Title

Nuclear Data Sheets for 225Fr

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Comments Dataset for 225 *

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Abstract: Nuclear structure data pertaining to ^{225}Fr have been evaluated, and incorporated into the ENSDF data file. This evaluation includes literature available by 16 May 2005 and supersedes the previous publication for ^{225}Fr (Y. A. Akovali, *Nuclear Data Sheets 60*, 617 (1990), literature cutoff date 1 June 1989). Data have been incorporated from the following references: 1987Co19, 1997Bu03 and 2003Au03.

Cutoff Date: Data received by 16 May 2005 have been evaluated.

General Policies and Organization of Material: See the introductory pages.

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Adopted Levels, Gammas

Q(β⁻)=1820 *30*; S(n)=5914 *58*; S(p)=5915 *SY*; Q(α)=4576 *SY* 2003Au03.
Uncertainties in S(p) and Q(α) are 300 and 200, respectively (2003Au03).
Assignment: Th(600–MeV p) mass separation (1969Ha03,1975We23).
For discussions of the nuclear structure of ^{225}Fr see, for example, 1987Sh24, 1988Le13, 1991Cw01 and 2000Sh32.

^{225}Fr Levels

Cross Reference (XREF) Flags

A ^{225}Rn β⁻ Decay
B ^{226}Ra(t,α)

E(level)†	Jπ	XREF	$T_{1/2}$	Comments
0.0‡	3/2–	AB	3.95 min *14*	%β⁻=100. μ=1.07 *2*; Q=1.32 *5*. Δ<r²>(^{212}Fr,^{225}Fr)=1.34862 *22* (1987Co19); the uncertainty indicated is statistical only; a systematic uncertainty of the order of a few percent is expected (1987Co19). μ, Q: from atomic beam LASER spectroscopy (1985Co24, 1989Ra17). Stermheimer correction applied for Q. See 1987Co19 for further discussion and anlysis. See 1988Le13 for calculated μ and Q values. Jπ: spin measured (atomic beam; 1985Co24). Nilsson orbital from cross section fingerprint in (t,α) for 0, 29, 83, 128 levels, supported by measured μ value. See 1986Ek02, 1997Bu03, and 1988Le13 for discussions. $T_{1/2}$: weighted average of 3.9 min *2* (1969Ha03), 4.0 min *2* (1983Ny01).
28.53‡ *3*	5/2–	AB		Jπ: from cross section fingerprint in (t,α) for 0, 29, 83, 128 levels; supported by M1+E2 29γ to 3/2– g.s..
82.50‡ *3*	7/2–	AB		Jπ: from cross section fingerprint in (t,α) for 0, 29, 83, 128 levels; supported by E2 83γ to 3/2– g.s., M1+E2 54γ to 5/2– 29 level.
128.06‡ *4*	9/2–	AB		Jπ: from cross section fingerprint in (t,α) for 0, 29, 83, 128 levels; supported by E2 99γ to 5/2– 29 level.
142.60§ *5*	(3/2)+	AB		Jπ: E1 143γ to 3/2–; E1 114γ to 5/2– 29 level.
151.61§ *3*	5/2+	A		E1 152γ to 3/2–; E1 69γ to 7/2– 83 level.
181 *3*	(1/2+)	B		Jπ: tentative value based on comparison of experimental σ(t,α) with DWBA calculation assuming this is the 1/2[400] bandhead. Assignment supported by comparison with (t,α) population for levels in neighboring odd–A Fr isotopes.
181.64§ *4*	(9/2)+	A		Jπ: E1 99γ to 7/2– 83 level; 99γ to 9/2– 128 level; band assignment.
198.22§ *4*	(7/2)+	A		Jπ: E1 169.7γ to 5/2– 29 level; E1 115.8γ to 7/2– 83 level; band assignment.
203.37# *4*	(9/2)–	Ab		XREF: b(205). Jπ: M1+E2 121γ to 7/2– 83 level; E2 175γ to 5/2– 29 level; band assignment.
205@	(3/2+)	B		XREF: B(205).
207.19# *3*	(5/2)–	Ab		XREF: b(205). Jπ: M1+E2 179γ to 5/2–29 level; M1+E2 207γ to 3/2– g.s.; band assignment.
228.34 *5*	(7/2,9/2)–	A		Jπ: M1+E2 146γ to 7/2– 83 level; (E1) 47γ to (9/2)+ 182 level.
241.36@ *4*	(5/2)+	AB		Jπ: M1 90γ to 5/2+ 152 level; (E1) 241γ to 3/2– g.s.; band assignment.
293.24@ *5*	(7/2)+	AB		Jπ: M1 95γ to (7/2)+ 198 level; E1 265γ to 5/2– 29 level; 165γ to 9/2– 128.
303.23 *6*	7/2+,9/2+,11/2+	A		Jπ: E1 175γ to 9/2– 128 level.
330.16 *4*	(5/2,7/2)–	AB		Jπ: E1 131γ to (7/2)+ 198 level; 330γ to 3/2– g.s..
346.05@ *4*	(9/2)+	A		Jπ: M1+E2 164γ to 9/2+ 182 level; 264γ to 7/2– 83 level; band assignment.
401 *3*		B		
409.03 *4*	(5/2)+	A		Jπ: M1(+E2) 210γ to (7/2)+ 198; M1+E2 257γ to 5/2+ 152; 409γ to 3/2– g.s..
424.96 *9*	(5/2–,7/2–)	A		Jπ: gammas to 3/2– g.s. and 9/2– 128 level.
≈448		B		
480.07 *4*	(5/2,7/2,9/2)+	A		Jπ: M1+E2 187γ to (7/2)+ 293 level.
502.93 *6*	(5/2)–	AB		Jπ: M1 296γ to (5/2)– 207 level; 360γ to (3/2)+ 143 level; 305γ to (7/2)+ 198 level.
559.69# *4*	7/2–	A		Jπ: M1 531γ to 5/2– 29 level; M1 431γ to 9/2– 28 level.

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Adopted Levels, Gammas (continued)

^{225}Fr Levels (continued)

E(level)†	Jπ	XREF	Comments
571.48 *6*	(7/2)−	AB	Jπ: M1 364γ to (5/2)− 207 level; 390γ to (9/2)+ 182 level.
591 *3*		B	
619.00 *7*	(5/2,7/2,9/2)+	A	Jπ: M1 420γ to (7/2)+ 198 level.
≈630		B	
635.67 *7*	(3/2,5/2,7/2)+	A	Jπ: M1 484γ to 5/2+ 152 level; possible 636γ to 3/2− g.s..
655 *3*		B	
665.11 *5*	(7/2)+	A	Jπ: M1 484γ to (9/2)+ 182 level; M1 423γ to (5/2)+ 241.
676 *3*		B	
721.05& *6*	(5/2)−	A	Jπ: M1 721γ to 3/2− g.s.; M1 693γ to 5/2− 29; weak, doubly−placed M1 639γ to 7/2− 82 level disfavors J=3/2.
744.25 *6*	(5/2,7/2)+	AB	Jπ: M1 335γ to (5/2)+ 409 level; M1 546γ to (7/2)+ 198 level.
754.23 *9*		A	Jπ: 602γ to 5/2+ 152 level; possible 573γ to (9/2)+ 182 level; possible 551γ to (9/2)− 203 level.
778.63& *4*	7/2−	A	Jπ: M1 750γ to 5/2− 29; M1 696γ to 7/2− 83 level; doubly−placed M1 651γ to 9/2− 128 level.
799 *3*		B	
832.09 *8*	(5/2+,7/2,9/2+)	A	Jπ: 681γ to 5/2+ 152 level; 651γ to (9/2)+ 182.
839.04 *9*	(5/2,7/2,9/2)+	A	Jπ: M1 536γ to 7/2+,9/2+,11/2+ 303 level.
845 *3*		B	
865.66 *5*	(7/2)−	A	Jπ: M1 658γ to (5/2)− 207 level; M1 738γ 9/2− 128 level.
885.94 *5*	(3/2,5/2)+	AB	Jπ: M1(+E2) 743γ to (3/2)+ 143 level; 858γ to 5/2− 29.
935.91 *15*	(5/2−,7/2,9/2+)	A	Jπ: 808γ to 9/2− 128 level; 784γ to 5/2+ 152 level.
974 *3*		B	
979.67 *7*	(3/2−,5/2)	A	Jπ: 980γ to 3/2− g.s.; 837γ to (3/2)+ 143; 408γ to (7/2)− 572.
1028 *3*		B	
1047.32 *6*		AB	Jπ: 1047γ to 3/2− g.s.; 896γ to 5/2+ 152 level.
1063.02 *7*		A	Jπ: 881γ to (9/2)+ 182.
1101.83 *9*	(7/2,9/2,11/2)+	A	Jπ: M1 920γ to (9/2)+ 182 level.
1127 *3*		B	
1185.15 *6*	(5/2−,7/2)	A	Jπ: 1034γ to 5/2+ 152; 982γ to (9/2)− 203; 978γ to (5/2)− 207.
1225.94 *8*		AB	Jπ: 1144γ to 7/2− 83; 1045γ to (9/2)+ 182.
≈1247		B	
1321 *3*		B	
1351 *3*		B	
1392.13 *8*	(5/2,7/2−)	A	Jπ: 1392γ to 3/2− g.s.; 1194γ to (7/2)+ 198; 821γ to (7/2)− 572.
1398 *3*		B	
1479.55 *5*	(7/2)	AB	Jπ: 1451γ to 5/2− 29; 1351γ to 9/2− 128; 1298γ to (9/2)+ 182; 1070γ to (5/2)+ 409.
1519.60 *11*		AB	Jπ: 1337γ to (9/2)+ 182; 960γ to 7/2− 560 level.
1526.03 *12*		A	Jπ: 1498γ to 5/2− 29.
≈1535		B	
1577.92 *7*	(5/2+,7/2)	A	Jπ: 1232γ to (9/2)+ 346 level; 1549γ to 5/2− 29 level; 1169γ to (5/2)+ 409 level.
1614.21 *8*	(5/2,7/2+)	A	Jπ: 1471γ to (3/2)+ 143; 1416γ to (7/2)+ 198; 1385γ to (7/2,9/2)− 228 level.
1655.32 *6*	(5/2,7/2+)	A	Jπ: 1513γ to (3/2)+ 143; 1457γ to (7/2)+ 198; 1095γ to 7/2− 560 level.
1749.73 *6*	(5/2,7/2+)	A	Jπ: 1667γ to 7/2− 83; 1607γ to (3/2)+ 143; 1551γ to (7/2)+ 198 level.

† From (t,α) for levels observed in (t,α) only; uncertainties vary between 1 and 3 keV, but evaluator has assigned 3 keV for all energies adopted from (t,α). All other level energies are from least−squares adjustment of Eγ, omitting 136.0γ, 668.05γ and 1421.0γ, each of which fits its placement very poorly (at least 5σ from least−squares adjusted value), and all unresolved or multiply−placed lines.

‡ (A): π 3/2[532] band (1997Bu03). Coriolis mixed with 1/2[541] band (1997Bu03). Assignment based on (t,α) reaction cross section fingerprint.

§ (B): π 3/2[651] band (1997Bu03). Coriolis mixed with 1/2[660] band. K=3/2 assignment based on relative E1 branching from J=5/2, 7/2, 9/2 band members to levels in g.s. band (Alaga rule).

(C): possible π 1/2[541] mixed band (1997Bu03). Supported by γ decay patterns assuming a 3/2[532] band admixture.

@ (D): possible π 3/2[402] band (1997Bu03). Coriolis mixed with J>1/2 members of 1/2[660] and 1/2[400] bands. Assignment supported by (t,α) cross section fingerprint.

& (E): Kπ=5/2− band (1997Bu03). possible configuration: π 5/2[523]. K=5/2 assignment based on comparison between Alaga rules and observed branching ratios for strong M1 transitions from J=5/2 and 7/2 band members to g.s. band levels. Supported by strong β^- branch from 7/2[743] ^{225}Rn parent to J=7/2 band member.

Adopted Levels, Gammas (continued)

$\gamma(^{225}Fr)$

E(level)	Eγ†	Iγ†	Mult.†	δ†	α
28.53	28.51 *5*	100	M1+E2	0.45 *15*	750 *270*
82.50	53.93 *5*	100 *6*	M1+E2	0.18 *3*	22.8
	82.55§ *5*	38§ *10*	E2		22.1
128.06	45.5 *1*	21 *3*	[M1]		29.6
	99.4§ *1*	100§ *33*	E2		9.2
142.60	114.03 *5*	28.7 *15*	E1		0.349
	142.60@ *5*	100@ *5*	E1		0.202
151.61	69.12 *5*	13.6 *7*	E1		0.291
	123.06 *5*	45.3 *23*	E1		0.290
	151.65 *5*	100.0	E1		0.174
181.64	30.0#	0.0089#	[E2]		2990
	53.6§ *1*	2.0§ *7*	[E1]		0.576
	99.15 *5*	100 *13*	E1		0.111
198.22	46.6@ *1*	0.64@ *21*	[M1]		27.6
	70.15 *5*	5.8 *3*	[E1]		0.280
	115.75 *5*	12.4 *7*	E1		0.337
	169.73 *5*	100 *6*	E1		0.132
203.37	21.72 *10*	8.8 *19*	[E1]		6.37
	120.83 *5*	100 *5*	M1+E2		6.4 *24*
	174.90§ *10*	72§ *22*	E2		0.92
207.19	64.6 *1*	2.7 *5*	[E1]		0.349
	178.66 *5*	100 *5*	M1+E2	1.47 *+18−14*	1.50 *12*
	207.21 *5*	36.0 *19*	M1+E2	1.4 *+4−3*	0.98 *17*
228.34	46.6@ *1*	25.0@ *17*	(E1)		0.84
	145.80 *5*	100 *5*	M1+E2		3.5 *17*
241.36	89.7§ *1*	26§ *3*	M1		4.08
	212.85 *5*	52 *3*	(E1)		0.0766
	241.34 *5*	100 *5*	(E1)		0.0569
293.24	94.9§ *1*	4.8§ *10*	M1		3.47
	141.65@ *10*	2.4@ *10*	[M1]		5.61
	165.20 *5*	87 *4*	[E1]		0.141
	264.67 *5*	100 *5*	E1		0.0459
303.23	175.17 *5*	100	E1		0.122
330.16	126.80 *10*	35.4 *19*	[M1,E2]		5.5 *22*
	131.84§ *10*	100§ *5*	E1		0.245
	247.60 *5*	89 *4*	[M1,E2]		0.7 *5*
	301.5 *2*	11.9 *19*	[M1,E2]		0.4 *3*
	330.10 *10*	40.5 *20*	[M1,E2]		0.32 *21*
346.05	104.72 *10*	10.5 *20*	[E2]		7.52
	142.60@ *10*	26@ *3*	[E1]		0.202
	147.96 *10*	22 *4*	M1,E2		3.4 *16*
	164.41 *5*	52 *3*	M1+E2		2.4 *13*
	263.56 *5*	100 *5*			
409.03	202.02 *5*	78 *4*	E1		0.087
	210.70§ *10*	24§ *3*	M1(+E2)		1.1 *7*
	257.38 *5*	100 *5*	M1+E2		0.6 *4*
	326.47 *10*				
	409.1 *2*	28 *4*			
424.96	296.80 *10*	100 *5*	[M1+E2]		0.4 *3*
	424.9 *2*	12.0 *23*			
480.07	71.16 *10*	21.2 *24*	[M1]		8.01
	186.6§ *3*	21§ *4*	M1+E2		1.6 *10*
	251.65 *10*	12.6 *13*			
	298.35 *10*	100 *5*	[M1]		0.696
502.93	295.55 *10*	100 *8*	M1		0.714
	299.6 *2*	17 *3*	[E2]		0.148
	304.7 *2*	19.2 *23*			
	351.3§ *2*	38§ *9*			
	360.45 *10*	57 *6*			
	503.00& *10*	<52&			
559.69	229.45 *5*	16.8 *8*	M1		1.44
	318.32 *10*	20.7 *10*			
	352.30 *10*	100 *5*	M1		0.442

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Adopted Levels, Gammas (continued)

γ(^{225}Fr) (continued)

E(level)	Eγ[†]	Iγ[†]	Mult.[†]	α
559.69	356.30 *10*	52.4 *26*	M1	0.429
	361.55 *10*	11.1 *7*		
	378.05 *10*	20.7 *10*		
	408.10[@] *10*	22.7[@] *16*		
	431.63 *10*	12.6 *13*	M1	0.255
	476.9[&] *2*	<6.7[&]		
	531.10 *10*	58 *3*	M1	0.147
571.48	364.10 *10*	91 *5*	M1	0.404
	368.2 *2*	30 *3*	[M1]	0.392
	373.40 *10*	78 *4*		
	389.90 *10*	44 *3*		
	419.8[§] *2*	100[§] *11*		
	543.05 *10*	47 *4*		
619.00	273.07 *10*	46 *4*	[M1,E2]	0.5 *4*
	288.80 *10*	100 *6*		
	420.15[§] *20*	75[§] *18*	M1	0.274
635.67	394.50 *10*	41 *4*		
	483.80[@] *10*	100[@] *14*	M1	0.188
	635.60[&] *10*	<72[&]		
665.11	105.29 *10*	34 *4*	[E1]	0.425
	256.20 *10*	20.9 *21*		
	423.65 *10*	59 *3*	M1	0.268
	461.55 *10*	26.0 *23*		
	466.90 *10*	62 *4*	M1	0.207
	483.80[@] *10*	100[@] *7*	M1	0.188
	537.15[&] *10*	<61[&]		
721.05	240.6[§] *3*	1.3[§] *4*	[E1]	0.0573
	514.2 *2*	10.5 *17*	M1	0.160
	517.8 *2*	2.0 *5*		
	638.50[&] *10*	<6.7[&]	M1	0.090
	692.60 *10*	42.5 *21*	M1	0.0728
	721.10 *10*	100 *5*	M1	0.0655
744.25	335.45 *10*	52.0 *26*	M1	0.505
	398.5 *2*	23 *5*		
	414.1[&] *2*	<22[&]		
	451.00 *10*	44 *3*		
	503.00[&] *10*	<54[&]		
	537.15[&] *10*	<85[&]		
	545.85[@] *10*	100[@] *4*	M1	0.137
	562.50 *10*	20 *6*		
	600.9 *2*	33 *4*		
754.23	136.06 *5*	100 *5*		
	551.10[&] *10*	47[&] *4*		
	572.70[&] *10*	97[&] *11*		
	602.2 *2*	25 *4*		
778.63	218.60 *10*	0.86 *6*	[M1,E2]	1.0 *7*
	275.65 *10*	0.54 *6*	[M1]	0.87
	369.65 *10*	1.58 *9*		
	432.54 *10*	2.56 *19*		
	448.65 *10*	2.56 *14*		
	537.15[&] *10*	<1.98[&]		
	571.40 *10*	12.7 *6*	M1	0.121
	627.10 *10*	4.37 *23*		
	650.65[@] *10*	12.1[@] *7*	M1	0.086
	696.20 *10*	70 *3*	M1	0.0718
	750.15 *10*	100 *5*	M1	0.0591
	778.70 *10*	5.9 *3*		
832.09	486.1 *2*	93 *27*		
	590.6 *2*	38 *7*		
	634.0 *2*	41 *6*		
	650.65[@] *10*	100[@] *17*		
	680.9 *2*	54 *6*		
839.04	203.4[§] *3*	14[§] *4*	[M1,E2]	1.3 *8*

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Adopted Levels, Gammas (continued)

γ(^{225}Fr) (continued)

E(level)	Eγ†	Iγ†	Mult.†	α
839.04	414.1& *2*	<15.1&		
	535.80 *10*	100 *6*	M1	0.144
	545.85@ *10*	28@ *3*	M1	0.137
	635.60& *10*	<37&		
	640.8 *2*	21 *7*		
	711.0 *2*	23.5 *24*		
	756.70& *10*	<36&		
	839.2& *2*	<55&		
865.66	362.75 *10*	5.2 *4*	[M1]	0.408
	562.50 *10*	3.9 *8*		
	572.70& *10*	<13.2&		
	624.3 *2*	3.5 *4*		
	658.30 *10*	18.4 *10*	M1	0.0832
	662.30 *10*	20.7 *13*		
	668.05‡ *10*	8.2 *4*		
	683.9 *2*	4.4 *5*		
	714.00 *10*	7.7 *4*		
	723.00 *10*	22.0 *10*		
	737.70 *10*	25.4 *13*	M1	0.0617
	783.40 *10*	18.7 *10*	M1	0.0527
	837.00@ *10*	100@ *6*	M1	0.0444
	866.0& *2*	<3.4&		
885.94	141.65@ *10*	8@ *6*	[M1,E2]	3.9 *18*
	326.47 *10*			
	405.6 *2*	44 *5*		
	476.9& *2*	<20.2&		
	644.40 *10*	27.8 *23*		
	679.1& *2*	<13.1&		
	734.40 *10*	55 *3*		
	743.35 *10*	100 *5*	M1(+E2)	0.038 *23*
	857.5 *2*	23 *3*		
	885.85 *10*	58 *3*		
935.91	605.6 *2*	100 *14*		
	784.0§ *2*	§		
	808.0 *2*	79 *11*		
979.67	408.10@ *10*	34@ *7*		
	828.05 *10*	27 *3*		
	837.00@ *10*	100@ *25*		
	951.00 *10*	55 *3*		
	979.6 *2*	14.1 *20*		
1047.32	292.80 *10*	13.0 *19*		
	326.47 *10*	92 *5*		
	638.50& *10*	<59&		
	806.2 *2*	40 *3*		
	866.0& *2*	<24&		
	895.7 *2*	100 *15*		
	1047.32 *10*	77 *5*		
1063.02	127.31& *10*	<52&		
	308.8 *2*	27 *3*		
	397.6 *2*	39 *7*		
	427.65 *10*	100 *6*		
	759.6 *2*	58 *6*		
	834.6 *2*	47 *8*		
	855.5& *2*	<35&		
	859.2 *2*	35 *5*		
	864.5 *2*	86 *6*		
	881.40 *10*	95 *6*		
1101.83	808.0 *2*			
	899.0 *2*	15.7 *17*		
	903.2 *2*	18 *5*		
	920.30 *10*	100 *5*	M1	0.0347
1185.15	319.61 *10*	37.5 *19*		
	566.3 *2*	23 *3*		

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Adopted Levels, Gammas (continued)

γ(^{225}Fr) (continued)

E(level)	Eγ†	Iγ†
1185.15	705.10 *10*	81 *4*
	839.2& *2*	<50&
	855.5& *2*	14& *3*
	891.7 *2*	29.1 *25*
	978.1 *2*	16.0 *25*
	981.5 *2*	29 *3*
	1033.5 *2*	100 *5*
	1102.55 *10*	41 *3*
1225.94	472.1& *2*	<27&
	801.0 *2*	39 *4*
	1027.4 *2*	39 *8*
	1044.7 *2*	24 *5*
	1143.65 *10*	100 *6*
1392.13	412.30 *10*	65 *6*
	727.4 *2*	44 *6*
	756.70& *10*	<79&
	821.1 *2*	41 *7*
	1194.1 *2*	100 *9*
	1363.3 *2*	70 *6*
	1392.0 *2*	35 *7*
1479.55	758.5 *2*	16.7 *23*
	814.1 *2*	20.9 *25*
	999.5 *2*	22.9 *22*
	1070.48 *10*	39 *3*
	1176.2 *2*	16.0 *24*
	1281.3 *2*	17.1 *23*
	1298.03 *10*	83 *4*
	1328.1@ *2*	84@ *11*
	1337.40@ *10*	34@ *11*
	1351.40 *10*	63 *4*
	1397.00 *10*	28.7 *24*
	1451.16 *10*	100 *6*
1519.60	127.31& *10*	<40&
	472.1& *2*	<26&
	798.7& *2*	<40&
	959.8 *2*	22 *4*
	1173.3 *2*	48 *6*
	1226.7 *2*	25 *5*
	1321.4 *2*	49 *4*
	1337.40@ *10*	100@ *20*
1526.03	1195.7 *2*	83 *17*
	1328.1@ *2*	100@ *33*
1526.03	1374.6& *2*	<55&
	1443.2 *2*	49 *7*
	1498.0 *2*	69 *7*
1577.92	798.7& *2*	<28&
	942.8 *2*	14.6 *25*
	1017.6 *2*	23 *4*
	1169.2 *2*	36 *3*
	1232.2 *2*	20 *3*
	1374.6& *2*	<22.9&
	1495.30 *10*	100 *6*
	1549.3 *2*	22 *3*
1614.21	388.50 *10*	100 *5*
	551.10& *10*	<72&
	679.1& *2*	<38&
	948.9 *2*	62 *6*
	1111.2 *2*	32 *12*
	1385.3 *2*	55 *6*
	1416.3 *2*	50 *4*
	1471.2 *2*	45 *8*
1655.32	470.2 *2*	27 *6*
	823.40 *10*	84 *5*
	876.7 *2*	43 *6*
	901.8 *2*	38 *10*
	990.0 *2*	35 *4*
	1019.40 *10*	100 *8*
	1095.1 *2*	41 *8*
	1229.9 *2*	32 *6*
	1457.10 *10*	62 *8*
	1504.4 *2*	59 *5*
	1512.8 *2*	63 *6*
	1626.8 *2*	26 *4*
1749.73	702.40 *10*	26 *3*
	917.4 *2*	11.4 *22*
	1028.8 *2*	26 *5*
	1084.2 *2*	22 *3*
	1130.9 *2*	17 *6*
	1421.0‡ *2*	18.6 *18*
	1508.6 *2*	27.0 *24*
	1551.4 *2*	29.2 *24*
	1568.10 *10*	100 *6*
	1607.3 *3*	12.2 *13*
	1667.4 *2*	29.8 *22*

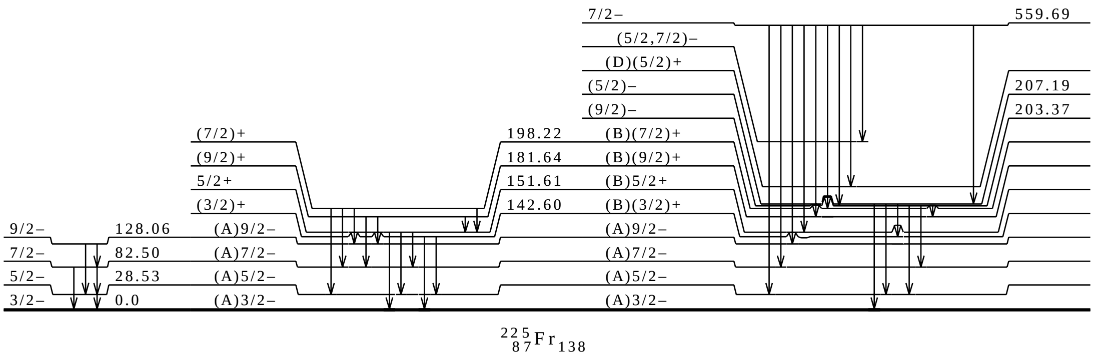
† From ^{225}Rn β^- decay.
‡ Eγ values for 136.0γ, 668.05γ and 1421.0γ are at least 5σ from expected least−squares adjusted value for placements indicated.
§ Peak obscured or unresolved in singles spectrum; most of information was obtained from coincidence experiments.
\# Transition not observed, but its existence and total intensity was deduced from coincidences between lines feeding the 182 level and those depopulating the 152 and 182 levels.
@ Multiply placed; intensity suitably divided.
& Multiply placed; undivided intensity given.

CITATION:
Nuclear Data Sheets (1990)

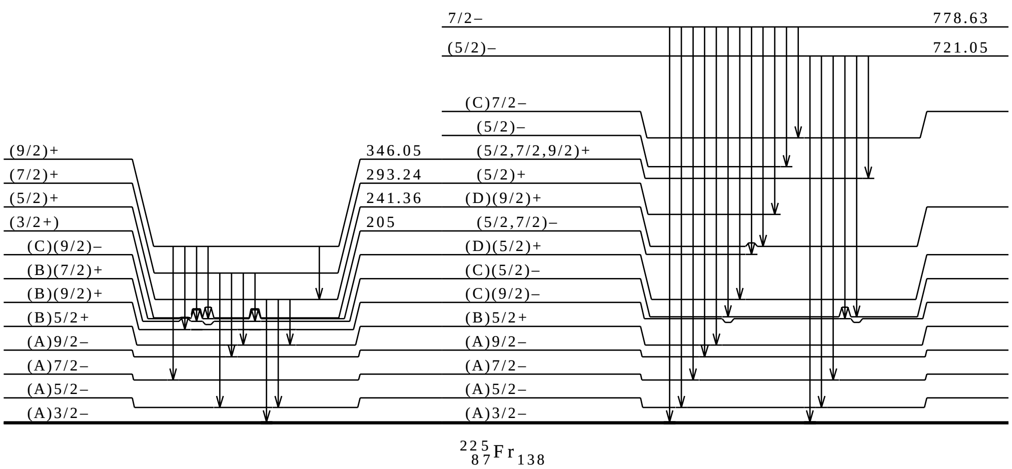
From NNDC(BNL)
program ENSDAT

Adopted Levels, Gammas (continued)

(A) π 3/2[532] band (1997Bu03). **(B) π 3/2[651] band (1997Bu03).** **(C) possible π 1/2[541] mixed band (1997Bu03).**

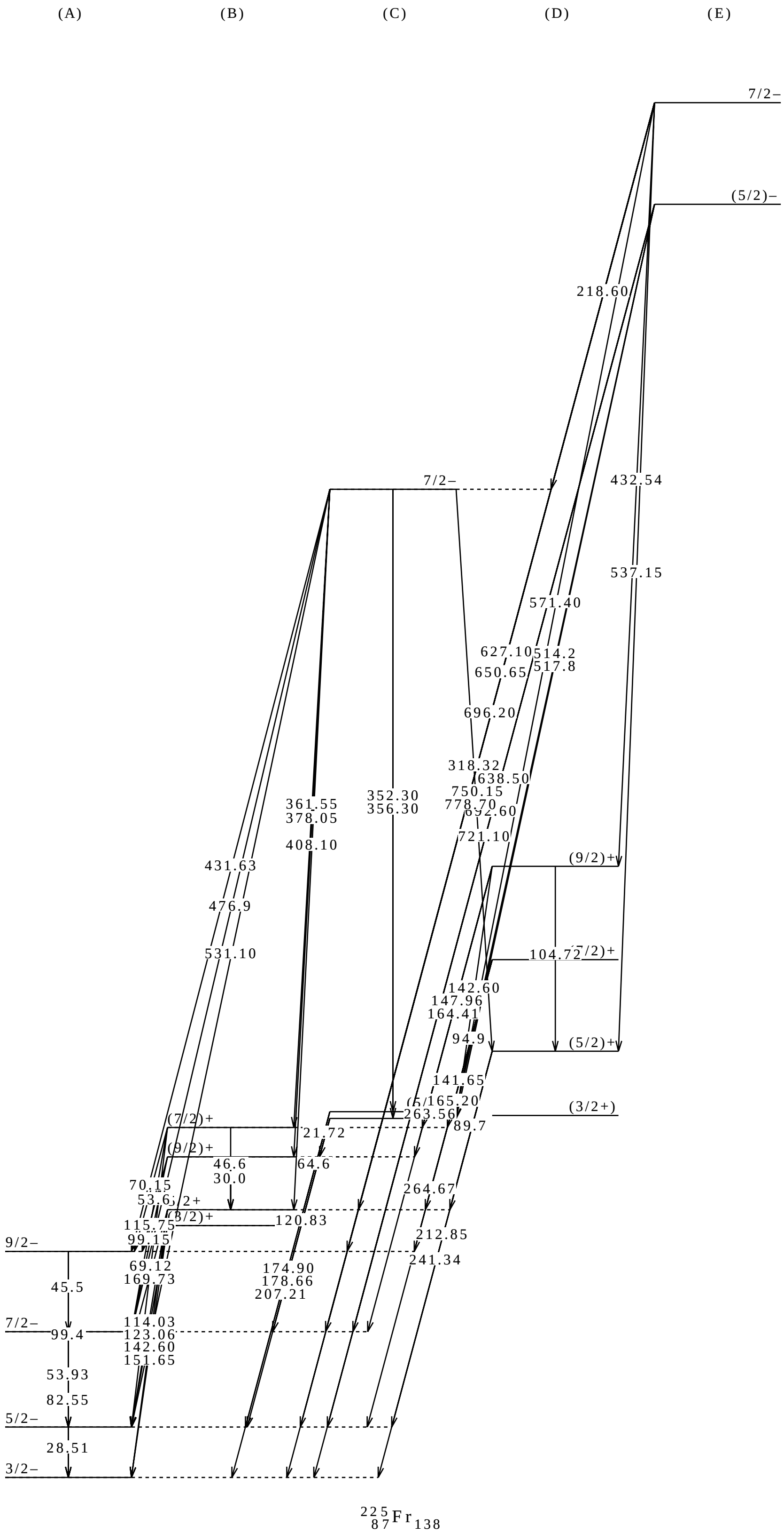


(D) possible π 3/2[402] band (1997Bu03). **(E) Kπ=5/2− band (1997Bu03).**



Adopted Levels, Gammas (continued)

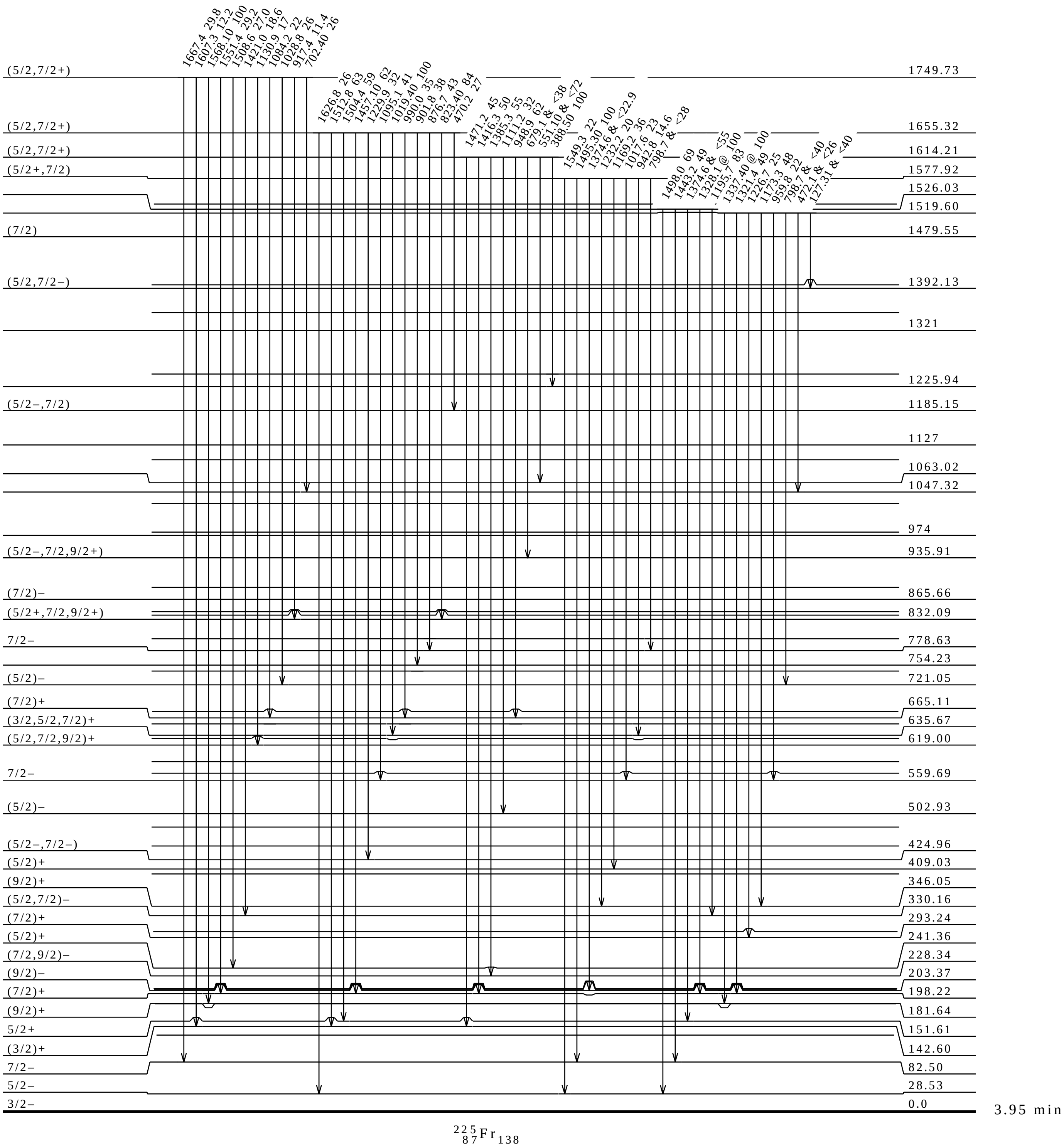
Bands for ^{225}Fr



Adopted Levels, Gammas (continued)

Level Scheme

Intensities: relative photon branching from each level
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given



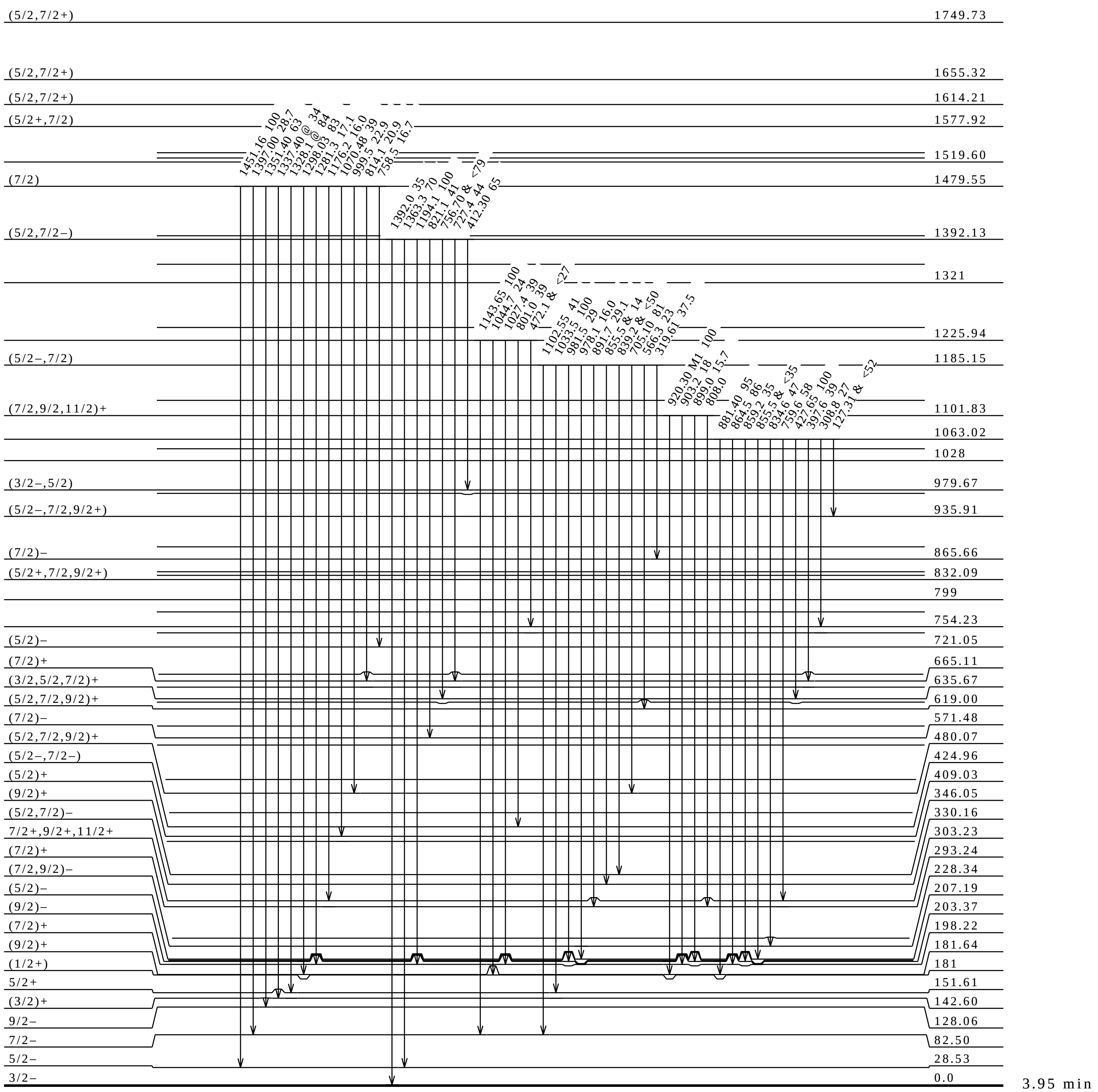
CITATION:
Nuclear Data Sheets (1990)

From NNDC(BNL)
program ENSDAT

Adopted Levels, Gammas (continued)

Level Scheme (continued)

Intensities: relative photon branching from each level
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given



$^{225}_{87}Fr_{138}$

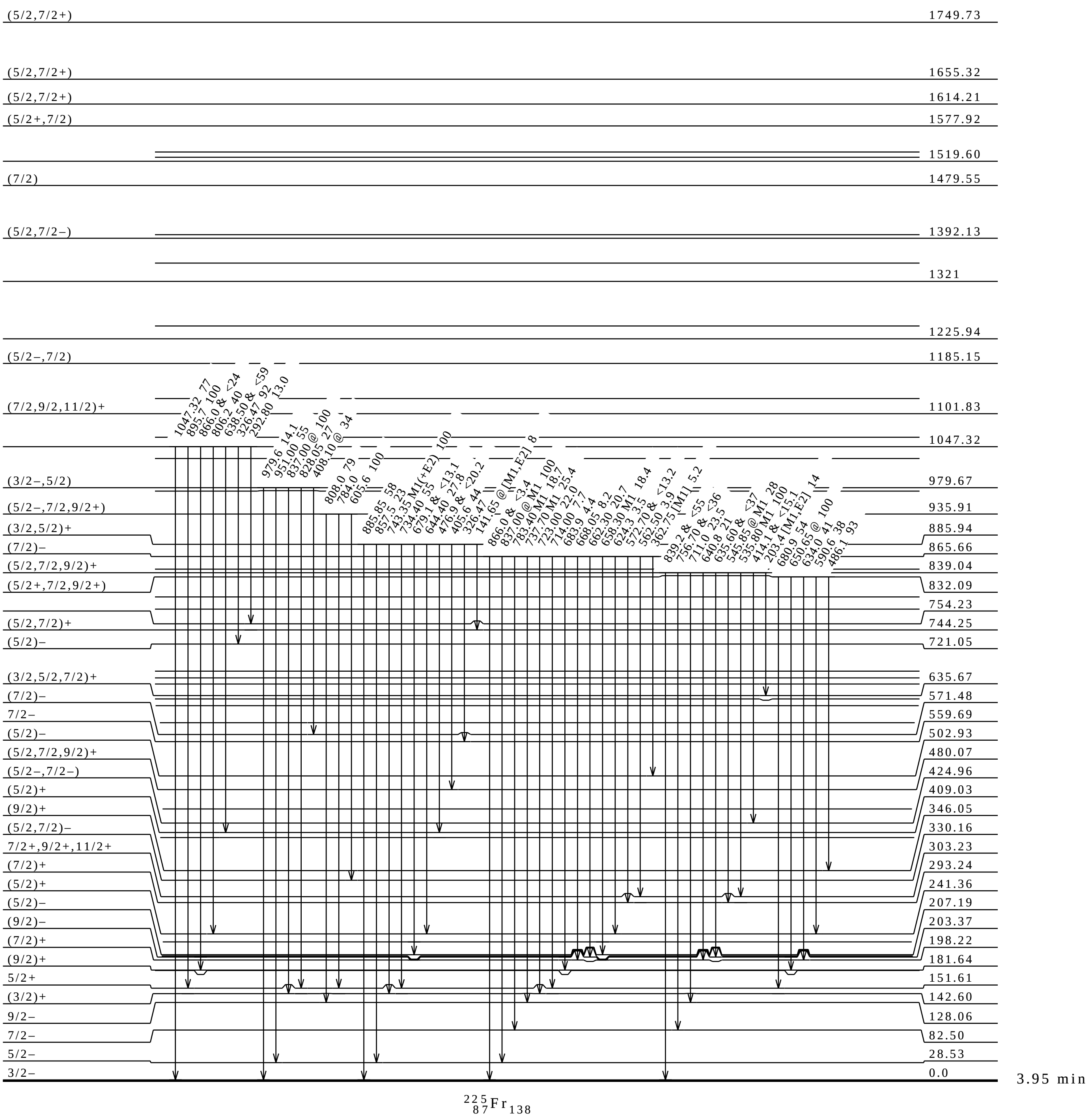
CITATION:
Nuclear Data Sheets (1990)

From NNDC(BNL)
program ENSDAT

Adopted Levels, Gammas (continued)

Level Scheme (continued)

Intensities: relative photon branching from each level
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given



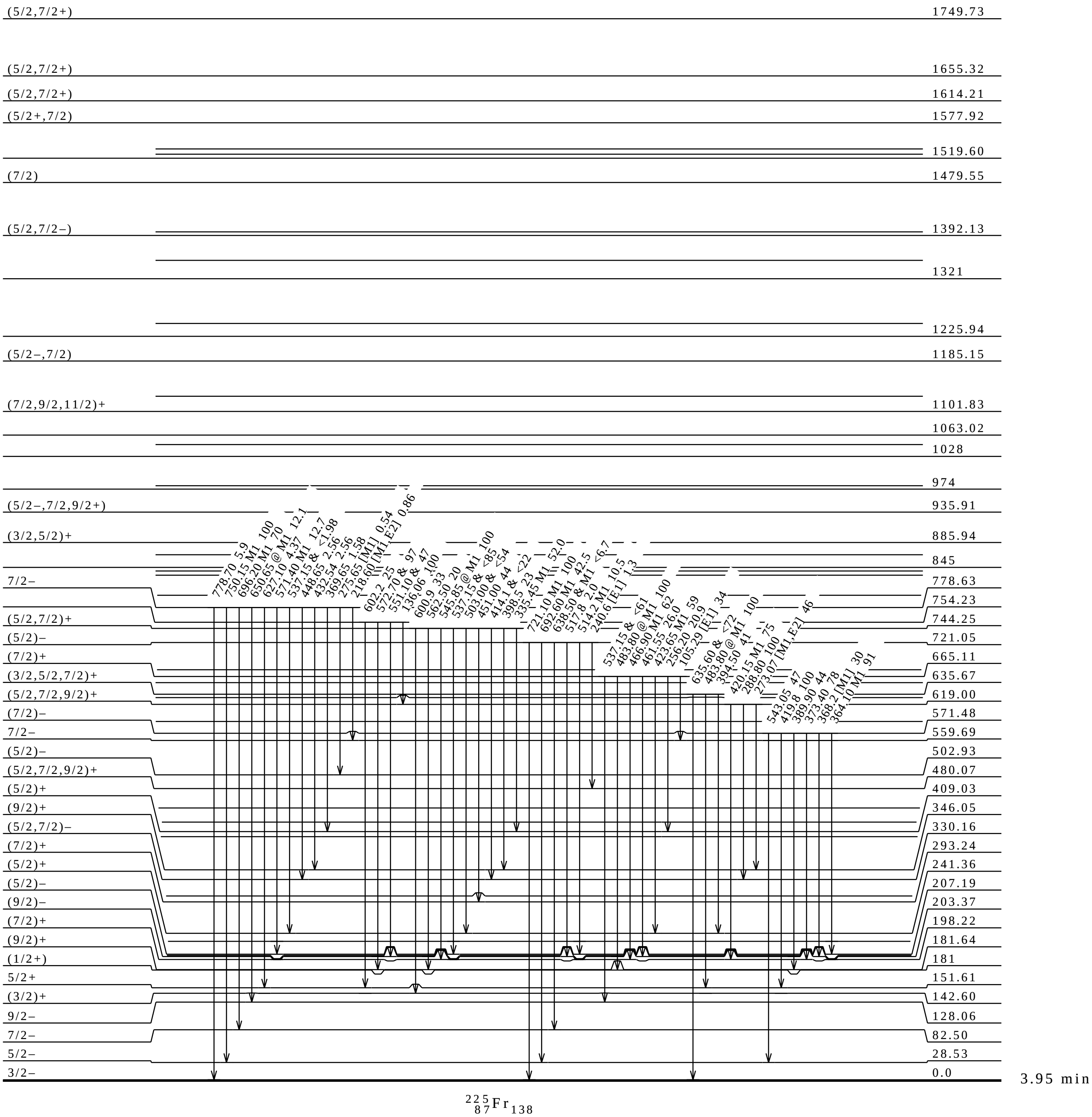
CITATION:
Nuclear Data Sheets (1990)

From NNDC(BNL)
program ENSDAT

Adopted Levels, Gammas (continued)

Level Scheme (continued)

Intensities: relative photon branching from each level
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given



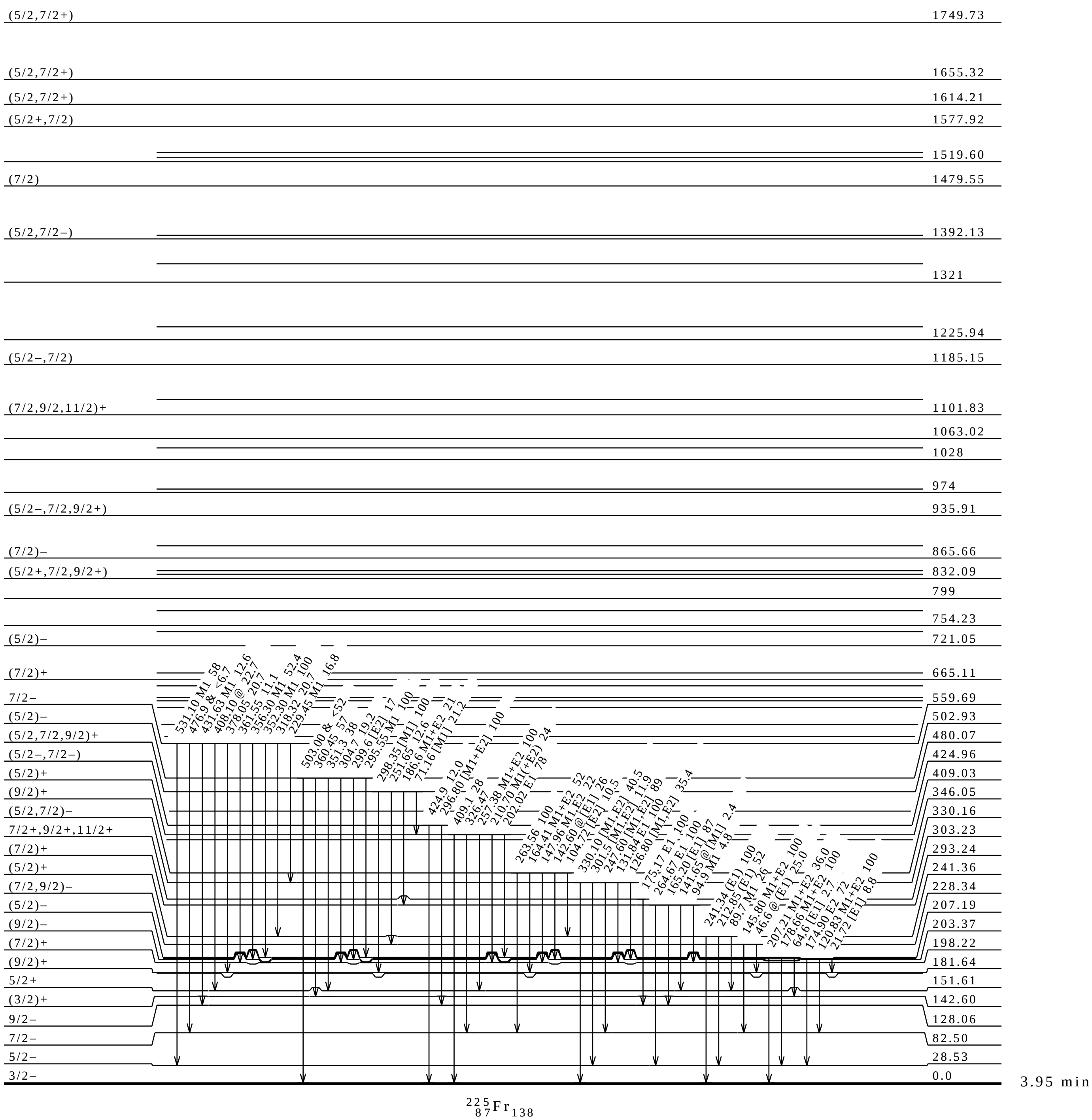
CITATION:
Nuclear Data Sheets (1990)

From NNDC(BNL)
program ENSDAT

Adopted Levels, Gammas (continued)

Level Scheme (continued)

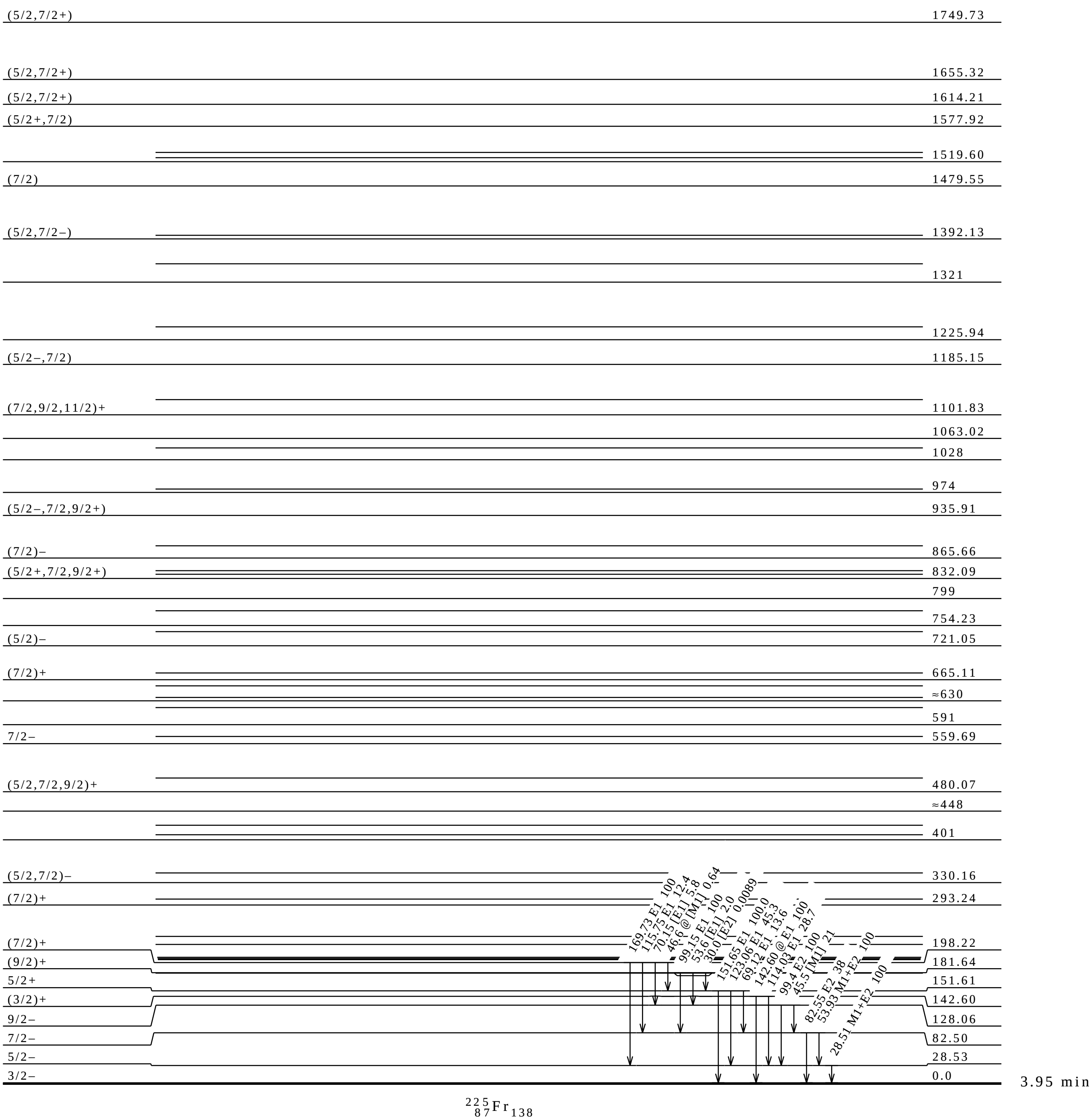
Intensities: relative photon branching from each level
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given



Adopted Levels, Gammas (continued)

Level Scheme (continued)

Intensities: relative photon branching from each level
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given



CITATION:
Nuclear Data Sheets (1990)

From NNDC(BNL)
program ENSDAT

^{225}Rn β^- Decay 1997Bu03

Parent ^{225}Rn: E=0.0; Jπ=7/2–; $T_{1/2}$=4.66 min *4*; Q(g.s.)=2680 syst; %β^- decay=100.

1997Bu03: ^{225}Fr sources from Isolde mass separator following spallation of UC_2 target by 600 MeV protons; two HPGe detectors (FWHM=1.8 keV at 1333); one HPGe x–ray detector (FWHM=0.70 keV at 122 keV); mini–Orange electron spectrometer; measured Eγ, Iγ, E(ce), I(ce), γγ coin, γ–ce coin, parent $T_{1/2}$. Supersedes 1987BoZP.

^{225}Fr Levels

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0	3/2–	409.03 *4*	(5/2)+	885.94 *5*	(3/2,5/2)+
28.53 *3*	5/2–	424.96 *9*	(5/2–,7/2–)	935.91 *15*	(5/2–,7/2,9/2+)
82.50 *3*	7/2–	480.07 *6*	(5/2,7/2,9/2)+	979.67 *7*	(3/2–,5/2)
128.06 *4*	9/2–	502.93 *6*	(5/2)–	1047.32 *6*	
142.60 *5*	(3/2)+	559.69 *4*	7/2–	1063.02 *7*	
151.61 *3*	5/2+	571.48 *6*	(7/2)–	1101.83 *9*	(7/2,9/2,11/2)+
181.64 *4*	(9/2)+	619.00 *7*	(5/2,7/2,9/2)+	1185.15 *6*	(5/2–,7/2)
198.22 *4*	(7/2)+	635.67 *7*	(3/2,5/2,7/2)+	1225.94 *8*	
203.37 *4*	(9/2)–	665.11 *5*	(7/2)+	1392.13 *8*	(5/2,7/2–)
207.19 *3*	(5/2)–	721.05 *6*	(5/2)–	1479.55 *5*	(7/2)
228.34 *5*	(7/2,9/2)–	744.25 *6*	(5/2,7/2)+	1519.60 *11*	
241.36 *4*	(5/2)+	754.23 *9*		1526.03 *12*	
293.24 *5*	(7/2)+	778.63 *4*	7/2–	1577.92 *8*	(5/2+,7/2)
303.23 *6*	7/2+,9/2+,11/2+	832.09 *8*	(5/2+,7/2,9/2+)	1614.21 *8*	(5/2,7/2+)
330.16 *4*	(5/2,7/2)–	839.04 *9*	(5/2,7/2,9/2)+	1655.32 *6*	(5/2,7/2+)
346.05 *4*	(9/2)+	865.66 *5*	(7/2)–	1749.73 *6*	(5/2,7/2+)

† From least–squares adjustment of Eγ, omitting the 136.0γ, 668.05γ and 1421.0γ each of which fits its placement very poorly (at least 5σ from least–squares adjusted value), and all unresolved or multiply–placed lines.

‡ From adopted levels.

β^- radiations

$E\beta^-$	E(level)	$I\beta^-$†§	Log *ft*‡	Comments
(930.3)	1749.73	2.0 *6*	6.3 *6*	av Eβ=3.0E2 12.
(1025)	1655.32	1.7 *5*	6.5 *6*	av Eβ=3.3E2 12.
(1066)	1614.21	1.0 *3*	6.8 *6*	av Eβ=3.5E2 12.
(1102)	1577.92	1.2 *4*	6.7 *5*	av Eβ=3.6E2 12.
(1154)	1526.03	0.69 *21*	7.0 *5*	av Eβ=3.8E2 12.
(1160)	1519.60	1.0 *3*	6.9 *5*	av Eβ=3.9E2 12.
(1200)	1479.55	3.3 *9*	6.4 *5*	av Eβ=4.0E2 12.
(1288)	1392.13	0.83 *25*	7.1 *5*	av Eβ=4.4E2 12.
(1454)	1225.94	0.53 *16*	7.5 *4*	av Eβ=5.0E2 12.
(1495)	1185.15	2.1 *6*	7.0 *4*	av Eβ=5.2E2 13.
(1578)	1101.83	0.74 *21*	7.5 *4*	av Eβ=5.5E2 13.
(1617)	1063.02	1.3 *4*	7.3 *4*	av Eβ=5.7E2 13.
(1633)	1047.32	1.2 *4*	7.4 *4*	av Eβ=5.7E2 13.
(1700)	979.67	1.5 *5*	7.3 *4*	av Eβ=6.0E2 13.
(1744#)	935.91	0.12 *9*	8.5 *5*	av Eβ=6.2E2 13.
(1794)	885.94	2.6 *8*	7.2 *4*	av Eβ=6.4E2 13.
(1814)	865.66	6.8 *19*	6.8 *4*	av Eβ=6.5E2 13.
(1841)	839.04	1.4 *5*	7.5 *4*	av Eβ=6.6E2 13.
(1848)	832.09	0.39 *13*	8.0 *3*	av Eβ=6.6E2 13.
(1901)	778.63	35 *10*	6.1 *3*	av Eβ=6.8E2 13.
(1926#)	754.23	0.40 *22*	8.1 *4*	av Eβ=6.9E2 13.
(1936#)	744.25	1.1 *5*	7.7 *4*	av Eβ=7.0E2 13.
(1959)	721.05	5.1 *14*	7.0 *3*	av Eβ=7.1E2 13.
(2015)	665.11	1.3 *4*	7.7 *3*	av Eβ=7.3E2 13.
(2109)	571.48	1.4 *4*	7.7 *3*	av Eβ=7.7E2 13.
(2120)	559.69	8.4 *23*	6.9 *3*	av Eβ=7.7E2 13.
(2177)	502.93	0.81 *25*	8.0 *3*	av Eβ=8.0E2 13.
(2200)	480.07	1.9 *6*	7.6 *3*	av Eβ=8.1E2 13.
(2255#)	424.96	0.9 *4*	8.0 *3*	av Eβ=8.3E2 13.
(2334)	346.05	4.1 *15*	7.4 *3*	av Eβ=8.6E2 13.
(2350#)	330.16	1.1 *6*	8.0 *4*	av Eβ=8.7E2 13.
(2387)	293.24	3.9 *11*	7.5 *3*	av Eβ=8.8E2 13.

Continued on next page (footnotes at end of table)

^{225}Rn β^- Decay 1997Bu03 (continued)

β^- radiations (continued)

Eβ⁻	E(level)	Iβ⁻†§	Log *ft*‡	Comments
(2452)	228.34	3.7 *18*	7.5 *3*	av Eβ=9.1E2 13.
(2477#)	203.37	5 *3*	7.4 *4*	av Eβ=9.2E2 13.
(2482)	198.22	4.3 *14*	7.5 *3*	av Eβ=9.2E2 13.
(2498#)	181.64	7 *3*	7.3 *3*	av Eβ=9.3E2 13.
(2528)	151.61	3.0 *10*	7.7 *3*	av Eβ=9.4E2 13.
(2537)	142.60	3.1 *9*	8.9[1u] *4*	av Eβ=9.1E2 13.
(2552#)	128.06	9 *5*	7.2 *4*	av Eβ=9.5E2 13.

† From intensity balance at level, assigning (1/2)I±(1/2)I at each placement for doubly–placed transitions whose intensity division has not been determined.
‡ Calculated assuming an uncertainty of 300 keV in Q value.
§ For β⁻ intensity per 100 decays, multiply by 1.0.
# Existence of this branch is questionable.

γ(^{225}Fr)

Iγ normalization: from Σ(I(γ+ce) to g.s.)=100; this assumes negligible β⁻ feeding of the 3/2– g.s. from the 7/2– parent (ΔJ=2, Δπ=no).

Eγ	E(level)	Iγ&	Mult.†	δ	α	I(γ+ce)&	Comments
21.72 *10*	203.37	12.2 *26*	[E1]		6.37		α(L)=4.75; α(M)=1.22.
28.51 *5*	28.53	12.2 *22*	M1+E2	0.45 *15*	750 *270*		α(L)=553 *265*; α(M)=145 *71*. %Iγ=0.087 *22* assuming adopted normalization. Mult.: α(M)exp=89 *6*, α(N)exp=35.7 *26*. δ: 0.32 *2* from α(M)exp; 0.37 from α(N)exp. However, intensity balance at the 29 level implies a lower limit for α(exp) of 1.1E3 2 and this corresponds to δ≈0.6, so the evaluator adopts δ=0.45 *15*.
30.0@	181.64	@	[E2]		2990	400	α(L)=2.21E3; α(M)=589.
45.5# *1*	128.06	32 *5*	[M1]		29.6		α(L)=22.5; α(M)=5.37. Mult.: (α(L1)exp+α(L2)exp)≤37.
46.6a *1*	198.22	6a *2*	[M1]		27.6		α(L)=21.0; α(M)=5.00. Mult.: (α(L1)exp+α(L2)exp)≤196, α(M)exp≤10.0 for doubly–placed γ.
	228.34	29a *2*	(E1)		0.84		α(L)=0.634; α(M)=0.154. Mult.: (α(L1)exp+α(L2)exp)≤40.5, α(M)exp≤2.1 for doubly–placed γ dominated by this transition; not M1 from level scheme.
53.6§ *1*	181.64	30§ *10*	[E1]		0.576		α(L)=0.435; α(M)=0.105; α(N+..)=0.0350.

Continued on next page (footnotes at end of table)

^{225}Rn β^- Decay 1997Bu03 (continued)

$\gamma(^{225}Fr)$ (continued)

Eγ	E(level)	Iγ[&]	Mult.[†]	δ	α	Comments
53.93[#] *5*	82.50	210 *12*	M1+E2	0.18 *3*	22.8	α(L)=17.1 *12*; α(M)=4.2 *3*; α(N+..)=1.48 *12*. Mult.: (α(L1)exp+α(L2)exp)=13.4 *10*, α(L3)exp=3.5 *3*, α(M)exp=4.3 *3*, α(N)exp<1.8. δ: from δ=0.17 *3* from α(L)exp=16.9 *10* and 0.19 *3* from α(M)exp. Note that δ<0.13 from α(L12)exp and δ=0.250 *12* from α(L3)exp. 1997Bu03 adopted δ=0.31 *4* from these data, however.
[x]58.0 *1*		13.6 *17*				
[x]62.48 *5*		30.3 *15*				
64.6 *1*	207.19	10.0 *19*	[E1]		0.349	α(L)=0.264; α(M)=0.0637; α(N+..)=0.0212.
69.12[#] *5*	151.61	136 *7*	E1		0.291	α(L)=0.220; α(M)=0.0531; α(N+..)=0.0177. Mult.: (α(L1)exp+α(L2)exp)≤1.8.
70.15[#] *5*	198.22	54 *3*	[E1]		0.280	α(L)=0.212; α(M)=0.0510; α(N+..)=0.0170.
71.16 *10*	480.07	20.1 *23*	[M1]		8.01	α(L)=6.06; α(M)=1.44; α(N+..)=0.51.
82.55[§] *5*	82.50	80[§] *20*	E2		22.1	α(L)=16.2; α(M)=4.36; α(N+..)=1.54. Mult.: (α(L1)exp+α(L2)exp)=8 *3*, α(L3)exp=6.1 *23*, α(M)exp=5.4 *20*.
89.7[§] *1*	241.36	26[§] *3*	M1		4.08	α(L)=3.09; α(M)=0.737; α(N+..)=0.260. Mult.: (α(L1)exp+α(L2)exp)=2.0 *3*.
94.9[§] *1*	293.24	14[§] *3*	M1		3.47	α(L)=2.62; α(M)=0.625; α(N+..)=0.221. Mult.: (α(L1)exp+α(L2)exp)=1.8 *5*.
99.15 *5*	181.64	1500 *200*	E1		0.111	α(L)=0.084; α(M)=0.0201; α(N+..)=0.00684. Mult.: (α(L1)exp+α(L2)exp)≤0.62, α(L3)exp≤0.31, α(M)exp≤0.21.
99.4[§] *1*	128.06	150[§] *50*	E2		9.2	α(L)=6.74; α(M)=1.82; α(N+..)=0.646. Mult.: (α(L1)exp+α(L2)exp)=4.8 *16*, α(L3)exp≤3.1, α(M)exp≤2.1.
104.72 *10*	346.05	16 *3*	[E2]		7.52	α(K)=0.307 *10*; α(L)=5.28 *16*; α(M)=1.43 *5*; α(N+..)=0.507 *16*.
105.29 *10*	665.11	24 *3*	[E1]		0.425	α(K)=0.330; α(L)=0.0716; α(M)=0.0172; α(N+..)=0.00584.
114.03[#] *5*	142.60	157 *8*	E1		0.349	α(K)=0.272; α(L)=0.0580; α(M)=0.0139; α(N+..)=0.00473. Mult.: (α(L1)exp+α(L2)exp)≤0.2, α(M)exp≤0.29.
115.75[#] *5*	198.22	116 *6*	E1		0.337	α(K)=0.263; α(L)=0.0558; α(M)=0.0133; α(N+..)=0.00455. Mult.: (α(L1)exp+α(L2)exp)≤0.54.
120.83[#] *5*	203.37	139 *7*	M1+E2		6.4 *24*	α(K)=4 *4*; α(L)=3.E1 3; α(M)=9 *9*; α(N+..)=3 *4*. Mult.: α(K)exp=6 *2*, (α(L1)exp+α(L2)exp)=1.6 *1*.
123.06[#] *5*	151.61	453 *23*	E1		0.290	α(K)=0.228; α(L)=0.0475; α(M)=0.0113; α(N+..)=0.00387. Mult.: (α(L1)exp+α(L2)exp)≤0.34, α(L3)exp≤0.10, α(M)exp≤0.25.
126.80 *10*	330.16	26.2 *14*	[M1,E2]		5.5 *22*	α(K)=3 *3*; α(L)=1.7 *6*; α(M)=0.43 *16*; α(N+..)=0.15 *6*.
127.31[b] *10*	1063.02	17[b] *3*				
	1519.60	17[b] *3*				
131.84[§#] *10*	330.16	74[§] *4*	E1		0.245	α(K)=0.193; α(L)=0.0396; α(M)=0.0095; α(N+..)=0.00323. Mult.: (α(L1)exp+α(L2)exp)≤0.07.
136.06[‡#] *5*	754.23	47.5 *24*				
141.65[a] *10*	293.24	7[a] *3*	[M1]		5.61	α(K)=4.51; α(L)=0.828; α(M)=0.198; α(N+..)=0.0697.

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^{225}Rn β^- Decay 1997Bu03 (continued)

$\gamma(^{225}Fr)$ (continued)

Eγ	E(level)	Iγ[&]	Mult.[†]	δ	α	Comments
141.65[a] *10*	885.94	8[a] *6*	[M1,E2]		3.9 *18*	α(K)=2.4 *21*; α(L)=1.1 *3*; α(M)=0.28 *8*; α(N+..)=0.10 *3*.
142.60[#a] *5*	142.60	547[a] *28*	E1		0.202	α(K)=0.160; α(L)=0.0323; α(M)=0.00770; α(N+..)=0.00263. Mult.: α(K)exp≤0.11, (α(L1)exp+α(L2)exp)≤0.04, α(M)exp≤0.07.
142.60[a] *10*	346.05	40[a] *5*	[E1]		0.202	α(K)=0.160; α(L)=0.0323; α(M)=0.00770; α(N+..)=0.00263.
145.80[#] *5*	228.34	116 *6*	M1+E2		3.5 *17*	α(K)=2.2 *20*; α(L)=0.96 *20*; α(M)=0.25 *7*; α(N+..)=0.088 *24*. Mult.: α(K)exp≤2.0, (α(L1)exp+α(L2)exp)=1.0 *5*.
147.96 *10*	346.05	33 *6*	M1,E2		3.4 *16*	α(K)=2.1 *19*; α(L)=0.91 *18*; α(M)=0.23 *6*; α(N+..)=0.083 *22*. Mult.: (α(L1)exp+α(L2)exp)=1.3 *4*.
151.65[#] *5*	151.61	1000	E1		0.174	α(K)=0.138; α(L)=0.0275; α(M)=0.00656; α(N+..)=0.00224. Mult.: α(K)exp≤1.1, (α(L1)exp+α(L2)exp)=≤0.05, α(L3)exp≤0.01, α(M)exp≤0.10.
164.41[#] *5*	346.05	79 *4*	M1+E2		2.4 *13*	α(K)=1.6 *14*; α(L)=0.61 *7*; α(M)=0.16 *3*; α(N+..)=0.055 *10*. Mult.: α(K)exp=2.2 *5*, (α(L1)exp+α(L2)exp)≤1.3.
165.20[#] *5*	293.24	255 *13*	[E1]		0.141	α(K)=0.112; α(L)=0.0221; α(M)=0.00525; α(N+..)=0.00179. Mult.: α(K)exp≤4.5, (α(L1)exp+α(L2)exp)≤0.41, α(M)exp≤0.47.
169.73 *5*	198.22	932 *56*	E1		0.132	α(K)=0.105; α(L)=0.0206; α(M)=0.00490; α(N+..)=0.00167. Mult.: α(K)exp≤0.66, (α(L1)exp+α(L2)exp)≤0.02, α(M)exp≤0.04.
174.90[§] *10*	203.37	100[§] *30*	E2		0.92	α(K)=0.214 *7*; α(L)=0.520 *16*; α(M)=0.140 *5*; α(N+..)=0.0493 *15*. Mult.: α(K)exp=0.33 *13*.
175.17[#] *5*	303.23	136 *32*	E1		0.122	α(K)=0.097; α(L)=0.0190; α(M)=0.00452; α(N+..)=0.00154. Mult.: α(K)exp≤0.92, (α(L1)exp+α(L2)exp)≤0.60, α(M)exp≤0.03.
178.66[#] *5*	207.19	367 *18*	M1+E2	1.47 *+18−14*	1.50 *12*	α(K)=0.88 *11*; α(L)=0.459 *3*; α(M)=0.119 *2*; α(N+..)=0.0420 *5*. Mult.: α(K)exp=0.88 *10*, (α(L1)exp+α(L2)exp)=0.27 *5*, α(M)exp≤0.12. δ: from α(K)exp.
186.6[§] *3*	480.07	20[§] *4*	M1+E2		1.6 *10*	α(K)=1.1 *10*; α(L)=0.385 *8*; α(M)=0.098 *8*; α(N+..)=0.034 *3*. Mult.: α(K)exp=0.54 *15*.
202.02[#] *5*	409.03	48.2 *24*	E1		0.087	α(K)=0.0694 *21*; α(L)=0.0132 *4*; α(M)=0.00314 *10*; α(N+..)=0.00107 *4*. Mult.: α(K)exp=2.4 *9*, (α(L1)exp+α(L2)exp)≤0.37.
203.4[§] *3*	839.04	10[§] *3*	[M1,E2]		1.3 *8*	α(K)=0.9 *8*; α(L)=0.284 *13*; α(M)=0.0718 *10*; α(N+..)=0.0252 *4*.

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^{225}Rn β⁻ Decay 1997Bu03 (continued)

γ(^{225}Fr) (continued)

Eγ	E(level)	Iγ[&]	Mult.[†]	δ	α	Comments
207.21[#] *5*	207.19	132 *7*	M1+E2	1.4 *+4−3*	0.98 *17*	α(K)=0.62 *16*; α(L)=0.261 *5*; α(M)=0.0672; α(N+..)=0.0236. Mult.: α(K)exp=0.62 *15*, (α(L1)exp+α(L2)exp)≤0.43, α(M)exp≤0.08. δ: from α(K)exp.
210.70[§] *10*	409.03	15[§] *2*	M1(+E2)		1.1 *7*	α(K)=0.8 *7*; α(L)=0.251 *18*; α(M)=0.0634 *8*; α(N+..)=0.0222 *2*. Mult.: α(K)exp=1.4 *3*.
212.85[#] *5*	241.36	51.2 *26*	(E1)		0.0766	α(K)=0.0613; α(L)=0.0116; α(M)=0.00276; α(N+..)=0.00094. Mult.: α(K)exp≤0.18 consistent with E1 or E2; Δπ=yes from level scheme.
218.60 *10*	778.63	18.4 *13*	[M1,E2]		1.0 *7*	α(K)=0.7 *6*; α(L)=0.222 *21*; α(M)=0.056 *2*; α(N+..)=0.0195 *7*.
229.45[#] *5*	559.69	51.8 *26*	M1		1.44	α(K)=1.16; α(L)=0.212; α(M)=0.0504; α(N+..)=0.0176. Mult.: α(K)exp=1.0 *3* or 1.8 *7*.
240.6[§] *3*	721.05	6[§] *2*	[E1]		0.0573	α(K)=0.0460; α(L)=0.0085; α(M)=0.00203; α(N+..)=0.00069.
241.34[#] *5*	241.36	99 *5*	(E1)		0.0569	α(K)=0.0457 *14*; α(L)=0.0085 *3*; α(M)=0.00202 *6*; α(N+..)=0.00069 *2*. Mult.: α(K)exp≤0.37, (α(L1)exp+α(L2)exp)≤0.11 consistent with E1 or E2. Δπ=yes from level scheme.
247.60[#] *5*	330.16	66 *3*	[M1,E2]		0.7 *5*	α(K)=0.5 *5*; α(L)=0.15 *3*; α(M)=0.036 *5*; α(N+..)=0.0127 *15*. Mult.: α(K)exp≤1.6, (α(L1)exp+α(L2)exp)≤0.19.
251.65 *10*	480.07	12.0 *12*				
256.20 *10*	665.11	14.6 *15*	[M1,E2]		0.6 *4*	α(K)=0.5 *4*; α(L)=0.13 *3*; α(M)=0.032 *5*; α(N+..)=0.0114 *16*.
257.38[#] *5*	409.03	62 *3*	M1+E2		0.6 *4*	α(K)=0.5 *4*; α(L)=0.13 *3*; α(M)=0.032 *5*; α(N+..)=0.0112 *16*. Mult.: α(K)exp=0.65 *10*, (α(L1)exp+α(L2)exp)≤0.19.
263.56[#] *5*	346.05	152 *7*				Mult.: α(K)exp≤0.23, (α(L1)exp+α(L2)exp)≤0.05; consistent with E1 or E2.
264.67[#] *5*	293.24	292 *14*	E1		0.0459	α(K)=0.0370; α(L)=0.00677; α(M)=0.00161; α(N+..)=0.00055. Mult.: α(K)exp≤0.12, (α(L1)exp+α(L2)exp)≤0.03.
273.07 *10*	619.00	12.8 *11*	[M1,E2]		0.5 *4*	α(K)=0.4 *4*; α(L)=0.106 *25*; α(M)=0.026 *5*; α(N+..)=0.0092 *17*.
275.65 *10*	778.63	11.6 *12*	[M1]		0.87	α(K)=0.697 *21*; α(L)=0.127 *4*; α(M)=0.0302 *9*; α(N+..)=0.0106 *4*.
288.80[#] *10*	619.00	27.9 *16*	[E1]		0.0376	α(K)=0.0304 *10*; α(L)=0.00549 *17*; α(M)=0.00130 *4*; α(N+..)=0.00045 *1*.
292.80 *10*	1047.32	7.0 *10*				
295.55[#] *10*	502.93	53 *4*	M1		0.714	α(K)=0.576; α(L)=0.105; α(M)=0.0249; α(N+..)=0.0087. Mult.: α(K)exp=0.48 *13*, (α(L1)exp+α(L2)exp)≤0.27.
296.80[#] *10*	424.96	104 *5*	[M1+E2]		0.4 *3*	α(K)=0.32 *25*; α(L)=0.081 *23*; α(M)=0.020 *5*; α(N+..)=0.0070 *16*. Mult.: α(K)exp≤0.35, (α(L1)exp+α(L2)exp)≤0.13.
298.35[#] *10*	480.07	95 *5*	[M1]		0.696	α(K)=0.561 *17*; α(L)=0.102 *3*; α(M)=0.0242 *8*; α(N+..)=0.0085 *3*. Mult.: α(K)exp=0.51 *13* and 0.60 *6*, (α(L1)exp+α(L2)exp)=0.12 *2*.

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$^{225}Rn\ \beta^-$ Decay 1997Bu03 (continued)

$\gamma(^{225}Fr)$ (continued)

Eγ	E(level)	Iγ[&]	Mult.[†]	α	Comments
299.6 *2*	502.93	8.9 *14*	[E2]	0.148	α(K)=0.0708 *22*; α(L)=0.0567 *17*; α(M)=0.0149 *5*; α(N+..)=0.00527 *16*.
301.5 *2*	330.16	8.8 *14*	[M1,E2]	0.4 *3*	α(K)=0.31 *24*; α(L)=0.077 *22*; α(M)=0.019 *5*; α(N+..)=0.0067 *16*.
304.7 *2*	502.93	10.2 *12*			
308.8 *2*	1063.02	10.5 *12*			
318.32[#] *10*	559.69	64 *3*			Mult.: α(K)exp≤0.22, (α(L1)exp+α(L2)exp)≤0.08.
319.61[#] *10*	1185.15	29.6 *15*			
326.47[#] *10*	409.03				
	885.94				
	1047.32	49.5 *25*			
330.10[#] *10*	330.16	30.0 *15*		0.32 *21*	α(K)=0.24 *19*; α(L)=0.058 *19*; α(M)=0.014 *4*; α(N+..)=0.0050 *14*.
335.45[#] *10*	744.25	26.0 *13*	M1	0.505	α(K)=0.408; α(L)=0.0738; α(M)=0.0175; α(N+..)=0.00613. Mult.: α(K)exp=0.37 *4*.
351.3[§] *2*	502.93	20[§] *5*			
352.30[#] *10*	559.69	309 *15*	M1	0.442	α(K)=0.357; α(L)=0.0645; α(M)=0.0153; α(N+..)=0.00536. Mult.: α(K)exp=0.33 *2* and 0.34 *5*, (α(L1)exp+α(L2)exp)=0.070 *3*.
356.30[#] *10*	559.69	162 *8*	M1	0.429	α(K)=0.346; α(L)=0.0626; α(M)=0.0149; α(N+..)=0.00520. Mult.: α(K)exp=0.36 *2*, (α(L1)exp+α(L2)exp)=0.09 *1*.
360.45 *10*	502.93	30 *3*			Mult.: α(K)exp≤0.06; consistent with E1 or E2.
361.55 *10*	559.69	34.4 *21*			
362.75 *10*	865.66	20.0 *16*	[M1]	0.408	α(K)=0.330 *10*; α(L)=0.0596 *18*; α(M)=0.0142 *5*; α(N+..)=0.00495 *15*.
364.10[#] *10*	571.48	52.1 *26*	M1	0.404	α(K)=0.326; α(L)=0.0590; α(M)=0.0140; α(N+..)=0.00490. Mult.: α(K)exp=0.50 *4*, (α(L1)exp+α(L2)exp)≤0.14.
[x]366.92[#] *10*		57 *3*	M1	0.396	α(K)=0.319; α(L)=0.0577; α(M)=0.0137; α(N+..)=0.00480. Mult.: α(K)exp=0.54 *4*.
368.2 *2*	571.48	17.0 *17*	[M1]	0.392	α(K)=0.316 *10*; α(L)=0.0572 *18*; α(M)=0.0136 *4*; α(N+..)=0.00475 *15*.
369.65[#] *10*	778.63	34.0 *19*			
373.40[#] *10*	571.48	44.6 *22*			Mult.: α(K)exp≤0.32, (α(L1)exp+α(L2)exp)≤0.09.
378.05[#] *10*	559.69	64 *3*			Mult.: α(K)exp≤0.22, (α(L1)exp+α(L2)exp)≤0.06.
388.50 *10*	1614.21	34.3 *17*			
389.90[#] *10*	571.48	24.9 *16*			
394.50 *10*	635.67	14.8 *15*	[M1,E2]	0.20 *13*	α(K)=0.15 *12*; α(L)=0.034 *14*; α(M)=0.008 *3*; α(N+..)=0.0029 *11*.
397.6 *2*	1063.02	14.8 *25*			
398.5 *2*	744.25	11.5 *26*			
405.6[#] *2*	885.94	45 *5*			
408.10[a] *10*	559.69	70[a] *5*			Mult.: α(K)exp≤0.16.
	979.67	34[a] *7*			Mult.: α(K)exp≤0.34.
409.1 *2*	409.03	17.2 *23*			
412.30 *10*	1392.13	20.7 *18*			
414.1[b] *2*	744.25	9.3[b] *14*			
	839.04	9.3[b] *14*			
419.8[§#] *2*	571.48	57[§] *6*			Mult.: α(K)exp≤0.16.
420.15[§] *20*	619.00	21[§] *5*	M1	0.274	α(K)=0.222; α(L)=0.0399; α(M)=0.0095; α(N+..)=0.00332. Mult.: α(K)exp=0.4 *13*.
423.65[#] *10*	665.11	41.3 *21*	M1	0.268	α(K)=0.217; α(L)=0.0390; α(M)=0.0093; α(N+..)=0.00325. Mult.: α(K)exp=0.33 *7*.
424.9 *2*	424.96	12.5 *24*			
427.65[#] *10*	1063.02	38.3 *22*			
431.63[#] *10*	559.69	39 *4*	M1	0.255	α(K)=0.206; α(L)=0.0371; α(M)=0.0088; α(N+..)=0.00309. Mult.: α(K)exp=0.40 *5*.
432.54[#] *10*	778.63	55 *4*			Mult.: α(K)exp≤0.29.
448.65[#] *10*	778.63	55 *3*			Mult.: α(K)exp≤0.10.
451.00 *10*	744.25	22.0 *16*			
461.55 *10*	665.11	18.2 *16*			
466.90 *10*	665.11	43.3 *22*	M1	0.207	α(K)=0.167; α(L)=0.0301; α(M)=0.00714; α(N+..)=0.00250. Mult.: α(K)exp=0.19 *3*.
470.2 *2*	1655.32	10.4 *22*			

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^{225}Rn β^- Decay 1997Bu03 (continued)

γ(^{225}Fr) (continued)

Eγ	E(level)	Iγ[&]	Mult.[†]	α	Comments
472.1[b] *2*	1225.94	11.0[b] *22*			
	1519.60	11.0[b] *22*			
476.9[b] *2*	559.69	18.7[b] *19*			
	885.94	18.7[b] *19*			
[x]482.1 *2*		15 *5*			
483.80[a] *10*	635.67	36[a] *5*	M1	0.188	α(K)=0.152; α(L)=0.0273; α(M)=0.00649; α(N+..)=0.00227. Mult.: α(K)exp=0.52 if entire I(ce) for doublet is assigned to this placement. α(K)exp=0.18 for doublet.
	665.11	70[a] *5*	M1	0.188	α(K)=0.152; α(L)=0.0273; α(M)=0.00649; α(N+..)=0.00227. Mult.: α(K)exp=0.27 if entire I(ce) for doublet is assigned to this placement. α(K)exp=0.18 for doublet.
[x]484.7 *2*		22 *5*			
486.1 *2*	832.09	28 *8*			
503.00[b] *10*	502.93	25.2[b] *20*			
	744.25	25.2[b] *20*			
514.2 *2*	721.05	50 *8*	M1	0.160	Mult.: α(K)exp=0.26 *6*. α(K)=0.129; α(L)=0.0232.
517.8 *2*	721.05	9.6 *23*			
[x]521.0 *2*		15.7 *19*			
531.10[#] *10*	559.69	180 *9*	M1	0.147	α(K)=0.119; α(L)=0.0213. Mult.: α(K)exp=0.13 *1*, (α(L1)exp+α(L2)exp)=0.02 *1*.
[x]534.25 *10*		25.0 *18*			
535.80[#] *10*	839.04	71 *4*	M1	0.144	α(K)=0.116; α(L)=0.0208. Mult.: α(K)exp=0.15 *2*.
537.15[b] *10*	665.11	40.5[b] *21*			Mult.: α(K)exp≤0.05.
	744.25	40.5[b] *21*			
	778.63	40.5[b] *21*			
543.05[#] *10*	571.48	26.8 *20*			
545.85[#a] *10*	744.25	50.0[a] *20*	M1	0.137	α(K)=0.110; α(L)=0.0198. Mult.: α(K)exp=0.19, α(L12)exp=0.04 if entire I(ce) for doublet is assigned to this placement. α(K)exp=0.14 for doublet.
	839.04	20.0[a] *20*	M1	0.137	α(K)=0.110; α(L)=0.0198. Mult.: α(K)exp=0.47 if entire I(ce) for doublet is assigned to this placement. α(K)exp=0.14 for doublet.
551.10[b] *10*	754.23	22.5[b] *21*			
	1614.21	22.5[b] *21*			
[x]561.3 *2*		12 *3*			
562.50 *10*	744.25	10 *3*			
	865.66	15 *3*			
566.3 *2*	1185.15	17.9 *22*			
571.40[#] *10*	778.63	272 *13*	M1	0.121	α(K)=0.098; α(L)=0.0175. Mult.: α(K)exp=0.10 *1* and 0.11 *3*, (α(L1)exp+α(L2)exp)=0.021 *2*.
572.70[b] *10*	754.23	46[b] *5*			
	865.66	46[b] *5*			
[x]587.7 *2*		11.4 *20*			
590.6 *2*	832.09	11.5 *20*			
600.9 *2*	744.25	16.6 *19*			
602.2 *2*	754.23	12.0 *19*			
605.6 *2*	935.91	17.0 *23*			
[x]614.8 *2*		15.3 *21*			
624.3 *2*	865.66	13.4 *17*			
627.10[#] *10*	778.63	94 *5*			Mult.: α(K)exp≤0.023.
634.0 *2*	832.09	12.3 *19*			
635.60[b] *10*	635.67	23.9[b] *20*			
	839.04	23.9[b] *20*			
638.50[#b] *10*	721.05	29.6[b] *22*	M1	0.090	α(K)=0.0729; α(L)=0.0130. Mult.: α(K)exp=0.10 *3*.
	1047.32	29.6[b] *22*			

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^{225}Rn β^- Decay 1997Bu03 (continued)

$\gamma(^{225}$Fr) (continued)

Eγ	E(level)	Iγ[&]	Mult.[†]	α	Comments
640.8 *2*	839.04	15 *5*			
644.40[#] *10*	885.94	28.4 *23*			
650.65[#a] *10*	778.63	260[a] *14*	M1	0.086	α(K)=0.0694; α(L)=0.0124. Mult.: α(K)exp=0.071 *6*, (α(L1)exp+α(L2)exp)≤0.012.
	832.09	30[a] *5*			Mult.: α(K)exp≤0.69.
658.30[#] *10*	865.66	71 *4*	M1	0.0832	α(K)=0.0673; α(L)=0.0120. Mult.: α(K)exp=0.10 *1*.
662.30[#] *10*	865.66	80 *5*			
668.05[‡] *10*	865.66	31.7 *16*			
679.1[b] *2*	885.94	11.1[b] *22*			
	1614.21	11.1[b] *22*			
680.9 *2*	832.09	16.1 *18*			
683.9 *2*	865.66	16.8 *19*			
692.60[#] *10*	721.05	202 *10*	M1	0.0728	α(K)=0.0589; α(L)=0.0105. Mult.: α(K)exp=0.077 *9*.
696.20[#] *10*	778.63	1510 *70*	M1	0.0718	α(K)=0.0581; α(L)=0.0104. Mult.: α(K)exp=0.052 *2*, (α(L1)exp+α(L2)exp)≤0.009.
702.40 *10*	1749.73	22.3 *24*			
705.10[#] *10*	1185.15	64 *3*			
711.0[#] *2*	839.04	16.7 *17*			
714.00 *10*	865.66	29.7 *17*			
[x]718.0 *2*		19.9 *20*			
721.10[#] *10*	721.05	475 *23*	M1	0.0655	α(K)=0.0530; α(L)=0.0094. Mult.: α(K)exp=0.046 *7*, (α(L1)exp+α(L2)exp)=0.008 *1*.
723.00[#] *10*	865.66	85 *4*			Mult.: α(K)exp≤0.08.
727.4 *2*	1392.13	14.1 *20*			
[x]729.9 *2*		12.5 *20*			
734.40[#] *10*	885.94	56 *3*			
737.70[#] *10*	865.66	98 *5*	M1	0.0617	α(K)=0.0499; α(L)=0.0089. Mult.: α(K)exp=0.041 *9*.
743.35[#] *10*	885.94	102 *5*	M1(+E2)	0.038 *23*	α(K)=0.030 *19*; α(L)=0.006 *3*. Mult.: α(K)exp=0.04 *1*.
750.15[#] *10*	778.63	2150 *110*	M1	0.0591	α(K)=0.0478; α(L)=0.0085. Mult.: α(K)exp=0.040 *2*, (α(L1)exp+α(L2)exp)=0.007, α(M)exp≤0.002.
756.70[b] *10*	839.04	22.9[b] *23*			
	1392.13	22.9[b] *23*			
758.5 *2*	1479.55	14.9 *20*			
759.6 *2*	1063.02	22.4 *22*			
[x]768.60[#] *10*		71 *5*			
778.70[#] *10*	778.63	127 *6*			Mult.: α(K)exp=0.004 *3*.
783.40[#] *10*	865.66	72 *4*	M1	0.0527	α(K)=0.0427; α(L)=0.00758. Mult.: α(K)exp=0.052 *9*.
784.0[§] *2*	935.91	[§]			
[x]788.8 *2*		17.3 *24*			
[x]790.70 *10*		30 *3*			
[x]795.3 *2*		19.7 *20*			
798.7[b] *2*	1519.60	18.4[b] *17*			
	1577.92	18.4[b] *17*			
801.0 *2*	1225.94	19.7 *22*			
[x]804.6 *2*		24.0 *18*			
806.2 *2*	1047.32	21.7 *17*			
808.0 *2*	935.91	13.5 *18*			
	1101.83				
[x]812.6 *2*		14.5 *16*			
814.1 *2*	1479.55	18.6 *22*			
[x]815.5 *2*		16.2 *26*			
[x]817.70 *10*		38.0 *24*			
821.1 *2*	1392.13	13.0 *23*			
823.40 *10*	1655.32	32.8 *21*			
[x]826.25 *10*		31.5 *21*			
828.05 *10*	979.67	27 *3*			
834.6 *2*	1063.02	18 *3*			

Continued on next page (footnotes at end of table)

$^{225}Rn\ \beta^-$ Decay 1997Bu03 (continued)

γ(^{225}Fr) (continued)

Eγ	E(level)	Iγ[&]	Mult.[†]	α	Comments
837.00[#a] *10*	865.66	386[a] *25*	M1	0.0444	α(K)=0.0359; α(L)=0.00637. Mult.: α(K)exp=0.045 *4*.
	979.67	100[a] *25*			Mult.: α(K)exp≤0.17.
839.2[b] *2*	839.04	32[b] *7*			
	1185.15	32[b] *7*			
[x]844.90 *10*		32.5 *24*			
855.5[b] *2*	1063.02	10.8[b] *26*			
	1185.15	10.8[b] *26*			
857.5 *2*	885.94	23 *3*			
859.2 *2*	1063.02	13.5 *21*			
864.5 *2*	1063.02	33.1 *22*			
866.0[b] *2*	865.66	10.4[b] *25*			
	1047.32	10.4[b] *25*			
876.7 *2*	1655.32	16.9 *22*			
881.40 *10*	1063.02	36.4 *22*			
885.85[#] *10*	885.94	59 *3*			
891.7 *2*	1185.15	23.3 *20*			
895.7 *2*	1047.32	54 *8*			
899.0 *2*	1101.83	11.9 *13*			
901.8 *2*	1655.32	15 *4*			
903.2 *2*	1101.83	14 *4*			
[x]915.70 *10*		30.8 *19*			
917.4 *2*	1749.73	9.9 *19*			
920.30 *10*	1101.83	76 *4*	M1	0.0347	α(K)=0.0281; α(L)=0.00497. Mult.: α(K)exp=0.06 *3*.
[x]937.4 *2*		17.0 *17*			
[x]941.0 *2*		11.6 *16*			
942.8 *2*	1577.92	10.5 *18*			
948.9 *2*	1614.21	21.3 *21*			
951.00 *10*	979.67	54.8 *27*			
[x]956.1 *2*		12.9 *20*			
959.8 *2*	1519.60	11.0 *20*			
[x]974.6 *2*		28.1 *22*			
978.1 *2*	1185.15	12.6 *20*			
979.6 *2*	979.67	14.1 *20*			
981.5 *2*	1185.15	23.2 *23*			
990.0 *2*	1655.32	13.8 *15*			
[x]997.20 *10*		33.7 *25*			
999.5 *2*	1479.55	20.4 *20*			
[x]1002.5 *2*		24.4 *24*			
[x]1011.1 *2*		13.0 *23*			
[x]1015.45 *10*		48 *3*			
1017.6 *2*	1577.92	16.5 *26*			
1019.40 *10*	1655.32	39 *3*			
1027.4 *2*	1225.94	20 *4*			
1028.8 *2*	1749.73	23 *4*			
1033.5 *2*	1185.15	79 *4*			
1044.7 *2*	1225.94	12.3 *25*			
1047.32 *10*	1047.32	41.8 *26*			
[x]1067.52 *10*		29.0 *18*			
1070.48 *10*	1479.55	34.9 *24*			
1084.2 *2*	1749.73	18.9 *24*			
[x]1093.3 *2*		13 *3*			
1095.1 *2*	1655.32	16 *3*			
[x]1099.2 *2*		14.1 *21*			
1102.55 *10*	1185.15	32.3 *26*			
[x]1104.2 *2*		16.0 *26*			
1111.2 *2*	1614.21	11 *4*			
[x]1115.8 *2*		18.5 *18*			
[x]1126.6 *2*		11.7 *26*			
[x]1129.6 *2*		26 *5*			
1130.9 *2*	1749.73	15 *5*			
[x]1141.23 *10*		35.4 *25*			

Continued on next page (footnotes at end of table)

^{225}Rn β^- Decay 1997Bu03 (continued)

$\gamma(^{225}$Fr) (continued)

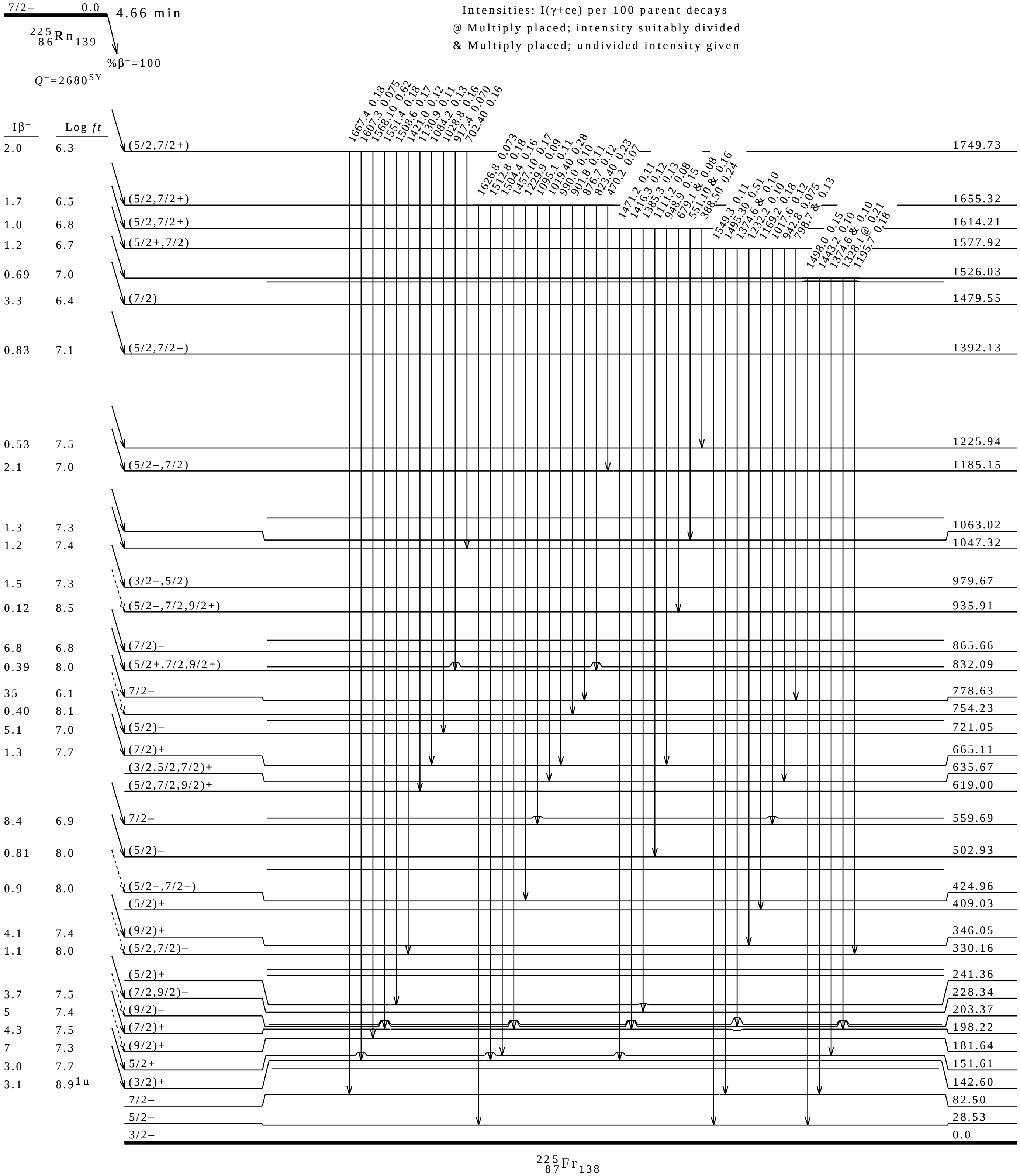
Eγ	E(level)	Iγ[&]	Eγ	E(level)	Iγ[&]
1143.65 *10*	1225.94	51 *3*	1495.30 *10*	1577.92	72 *4*
1169.2 *2*	1577.92	25.9 *24*	1498.0 *2*	1526.03	20.6 *21*
1173.3 *2*	1519.60	24 *3*	[x]1502.1 *2*		20.2 *21*
1176.2 *2*	1479.55	14.2 *21*	1504.4 *2*	1655.32	23.1 *21*
1194.1 *2*	1392.13	32 *3*	1508.6 *2*	1749.73	23.5 *21*
1195.7 *2*	1526.03	25 *5*	1512.8 *2*	1655.32	24.7 *22*
[x]1215.2 *2*		34 *3*	[x]1522.83 *10*		47 *3*
[x]1219.8 *2*		21.7 *26*	[x]1525.3 *2*		12.7 *15*
1226.7 *2*	1519.60	12.4 *25*	1549.3 *2*	1577.92	15.7 *21*
1229.9 *2*	1655.32	12.3 *22*	1551.4 *2*	1749.73	25.4 *21*
1232.2 *2*	1577.92	14.3 *22*	[x]1553.9 *2*		23 *4*
[x]1257.8 *2*		17.8 *21*	[x]1555.6 *2*		17 *4*
[x]1261.5 *2*		12.7 *17*	[x]1563.7 *2*		10.0 *20*
[x]1273.00 *10*		43 *5*	1568.10 *10*	1749.73	87 *5*
1281.3 *2*	1479.55	15.2 *20*	[x]1582.90 *10*		37 *4*
[x]1291.8 *2*		31 *3*	[x]1601.8 *2*		15.9 *16*
1298.03 *10*	1479.55	74 *4*	1607.3 *3*	1749.73	10.6 *11*
[x]1301.6 *2*		13.7 *18*	[x]1609.8 *2*		25.3 *20*
[x]1308.42 *10*		33.7 *26*	[x]1623.5 *2*		7.2 *19*
[x]1314.88 *10*		76 *4*	1626.8 *2*	1655.32	10.3 *16*
[x]1317.3 *2*		23.2 *19*	[x]1635.2 *2*		15.7 *16*
1321.4 *2*	1519.60	24.6 *19*	[x]1642.4 *2*		27.2 *20*
1328.1[a] *2*	1479.55	75[a] *10*	[x]1646.5 *2*		17.5 *16*
	1526.03	30[a] *10*	[x]1654.3 *2*		8.4 *15*
1337.40[a] *10*	1479.55	30[a] *10*	[x]1663.5 *5*		6.0 *13*
	1519.60	50[a] *10*	1667.4 *2*	1749.73	25.9 *19*
1351.40 *10*	1479.55	56 *4*	[x]1672.5 *2*		14.9 *15*
[x]1361.0 *2*		14.3 *19*	[x]1682.5 *5*		10.9 *14*
1363.3 *2*	1392.13	22.4 *18*	[x]1692.0 *2*		8.1 *19*
[x]1371.6 *2*		24.1 *19*	[x]1694.5 *2*		27.0 *20*
1374.6[b] *2*	1526.03	14.7[b] *18*	[x]1698.2 *5*		9.1 *19*
	1577.92	14.7[b] *18*	[x]1700.2 *5*		11.8 *19*
1385.3 *2*	1614.21	18.9 *19*	[x]1703.5 *5*		12.2 *18*
[x]1389.3 *2*		17.1 *20*	[x]1734.1 *5*		8.9 *19*
1392.0 *2*	1392.13	11.3 *22*	[x]1794.0 *5*		7.1 *14*
1397.00 *10*	1479.55	25.5 *21*	[x]1796.1 *5*		6.3 *12*
1416.3 *2*	1614.21	17.0 *15*	[x]1809.7 *5*		7.6 *15*
1421.0[‡] *2*	1749.73	16.2 *16*	[x]1814.7 *5*		5.0 *10*
[x]1423.2 *2*		18.4 *16*	[x]1818.3 *5*		7.5 *15*
1443.2 *2*	1526.03	14.6 *22*	[x]1828.6 *5*		7.8 *17*
1451.16 *10*	1479.55	89 *5*	[x]1831.2 *5*		10.2 *18*
1457.10 *10*	1655.32	24 *3*	[x]1842.9 *5*		9.0 *19*
[x]1466.5 *2*		28 *3*	[x]1849.3 *5*		9.0 *19*
1471.2 *2*	1614.21	15.5 *26*	[x]1859.7 *5*		6.0 *12*
[x]1478.2 *2*		19.1 *22*	[x]1883.1 *5*		9.2 *19*
[x]1483.16 *10*		39.0 *22*	[x]1894.3 *5*		6.0 *12*
[x]1487.24 *10*		23.8 *20*	[x]1926.0 *5*		6.0 *12*

† From measured ce data.
‡ Eγ values for 136.0γ, 668.05γ and 1421.0γ are at least 5σ from expected least–squares adjusted value for placements indicated.
§ Peak obscured or unresolved in singles spectrum; most of information was obtained from coincidence experiments.
\# A multiscaling experiment indicates that this line has the correct half–life for ^{225}Rn decay.
@ Transition not observed, but its existence and total intensity was deduced from coincidences between lines feeding the 182 level and those depopulating the 152 and 182 levels.
& For absolute intensity per 100 decays, multiply by 0.0071 *19*.
a Multiply placed; intensity suitably divided.
b Multiply placed; undivided intensity given.
x γ ray not placed in level scheme.

^{225}Rn β^- Decay 1997Bu03 (continued)

Decay Scheme

Intensities: I(γ+ce) per 100 parent decays
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given



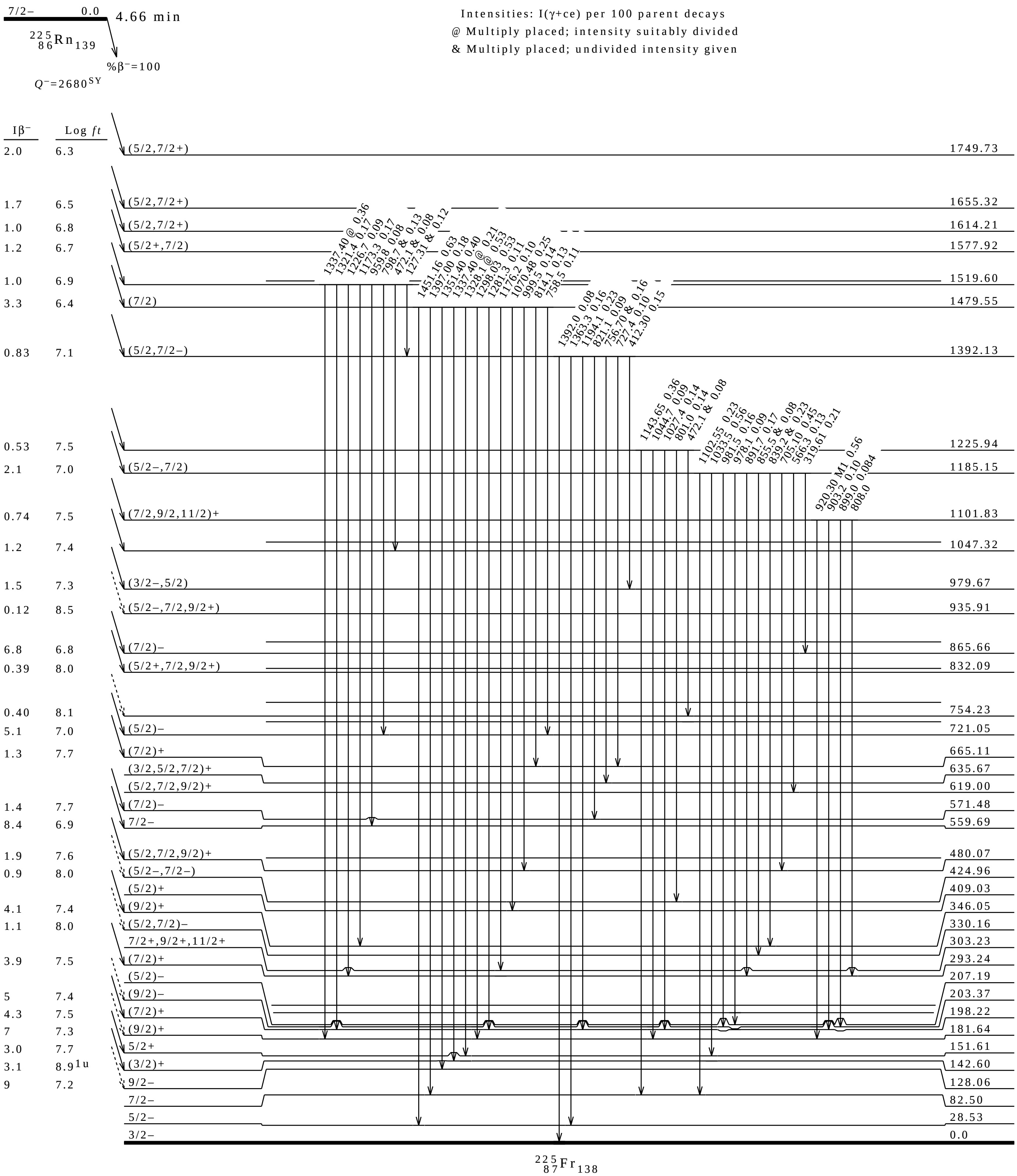
CITATION:
Nuclear Data Sheets (1990)

From NNDC(BNL)
program ENSDAT

^{225}Rn β^- Decay 1997Bu03 (continued)

Decay Scheme (continued)

Intensities: I(γ+ce) per 100 parent decays
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given



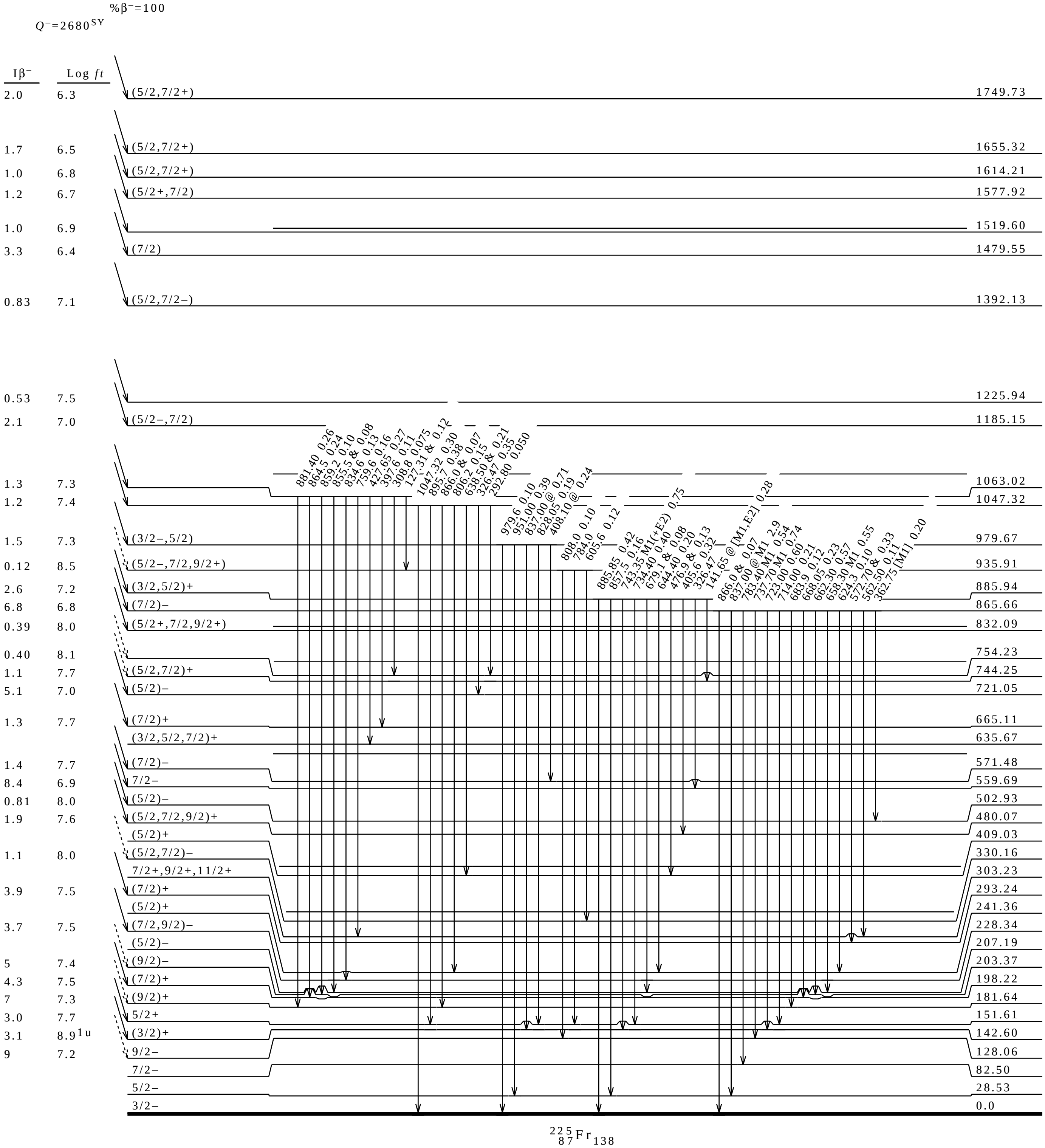
CITATION:
Nuclear Data Sheets (1990)

From NNDC(BNL)
program ENSDAT

^{225}Rn β^- Decay 1997Bu03 (continued)

Decay Scheme (continued)

Intensities: I(γ+ce) per 100 parent decays
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given



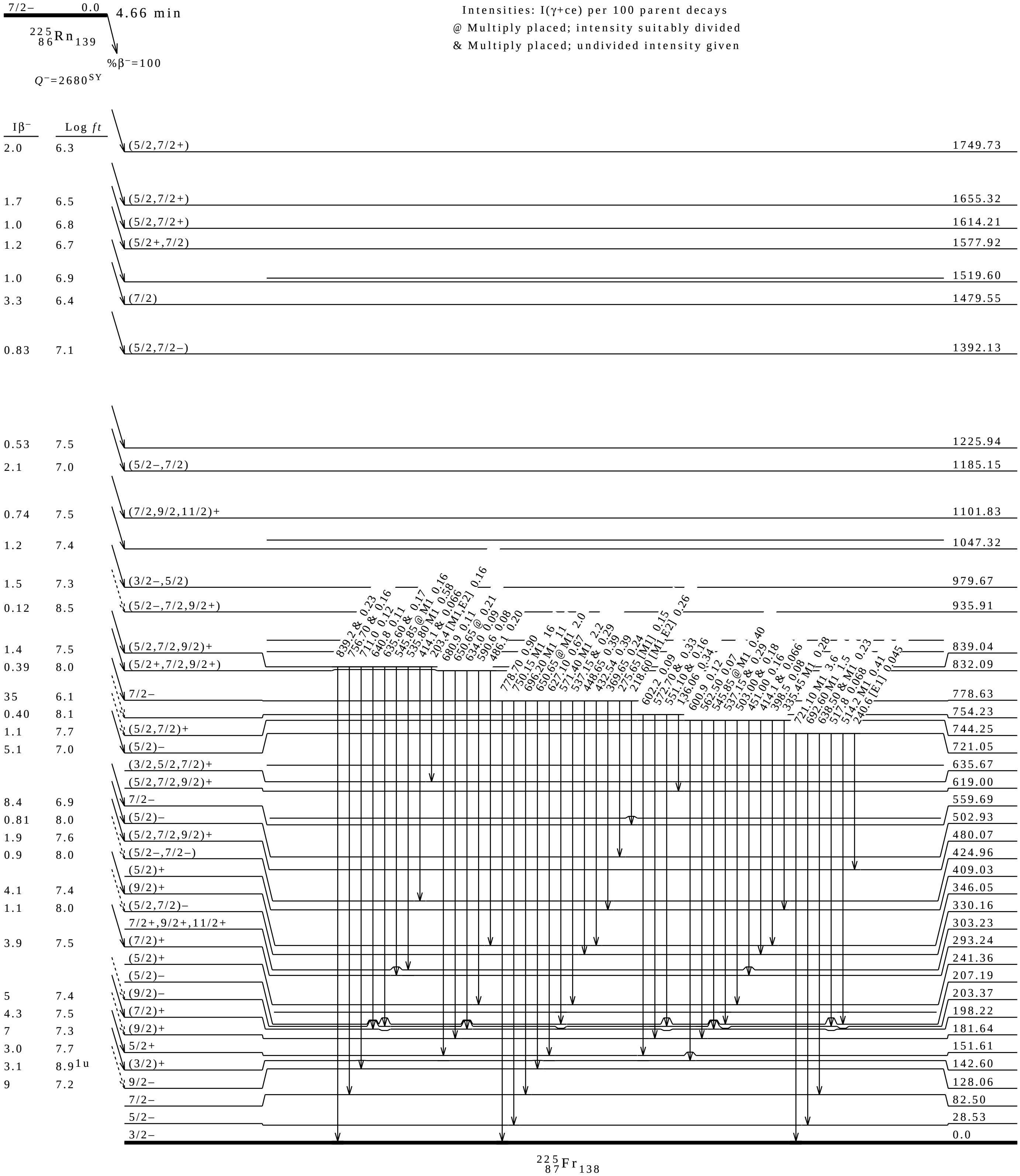
CITATION:
Nuclear Data Sheets (1990)

From NNDC(BNL)
program ENSDAT

^{225}Rn β^- Decay 1997Bu03 (continued)

Decay Scheme (continued)

Intensities: I(γ+ce) per 100 parent decays
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given

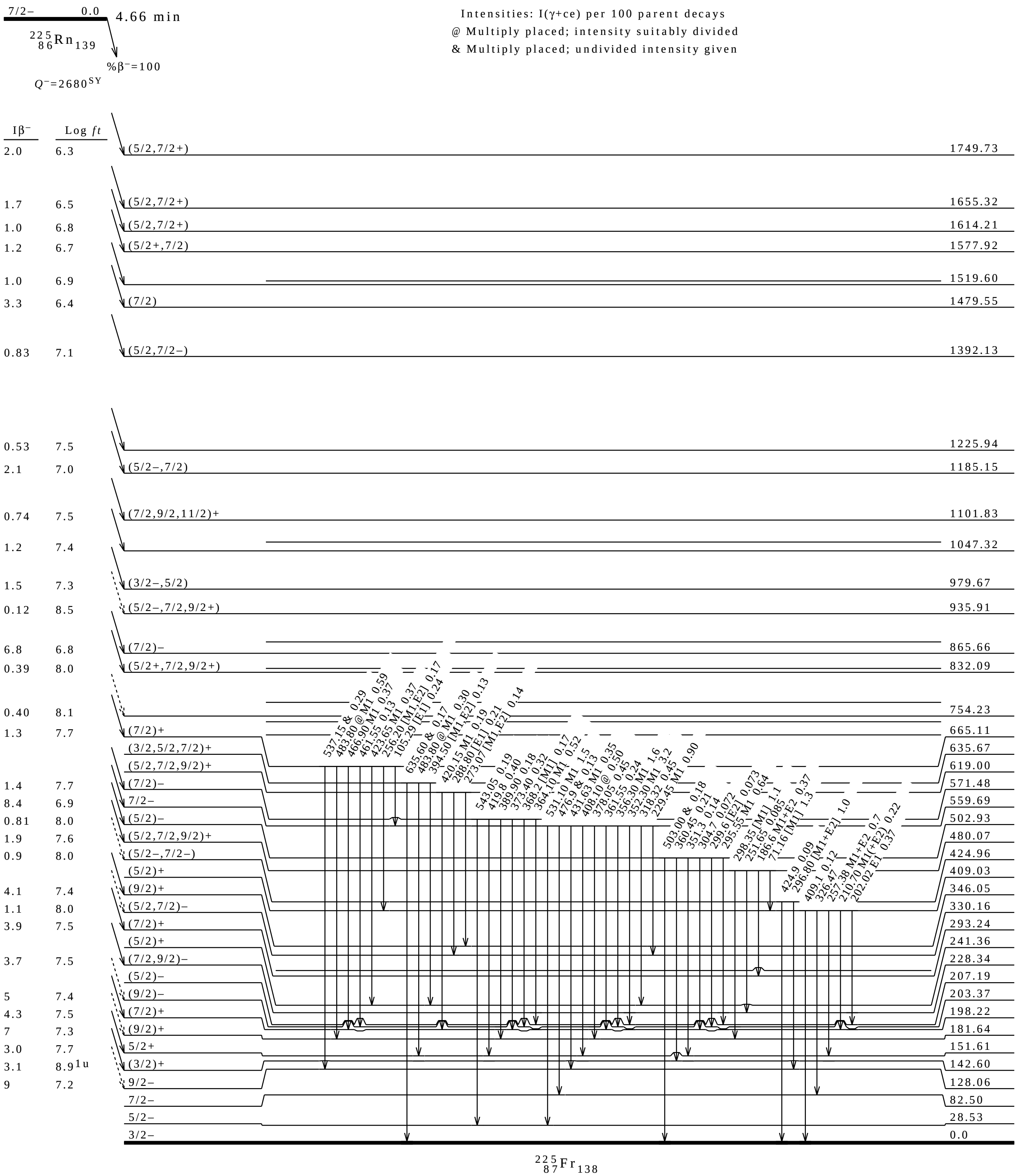


CITATION:
Nuclear Data Sheets (1990)

From NNDC(BNL)
program ENSDAT

$^{225}Rn\ \beta^-$ Decay 1997Bu03 (continued)

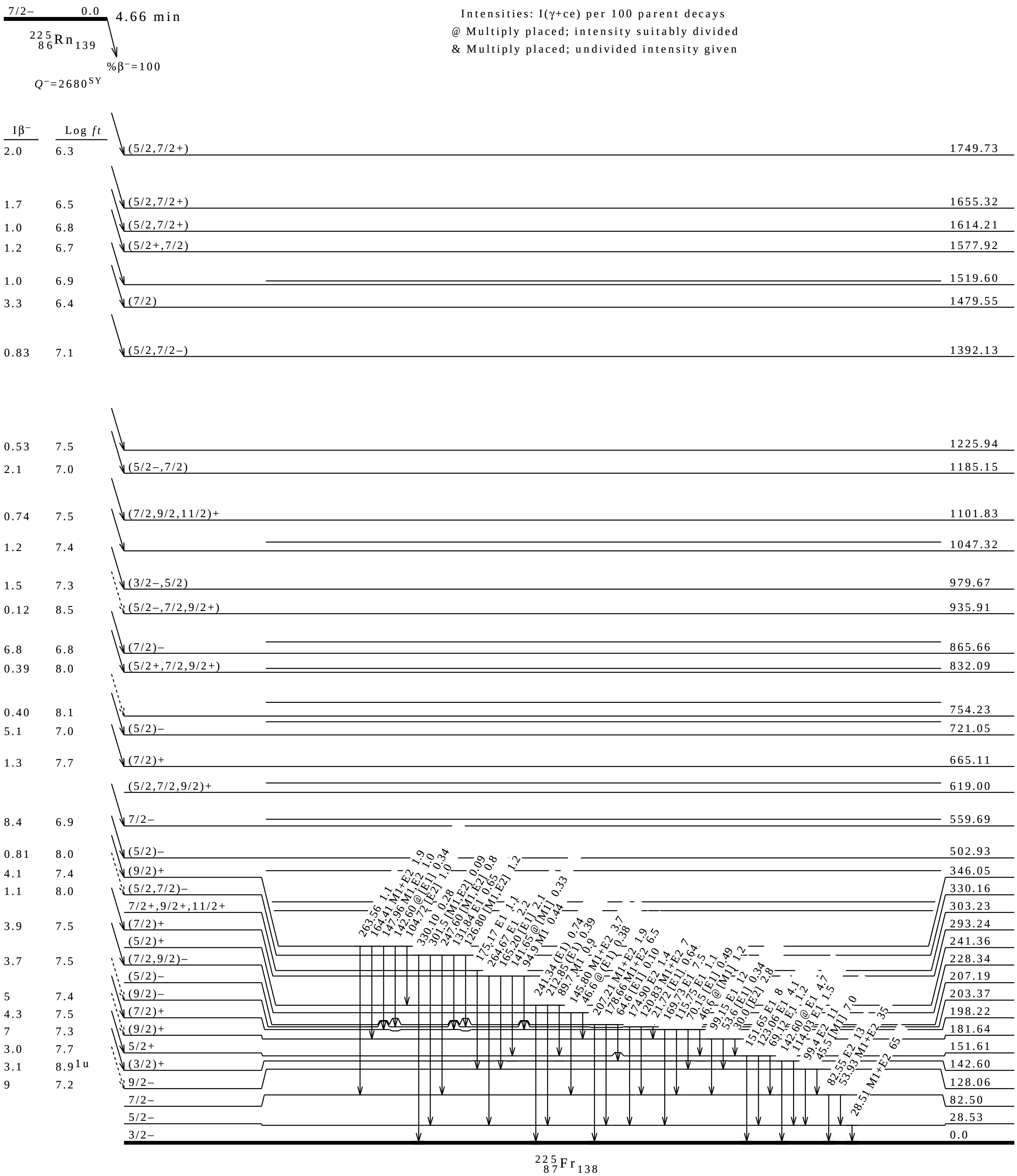
Decay Scheme (continued)



$^{225}Rn\ \beta^-$ Decay 1997Bu03 (continued)

Decay Scheme (continued)

Intensities: I(γ+ce) per 100 parent decays
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given



CITATION:
Nuclear Data Sheets (1990)

From NNDC(BNL)
program ENSDAT

^{226}Ra(t,α) 1997Bu03

1997Bu03: E(t)=18 MeV; Enge split–pole spectrograph with photographic emulsions; FWHM≈18 keV; θ(lab)=40°, 50°, 60°; ≈40 μgm/cm^2 carbon–backed ^{226}Ra ($T_{1/2}$=1600y) target; measured Eα, dσ/dΩ. Supersedes 1987BuZV.

^{225}Fr Levels

Calculated dσ/dΩ(60°) (μb/sr) (1997Bu03) for selected orbitals:

Spin	1/2[400]	1/2[530]	1/2[541]	3/2[402]	3/2[651]	3/2[532]
1/2	121	0.8	1.6			
3/2	23	14	1.5	103	0.0	0.7
5/2	7.6	0.2	13	4.6	0.03	6.2
7/2	0.4	39	2.0	1.2	0.0	3.3
9/2	0.05	0.4	33	0.05	2.0	26
11/2		0.8	0.1		0.01	0.3
13/2					12	

E(level)†	Jπ‡	dσ/dΩ(60°) μb/sr	Comments
0.0§	3/2–	≈1.5	
28§	5/2–	14	
82§	7/2–	20	
≈130§	9/2–	≈45	
≈142#		≈23	Jπ: observed dσ/dΩ is far too large for 3/2 3/2[651] level but this may be attributable to ΔN=2 mixing with 3/2[402] band (1997Bu03).
181&	(1/2+)	120	Possibly the 1/2[400] bandhead, based on very strong excitation; assignment supported by comparison with (t,α) systematics in neighboring odd–A Fr isotopes.
205@	(3/2+)	103	May include small contributions from (9/2)– and (7/2)– levels adopted at 203 and 207 keV, respectively.
244@&	(5/2+)	32	
≈294@	(7/2+)	≈3.1	
≈329		≈3.8	
401		80	
≈448		≈2.4	
500&		9	
≈570&		≈6	
591		75	
≈630		≈8	
655		29	
676		≈13	
≈741&		2.6	
799		4.4	
845		6.7	
882&		2.9	
974		8.8	
1028		3.4	
1049		5.6	
1127		70	
≈1229&		≈23	
≈1247		≈23	
1321		13	
1351		13	
1398		13	
1477&		18	
≈1516&		≈23	
≈1535		≈31	

† Average value from spectra at three angles. Uncertainties range from ≈1 keV for well–resolved, low–energy peaks to ≈3 keV for the highest–energy levels.

‡ Assignment based on comparison of experimental (t,α) cross sections with [$2Nc^2V^2\sigma$(DWBA), where N=23, single–particle coefficients c are taken from the Nilsson model and V^2 is the probability that orbital has a pair of particles in the target nucleus. See 1997Bu03 for further discussion.

§ (A): π 3/2[532] band. Coriolis mixed with 1/2[541] band.

\# (B): π 3/2[651] band. Coriolis mixed 1/2[660] band.

@ (C): possible π 3/2[402] band. Coriolis mixed with J>1/2 members of 1/2[660] and 1/2[400] bands.

& It is questionable whether this peak includes the level observed at approximately this energy in β^- decay (1997Bu03).

KEYNUMBERS

1969Ha03
1975We23
1983Ny01
1985Co24
1986Ek02
1987BoZP
1987BuZV
1987Co19
1987Sh24
1988Le13
1989Ra17
1991Cw01
1997Bu03
2000Sh32
2003Au03