Adopted Levels, Gammas

History

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

Q(β^-)=−8.59×10^3 *3*; S(n)=9.90×10^3 *3*; S(p)=3109 *18*; Q(α)=6546.4 *19* 2012Wa38
Note: Current evaluation has used the following Q record −8590 30 *9900* 30 *3110* 19 *6545.5 19* 2003Au03.
Additional information 1.

^{204}Rn Levels

Cross Reference (XREF) Flags

A ^{208}Ra α decay
B ^{192}Pt(^{16}O,4nγ)
C ^{168}Er(^{40}Ar,4nγ)

E(level)†	Jπ‡	$T_{1/2}$	XREF	Comments
0	0^+	74.5 s *14*	ABC	%α=72.4 *9*; %ε+%β^+=27.6 *9* %α is weighted average of 70% *2* (1971Ho01) and 73% *1* (1993Wa04). Other: 42% *10* (1967Va17). $T_{1/2}$: Weighted average of 75 s *2* (1967Va17) and 74 s *2* (1971Ho01). Other: 70 s *11* (1996Ta18).
542.90 *10*	2^+		BC	Jπ: 542.9γ E2 to 0^+.
1131.50 *15*	4^+		BC	Jπ: 588.6γ E2 to 2^+.
1627.8 *13*	$(2,3,4^+)$		C	Jπ: 1084.9γ to 2^+.
1772.79 *17*	6^+		BC	Jπ: 641.3γ E2 to 4^+.
1806.20 *17*	6^+		BC	Jπ: 674.7γ E2 to 4^+. Possible configuration=$(\pi\ f_{7/2})^{+2}_{6+}$.
1911.9 *5*	$(5,6^+)$		C	Jπ: 779.9γ to 4^+.
2032.72 *19*	8^+	<5 ns	BC	Jπ: 259.9γ E2 to 6^+. $T_{1/2}$: From ^{192}Pt(^{16}O,4nγ) (1981Ho29). Possible configuration=$(\pi\ h_{9/2})^{+2}_{8+}$.
2105.11 *19*	8^+		BC	Jπ: 298.9γ E2 to 6^+.
2182.7 *6*	(6,7)		C	Jπ: 376.5γ to 6^+; population of this state in ^{168}Er(^{40}Ar,4nγ).
2218.81 *19*	9^-		BC	Jπ: 113.7γ E1 to 8^+; 186.1γ E1 to 8^+.
2239.2 *3*	$(7,8^+)$		C	Jπ: 327.0γ to $(5,6^+)$; 433.2γ and 466.4γ to 6^+.
2248.13 *24*	8^+		C	Jπ: 215.3γ M1 to 8^+; 475.6γ E2 to 6^+.
2365.5 *5*	(8,9)		C	Jπ: 332.8γ to 8^+; population of this state in ^{168}Er(^{40}Ar,4nγ).
2371.2 *4*	(8,9)		C	Jπ: 266.1γ to 8^+; population of this state in ^{168}Er(^{40}Ar,4nγ).
2452.8 *3*	10^+		BC	Jπ: 234.0γ E1 to 9^-.
2461.9 *4*	10^-	33.4 ns *24*	BC	Jπ: 242.8γ M1 to 9^-. $T_{1/2}$: Weighted average of 34 ns *4* in ^{168}Er(^{40}Ar,4nγ) (2002Do19) and 33 ns *3* in ^{192}Pt(^{16}O,4nγ) (1981Ho29). Both values were deduced from 242γ(t). In 1981Ho29 it is concluded that 242γ directly depopulates the isomer. Possible configuration=$((\pi\ f_{7/2})^{+1}(\pi\ i_{13/2})^{+1})_{10-}$.
2540.0 *7*	(8^+)		C	Jπ: 767.2γ to 6^+; population of this state in ^{168}Er(^{40}Ar,4nγ).
2597.2 *4*	11^-		BC	Jπ: 135.2γ M1 to 10^-. Possible configuration=$((\pi\ h_{9/2})^{+1}(\pi\ i_{13/2})^{+1})_{11-}$.
2636.61 *21*	10^+		BC	Jπ: 603.9γ E2 to 8^+.
2681.1 *3*	10^+		C	Jπ: 576.0γ E2 to 8^+.
2688.1 *3*	10^+		C	Jπ: 583.0γ E2 to 8^+.
2794.3 *7*	9^+		C	Jπ: 761.6γ M1 to 8^+.
2884.8 *8*	$(11,12^-)$		B	Jπ: 288γ to 11^-; 422.5γ to 10^-.
2894.9 *4*	(10^+)		C	Jπ: 646.8γ (E2) to 8^+.
2933.11 *21*	(10^+)		C	Jπ: 828.0γ to 8^+; population of this state in ^{168}Er(^{40}Ar,4nγ).

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Adopted Levels, Gammas (continued)

^{204}Rn Levels (continued)

E(level)†	Jπ‡	$T_{1/2}$	XREF	Comments
3035.3 *3*	12^+	14 ns *4*	BC	Jπ: 438.0γ E1 to 11^-; 582.6γ E2 to 10^+. $T_{1/2}$: From 234γ(t), 438γ(t), and 583γ(t) in ^{168}Er(^{40}Ar,4nγ) (2002Do19), but the lifetime assignment to this level is tentative. The authors argue about the presence of a low-energy transition (unobserved) that feeds this level. Other: ≈10 ns in ^{192}Pt(^{16}O,4nγ) (1981Ho29), but the lifetime is tentatively associated with the 4096-keV level.
3151.0 *4*	(12^+)		C	Jπ: 469.9γ (E2) to 10^+.
3165.5 *4*	(11^-)		BC	Jπ: 568.3γ (M1) to 11^-.
3193.0 *4*	11		C	Jπ: 504.9γ D to 10^+.
3228.5 *4*	$(11,12^+)$		C	Jπ: 591.9γ to 10^+; population of this level in ^{168}Er(^{40}Ar,4nγ).
3246.4 *12*	(10^+)		C	Jπ: 706.4γ to 8^+; population of this level in ^{168}Er(^{40}Ar,4nγ).
3305.8 *4*	13^-		BC	Jπ: 708.6γ E2 to 11^-; 270.5γ to 12^+.
3398.7 *11*	$(11,12^+)$		C	Jπ: 465.6γ to (10^+); population of this level in ^{168}Er(^{40}Ar,4nγ).
3410.5 *4*	(12^+)		C	Jπ: 722.4γ (E2) to 10^+.
3468.2? *13*			B	
3473.6 *5*	$(11,12^+)$		C	Jπ: 578.7γ to (10^+).
3507.1 *4*	13^-		C	Jπ: 471.8γ E1 to 12^+.
3531.9 *6*	(13^-)		B	Jπ: 226γ to 13^-; 366γ to (11^-); 497γ to 12^+.
3677.2 *4*	12^+		C	Jπ: 511.6γ E1 to (11^-); 1040.6γ E2 to 10^+.
3736.5 *5*	$(12,13,14^+)$		C	Jπ: 262.9γ to $(11,12^+)$; 508.0γ to $(11,12^+)$.
3782.3 *6*	$(12,13,14^+)$		C	Jπ: 371.8γ to (12^+).
3895.0 *5*	$(13,14,15^-)$		C	Jπ: 589.2γ to 13^-.
3949.0 *4*	14^+		C	Jπ: 271.8γ E2 to 12^+.
3980.2 *13*	$(12,13,14^+)$		C	Jπ: 751.7γ to $(11,12^+)$.
3983.8 *8*	$(14,15^-)$		B	Jπ: 452γ to (13^-); 678γ to 13^-.
4001.9 *5*	14^+		C	Jπ: 494.8γ E1 to 13^-.
4087.4 *5*	$(14,15,16^+)$		C	Jπ: 138.4γ to 14^+.
4095.8 *9*	(15^-)		B	Jπ: 112γ to $(14,15^-)$; 790γ to 13^-. $T_{1/2}$: ≈10 ns in ^{192}Pt(^{16}O,4nγ) (1981Ho29), but the lifetime is tentatively associated with this level. See the comment to the 3035-keV level for details.
4120.7 *8*	$(13,14^+)$		C	Jπ: 710.2γ to (12^+).
4253.9 *12*	$(14,15^-)$		B	Jπ: 722γ to (13^-).
4413.9 *7*	$(15,16,17^-)$		C	Jπ: 518.9γ to $(14,15^-)$.
4583.2 *10*	$(15,16,17^-)$		C	Jπ: 688.2γ to $(14,15^-)$.

† From a least-squares fit to Eγ.
‡ From deduced transition multipolarities using γ(θ) in ^{192}Pt(^{16}O,4nγ) and DCO ratios in ^{168}Er(^{40}Ar,4nγ), including α(exp) deduced from intensity-balance considerations.

γ(^{204}Rn)

E_i(level)	J_i^π	E_γ‡	I_γ‡	E_f	J_f^π	Mult.‡	α†	Comments
542.90	2^+	542.9 *1*	100	0	0^+	E2	0.0290	α(K)=0.0201 *3*; α(L)=0.00671 *10*; α(M)=0.001695 *24*; α(N+..)=0.000546 *8* α(N)=0.000441 *7*; α(O)=9.29×10^{-5} *13*; α(P)=1.207×10^{-5} *17*
1131.50	4^+	588.6 *1*	100	542.90	2^+	E2	0.0242	α(K)=0.01712 *24*; α(L)=0.00529 *8*; α(M)=0.001327 *19*; α(N+..)=0.000428 *6* α(N)=0.000345 *5*; α(O)=7.30×10^{-5} *11*; α(P)=9.58×10^{-6} *14*
1627.8	$(2,3,4^+)$	1084.9 *13*	100	542.90	2^+			
1772.79	6^+	641.3 *1*	100	1131.50	4^+	E2	0.0200	α(K)=0.01451 *21*; α(L)=0.00414 *6*; α(M)=0.001033

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Adopted Levels, Gammas (continued)

γ(^{204}Rn) (continued)

E_i(level)	J_i^π	E_γ‡	I_γ‡	E_f	J_f^π	Mult.‡	α†	Comments
								15; α(N+..)=0.000333 *5* α(N)=0.000269 *4*; α(O)=5.70×10^{-5} *8*; α(P)=7.57×10^{-6} *11*
1806.20	6$^+$	674.7 *1*	100	1131.50	4$^+$	E2	0.0180	α(K)=0.01317 *19*; α(L)=0.00360 *5*; α(M)=0.000895 *13*; α(N+..)=0.000289 *4* α(N)=0.000233 *4*; α(O)=4.95×10^{-5} *7*; α(P)=6.61×10^{-6} *10*
1911.9	(5,6$^+$)	779.9 *6*	100	1131.50	4$^+$			
2032.72	8$^+$	259.9 *1*	100	1772.79	6$^+$	E2	0.215	α(K)=0.0941 *14*; α(L)=0.0900 *13*; α(M)=0.0238 *4*; α(N+..)=0.00762 *11* α(N)=0.00620 *9*; α(O)=0.001270 *18*; α(P)=0.0001499 *21* B(E2)(W.u.)>1.1
2105.11	8$^+$	298.9 *1*	100	1806.20	6$^+$	E2	0.1395	α(K)=0.0695 *10*; α(L)=0.0520 *8*; α(M)=0.01367 *20*; α(N+..)=0.00438 *7* α(N)=0.00356 *5*; α(O)=0.000733 *11*; α(P)=8.79×10^{-5} *13*
2182.7	(6,7)	376.5 *5*	100	1806.20	6$^+$			
2218.81	9$^-$	113.7 *1*	81 *4*	2105.11	8$^+$	E1	0.341	α(K)=0.267 *4*; α(L)=0.0561 *8*; α(M)=0.01341 *19*; α(N+..)=0.00426 *6* α(N)=0.00344 *5*; α(O)=0.000720 *11*; α(P)=9.29×10^{-5} *14* Mult.: Other: α(exp) deduced from intensity-balance considerations favors E1 rather than M1 assignment in ^{192}Pt(^{16}O,4nγ) (1981Ho29).
		186.1 *1*	100 *4*	2032.72	8$^+$	E1	0.1024	α(K)=0.0820 *12*; α(L)=0.01556 *22*; α(M)=0.00370 *6*; α(N+..)=0.001183 *17* α(N)=0.000954 *14*; α(O)=0.000202 *3*; α(P)=2.71×10^{-5} *4*
2239.2	(7,8$^+$)	327.0 *5*	40 *4*	1911.9	(5,6$^+$)			
		433.2 *4*	96 *8*	1806.20	6$^+$			
		466.4 *4*	100 *8*	1772.79	6$^+$			
2248.13	8$^+$	215.3 *2*	36 *7*	2032.72	8$^+$	M1	1.497	α(K)=1.210 *18*; α(L)=0.218 *4*; α(M)=0.0518 *8*; α(N+..)=0.01687 *24* α(N)=0.01349 *20*; α(O)=0.00295 *5*; α(P)=0.000431 *7*
		475.6 *3*	100 *7*	1772.79	6$^+$	E2	0.0397	α(K)=0.0261 *4*; α(L)=0.01013 *15*; α(M)=0.00258 *4*; α(N+..)=0.000831 *12* α(N)=0.000672 *10*; α(O)=0.0001408 *20*; α(P)=1.80×10^{-5} *3*
2365.5	(8,9)	332.8 *4*	100	2032.72	8$^+$			
2371.2	(8,9)	266.1 *3*	100	2105.11	8$^+$			
2452.8	10$^+$	234.0 *2*	100	2218.81	9$^-$	E1	0.0592	α(K)=0.0477 *7*; α(L)=0.00875 *13*; α(M)=0.00208 *3*; α(N+..)=0.000666 *10* α(N)=0.000536 *8*; α(O)=0.0001143 *17*; α(P)=1.554×10^{-5} *22*
2461.9	10$^-$	242.8 *4*	100 *9*	2218.81	9$^-$	M1	1.071	α(K)=0.866 *13*; α(L)=0.1557 *23*; α(M)=0.0370 *6*; α(N+..)=0.01205 *18* α(N)=0.00963 *15*; α(O)=0.00211 *4*; α(P)=0.000308 *5* B(M1)(W.u.)=2.22×10^{-5} *17*
2540.0	(8$^+$)	767.2 *6*	100	1772.79	6$^+$			
2597.2	11$^-$	135.2 *2*	100	2461.9	10$^-$	M1	5.57	α(K)=4.49 *7*; α(L)=0.816 *12*; α(M)=0.194 *3*; α(N+..)=0.0632 *10* α(N)=0.0505 *8*; α(O)=0.01105 *17*; α(P)=0.001614

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Adopted Levels, Gammas (continued)

$\gamma(^{204}Rn)$ (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π	Mult.[‡]	α[†]	Comments
								24 Mult.: Based on $\gamma(\theta)$ the E1 multipolarity is assigned in 1981Ho29, but the α(exp) deduced from intensity balance considerations in 2002Do19 favors M1.
2636.61	10^+	603.9 *1*	100	2032.72	8^+	E2	0.0228	α(K)=0.01629 *23*; α(L)=0.00491 *7*; α(M)=0.001230 *18*; α(N+..)=0.000397 *6* α(N)=0.000320 *5*; α(O)=6.77×10^{-5} *10*; α(P)=8.92×10^{-6} *13*
2681.1	10^+	576.0 *2*	100	2105.11	8^+	E2	0.0254	α(K)=0.0179 *3*; α(L)=0.00563 *8*; α(M)=0.001415 *20*; α(N+..)=0.000456 *7* α(N)=0.000369 *6*; α(O)=7.78×10^{-5} *11*; α(P)=1.018×10^{-5} *15*
2688.1	10^+	583.0 *2*	100	2105.11	8^+	E2	0.0247	α(K)=0.01744 *25*; α(L)=0.00543 *8*; α(M)=0.001365 *20*; α(N+..)=0.000440 *7* α(N)=0.000355 *5*; α(O)=7.50×10^{-5} *11*; α(P)=9.84×10^{-6} *14*
2794.3	9^+	761.6 *6*	100	2032.72	8^+	M1	0.0494	α(K)=0.0401 *6*; α(L)=0.00701 *10*; α(M)=0.001659 *24*; α(N+..)=0.000540 *8* α(N)=0.000432 *7*; α(O)=9.46×10^{-5} *14*; α(P)=1.383×10^{-5} *20*
2884.8	$(11,12^-)$	288[#]		2597.2	11^-			
		422.5[#]		2461.9	10^-			
2894.9	(10^+)	646.8 *3*	100	2248.13	8^+	(E2)	0.0197	α(K)=0.01428 *20*; α(L)=0.00404 *6*; α(M)=0.001008 *15*; α(N+..)=0.000325 *5* α(N)=0.000262 *4*; α(O)=5.56×10^{-5} *8*; α(P)=7.40×10^{-6} *11*
2933.11	(10^+)	828.0 *1*	100	2105.11	8^+			
3035.3	12^+	438.0 *4*	59 *5*	2597.2	11^-	E1	0.01449	α(K)=0.01184 *17*; α(L)=0.00202 *3*; α(M)=0.000475 *7*; α(N+..)=0.0001533 *22* α(N)=0.0001231 *18*; α(O)=2.65×10^{-5} *4*; α(P)=3.72×10^{-6} *6* B(E1)(W.u.)=6.0×10^{-8} *19*
		582.6 *2*	100 *5*	2452.8	10^+	E2	0.0247	α(K)=0.01747 *25*; α(L)=0.00545 *8*; α(M)=0.001368 *20*; α(N+..)=0.000441 *7* α(N)=0.000356 *5*; α(O)=7.52×10^{-5} *11*; α(P)=9.86×10^{-6} *14* B(E2)(W.u.)=0.0052 *16*
3151.0	(12^+)	469.9 *2*	100	2681.1	10^+	(E2)	0.0408	α(K)=0.0268 *4*; α(L)=0.01052 *15*; α(M)=0.00269 *4*; α(N+..)=0.000865 *13* α(N)=0.000700 *10*; α(O)=0.0001464 *21*; α(P)=1.86×10^{-5} *3*
3165.5	(11^-)	568.3 *3*	100	2597.2	11^-	(M1)	0.1067	α(K)=0.0866 *13*; α(L)=0.01527 *22*; α(M)=0.00361 *5*; α(N+..)=0.001178 *17* α(N)=0.000941 *14*; α(O)=0.000206 *3*; α(P)=3.01×10^{-5} *5*
3193.0	11	504.9 *3*	100	2688.1	10^+	D		
3228.5	$(11,12^+)$	591.9 *3*	100	2636.61	10^+			
3246.4	(10^+)	706.4 *10*	100	2540.0	(8^+)			
3305.8	13^-	140.3 *4*	7.1 *6*	3165.5	(11^-)			
		270.5[#]		3035.3	12^+			
		708.6 *2*	100.0 *6*	2597.2	11^-	E2	0.01619	α(K)=0.01200 *17*; α(L)=0.00316 *5*; α(M)=0.000781 *11*; α(N+..)=0.000253 *4*

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Adopted Levels, Gammas (continued)

γ(^{204}Rn) (continued)

E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π	Mult.[‡]	α[†]	Comments
								α(N)=0.000203 *3*; α(O)=4.33×10^{-5} *6*; α(P)=5.82×10^{-6} *9*
3398.7	(11,12$^+$)	465.6 *10*	100	2933.11	(10$^+$)			
3410.5	(12$^+$)	722.4 *2*	100	2688.1	10$^+$	(E2)	0.01555	α(K)=0.01158 *17*; α(L)=0.00300 *5*; α(M)=0.000741 *11*; α(N+..)=0.000240 *4* α(N)=0.000193 *3*; α(O)=4.11×10^{-5} *6*; α(P)=5.54×10^{-6} *8*
3468.2?		583.4[#]	100	2884.8	(11,12$^-$)			I$_\gamma$: From ^{192}Pt(^{16}O,4nγ).
3473.6	(11,12$^+$)	578.7 *3*	100	2894.9	(10$^+$)			
3507.1	13$^-$	471.8 *2*	100	3035.3	12$^+$	E1	0.01241	α(K)=0.01016 *15*; α(L)=0.001716 *24*; α(M)=0.000404 *6*; α(N+..)=0.0001304 *19* α(N)=0.0001046 *15*; α(O)=2.26×10^{-5} *4*; α(P)=3.18×10^{-6} *5*
3531.9	(13$^-$)	226[#]		3305.8	13$^-$			
		366.0[#]		3165.5	(11$^-$)			
		497[#]		3035.3	12$^+$			
3677.2	12$^+$	511.6 *3*	100 *7*	3165.5	(11$^-$)	E1	0.01051	α(K)=0.00861 *13*; α(L)=0.001444 *21*; α(M)=0.000340 *5*; α(N+..)=0.0001096 *16* α(N)=8.79×10^{-5} *13*; α(O)=1.90×10^{-5} *3*; α(P)=2.68×10^{-6} *4*
		1040.6 *3*	100 *7*	2636.61	10$^+$	E2	0.00753 *11*	α(K)=0.00591 *9*; α(L)=0.001228 *18*; α(M)=0.000297 *5*; α(N+..)=9.62×10^{-5} *14* α(N)=7.72×10^{-5} *11*; α(O)=1.664×10^{-5} *24*; α(P)=2.32×10^{-6} *4*
3736.5	(12,13,14$^+$)	262.9 *8*	25 *5*	3473.6	(11,12$^+$)			
		508.0 *4*	100 *8*	3228.5	(11,12$^+$)			
3782.3	(12,13,14$^+$)	371.8 *4*	100	3410.5	(12$^+$)			
3895.0	(13,14,15$^-$)	589.2 *3*	100	3305.8	13$^-$			
3949.0	14$^+$	271.8 *2*	100	3677.2	12$^+$	E2	0.187	α(K)=0.0854 *12*; α(L)=0.0753 *11*; α(M)=0.0199 *3*; α(N+..)=0.00637 *10* α(N)=0.00518 *8*; α(O)=0.001062 *16*; α(P)=0.0001260 *18*
3980.2	(12,13,14$^+$)	751.7 *12*	100	3228.5	(11,12$^+$)			
3983.8	(14,15$^-$)	452[#]		3531.9	(13$^-$)			
		678[#]		3305.8	13$^-$			
4001.9	14$^+$	494.8 *2*	100	3507.1	13$^-$	E1	0.01125	α(K)=0.00921 *13*; α(L)=0.001550 *22*; α(M)=0.000365 *6*; α(N+..)=0.0001177 *17* α(N)=9.44×10^{-5} *14*; α(O)=2.04×10^{-5} *3*; α(P)=2.88×10^{-6} *4*
4087.4	(14,15,16$^+$)	138.4 *3*	100	3949.0	14$^+$			
4095.8	(15$^-$)	112[#]		3983.8	(14,15$^-$)			
		790[#]		3305.8	13$^-$			

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Adopted Levels, Gammas (continued)

$\gamma(^{204}Rn)$ (continued)

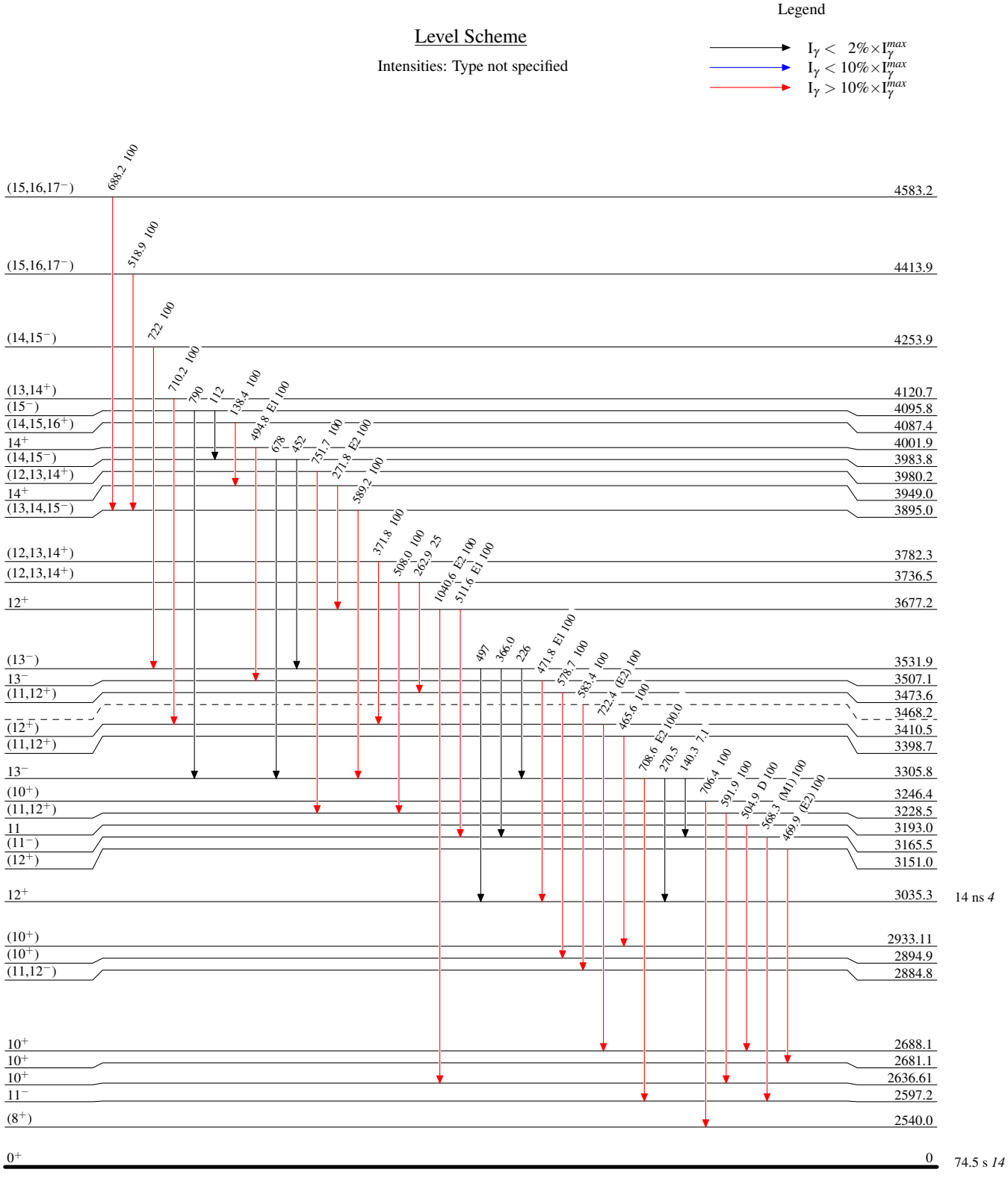
E_i(level)	J_i^π	E_γ[‡]	I_γ[‡]	E_f	J_f^π
4120.7	$(13,14^+)$	710.2 *7*	100	3410.5	(12^+)
4253.9	$(14,15^-)$	722[#]	100	3531.9	(13^-)
4413.9	$(15,16,17^-)$	518.9 *5*	100	3895.0	$(13,14,15^-)$
4583.2	$(15,16,17^-)$	688.2 *8*	100	3895.0	$(13,14,15^-)$

† Additional information 2.
‡ From $^{168}Er(^{40}Ar,4n\gamma)$, unless otherwise specified.
# From $^{192}Pt(^{16}O,4n\gamma)$.

Adopted Levels, Gammas

Level Scheme

Intensities: Type not specified

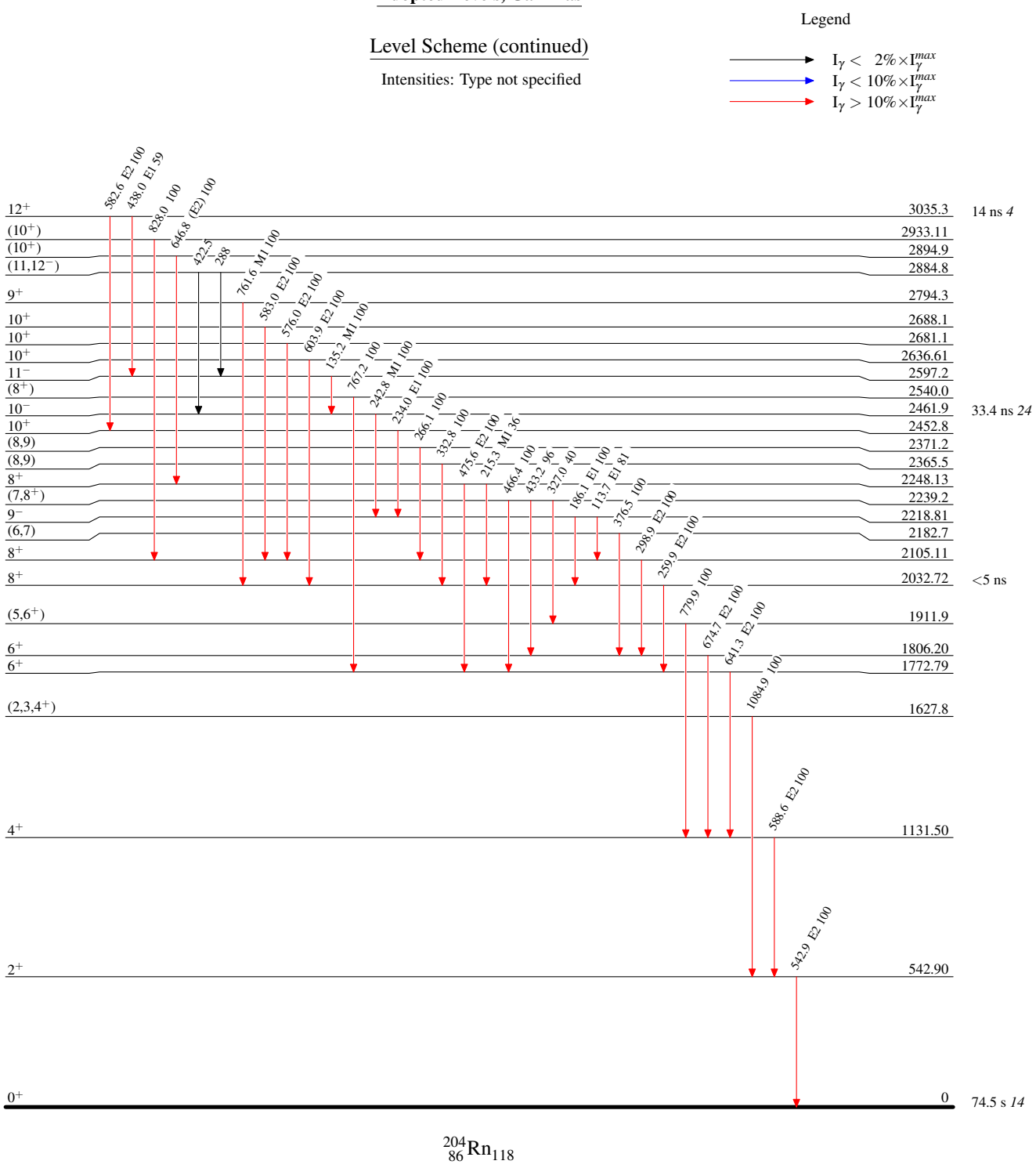


$^{204}_{86}Rn_{118}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Type not specified



$^{204}_{86}Rn_{118}$