^{221}Rn β^- decay 1977Vy02

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Ashok Jain, Sukhjeet Singh, Suresh Kumar, Jagdish Tuli	NDS 108,883 (2007)	15-Jan-2007

Parent: ^{221}Rn: E=0.0; J$^\pi$=7/2$^{(+)}$; $T_{1/2}$=25 min *2*; Q(β^-)=1150 *syst*; %β^- decay=78 *1*
Measured γ, ce.

^{221}Fr Levels

E(level)	J$^\pi$	$T_{1/2}$	Comments
0.0	5/2$^-$	4.9 min *2*	
26.02 *4*	(1/2)$^-$		
36.68 *3*	(3/2)$^-$		
38.531 *21*	(9/2)$^-$		
99.63 *3*	(3/2)$^-$		
99.88 *4*	(3/2)$^+$		
100.93 *3*	(5/2)$^-$		
108.387 *24*	(7/2)$^-$		
145.9 *6*	(1/2)$^+$		From 2003Gr33.
150.08† *3*	(7/2)$^+$		
195.788† *22*	(7/2)$^-$		
224.67† *3*	(3/2)$^+$		
234.63† *6*	(5/2)$^+$		
253.53† *3*	(5/2)$^+$		
279.28† *3*	(7/2)$^+$		
294.76† *5*	(9/2)$^+$		
393.40† *7*	(5/2,7/2)$^+$		

† Population in ^{221}Rn β^- decay is supported by matching intensity ratios from 2001GrZU.

β^- radiations

E(decay)	E(level)	Iβ^-†	Log *ft*	Comments
(757 *syst*)	393.40	2.3 *4*	6.6	av Eβ=235.8
(855 *syst*)	294.76	27.2 *20*	5.7	av Eβ=271.4
(871 *syst*)	279.28	5.9 *6*	6.4	av Eβ=277.1
(896 *syst*)	253.53	6.1 *6*	6.4	av Eβ=286.5
(915 *syst*)	234.63	1.86 *17*	7.0	av Eβ=293.6
(925‡ *syst*)	224.67			
(954 *syst*)	195.788	2.1 *3*	7.0	av Eβ=307.9
(1000 *syst*)	150.08	3.6 *15*	6.8	av Eβ=325.0
(1004 *syst*)	145.9	0.4	7.9	
(1042 *syst*)	108.387	8.1 *25*	6.5	av Eβ=340.7
(1049 *syst*)	100.93	8.8 *15*	6.5	av Eβ=343.5
(1050 *syst*)	99.88	2.3 *6*	7.1	av Eβ=343.9
(1050 *syst*)	99.63	0.9 *4*	7.5	av Eβ=344.0
(1111 *syst*)	38.531	≥1.3	≤7.4	av Eβ=367.2
(1113‡ *syst*)	36.68			
(1124‡ *syst*)	26.02			
(1150 *syst*)	0.0	8 *4*	6.7	av Eβ=382.0 Iβ^-: sum of β intensities to g.s., 26.0-, and 36.65-keV levels.

Continued on next page (footnotes at end of table)

^{221}Rn β^- decay 1977Vy02 (continued)

β^- radiations (continued)

† Absolute intensity per 100 decays.
‡ Existence of this branch is questionable.

γ(^{221}Fr)

Iγ normalization: Relative photon intensities were normalized by 1977Vy02 to %Iγ(218γ of ^{221}Fr decay)=10.7 *6*; %Iγ(218γ)=11.57 *15* has been adopted in ^{221}Fr α decay scheme.

E_γ[†]	I_γ[†c]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	α[d]	Comments
(10.7[&] *2*)		36.68	(3/2)$^-$	26.02	(1/2)$^-$			I(γ+ce)(10.7γ)≥4.0 from I(γ+ce)(10.7γ)/I(γ+ce)(36.7γ)= 8.5 *15*/17.9 *23*, as deduced in ^{225}Ac α decay, and I(γ+ce)(36.7γ)≥8.4. If there is no β branch to the 36.68 keV level, the intensity balance yields I(γ+ce)(10.7γ)+I(γ+ce)(36.7γ)=16.3 *14*; therefore, I(γ+ce)(10.7γ)=5.2 *12*.
(26.0[#] *1*)		26.02	(1/2)$^-$	0.0	5/2$^-$	(E2)	5.94×10^3 *15*	α(L)=4.39×10^3 *11*; α(M)=1.18×10^3 *3*; α(N+..)=378 *9* α(N)=307 *8*; α(O)=63.3 *15*; α(P)=8.01 *19*; α(Q)=0.00946 *22* I(γ+ce)≤9.3 (and Iγ≤0.0015) if there is no β^- branch to the 26.02 keV level; I(γ+ce)=8.1 *12* (and Iγ=0.0013 *2*) if I(γ+ce)(10.7γ)=5.2 *12* (that is, if there is also no β^- to 36.68-keV level).
36.7[@] *1*		36.68	(3/2)$^-$	0.0	5/2$^-$	E2(+M1)	6.×10^2 *6*	α(L)=4; α(M)=1.1×10^2 *11*; α(N+..)=4 α(N)=3; α(O)=6 *6*; α(P)=0.8 *7*; α(Q)=0.0035 *16* Mult.: M1 admixture <10% (2003Ku44). I_γ: ≥0.0075 from Ice(M2 36.7γ)+Ice(M3 36.7γ)≥1.6 (measured) and the theoretical conversion coefficient of (α(M2)+α(M3))(E2)=214. If there is no β branch to the 36.68-keV level, the intensity balance yields I(γ+ce)(36.7γ)=11.1 *19*; therefore, Iγ(36.7γ)=0.0099 *17*.
38.53[@] *3*	≥0.0095	38.531	(9/2)$^-$	0.0	5/2$^-$	E2	859	α(L)=634 *10*; α(M)=170.4 *25*; α(N+..)=54.9 *8* α(N)=44.6 *7*; α(O)=9.19 *14*; α(P)=1.168 *17*; α(Q)=0.001573 *23* I_γ: calculated by the evaluator from measured Ice(M2 38.53γ)+Ice(M3 38.5γ)≥1.6 and the theoretical conversion coefficients. The intensity balance to the g.s. yields Iγ<0.05.
46.2	0.031	145.9	(1/2)$^+$	99.63	(3/2)$^-$			
49.04 *15*	0.07 *1*	150.08	(7/2)$^+$	100.93	(5/2)$^-$	(E1)	0.718 *12*	α(L)=0.544 *9*; α(M)=0.1326 *22*; α(N+..)=0.0419 *7* α(N)=0.0339 *6*; α(O)=0.00701 *12*; α(P)=0.000921 *15*; α(Q)=2.65×10^{-5} *5*
57.73 *15*	0.020 *7*	253.53	(5/2)$^+$	195.788	(7/2)$^-$	(E1)	0.464 *8*	α(L)=0.352 *6*; α(M)=0.0854 *14*; α(N+..)=0.0271 *5* α(N)=0.0219 *4*; α(O)=0.00456 *8*; α(P)=0.000613 *10*; α(Q)=1.87×10^{-5} *3*
62.95[@] *3*	0.14 *2*	99.63	(3/2)$^-$	36.68	(3/2)$^-$	M1	10.84	α(L)=8.23 *12*; α(M)=1.96 *3*; α(N+..)=0.649 *10* α(N)=0.515 *8*; α(O)=0.1151 *17*; α(P)=0.0185 *3*; α(Q)=0.001033 *15*

^{221}Rn β^- decay 1977Vy02 (continued)

$\gamma(^{221}$Fr) (continued)

E_γ[†]	I_γ[†c]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	δ[‡]	α[d]	Comments
64.24 10	0.26 2	100.93	(5/2)⁻	36.68	(3/2)⁻	M1+E2	0.51 10	23 4	α(L)=17 3; α(M)=4.4 8; α(N+..)=1.4 3 α(N)=1.16 22; α(O)=0.25 5; α(P)=0.034 6; α(Q)=0.00081 6
69.79 10	0.04 1	108.387	(7/2)⁻	38.531	(9/2)⁻	E2		48.2	α(L)=35.5 6; α(M)=9.60 15; α(N+..)=3.10 5 α(N)=2.51 4; α(O)=0.520 9; α(P)=0.0665 11; α(Q)=0.0001186 18
71.67 10	0.118 12	108.387	(7/2)⁻	36.68	(3/2)⁻	E2		42.4	α(L)=31.2 5; α(M)=8.45 14; α(N+..)=2.73 5 α(N)=2.21 4; α(O)=0.458 8; α(P)=0.0586 9; α(Q)=0.0001067 16
73.5[#] 1	0.0031[a] 9	99.63	(3/2)⁻	26.02	(1/2)⁻	E2+M1		22 16	α(L)=16 12; α(M)=4 4; α(N+..)=1.4 10 α(N)=1.1 9; α(O)=0.24 17; α(P)=0.032 21; α(Q)=0.0004 3
73.86[@] 2	0.52 3	99.88	(3/2)⁺	26.02	(1/2)⁻	E1		0.240	α(L)=0.182 3; α(M)=0.0440 7; α(N+..)=0.01403 20 α(N)=0.01131 16; α(O)=0.00238 4; α(P)=0.000330 5; α(Q)=1.092×10^{-5} 16
74.9[@] 2	≈0.15	100.93	(5/2)⁻	26.02	(1/2)⁻	(M1+E2)	≈0.5	≈12.09	α(L)≈9.02; α(M)≈2.31; α(N+..)≈0.755 α(N)≈0.607; α(O)≈0.1296; α(P)≈0.0184; α(Q)≈0.000515
78.8[b]	0.031	224.67	(3/2)⁺	145.9	(1/2)⁺	M1		5.63	α(L)=4.27 6; α(M)=1.019 15; α(N+..)=0.337 5 α(N)=0.267 4; α(O)=0.0597 9; α(P)=0.00958 14; α(Q)=0.000536 8
87.41[@] 3	≈0.18	195.788	(7/2)⁻	108.387	(7/2)⁻	M1		4.16	α(L)=3.16 5; α(M)=0.754 11; α(N+..)=0.249 4 α(N)=0.198 3; α(O)=0.0442 7; α(P)=0.00709 10; α(Q)=0.000396 6
94.90[#] 5	0.057[a] 13	195.788	(7/2)⁻	100.93	(5/2)⁻	M1		3.28	α(L)=2.49 4; α(M)=0.594 9; α(N+..)=0.196 3 α(N)=0.1557 22; α(O)=0.0348 5; α(P)=0.00558 8; α(Q)=0.000312 5
96.15[#] 5	0.019[a] 5	195.788	(7/2)⁻	99.63	(3/2)⁻	M1+E2	0.8 3	6.0 14	α(L)=4.5 11; α(M)=1.2 3; α(N+..)=0.38 10 α(N)=0.31 8; α(O)=0.065 16; α(P)=0.0090 18; α(Q)=0.00020 5
99.63[@] 5	0.23 4	99.63	(3/2)⁻	0.0	5/2⁻	M1+E2	0.19 4	3.06 11	α(L)=2.32 8; α(M)=0.560 21; α(N+..)=0.185 7 α(N)=0.147 6; α(O)=0.0325 12; α(P)=0.00512 14; α(Q)=0.000263 6 I_γ: calculated by the evaluator from I(99.63γ)/I(62.95γ)=0.70 6/0.14 2, as deduced in ^{225}Ac α decay.
99.91[@] 5	1.4 5	99.88	(3/2)⁺	0.0	5/2⁻	E1		0.1073	α(L)=0.0814 12; α(M)=0.0196 3; α(N+..)=0.00629 9 α(N)=0.00505 8; α(O)=0.001077 16; α(P)=0.0001534 22; α(Q)=5.57×10^{-6} 8 I(99.63γ)+I(99.91γ)=1.6 4 was measured.
100.96[@] 5	0.30 7	100.93	(5/2)⁻	0.0	5/2⁻	M1+E2	0.7 7	4.6 19	α(L)=3.4 14; α(M)=0.9 4; α(N+..)=0.29 13 α(N)=0.23 11; α(O)=0.049 21; α(P)=0.0070 24; α(Q)=0.00019 8

γ(^{221}Fr) (continued)

E_γ[†]	I_γ[†c]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α[d]	Comments
103.3 *2*	0.048 *14*	253.53	(5/2)$^+$	150.08	(7/2)$^+$	[M1+E2]		10 *3*	α(K)=5 *5*; α(L)=3.7 *18*; α(M)=1.0 *6*; α(N+..)=0.32 *17* α(N)=0.26 *14*; α(O)=0.05 *3*; α(P)=0.007 *3*; α(Q)=0.00014 *11*
108.44 *4*	2.12 *13*	108.387	(7/2)$^-$	0.0	5/2$^-$	M1+E2	0.53 *6*	10.25 *25*	α(K)=7.2 *4*; α(L)=2.29 *12*; α(M)=0.58 *4*; α(N+..)=0.189 *11* α(N)=0.152 *9*; α(O)=0.0328 *17*; α(P)=0.00481 *20*; α(Q)=0.000171 *8*
111.56 *4*	2.12 *13*	150.08	(7/2)$^+$	38.531	(9/2)$^-$	(E1)		0.362	α(K)=0.282 *4*; α(L)=0.0608 *9*; α(M)=0.01460 *21*; α(N+..)=0.00470 *7* α(N)=0.00377 *6*; α(O)=0.000807 *12*; α(P)=0.0001160 *17*; α(Q)=4.34×10^{-6} *6*
114[b]	0.31	393.40	(5/2,7/2)$^+$	279.28	(7/2)$^+$	M1		9.86	α(K)=7.93 *12*; α(L)=1.466 *21*; α(M)=0.350 *5*; α(N+..)=0.1156 *17* α(N)=0.0917 *13*; α(O)=0.0205 *3*; α(P)=0.00329 *5*; α(Q)=0.000184 *3*
119.9	0.36	145.9	(1/2)$^+$	26.02	(1/2)$^-$	E1		0.305	α(K)=0.238 *4*; α(L)=0.0503 *7*; α(M)=0.01206 *17*; α(N+..)=0.00389 *6* α(N)=0.00312 *5*; α(O)=0.000668 *10*; α(P)=9.67×10^{-5} *14*; α(Q)=3.69×10^{-6} *6* From 2003Gr33.
123.75[#] *5*	≈0.026[a]	224.67	(3/2)$^+$	100.93	(5/2)$^-$	[E1]		0.282	α(K)=0.221 *4*; α(L)=0.0463 *7*; α(M)=0.01109 *16*; α(N+..)=0.00358 *5* α(N)=0.00287 *4*; α(O)=0.000616 *9*; α(P)=8.93×10^{-5} *13*; α(Q)=3.44×10^{-6} *5*
124.82[#] *5*	≈0.0096[a]	224.67	(3/2)$^+$	99.88	(3/2)$^+$	M1+E2	≈0.8	≈6.00	α(K)≈3.87; α(L)≈1.592; α(M)≈0.409; α(N+..)≈0.1335 α(N)≈0.1072; α(O)≈0.0229; α(P)≈0.00327; α(Q)≈9.24×10^{-5}
126.25 *10*	0.22 *3*	234.63	(5/2)$^+$	108.387	(7/2)$^-$	(E1)		0.269	α(K)=0.211 *3*; α(L)=0.0439 *7*; α(M)=0.01052 *15*; α(N+..)=0.00339 *5* α(N)=0.00272 *4*; α(O)=0.000584 *9*; α(P)=8.49×10^{-5} *12*; α(Q)=3.28×10^{-6} *5*
129.25 *10*	0.22 *3*	279.28	(7/2)$^+$	150.08	(7/2)$^+$	[M1,E2]		5.0 *20*	α(K)=3 *3*; α(L)=1.5 *5*; α(M)=0.39 *15*; α(N+..)=0.13 *5* α(N)=0.10 *4*; α(O)=0.022 *8*; α(P)=0.0030 *8*; α(Q)=7
133.68 *10*	0.53 *10*	234.63	(5/2)$^+$	100.93	(5/2)$^-$	(E1)		0.234	α(K)=0.184 *3*; α(L)=0.0378 *6*; α(M)=0.00906 *13*; α(N+..)=0.00292 *5* α(N)=0.00234 *4*; α(O)=0.000504 *8*; α(P)=7.35×10^{-5} *11*; α(Q)=2.89×10^{-6} *4*
135.02 *10*	0.64 *6*	234.63	(5/2)$^+$	99.63	(3/2)$^-$	(E1)		0.228	α(K)=0.180 *3*; α(L)=0.0368 *6*; α(M)=0.00882 *13*; α(N+..)=0.00285 *4* α(N)=0.00228 *4*; α(O)=0.000491 *7*; α(P)=7.17×10^{-5} *11*; α(Q)=2.82×10^{-6} *4*
139.6[b]	0.28	393.40	(5/2,7/2)$^+$	253.53	(5/2)$^+$	M1		5.54	α(K)=4.46 *7*; α(L)=0.820 *12*; α(M)=0.195 *3*;

$\gamma(^{221}Fr)$ (continued)

E_γ[†]	I_γ[†c]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	δ[‡]	α[d]	Comments
									α(N+..)=0.0646 *9* α(N)=0.0512 *8*; α(O)=0.01145 *16*; α(P)=0.00184 *3*; α(Q)=0.0001025 *15*
144.7 *2*	0.54 *20*	294.76	(9/2)$^+$	150.08	(7/2)$^+$	(M1+E2)	≈0.8	≈3.79	α(K)≈2.57; α(L)≈0.914; α(M)≈0.232; α(N+..)≈0.0761 α(N)≈0.0610; α(O)≈0.01312; α(P)≈0.00190; α(Q)≈6.05×10^{-5}
145.17[@] *5*	0.63 *20*	253.53	(5/2)$^+$	108.387	(7/2)$^-$	(E1)		0.191	α(K)=0.1512 *22*; α(L)=0.0305 *5*; α(M)=0.00730 *11*; α(N+..)=0.00236 *4* α(N)=0.00189 *3*; α(O)=0.000407 *6*; α(P)=5.97×10^{-5} *9*; α(Q)=2.40×10^{-6} *4*
150.06 *4*	4.2 *3*	150.08	(7/2)$^+$	0.0	5/2$^-$	E1		0.1765	α(K)=0.1397 *20*; α(L)=0.0280 *4*; α(M)=0.00669 *10*; α(N+..)=0.00217 *3* α(N)=0.001734 *25*; α(O)=0.000374 *6*; α(P)=5.50×10^{-5} *8*; α(Q)=2.22×10^{-6} *4*
152.60 *8*	≈0.2	253.53	(5/2)$^+$	100.93	(5/2)$^-$	[E1]		0.1695	α(K)=0.1342 *19*; α(L)=0.0268 *4*; α(M)=0.00641 *9*; α(N+..)=0.00207 *3* α(N)=0.001660 *24*; α(O)=0.000358 *5*; α(P)=5.27×10^{-5} *8*; α(Q)=2.14×10^{-6} *3*
153.87 *6*	0.80 *6*	253.53	(5/2)$^+$	99.63	(3/2)$^-$	(E1)		0.1661	α(K)=0.1316 *19*; α(L)=0.0262 *4*; α(M)=0.00627 *9*; α(N+..)=0.00203 *3* α(N)=0.001625 *23*; α(O)=0.000351 *5*; α(P)=5.16×10^{-5} *8*; α(Q)=2.10×10^{-6} *3*
157.26[@] *2*	0.22 *4*	195.788	(7/2)$^-$	38.531	(9/2)$^-$	M1+E2	0.21 *21*	3.8 *3*	α(K)=3.1 *4*; α(L)=0.59 *3*; α(M)=0.142 *9*; α(N+..)=0.047 *3* α(N)=0.0374 *24*; α(O)=0.0083 *5*; α(P)=0.00132 *4*; α(Q)=7.0×10^{-5} *7*
168.86 *13*	0.26 *3*	393.40	(5/2,7/2)$^+$	224.67	(3/2)$^+$	[M1,E2]		2.1 *11*	α(K)=1.4 *12*; α(L)=0.54 *6*; α(M)=0.137 *24*; α(N+..)=0.045 *8* α(N)=0.036 *7*; α(O)=0.0077 *11*; α(P)=0.00111 *5*; α(Q)=3
169.9[b]	0.016	195.788	(7/2)$^-$	26.02	(1/2)$^-$				
170.98 *20*	0.46 *4*	279.28	(7/2)$^+$	108.387	(7/2)$^-$	(E1)		0.1286	α(K)=0.1023 *15*; α(L)=0.0200 *3*; α(M)=0.00478 *7*; α(N+..)=0.001548 *23* α(N)=0.001238 *18*; α(O)=0.000268 *4*; α(P)=3.97×10^{-5} *6*; α(Q)=1.656×10^{-6} *24*
178.36 *4*	0.84 *6*	279.28	(7/2)$^+$	100.93	(5/2)$^-$	E1		0.1161	α(K)=0.0925 *13*; α(L)=0.0179 *3*; α(M)=0.00429 *6*; α(N+..)=0.001389 *20* α(N)=0.001111 *16*; α(O)=0.000241 *4*; α(P)=3.58×10^{-5} *5*; α(Q)=1.506×10^{-6} *21*
186.1[b]	0.0053	224.67	(3/2)$^+$	38.531	(9/2)$^-$				
186.38 *4*	20.0 *12*	294.76	(9/2)$^+$	108.387	(7/2)$^-$	E1		0.1044	α(K)=0.0833 *12*; α(L)=0.01605 *23*; α(M)=0.00383 *6*; α(N+..)=0.001242 *18*

$^{221}_{87}Fr_{134}$-6

γ(^{221}Fr) (continued)

E_γ[†]	I_γ[†c]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[‡]	δ[‡]	α[d]	Comments
									α(N)=0.000994 *14*; α(O)=0.000215 *3*; α(P)=3.21×10^{-5} *5*; α(Q)=1.364×10^{-6} *20*
188.00[@] *5*	≈0.2	224.67	(3/2)$^+$	36.68	(3/2)$^-$	E1		0.1023	α(K)=0.0816 *12*; α(L)=0.01570 *22*; α(M)=0.00375 *6*; α(N+..)=0.001216 *17* α(N)=0.000972 *14*; α(O)=0.000211 *3*; α(P)=3.14×10^{-5} *5*; α(Q)=1.338×10^{-6} *19*
195.69 *7*	0.10 *2*	195.788	(7/2)$^-$	0.0	5/2$^-$	M1+E2	0.8 *8*	1.5 *6*	α(K)=1.1 *6*; α(L)=0.315 *5*; α(M)=0.079 *4*; α(N+..)=0.0258 *12* α(N)=0.0206 *11*; α(O)=0.00448 *12*; α(P)=0.00067 *4*; α(Q)=2.6×10^{-5} *14* I_γ: calculated by the evaluator from Iγ(195.69γ)/Iγ(157.26γ)=0.15 *1*/0.33 *2*, as measured in ^{225}Ac α decay, and Iγ(157.26γ)=0.22 *4*. Iγ(195.69γ)≈0.15 was measured by 1977Vy02.
197.77[ef] *12*		234.63	(5/2)$^+$	36.68	(3/2)$^-$				
197.77[e] *12*	0.72 *9*	393.40	(5/2,7/2)$^+$	195.788	(7/2)$^-$	(E1)		0.0905	α(K)=0.0724 *11*; α(L)=0.01381 *20*; α(M)=0.00329 *5*; α(N+..)=0.001070 *15* α(N)=0.000855 *12*; α(O)=0.000186 *3*; α(P)=2.78×10^{-5} *4*; α(Q)=1.195×10^{-6} *17*
198.7[#] *1*	≈0.0088[a]	224.67	(3/2)$^+$	26.02	(1/2)$^-$	[E1]		0.0895	α(K)=0.0716 *10*; α(L)=0.01365 *20*; α(M)=0.00326 *5*; α(N+..)=0.001057 *15* α(N)=0.000845 *12*; α(O)=0.000183 *3*; α(P)=2.74×10^{-5} *4*; α(Q)=1.182×10^{-6} *17*
216.92 *10*	2.4 *4*	253.53	(5/2)$^+$	36.68	(3/2)$^-$	(E1)		0.0726	α(K)=0.0582 *9*; α(L)=0.01096 *16*; α(M)=0.00261 *4*; α(N+..)=0.000849 *12* α(N)=0.000678 *10*; α(O)=0.0001475 *21*; α(P)=2.22×10^{-5} *4*; α(Q)=9.73×10^{-7} *14*
224.64[#] *5*	≈0.036[a]	224.67	(3/2)$^+$	0.0	5/2$^-$	[E1]		0.0668	α(K)=0.0536 *8*; α(L)=0.01005 *14*; α(M)=0.00239 *4*; α(N+..)=0.000778 *11* α(N)=0.000621 *9*; α(O)=0.0001353 *19*; α(P)=2.04×10^{-5} *3*; α(Q)=9.00×10^{-7} *13*
228.2[b]	0.24	253.53	(5/2)$^+$	26.02	(1/2)$^-$				
240.6 *2*	0.67 *7*	279.28	(7/2)$^+$	38.531	(9/2)$^-$	[E1]		0.0569	α(K)=0.0457 *7*; α(L)=0.00848 *12*; α(M)=0.00202 *3*; α(N+..)=0.000657 *10* α(N)=0.000524 *8*; α(O)=0.0001143 *17*; α(P)=1.728×10^{-5} *25*; α(Q)=7.74×10^{-7} *11*
243.2[#] *1*	0.018[a] *8*	393.40	(5/2,7/2)$^+$	150.08	(7/2)$^+$	[M1]		1.162	α(K)=0.938 *14*; α(L)=0.1706 *24*; α(M)=0.0406 *6*;

$\gamma(^{221}$Fr) (continued)

E_γ[†]	I_γ[†c]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	α[d]	Comments
								α(N+..)=0.01343 *19* α(N)=0.01065 *15*; α(O)=0.00238 *4*; α(P)=0.000382 *6*; α(Q)=2.13×10^{-5} *3*
253.53[@] *5*	0.53 *5*	253.53	(5/2)$^+$	0.0	5/2$^-$	[E1]	0.0503	α(K)=0.0405 *6*; α(L)=0.00746 *11*; α(M)=0.001775 *25*; α(N+..)=0.000578 *8* α(N)=0.000461 *7*; α(O)=0.0001007 *15*; α(P)=1.526×10^{-5} *22*; α(Q)=6.91×10^{-7} *10* I_γ: calculated by the evaluator from I(253.53γ)/I(153.87γ)=0.113 *5*/0.172 *8* and I(253.53γ)/I(145.17γ)=0.113 *5*/0.134 *6*, as measured in ^{225}Ac α decay. I(253.53γ)+I(254.2γ of ^{217}Po)=2.7 *2* was measured, and I(253.53γ)≈0.6 was estimated by 1977Vy02 by decomposing the peak into components.
256.0 *2*	0.32 *8*	294.76	(9/2)$^+$	38.531	(9/2)$^-$	[E1]	0.0492	α(K)=0.0396 *6*; α(L)=0.00729 *11*; α(M)=0.001733 *25*; α(N+..)=0.000564 *8* α(N)=0.000450 *7*; α(O)=9.84×10^{-5} *14*; α(P)=1.491×10^{-5} *21*; α(Q)=6.76×10^{-7} *10*
279.26 *4*	1.82 *12*	279.28	(7/2)$^+$	0.0	5/2$^-$	E1	0.0403	α(K)=0.0325 *5*; α(L)=0.00591 *9*; α(M)=0.001404 *20*; α(N+..)=0.000458 *7* α(N)=0.000365 *6*; α(O)=7.98×10^{-5} *12*; α(P)=1.215×10^{-5} *17*; α(Q)=5.60×10^{-7} *8*
284.8[#] *2*	0.061[a] *32*	393.40	(5/2,7/2)$^+$	108.387	(7/2)$^-$	[E1]	0.0385	α(K)=0.0311 *5*; α(L)=0.00564 *8*; α(M)=0.001339 *19*; α(N+..)=0.000437 *7* α(N)=0.000348 *5*; α(O)=7.62×10^{-5} *11*; α(P)=1.161×10^{-5} *17*; α(Q)=5.37×10^{-7} *8*
354.8[#] *2*	0.023[a] *8*	393.40	(5/2,7/2)$^+$	38.531	(9/2)$^-$	[E1]	0.0235	α(K)=0.0191 *3*; α(L)=0.00337 *5*; α(M)=0.000799 *12*; α(N+..)=0.000261 *4* α(N)=0.000208 *3*; α(O)=4.57×10^{-5} *7*; α(P)=7.03×10^{-6} *10*; α(Q)=3.38×10^{-7} *5*

[†] From 1977Vy02 (semi, s ce), unless otherwise noted.

[‡] From ce measurements of 1977Vy02 in ^{221}Rn β^- decay and of 1972Dz14 in ^{225}Ac α decay. Multipolarities in brackets are assumed from the level scheme; they were not determined experimentally.

[#] Not observed in ^{221}Rn β^- decay; Eγ from ^{225}Ac α decay.

[@] Energy from ^{225}Ac α decay.

[&] Not observed; energy from level scheme.

[a] Calculated by the evaluator from adopted branchings.

[b] Observed by 2003Gr33.

[c] For absolute intensity per 100 decays, multiply by 1.081 *20*.

[d] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with "Frozen Orbitals" approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

[e] Multiply placed.

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

^{221}Rn β^- decay 1977Vy02

Decay Scheme

Intensities: I_γ per 100 parent decays