Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh	NDS 177, 1 (2021)	3-Sep-2021

Q(β^-)=−5018 *14*; S(n)=8210 *9*; S(p)=1083 *12*; Q(α)=5918 *5* 2021Wa16
S(2n)=18630 *30*, S(2p)=4730 *30*, Q(ε)=8185 *18*, Q(εp)=4165 *9* (2021Wa16).
The α-decay chain ^{202}Fr – ^{198}At – ^{194}Bi suggests population of two ^{194}Bi activities: ^{194}Bi(J^π=(3$^+$),95 s, g.s.) and ^{194}Bi(J^π=(10$^-$),115 s, 0+x level) (1992Hu04,1991Va04). A second ^{194}Bi(J^π=(6$^+$,7$^+$),125 s, 0+y level) isomer was inferred from electron-capture decay studies (1987Va09). The two isomers are now identified at 161 *8* and 150 *50* keV, respectively.
Other measurements:
2017Ba12 (also 2017Mo44): measurement of hyperfine spectra, magnetic dipole moments and rms radii using three-step laser resonance ionization and in-source laser spectroscopy at IRIS facility of Petersburg Nuclear Physics Institute.
Additional information 1.
Mass measurement: 2013St25, 2008We02, 2005GeZW, 2000Ra23. Other: 2005We13.
Theoretical references: consult the NSR database (www.nndc.bnl.gov/nsr/) for 33 primary references dealing with half-lives in different decay modes, and some for nuclear structure calculations.

^{194}Bi Levels

Band assignments are from ^{159}Tb(^{40}Ar,5nγ) (2020He17).

Cross Reference (XREF) Flags

A ^{198}At α decay (4.46 s)
B ^{198}At α decay (1.25 s)
C ^{159}Tb(^{40}Ar,5nγ)

E(level)†	J$^\pi$‡	T$_{1/2}$	XREF	Comments
0.0	(3$^+$)	95 s *3*	A	%ε+%β^+=99.54 *25*; %α=0.46 *25* μ=4.17 *10* (2017Ba12,2019StZV) Measured δ<r^2>(^{194}Po,^{209}Po)=−0.727 fm^2 *21* (stat) *51* (syst) (2017Ba12,2017Mo44). μ: from in-source laser spectroscopy (2017Ba12), uncertainties of 0.099 (stat) and 0.084 (syst) combined in quadrature by the evaluators. Value of 4.19 *13* in 2017Ba12 is evaluated to 4.17 *10* in 2019StZV. %α: from 1991Va04. Other value: 0.066 (1985HuZY), <0.15 (1972Ga27). J$^\pi$: populated by favored (HF≈3) α decay from ^{198}At(J^π=(3$^+$)) (1992Hu04). Probable configuration=πh$_{9/2}\otimes(\nu$f$_{7/2}+\nu$f$_{5/2})$ (1987Va09). T$_{1/2}$: from α decay curve (1991Va04). Others: 94 s *5* from (1988Hu03); 106 s *3* (1987Va09) from decay curves for 1308γ and 930.6 (E0) lines, both seen in the decay of all the three ^{194}Bi activities; 105 s *15* (1974Le02) from the decay of a 5.61 MeV *2* α, which includes the 5598α (from ^{194}Bi (10$^-$) decay) and the tail from the 5645α (from ^{194}Bi (3$^+$) decay).
145 *50*	(6$^+$,7$^+$)	125 s *2*		%ε+%β^+=100 E(level): from evaluated mass excess of −16023 *5* (2021Wa16) for the g.s. and measured mass excess of −15878 *50* (2008We02), where dominant activity is associated with the medium-spin of ^{194}Bi. However, original uncertainty of 14 keV is increased to 50 keV to account for a possible mixture of the other two long-lived activities in ^{194}Bi. J$^\pi$: ε population to levels with J=5 through 8 in ^{194}Pb. Systematics of J^π=6$^+$,7$^+$ in neighboring odd-odd bismuth isomers. Probable configuration=πh$_{9/2}\otimes\nu$p$_{3/2}$ (1985HuZY). T$_{1/2}$: from γ decay curve (1987Va09, probably erroneously quoted by the authors as mean-life). Other value: 120 s *18* (1976Ch30, γ-decay curve). No α decay mode has been detected from this isomer.

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Adopted Levels, Gammas (continued)

^{194}Bi Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
161 *8*	(10⁻)	115 s *4*	BC	%ε+%β⁺=99.80 *7*; %α=0.20 *7* μ=2.46 *11* (2017Ba12,2019StZV) Additional information 2. Measured δ<r²>(^{194m}Po,^{209}Po)=−0.737 fm² *14*(stat) *52*(syst) (2017Ba12). μ: from in-source laser spectroscopy (2017Ba12), uncertainties of 0.11 (stat) and 0.05 (syst) combined in quadrature by the evaluators. Value of 2.47 *12* in 2017Ba12 is evaluated to 2.46 *11* in 2019StZV. %α: From 1991Va04. Other value: 0.21 (1985HuZY). E(level): deduced by 2019Gh11 from α-decay data. Others: 184 *12* deduced from measurement of mass excesses of ^{190m}Tl, ^{194}Tl, ^{194m}Tl and ^{198}At, and analysis of other masses through α-decay chains (2013St25). Jπ: favored α decay with HF≈2 from ^{198}At (Jπ=(10⁻)). Probable configuration=πh$_{9/2}$⊗νi$_{13/2}$ (1988Hu03). $T_{1/2}$: from α-decay curve (1991Va04). Other measurement: 116 s *4* (1988Hu03, from α-decay curve).
218.2 *1*	(2⁺,3⁺,4⁺)		A	Jπ: M1+E2 γ to (3⁺).
265.6 *1*	(9⁻)		BC	Jπ: 104.6γ M1+E2 to (10⁻); 528.6γ ΔJ=1 from (10⁺).
382.4 *1*	(1 to 5)$^{(+)}$		A	Jπ: 103.4γ (E2) from (1:5)$^{(+)}$ level; 382.4γ to (3⁺).
399.7 *1*	(1 to 5)$^{(+)}$		A	Jπ: 181.4γ (M1) to (2⁺,3⁺,4⁺).
485.5 *1*	(1 to 5)$^{(+)}$		A	Jπ: 267.1γ (M1) to (2⁺,3⁺,4⁺) level; 485.8γ to 3⁺.
687.2[@] *1*	(11⁻)		BC	Jπ: 526.1γ M1, ΔJ=1 to (10⁻); bandhead.
700.1 *1*	(10⁻)		BC	Jπ: 539.4 γ to (10⁻); 211.0γ from (11⁻).
794.1[#] *1*	(10⁺)	≈1 ns	C	Jπ: 633.1γ ΔJ=0, (E1) to (10⁻); 528.6γ E1, ΔJ=1 to (9⁻); bandhead. $T_{1/2}$: estimated by 2020He17 from recoil shadow anisotropy method (RSAM) in ^{159}Tb(^{40}Ar,5nγ).
910.9 *1*	(11⁻)		C	Jπ: 211.0γ and 749.6γ to (10⁻).
936.0[#] *2*	(11⁺)		C	Jπ: 142.3γ (M1), ΔJ=1 to (10⁺); band assignment.
1018.5[@] *1*	(12⁻)		C	Jπ: 857.5γ E2, ΔJ=2 to (10⁻); 331.3γ to (11⁻); band assignment.
1162.9[#] *2*	(12⁺)		C	Jπ: 227.0γ D, ΔJ=1 to (11⁺); 368.8γ to (10⁺); band assignment.
1225.6 *1*	(12⁻)		C	Jπ: 1064.6γ E2, ΔJ=2 to (10⁻).
1315.9 *2*	(11⁺)		C	Jπ: 379.7γ (D), ΔJ=0 to (11⁺).
1348.8[@] *1*	(13⁻)		C	Jπ: 661.8γ E2, ΔJ=2 to (11⁻); 330.2γ M1, ΔJ=1 to (12⁻).
1370.1 *1*	(10⁻,11⁺)		C	Jπ: negative POL value suggests ΔJ=0, E1 or ΔJ=1, M1 576.0γ to (10⁺). No Jπ assignment in 2020He17.
1382.5 *1*	(11⁻)		C	Jπ: 695.3γ (D), ΔJ=0 to (11⁻).
1426.3[#] *2*	(13⁺)		C	Jπ: 490.3γ Q, ΔJ=2 to (11⁺); 263.4γ (M1), ΔJ=1 to (12⁺).
1482.2 *1*	(12)		C	Jπ: 795.1γ D, ΔJ=1 to (11⁻).
1499.9 *2*	(12⁺)		C	Jπ: 705.3γ E2, ΔJ=2 to (10⁺); ; 183.9γ M1, ΔJ=1 to (11⁺).
1592.0[@] *1*	(14⁻)		C	Jπ: 573.6γ E2, ΔJ=2 to (12⁻); 243.3γ M1, ΔJ=1 to (13⁻).
1643.1 *1*	(13⁻)		C	Jπ: 956.0γ E2, ΔJ=2 to (11⁻); 524.5γ to (12⁻).
1698.6 *1*	(13⁻)		C	Jπ: 472.8γ M1, ΔJ=1 to (12⁻); 1011.4γ to (11⁻).
1720.2[#] *2*	(14⁺)		C	Jπ: 557.3γ E2, ΔJ=2 to (12⁺); 294.0γ M1, ΔJ=1 to (13⁺).
1724.6 *1*			C	Jπ: 706.1γ to (12⁻) suggests (12,13,14⁻).
1844.9 *2*			C	Jπ: 1157.7γ to (11⁻) suggests (11,12,13⁻).
1888.4 *1*	(14⁻)		C	Jπ: 662.8γ E2, ΔJ=2 to (12⁻); 539.5γ M1, ΔJ=1 to (13⁻).
1895.9 *2*	(13⁻)		C	Jπ: 670.4γ D, ΔJ=1 to (12⁻); 1208.6γ to (11⁻).
1926.2 *2*			C	Jπ: 283.1γ to (13⁻) suggests (13,14,15⁻).
1955.5[@] *1*	(15⁻)		C	Jπ: 363.4γ M1, ΔJ=1 to (14⁻); 363.4γ M1, ΔJ=1 to (14⁻).
1956.6 *2*	(12⁻,13⁺)		C	Jπ: negative POL value suggests ΔJ=0, E1 or ΔJ=1, M1 456.7γ to (12⁺). No Jπ assignment in 2020He17.
1985.3 *2*			C	Jπ: 485.4γ to (12⁺) suggests (12,13,14⁺).
2030.2 *1*	(14⁻)		C	Jπ: 804.7γ E2, ΔJ=2 to (12⁻); 331.5γ to (13⁻); band assignment.
2033.3[#] *2*	(15⁺)		C	Jπ: 606.9γ E2, ΔJ=2 to (13⁺); 313.2γ M1, ΔJ=1 to (14⁺).

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Adopted Levels, Gammas (continued)

^{194}Bi Levels (continued)

E(level)[†]	Jπ[‡]	XREF	Comments
2060.27 *19*		C	Jπ: 560.4γ to (12+) suggests (12,13,14+).
2086.9 *1*	(13−,14+)	C	Jπ: negative POL value suggests ΔJ=0, E1 or ΔJ=1, M1 738.1γ to (13+). No Jπ assignment in 2020He17.
2113.0 *2*	(15)	C	Jπ: 224.6γ D, ΔJ=1 to (14−).
2230.6 *2*	(15−)	C	Jπ: 881.7γ E2, ΔJ=2 to (13−).
2245.4[@] *1*	(16−)	C	Jπ: 653.5γ E2, ΔJ=2 to (14−); 289.9γ to (15−); band assignment.
2268.9 *2*	(13−,14+)	C	Jπ: negative POL value suggests ΔJ=0, E1 or ΔJ=1, M1 842.6γ to (13+). No Jπ assignment in 2020He17.
2348.7 *1*	(15)	C	Jπ: 756.7γ D, ΔJ=1 to (14−).
2367.8[#] *2*	(16+)	C	Jπ: 647.4γ E2, ΔJ=2 to (14+); 334.6γ M1, ΔJ=1 to (15+).
2427.5[&] *2*	(16+)	C	Jπ: 707.3γ E2, ΔJ=2 to (14+); 394.2γ M1, ΔJ=1 to (15+).
2429.4 *2*	(16−)	C	Jπ: 541.0γ E2, ΔJ=2 to (14−).
2460.3 *2*	(16)	C	Jπ: 427.0γ D, ΔJ=1 to (15+).
2557.8? *2*		C	Jπ: 527.6γ to (14−) suggests (14,15,16−).
2612.0[&] *2*	(17+)	C	Jπ: 184.5γ D, ΔJ=1 to (16+); band assignment.
2646.3[@] *1*	(17−)	C	Jπ: 690.8γ to (15−), 400.9γ to (16−); band assignment.
2721.1[#] *2*	(17+)	C	Jπ: 688.2γ, ΔJ=2, Q to (15+); 353.3γ D, ΔJ=1 to (16+); band assignment.
2783.7? *2*		C	Jπ: possible 750.4γ to (15+) suggests (15,16,17+).
2808.2? *3*		C	Jπ: 347.9γ to (16) suggests (16,17,18).
2966.5[&] *2*	(18+)	C	Jπ: 354.5γ (M1), ΔJ=1 to (17+); band assignment.
2978.5[@] *2*	(18−)	C	Jπ: 733.1γ, Δ=2, Q to (16−); band assignment.
3091.9[#] *2*	(18+)	C	Jπ: 723.7γ, ΔJ=(2), (Q) to (16+); 371.3γ to (17+); band assignment.
3203.90 *21*		C	Jπ: 776.4γ to (16+) suggests (16,17,18+).
3410.70[&] *25*	(19+)	C	Jπ: 444.2γ D, ΔJ=1 to (18+); band assignment.
3843.9[&] *3*	(20+)	C	Jπ: 433.2γ to (19+) and band assignment. No assignment in 2020He17.
4301.8[&] *4*	(21+)	C	Jπ: 457.9γ to (20+) and band assignment. No assignment in 2020He17.
x[a]	(16)	C	Jπ: possible configuration=[πi$_{13/2}$⊗νi$^{-2}_{13/2}$]⊗νp$_{3/2}$ (2020He17); bandhead.
139.4+x[a] *1*	(17)	C	Jπ: 139.4γ (M1), ΔJ=1 to (16); band assignment.
280.7+x[a] *2*	(18)	C	Jπ: 141.2γ (M1), ΔJ=1 to (17); band assignment.
446.6+x[a] *2*	(19)	C	Jπ: 165.9γ (M1), ΔJ=1 to (18); band assignment.
648.3+x[a] *2*	(20)	C	Jπ: 201.7γ M1, ΔJ=1 to (19); band assignment.
891.0+x[a] *2*	(21)	C	Jπ: 242.7γ M1, ΔJ=1 to (20); 444.1γ to (19); band assignment.
1165.9+x[a] *2*	(22)	C	Jπ: 274.8γ M1, ΔJ=1 to (21); 517.9γ to (20); band assignment.
1469.0+x[a] *3*	(23)	C	Jπ: 303.2γ (M1), ΔJ=1 to (22); 577.6γ to (21); band assignment.
1799.3+x[a] *3*	(24)	C	Jπ: 330.3γ (M1), ΔJ=1 to (23); band assignment.
2117.3+x[a] *3*	(25)	C	Jπ: 318.0γ to (24); band assignment.
2403.1+x?[a] *3*	(26)	C	E(level): level energy is either 2403.1+x or 2384.6+x as, according to 2020He17, ordering of the 285.8γ and 267.3γ is tentative. Jπ: 285.8γ to (25); band assignment.
2670.4+x[a] *4*	(27)	C	Jπ: 267.3γ to (26); band assignment.
y[b]	J	C	2020He17 suggest this level as an isomer from absence of transitions from the lower-lying structures in their γγ-coin spectra.
124.8+y[b] *1*	(J+1)	C	
335.9+y[b] *2*	(J+2)	C	
595.1+y[b] *2*	(J+3)	C	
958.5+y[b] *2*	(J+4)	C	
1396.6+y[b] *2*	(J+5)	C	

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Adopted Levels, Gammas (continued)

^{194}Bi Levels (continued)

† From a least-squares fit to γ-ray energies by keeping energy of the 161-keV level fixed, without its uncertainty of 8 keV, and with doubled uncertainties in Eγ values for six γ rays as indicated, resulting in reduced χ^2=3.2 as compared to critical χ^2=1.7. Without this adjustment, reduced χ^2=5.9. It appears that the listed uncertainties in γ-ray energies are somewhat underestimated. All the level energies are relative to 161-keV level, with no uncertainty. For absolute uncertainties, 8 keV uncertainty in the 161-keV level should be considered.

‡ Assignments for high-spin levels are based on measured γγ(DCO), γ(lin pol) in ^{159}Tb(^{40}Ar,5nγ), band assignments and γ-decay patterns, assuming that spin values are generally in ascending order as the excitation energy increases, typical of reactions populating yrast level structures.

Band(A): Band based on (10^+). Strongly coupled rotational band with proposed configuration=$\pi i_{13/2}\otimes\nu i^{-1}_{13/2}$ (2020He17).

@ Band(B): ΔJ=1, dipole band based on (11^-). Strongly coupled rotational band with proposed Configuration=$\pi h_{9/2}\otimes\nu i^{-1}_{13/2}$ (2020He17).

& Band(C): ΔJ=1, dipole band based on (16^+). Possible magnetic-dipole (shears) rotational band. Proposed configurations: $\pi(h^2_{9/2}i_{13/2})\otimes\nu^+$ or $\pi h_{9/2}\otimes\nu i^{-2}_{13/2}\otimes\nu^-$, 4=qp band.

a Band(D): ΔJ=1, dipole band based on J≈(16). This band is interpreted as a strongly coupled rotational band, with the spin assignment for the bandhead based on a proposed configuration of $\pi i_{13/2}\otimes\nu i^{-2}_{13/2}\otimes\nu p_{3/2}$, based on comparison with similar transition energies between this band and positive-parity bands in the odd-A Bi nuclei after 2-neutron alignments. Such a configuration suggests negative parity for the band, although, 2020He17 do not assign parity for this band. 2020He17 stated that decrease in gamma energies above the J=25 state may indicate a band crossing. 2020He17 further conclude that deduced B(M1)/B(E2) values for this band exclude a magnetic dipole rotational (shears) structure. Note that spins in this dataset are taken from Fig. 1 and discussion in text in 2020He17. These are higher by one unit in authors′ Table 1.

b Band(E): ΔJ=1, dipole band. 2020He17 suggest the lowest energy level as an isomer from absence of transitions from the lower-lying structures in the γγ-coin spectra. The identification of this band is based on observation of Bi x rays, and that no such γ sequence has been observed in in neighbouring odd-A Bi nuclei.

Adopted Levels, Gammas (continued)

γ(^{194}Bi)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	δ	α[&]	Comments
218.2	(2$^+$,3$^+$,4$^+$)	218.2 *1*	100	0.0	(3$^+$)	M1+E2	1.0 *6*	0.7 *3*	Mult.,δ: from α(K)exp in α decay (4.46 s) (2019Gh11).
265.6	(9$^-$)	104.6 *1*	100	161	(10$^-$)	M1+E2		7.3 *17*	E_γ: weighted average of 104.5 *2* from ^{198}At α decay (1.25 s) and 104.6 *1* from (^{40}Ar,5nγ). Mult.: from intensity balance in (^{40}Ar,5nγ) (2020He17), and in ^{198}At α decay (2019Gh11).
382.4	(1 to 5)$^{(+)}$	382.4 *1*	100	0.0	(3$^+$)	[M1,E2]		0.15 *9*	
399.7	(1 to 5)$^{(+)}$	181.4 *1*	100 *12*	218.2	(2$^+$,3$^+$,4$^+$)	(M1)[@]		1.88	
		399.7 *2*	44 *8*	0.0	(3$^+$)	[M1,E2]		0.13 *8*	
485.5	(1 to 5)$^{(+)}$	103.4 *2*	31 *8*	382.4	(1 to 5)$^{(+)}$	(E2)[@]		7.6 *17*	
		267.1 *1*	100 *15*	218.2	(2$^+$,3$^+$,4$^+$)	(M1)[@]		0.638	
		485.8 *7*	15 *8*	0.0	(3$^+$)	[M1,E2]		0.08 *5*	
687.2	(11$^-$)	526.1 *1*	100	161	(10$^-$)	M1		0.1024	E_γ: from (^{40}Ar,5nγ). Other: 525.4 *2* in ^{198}At α decay.
700.1	(10$^-$)	539.4 *1*	100	161	(10$^-$)				E_γ: from (^{40}Ar,5nγ). Other: 538.3 *4* in ^{198}At α decay.
794.1	(10$^+$)	528.6 *1*	15.2 *5*	265.6	(9$^-$)	(E1)		0.00884	B(E1)(W.u.)≈1.8×10^{-7}
		633.1 *1*	100.0 *32*	161	(10$^-$)	(E1)		0.00615	B(E1)(W.u.)≈6.9×10^{-7}
910.9	(11$^-$)	211.0 *1*	40.4 *35*	700.1	(10$^-$)	[M1]		1.228	
		749.6 *1*	100 *9*	161	(10$^-$)				
936.0	(11$^+$)	142.3[‡] *1*	100	794.1	(10$^+$)	(M1)		3.73	
1018.5	(12$^-$)	107.9 *1*	3.22 *34*	910.9	(11$^-$)	[M1+E2]		6.5 *17*	
		331.3 *1*	25.8 *10*	687.2	(11$^-$)	[M1]		0.354	
		857.5 *1*	100 *5*	161	(10$^-$)	E2			
1162.9	(12$^+$)	227.0 *1*	100.0 *30*	936.0	(11$^+$)	(M1)		1.001	
		368.8 *2*	5.1 *14*	794.1	(10$^+$)				
1225.6	(12$^-$)	1064.6 *1*	100	161	(10$^-$)	E2			
1315.9	(11$^+$)	153.2 *1*	56.0 *33*	1162.9	(12$^+$)	[M1]		3.02	
		379.7 *1*	100 *6*	936.0	(11$^+$)	(M1)		0.245	Mult.: ΔJ=0, dipole from DCO ratio.
1348.8	(13$^-$)	330.2 *1*	100 *4*	1018.5	(12$^-$)	M1		0.357	
		437.7 *1*	11.2 *9*	910.9	(11$^-$)				
		661.8 *1*	48.9 *18*	687.2	(11$^-$)	E2			
1370.1	(10$^-$,11$^+$)	576.0 *1*	100	794.1	(10$^+$)	D		0.044 *37*	
1382.5	(11$^-$)	695.3 *1*	100	687.2	(11$^-$)	(D)			Mult.: ΔJ=0, dipole from DCO ratio.
1426.3	(13$^+$)	263.4 *1*	100.0 *30*	1162.9	(12$^+$)	(M1)		0.663	
		490.3 *1*	14.7 *7*	936.0	(11$^+$)	Q			
1482.2	(12)	795.1 *1*	100	687.2	(11$^-$)	D			
1499.9	(12$^+$)	183.9 *1*	100 *5*	1315.9	(11$^+$)	M1		1.80	
		564.4[‡] *1*	75 *5*	936.0	(11$^+$)				
		705.3[‡] *1*	92 *7*	794.1	(10$^+$)	E2			
1592.0	(14$^-$)	243.3 *1*	62.9 *22*	1348.8	(13$^-$)	M1		0.826	
		573.6 *1*	100 *4*	1018.5	(12$^-$)	E2		0.0223	
1643.1	(13$^-$)	624.5 *4*	26 *5*	1018.5	(12$^-$)				
		956.0 *1*	100 *5*	687.2	(11$^-$)	E2			

$^{194}_{83}Bi_{111}$-5

Adopted Levels, Gammas (continued)

γ(^{194}Bi) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[&]	Comments
1698.6	(13$^-$)	472.8 *1*	100 *6*	1225.6	(12$^-$)	M1	0.1360	
		681.2[‡] *2*	74 *6*	1018.5	(12$^-$)			E_γ: poor fit in the level scheme. Level-energy difference=680.1.
		1011.4 *1*	100	687.2	(11$^-$)			
1720.2	(14$^+$)	294.0 *1*	100.0 *31*	1426.3	(13$^+$)	M1	0.490	
		557.3 *1*	24.3 *10*	1162.9	(12$^+$)	E2	0.0238	
1724.6		706.1 *1*	100	1018.5	(12$^-$)			
1844.9		1157.7 *2*	100	687.2	(11$^-$)			
1888.4	(14$^-$)	539.5 *1*	88 *4*	1348.8	(13$^-$)	M1	0.0959	
		662.8 *1*	100 *4*	1225.6	(12$^-$)	E2		
1895.9	(13$^-$)	670.4 *2*	100 *8*	1225.6	(12$^-$)	D		
		1208.6 *2*	81 *8*	687.2	(11$^-$)			
1926.2		283.1 *2*	100	1643.1	(13$^-$)			
1955.5	(15$^-$)	363.4 *1*	100 *4*	1592.0	(14$^-$)	M1	0.275	
		606.6 *1*	81 *5*	1348.8	(13$^-$)	Q		
1956.6	(12$^-$,13$^+$)	456.7 *1*	100	1499.9	(12$^+$)	D	0.08 *7*	
1985.3		485.4 *1*	100	1499.9	(12$^+$)			
2030.2	(14$^-$)	331.5 *1*	100 *8*	1698.6	(13$^-$)			
		804.7 *2*	80 *8*	1225.6	(12$^-$)	E2		
2033.3	(15$^+$)	313.2 *1*	100.0 *31*	1720.2	(14$^+$)	M1	0.413	
		606.9 *1*	36.0 *14*	1426.3	(13$^+$)	E2		
2060.27		560.4 *1*	100	1499.9	(12$^+$)			
2086.9	(13$^-$,14$^+$)	604.8 *2*	44 *6*	1482.2	(12)			
		738.1 *1*	100 *6*	1348.8	(13$^-$)	D		
2113.0	(15)	224.6 *1*	100	1888.4	(14$^-$)	D	0.54 *48*	
2230.6	(15$^-$)	587.7 *3*	67 *10*	1643.1	(13$^-$)			
		881.7 *2*	100 *10*	1348.8	(13$^-$)	E2		
2245.4	(16$^-$)	289.9 *1*	36.8 *21*	1955.5	(15$^-$)	[M1]	0.510	
		653.5 *1*	100 *4*	1592.0	(14$^-$)	E2		
2268.9	(13$^-$,14$^+$)	842.6 *1*	100	1426.3	(13$^+$)	D		
2348.7	(15)	318.2 *2*	48 *4*	2030.2	(14$^-$)			
		756.7 *1*	100 *7*	1592.0	(14$^-$)	D		
2367.8	(16$^+$)	334.6 *1*	100.0 *33*	2033.3	(15$^+$)	M1	0.345	
		647.4 *1*	46.2 *22*	1720.2	(14$^+$)	E2		
2427.5	(16$^+$)	59.6[a] *1*	11.9 *9*	2367.8	(16$^+$)	[M1]	8.64	
		394.2 *1*	100.0 *34*	2033.3	(15$^+$)	M1	0.221	
		707.3 *1*	71.6 *25*	1720.2	(14$^+$)	E2		
2429.4	(16$^-$)	541.0 *1*	100	1888.4	(14$^-$)	E2	0.0255	
2460.3	(16)	427.0 *1*	100	2033.3	(15$^+$)	D		
2557.8?		527.6[a] *1*	100	2030.2	(14$^-$)			
2612.0	(17$^+$)	184.5 *1*	100	2427.5	(16$^+$)	(M1)	1.79	
2646.3	(17$^-$)	400.9 *1*	63 *6*	2245.4	(16$^-$)			
		690.8 *1*	100 *4*	1955.5	(15$^-$)			
2721.1	(17$^+$)	353.3 *1*	100 *6*	2367.8	(16$^+$)	D		

Adopted Levels, Gammas (continued)

γ(^{194}Bi) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[&]
2721.1	(17$^+$)	688.2 *2*	65 *4*	2033.3	(15$^+$)	Q	
2783.7?		750.4[a] *1*	100	2033.3	(15$^+$)	(D+Q)	
2808.2?		347.9[a] *2*	100	2460.3	(16)		
2966.5	(18$^+$)	354.5 *1*	100	2612.0	(17$^+$)	(M1)	0.295
2978.5	(18$^-$)	733.1 *1*	100	2245.4	(16$^-$)	Q	
3091.9	(18$^+$)	371.3[‡] *1*	100 *7*	2721.1	(17$^+$)	[M1]	0.260
		723.7[‡] *1*	73 *5*	2367.8	(16$^+$)	(Q)	
3203.90		776.4 *1*	100	2427.5	(16$^+$)		
3410.70	(19$^+$)	444.2 *1*	100	2966.5	(18$^+$)	D	
3843.9	(20$^+$)	433.2 *1*	100	3410.70	(19$^+$)		
4301.8	(21$^+$)	457.9 *2*	100	3843.9	(20$^+$)		
139.4+x	(17)	139.4 *1*	100	x	(16)	(M1)	3.95
280.7+x	(18)	141.3 *1*	100	139.4+x	(17)	(M1)	3.80
446.6+x	(19)	165.9 *1*	100	280.7+x	(18)	(M1)	2.41
648.3+x	(20)	201.7 *1*	100	446.6+x	(19)	M1	1.393
891.0+x	(21)	242.7 *1*	100 *4*	648.3+x	(20)	M1	0.832
		444.1 *3*	17.1 *29*	446.6+x	(19)		
1165.9+x	(22)	274.8 *1*	100 *4*	891.0+x	(21)	M1	0.590
		517.9 *2*	25.9 *25*	648.3+x	(20)		
1469.0+x	(23)	303.2 *1*	100 *5*	1165.9+x	(22)	(M1)	0.451
		577.6 *3*	23.8 *24*	891.0+x	(21)		
1799.3+x	(24)	330.3 *1*	100	1469.0+x	(23)	(M1)	0.357
2117.3+x	(25)	318.0 *1*	100	1799.3+x	(24)	[M1]	0.396
2403.1+x?	(26)	285.8[#] *1*	100	2117.3+x	(25)	[M1]	0.530
2670.4+x	(27)	267.3[#] *1*	100	2403.1+x?	(26)	[M1]	0.638
124.8+y	(J+1)	124.8 *1*	100	y	J	(M1)	5.41
335.9+y	(J+2)	211.1 *1*	100	124.8+y	(J+1)	M1	1.226
595.1+y	(J+3)	259.2 *1*	100	335.9+y	(J+2)	(M1)	0.693
958.5+y	(J+4)	363.4 *1*	100	595.1+y	(J+3)	(M1)	0.275
1396.6+y	(J+5)	438.1 *1*	100	958.5+y	(J+4)	D	

[†] From ^{159}Tb(^{40}Ar,5nγ) (2020He17) for all the levels above 700 keV. Multipolarity assignments in (^{40}Ar,5nγ) are based on measured γγ(θ)(DCO) and γγ(lin pol). Below 700-MeV excitation energy, values are ^{198}At α decay (4.46 s), with exceptions noted.

[‡] Uncertainty in Eγ value doubled in five cases to 0.2 keV and 0.4 keV for the 681.2γ (from 1699 level), as with the listed uncertainties, the fit is poor in the level scheme.

[#] Ordering of the 285.8γ and 267.3γ is tentative.

[@] From intensity balance considerations in α decay (4.46 s) (2019Gh11), with only the dominant (M1 or E2) multipolarity assigned, as suggested by 2019Gh11, with possible admixture of second relevant component (E2 or M1).

[&] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies,

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$\gamma(^{194}Bi)$ (continued)

assigned multipolarities, and mixing ratios, unless otherwise specified.

[a] Placement of transition in the level scheme is uncertain.

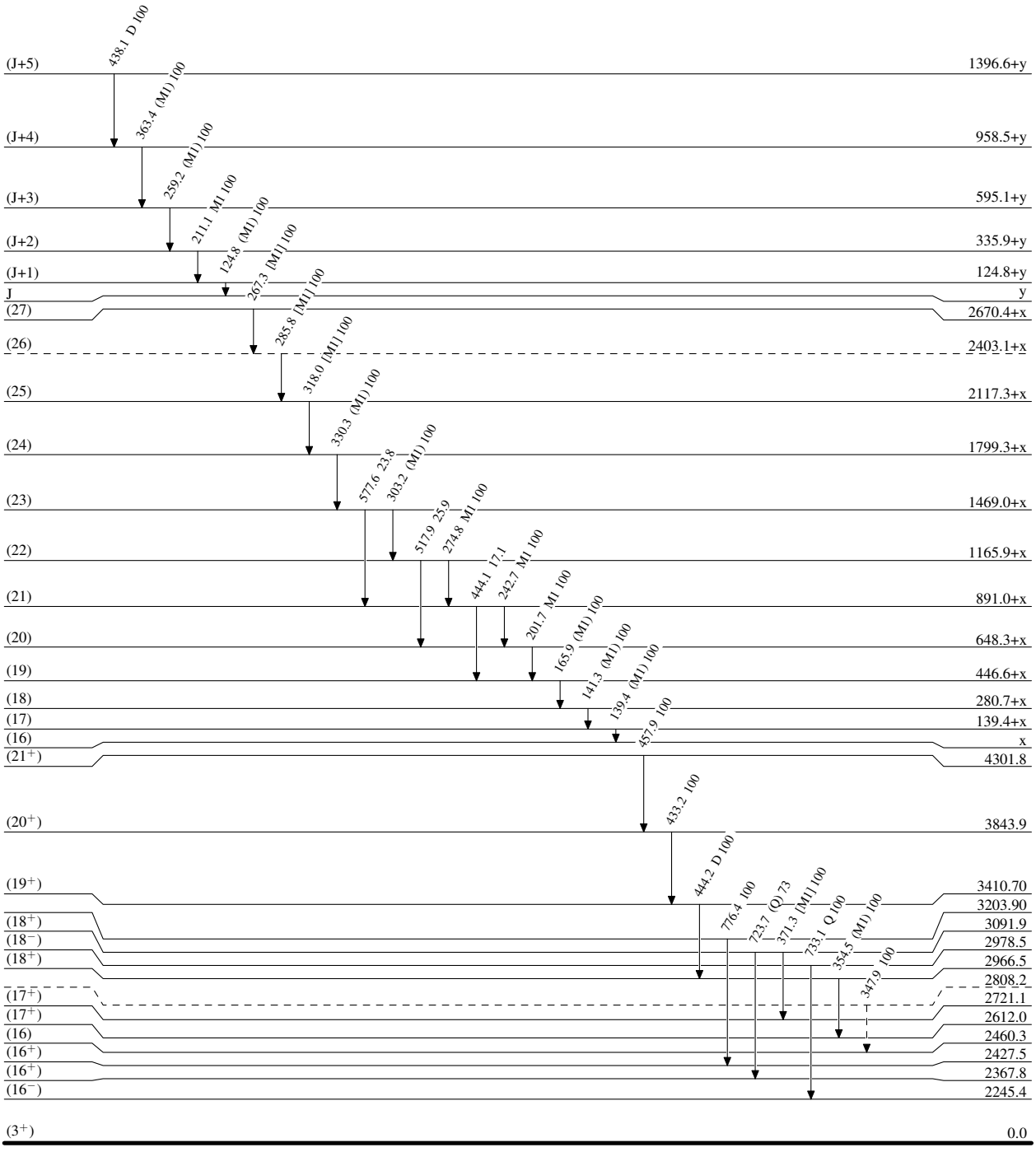
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



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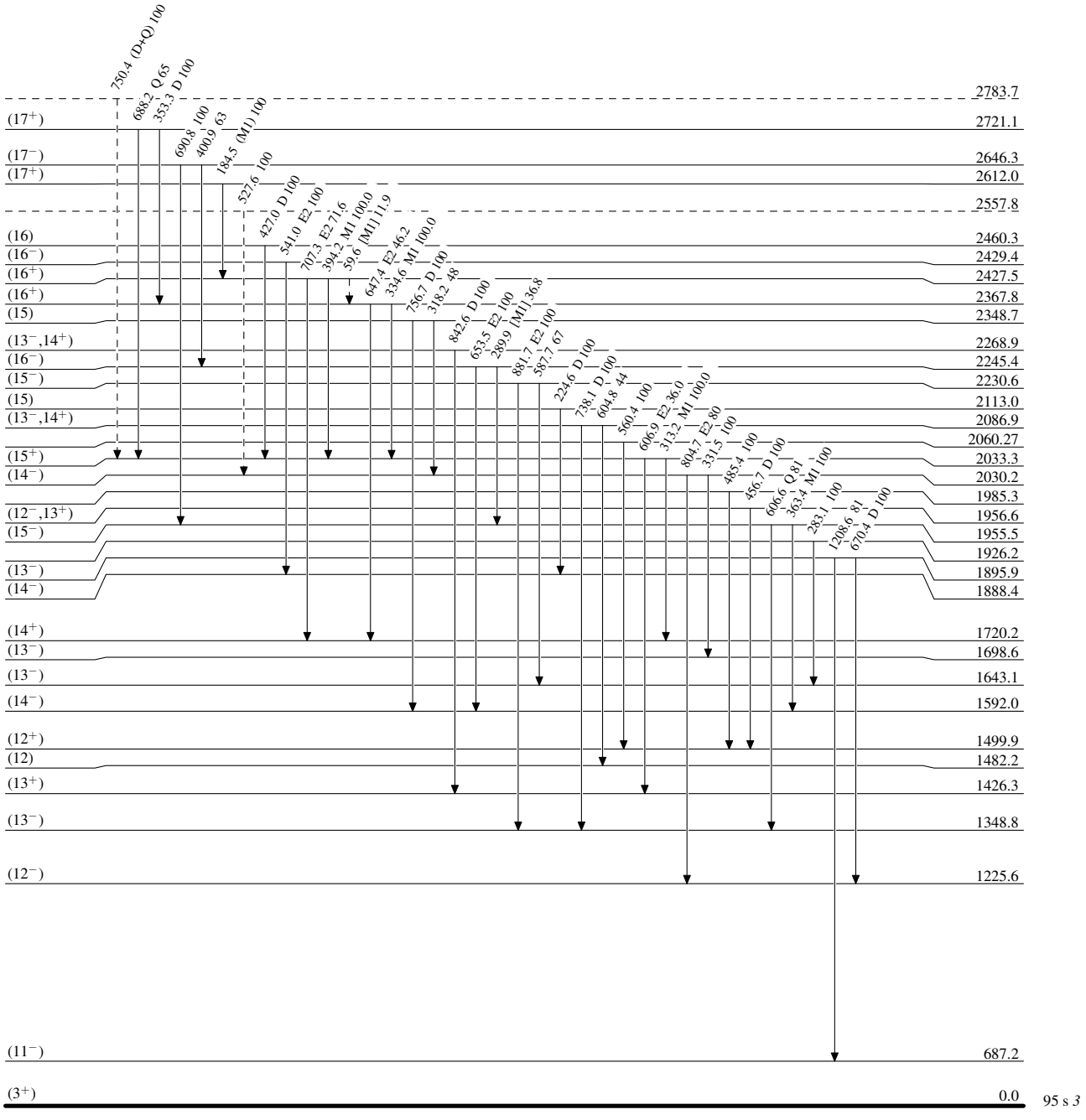
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



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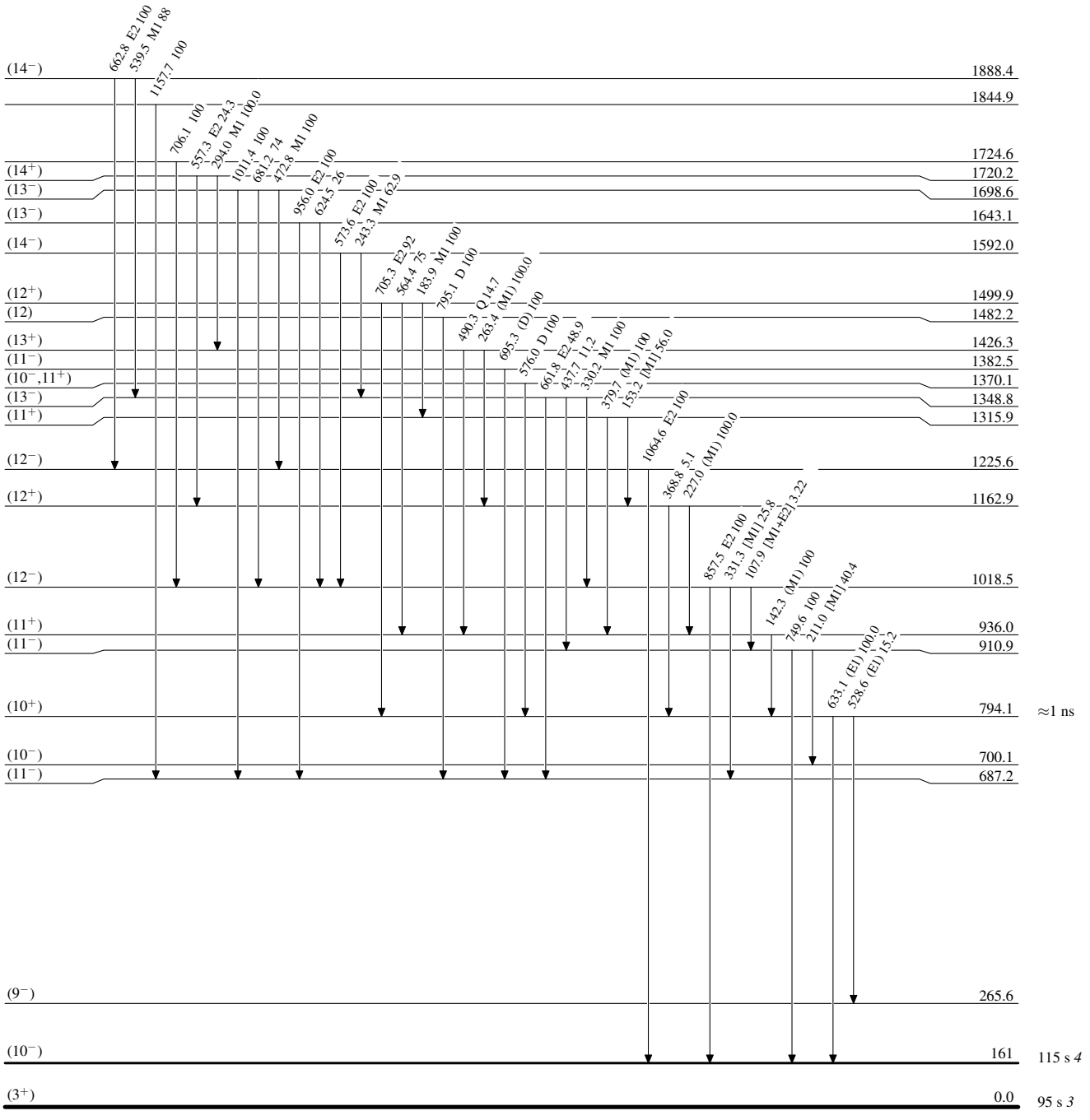
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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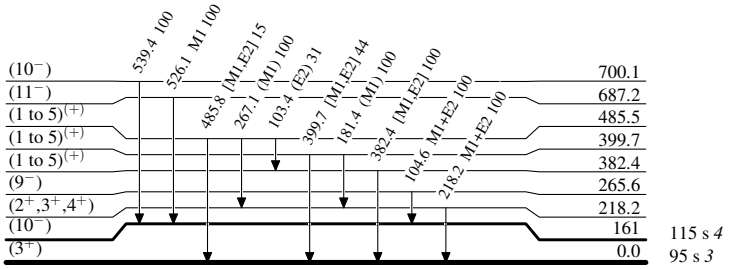
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



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Adopted Levels, Gammas