$ 6 $\alpha(N)=0.000284$ 5; $\alpha(O)=5.67\times 10^{-5}$ 9; $\alpha(P)=6.09\times 10^{-6}$ 10 $\delta$ : From adopted gammas.
791.20 9	4.1 3	2065.17	5 <sup>+</sup>	1273.99	4 <sup>+</sup>	M1+E2	-1.2 2	0.0196 20	$\alpha(K)=0.018$ 9; $\alpha(L)=0.0032$ 13; $\alpha(M)=0.0008$ 3; $\alpha(N+..)=0.00023$ 9 $\alpha(N)=0.00019$ 8; $\alpha(O)=3.8\times 10^{-5}$ 15; $\alpha(P)=3.8\times 10^{-6}$ 18 $\alpha(N)=0.0001179$ 17; $\alpha(O)=2.28\times 10^{-5}$ 4; $\alpha(P)=2.07\times 10^{-6}$ 3 $\alpha(K)=0.0158$ 17; $\alpha(L)=0.00289$ 24; $\alpha(M)=0.00068$ 6;

<sup>204</sup>Bi ε decay **1970CrZY,1977KaXO,1984Dz05** (continued)

$E_\gamma$ ‡	$I_\gamma$ #h	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult.&	$\gamma(^{204}\text{Pb})$ (continued)		Comments
							$\delta^a$	$\alpha^\dagger$	
821.13 15	0.76 11	3301.60	5 <sup>-</sup>	2480.29	6 <sup>-</sup>	(M1)		0.0295	$\alpha(\text{N}+..)=0.000211$ 18 $\alpha(\text{N})=0.000173$ 14; $\alpha(\text{O})=3.4\times 10^{-5}$ 3; $\alpha(\text{P})=3.5\times 10^{-6}$ 4 $\delta$ : From adopted gammas. Other: 1.1 4 in <sup>204</sup> Bi ε decay. $\alpha(\text{K})_{\text{exp}} = 0.057$ 6/3.4 4 = 0.017 3. $\alpha(\text{K})=0.0243$ 4; $\alpha(\text{L})=0.00403$ 6; $\alpha(\text{M})=0.000940$ 14; $\alpha(\text{N}+..)=0.000291$ 4
823.05 15	0.65 10	2386.02	5 <sup>+</sup>	1563.22	4 <sup>+</sup>	M1+E2	+1.5 <sup>c</sup> 5	0.016 4	$\alpha(\text{N})=0.000239$ 4; $\alpha(\text{O})=4.76\times 10^{-5}$ 7; $\alpha(\text{P})=5.12\times 10^{-6}$ 8 $\alpha(\text{K})=0.013$ 4; $\alpha(\text{L})=0.0024$ 5; $\alpha(\text{M})=0.00056$ 11; $\alpha(\text{N}+..)=0.00017$ 4
827.62 15	0.63 10	3092.11	5 <sup>-</sup>	2264.28	7 <sup>-</sup>	[E2]		0.00970 14	$\alpha(\text{N})=0.00014$ 3; $\alpha(\text{O})=2.8\times 10^{-5}$ 6; $\alpha(\text{P})=2.8\times 10^{-6}$ 7 $\alpha=0.00970$ 14; $\alpha(\text{K})=0.00758$ 11; $\alpha(\text{L})=0.001616$ 23; $\alpha(\text{M})=0.000389$ 6; $\alpha(\text{N}+..)=0.0001194$
831.95 15	1.2 2	3170.23	5 <sup>-</sup>	2338.30	(4) <sup>-</sup>	M1(+E2)	<0.94	0.024 5	$\alpha(\text{N})=9.85\times 10^{-5}$ 14; $\alpha(\text{O})=1.91\times 10^{-5}$ 3; $\alpha(\text{P})=1.767\times 10^{-6}$ 25 $\alpha(\text{K})=0.020$ 4; $\alpha(\text{L})=0.0034$ 6; $\alpha(\text{M})=0.00078$ 13; $\alpha(\text{N}+..)=0.00024$ 4
834.16 8	1.40 14	3092.11	5 <sup>-</sup>	2258.01	5 <sup>-</sup>	M1(+E2)	<0.6	0.026 3	$\alpha(\text{N})=0.00020$ 4; $\alpha(\text{O})=4.0\times 10^{-5}$ 7; $\alpha(\text{P})=4.2\times 10^{-6}$ 8 $\alpha(\text{N})=0.00020$ 4; $\alpha(\text{O})=3.9\times 10^{-5}$ 7; $\alpha(\text{P})=4.1\times 10^{-6}$ 8 $\alpha(\text{K})_{\text{exp}} = 0.024$ 6/1.06 16 = 0.023 7. $\alpha(\text{K})=0.0212$ 22; $\alpha(\text{L})=0.0036$ 3; $\alpha(\text{M})=0.00083$ 7; $\alpha(\text{N}+..)=0.000258$ 22
841.10 12	0.33 4	3105.15	6 <sup>-</sup>	2264.28	7 <sup>-</sup>	M1(+E2)	<0.89	0.024 4	$\alpha(\text{N})=0.000212$ 18; $\alpha(\text{O})=4.2\times 10^{-5}$ 4; $\alpha(\text{P})=4.5\times 10^{-6}$ 5 $\alpha(\text{K})_{\text{exp}} = 0.030$ 7/1.14 17 = 0.026 7. $\alpha(\text{K})=0.019$ 4; $\alpha(\text{L})=0.0033$ 5; $\alpha(\text{M})=0.00077$ 12; $\alpha(\text{N}+..)=0.00024$ 4
847.19 8	1.2 2	3105.15	6 <sup>-</sup>	2258.01	5 <sup>-</sup>	M1+E2	0.6 5	0.022 5	$\alpha(\text{N})=0.00020$ 3; $\alpha(\text{O})=3.9\times 10^{-5}$ 6; $\alpha(\text{P})=4.1\times 10^{-6}$ 7 $\alpha(\text{N})=0.00019$ 4; $\alpha(\text{O})=3.8\times 10^{-5}$ 7; $\alpha(\text{P})=4.0\times 10^{-6}$ 8 $\alpha(\text{K})_{\text{exp}} = 0.0062$ 12/0.28 5 = 0.022 6. $\alpha(\text{K})=0.018$ 5; $\alpha(\text{L})=0.0031$ 7; $\alpha(\text{M})=0.00073$ 15; $\alpha(\text{N}+..)=0.00023$ 5
883.8 <sup>@</sup> 1	0.18 <sup>@</sup>	2157.94	(4) <sup>+</sup>	1273.99	4 <sup>+</sup>	[M1]		0.0244	$\alpha(\text{N})=0.00019$ 4; $\alpha(\text{O})=3.7\times 10^{-5}$ 8; $\alpha(\text{P})=3.9\times 10^{-6}$ 9 $\alpha(\text{N})=0.000178$ 25; $\alpha(\text{O})=3.5\times 10^{-5}$ 5; $\alpha(\text{P})=3.7\times 10^{-6}$ 6 $\alpha(\text{K})_{\text{exp}} = 0.0200$ 24/1.10 17 = 0.018 4. $\alpha(\text{K})=0.0201$ 3; $\alpha(\text{L})=0.00333$ 5; $\alpha(\text{M})=0.000776$ 11; $\alpha(\text{N}+..)=0.000241$ 4
899.15 3	124 10	899.15	2 <sup>+</sup>	0	0 <sup>+</sup>	E2		0.00821 12	$\alpha(\text{N})=0.000197$ 3; $\alpha(\text{O})=3.93\times 10^{-5}$ 6; $\alpha(\text{P})=4.23\times 10^{-6}$ 6 $\alpha=0.00821$ 12; $\alpha(\text{K})=0.00647$ 9; $\alpha(\text{L})=0.001323$ 19; $\alpha(\text{M})=0.000317$ 5; $\alpha(\text{N}+..)=9.73\times 10^{-5}$ 14 $\alpha(\text{N})=8.02\times 10^{-5}$ 12; $\alpha(\text{O})=1.562\times 10^{-5}$ 22; $\alpha(\text{P})=1.473\times 10^{-6}$ 21 $\alpha(\text{K})_{\text{exp}} = 0.653/100 = 0.00653$ ; intensities normalized to reproduce $\alpha(\text{K})=0.00653$ for E2 899γ.
911.74 15	17 2	2185.73	9 <sup>-</sup>	1273.99	4 <sup>+</sup>	E5		0.0958	$\alpha(\text{K})_{\text{exp}}=0.045$ 5; $\alpha(\text{L})_{\text{exp}}=0.027$ 4 $\alpha(\text{K})=0.0544$ 8; $\alpha(\text{L})=0.0308$ 5; $\alpha(\text{M})=0.00809$ 12; $\alpha(\text{N}+..)=0.00249$ 4

<sup>204</sup>Bi ε decay [1970CrZY](#),[1977KaXO](#),[1984Dz05](#) (continued)

γ(<sup>204</sup>Pb) (continued)

<u>E<sub>γ</sub><sup>‡</sup></u>	<u>I<sub>γ</sub><sup>#h</sup></u>	<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>Mult.&amp;</u>	<u>δ<sup>a</sup></u>	<u>α<sup>†</sup></u>	<u>Comments</u>
911.96 <i>15</i>	14 2	3170.23	5 <sup>-</sup>	2258.01	5 <sup>-</sup>	(M1)		0.0225	α(N)=0.00207 3; α(O)=0.000390 6; α(P)=3.10×10 <sup>-5</sup> 5 I <sub>γ</sub> : For an equilibrium source. α(K)=0.0185 3; α(L)=0.00307 5; α(M)=0.000715 10; α(N+..)=0.000222 4
918.26 <i>15</i>	13.6 <i>10</i>	1817.40	4 <sup>+</sup>	899.15	2 <sup>+</sup>	E2		0.00788 <i>11</i>	α(N)=0.000182 3; α(O)=3.62×10 <sup>-5</sup> 5; α(P)=3.90×10 <sup>-6</sup> 6 α=0.00788 <i>11</i> ; α(K)=0.00622 9; α(L)=0.001259 18; α(M)=0.000301 5; α(N+..)=9.25×10 <sup>-5</sup> 13 α(N)=7.62×10 <sup>-5</sup> 11; α(O)=1.485×10 <sup>-5</sup> 21; α(P)=1.407×10 <sup>-6</sup> 20 α(K)exp = 0.076 12/11.0 8 = 0.0069 12.
924.16 <i>15</i>	0.09 2	4094.29	6 <sup>-</sup>	3170.23	5 <sup>-</sup>	[M1]		0.0218	α(K)=0.0179 3; α(L)=0.00296 5; α(M)=0.000690 10; α(N+..)=0.000214 3 α(N)=0.0001754 25; α(O)=3.50×10 <sup>-5</sup> 5; α(P)=3.76×10 <sup>-6</sup> 6
934.13 <sup><i>i</i></sup> <i>15</i>	0.36 <sup><i>i</i></sup> 5	3092.11	5 <sup>-</sup>	2157.94	(4 <sup>+</sup> )	[E1]		0.00283 4	α=0.00283 4; α(K)=0.00236 4; α(L)=0.000361 5; α(M)=8.34×10 <sup>-5</sup> 12; α(N+..)=2.57×10 <sup>-5</sup> 4
934.13 <sup><i>i</i></sup> <i>15</i>	0.36 <sup><i>i</i></sup> 5	3198.46?	5 <sup>-</sup> ,6,7 <sup>-</sup>	2264.28	7 <sup>-</sup>	[M1,E2]		0.014 7	α(N)=2.11×10 <sup>-5</sup> 3; α(O)=4.18×10 <sup>-6</sup> 6; α(P)=4.30×10 <sup>-7</sup> 6 α(K)=0.012 6; α(L)=0.0020 9; α(M)=0.00048 20; α(N+..)=0.00015 6
941.0 <sup><i>id</i></sup> 5	0.13 <sup><i>i</i></sup> 6	3198.46?	5 <sup>-</sup> ,6,7 <sup>-</sup>	2258.01	5 <sup>-</sup>	[M1,E2]		0.014 7	α(N)=0.00012 5; α(O)=2.4×10 <sup>-5</sup> 10; α(P)=2.5×10 <sup>-6</sup> 12 α(K)=0.012 6; α(L)=0.0020 9; α(M)=0.00047 19; α(N+..)=0.00015 6
941.0 <sup><i>i</i></sup> 5	0.13 <sup><i>i</i></sup> 6	4111.33	(5) <sup>-</sup>	3170.23	5 <sup>-</sup>	[M1]		0.0208	α(N)=0.00012 5; α(O)=2.4×10 <sup>-5</sup> 10; α(P)=2.5×10 <sup>-6</sup> 12 α(K)=0.01710 24; α(L)=0.00283 4; α(M)=0.000659 10; α(N+..)=0.000204 3
950.33 <i>15</i>	0.20 3	2513.55?		1563.22	4 <sup>+</sup>				α(N)=0.0001674 24; α(O)=3.34×10 <sup>-5</sup> 5; α(P)=3.59×10 <sup>-6</sup> 5
<sup>x</sup> 958.77 <i>15</i>	0.24 4								
964.32 <i>15</i>	0.66 8	2238.33?	5,6	1273.99	4 <sup>+</sup>				
971.21 <sup><i>if</i></sup> 20	0.33 <sup><i>i</i></sup> 3	2919.55	5 <sup>-</sup>	1948.31	3 <sup>+</sup>	[M2]		0.0469	α(K)=0.0377 6; α(L)=0.00700 10; α(M)=0.001660 24; α(N+..)=0.000516 8 α(N)=0.000423 6; α(O)=8.42×10 <sup>-5</sup> 12; α(P)=8.90×10 <sup>-6</sup> 13
971.21 <sup><i>if</i></sup> 20	0.33 <sup><i>i</i></sup> 3	4076.24	(5) <sup>-</sup>	3105.15	6 <sup>-</sup>	[M1]		0.0192	α(K)=0.01577 22; α(L)=0.00260 4; α(M)=0.000607 9; α(N+..)=0.000188 3 α(N)=0.0001542 22; α(O)=3.08×10 <sup>-5</sup> 5; α(P)=3.31×10 <sup>-6</sup> 5
973.80 <sup><i>f</i></sup> 20	0.55 4	3232.13	5 <sup>-</sup>	2258.01	5 <sup>-</sup>	[M1]		0.0190	α(K)=0.01566 22; α(L)=0.00259 4; α(M)=0.000603 9; α(N+..)=0.000187 3
983.98 3	74 4	2258.01	5 <sup>-</sup>	1273.99	4 <sup>+</sup>	E1(+M2)	<0.11	0.0028 3	α(N)=0.0001531 22; α(O)=3.06×10 <sup>-5</sup> 5; α(P)=3.29×10 <sup>-6</sup> 5 α=0.0028 3; α(K)=0.00235 21; α(L)=0.00037 4; α(M)=8.5×10 <sup>-5</sup> 10; α(N+..)=2.6×10 <sup>-5</sup> 3 α(N)=2.15×10 <sup>-5</sup> 24; α(O)=4.3×10 <sup>-6</sup> 5; α(P)=4.4×10 <sup>-7</sup> 5 α(N)=1.93×10 <sup>-5</sup> 4; α(O)=3.83×10 <sup>-6</sup> 7; α(P)=3.95×10 <sup>-7</sup> 7 α(L)exp = 0.0215 22/59 4 = 0.00036 4.

γ(<sup>204</sup>Pb) (continued)

$E_\gamma$ ‡	$I_\gamma$ #/h	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult. &	$\delta^a$	$\alpha^\dagger$	Comments
990.4 2	1.50 15	2264.28	7 <sup>-</sup>	1273.99	4 <sup>+</sup>	E3		0.01581	$\alpha(K)=0.01165$ 17; $\alpha(L)=0.00315$ 5; $\alpha(M)=0.000776$ 11; $\alpha(N+..)=0.000239$ 4 $\alpha(N)=0.000197$ 3; $\alpha(O)=3.80\times 10^{-5}$ 6; $\alpha(P)=3.43\times 10^{-6}$ 5 $\alpha(K)_{\text{exp}} = 0.016$ 4/1.30 20 = 0.012 4.
1014.19 25	0.10 2	4183.88	6 <sup>-</sup>	3170.23	5 <sup>-</sup>	[M1]		0.01715	$\alpha(K)=0.01411$ 20; $\alpha(L)=0.00233$ 4; $\alpha(M)=0.000542$ 8; $\alpha(N+..)=0.0001683$ 24 $\alpha(N)=0.0001378$ 20; $\alpha(O)=2.75\times 10^{-5}$ 4; $\alpha(P)=2.96\times 10^{-6}$ 5
<sup>x</sup> 1021.93 25	0.24 4					(M1+E2)	<0.7	0.0151 18	$\alpha(K)=0.0124$ 15; $\alpha(L)=0.00207$ 22; $\alpha(M)=0.00048$ 5; $\alpha(N+..)=0.000150$ 16 $\alpha(N)=0.000123$ 13; $\alpha(O)=2.4\times 10^{-5}$ 3; $\alpha(P)=2.6\times 10^{-6}$ 3 $\alpha(N)=0.000116$ 19; $\alpha(O)=2.3\times 10^{-5}$ 4; $\alpha(P)=2.5\times 10^{-6}$ 5 $\alpha(K)_{\text{exp}} = 0.0032$ 6/0.22 4 = 0.015 4.
1027.59 25	0.09 2	3092.11	5 <sup>-</sup>	2065.17	5 <sup>+</sup>	[E1]		0.00238 4	$\alpha=0.00238$ 4; $\alpha(K)=0.00199$ 3; $\alpha(L)=0.000303$ 5; $\alpha(M)=6.98\times 10^{-5}$ 10; $\alpha(N+..)=2.15\times 10^{-5}$ 3 $\alpha(N)=1.765\times 10^{-5}$ 25; $\alpha(O)=3.50\times 10^{-6}$ 5; $\alpha(P)=3.62\times 10^{-7}$ 5
1037.34 18	0.49 6	3301.60	5 <sup>-</sup>	2264.28	7 <sup>-</sup>	(E2)		0.00620 9	$\alpha=0.00620$ 9; $\alpha(K)=0.00496$ 7; $\alpha(L)=0.000950$ 14; $\alpha(M)=0.000226$ 4; $\alpha(N+..)=6.95\times 10^{-5}$ 10 $\alpha(N)=5.72\times 10^{-5}$ 8; $\alpha(O)=1.119\times 10^{-5}$ 16; $\alpha(P)=1.087\times 10^{-6}$ 16 $\alpha(K)_{\text{exp}}\approx 0.002/0.40$ 6 $\approx$ 0.005.
1043.63 10	1.6 2	3301.60	5 <sup>-</sup>	2258.01	5 <sup>-</sup>	M1(+E2)		0.011 5	$\alpha(K)=0.009$ 5; $\alpha(L)=0.0015$ 7; $\alpha(M)=0.00036$ 14; $\alpha(N+..)=0.00011$ 5 $\alpha(N)=9.E-5$ 4; $\alpha(O)=1.8\times 10^{-5}$ 8; $\alpha(P)=1.9\times 10^{-6}$ 9 $\alpha(N)=0.000118$ 10; $\alpha(O)=2.36\times 10^{-5}$ 20; $\alpha(P)=2.53\times 10^{-6}$ 23 $\alpha(K)_{\text{exp}} = 0.020$ 3/1.14 17 = 0.018 4.
1049.2 1	0.25	1948.31	3 <sup>+</sup>	899.15	2 <sup>+</sup>	M1(+E2)	-2.4 2	0.00750 25	$\alpha=0.00750$ 25; $\alpha(K)=0.00605$ 21; $\alpha(L)=0.00110$ 4; $\alpha(M)=0.000261$ 8; $\alpha(N+..)=8.05\times 10^{-5}$ 23 $\alpha(N)=6.62\times 10^{-5}$ 19; $\alpha(O)=1.30\times 10^{-5}$ 4; $\alpha(P)=1.31\times 10^{-6}$ 5 $\alpha(N)=0.000109$ 18; $\alpha(O)=2.2\times 10^{-5}$ 4; $\alpha(P)=2.3\times 10^{-6}$ 5 $E_\gamma$ : From adopted gammas. $\delta$ : From adopted gammas. Other:<1.0 (1984Dz05). $\alpha(K)_{\text{exp}} = 0.0030$ 9/0.22 4 = 0.014 5.
1054.44 <sup>f</sup> 20	0.11 1	3996.17	(5,6 <sup>+</sup> )	2941.7?	(4 <sup>-</sup> ,5 <sup>-</sup> ,6 <sup>-</sup> )				
<sup>x</sup> 1056.55 25	0.22 4								
<sup>x</sup> 1060.11 18	0.50 15					M1(+E2)	<1.6	0.012 4	$\alpha(K)=0.010$ 3; $\alpha(L)=0.0017$ 5; $\alpha(M)=0.00039$ 10; $\alpha(N+..)=0.00012$ 3 $\alpha(N)=9.8\times 10^{-5}$ 25; $\alpha(O)=2.0\times 10^{-5}$ 5; $\alpha(P)=2.1\times 10^{-6}$ 6 $\alpha(N)=9.9\times 10^{-5}$ 24; $\alpha(O)=2.0\times 10^{-5}$ 5; $\alpha(P)=2.1\times 10^{-6}$ 6 $\alpha(K)_{\text{exp}} = 0.0027$ 7/0.26 5 = 0.010 3.
1064.32 4	1.20 15	2338.30	(4) <sup>-</sup>	1273.99	4 <sup>+</sup>	E1(+M2)	$\approx$ +0.2	$\approx$ 0.00356	$\alpha\approx 0.00356$ ; $\alpha(K)\approx 0.00293$ ; $\alpha(L)\approx 0.000481$ ;





<sup>204</sup>Bi ε decay [1970CrZY](#),[1977KaXO](#),[1984Dz05](#) (continued)

γ(<sup>204</sup>Pb) (continued)

<u>E<sub>γ</sub><sup>‡</sup></u>	<u>I<sub>γ</sub><sup>#h</sup></u>	<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>Mult.&amp;</u>	<u>δ<sup>a</sup></u>	<u>α<sup>†</sup></u>	<u>Comments</u>
									α(N+..)=0.000119 9 α(N)=9.7×10 <sup>-5</sup> 7; α(O)=1.93×10 <sup>-5</sup> 14; α(P)=2.07×10 <sup>-6</sup> 16; α(IPF)=9.7×10 <sup>-7</sup> 6 α(N)=9.6×10 <sup>-5</sup> 8; α(O)=1.91×10 <sup>-5</sup> 16; α(P)=2.05×10 <sup>-6</sup> 18; α(IPF)=9.6×10 <sup>-7</sup> 7 α(K)exp = 0.0098 15/0.87 10 = 0.0113 22.
1139.82 <sup>i</sup> 7	0.70 <sup>i</sup> 8	2491.28	3 <sup>+</sup>	1351.28	2 <sup>+</sup>	M1+E2	≈-0.5 <sup>c</sup>	≈0.01121	α(K)≈0.00921; α(L)≈0.001531; α(M)≈0.000357; α(N+..)=0.0001119 α(N)≈9.07×10 <sup>-5</sup> ; α(O)≈1.81×10 <sup>-5</sup> ; α(P)≈1.93×10 <sup>-6</sup> ; α(IPF)≈1.189×10 <sup>-6</sup>
1139.82 <sup>i</sup> 7	0.70 <sup>i</sup> 8	3397.48	6 <sup>-</sup>	2258.01	5 <sup>-</sup>	M1		0.01272	α(K)=0.01047 15; α(L)=0.001721 24; α(M)=0.000401 6; α(N+..)=0.0001257 18 α(N)=0.0001019 15; α(O)=2.03×10 <sup>-5</sup> 3; α(P)=2.19×10 <sup>-6</sup> 3; α(IPF)=1.308×10 <sup>-6</sup> 19
<sup>x</sup> 1146.54 25	0.21 4					(M1+E2)	<0.8	0.0111 15	α(K)=0.0091 13; α(L)=0.00151 19; α(M)=0.00035 5; α(N+..)=0.000111 14 α(N)=9.0×10 <sup>-5</sup> 11; α(O)=1.79×10 <sup>-5</sup> 22; α(P)=1.91×10 <sup>-6</sup> 25; α(IPF)=1.50×10 <sup>-6</sup> 15 α(K)exp = 0.0021 4/0.19 3 = 0.011 3.
1155.9 <sup>@</sup> 1	≈0.05 <sup>@</sup>	2719.16	5 <sup>+</sup>	1563.22	4 <sup>+</sup>	M1+E2		0.009 4	α=0.009 4; α(K)=0.007 3; α(L)=0.0012 5; α(M)=0.00028 11; α(N+..)=9.E-5 4 α(N)=7.E-5 3; α(O)=1.4×10 <sup>-5</sup> 6; α(P)=1.5×10 <sup>-6</sup> 7; α(IPF)=1.7×10 <sup>-6</sup> 5
1157.59 5	0.66 7	3637.91	6 <sup>-</sup>	2480.29	6 <sup>-</sup>	M1(+E2)	<0.57	0.0113 9	α(K)=0.0093 8; α(L)=0.00154 12; α(M)=0.00036 3; α(N+..)=0.000114 9 α(N)=9.1×10 <sup>-5</sup> 7; α(O)=1.82×10 <sup>-5</sup> 14; α(P)=1.95×10 <sup>-6</sup> 16; α(IPF)=2.21×10 <sup>-6</sup> 14 α(N)=9.1×10 <sup>-5</sup> 8; α(O)=1.81×10 <sup>-5</sup> 15; α(P)=1.94×10 <sup>-6</sup> 17; α(IPF)=2.20×10 <sup>-6</sup> 15 α(K)exp = 0.0055 7/0.52 7 = 0.0106 20.
1165.19 <sup>f</sup> 20	0.070 12	4094.29	6 <sup>-</sup>	2928.76	5 <sup>-</sup>	[M1]		0.01203	α(K)=0.00990 14; α(L)=0.001626 23; α(M)=0.000379 6; α(N+..)=0.0001204 17 α(N)=9.62×10 <sup>-5</sup> 14; α(O)=1.92×10 <sup>-5</sup> 3; α(P)=2.07×10 <sup>-6</sup> 3; α(IPF)=2.93×10 <sup>-6</sup> 5
1167.01 25	0.23 3	3425.0?	5 <sup>-</sup> ,6 <sup>-</sup>	2258.01	5 <sup>-</sup>	(M1+E2)	<0.82	0.0106 15	α(K)=0.0087 12; α(L)=0.00144 18; α(M)=0.00034 5; α(N+..)=0.000107 14 α(N)=8.5×10 <sup>-5</sup> 11; α(O)=1.70×10 <sup>-5</sup> 22; α(P)=1.82×10 <sup>-6</sup> 25; α(IPF)=2.8×10 <sup>-6</sup> 3 α(N)=8.3×10 <sup>-5</sup> 13; α(O)=1.7×10 <sup>-5</sup> 3; α(P)=1.8×10 <sup>-6</sup> 3; α(IPF)=2.7×10 <sup>-6</sup> 4 α(K)exp = 0.0020 4/0.20 3 = 0.0100 25.
1181.3 2	0.11 2	4094.29	6 <sup>-</sup>	2912.84	5 <sup>-</sup>	M1(+E2)	<0.91	0.0101 16	α(K)=0.0083 13; α(L)=0.00138 20; α(M)=0.00032 5;

<sup>204</sup>Bi ε decay [1970CrZY](#),[1977KaXO](#),[1984Dz05](#) (continued)

γ(<sup>204</sup>Pb) (continued)

<u>E<sub>γ</sub><sup>‡</sup></u>	<u>I<sub>γ</sub><sup>#h</sup></u>	<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>Mult.&amp;</u>	<u>δ<sup>a</sup></u>	<u>α<sup>†</sup></u>	<u>Comments</u>
									α(N+..)=0.000104 15 α(N)=8.2×10 <sup>-5</sup> 12; α(O)=1.62×10 <sup>-5</sup> 24; α(P)=1.7×10 <sup>-6</sup> 3; α(IPF)=4.1×10 <sup>-6</sup> 5 α(N)=8.0×10 <sup>-5</sup> 13; α(O)=1.6×10 <sup>-5</sup> 3; α(P)=1.7×10 <sup>-6</sup> 3; α(IPF)=4.0×10 <sup>-6</sup> 5 α(K)exp = 0.00100 25/0.100 24 = 0.010 3. α=0.0099 13; α(K)=0.0082 11; α(L)=0.00135 17; α(M)=0.00032 4; α(N+..)=0.000104 13 α(N)=8.0×10 <sup>-5</sup> 10; α(O)=1.59×10 <sup>-5</sup> 20; α(P)=1.70×10 <sup>-6</sup> 22; α(IPF)=6.2×10 <sup>-6</sup> 6 α(K)exp = 0.0024 5/0.24 5 = 0.010 3. α(K)=0.0088 4; α(L)=0.00145 5; α(M)=0.000338 12; α(N+..)=0.000112 4 α(N)=8.6×10 <sup>-5</sup> 3; α(O)=1.71×10 <sup>-5</sup> 6; α(P)=1.84×10 <sup>-6</sup> 7; α(IPF)=7.30×10 <sup>-6</sup> 22 α(N)=8.4×10 <sup>-5</sup> 5; α(O)=1.67×10 <sup>-5</sup> 10; α(P)=1.79×10 <sup>-6</sup> 12; α(IPF)=7.2×10 <sup>-6</sup> 4 α(K)exp = 0.0196 20/1.95 25 = 0.0101 16. α=0.0021 3; α(K)=0.00170 22; α(L)=0.00026 4; α(M)=6.1×10 <sup>-5</sup> 10; α(N+..)=3.8×10 <sup>-5</sup> 3 α(N)=1.54×10 <sup>-5</sup> 24; α(O)=3.1×10 <sup>-6</sup> 5; α(P)=3.2×10 <sup>-7</sup> 5; α(IPF)=1.89×10 <sup>-5</sup> 4 α(N)=1.51×10 <sup>-5</sup> 21; α(O)=3.0×10 <sup>-6</sup> 5; α(P)=3.1×10 <sup>-7</sup> 5; α(IPF)=1.89×10 <sup>-5</sup> 4 α(K)exp = 0.0047 7/3.0 4 = 0.0016 3. α=0.0094 11; α(K)=0.0077 9; α(L)=0.00127 14; α(M)=0.00030 4; α(N+..)=0.000103 11 α(N)=7.5×10 <sup>-5</sup> 8; α(O)=1.50×10 <sup>-5</sup> 17; α(P)=1.60×10 <sup>-6</sup> 19; α(IPF)=1.15×10 <sup>-5</sup> 10 α(N)=7.5×10 <sup>-5</sup> 9; α(O)=1.49×10 <sup>-5</sup> 18; α(P)=1.59×10 <sup>-6</sup> 21; α(IPF)=1.14×10 <sup>-5</sup> 11 α(K)exp = 0.0033 5/0.38 6 = 0.0087 19.
<sup>x</sup> 1198.98 25	0.30 5					(M1+E2)	<0.8	0.0099 13	
1203.72 6	2.5 3	3637.91	6 <sup>-</sup>	2434.10	6 <sup>-</sup>	M1(+E2)	<0.36	0.0107 4	
1211.72 5	3.8 4	3029.14	5 <sup>-</sup>	1817.40	4 <sup>+</sup>	E1(+M2)	<0.15	0.0021 3	
1232.91 9	0.50 6	3637.91	6 <sup>-</sup>	2405.13	7 <sup>-</sup>	M1(+E2)	<0.75	0.0094 11	
<sup>x</sup> 1240.3 10	0.16 8								
1258.9 <sup>i</sup> 1	0.55 <sup>i</sup> 9	2157.94	(4 <sup>+</sup> )	899.15	2 <sup>+</sup>	[E2]		0.00430 6	α=0.00430 6; α(K)=0.00347 5; α(L)=0.000622 9; α(M)=0.0001466 21; α(N+..)=5.52×10 <sup>-5</sup> 8 α(N)=3.71×10 <sup>-5</sup> 6; α(O)=7.31×10 <sup>-6</sup> 11; α(P)=7.32×10 <sup>-7</sup> 11; α(IPF)=1.000×10 <sup>-5</sup> 14 α(N)=3.71×10 <sup>-5</sup> 6; α(O)=7.31×10 <sup>-6</sup> 11; α(P)=7.32×10 <sup>-7</sup> 11; α(IPF)=1.003×10 <sup>-5</sup> 15 E <sub>γ</sub> : From adopted gammas.
1259.08 <sup>i</sup> 25	0.55 <sup>i</sup> 9	4172.28?	(5,6 <sup>+</sup> )	2912.84	5 <sup>-</sup>				

$\gamma(^{204}\text{Pb})$ (continued)									
$E_\gamma$ ‡	$I_\gamma$ #h	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult. &	$\delta^a$	$\alpha^\dagger$	Comments
1261.71 25	0.17 3	3768.52	5 <sup>-</sup> ,6 <sup>-</sup>	2507.02	5 <sup>-</sup>	[M1]		0.00983 14	$\alpha=0.00983$ 14; $\alpha(\text{K})=0.00809$ 12; $\alpha(\text{L})=0.001325$ 19; $\alpha(\text{M})=0.000309$ 5; $\alpha(\text{N}+..)=0.0001141$ $\alpha(\text{N})=7.84\times 10^{-5}$ 11; $\alpha(\text{O})=1.565\times 10^{-5}$ 22; $\alpha(\text{P})=1.685\times 10^{-6}$ 24; $\alpha(\text{IPF})=1.84\times 10^{-5}$ 3
1274 @	0.0103 @	1273.99	4 <sup>+</sup>	0	0 <sup>+</sup>	[E4]		0.01771	$\alpha(\text{K})=0.01288$ 18; $\alpha(\text{L})=0.00365$ 6; $\alpha(\text{M})=0.000905$ 13; $\alpha(\text{N}+..)=0.000279$ 4 $\alpha(\text{N})=0.000230$ 4; $\alpha(\text{O})=4.45\times 10^{-5}$ 7; $\alpha(\text{P})=4.08\times 10^{-6}$ 6
1274.76 4	2.7 3	3092.11	5 <sup>-</sup>	1817.40	4 <sup>+</sup>	E1(+M2)	<0.16	0.0019 3	$\alpha=0.0019$ 3; $\alpha(\text{K})=0.00158$ 22; $\alpha(\text{L})=0.00024$ 4; $\alpha(\text{M})=5.6\times 10^{-5}$ 10; $\alpha(\text{N}+..)=5.9\times 10^{-5}$ 3 $\alpha(\text{N})=1.43\times 10^{-5}$ 24; $\alpha(\text{O})=2.8\times 10^{-6}$ 5; $\alpha(\text{P})=3.0\times 10^{-7}$ 5; $\alpha(\text{IPF})=4.17\times 10^{-5}$ 8 $\alpha(\text{K})_{\text{exp}} = 0.0033$ 5/2.13 3 = 0.00155 24.
<sup>x</sup> 1290.61 25	0.23 4					(M1+E2)	<0.6	0.0086 7	$\alpha=0.0086$ 7; $\alpha(\text{K})=0.0071$ 6; $\alpha(\text{L})=0.00116$ 9; $\alpha(\text{M})=0.000271$ 21; $\alpha(\text{N}+..)=0.000108$ 8 $\alpha(\text{N})=6.9\times 10^{-5}$ 6; $\alpha(\text{O})=1.37\times 10^{-5}$ 11; $\alpha(\text{P})=1.47\times 10^{-6}$ 12; $\alpha(\text{IPF})=2.36\times 10^{-5}$ 15 $\alpha(\text{N})=6.8\times 10^{-5}$ 7; $\alpha(\text{O})=1.35\times 10^{-5}$ 13; $\alpha(\text{P})=1.44\times 10^{-6}$ 15; $\alpha(\text{IPF})=2.33\times 10^{-5}$ 19 $\alpha(\text{K})_{\text{exp}} = 0.0020$ 4/0.22 4 = 0.0091 25.
1299.1 2	0.19 3	3733.25?	6 <sup>-</sup> ,7 <sup>-</sup>	2434.10	6 <sup>-</sup>	M1(+E2)	<1.0	0.0079 13	$\alpha=0.0079$ 13; $\alpha(\text{K})=0.0064$ 11; $\alpha(\text{L})=0.00107$ 17; $\alpha(\text{M})=0.00025$ 4; $\alpha(\text{N}+..)=0.000101$ 15 $\alpha(\text{N})=6.3\times 10^{-5}$ 10; $\alpha(\text{O})=1.26\times 10^{-5}$ 20; $\alpha(\text{P})=1.34\times 10^{-6}$ 22; $\alpha(\text{IPF})=2.4\times 10^{-5}$ 3 $\alpha(\text{N})=6.1\times 10^{-5}$ 12; $\alpha(\text{O})=1.22\times 10^{-5}$ 23; $\alpha(\text{P})=1.3\times 10^{-6}$ 3; $\alpha(\text{IPF})=2.4\times 10^{-5}$ 4 $\alpha(\text{K})_{\text{exp}} = 0.0012$ 2/0.17 3 = 0.0071 17.
1328.21 10	0.50 6	3733.25?	6 <sup>-</sup> ,7 <sup>-</sup>	2405.13	7 <sup>-</sup>	M1(+E2)	<0.5	0.0082 5	$\alpha=0.0082$ 5; $\alpha(\text{K})=0.0067$ 4; $\alpha(\text{L})=0.00110$ 7; $\alpha(\text{M})=0.000256$ 15; $\alpha(\text{N}+..)=0.000114$ 6 $\alpha(\text{N})=6.5\times 10^{-5}$ 4; $\alpha(\text{O})=1.30\times 10^{-5}$ 8; $\alpha(\text{P})=1.39\times 10^{-6}$ 9; $\alpha(\text{IPF})=3.41\times 10^{-5}$ 16 $\alpha(\text{N})=6.4\times 10^{-5}$ 5; $\alpha(\text{O})=1.28\times 10^{-5}$ 10; $\alpha(\text{P})=1.37\times 10^{-6}$ 11; $\alpha(\text{IPF})=3.36\times 10^{-5}$ 21 $\alpha(\text{K})_{\text{exp}} = 0.0033$ 5/0.41 6 = 0.0080 17.
1334.50 10	0.39 4	3768.52	5 <sup>-</sup> ,6 <sup>-</sup>	2434.10	6 <sup>-</sup>	M1		0.00854 12	$\alpha=0.00854$ 12; $\alpha(\text{K})=0.00701$ 10; $\alpha(\text{L})=0.001147$ 16; $\alpha(\text{M})=0.000267$ 4; $\alpha(\text{N}+..)=0.0001205$ $\alpha(\text{N})=6.78\times 10^{-5}$ 10; $\alpha(\text{O})=1.354\times 10^{-5}$ 19; $\alpha(\text{P})=1.459\times 10^{-6}$ 21; $\alpha(\text{IPF})=3.77\times 10^{-5}$ 6 $\alpha(\text{K})_{\text{exp}} = 0.0032$ 5/0.31 5 = 0.0103 23.
1348.4 4	0.29 2	3782.14	5 <sup>-</sup>	2434.10	6 <sup>-</sup>	M1(+E2)	<0.87	0.0074 10	$\alpha=0.0074$ 10; $\alpha(\text{K})=0.0060$ 9; $\alpha(\text{L})=0.00099$ 13; $\alpha(\text{M})=0.00023$ 3; $\alpha(\text{N}+..)=0.000110$ 13 $\alpha(\text{N})=5.9\times 10^{-5}$ 8; $\alpha(\text{O})=1.17\times 10^{-5}$ 15; $\alpha(\text{P})=1.25\times 10^{-6}$ 17; $\alpha(\text{IPF})=3.8\times 10^{-5}$ 4

γ(<sup>204</sup>Pb) (continued)

$E_\gamma$ ‡	$I_\gamma$ #h	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult.&	$\delta^a$	$\alpha^\dagger$	Comments
1351.2 @ 1	0.60 @ 5	1351.28	2 <sup>+</sup>	0	0 <sup>+</sup>	E2		0.00378 6	$\alpha(N)=5.9\times 10^{-5}$ 7; $\alpha(O)=1.18\times 10^{-5}$ 14; $\alpha(P)=1.27\times 10^{-6}$ 16; $\alpha(IPF)=3.9\times 10^{-5}$ 4 $\alpha(K)_{exp} = 0.0018$ 4/0.25 4 = 0.0072 20. $\alpha=0.00378$ 6; $\alpha(K)=0.00305$ 5; $\alpha(L)=0.000536$ 8; $\alpha(M)=0.0001259$ 18; $\alpha(N+..)=6.37\times 10^{-5}$ 9 $\alpha(N)=3.19\times 10^{-5}$ 5; $\alpha(O)=6.29\times 10^{-6}$ 9; $\alpha(P)=6.36\times 10^{-7}$ 9; $\alpha(IPF)=2.48\times 10^{-5}$ 4 $\alpha(N)=3.19\times 10^{-5}$ 5; $\alpha(O)=6.28\times 10^{-6}$ 9; $\alpha(P)=6.35\times 10^{-7}$ 9; $\alpha(IPF)=2.50\times 10^{-5}$ 4 $\alpha(N)=3.19\times 10^{-5}$ 5; $\alpha(O)=6.29\times 10^{-6}$ 9; $\alpha(P)=6.35\times 10^{-7}$ 9; $\alpha(IPF)=2.49\times 10^{-5}$ 4 Mult.: From adopted gammas.
1353.3 1	1.1 2	2627.33	(5 <sup>+</sup> )	1273.99	4 <sup>+</sup>	(M1)		0.00825 12	$\alpha=0.00825$ 12; $\alpha(K)=0.00676$ 10; $\alpha(L)=0.001106$ 16; $\alpha(M)=0.000258$ 4; $\alpha(N+..)=0.0001240$ $\alpha(N)=6.54\times 10^{-5}$ 10; $\alpha(O)=1.307\times 10^{-5}$ 19; $\alpha(P)=1.407\times 10^{-6}$ 20; $\alpha(IPF)=4.41\times 10^{-5}$ 7 $\alpha(N)=6.54\times 10^{-5}$ 10; $\alpha(O)=1.306\times 10^{-5}$ 19; $\alpha(P)=1.407\times 10^{-6}$ 20; $\alpha(IPF)=4.41\times 10^{-5}$ 7 E <sub>γ</sub> : From adopted gammas.
1373.7 2	0.51 7	3637.91	6 <sup>-</sup>	2264.28	7 <sup>-</sup>	M1(+E2)		0.0058 22	$\alpha=0.0058$ 22; $\alpha(K)=0.0047$ 18; $\alpha(L)=0.0008$ 3; $\alpha(M)=0.00018$ 7; $\alpha(N+..)=0.00010$ 3 $\alpha(N)=4.7\times 10^{-5}$ 16; $\alpha(O)=9.E-6$ 4; $\alpha(P)=1.0\times 10^{-6}$ 4; $\alpha(IPF)=4.1\times 10^{-5}$ 11 $\alpha(N)=6.16\times 10^{-5}$ 16; $\alpha(O)=1.23\times 10^{-5}$ 4; $\alpha(P)=1.32\times 10^{-6}$ 4; $\alpha(IPF)=5.08\times 10^{-5}$ 12 $\alpha(K)_{exp} = 0.0030$ 3/0.37 6 = 0.0081 15. $\alpha=0.0065$ 14; $\alpha(K)=0.0053$ 12; $\alpha(L)=0.00087$ 18; $\alpha(M)=0.00020$ 5; $\alpha(N+..)=0.000110$ 21 $\alpha(N)=5.2\times 10^{-5}$ 11; $\alpha(O)=1.03\times 10^{-5}$ 22; $\alpha(P)=1.10\times 10^{-6}$ 25; $\alpha(IPF)=4.7\times 10^{-5}$ 8 $\alpha(N)=5.1\times 10^{-5}$ 11; $\alpha(O)=1.02\times 10^{-5}$ 23; $\alpha(P)=1.1\times 10^{-6}$ 3; $\alpha(IPF)=4.6\times 10^{-5}$ 8 $\alpha(K)_{exp} = 0.0013$ 3/0.25 4 = 0.0054 13. $\alpha=0.0072$ 6; $\alpha(K)=0.0059$ 5; $\alpha(L)=0.00097$ 8; $\alpha(M)=0.000226$ 18; $\alpha(N+..)=0.000122$ 9 $\alpha(N)=5.7\times 10^{-5}$ 5; $\alpha(O)=1.14\times 10^{-5}$ 10; $\alpha(P)=1.23\times 10^{-6}$ 11; $\alpha(IPF)=5.2\times 10^{-5}$ 4 $\alpha(N)=5.6\times 10^{-5}$ 7; $\alpha(O)=1.11\times 10^{-5}$ 13; $\alpha(P)=1.19\times 10^{-6}$ 15; $\alpha(IPF)=5.1\times 10^{-5}$ 5 $\alpha(K)_{exp} = 0.00106$ 21/0.145 25 = 0.0073 19. $\alpha=0.0020$ 5; $\alpha(K)=0.0015$ 4; $\alpha(L)=0.00024$ 7; $\alpha(M)=5.6\times 10^{-5}$
1380.05 20	0.29 3	3637.91	6 <sup>-</sup>	2258.01	5 <sup>-</sup>	M1(+E2)	<1.4	0.0065 14	
1383.62 25	0.20 3	4115.07	6 <sup>-</sup>	2731.77?	5 <sup>-</sup> ,6 <sup>-</sup> ,7 <sup>-</sup>	(M1+E2)	<0.63	0.0072 6	
1414.74 10	1.22 14	3232.13	5 <sup>-</sup>	1817.40	4 <sup>+</sup>	E1(+M2)	0.18 7	0.0020 5	

<sup>204</sup>Bi ε decay [1970CrZY](#),[1977KaXO](#),[1984Dz05](#) (continued)

$\gamma(^{204}\text{Pb})$ (continued)									
$E_\gamma$ ‡	$I_\gamma$ #h	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult. &	$\delta^a$	$\alpha^\dagger$	Comments
									15; $\alpha(\text{N+..})=0.000130$ 3 $\alpha(\text{N})=1.4\times 10^{-5}$ 4; $\alpha(\text{O})=2.8\times 10^{-6}$ 8; $\alpha(\text{P})=3.0\times 10^{-7}$ 9; $\alpha(\text{IPF})=0.000112$ 3 $\alpha(\text{N})=1.3\times 10^{-5}$ 4; $\alpha(\text{O})=2.7\times 10^{-6}$ 7; $\alpha(\text{P})=2.8\times 10^{-7}$ 8; $\alpha(\text{IPF})=0.000113$ 3 $\alpha(\text{K})_{\text{exp}} = 0.0014$ 3/0.92 10 = 0.0016 3. $\alpha=0.00703$ 10; $\alpha(\text{K})=0.00573$ 8; $\alpha(\text{L})=0.000935$ 13; $\alpha(\text{M})=0.000218$ 3; $\alpha(\text{N+..})=0.0001499$ 2 $\alpha(\text{N})=5.53\times 10^{-5}$ 8; $\alpha(\text{O})=1.104\times 10^{-5}$ 16; $\alpha(\text{P})=1.189\times 10^{-6}$ 17; $\alpha(\text{IPF})=8.24\times 10^{-5}$ 12 $E_\gamma$ : From adopted gammas.
1445.2 1	0.11 2	2719.16	5 <sup>+</sup>	1273.99	4 <sup>+</sup>	[M1]		0.00703 10	
<sup>x</sup> 1447.52 25	0.27 4								
<sup>x</sup> 1453.29 <sup>f</sup> 20	0.054 12								
<sup>x</sup> 1466.36 25	0.45 7					(M1+E2)		0.0050 18	$\alpha=0.0050$ 18; $\alpha(\text{K})=0.0041$ 15; $\alpha(\text{L})=0.00068$ 23; $\alpha(\text{M})=0.00016$ 6; $\alpha(\text{N+..})=0.00012$ 4 $\alpha(\text{N})=4.0\times 10^{-5}$ 14; $\alpha(\text{O})=8.E-6$ 3; $\alpha(\text{P})=8.E-7$ 3; $\alpha(\text{IPF})=7.3\times 10^{-5}$ 20 $\alpha(\text{N})=4.8\times 10^{-5}$ 6; $\alpha(\text{O})=9.6\times 10^{-6}$ 11; $\alpha(\text{P})=1.03\times 10^{-6}$ 12; $\alpha(\text{IPF})=8.5\times 10^{-5}$ 8
1468.82 <sup>id</sup> 25	0.25 <sup>i</sup> 25	3733.25?	6 <sup>-</sup> ,7 <sup>-</sup>	2264.28	7 <sup>-</sup>	(M1)		0.00676 10	$\alpha=0.00676$ 10; $\alpha(\text{K})=0.00550$ 8; $\alpha(\text{L})=0.000897$ 13; $\alpha(\text{M})=0.000209$ 3; $\alpha(\text{N+..})=0.0001583$ 2 $\alpha(\text{N})=5.30\times 10^{-5}$ 8; $\alpha(\text{O})=1.059\times 10^{-5}$ 15; $\alpha(\text{P})=1.141\times 10^{-6}$ 16; $\alpha(\text{IPF})=9.36\times 10^{-5}$ 14
1468.82 <sup>id</sup> 25	0.25 <sup>i</sup> 25	4165.88	5 <sup>-</sup>	2696.57	7 <sup>-</sup>	[E2]		0.00327 5	$\alpha=0.00327$ 5; $\alpha(\text{K})=0.00262$ 4; $\alpha(\text{L})=0.000451$ 7; $\alpha(\text{M})=0.0001057$ 15; $\alpha(\text{N+..})=8.70\times 10^{-5}$ 13 $\alpha(\text{N})=2.68\times 10^{-5}$ 4; $\alpha(\text{O})=5.29\times 10^{-6}$ 8; $\alpha(\text{P})=5.40\times 10^{-7}$ 8; $\alpha(\text{IPF})=5.44\times 10^{-5}$ 8 $\alpha(\text{N})=5.30\times 10^{-5}$ 8; $\alpha(\text{O})=1.059\times 10^{-5}$ 15; $\alpha(\text{P})=1.141\times 10^{-6}$ 16; $\alpha(\text{IPF})=9.36\times 10^{-5}$ 14
1475.08 25	0.11 2	3733.25?	6 <sup>-</sup> ,7 <sup>-</sup>	2258.01	5 <sup>-</sup>	[M1,E2]		0.0050 18	$\alpha=0.0050$ 18; $\alpha(\text{K})=0.0040$ 15; $\alpha(\text{L})=0.00067$ 22; $\alpha(\text{M})=0.00016$ 5; $\alpha(\text{N+..})=0.00012$ 4 $\alpha(\text{N})=4.0\times 10^{-5}$ 13; $\alpha(\text{O})=8.E-6$ 3; $\alpha(\text{P})=8.E-7$ 3; $\alpha(\text{IPF})=7.6\times 10^{-5}$ 21
1487.78 25	0.26 4	4183.88	6 <sup>-</sup>	2696.57	7 <sup>-</sup>	(M1+E2)	<0.71	0.0060 6	$\alpha=0.0060$ 6; $\alpha(\text{K})=0.0049$ 5; $\alpha(\text{L})=0.00080$ 8; $\alpha(\text{M})=0.000185$ 17; $\alpha(\text{N+..})=0.000153$ 13 $\alpha(\text{N})=4.7\times 10^{-5}$ 5; $\alpha(\text{O})=9.4\times 10^{-6}$ 9; $\alpha(\text{P})=1.01\times 10^{-6}$ 10; $\alpha(\text{IPF})=9.6\times 10^{-5}$ 8 $\alpha(\text{N})=4.5\times 10^{-5}$ 7; $\alpha(\text{O})=9.0\times 10^{-6}$ 13; $\alpha(\text{P})=9.6\times 10^{-7}$ 15; $\alpha(\text{IPF})=9.2\times 10^{-5}$ 11 $\alpha(\text{K})_{\text{exp}} = 0.00120$ 22/0.21 3 = 0.0057 13; evaluator assumes that Ice(K)=0.0012 22 quoted by <a href="#">1984Dz05</a> is an error.

γ(<sup>204</sup>Pb) (continued)

$E_\gamma$ ‡	$I_\gamma$ #h	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult. &	$\delta^a$	$\alpha^\dagger$	Comments
1517.46 12	0.46 5	3997.75?	(5,6,7) <sup>-</sup>	2480.29	6 <sup>-</sup>	M1(+E2)	<0.65	0.0058 5	$\alpha=0.0058$ 5; $\alpha(K)=0.0047$ 4; $\alpha(L)=0.00077$ 6; $\alpha(M)=0.000178$ 14; $\alpha(N+.)=0.000166$ 12 $\alpha(N)=4.5\times 10^{-5}$ 4; $\alpha(O)=9.0\times 10^{-6}$ 8; $\alpha(P)=9.7\times 10^{-7}$ 9; $\alpha(IPF)=0.000111$ 8 $\alpha(N)=4.4\times 10^{-5}$ 5; $\alpha(O)=8.8\times 10^{-6}$ 10; $\alpha(P)=9.4\times 10^{-7}$ 11; $\alpha(IPF)=0.000109$ 10 $\alpha(K)_{exp} = 0.0021$ 3/0.38 6 = 0.0055 12.
1524.07 8	1.21 10	3782.14	5 <sup>-</sup>	2258.01	5 <sup>-</sup>	M1(+E2)	<0.62	0.0058 5	$\alpha=0.0058$ 5; $\alpha(K)=0.0047$ 4; $\alpha(L)=0.00076$ 6; $\alpha(M)=0.000177$ 13; $\alpha(N+.)=0.000170$ 12 $\alpha(N)=4.5\times 10^{-5}$ 4; $\alpha(O)=9.0\times 10^{-6}$ 7; $\alpha(P)=9.6\times 10^{-7}$ 8; $\alpha(IPF)=0.000115$ 8 $\alpha(N)=4.4\times 10^{-5}$ 5; $\alpha(O)=8.7\times 10^{-6}$ 10; $\alpha(P)=9.3\times 10^{-7}$ 11; $\alpha(IPF)=0.000112$ 10 $\alpha(K)_{exp} = 0.0051$ 5/1.02 10 = 0.0050 7.
<sup>x</sup> 1536.57 10	0.52 6					M1+E2	1.7 11	0.0038 15	$\alpha=0.0038$ 15; $\alpha(K)=0.0031$ 12; $\alpha(L)=0.00051$ 19; $\alpha(M)=0.00012$ 5; $\alpha(N+.)=0.00013$ 4 $\alpha(N)=3.0\times 10^{-5}$ 11; $\alpha(O)=6.0\times 10^{-6}$ 22; $\alpha(P)=6.3\times 10^{-7}$ 25; $\alpha(IPF)=9.E-5$ 3 $\alpha(N)=2.9\times 10^{-5}$ 9; $\alpha(O)=5.8\times 10^{-6}$ 19; $\alpha(P)=6.1\times 10^{-7}$ 21; $\alpha(IPF)=8.7\times 10^{-5}$ 21 $\alpha(K)_{exp} = 0.00140$ 21/0.41 6 = 0.0034 7.
1569.3 2	0.17 2	4076.24	(5) <sup>-</sup>	2507.02	5 <sup>-</sup>	M1(+E2)	<0.5	0.0055 3	$\alpha=0.0055$ 3; $\alpha(K)=0.00442$ 24; $\alpha(L)=0.00072$ 4; $\alpha(M)=0.000168$ 9; $\alpha(N+.)=0.000193$ 10 $\alpha(N)=4.26\times 10^{-5}$ 23; $\alpha(O)=8.5\times 10^{-6}$ 5; $\alpha(P)=9.2\times 10^{-7}$ 5; $\alpha(IPF)=0.000141$ 7 $\alpha(N)=3.8\times 10^{-5}$ 7; $\alpha(O)=7.7\times 10^{-6}$ 13; $\alpha(P)=8.2\times 10^{-7}$ 15; $\alpha(IPF)=0.000129$ 18 $\alpha(K)_{exp} = 0.00086$ 20/0.14 3 = 0.0061 19.
1573.0 2	0.34 5	3637.91	6 <sup>-</sup>	2065.17	5 <sup>+</sup>	E1+M2	0.53 11	0.0040 9	$\alpha=0.0040$ 9; $\alpha(K)=0.0031$ 7; $\alpha(L)=0.00052$ 13; $\alpha(M)=0.00012$ 3; $\alpha(N+.)=0.000222$ 5 $\alpha(N)=3.1\times 10^{-5}$ 8; $\alpha(O)=6.2\times 10^{-6}$ 15; $\alpha(P)=6.6\times 10^{-7}$ 16; $\alpha(IPF)=0.000184$ 12 $\alpha(N)=3.0\times 10^{-5}$ 8; $\alpha(O)=5.9\times 10^{-6}$ 16; $\alpha(P)=6.3\times 10^{-7}$ 18; $\alpha(IPF)=0.000186$ 14 $\alpha(K)_{exp} = 0.00092$ 18/0.30 4 = 0.0031 7.
1582.8 @ 1	≈0.0084 @	1582.79	2 <sup>+</sup>	0	0 <sup>+</sup>	E2		0.00289 4	$\alpha=0.00289$ 4; $\alpha(K)=0.00229$ 4; $\alpha(L)=0.000388$ 6; $\alpha(M)=9.07\times 10^{-5}$ 13; $\alpha(N+.)=0.0001191$ 17 $\alpha(N)=2.30\times 10^{-5}$ 4; $\alpha(O)=4.55\times 10^{-6}$ 7; $\alpha(P)=4.67\times 10^{-7}$ 7; $\alpha(IPF)=9.11\times 10^{-5}$ 13
1589.42 12	0.50 6	4285.98	6 <sup>-</sup>	2696.57	7 <sup>-</sup>	M1(+E2)	<0.47	0.0054 3	$\alpha=0.0054$ 3; $\alpha(K)=0.00430$ 21; $\alpha(L)=0.00070$ 4; $\alpha(M)=0.000163$ 8; $\alpha(N+.)=0.000204$ 9

γ(<sup>204</sup>Pb) (continued)

<u>E<sub>γ</sub><sup>‡</sup></u>	<u>I<sub>γ</sub><sup>#h</sup></u>	<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>Mult.&amp;</u>	<u>δ<sup>α</sup></u>	<u>α<sup>†</sup></u>	<u>Comments</u>
1592.5 <sup>@</sup> 1	≈0.38 <sup>@</sup>	2491.28	3 <sup>+</sup>	899.15	2 <sup>+</sup>	M1+E2	≈-1.0 <sup>C</sup>	≈0.00423	α(N)=4.15×10 <sup>-5</sup> 20; α(O)=8.3×10 <sup>-6</sup> 4; α(P)=8.9×10 <sup>-7</sup> 5; α(IPF)=0.000153 7 α(N)=4.0×10 <sup>-5</sup> 4; α(O)=8.0×10 <sup>-6</sup> 7; α(P)=8.6×10 <sup>-7</sup> 8; α(IPF)=0.000148 11 α(K)exp = 0.0022 3/0.43 6 = 0.0051 10. α≈0.00423; α(K)≈0.00337; α(L)≈0.000556; α(M)≈0.0001296 α(N)≈3.29×10 <sup>-5</sup> ; α(O)≈6.55×10 <sup>-6</sup> ; α(P)≈6.95×10 <sup>-7</sup> ; α(IPF)≈0.0001276
1607.2 2	0.28 4	3170.23	5 <sup>-</sup>	1563.22	4 <sup>+</sup>	(E1+M2)	0.45 12	0.0032 9	α=0.0032 9; α(K)=0.0025 8; α(L)=0.00041 13; α(M)=0.00010 3; α(N+..)=0.000244 6 α(N)=2.4×10 <sup>-5</sup> 8; α(O)=4.9×10 <sup>-6</sup> 15; α(P)=5.2×10 <sup>-7</sup> 16; α(IPF)=0.000214 15 α(N)=2.4×10 <sup>-5</sup> 9; α(O)=4.9×10 <sup>-6</sup> 17; α(P)=5.2×10 <sup>-7</sup> 18; α(IPF)=0.000214 16 α(K)exp = 0.00057 11/0.23 5 = 0.0025 7.
1612.15 25	0.25 10	3876.38?	(5 <sup>-</sup> ,6 <sup>+</sup> )	2264.28	7 <sup>-</sup>				
1614.30 <sup>f</sup> 20	0.18 2	4094.29	6 <sup>-</sup>	2480.29	6 <sup>-</sup>	[M1]		0.00542 8	α=0.00542 8; α(K)=0.00433 6; α(L)=0.000704 10; α(M)=0.0001639 23; α(N+..)=0.000225 4 α(N)=4.16×10 <sup>-5</sup> 6; α(O)=8.32×10 <sup>-6</sup> 12; α(P)=8.97×10 <sup>-7</sup> 13; α(IPF)=0.0001737 25
<sup>x</sup> 1639.38 25	0.47 9					(E2)		0.00274 4	α=0.00274 4; α(K)=0.00215 3; α(L)=0.000361 5; α(M)=8.44×10 <sup>-5</sup> 12; α(N+..)=0.0001378 20 α(N)=2.14×10 <sup>-5</sup> 3; α(O)=4.24×10 <sup>-6</sup> 6; α(P)=4.37×10 <sup>-7</sup> 7; α(IPF)=0.0001117 16 α(K)exp = 0.00088 13/0.43 6 = 0.0020 4.
1645.60 8	0.87 10	2919.55	5 <sup>-</sup>	1273.99	4 <sup>+</sup>	E1(+M2)	0.16 12	0.0016 5	α=0.0016 5; α(K)=0.0011 5; α(L)=0.00017 8; α(M)=3.9×10 <sup>-5</sup> 18; α(N+..)=0.000280 6 α(N)=1.0×10 <sup>-5</sup> 5; α(O)=2.0×10 <sup>-6</sup> 9; α(P)=2.1×10 <sup>-7</sup> 10; α(IPF)=0.000268 11 α(N)=1.1×10 <sup>-5</sup> 4; α(O)=2.3×10 <sup>-6</sup> 8; α(P)=2.4×10 <sup>-7</sup> 8; α(IPF)=0.000264 9 α(K)exp = 0.00083 17/0.69 10 = 0.0012 3.
1652.10 14	0.70 10	3215.21	5 <sup>+</sup>	1563.22	4 <sup>+</sup>	M1(+E2)	<0.81	0.0047 5	α=0.0047 5; α(K)=0.0037 4; α(L)=0.00060 7; α(M)=0.000140 15; α(N+..)=0.000224 21 α(N)=3.6×10 <sup>-5</sup> 4; α(O)=7.1×10 <sup>-6</sup> 8; α(P)=7.6×10 <sup>-7</sup> 9; α(IPF)=0.000181 16 α(N)=3.5×10 <sup>-5</sup> 5; α(O)=6.9×10 <sup>-6</sup> 10; α(P)=7.4×10 <sup>-7</sup> 11; α(IPF)=0.000177 21 α(K)exp = 0.0023 3/0.55 10 = 0.0042 9.
1654.79 14	0.70 10	2928.76	5 <sup>-</sup>	1273.99	4 <sup>+</sup>	E1(+M2)	<0.25	0.0016 3	α=0.0016 3; α(K)=0.0011 3; α(L)=0.00017 5; α(M)=4.0×10 <sup>-5</sup> 11; α(N+..)=0.000286 5 α(N)=1.0×10 <sup>-5</sup> 3; α(O)=2.0×10 <sup>-6</sup> 6; α(P)=2.2×10 <sup>-7</sup> 6; α(IPF)=0.000273 7 α(K)exp = 0.00059 12/0.55 10 = 0.0011 3.



<sup>204</sup>Bi ε decay [1970CrZY](#),[1977KaXO](#),[1984Dz05](#) (continued)

γ(<sup>204</sup>Pb) (continued)

$E_\gamma$ <sup>‡</sup>	$I_\gamma$ <sup>#h</sup>	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult. <sup>&amp;</sup>	$\delta^a$	$\alpha^\dagger$	Comments
1658.9 2	0.11 1	4165.88	5 <sup>-</sup>	2507.02	5 <sup>-</sup>	(M1)		0.00510 8	$\alpha$ (K)=0.00510 8; $\alpha$ (K)=0.00404 6; $\alpha$ (L)=0.000657 10; $\alpha$ (M)=0.0001529 22; $\alpha$ (N+..)=0.000248 4 $\alpha$ (N)=3.88×10 <sup>-5</sup> 6; $\alpha$ (O)=7.76×10 <sup>-6</sup> 11; $\alpha$ (P)=8.36×10 <sup>-7</sup> 12; $\alpha$ (IPF)=0.000201 3 $\alpha$ (K)exp≈0.0005/0.10 3≈0.005.
1665.3 <sup>@f</sup> 1	0.076 <sup>@</sup>	1665.28?	2 <sup>+</sup>	0	0 <sup>+</sup>	E2		0.00267 4	$\alpha$ (K)=0.00267 4; $\alpha$ (K)=0.00209 3; $\alpha$ (L)=0.000350 5; $\alpha$ (M)=8.18×10 <sup>-5</sup> 12; $\alpha$ (N+..)=0.0001469 21 $\alpha$ (N)=2.07×10 <sup>-5</sup> 3; $\alpha$ (O)=4.10×10 <sup>-6</sup> 6; $\alpha$ (P)=4.24×10 <sup>-7</sup> 6; $\alpha$ (IPF)=0.0001216 17
1665.4 <sup>i</sup> 2 1669.3 2	0.076 <sup>i</sup> 6 0.10 2	4172.28? 3232.13	(5,6 <sup>+</sup> ) 5 <sup>-</sup>	2507.02 1563.22	5 <sup>-</sup> 4 <sup>+</sup>	E2,E1 E1		0.001322 19	$\alpha$ (K)=0.001322 19; $\alpha$ (K)=0.000865 13; $\alpha$ (L)=0.0001285 18; $\alpha$ (M)=2.95×10 <sup>-5</sup> 5; $\alpha$ (N+..)=0.000299 $\alpha$ (N)=7.48×10 <sup>-6</sup> 11; $\alpha$ (O)=1.489×10 <sup>-6</sup> 21; $\alpha$ (P)=1.572×10 <sup>-7</sup> 22; $\alpha$ (IPF)=0.000290 4 $\alpha$ (K)exp≈0.0002/0.080 20≈0.0025.
<sup>x</sup> 1675.07 25	0.08 2					E3+M4	0.8 <sup>b</sup> 4	0.015 7	$\alpha$ (K)=0.012 5; $\alpha$ (L)=0.0025 11; $\alpha$ (M)=0.0006 3; $\alpha$ (N+..)=0.00022 7 $\alpha$ (N)=0.00015 7; $\alpha$ (O)=3.0×10 <sup>-5</sup> 14; $\alpha$ (P)=3.0×10 <sup>-6</sup> 14; $\alpha$ (IPF)=3.9×10 <sup>-5</sup> 17
<sup>x</sup> 1679.84 <sup>f</sup> 20 1685.9 2	0.052 10 0.19 2	4165.88	5 <sup>-</sup>	2480.29	6 <sup>-</sup>	M1(+E2)	<1.1	0.0043 7	$\alpha$ (K)=0.0043 7; $\alpha$ (K)=0.0034 5; $\alpha$ (L)=0.00055 8; $\alpha$ (M)=0.000128 19; $\alpha$ (N+..)=0.00023 3 $\alpha$ (N)=3.3×10 <sup>-5</sup> 5; $\alpha$ (O)=6.5×10 <sup>-6</sup> 10; $\alpha$ (P)=7.0×10 <sup>-7</sup> 11; $\alpha$ (IPF)=0.000194 25 $\alpha$ (N)=3.3×10 <sup>-5</sup> 5; $\alpha$ (O)=6.6×10 <sup>-6</sup> 9; $\alpha$ (P)=7.1×10 <sup>-7</sup> 10; $\alpha$ (IPF)=0.000196 23 $\alpha$ (K)exp = 0.00060 12/0.15 3 = 0.0040 11.
1689.05 12	0.73 7	4094.29	6 <sup>-</sup>	2405.13	7 <sup>-</sup>	M1(+E2)	<0.58	0.0046 3	$\alpha$ (K)=0.0046 3; $\alpha$ (K)=0.00363 24; $\alpha$ (L)=0.00059 4; $\alpha$ (M)=0.000138 9; $\alpha$ (N+..)=0.000251 15 $\alpha$ (N)=3.49×10 <sup>-5</sup> 22; $\alpha$ (O)=7.0×10 <sup>-6</sup> 5; $\alpha$ (P)=7.5×10 <sup>-7</sup> 5; $\alpha$ (IPF)=0.000209 12 $\alpha$ (N)=3.4×10 <sup>-5</sup> 4; $\alpha$ (O)=6.7×10 <sup>-6</sup> 7; $\alpha$ (P)=7.2×10 <sup>-7</sup> 8; $\alpha$ (IPF)=0.000202 18 $\alpha$ (K)exp = 0.0023 3/0.56 7 = 0.0041 7.
1697.06 <sup>f</sup> 20	0.073 11	3301.60	5 <sup>-</sup>	1604.73	3 <sup>+</sup>	[M2]		0.01099	$\alpha$ (K)=0.00890 13; $\alpha$ (L)=0.001535 22; $\alpha$ (M)=0.000360 5; $\alpha$ (N+..)=0.000202 3 $\alpha$ (N)=9.17×10 <sup>-5</sup> 13; $\alpha$ (O)=1.83×10 <sup>-5</sup> 3; $\alpha$ (P)=1.96×10 <sup>-6</sup> 3; $\alpha$ (IPF)=9.04×10 <sup>-5</sup> 13
<sup>x</sup> 1700.14 25	0.32 5					E1		0.001313 19	$\alpha$ (K)=0.001313 19; $\alpha$ (K)=0.000839 12; $\alpha$ (L)=0.0001246 18; $\alpha$ (M)=2.86×10 <sup>-5</sup> 4; $\alpha$ (N+..)=0.000321 $\alpha$ (N)=7.25×10 <sup>-6</sup> 11; $\alpha$ (O)=1.443×10 <sup>-6</sup> 21;

<sup>204</sup>Bi ε decay **1970CrZY,1977KaXO,1984Dz05** (continued)

$\gamma(^{204}\text{Pb})$ (continued)									
$E_\gamma$ ‡	$I_\gamma$ #h	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult.&	$\delta^a$	$\alpha^\dagger$	Comments
1703.27 5	2.5 2	3768.52	5 <sup>-</sup> ,6 <sup>-</sup>	2065.17	5 <sup>+</sup>	E1(+M2)	<0.21	0.00151 21	$\alpha(\text{P})=1.524\times 10^{-7}$ 22; $\alpha(\text{IPF})=0.000312$ 5 $E_\gamma$ : Observed only by 1970CrZY; 1984Dz05 place upper limit on ce(K). $\alpha=0.00151$ 21; $\alpha(\text{K})=0.00100$ 17; $\alpha(\text{L})=0.00015$ 3; $\alpha(\text{M})=3.5\times 10^{-5}$ 7; $\alpha(\text{N+..})=0.000321$ 6 $\alpha(\text{N})=9.0\times 10^{-6}$ 18; $\alpha(\text{O})=1.8\times 10^{-6}$ 4; $\alpha(\text{P})=1.9\times 10^{-7}$ 4; $\alpha(\text{IPF})=0.000310$ 7 $\alpha(\text{N})=8.8\times 10^{-6}$ 17; $\alpha(\text{O})=1.8\times 10^{-6}$ 4; $\alpha(\text{P})=1.9\times 10^{-7}$ 4; $\alpha(\text{IPF})=0.000310$ 6
1709.9 2	0.17 4	4115.07	6 <sup>-</sup>	2405.13	7 <sup>-</sup>	(M1+E2)	<1.1	0.0042 6	$\alpha(\text{K})_{\text{exp}} = 0.0020$ 3/2.00 20 = 0.00100 18. $\alpha=0.0042$ 6; $\alpha(\text{K})=0.0033$ 5; $\alpha(\text{L})=0.00053$ 8; $\alpha(\text{M})=0.000124$ 18; $\alpha(\text{N+..})=0.00025$ 4 $\alpha(\text{N})=3.1\times 10^{-5}$ 5; $\alpha(\text{O})=6.3\times 10^{-6}$ 9; $\alpha(\text{P})=6.7\times 10^{-7}$ 11; $\alpha(\text{IPF})=0.00021$ 3 $\alpha(\text{N})=3.59\times 10^{-5}$ 5; $\alpha(\text{O})=7.18\times 10^{-6}$ 10; $\alpha(\text{P})=7.74\times 10^{-7}$ 11; $\alpha(\text{IPF})=0.000233$ 4 $\alpha(\text{K})_{\text{exp}} = 0.0009$ 3/0.21 4 = 0.0043 15.
<sup>x</sup> 1715.3 2	0.22 5					E2		0.00256 4	$\alpha=0.00256$ 4; $\alpha(\text{K})=0.00199$ 3; $\alpha(\text{L})=0.000330$ 5; $\alpha(\text{M})=7.70\times 10^{-5}$ 11; $\alpha(\text{N+..})=0.0001649$ 24 $\alpha(\text{N})=1.95\times 10^{-5}$ 3; $\alpha(\text{O})=3.87\times 10^{-6}$ 6; $\alpha(\text{P})=4.01\times 10^{-7}$ 6; $\alpha(\text{IPF})=0.0001411$ 20
1731.68 14	0.74 6	4165.88	5 <sup>-</sup>	2434.10	6 <sup>-</sup>	M1(+E2)	<0.58	0.0044 3	$\alpha(\text{K})_{\text{exp}} = 0.00055$ 11/0.22 4 = 0.0025 7. $\alpha=0.0044$ 3; $\alpha(\text{K})=0.00341$ 22; $\alpha(\text{L})=0.00056$ 4; $\alpha(\text{M})=0.000129$ 8; $\alpha(\text{N+..})=0.000275$ 16 $\alpha(\text{N})=3.28\times 10^{-5}$ 21; $\alpha(\text{O})=6.6\times 10^{-6}$ 4; $\alpha(\text{P})=7.0\times 10^{-7}$ 5; $\alpha(\text{IPF})=0.000235$ 13 $\alpha(\text{N})=3.27\times 10^{-5}$ 22; $\alpha(\text{O})=6.5\times 10^{-6}$ 5; $\alpha(\text{P})=7.0\times 10^{-7}$ 5; $\alpha(\text{IPF})=0.000234$ 14
1749.82 25	0.36 6	4183.88	6 <sup>-</sup>	2434.10	6 <sup>-</sup>	(E2+M1)	>1.2	0.0029 5	$\alpha(\text{K})_{\text{exp}} = 0.0023$ 3/0.58 8 = 0.0040 8. $\alpha=0.0029$ 5; $\alpha(\text{K})=0.0022$ 4; $\alpha(\text{L})=0.00037$ 6; $\alpha(\text{M})=8.6\times 10^{-5}$ 13; $\alpha(\text{N+..})=0.00020$ 3 $\alpha(\text{N})=2.2\times 10^{-5}$ 4; $\alpha(\text{O})=4.3\times 10^{-6}$ 7; $\alpha(\text{P})=4.6\times 10^{-7}$ 7; $\alpha(\text{IPF})=0.000176$ 22 $\alpha(\text{N})=2.3\times 10^{-5}$ 4; $\alpha(\text{O})=4.5\times 10^{-6}$ 8; $\alpha(\text{P})=4.7\times 10^{-7}$ 9; $\alpha(\text{IPF})=0.00018$ 3 $\alpha(\text{N})=1.88\times 10^{-5}$ 3; $\alpha(\text{O})=3.72\times 10^{-6}$ 6; $\alpha(\text{P})=3.86\times 10^{-7}$ 6; $\alpha(\text{IPF})=0.0001550$ 22
1755.28 6	1.54 14	3029.14	5 <sup>-</sup>	1273.99	4 <sup>+</sup>	E1(+M2)	<0.16	0.00141 12	$\alpha(\text{K})_{\text{exp}} = 0.00062$ 12/0.30 5 = 0.0021 5. $\alpha=0.00141$ 12; $\alpha(\text{K})=0.00089$ 10; $\alpha(\text{L})=0.000134$ 17; $\alpha(\text{M})=3.1\times 10^{-5}$ 4; $\alpha(\text{N+..})=0.000359$ 6 $\alpha(\text{N})=7.8\times 10^{-6}$ 10; $\alpha(\text{O})=1.56\times 10^{-6}$ 20; $\alpha(\text{P})=1.65\times 10^{-7}$ 21; $\alpha(\text{IPF})=0.000350$ 6

<sup>204</sup>Bi ε decay [1970CrZY,1977KaXO,1984Dz05](#) (continued)

γ(<sup>204</sup>Pb) (continued)

<u>E<sub>γ</sub><sup>‡</sup></u>	<u>I<sub>γ</sub><sup>#h</sup></u>	<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>Mult.&amp;</u>	<u>δ<sup>a</sup></u>	<u>α<sup>†</sup></u>	<u>Comments</u>
1761.0 2	0.26 3	4165.88	5 <sup>-</sup>	2405.13	7 <sup>-</sup>	E2		0.00246 4	α(N)=7.6×10 <sup>-6</sup> 8; α(O)=1.52×10 <sup>-6</sup> 15; α(P)=1.60×10 <sup>-7</sup> 16; α(IPF)=0.000350 6 α(K)exp = 0.00101 15/1.24 15 = 0.00081 16. α=0.00246 4; α(K)=0.00189 3; α(L)=0.000313 5; α(M)=7.31×10 <sup>-5</sup> 11; α(N+..)=0.000182 3 α(N)=1.85×10 <sup>-5</sup> 3; α(O)=3.67×10 <sup>-6</sup> 6; α(P)=3.81×10 <sup>-7</sup> 6; α(IPF)=0.0001595 23
1778.45 20	0.34 4	4183.88	6 <sup>-</sup>	2405.13	7 <sup>-</sup>	M1(+E2)	<1.6	0.0037 7	α(K)exp = 0.00050 15/0.21 4 = 0.0024 8. α=0.0037 7; α(K)=0.0028 6; α(L)=0.00046 9; α(M)=0.000108 21; α(N+..)=0.00027 5 α(N)=2.7×10 <sup>-5</sup> 6; α(O)=5.4×10 <sup>-6</sup> 11; α(P)=5.8×10 <sup>-7</sup> 12; α(IPF)=0.00024 4 α(N)=2.7×10 <sup>-5</sup> 6; α(O)=5.3×10 <sup>-6</sup> 12; α(P)=5.7×10 <sup>-7</sup> 13; α(IPF)=0.00023 5
1780.33 25	0.42 7	4165.88	5 <sup>-</sup>	2386.02	5 <sup>+</sup>	(E1+M2)	0.66 20	0.0039 11	α(K)exp = 0.00092 23/0.27 5 = 0.0034 11. α=0.0039 11; α(K)=0.0029 10; α(L)=0.00049 16; α(M)=0.00011 4; α(N+..)=0.000330 22 α(N)=2.9×10 <sup>-5</sup> 10; α(O)=5.8×10 <sup>-6</sup> 19; α(P)=6.2×10 <sup>-7</sup> 21; α(IPF)=0.00029 4 α(N)=3.1×10 <sup>-5</sup> 15; α(O)=6.E-6 3; α(P)=7.E-7 3; α(IPF)=0.00029 5 α(N)=2.6×10 <sup>-5</sup> 7; α(O)=5.2×10 <sup>-6</sup> 13; α(P)=5.5×10 <sup>-7</sup> 15; α(IPF)=0.00023 5 δ: From α(K)exp of <a href="#">1984Dz05</a> . Another possibility is M1+E2 with δ<3; however, that is inconsistent with J <sup>π</sup> . Possibly this γ is an M1,E1 doublet. α(K)exp = 0.0012 3/0.42 8 = 0.0029 9.
1786.38 <sup>f</sup> 20	0.051 10	4172.28?	(5,6 <sup>+</sup> )	2386.02	5 <sup>+</sup>				
1791.17 <sup>f</sup> 20	0.046 10	4129.38	(5,6)	2338.30	(4) <sup>-</sup>				
1794.34 <sup>f</sup> 20	0.067 10	4032.69?	(5,6 <sup>+</sup> )	2238.33?	5,6				
<sup>x</sup> 1796.91 25	0.12 3								
1803.95 25	0.07 1	4067.95	(5 <sup>-</sup> ,6 <sup>+</sup> )	2264.28	7 <sup>-</sup>				
1818.10 2	0.65 5	3092.11	5 <sup>-</sup>	1273.99	4 <sup>+</sup>	E1		0.001294 19	α=0.001294 19; α(K)=0.000751 11; α(L)=0.0001112 16; α(M)=2.56×10 <sup>-5</sup> 4; α(N+..)=0.000406 α(N)=6.47×10 <sup>-6</sup> 9; α(O)=1.289×10 <sup>-6</sup> 18; α(P)=1.364×10 <sup>-7</sup> 19; α(IPF)=0.000398 6 α(K)exp < 0.0004/0.50 8 = 0.0008 upper limit.
1826.42 10	0.70 7	3891.60?	5 <sup>-</sup> ,6 <sup>-</sup>	2065.17	5 <sup>+</sup>	E1(+M2)	<0.20	0.00144 16	α=0.00144 16; α(K)=0.00087 13; α(L)=0.000133 23; α(M)=3.1×10 <sup>-5</sup> 6; α(N+..)=0.000409 7 α(N)=7.8×10 <sup>-6</sup> 14; α(O)=1.5×10 <sup>-6</sup> 3; α(P)=1.6×10 <sup>-7</sup> 3; α(IPF)=0.000399 8 α(K)exp = 0.00040 10/0.51 8 = 0.00078 23.

γ(<sup>204</sup>Pb) (continued)

<u>E<sub>γ</sub><sup>‡</sup></u>	<u>I<sub>γ</sub><sup>#h</sup></u>	<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>Mult.&amp;</u>	<u>δ<sup>a</sup></u>	<u>α<sup>†</sup></u>	<u>Comments</u>
1836.6 2	0.088 15	4094.29	6 <sup>-</sup>	2258.01	5 <sup>-</sup>	M1(+E2)	<1.1	0.0036 5	α=0.0036 5; α(K)=0.0027 4; α(L)=0.00045 6; α(M)=0.000104 14; α(N+..)=0.00032 4 α(N)=2.6×10 <sup>-5</sup> 4; α(O)=5.3×10 <sup>-6</sup> 8; α(P)=5.6×10 <sup>-7</sup> 8; α(IPF)=0.00028 4 α(N)=2.7×10 <sup>-5</sup> 4; α(O)=5.3×10 <sup>-6</sup> 7; α(P)=5.7×10 <sup>-7</sup> 8; α(IPF)=0.00029 4 α(K)exp = 0.00030 8/0.070 25 = 0.0043 19.
1850.65 35	0.11 2	4115.07	6 <sup>-</sup>	2264.28	7 <sup>-</sup>	M1(+E2)	<0.37	0.00393 12	α=0.00393 12; α(K)=0.00298 9; α(L)=0.000484 15; α(M)=0.000112 4; α(N+..)=0.000355 11 α(N)=2.86×10 <sup>-5</sup> 9; α(O)=5.71×10 <sup>-6</sup> 18; α(P)=6.15×10 <sup>-7</sup> 20; α(IPF)=0.000320 9 α(N)=2.81×10 <sup>-5</sup> 14; α(O)=5.6×10 <sup>-6</sup> 3; α(P)=6.0×10 <sup>-7</sup> 3; α(IPF)=0.000315 14 α(K)exp = 0.00040 8/0.100 20 = 0.0040 11.
1856.92 20	0.35 4	4115.07	6 <sup>-</sup>	2258.01	5 <sup>-</sup>	M1(+E2)	<1.9	0.0033 7	α=0.0033 7; α(K)=0.0025 6; α(L)=0.00041 9; α(M)=9.5×10 <sup>-5</sup> 20; α(N+..)=0.00031 6 α(N)=2.4×10 <sup>-5</sup> 5; α(O)=4.8×10 <sup>-6</sup> 10; α(P)=5.2×10 <sup>-7</sup> 11; α(IPF)=0.00028 6 α(N)=2.4×10 <sup>-5</sup> 5; α(O)=4.8×10 <sup>-6</sup> 10; α(P)=5.1×10 <sup>-7</sup> 12; α(IPF)=0.00028 6 α(K)exp = 0.00082 16/0.29 6 = 0.0028 8.
<sup>x</sup> 1881.76 25	0.13 4								
<sup>x</sup> 1889.02 <sup>f</sup> 20	0.036 7								
1891.37 <sup>f</sup> 20	0.092 9	4229.67?	(5,6)	2338.30	(4) <sup>-</sup>				
1896.27 8	1.62 15	3170.23	5 <sup>-</sup>	1273.99	4 <sup>+</sup>	E1(+M2)	<0.16	0.00138 9	α=0.00138 9; α(K)=0.00078 8; α(L)=0.000117 14; α(M)=2.7×10 <sup>-5</sup> 3; α(N+..)=0.000460 7 α(N)=6.8×10 <sup>-6</sup> 8; α(O)=1.36×10 <sup>-6</sup> 16; α(P)=1.44×10 <sup>-7</sup> 17; α(IPF)=0.000451 8 α(N)=6.6×10 <sup>-6</sup> 6; α(O)=1.32×10 <sup>-6</sup> 13; α(P)=1.40×10 <sup>-7</sup> 13; α(IPF)=0.000452 7 α(K)exp = 0.00090 14/1.27 15 = 0.00071 14.
1907.23 25	0.21 4	4165.88	5 <sup>-</sup>	2258.01	5 <sup>-</sup>	M1+E2	>0.36	0.0029 7	α=0.0029 7; α(K)=0.0022 6; α(L)=0.00035 9; α(M)=8.2×10 <sup>-5</sup> 20; α(N+..)=0.00031 7 α(N)=2.1×10 <sup>-5</sup> 5; α(O)=4.1×10 <sup>-6</sup> 11; α(P)=4.4×10 <sup>-7</sup> 12; α(IPF)=0.00029 7 α(N)=2.0×10 <sup>-5</sup> 6; α(O)=4.1×10 <sup>-6</sup> 11; α(P)=4.3×10 <sup>-7</sup> 12; α(IPF)=0.00028 7 α(K)exp = 0.00040 8/0.19 4 = 0.0021 6.
<sup>x</sup> 1916.43 25	0.06 1								
1925.80 6	0.74 6	4183.88	6 <sup>-</sup>	2258.01	5 <sup>-</sup>	M1+E2	<2.3	0.0031 7	α=0.0031 7; α(K)=0.0023 5; α(L)=0.00037 8; α(M)=8.6×10 <sup>-5</sup> 19; α(N+..)=0.00034 7 α(N)=2.2×10 <sup>-5</sup> 5; α(O)=4.4×10 <sup>-6</sup> 10; α(P)=4.7×10 <sup>-7</sup> 11;

<sup>204</sup>Bi ε decay [1970CrZY](#),[1977KaXO](#),[1984Dz05](#) (continued)

<u>γ(<sup>204</sup>Pb) (continued)</u>									
<u>E<sub>γ</sub><sup>‡</sup></u>	<u>I<sub>γ</sub><sup>#h</sup></u>	<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>Mult. &amp;</u>	<u>δ<sup>a</sup></u>	<u>α<sup>†</sup></u>	<u>Comments</u>
									α(IPF)=0.00032 7 α(N)=2.1×10 <sup>-5</sup> 6; α(O)=4.2×10 <sup>-6</sup> 11; α(P)=4.5×10 <sup>-7</sup> 13; α(IPF)=0.00031 8 α(K)exp = 0.00140 21/0.60 8 = 0.0023 5.
1931.08 <sup>f</sup> 20	0.020 5	3996.17	(5,6 <sup>+</sup> )	2065.17	5 <sup>+</sup>				
1941.19 6	0.99 10	3215.21	5 <sup>+</sup>	1273.99	4 <sup>+</sup>	E2(+M1)	>0.33	0.0028 7	α=0.0028 7; α(K)=0.0021 5; α(L)=0.00034 9; α(M)=7.9×10 <sup>-5</sup> 19; α(N+..)=0.00033 8 α(N)=2.0×10 <sup>-5</sup> 5; α(O)=4.0×10 <sup>-6</sup> 10; α(P)=4.3×10 <sup>-7</sup> 11; α(IPF)=0.00031 7 α(N)=2.0×10 <sup>-5</sup> 5; α(O)=4.0×10 <sup>-6</sup> 10; α(P)=4.3×10 <sup>-7</sup> 12; α(IPF)=0.00031 7 α(K)exp = 0.0016 3/0.78 10 = 0.0021 5.
<sup>x</sup> 1952.3 8	0.11 3								
<sup>x</sup> 1956.74 25	0.43 9								
1958.10 25	0.50 7	3232.13	5 <sup>-</sup>	1273.99	4 <sup>+</sup>	[E1]		0.001292 18	α=0.001292 18; α(K)=0.000665 10; α(L)=9.82×10 <sup>-5</sup> 14; α(M)=2.26×10 <sup>-5</sup> 4; α(N+..)=0.000507 7 α(N)=5.71×10 <sup>-6</sup> 8; α(O)=1.138×10 <sup>-6</sup> 16; α(P)=1.207×10 <sup>-7</sup> 17; α(IPF)=0.000500 7
1964.82 10	0.47 5	3782.14	5 <sup>-</sup>	1817.40	4 <sup>+</sup>	E1		0.001293 18	α=0.001293 18; α(K)=0.000661 10; α(L)=9.77×10 <sup>-5</sup> 14; α(M)=2.24×10 <sup>-5</sup> 4; α(N+..)=0.000512 8 α(N)=5.68×10 <sup>-6</sup> 8; α(O)=1.132×10 <sup>-6</sup> 16; α(P)=1.200×10 <sup>-7</sup> 17; α(IPF)=0.000505 7 α(K)exp < 0.0003/0.38 7 = 0.0008 upper limit. E <sub>γ</sub> : From adopted gammas.
1988.0 1	0.04 1	2887.16	2,3	899.15	2 <sup>+</sup>				
<sup>x</sup> 2009.6 5	0.10 2								
<sup>x</sup> 2014.1 5	0.06 1								
2028.1 4	0.18 2	4285.98	6 <sup>-</sup>	2258.01	5 <sup>-</sup>	E2(+M1)	>0.39	0.0026 6	α=0.0026 6; α(K)=0.0019 5; α(L)=0.00030 7; α(M)=7.1×10 <sup>-5</sup> 16; α(N+..)=0.00038 9 α(N)=1.8×10 <sup>-5</sup> 4; α(O)=3.6×10 <sup>-6</sup> 8; α(P)=3.8×10 <sup>-7</sup> 9; α(IPF)=0.00035 8 α(N)=1.8×10 <sup>-5</sup> 5; α(O)=3.6×10 <sup>-6</sup> 9; α(P)=3.9×10 <sup>-7</sup> 10; α(IPF)=0.00036 9 α(K)exp = 0.00025 5/0.14 3 = 0.0018 5.
2046.0 5	0.09 2	4111.33	(5) <sup>-</sup>	2065.17	5 <sup>+</sup>	[E1]		0.001300 19	α=0.001300 19; α(K)=0.000619 9; α(L)=9.13×10 <sup>-5</sup> 13; α(M)=2.10×10 <sup>-5</sup> 3; α(N+..)=0.000569 8 α(N)=5.31×10 <sup>-6</sup> 8; α(O)=1.058×10 <sup>-6</sup> 15; α(P)=1.123×10 <sup>-7</sup> 16; α(IPF)=0.000562 8
2064.2 <sup>k</sup> 5	0.04 1	4129.38	(5,6)	2065.17	5 <sup>+</sup>				
<sup>x</sup> 2084.2 5	0.03 2								
<sup>x</sup> 2092.6 5	0.04 1								
2100.6 5	0.05 1	4165.88	5 <sup>-</sup>	2065.17	5 <sup>+</sup>	[E1]		0.001307 19	α=0.001307 19; α(K)=0.000593 9; α(L)=8.74×10 <sup>-5</sup> 13;

<sup>204</sup>Bi ε decay [1970CrZY](#),[1977KaXO](#),[1984Dz05](#) (continued)

γ(<sup>204</sup>Pb) (continued)

<u>E<sub>γ</sub><sup>‡</sup></u>	<u>I<sub>γ</sub><sup>#h</sup></u>	<u>E<sub>i</sub>(level)</u>	<u>J<sub>i</sub><sup>π</sup></u>	<u>E<sub>f</sub></u>	<u>J<sub>f</sub><sup>π</sup></u>	<u>Mult.&amp;</u>	<u>α<sup>†</sup></u>	<u>Comments</u>
								α(M)=2.01×10 <sup>-5</sup> 3; α(N+..)=0.000606 9 α(N)=5.08×10 <sup>-6</sup> 8; α(O)=1.013×10 <sup>-6</sup> 15; α(P)=1.076×10 <sup>-7</sup> 15; α(IPF)=0.000600 9
<sup>x</sup> 2137.6 5	0.04 1							
2169.4 5	0.05 1	3733.25?	6 <sup>-</sup> ,7 <sup>-</sup>	1563.22	4 <sup>+</sup>	[M2,E3]	0.0047 15	α=0.0047 15; α(K)=0.0036 12; α(L)=0.00063 19; α(M)=0.00015 5; α(N+..)=0.00029 5 α(N)=3.7×10 <sup>-5</sup> 12; α(O)=7.4×10 <sup>-6</sup> 23; α(P)=8.E-7 3; α(IPF)=0.00024 4
<sup>x</sup> 2172.2 5	0.04 1							
2176.9 5	0.06 1	3782.14	5 <sup>-</sup>	1604.73	3 <sup>+</sup>	[M2]	0.00614 9	α=0.00614 9; α(K)=0.00481 7; α(L)=0.000810 12; α(M)=0.000189 3; α(N+..)=0.000337 5 α(N)=4.82×10 <sup>-5</sup> 7; α(O)=9.61×10 <sup>-6</sup> 14; α(P)=1.033×10 <sup>-6</sup> 15; α(IPF)=0.000278 4
2183.7 5	0.04 1	4250.04	(5,6 <sup>+</sup> )	2065.17	5 <sup>+</sup>			
2250.28 <sup>f</sup> 20	0.020 5	4067.95	(5 <sup>-</sup> ,6 <sup>+</sup> )	1817.40	4 <sup>+</sup>			
<sup>x</sup> 2252.07 <sup>f</sup> 20	0.030 5							
2263.38 10	0.37 6	4080.88	(5,6 <sup>+</sup> )	1817.40	4 <sup>+</sup>			
2279.4 5	0.05 1	3842.6?	(5,6 <sup>+</sup> )	1563.22	4 <sup>+</sup>			
2312.9 5	0.09 2	3876.38?	(5 <sup>-</sup> ,6 <sup>+</sup> )	1563.22	4 <sup>+</sup>			
<sup>x</sup> 2324.82 <sup>f</sup> 20	0.019 4							
<sup>x</sup> 2326.0 5	0.05 1							
2433.3 5	0.04 1	3996.17	(5,6 <sup>+</sup> )	1563.22	4 <sup>+</sup>			
<sup>x</sup> 2447.60 <sup>f</sup> 20	0.020 4							
<sup>x</sup> 2450.7 5	0.06 1							
2471.31 <sup>f</sup> 20	0.031 5	4076.24	(5) <sup>-</sup>	1604.73	3 <sup>+</sup>	[M2]	0.00471 7	α=0.00471 7; α(K)=0.00353 5; α(L)=0.000588 9; α(M)=0.0001375 20; α(N+..)=0.000453 7 α(N)=3.49×10 <sup>-5</sup> 5; α(O)=6.98×10 <sup>-6</sup> 10; α(P)=7.51×10 <sup>-7</sup> 11; α(IPF)=0.000411 6
<sup>x</sup> 2472.6 5	0.05 1							
2475.6 5	0.04 1	4039.1?	(5,6 <sup>+</sup> )	1563.22	4 <sup>+</sup>			
2493.9 <sup>k</sup> 20	0.02 1	3768.52	5 <sup>-</sup> ,6 <sup>-</sup>	1273.99	4 <sup>+</sup>	[E1,M2]	0.0030 17	α=0.0030 17; α(K)=0.0020 15; α(L)=0.0003 3; α(M)=7.E-5 6; α(N+..)=0.00066 20 α(N)=1.9×10 <sup>-5</sup> 16; α(O)=4.E-6 3; α(P)=4.E-7 4; α(IPF)=0.00064 22 E <sub>γ</sub> : Seen only by <a href="#">1972Hn01</a> .
2517.74 10	0.25 3	4080.88	(5,6 <sup>+</sup> )	1563.22	4 <sup>+</sup>			
2566.14 10	0.12 2	4129.38	(5,6)	1563.22	4 <sup>+</sup>			
<sup>x</sup> 2655.1 5	0.05 2							
<sup>x</sup> 2668.2 5	0.02 1							
2680.9 5	0.47 6	4243.86?	(5,6 <sup>+</sup> )	1563.22	4 <sup>+</sup>			
2686.82 10	0.34 5	4250.04	(5,6 <sup>+</sup> )	1563.22	4 <sup>+</sup>			
2721.2 5	0.04 1	3996.17	(5,6 <sup>+</sup> )	1273.99	4 <sup>+</sup>			
2758.8 5	0.12 2	4032.69?	(5,6 <sup>+</sup> )	1273.99	4 <sup>+</sup>			
2765.3 5	0.02 1	4039.1?	(5,6 <sup>+</sup> )	1273.99	4 <sup>+</sup>			

$\gamma(^{204}\text{Pb})$  (continued)

$E_\gamma$ <sup>‡</sup>	$I_\gamma$ # <sup>h</sup>	$E_i$ (level)	$J_i^\pi$	$E_f$	$J_f^\pi$	Mult.&	$\alpha$ <sup>†</sup>	Comments
2794.4 5	0.02 1	4067.95	(5 <sup>-</sup> ,6 <sup>+</sup> )	1273.99	4 <sup>+</sup>			
2802.1 5	0.02 1	4076.24	(5) <sup>-</sup>	1273.99	4 <sup>+</sup>	[E1]	0.001482 21	$\alpha=0.001482$ 21; $\alpha(\text{K})=0.000374$ 6; $\alpha(\text{L})=5.48\times 10^{-5}$ 8; $\alpha(\text{M})=1.256\times 10^{-5}$ 18; $\alpha(\text{N}+..)=0.001040$ 1 $\alpha(\text{N})=3.18\times 10^{-6}$ 5; $\alpha(\text{O})=6.35\times 10^{-7}$ 9; $\alpha(\text{P})=6.78\times 10^{-8}$ 10; $\alpha(\text{IPF})=0.001036$ 15
2837.33 10	0.26 4	4111.33	(5) <sup>-</sup>	1273.99	4 <sup>+</sup>	[E1]	0.001493 21	$\alpha=0.001493$ 21; $\alpha(\text{K})=0.000367$ 6; $\alpha(\text{L})=5.37\times 10^{-5}$ 8; $\alpha(\text{M})=1.231\times 10^{-5}$ 18; $\alpha(\text{N}+..)=0.001059$ 1 $\alpha(\text{N})=3.12\times 10^{-6}$ 5; $\alpha(\text{O})=6.22\times 10^{-7}$ 9; $\alpha(\text{P})=6.65\times 10^{-8}$ 10; $\alpha(\text{IPF})=0.001056$ 15
2854.9 5	0.02 1	4129.38	(5,6)	1273.99	4 <sup>+</sup>			
<sup>x</sup> 2864.6 5	0.01 1							
2898.0 5	0.015 5	4172.28?	(5,6 <sup>+</sup> )	1273.99	4 <sup>+</sup>			
<sup>x</sup> 2948.0 5	0.01 1							
2955.6 5	0.02 1	4229.67?	(5,6)	1273.99	4 <sup>+</sup>			
2976.9 5	0.02 1	4250.04	(5,6 <sup>+</sup> )	1273.99	4 <sup>+</sup>			
3011.4 5	0.03 1	4285.98	6 <sup>-</sup>	1273.99	4 <sup>+</sup>	[M2]	0.00332 5	$\alpha=0.00332$ 5; $\alpha(\text{K})=0.00220$ 3; $\alpha(\text{L})=0.000361$ 5; $\alpha(\text{M})=8.41\times 10^{-5}$ 12; $\alpha(\text{N}+..)=0.000683$ 10 $\alpha(\text{N})=2.14\times 10^{-5}$ 3; $\alpha(\text{O})=4.27\times 10^{-6}$ 6; $\alpha(\text{P})=4.61\times 10^{-7}$ 7; $\alpha(\text{IPF})=0.000657$ 10

<sup>†</sup> Additional information 8.

<sup>‡</sup> From [1958St99](#), [1970CrZY](#), [1972Hn01](#), [1977KaXO](#), and [1984Dz05](#).

# Most are from average of [1970CrZY](#) and [1971Hn01](#) (see [1971Ma78](#)) and from [1984Dz05](#).

@ From adopted gammas.

& Based on ce data of [1958St99](#), [1972Hn01](#), [1977VaYT](#), [1977VaYS](#), and [1984Dz05](#). [1972Hn01](#) combine their  $I_\gamma$  values with the  $\text{Ice}(\text{K})$  values given in [1958St99](#) to calculate  $\alpha(\text{K})_{\text{exp}}$ .

<sup>a</sup> Calculated by evaluators from  $\alpha(\text{K})_{\text{exp}}$ , unless otherwise specified.

<sup>b</sup> Calculated by evaluators from the % admixture ranges quoted in [1984Dz05](#). These ranges are based on ce measurements and do not determine the sign of  $\delta$ .

<sup>c</sup> Based on  $\gamma(\theta)$  in (n,n' $\gamma$ ).

<sup>d</sup> Placement is favored by  $\gamma\gamma$ -coin.

<sup>e</sup> Seen only in ce spectra;  $E_\gamma$  from [1958St99](#).

<sup>f</sup> From [1977KaXO](#), as adopted in [1994Sc24](#).  $\Delta E \approx 0.1\text{-}0.2$  keV [H. Griffin, priv. comm. (1979)].

<sup>g</sup> From ce data of [1972Hn01](#).

<sup>h</sup> For absolute intensity per 100 decays, multiply by 0.80 7.

<sup>i</sup> Multiply placed with undivided intensity.

<sup>j</sup> Multiply placed with intensity suitably divided.

<sup>k</sup> Placement of transition in the level scheme is uncertain.

<sup>x</sup>  $\gamma$  ray not placed in level scheme.

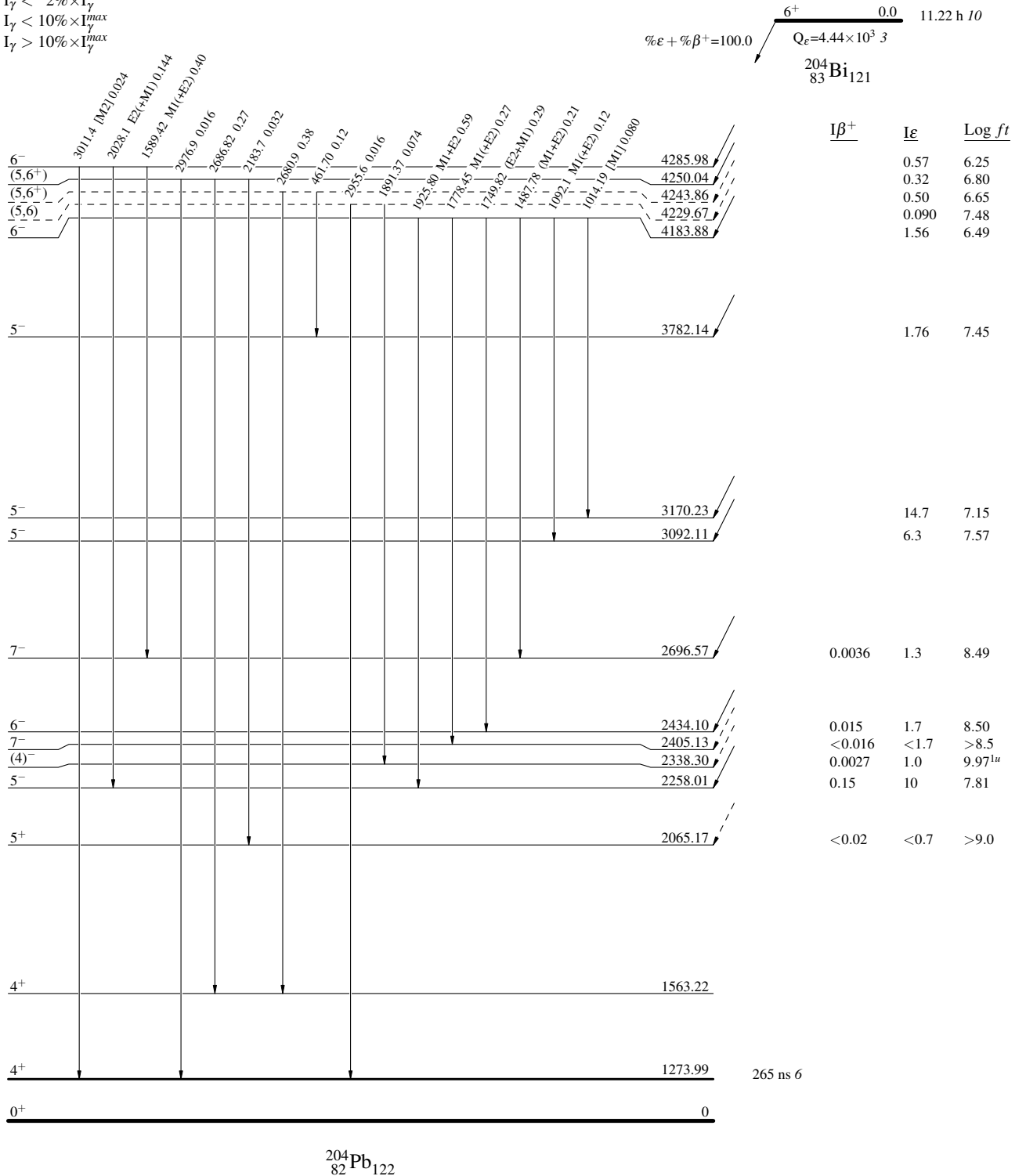
$^{204}\text{Bi}$   $\epsilon$  decay 1970CrZY,1977KaXO,1984Dz05

## Decay Scheme

Intensities:  $I_\gamma$  per 100 parent decays

## Legend

- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
- $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
- $I_\gamma > 10\% \times I_\gamma^{\text{max}}$





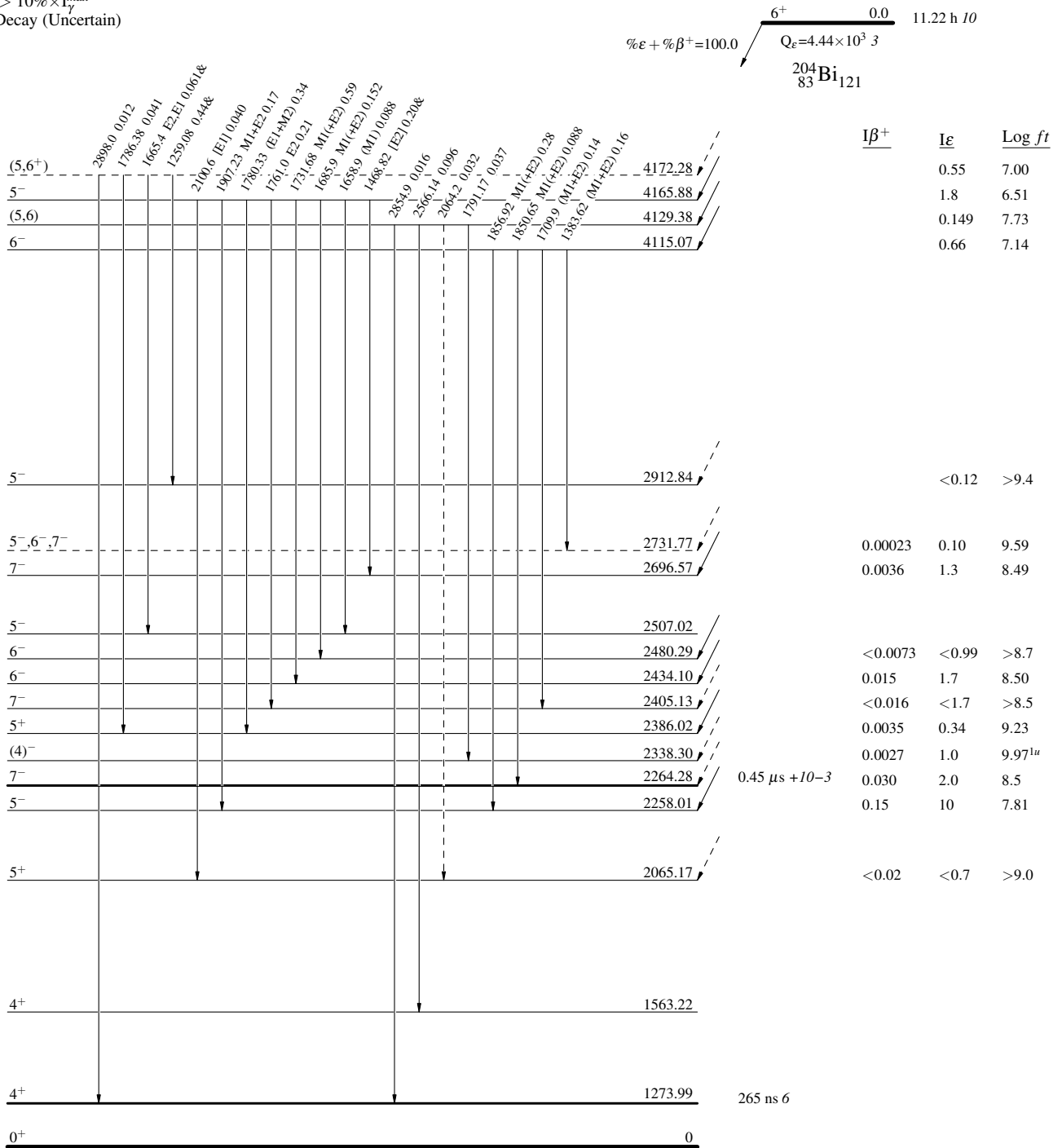
$^{204}\text{Bi}$   $\epsilon$  decay 1970CrZY,1977KaXO,1984Dz05

Decay Scheme (continued)

Legend

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

Intensities:  $I_\gamma$  per 100 parent decays  
& Multiply placed: undivided intensity given



$^{204}_{82}\text{Pb}_{122}$

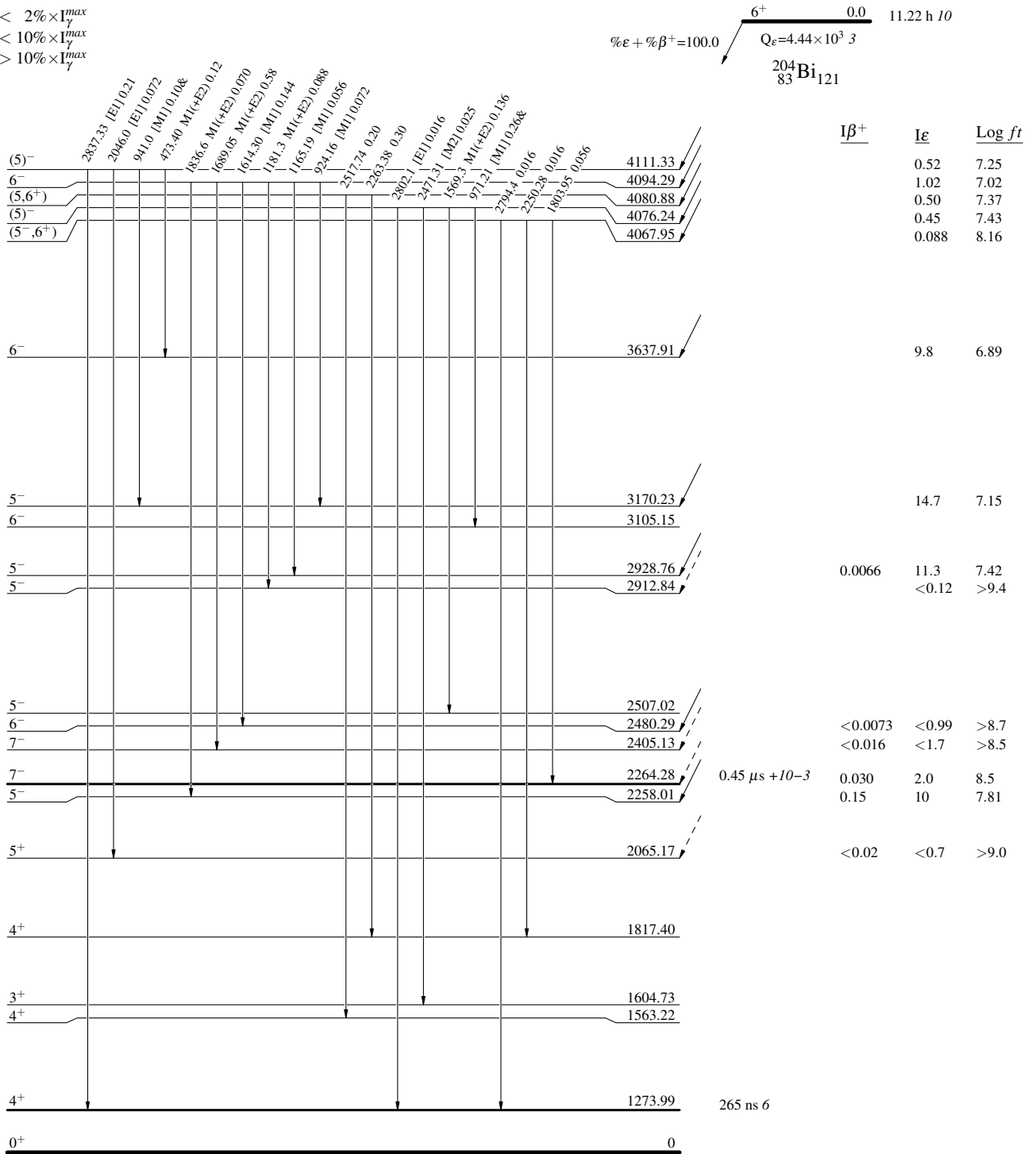
$^{204}\text{Bi}$   $\epsilon$  decay 1970CrZY,1977KaXO,1984Dz05

Decay Scheme (continued)

Intensities:  $I_\gamma$  per 100 parent decays  
& Multiply placed: undivided intensity given

Legend

- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
- $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
- $I_\gamma > 10\% \times I_\gamma^{\text{max}}$



<sup>204</sup>Bi ε decay 1970CrZY,1977KaXO,1984Dz05

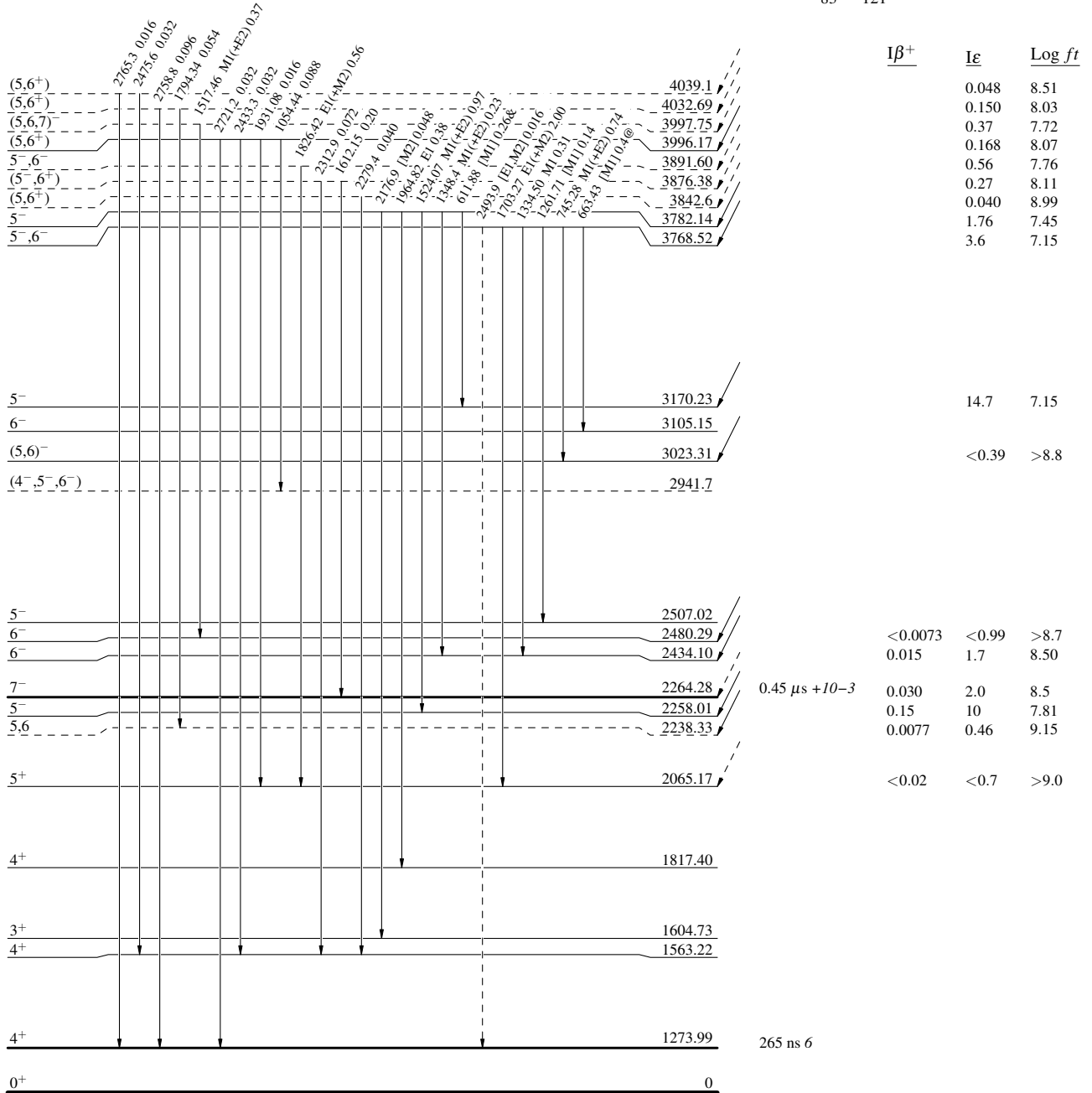
Decay Scheme (continued)

Intensities: I<sub>γ</sub> per 100 parent decays  
& Multiply placed: undivided intensity given  
@ Multiply placed: intensity suitably divided

Legend

- I<sub>γ</sub> < 2% × I<sub>γ</sub><sup>max</sup>
- I<sub>γ</sub> < 10% × I<sub>γ</sub><sup>max</sup>
- I<sub>γ</sub> > 10% × I<sub>γ</sub><sup>max</sup>
- - - - - γ Decay (Uncertain)

6+ 0.0 11.22 h 10  
 Q<sub>ε</sub> = 4.44 × 10<sup>3</sup> z  
<sup>204</sup>Bi<sub>83</sub><sup>121</sup>  
 %ε + %β<sup>+</sup> = 100.0



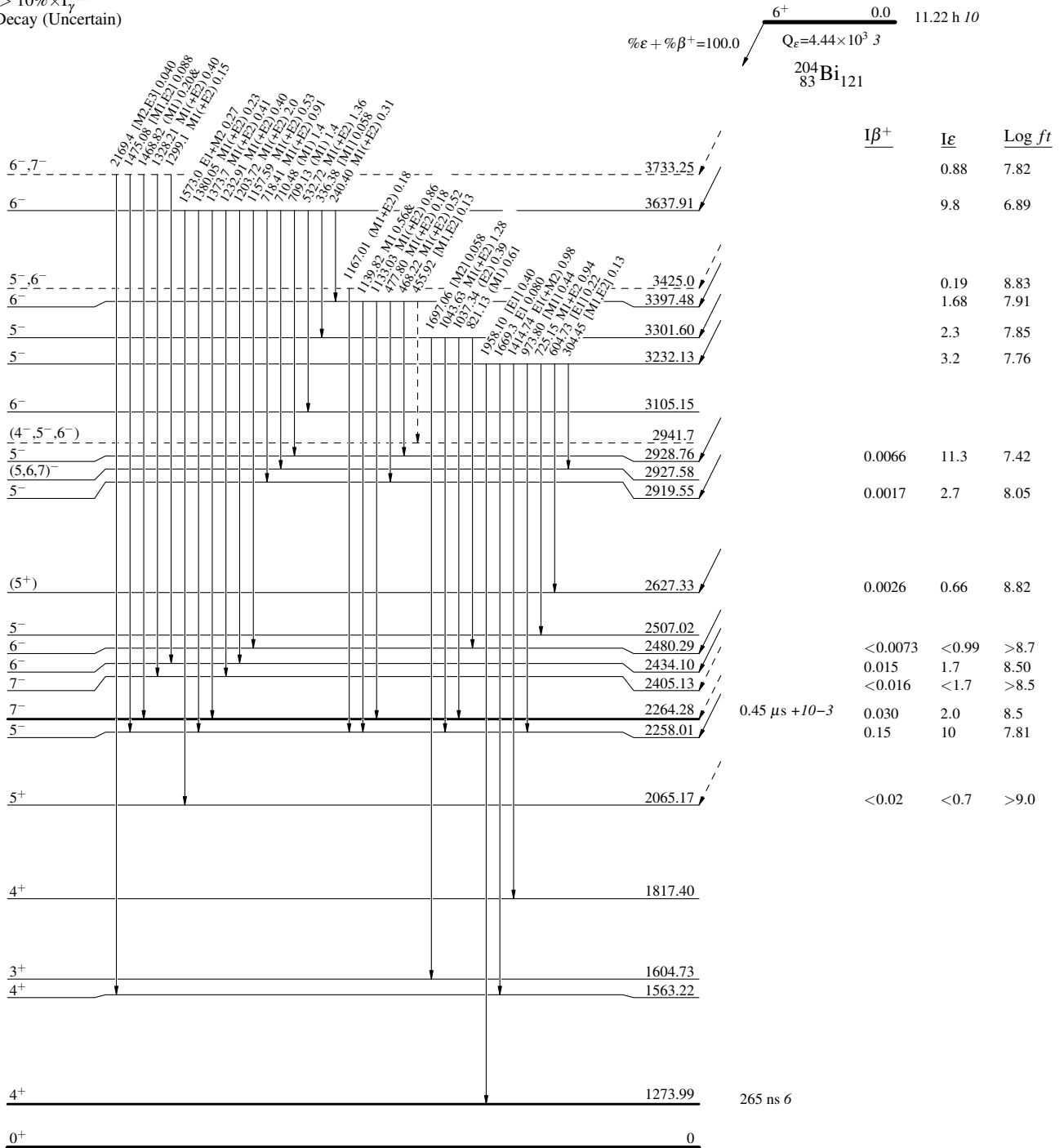
<sup>204</sup>Bi ε decay 1970CrZY,1977KaXO,1984Dz05

Decay Scheme (continued)

Intensities: I<sub>γ</sub> per 100 parent decays  
& Multiply placed: undivided intensity given  
@ Multiply placed: intensity suitably divided

Legend

- I<sub>γ</sub> < 2% × I<sub>γ</sub><sup>max</sup>
- I<sub>γ</sub> < 10% × I<sub>γ</sub><sup>max</sup>
- I<sub>γ</sub> > 10% × I<sub>γ</sub><sup>max</sup>
- - - - - γ Decay (Uncertain)



$^{204}\text{Bi}$   $\epsilon$  decay 1970CrZY,1977KaXO,1984Dz05

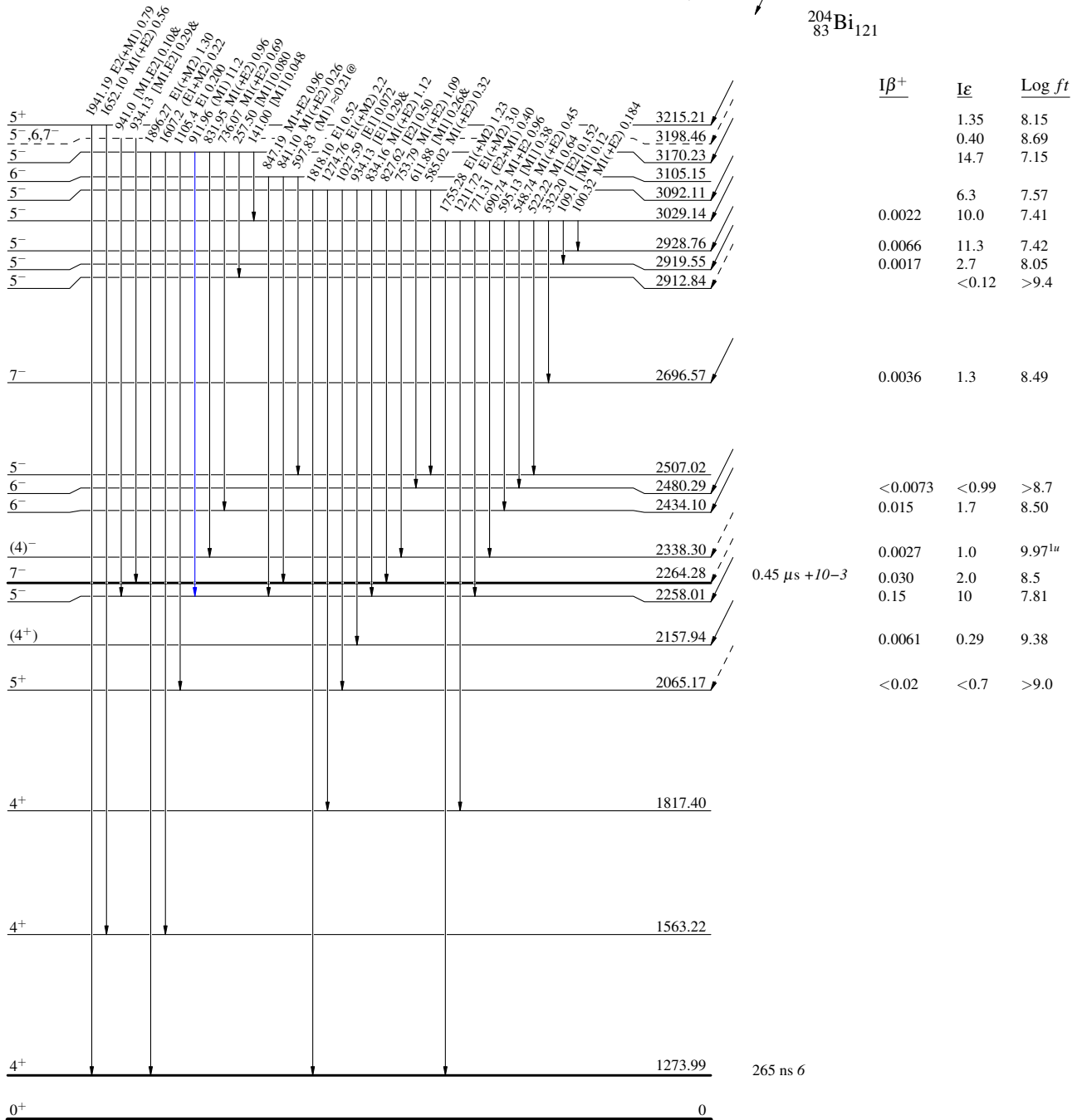
Decay Scheme (continued)

Intensities:  $I_\gamma$  per 100 parent decays  
& Multiply placed: undivided intensity given  
@ Multiply placed: intensity suitably divided

Legend

- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
- $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
- $I_\gamma > 10\% \times I_\gamma^{\text{max}}$

$^{204}_{83}\text{Bi}_{121}$   $6^+$   $0.0$  11.22 h 10  
 $Q_\epsilon = 4.44 \times 10^3$  z  
 $\% \epsilon + \% \beta^+ = 100.0$



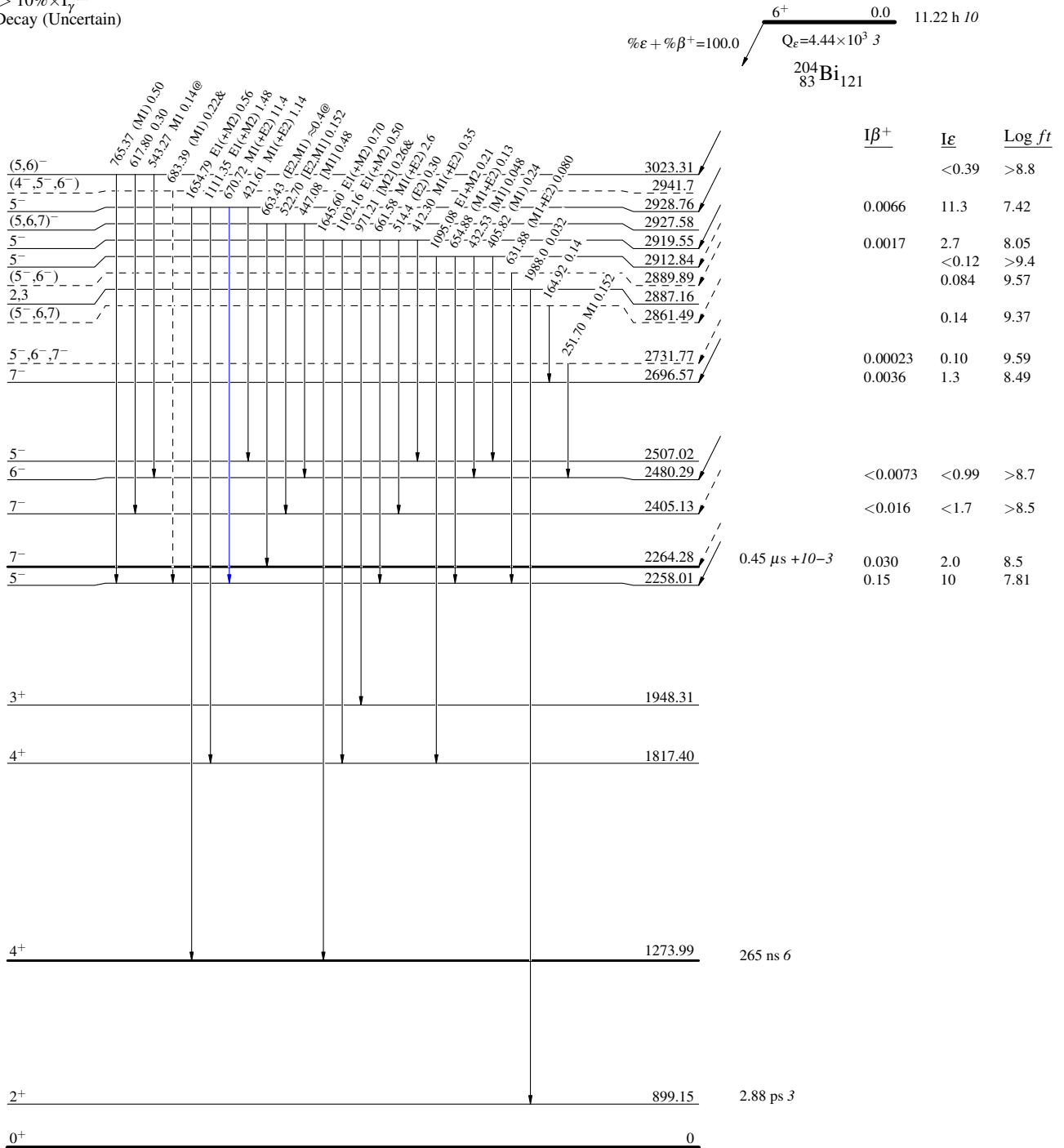
$^{204}\text{Bi}$   $\epsilon$  decay 1970CrZY,1977KaXO,1984Dz05

Decay Scheme (continued)

Intensities:  $I_\gamma$  per 100 parent decays  
& Multiply placed: undivided intensity given  
@ Multiply placed: intensity suitably divided

Legend

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



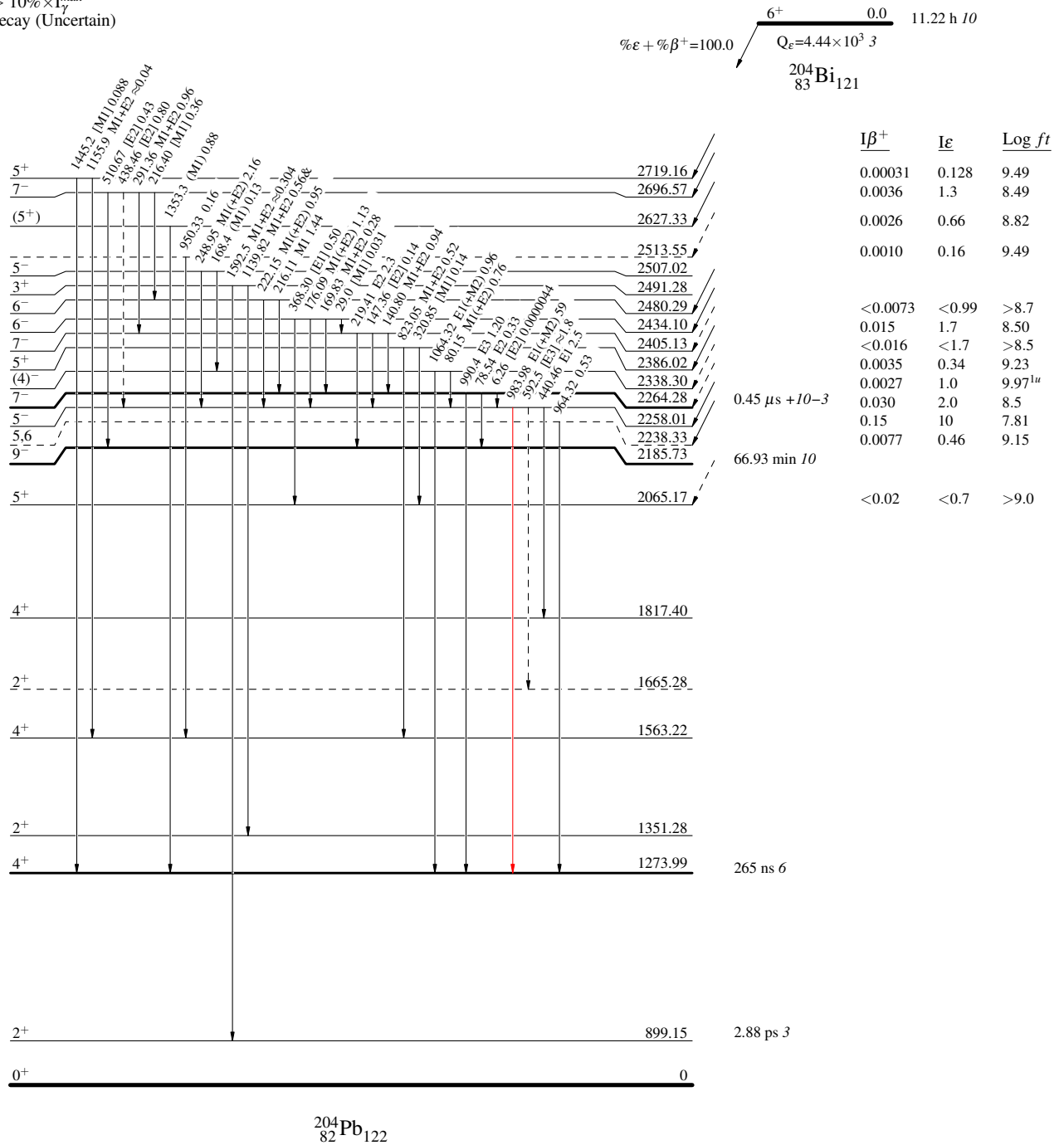
$^{204}\text{Bi}$   $\epsilon$  decay 1970CrZY,1977KaXO,1984Dz05

Decay Scheme (continued)

Intensities:  $I_\gamma$  per 100 parent decays  
& Multiply placed: undivided intensity given  
@ Multiply placed: intensity suitably divided

Legend

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



$^{204}\text{Bi}$   $\epsilon$  decay 1970CrZY,1977KaXO,1984Dz05

Decay Scheme (continued)

Intensities:  $I_\gamma$  per 100 parent decays  
 & Multiply placed: undivided intensity given  
 @ Multiply placed: intensity suitably divided

Legend

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

