Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia	NDS 181, 475 (2022)	1-Jan-2022

Q(β^-)=−3900 *11*; S(n)=8110 *10*; S(p)=2184 *6*; Q(α)=6904.7 *13* 2021Wa16

2015Ba20: ^{136}Xe + ^{208}Pb, E(c.m.)=450 MeV, measured multi-nucleon transfer reaction cross section $\sigma_{\text{cumulative yield}}$=0.0402 mb *80* a $\sigma_{\text{independent yield}}$=0.0402 mb *80* for ^{213}Fr.

1986Hi01,1988Ne03: ^{197}Au(^{16}O,F), E=95-124 MeV, measured neutron fission-fragment angular correlations for the compound nuclei. 1988Ne03 measured average number of neutrons preceding fission.

2009Pa49: ^{238}U(p,X), E=1 GeV; measured fission and spallation yields from different mass targets.

2014Si03: ^{194}Pt(^{19}F,X), E=96.2-137.3 MeV; measured spectra and angular distribution of evaporation residues (ER), σ(ER, E).

1972Le23: ^{205}Tl(^{12}C,4n), E=60-90 MeV, measured σ(E).

^{213}Fr Levels

Cross Reference (XREF) Flags

A	^{213}Ra ε decay (2.73 min)	D	^{217}Ac α decay (8 ns)
B	^{217}Ac α decay (69 ns)	E	^{217}Ac α decay (740 ns)
C	^{217}Ac α decay: E=1.15 MeV	F	(HI,xnγ)

E(level)†	J$^\pi$‡	$T_{1/2}$#	XREF	Comments
0.0	9/2$^-$	34.17 s *6*	BCDEF	%α=99.44 *5*; %ε+%β^+=0.56 *5* μ=+4.02 *8*; Q=−0.14 *2* J$^\pi$: Measured by Atomic Beam Magnetic Resonance (ABMR) technique (1978Ek02, 1978Ek05); configuration: π ($h^{+1}_{9/2}$) from μ and shell model. $T_{1/2}$: Weighted average of 34.6 s *3* (1974Ho27), 34.7 s *3* (1967Va20), 33.7 s *15* (1964Gr04), 34.14 s *6* (2013Fi08), 33.2 s *20* (2016Pr08 − 605.9-keV conversion electron (t) (corresponding to the 704.3 keV γ ray). 28.4 s *35* (2016Pr08 − from 577.0γ(t) of ^{209}At following the α decay of ^{213}Fr), 34.1 s *7* and 34 s *6* (2012No08 − the latter value was measured for ^{213}Fr^{+86} at rest and both from α(t)), 16 s *+37−13* (2015De22), 20 s *+48−8* (2019Mi08). Others: 35.0 s *2* (1982Bo04 − possibly contribution from ^{213}Ra, ^{211}Po contaminations not discussed), 34 s (1961Gr42 − from 6770α(t)). %α: Weighted average of %α=99.1 *1*, %(ε+β^+)=0.9 *1* (1974Ho27), %α=99.48 *3*, %(ε+β^+)=0.52 *3* (1964Gr04) and %α=99.43 *3*, %(ε+β^+)=0.57 *3* (1967Va20). χ^2=6.7 cf. χ^2_{crit}=3.0. Other: %α=99.75 *15*, %(ε+β^+)=0.25 *15* (2017Lo13 − possible escape of ^{213}Rn). (ε+β^+) branching was deduced from comparison of ^{213}Fr and ^{213}Rn α's in by 1964Gr04, 1967Va20, 1974Ho27, and 2017Lo13. Weighted average of all values is the same as above with χ^2=5.9 cf. χ^2_{crit}=2.6 and unweighted average: %α=99.44 *13*, %(ε+β^+)=0.56 *13*. μ: From 2019StZV, (1985Co24 and 1986Ek02 − by LASER induced optical pumping). Other: 3.996 *14* (1980Li22 − deduced from g_I value). Q: From 2016St14, 1985Co24. δ<r^2>(^{212}Fr,^{213}Fr)=0.06829 fm^2 *8* (1987Co19) and 0.02780 *3* (1985Co24). Same first author for both. Uncertainty is statistical only, 1987Co19 noted the systematic uncertainty to be a few percent. Isotope shift measurement − 2014Co18.
498.0 *10*	(7/2$^-$)		E	J$^\pi$: From dominant I_α=11 with respect to I_α(10540)=100 in ^{217}Ac α decay (740 ns).
1105.0 *10*	(13/2)$^+$		E	J$^\pi$: 1105γ M2 to 9/2$^-$ g.s. and I_α(10540)=90 *6* branching in ^{217}Ac α decay (740 ns).
1188.80 *10*	13/2$^-$	<2.1 ns	F	J$^\pi$: 1188.8γ E2 to 9/2$^-$ state. Configuration: π ($h^{+1}_{9/2}$)⊗2$^+$.
1411.00 *15*	17/2$^-$	18 ns *1*	F	μ=7.5 *14* (1986By01,2020StZV) J$^\pi$: 222.2γ E2 to 13/2$^-$ state. g=0.88 *16* by γ(H,θ,t) in (HI,xnγ) (1986By01). Configuration: π ($h^{+1}_{9/2}$)⊗4$^+$.

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Adopted Levels, Gammas (continued)

^{213}Fr Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$[#]	XREF	Comments
1590.40 *18*	21/2$^-$	505 ns *14*	F	μ=9.28 *3* (2020StZV) J$^{\pi}$: 179.4γ E2 to 17/2$^-$ state. Measurements: g=0.888 *3* (1977Be56, 1976Ha37); 0.888 *4* (1979Ho06); 0.89 *2* (1986By01) by γ(H,θ,t) in (HI,xnγ); 0.888 *3* (1978Ha50). Configuration: π ($h^{+1}_{9/2}$)$\otimes$6$^+$.
1856.30 *20*	23/2$^-$	<1.4 ns	F	J$^{\pi}$: 265.9γ M1+E2 to 21/2$^-$ state. Configuration: π ($h^{+2}_{9/2}$,$f^{+1}_{7/2}$).
2537.61 *23*	29/2$^+$	238 ns *6*	F	μ=15.15 *5*; Q=−0.70 *7* J$^{\pi}$: 681.3γ E3 to 23/2$^-$ state. Main configuration: π ($h^{+2}_{9/2}$,$i^{+1}_{13/2}$). T$_{1/2}$: Other: 243 ns *21* (1986By01). μ: From 2020StZV, 1977Be56. g factor measurements by γ(H,θ,t), corrected for Knight shift: g=1.055 *5* (1989By01), 1.049 *2* (1979Ho06), 1.0494 *18* (1977Be56,1976Ha37,1978Ha50), 1.04 *2* (1974Re09), and 1.05 *3* (1973ReZP). Q: From 1990By03, 2016St14. Deduced value using B(E2) for the 8$^+$ to 6$^+$ transition in ^{212}Rn and an effective charge of 1.5e. See also 1991Ha02 for calculations. Q=0.81 *4* in 1990Ha30 from level mixing spectroscopy.
2740.2 *3*	27/2$^-$	<7 ns	F	J$^{\pi}$: 884γ E2 to 23/2$^-$ state. Configuration: π ($h^{+2}_{9/2}$,$f^{+1}_{7/2}$)$\otimes$2$^+$.
2950.5 *3*	31/2$^-$	<2.1 ns	F	J$^{\pi}$: 413.0γ E1 to 29/2$^+$ state, 210.4γ (E2) to 27/2$^-$ state. Configuration: π ($h^{+2}_{9/2}$,$f^{+1}_{7/2}$)$\otimes$4$^+$.
3427.34 *24*	33/2$^+$	<2.1 ns	F	J$^{\pi}$: 476.9γ E1 to 31/2$^-$ state, 889.7γ E2 to 29/2$^+$ state. Configuration: π ($h^{+2}_{9/2}$,$i^{+1}_{13/2}$)$\otimes$2$^+$.
3489.2 *4*	(33/2)		F	J$^{\pi}$: 538.7γ (D) to 31/2$^-$ state.
3655.4 *4*	37/2$^+$	2.4 ns *7*	F	J$^{\pi}$: 228.1γ E2 to 33/2$^+$ state. Configuration: π ($h^{+2}_{9/2}$,$i^{+1}_{13/2}$)$\otimes$4$^+$.
4029.2 *5*			F	
4082.9 *4*	39/2$^+$	<1.4 ns	F	J$^{\pi}$: 427.5γ M1+E2 to 37/2$^+$ state.
4653.6? *11*			F	
4675.4 *4*		<2.1 ns	F	Two cascading gammas combining the level with 47/2$^-$, three cascading gammas from 49/2$^+$ state, and probable M1 character of the 592.5γ to 39/2$^+$ suggest (41/2$^+$).
4695.9 *4*	39/2$^-$	<2.1 ns	F	J$^{\pi}$: 1040.3γ E1 to 37/2$^+$ state.
4898.5 *4*	41/2$^-$	<2.8 ns	F	J$^{\pi}$: 815.6γ E1 to 39/2$^+$ state.
4982.0 *6*			F	If 306.5γ to 4675.4-keV level is E1, as implied by intensity balance at 4675.4-keV level, and if J^{π}(4675.4-keV level) is (41/2$^+$), J^{π}(4982.0-keV level)=(43/2$^-$) is consistent with being populated from 49/2$^+$ state through three cascading γ transitions.
4992.7 *4*	45/2$^-$	13 ns *2*	F	μ=23.2 *7* J$^{\pi}$: 909.8γ E3 to 39/2$^+$ state, 94.4γ E2 to 41/2$^-$ state. Measurements: g=0.990 *25* (1979Ho06); 1.03 *3* (1986By01) by γ(H,θ,t) in (HI,xnγ). Configuration: π ($h^{+3}_{9/2}$,$i^{+2}_{13/2}$). μ: From 2020StZV, 1986By01 from time-differential perturbed angular distribution (TDPAD) measurements.
5001.9 *5*			F	784.0γ from 47/2$^-$ state and two cascading γ transitions to 39/2$^+$ state (326.3γ (D) and 592.5γ (D)) suggest J^{π}=(43/2$^-$).
5220.2 *5*			F	
5506.3 *4*	43/2$^-$	<2.1 ns	F	J$^{\pi}$: 810.2γ E2 to 39/2$^-$ state.
5785.9 *4*	47/2$^-$	<1.4 ns	F	J$^{\pi}$: 793.2γ M1 to 45/2$^-$ state. 279.6γ E2 to 43/2$^-$ state.
5814.8 *5*	(45/2$^+$)		F	J$^{\pi}$: 308.3γ (E1) to 43/2$^-$ state.
5951.5 *5*			F	
6102.7 *6*	(49/2$^-$)		F	J$^{\pi}$: 316.8γ (M1+E2) to 47/2$^-$ state.
6334.1 *5*			F	
6572.9 *4*	49/2$^+$	<2.1 ns	F	J$^{\pi}$: 786.9γ E1 to 47/2$^-$ state.
6715.3 *5*	53/2$^+$	6.2 ns *14*	F	J$^{\pi}$: 142.3γ E2 to 49/2$^+$ state, 929.5γ E3 to 47/2$^-$ state. Configuration: π ([$h^{+4}_{9/2}$,$i^{+1}_{13/2}$]$_{37/2^+}$) ν ([$p^{-1}_{1/2}$,$j^{+1}_{15/2}$]$_{8^+}$).
6724.5 *7*	(55/2$^+$)		F	J$^{\pi}$: 621.8γ to (49/2$^-$) state presumably an E3, since of the cascading 621.8γ and 316.8γ (from 49/2$^-$ state) later one is (M1+E2).
6803.0 *8*	(55/2)		F	J$^{\pi}$: Assuming the 738.8γ from the 7541 level is dipole; no γ from (59/2$^+$).
6812.8 *6*			F	
7135.0 *8*			F	

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Adopted Levels, Gammas (continued)

^{213}Fr Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	XREF	Comments
7247.5 *8*			F	
7288.0 *7*	(57/2$^+$)	<2.1 ns	F	Jπ: 563.3γ M1 to (55/2$^+$) state.
7374.4 *8*	(57/2,59/2)		F	Jπ: 349.5γ from (59/2$^+$) state at 7723 keV is probably dipole; possible γ to (57/2$^+$); level decays through six cascading gammas to 45/2$^-$ level. If 349.5γ is E1, then π=(−).
7541.8 *7*	(57/2)		F	Jπ: 182.0γ from (59/2$^+$) state at 7723 keV is dipole; 817.7γ to (55/2$^+$) state. If 182.0γ is M1, as suggested by the intensity balance at the 7723.3 level, then J^π=(57/2$^+$).
7723.7 *7*	(59/2$^+$)		F	Jπ: 182γ D to (57/2), 349.5γ D to (57/2,59/2). Configuration: π ($[h^{+3}_{9/2},i^{+1}_{13/2},f_{7/2}]_{39/2^+}$) ν ($[p^{-2}_{1/2},g_{9/2},i_{11/2}]_{10^+}$).
7983.6 *7*	(61/2$^-$)	<3.5 ns	F	Jπ: 1259γ E3 to (55/2$^+$), Possible configuration: π($[h^{+3}_{9/2},i^{+2}_{13/2}]_{45/2^-}$) ν ($[p^{-1}_{1/2},j^{+1}_{15/2}]_{8^+}$).
8094.9 *7*	(65/2$^-$)	3.1 μs *2*	F	μ=22.5 *2*; Q=−2.19 *53* Jπ: 371.2γ (E3) to (59/2$^+$) state. Configuration: π ($[h^{+3}_{9/2},i^{+2}_{13/2}]_{45/2^-}$) ν ($[p^{-2}_{1/2},g_{9/2},i_{11/2}]_{10^+}$). μ: From 2020StZV, 1989By01 from time-differential perturbed angular distribution (TDPAD) measurements. Q: From 1991Ha02 (not given in 2016St14), if Q(29/2$^+$ state) =−0.70 *7*. In 1990Ha30, Q=2.51 *51* was obtained by level mixing spectroscopy, a g-factor of 0.695 *7* was used.

[†] Deduced by the evaluator from a least squares fit to the γ-ray energies. Eγ related to uncertain placement and expected ones were ignored.

[‡] Spins and parities for levels above 1188 keV are from (HI,xnγ) data. These assignments are based on γ angular distribution, linear polarization, conversion electron measurements, and transition strengths.

[#] All excited states′ half-lives are from (HI,xnγ) data.

Adopted Levels, Gammas (continued)

$\gamma(^{213}Fr)$

All γ properties are from (HI,xnγ) data.

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	δ	$\alpha^{\ddagger}$	Comments
498.0	(7/2$^-$)	498	100	0.0	9/2$^-$				
1105.0	(13/2)$^+$	1105	100	0.0	9/2$^-$	M2		0.0479 *7*	α(K)=0.0380 *5*; α(L)=0.00747 *10*; α(M)=0.001800 *25* α(N)=0.000473 *7*; α(O)=0.0001056 *15*; α(P)=1.688×10^{-5} *24*; α(Q)=9.26×10^{-7} *13* α(IPF)=5.71×10^{-8} *8* Mult.: from ce in ^{217}Ac α decay (740 ns) (1985De14).
1188.80	13/2$^-$	1188.8 *1*	100	0.0	9/2$^-$	E2		0.00616 *9*	α(K)=0.00487 *7*; α(L)=0.000976 *14*; α(M)=0.0002354 *33* α(N)=6.16×10^{-5} *9*; α(O)=1.360×10^{-5} *19*; α(P)=2.119×10^{-6} *30*; α(Q)=1.025×10^{-7} *14* α(IPF)=2.65×10^{-6} *4*
1411.00	17/2$^-$	222.2 *1*	100	1188.80	13/2$^-$	E2		0.382 *5*	B(E2)(W.u.)=0.556 *+33−30* α(K)=0.1318 *18*; α(L)=0.1845 *26*; α(M)=0.0494 *7* α(N)=0.01295 *18*; α(O)=0.00271 *4*; α(P)=0.000362 *5*; α(Q)=3.43×10^{-6} *5*
1590.40	21/2$^-$	179.4 *1*	100	1411.00	17/2$^-$	E2		0.823 *12*	B(E2)(W.u.)=0.0438 *13* α(K)=0.2013 *28*; α(L)=0.458 *7*; α(M)=0.1234 *18* α(N)=0.0324 *5*; α(O)=0.00675 *10*; α(P)=0.000890 *13*; α(Q)=5.84×10^{-6} *8*
1856.30	23/2$^-$	265.9 *1*	100	1590.40	21/2$^-$	M1+E2	0.9 *+11−9*	0.60 *31*	α(N)=0.0074 *9*; α(O)=0.00161 *25*; α(P)=0.00024 *5*; α(Q)=1.0×10^{-5} *6* α(K)=0.45 *29*; α(L)=0.113 *20*; α(M)=0.028 *4*
2537.61	29/2$^+$	681.3 *1*	100	1856.30	23/2$^-$	E3		0.0529 *7*	B(E3)(W.u.)=26.4 *7* α(K)=0.0317 *4*; α(L)=0.01579 *22*; α(M)=0.00412 *6* α(N)=0.001086 *15*; α(O)=0.0002336 *33*; α(P)=3.38×10^{-5} *5*; α(Q)=9.27×10^{-7} *13*
2740.2	27/2$^-$	202.8[#] *4*		2537.61	29/2$^+$				
		884.0 *3*	100 *16*	1856.30	23/2$^-$	E2		0.01087 *15*	α(K)=0.00831 *12*; α(L)=0.001929 *27*; α(M)=0.000473 *7* α(N)=0.0001238 *17*; α(O)=2.71×10^{-5} *4*; α(P)=4.14×10^{-6} *6*; α(Q)=1.787×10^{-7} *25*
2950.5	31/2$^-$	210.4 *3*	<33	2740.2	27/2$^-$	(E2)		0.462 *7*	α(K)=0.1474 *21*; α(L)=0.2319 *35*; α(M)=0.0622 *9* α(N)=0.01631 *25*; α(O)=0.00341 *5*; α(P)=0.000454 *7*; α(Q)=3.92×10^{-6} *6*
		413.0 *2*	100 *2*	2537.61	29/2$^+$	E1		0.01695 *24*	α(K)=0.01381 *19*; α(L)=0.002396 *34*; α(M)=0.000567 *8* α(N)=0.0001475 *21*; α(O)=3.25×10^{-5} *5*; α(P)=5.03×10^{-6} *7*; α(Q)=2.474×10^{-7} *35*
3427.34	33/2$^+$	476.9 *2*	45.7 *20*	2950.5	31/2$^-$	E1		0.01255 *18*	α(K)=0.01025 *14*; α(L)=0.001751 *25*; α(M)=0.000413 *6* α(N)=0.0001077 *15*; α(O)=2.376×10^{-5} *33*; α(P)=3.70×10^{-6} *5*; α(Q)=1.858×10^{-7} *26*

$^{213}_{87}Fr_{126}$-4

Adopted Levels, Gammas (continued)

γ(^{213}Fr) (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	δ	α[‡]	Comments
3427.34	33/2$^+$	889.7 *1*	100 *4*	2537.61	29/2$^+$	E2		0.01073 *15*	α(K)=0.00822 *12*; α(L)=0.001899 *27*; α(M)=0.000465 *7* α(N)=0.0001219 *17*; α(O)=2.67×10^{-5} *4*; α(P)=4.08×10^{-6} *6*; α(Q)=1.765×10^{-7} *25*
3489.2	(33/2)	538.7 *3*	100	2950.5	31/2$^-$	(D)			
3655.4	37/2$^+$	228.1 *2*	100	3427.34	33/2$^+$	E2		0.349 *5*	B(E2)(W.u.)=3.8 *+16−8* α(K)=0.1248 *18*; α(L)=0.1655 *24*; α(M)=0.0443 *6* α(N)=0.01161 *17*; α(O)=0.002433 *35*; α(P)=0.000325 *5*; α(Q)=3.22×10^{-6} *5*
4029.2		540.0 *3*	100	3489.2	(33/2)				
4082.9	39/2$^+$	427.5 *1*	100	3655.4	37/2$^+$	M1+E2	0.10 *3*	0.246 *4*	α(K)=0.1992 *30*; α(L)=0.0359 *5*; α(M)=0.00854 *12* α(N)=0.002237 *32*; α(O)=0.000500 *7*; α(P)=8.02×10^{-5} *12*; α(Q)=4.47×10^{-6} *7*
4653.6?		624.2[#] *5*	100	4029.2					
4675.4		592.5 *3*	100 *7*	4082.9	39/2$^+$				
4695.9	39/2$^-$	(42.3[†])		4653.6?					
		665[#]		4029.2					
		1040.3 *3*	100 *10*	3655.4	37/2$^+$	E1		0.00286 *4*	α(K)=0.002364 *33*; α(L)=0.000377 *5*; α(M)=8.83×10^{-5} *12* α(N)=2.304×10^{-5} *32*; α(O)=5.13×10^{-6} *7*; α(P)=8.15×10^{-7} *11*; α(Q)=4.46×10^{-8} *6* Other probable gammas from the level are ignored.
4898.5	41/2$^-$	815.6 *2*	100	4082.9	39/2$^+$	E1		0.00443 *6*	α(K)=0.00365 *5*; α(L)=0.000593 *8*; α(M)=0.0001392 *19* α(N)=3.63×10^{-5} *5*; α(O)=8.06×10^{-6} *11*; α(P)=1.274×10^{-6} *18*; α(Q)=6.82×10^{-8} *10*
4982.0		306.5 *4*	100	4675.4					
4992.7	45/2$^-$	94.4 *3*	3.4 *9*	4898.5	41/2$^-$	E2		11.49 *24*	B(E2)(W.u.)=1.80 *+48−43* α(L)=8.46 *17*; α(M)=2.29 *5* α(N)=0.601 *12*; α(O)=0.1244 *26*; α(P)=0.01601 *33*; α(Q)=3.84×10^{-5} *7*
		909.8 *2*	100 *8*	4082.9	39/2$^+$	E3		0.0255 *4*	B(E3)(W.u.)=46 *+10−7* α(K)=0.01750 *25*; α(L)=0.00601 *8*; α(M)=0.001530 *21* α(N)=0.000403 *6*; α(O)=8.75×10^{-5} *12*; α(P)=1.303×10^{-5} *18*; α(Q)=4.59×10^{-7} *6*
5001.9		326.3 *4*	100	4675.4		(D)			
5220.2		(227.5[†])		4992.7	45/2$^-$				
		238		4982.0					
		545.1 *5*	100	4675.4					
5506.3	43/2$^-$	810.2 *3*	100	4695.9	39/2$^-$	E2		0.01293 *18*	α(K)=0.00975 *14*; α(L)=0.002392 *34*; α(M)=0.000590 *8* α(N)=0.0001545 *22*; α(O)=3.38×10^{-5} *5*; α(P)=5.12×10^{-6} *7*; α(Q)=2.112×10^{-7} *30*
5785.9	47/2$^-$	279.6 *2*	46 *4*	5506.3	43/2$^-$	E2		0.1797 *25*	α(K)=0.0812 *11*; α(L)=0.0729 *10*; α(M)=0.01932 *28* α(N)=0.00507 *7*; α(O)=0.001068 *15*; α(P)=0.0001452 *21*; α(Q)=1.989×10^{-6} *28*

$^{213}_{87}Fr_{126}$-5

Adopted Levels, Gammas (continued)

γ(^{213}Fr) (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	α[‡]	Comments
5785.9	47/2⁻	784.0 *4*	2.3 *8*	5001.9				
		793.2 *3*	100 *16*	4992.7	45/2⁻	M1	0.0481	α(K)=0.0391 *6*; α(L)=0.00690 *10*; α(M)=0.001638 *23* α(N)=0.000429 *6*; α(O)=9.60×10^{-5} *14*; α(P)=1.541×10^{-5} *22*; α(Q)=8.66×10^{-7} *13*
5814.8	(45/2⁺)	308.3 *3*	60 *20*	5506.3	43/2⁻	(E1)	0.0322 *5*	α(N)=0.000288 *4*; α(O)=6.32×10^{-5} *9*; α(P)=9.66×10^{-6} *14*; α(Q)=4.53×10^{-7} *6* α(K)=0.0260 *4*; α(L)=0.00467 *7*; α(M)=0.001109 *16*
		594.7 *4*	100 *20*	5220.2				
5951.5		949.4 *3*	91 *36*	5001.9				
		959.0 *3*	100 *27*	4992.7	45/2⁻			
6102.7	(49/2⁻)	316.8 *4*	100	5785.9	47/2⁻	(M1+E2)	0.34 *22*	α(K)=0.26 *20*; α(L)=0.064 *18*; α(M)=0.016 *4* α(N)=0.00411 *99*; α(O)=9.0×10^{-4} *24*; α(P)=1.4×10^{-4} *5*; α(Q)=6.E−6 *4*
6334.1		382.7 *3*	100	5951.5				
6572.9	49/2⁺	239.0 *4*	9 *5*	6334.1				
		469.7[#] *4*		6102.7	(49/2⁻)			
		758.0 *4*	16 *3*	5814.8	(45/2⁺)			
		786.9 *1*	100 *9*	5785.9	47/2⁻	E1	0.00473 *7*	α(K)=0.00390 *5*; α(L)=0.000635 *9*; α(M)=0.0001491 *21* α(N)=3.89×10^{-5} *5*; α(O)=8.63×10^{-6} *12*; α(P)=1.363×10^{-6} *19*; α(Q)=7.27×10^{-8} *10*
6715.3	53/2⁺	142.3 *3*	71 *9*	6572.9	49/2⁺	E2	2.027 *33*	B(E2)(W.u.)=4.6 *+15−9* α(K)=0.292 *4*; α(L)=1.278 *22*; α(M)=0.345 *6* α(N)=0.0906 *15*; α(O)=0.01883 *32*; α(P)=0.00245 *4*; α(Q)=1.083×10^{-5} *16*
		929.5 *3*	100 *20*	5785.9	47/2⁻	E3	0.02428 *34*	B(E3)(W.u.)=38 *+13−9* α(K)=0.01676 *23*; α(L)=0.00563 *8*; α(M)=0.001429 *20* α(N)=0.000376 *5*; α(O)=8.18×10^{-5} *11*; α(P)=1.221×10^{-5} *17*; α(Q)=4.37×10^{-7} *6*
6724.5	(55/2⁺)	(9.2[†])		6715.3	53/2⁺			
		621.8 *3*	100 *33*	6102.7	(49/2⁻)	[E3]	0.0681 *10*	α(K)=0.0384 *5*; α(L)=0.02205 *31*; α(M)=0.00580 *8* α(N)=0.001529 *22*; α(O)=0.000328 *5*; α(P)=4.70×10^{-5} *7*; α(Q)=1.171×10^{-6} *16*
6803.0	(55/2)	(78.4[†])	100	6724.5	(55/2⁺)			
6812.8		478.7 *3*	100	6334.1				
7135.0		322.2 *5*	100	6812.8				
7247.5		(112.2[†])	100	7135.0				
7288.0	(57/2⁺)	563.3 *3*	100	6724.5	(55/2⁺)	M1	0.1187 *17*	α(K)=0.0961 *14*; α(L)=0.01716 *24*; α(M)=0.00408 *6* α(N)=0.001068 *15*; α(O)=0.0002388 *34*; α(P)=3.83×10^{-5} *5*; α(Q)=2.146×10^{-6} *30*
7374.4	(57/2,59/2)	(86.3[†])		7288.0	(57/2⁺)			
		127.2 *4*	100 *19*	7247.5				
7541.8	(57/2)	253.6 *4*	100 *7*	7288.0	(57/2⁺)			

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Adopted Levels, Gammas (continued)

$\gamma(^{213}Fr)$ (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	α[‡]	Comments
7541.8	(57/2)	294.1 *3*	13 *3*	7247.5				
		738.8 *3*	12.8 *15*	6803.0	(55/2)	D		
		817.7 *3*	15 *5*	6724.5	$(55/2^+)$			
7723.7	$(59/2^+)$	182.0 *3*	56 *11*	7541.8	(57/2)	D		
		349.5 *3*	100 *6*	7374.4	(57/2,59/2)	D		
		435.6 *4*	11 *3*	7288.0	$(57/2^+)$			
		998.9 *3*	16 *5*	6724.5	$(55/2^+)$			
7983.6	$(61/2^-)$	695		7288.0	$(57/2^+)$			
		1259.1 *3*	100 *5*	6724.5	$(55/2^+)$	E3	0.01229 *17*	α(K)=0.00916 *13*; α(L)=0.002352 *33*; α(M)=0.000583 *8* α(N)=0.0001532 *21*; α(O)=3.36×10^{-5} *5*; α(P)=5.15×10^{-6} *7*; α(Q)=2.204×10^{-7} *31* α(IPF)=3.31×10^{-6} *5*
8094.9	$(65/2^-)$	111.3 *2*	64.0 *19*	7983.6	$(61/2^-)$	(E2)	5.66 *9*	B(E2)(W.u.)=0.0162 *11* α(K)=0.329 *5*; α(L)=3.92 *6*; α(M)=1.063 *17* α(N)=0.279 *5*; α(O)=0.0578 *9*; α(P)=0.00747 *12*; α(Q)=2.235×10^{-5} *34*
		371.2 *2*	100 *8*	7723.7	$(59/2^+)$	(E3)	0.372 *5*	B(E3)(W.u.)=26.6 *24* α(K)=0.1160 *16*; α(L)=0.1879 *27*; α(M)=0.0513 *7* α(N)=0.01356 *19*; α(O)=0.00286 *4*; α(P)=0.000392 *6*; α(Q)=4.99×10^{-6} *7*

† Transition expected, but not observed.
‡ Additional information 1.
# Placement of transition in the level scheme is uncertain.

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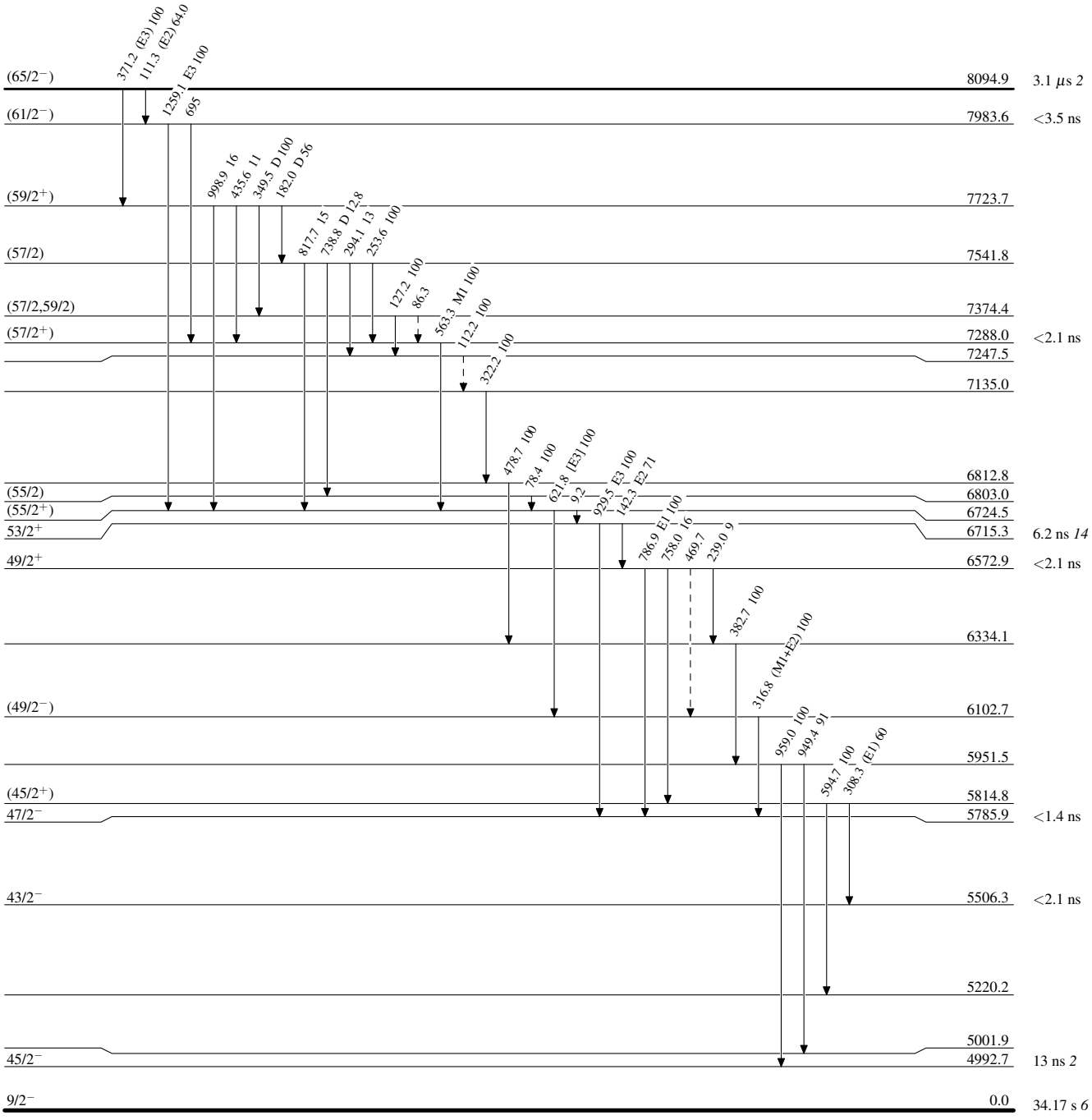
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

- - - - - - ► γ Decay (Uncertain)



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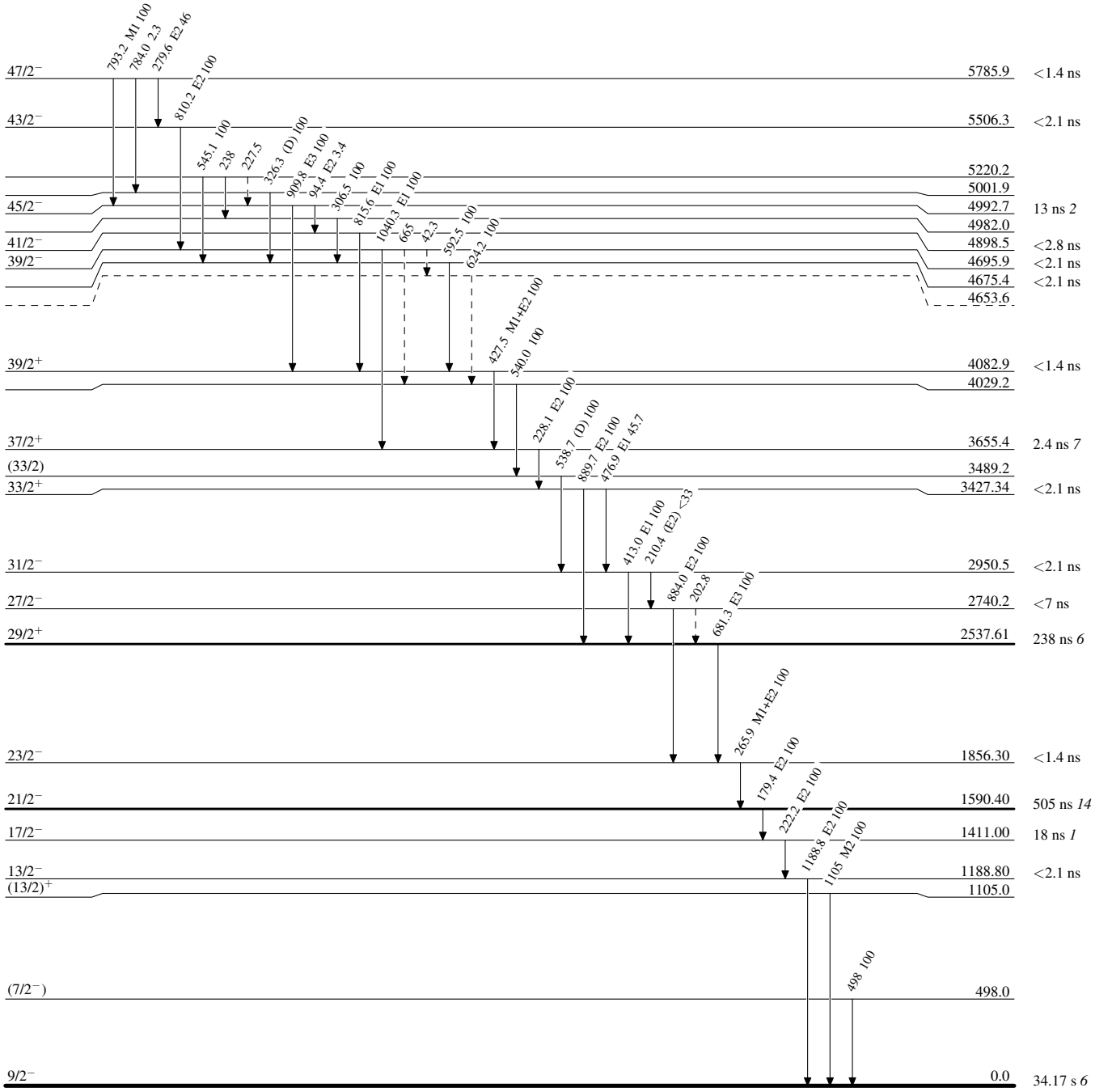
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

γ Decay (Uncertain)



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