

## 1 Decay Scheme

<sup>225</sup>Ac disintegrates 100% by alpha emission to the ground state and the excited levels of <sup>221</sup>Fr.

*Le <sup>225</sup>Ac se désintègre par émissions alpha vers le niveau fondamental et les niveaux excités du <sup>221</sup>Fr.*

## 2 Nuclear Data

$T_{1/2}(^{225}\text{Ac})$	:	9,9172	(21)	d
$T_{1/2}(^{221}\text{Fr})$	:	4,801	(5)	min
$Q^\alpha(^{225}\text{Ac})$	:	5935,1	(14)	keV

### 2.1 $\alpha$ Transitions

	Energy (keV)	Probability (%)	F
$\alpha_{0,48}$	4992,4 (14)	0,0011 (4)	2,4
$\alpha_{0,47}$	5083,1 (14)	0,0013 (3)	7,5
$\alpha_{0,46}$	5110,1 (14)	0,00015 (5)	95
$\alpha_{0,45}$	5116,5 (14)	0,00083 (21)	19
$\alpha_{0,44}$	5126,6 (14)	0,0021 (3)	8,6
$\alpha_{0,43}$	5155,8 (14)	0,00114 (18)	24
$\alpha_{0,42}$	5168,7 (14)	0,0038 (19)	9
$\alpha_{0,41}$	5186,3 (14)	0,015 (7)	2,7
$\alpha_{0,40}$	5222,0 (14)	0,0058 (8)	11,6
$\alpha_{0,39}$	5255,5 (14)	0,00066 (12)	161
$\alpha_{0,38}$	5289,1 (14)	0,00015 (5)	1110
$\alpha_{0,37}$	5297,5 (14)	0,0101 (10)	18,4
$\alpha_{0,36}$	5304,5 (14)	0,022 (1)	9,3
$\alpha_{0,35}$	5334,1 (14)	0,0026 (5)	116
$\alpha_{0,34}$	5364,5 (14)	0,048 (19)	9
$\alpha_{0,33}$	5383,3 (14)	0,214 (10)	2,69
$\alpha_{0,32}$	5417,5 (14)	0,007 (7)	130
$\alpha_{0,31}$	5438,6 (14)	0,0027 (8)	440

	Energy (keV)	Probability (%)	F
$\alpha_{0,30}$	5453,1 (14)	0,000097 (2)	14580
$\alpha_{0,29}$	5476,0 (14)	0,0020 (5)	950
$\alpha_{0,28}$	5488,8 (14)	0,0006 (4)	3700
$\alpha_{0,27}$	5512,5 (14)	0,0030 (4)	1000
$\alpha_{0,26}$	5526,5 (14)	0,0023 (3)	1550
$\alpha_{0,25}$	5528,4 (14)	0,0028 (8)	1300
$\alpha_{0,24}$	5534,2 (14)	0,0083 (6)	473
$\alpha_{0,23}$	5541,8 (14)	0,098 (19)	44
$\alpha_{0,22}$	5567,4 (14)	0,00052 (18)	11400
$\alpha_{0,21}$	5586,7 (14)	0,0020 (3)	3760
$\alpha_{0,20}$	5596,9 (14)	0,0022 (7)	3900
$\alpha_{0,19}$	5615,0 (14)	0,0052 (19)	2050
$\alpha_{0,18}$	5623,7 (14)	0,013 (6)	910
$\alpha_{0,17}$	5640,4 (14)	0,0072 (8)	2010
$\alpha_{0,16}$	5646,9 (14)	0,055 (12)	285
$\alpha_{0,15}$	5655,8 (14)	0,084 (10)	208
$\alpha_{0,14}$	5664,0 (14)	0,017 (7)	1130
$\alpha_{0,13}$	5681,5 (14)	0,95 (4)	25
$\alpha_{0,12}$	5700,6 (14)	0,114 (7)	261
$\alpha_{0,11}$	5711,0 (14)	1,09 (5)	30,7
$\alpha_{0,10}$	5739,3 (14)	4,16 (23)	11,3
$\alpha_{0,9}$	5785,0 (14)	1,31 (4)	61,3
$\alpha_{0,8}$	5789,3 (14)	0,021 (14)	4000
$\alpha_{0,7}$	5826,7 (14)	2,03 (23)	64
$\alpha_{0,6}$	5834,2 (14)	1,6 (3)	89
$\alpha_{0,5}$	5835,3 (14)	1,24 (10)	116
$\alpha_{0,4}$	5835,6 (17)	9,0 (5)	16
$\alpha_{0,3}$	5896,5 (14)	6,2 (9)	46
$\alpha_{0,2}$	5898,0 (21)	18,9 (20)	15,6
$\alpha_{0,1}$	5909,3 (14)	0,3	1107
$\alpha_{0,0}$	5935,1 (14)	52,4 (24)	8,5

## 2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy (keV)	P <sub><math>\gamma+ce</math></sub> (%)	Multipolarity	$\alpha_K$	$\alpha_L$	$\alpha_M$	$\alpha_T$
$\gamma_{2,1}(\text{Fr})$	10,79 (2)	7,7 (10)	M1			363 (6)	484 (8)
$\gamma_{1,0}(\text{Fr})$	25,856 (17)	9,4 (13)	E2		4510 (70)	1209 (18)	6110 (90)
$\gamma_{2,0}(\text{Fr})$	36,646 (11)	19,8 (17)	E2		811 (12)	218 (3)	1099 (16)
$\gamma_{3,0}(\text{Fr})$	38,546 (12)	9,1 (9)	E2		633 (9)	170,1 (24)	858 (12)
$\gamma_{8,4}(\text{Fr})$	46,159 (24)	0,0090 (13)	[E1]		0,639 (9)	0,1562 (22)	0,845 (12)
$\gamma_{9,6}(\text{Fr})$	49,166 (17)	0,0137 (14)	[E1]		0,540 (8)	0,1317 (19)	0,713 (10)
$\gamma_{9,5}(\text{Fr})$	50,311 (21)	0,15	[E2]		172,3 (25)	46,5 (7)	234 (4)
$\gamma_{34,32}(\text{Fr})$	53,036 (39)	0,074	[M1]		13,6 (2)	3,24 (5)	17,9 (3)
$\gamma_{13,10}(\text{Fr})$	57,762 (16)	0,0075 (12)	(E1)		0,351 (5)	0,0852 (12)	0,463 (7)
$\gamma_{6,3}(\text{Fr})$	62,351 (16)	0,44 (10)	[E2]		61,0 (9)	16,48 (24)	82,8 (12)
$\gamma_{4,2}(\text{Fr})$	62,950 (17)	5,81 (36)	M1		8,23 (12)	1,96 (3)	10,84 (16)

	Energy (keV)	P <sub>γ+ce</sub> (%)	Multipolarity	α <sub>K</sub>	α <sub>L</sub>	α <sub>M</sub>	α <sub>T</sub>
γ <sub>5,2</sub> (Fr)	63,106 (19)	0,0286 (41)	[E1]		0,277 (4)	0,0671 (10)	0,366 (6)
γ <sub>6,2</sub> (Fr)	64,251 (16)	1,13 (21)	M1+E2		17 (3)	4,4 (8)	23 (4)
γ <sub>7,3</sub> (Fr)	69,858 (16)	0,23 (6)	E2		35,3 (5)	9,55 (14)	47,9 (7)
γ <sub>7,2</sub> (Fr)	71,758 (16)	0,57 (6)	E2		31,1 (5)	8,40 (12)	42,2 (6)
γ <sub>4,1</sub> (Fr)	73,740 (21)	0,73 (19)	E2		27,3 (4)	7,38 (11)	37,0 (6)
γ <sub>5,1</sub> (Fr)	73,896 (23)	0,383 (29)	E1		0,182 (3)	0,0439 (7)	0,240 (4)
γ <sub>6,1</sub> (Fr)	75,041 (20)	0,197 (39)	(M1+E2)		8,96 (13)	2,30 (4)	12,00 (17)
γ <sub>11,8</sub> (Fr)	78,812 (24)	0,082 (13)	M1		4,27 (6)	1,018 (15)	5,63 (8)
γ <sub>10,7</sub> (Fr)	87,385 (16)	1,4 (1)	M1		3,16 (5)	0,754 (11)	4,17 (6)
γ <sub>10,6</sub> (Fr)	94,892 (16)	0,449 (43)	M1		2,49 (4)	0,594 (9)	3,28 (5)
γ <sub>10,5</sub> (Fr)	96,037 (19)	0,23 (7)	M1+E2		4,5 (11)	1,2 (3)	6,1 (15)
γ <sub>4,0</sub> (Fr)	99,596 (13)	3,09 (22)	M1+E2		2,32 (8)	0,560 (21)	3,06 (11)
γ <sub>5,0</sub> (Fr)	99,752 (16)	1,20 (9)	E1		0,0818 (12)	0,0197 (3)	0,1077 (15)
γ <sub>6,0</sub> (Fr)	100,897 (11)	0,54 (19)	M1+E2		3,4 (14)	0,9 (4)	4,6 (19)
γ <sub>13,9</sub> (Fr)	103,488 (18)	0,033 (12)	[M1,E2]	5,32 (8)	3,72 (6)	0,976 (14)	10,33 (15)
γ <sub>7,0</sub> (Fr)	108,404 (11)	2,87 (19)	M1+E2	7,2 (4)	2,30 (12)	0,58 (4)	10,26 (25)
γ <sub>9,3</sub> (Fr)	111,517 (18)	0,427 (29)	(E1)	0,282 (4)	0,0609 (9)	0,01461 (21)	0,363 (5)
γ <sub>24,16</sub> (Fr)	112,78 (5)	0,00284 (41)	[E1]	0,275 (4)	0,0591 (9)	0,01418 (20)	0,353 (5)
γ <sub>23,15</sub> (Fr)	114,091 (25)	0,0094 (14)	M1	7,91 (11)	1,463 (21)	0,349 (5)	9,84 (14)
γ <sub>8,1</sub> (Fr)	119,899 (26)	0,104 (7)	[E1]	0,238 (4)	0,0503 (7)	0,01206 (17)	0,305 (5)
γ <sub>14,9</sub> (Fr)	121,08 (7)	0,022 (6)	(E1)	0,233 (4)	0,0490 (7)	0,01175 (17)	0,298 (5)
γ <sub>11,6</sub> (Fr)	123,670 (17)	0,112 (8)	[E1]	0,222 (4)	0,0464 (7)	0,01111 (16)	0,283 (4)
γ <sub>11,5</sub> (Fr)	124,815 (21)	0,205 (13)	M1+E2	3,87 (6)	1,593 (23)	0,409 (6)	6,00 (9)
γ <sub>12,7</sub> (Fr)	126,066 (21)	0,0100 (9)	(E1)	0,212 (3)	0,0441 (7)	0,01057 (15)	0,270 (4)
γ <sub>15,9</sub> (Fr)	129,146 (21)	0,016 (9)	[M1,E2]	2,95 (5)	1,503 (21)	0,390 (6)	4,97 (7)
γ <sub>12,6</sub> (Fr)	133,573 (21)	0,0242 (20)	(E1)	0,185 (3)	0,0379 (6)	0,00907 (13)	0,234 (4)
γ <sub>12,4</sub> (Fr)	134,874 (22)	0,0393 (37)	(E1)	0,180 (3)	0,0369 (6)	0,00885 (13)	0,229 (4)
γ <sub>26,14</sub> (Fr)	137,40 (15)	0,0023 (3)					
γ <sub>23,13</sub> (Fr)	139,749 (22)	0,0068 (26)	M1+E2	2,4 (21)	1,1 (3)	0,28 (9)	3,9 (17)
γ <sub>17,9</sub> (Fr)	144,627 (42)	0,0022 (6)	(M1+E2)	2,57 (4)	0,915 (13)	0,233 (4)	3,80 (6)
γ <sub>13,7</sub> (Fr)	145,147 (16)	0,174 (11)	(E1)	0,1513 (22)	0,0305 (5)	0,00730 (11)	0,191 (3)
γ <sub>9,0</sub> (Fr)	150,063 (13)	0,815 (14)	E1	0,1397 (20)	0,0280 (4)	0,00669 (10)	0,1765 (25)
γ <sub>13,6</sub> (Fr)	152,654 (16)	0,0230 (15)	[E1]	0,1341 (19)	0,0268 (4)	0,00640 (9)	0,1693 (24)
γ <sub>13,4</sub> (Fr)	153,955 (18)	0,239 (15)	E1	0,1314 (19)	0,0262 (4)	0,00626 (9)	0,1659 (24)
γ <sub>10,3</sub> (Fr)	157,243 (16)	1,73 (18)	M1+E2	3,1 (4)	0,59 (3)	0,143 (9)	3,8 (3)
γ <sub>18,9</sub> (Fr)	161,35 (8)	0,013 (6)	[M1,E2]	1,602 (23)	0,636 (9)	0,1630 (23)	2,45 (4)
γ <sub>23,11</sub> (Fr)	168,733 (22)	0,037 (20)	[M1,E2]	1,417 (20)	0,538 (8)	0,1377 (20)	2,14 (3)
γ <sub>10,1</sub> (Fr)	169,933 (20)	0,0139 (14)					
γ <sub>15,7</sub> (Fr)	170,805 (20)	0,015 (8)	(E1)	0,1025 (15)	0,0200 (3)	0,00479 (7)	0,1289 (18)
γ <sub>15,6</sub> (Fr)	178,312 (20)	0,0180 (13)	E1	0,0925 (13)	0,0180 (3)	0,00429 (6)	0,1162 (17)
γ <sub>16,7</sub> (Fr)	179,756 (32)	0,030 (11)	(M1,E2)	1,192 (17)	0,427 (6)	0,1087 (16)	1,763 (25)
γ <sub>11,3</sub> (Fr)	186,021 (18)	0,0127 (14)					
γ <sub>17,7</sub> (Fr)	186,286 (41)	0,0046 (6)	E1	0,0834 (12)	0,01607 (23)	0,00384 (6)	0,1045 (15)
γ <sub>16,6</sub> (Fr)	187,263 (32)	0,0103 (7)					
γ <sub>11,2</sub> (Fr)	187,921 (17)	0,584 (33)	E1	0,0817 (12)	0,01572 (22)	0,00375 (6)	0,1024 (15)
γ <sub>10,0</sub> (Fr)	195,789 (11)	0,37 (9)	M1+E2	1,1 (6)	0,314 (5)	0,079 (4)	1,5 (6)
γ <sub>23,10</sub> (Fr)	197,511 (21)	0,0284 (33)	E1	0,0726 (11)	0,01386 (20)	0,00331 (5)	0,0908 (13)
γ <sub>12,2</sub> (Fr)	197,824 (21)	0,041 (5)	[E1]	0,0723 (11)	0,0138 (2)	0,00329 (5)	0,0905 (13)
γ <sub>11,1</sub> (Fr)	198,711 (21)	0,0205 (14)	[E1]	0,0716 (10)	0,01365 (20)	0,00326 (5)	0,0895 (13)
γ <sub>29,13</sub> (Fr)	205,19 (6)	0,0015 (5)					
γ <sub>13,2</sub> (Fr)	216,905 (16)	0,343 (21)	(E1)	0,0582 (9)	0,01096 (16)	0,00261 (4)	0,0726 (11)
γ <sub>19,4</sub> (Fr)	220,43 (8)	0,0060 (18)					
γ <sub>11,0</sub> (Fr)	224,567 (13)	0,119 (9)	[E1]	0,0537 (8)	0,01005 (14)	0,00239 (4)	0,0669 (10)
γ <sub>13,1</sub> (Fr)	227,695 (21)	0,0046 (12)					
γ <sub>41,32</sub> (Fr)	231,196 (39)	0,012 (7)	(M1)	1,079 (16)	0,197 (3)	0,0468 (7)	1,338 (19)
γ <sub>14,2</sub> (Fr)	234,49 (7)	0,0017 (3)					
γ <sub>20,4</sub> (Fr)	238,64 (8)	0,0022 (7)	(M1)	0,988 (14)	0,180 (3)	0,0428 (6)	1,225 (18)
γ <sub>15,3</sub> (Fr)	240,663 (21)	0,0124 (11)	[E1]	0,0457 (7)	0,00848 (12)	0,00202 (3)	0,0568 (8)
γ <sub>23,9</sub> (Fr)	243,237 (22)	0,0067 (9)	[M1]	0,937 (14)	0,1705 (24)	0,0406 (6)	1,162 (17)
γ <sub>16,3</sub> (Fr)	249,614 (32)	0,0170 (13)	(E2)	0,1033 (15)	0,1145 (16)	0,0305 (5)	0,258 (4)

	Energy (keV)	P <sub>γ+ce</sub> (%)	Multipolarity	α <sub>K</sub>	α <sub>L</sub>	α <sub>M</sub>	α <sub>T</sub>
γ <sub>13,0</sub> (Fr)	253,551 (12)	0,139 (8)	[E1]	0,0405 (6)	0,00746 (11)	0,001775 (25)	0,0503 (7)
γ <sub>17,3</sub> (Fr)	256,144 (42)	0,00039 (7)	[E1]	0,0396 (6)	0,00728 (11)	0,001731 (25)	0,0491 (7)
γ <sub>15,0</sub> (Fr)	279,209 (17)	0,0317 (23)	E1	0,0325 (5)	0,00591 (9)	0,001405 (20)	0,0403 (6)
γ <sub>36,21</sub> (Fr)	282,201 (46)	0,00097 (9)	[M1]	0,622 (9)	0,1128 (16)	0,0268 (4)	0,770 (11)
γ <sub>23,7</sub> (Fr)	284,896 (21)	0,0077 (6)	[E1]	0,0311 (5)	0,00563 (8)	0,001338 (19)	0,0385 (6)
γ <sub>33,13</sub> (Fr)	298,261 (21)						
γ <sub>25,7</sub> (Fr)	298,33 (6)	0,0028 (7)	(M1,E2)	0,302 (5)	0,0767 (11)	0,0190 (3)	0,404 (6)
γ <sub>34,13</sub> (Fr)	317,119 (32)	0,00065 (33)	M1	0,451 (7)	0,0817 (12)	0,0194 (3)	0,559 (8)
γ <sub>33,12</sub> (Fr)	317,342 (25)		E1	0,0244 (4)	0,00437 (7)	0,001036 (15)	0,0301 (5)
γ <sub>27,6</sub> (Fr)	321,753 (41)	0,00340 (41)	[E1]	0,0237 (4)	0,00423 (6)	0,001003 (14)	0,0292 (4)
γ <sub>32,10</sub> (Fr)	321,845 (27)						
γ <sub>21,0</sub> (Fr)	348,35 (4)	0,0030 (3)					
γ <sub>23,3</sub> (Fr)	354,754 (22)	0,0020 (7)	[E1]	0,0191 (3)	0,00337 (5)	0,000799 (12)	0,0235 (4)
γ <sub>33,10</sub> (Fr)	356,023 (20)	0,00026 (11)					
γ <sub>24,3</sub> (Fr)	362,394 (42)	0,0055 (5)	(E1)	0,0182 (3)	0,00321 (5)	0,000761 (11)	0,0225 (4)
γ <sub>22,0</sub> (Fr)	367,74 (12)	0,00052 (18)	E1+M2	0,026 (9)	0,0053 (22)	0,0013 (6)	0,033 (12)
γ <sub>34,10</sub> (Fr)	374,881 (32)	0,0019 (5)	[E1]	0,01696 (24)	0,00298 (5)	0,000705 (10)	0,0209 (3)
γ <sub>31,7</sub> (Fr)	388,10 (7)	0,00125 (21)					
γ <sub>37,12</sub> (Fr)	403,130 (35)	0,00019 (16)					
γ <sub>33,8</sub> (Fr)	406,057 (26)	0,0079 (5)	[E1]	0,01431 (20)	0,00249 (4)	0,000588 (9)	0,01758 (25)
γ <sub>32,5</sub> (Fr)	417,882 (30)	0,0056 (5)					
γ <sub>47,27</sub> (Fr)	429,43 (8)	0,00038 (19)					
γ <sub>36,10</sub> (Fr)	434,762 (25)	0,0029 (3)					
γ <sub>40,14</sub> (Fr)	442,10 (9)	0,0045 (7)					
γ <sub>33,7</sub> (Fr)	443,408 (20)	0,0015 (5)	[E2]	0,0310 (5)	0,01371 (20)	0,00353 (5)	0,0494 (7)
γ <sub>30,3</sub> (Fr)	443,43 (10)	0,0001					
γ <sub>28,0</sub> (Fr)	446,31 (10)	0,0006 (4)					
γ <sub>33,6</sub> (Fr)	450,915 (20)	0,0036 (6)	[M1]	0,1740 (25)	0,0312 (5)	0,00743 (11)	0,215 (3)
γ <sub>33,4</sub> (Fr)	452,216 (21)	0,13 (1)	[M1]	0,1727 (25)	0,0310 (5)	0,00737 (11)	0,213 (3)
γ <sub>29,0</sub> (Fr)	458,74 (6)	0,00053 (13)					
γ <sub>34,7</sub> (Fr)	462,266 (32)	0,00045 (11)	[E1]	0,01093 (16)	0,00187 (3)	0,000442 (7)	0,01339 (19)
γ <sub>34,6</sub> (Fr)	469,773 (32)	0,0028 (4)					
γ <sub>32,2</sub> (Fr)	480,988 (27)	0,0340 (22)					
γ <sub>32,1</sub> (Fr)	491,778 (30)	0,00035 (14)					
γ <sub>31,0</sub> (Fr)	496,50 (7)	0,0015 (7)					
γ <sub>45,19</sub> (Fr)	498,6 (6)	0,00083 (21)					
γ <sub>33,3</sub> (Fr)	513,266 (21)	0,00055 (21)					
γ <sub>33,2</sub> (Fr)	515,166 (20)	0,0246 (15)	[M1]	0,1219 (17)	0,0218 (3)	0,00518 (8)	0,1506 (21)
γ <sub>32,0</sub> (Fr)	517,634 (25)	0,0159 (10)					
γ <sub>36,7</sub> (Fr)	522,147 (25)	0,00208 (15)					
γ <sub>33,1</sub> (Fr)	525,956 (24)	0,0403 (25)	[M1]	0,1154 (17)	0,0206 (3)	0,00490 (7)	0,1425 (20)
γ <sub>36,6</sub> (Fr)	529,654 (25)	0,0076 (7)					
γ <sub>36,4</sub> (Fr)	530,955 (26)	0,0047 (5)					
γ <sub>34,3</sub> (Fr)	532,124 (32)	0,00077 (21)	[E1]	0,00823 (12)	0,001389 (20)	0,000327 (5)	0,01005 (14)
γ <sub>37,4</sub> (Fr)	538,004 (33)	0,0038 (10)					
γ <sub>43,12</sub> (Fr)	544,85 (6)	0,00053 (14)					
γ <sub>33,0</sub> (Fr)	551,812 (17)	0,0059 (16)	[M1]	0,1015 (15)	0,0181 (3)	0,00431 (6)	0,1254 (18)
γ <sub>35,2</sub> (Fr)	564,294 (32)	0,00022 (9)					
γ <sub>40,8</sub> (Fr)	567,48 (6)	0,0012 (4)					
γ <sub>34,0</sub> (Fr)	570,67 (3)	0,0040 (5)	[E1]	0,00717 (10)	0,001202 (17)	0,000283 (4)	0,00874 (13)
γ <sub>36,3</sub> (Fr)	592,005 (26)	0,00083 (14)					
γ <sub>36,2</sub> (Fr)	593,905 (25)	0,0029 (3)					
γ <sub>35,0</sub> (Fr)	600,94 (3)	0,0024 (5)					
γ <sub>37,2</sub> (Fr)	600,954 (32)	0,006					
γ <sub>41,8</sub> (Fr)	603,075 (36)	0,00173 (21)					
γ <sub>43,9</sub> (Fr)	629,26 (6)	0,00032 (7)					
γ <sub>37,0</sub> (Fr)	637,60 (3)	0,00012	E1+M2	0,0074 (17)	0,0013 (4)	0,00031 (9)	0,0092 (22)
γ <sub>38,0</sub> (Fr)	645,94 (12)	0,00015 (5)	E1+M2	0,0072 (16)	0,0013 (4)	0,00031 (9)	0,0089 (21)
γ <sub>41,5</sub> (Fr)	649,078 (34)	0,0017 (5)					
γ <sub>47,10</sub> (Fr)	656,29 (7)	0,00049 (21)					

	Energy (keV)	P <sub>γ+ce</sub> (%)	Multipolarity	α <sub>K</sub>	α <sub>L</sub>	α <sub>M</sub>	α <sub>T</sub>
γ <sub>42,7</sub> (Fr)	658,04 (5)	0,0014 (3)					
γ <sub>42,4</sub> (Fr)	666,84 (5)	0,0021 (18)					
γ <sub>46,9</sub> (Fr)	674,94 (30)	0,00010 (5)					
γ <sub>39,0</sub> (Fr)	679,53 (7)	0,00066 (12)					
γ <sub>43,5</sub> (Fr)	679,57 (6)						
γ <sub>47,9</sub> (Fr)	702,02 (7)	0,00016 (7)					
γ <sub>48,10</sub> (Fr)	747,0 (1)	0,0011 (4)					
γ <sub>47,4</sub> (Fr)	752,48 (7)	0,00026 (7)					
γ <sub>43,1</sub> (Fr)	753,46 (6)	0,00023 (7)					
γ <sub>42,0</sub> (Fr)	766,44 (5)	0,00030 (6)	E1+M2	0,0051 (10)	0,00087 (21)	0,00021 (5)	0,0062 (13)
γ <sub>43,0</sub> (Fr)	779,32 (6)	0,000055 (14)	E1+M2	0,0049 (10)	0,00084 (20)	0,00020 (5)	0,0060 (12)
γ <sub>44,0</sub> (Fr)	808,48 (10)	0,0021 (3)	E1+M2	0,0045 (9)	0,00078 (18)	0,00018 (5)	0,0056 (11)
γ <sub>46,0</sub> (Fr)	825,0 (3)	0,000049	E1+M2	0,0044 (8)	0,00075 (17)	0,00018 (4)	0,0053 (11)

### 3 Atomic Data

#### 3.1 Fr

ω <sub>K</sub>	:	0,967	(4)
ω <sub>L</sub>	:	0,440	(18)
n <sub>KL</sub>	:	0,803	(5)

##### 3.1.1 X Radiations

	Energy (keV)		Relative probability
X <sub>K</sub>			
Kα <sub>2</sub>	83,23		60,92
Kα <sub>1</sub>	86,1		100
Kβ <sub>3</sub>	96,815	}	34,88
Kβ <sub>1</sub>	97,474		
Kβ <sub>5</sub> ''	98,069		
Kβ <sub>2</sub>	100,16	}	11,3
Kβ <sub>4</sub>	100,548		
KO <sub>2,3</sub>	100,972		
X <sub>L</sub>			
Lℓ	10,3798		
Lα	11,895 - 12,0299		
Lη	13,254		
Lβ	13,8773 - 15,6386		
Lγ	16,7515 - 17,7993		

**3.1.2 Auger Electrons**

	Energy (keV)	Relative probability
Auger K		
KLL	63,576 - 70,787	100
KLX	77,720 - 86,101	57,4
KXY	91,84 - 101,12	8,24
Auger L		
	5,73 - 18,52	

**4  $\alpha$  Emissions**

	Energy (keV)	Probability (%)
$\alpha_{0,48}$	4903,6 (14)	0,0011 (4)
$\alpha_{0,47}$	4992,7 (14)	0,0013 (3)
$\alpha_{0,46}$	5019,3 (14)	0,00015 (5)
$\alpha_{0,45}$	5025,5 (14)	0,00083 (21)
$\alpha_{0,44}$	5035,5 (14)	0,0021 (3)
$\alpha_{0,43}$	5064,1 (14)	0,00114 (18)
$\alpha_{0,42}$	5076,8 (14)	0,0038 (19)
$\alpha_{0,41}$	5094,1 (14)	0,015 (7)
$\alpha_{0,40}$	5129,0 (14)	0,0058 (8)
$\alpha_{0,39}$	5162,1 (14)	0,00066 (12)
$\alpha_{0,38}$	5195,1 (14)	0,00015 (5)
$\alpha_{0,37}$	5203,3 (14)	0,0101 (10)
$\alpha_{0,36}$	5210,2 (14)	0,022 (1)
$\alpha_{0,35}$	5239,3 (14)	0,0026 (5)
$\alpha_{0,34}$	5269,1 (14)	0,048 (19)
$\alpha_{0,33}$	5287,6 (14)	0,214 (10)
$\alpha_{0,32}$	5321,2 (14)	0,007 (7)
$\alpha_{0,31}$	5341,9 (14)	0,0027 (8)
$\alpha_{0,30}$	5356,2 (14)	0,000097 (2)
$\alpha_{0,29}$	5379,0 (14)	0,0020 (5)
$\alpha_{0,28}$	5391,2 (14)	0,0006 (4)
$\alpha_{0,27}$	5414,5 (14)	0,0030 (4)
$\alpha_{0,26}$	5428,3 (14)	0,0023 (3)
$\alpha_{0,25}$	5430,1 (14)	0,0028 (8)
$\alpha_{0,24}$	5435,8 (14)	0,0083 (6)
$\alpha_{0,23}$	5443,3 (14)	0,098 (19)
$\alpha_{0,22}$	5468,4 (14)	0,00052 (18)
$\alpha_{0,21}$	5487,4 (14)	0,0020 (3)
$\alpha_{0,20}$	5497,4 (14)	0,0022 (7)
$\alpha_{0,19}$	5515,2 (14)	0,0052 (19)
$\alpha_{0,18}$	5523,7 (14)	0,013 (6)

	Energy (keV)	Probability (%)
$\alpha_{0,17}$	5540,1 (14)	0,0072 (8)
$\alpha_{0,16}$	5546,5 (14)	0,055 (12)
$\alpha_{0,15}$	5555,3 (14)	0,084 (10)
$\alpha_{0,14}$	5563,3 (14)	0,017 (7)
$\alpha_{0,13}$	5580,5 (14)	0,95 (4)
$\alpha_{0,12}$	5599,3 (14)	0,114 (7)
$\alpha_{0,11}$	5609,0 (14)	1,09 (5)
$\alpha_{0,10}$	5637,3 (14)	4,16 (23)
$\alpha_{0,9}$	5682,2 (14)	1,31 (4)
$\alpha_{0,8}$	5686,4 (14)	0,021 (14)
$\alpha_{0,7}$	5723,1 (14)	2,03 (23)
$\alpha_{0,6}$	5730,5 (14)	1,6 (3)
$\alpha_{0,5}$	5731,6 (14)	1,24 (10)
$\alpha_{0,4}$	5731,9 (17)	9,0 (5)
$\alpha_{0,3}$	5791,7 (14)	6,2 (9)
$\alpha_{0,2}$	5793,1 (21)	18,9 (20)
$\alpha_{0,1}$	5804,2 (14)	0,3
$\alpha_{0,0}$	5829,6 (14)	52,4 (24)

## 5 Electron Emissions

		Energy (keV)	Electrons (per 100 disint.)
eAL	(Fr)	5,73 - 18,52	23,7 (6)
eAK	(Fr)		
	KLL	63,576 - 70,787	} 0,123 (17)
	KLX	77,720 - 86,101	
	KXY	91,84 - 101,12	
ec <sub>13,9</sub> T	(Fr)	2,360 - 103,433	0,031 (7)
ec <sub>2,1</sub> M	(Fr)	6,15 - 7,80	5,4 (7)
ec <sub>1,0</sub> L	(Fr)	7,222 - 10,831	7,2 (10)
ec <sub>7,0</sub> T	(Fr)	7,270 - 108,349	2,62 (18)
ec <sub>7,0</sub> K	(Fr)	7,274 (11)	1,84 (15)
ec <sub>2,1</sub> N	(Fr)	9,64 - 10,54	1,43 (19)
ec <sub>9,3</sub> T	(Fr)	10,390 - 111,462	0,114 (8)
ec <sub>2,1</sub> O	(Fr)	10,56 - 10,74	0,320 (43)
ec <sub>24,16</sub> T	(Fr)	11,65 - 112,72	0,00074 (11)
ec <sub>23,15</sub> T	(Fr)	12,960 - 114,036	0,0086 (13)
ec <sub>2,0</sub> L	(Fr)	18,012 - 21,621	14,7 (12)
ec <sub>8,1</sub> T	(Fr)	18,770 - 119,844	0,0244 (16)
ec <sub>3,0</sub> L	(Fr)	19,912 - 23,521	6,8 (6)
ec <sub>14,9</sub> T	(Fr)	19,95 - 121,02	0,0051 (15)
ec <sub>1,0</sub> M	(Fr)	21,212 - 22,862	1,92 (26)
ec <sub>11,6</sub> T	(Fr)	22,54 - 123,62	0,0246 (17)

		Energy (keV)	Electrons (per 100 disint.)
ec <sub>11,5</sub> T	(Fr)	23,68 - 124,76	0,175 (11)
ec <sub>11,5</sub> K	(Fr)	23,685 (21)	0,113 (7)
ec <sub>1,0</sub> N	(Fr)	24,708 - 25,607	0,50 (7)
ec <sub>12,7</sub> T	(Fr)	24,940 - 126,011	0,00213 (19)
ec <sub>1,0</sub> O	(Fr)	25,627 - 25,801	0,104 (14)
ec <sub>15,9</sub> T	(Fr)	28,020 - 129,091	0,0134 (25)
ec <sub>9,5</sub> L	(Fr)	31,677 - 35,286	0,1068 (16)
ec <sub>2,0</sub> M	(Fr)	32,002 - 33,652	3,95 (33)
ec <sub>12,6</sub> T	(Fr)	32,440 - 133,518	0,00459 (38)
ec <sub>12,4</sub> T	(Fr)	33,740 - 134,819	0,0073 (7)
ec <sub>3,0</sub> M	(Fr)	33,902 - 35,552	1,82 (17)
ec <sub>2,0</sub> N	(Fr)	35,498 - 36,397	1,03 (9)
ec <sub>2,0</sub> O	(Fr)	36,417 - 36,591	0,213 (18)
ec <sub>3,0</sub> N	(Fr)	37,398 - 38,297	0,476 (45)
ec <sub>23,13</sub> T	(Fr)	38,620 - 139,694	0,0054 (25)
ec <sub>17,9</sub> T	(Fr)	43,500 - 144,572	0,00175 (46)
ec <sub>6,3</sub> L	(Fr)	43,717 - 47,326	0,32 (7)
ec <sub>13,7</sub> T	(Fr)	44,020 - 145,092	0,0279 (18)
ec <sub>4,2</sub> L	(Fr)	44,32 - 47,92	4,03 (25)
ec <sub>6,2</sub> L	(Fr)	45,617 - 49,226	0,80 (16)
ec <sub>9,0</sub> T	(Fr)	48,930 - 150,008	0,1223 (27)
ec <sub>7,3</sub> L	(Fr)	51,224 - 54,833	0,166 (42)
ec <sub>13,6</sub> T	(Fr)	51,520 - 152,599	0,00334 (23)
ec <sub>13,4</sub> T	(Fr)	52,83 - 153,90	0,0340 (22)
ec <sub>7,2</sub> L	(Fr)	53,124 - 56,733	0,411 (41)
ec <sub>4,1</sub> L	(Fr)	55,11 - 58,72	0,52 (14)
ec <sub>10,3</sub> T	(Fr)	56,110 - 157,188	1,37 (16)
ec <sub>10,3</sub> K	(Fr)	56,113 (16)	1,12 (17)
ec <sub>6,1</sub> L	(Fr)	56,407 - 60,016	0,134 (27)
ec <sub>4,2</sub> M	(Fr)	58,31 - 59,96	0,96 (6)
ec <sub>6,2</sub> M	(Fr)	59,607 - 61,257	0,207 (42)
ec <sub>18,9</sub> T	(Fr)	60,22 - 161,29	0,0088 (22)
ec <sub>4,2</sub> N	(Fr)	61,8 - 62,7	0,252 (16)
ec <sub>7,2</sub> M	(Fr)	67,114 - 68,764	0,111 (11)
ec <sub>23,11</sub> T	(Fr)	67,600 - 168,678	0,026 (11)
ec <sub>10,7</sub> L	(Fr)	68,751 - 72,360	0,86 (6)
ec <sub>4,1</sub> M	(Fr)	69,10 - 70,75	0,140 (37)
ec <sub>15,7</sub> T	(Fr)	69,68 - 170,75	0,0017 (9)
ec <sub>10,6</sub> L	(Fr)	76,258 - 79,867	0,261 (25)
ec <sub>15,6</sub> T	(Fr)	77,180 - 178,257	0,00187 (14)
ec <sub>10,5</sub> L	(Fr)	77,403 - 81,012	0,149 (48)
ec <sub>16,7</sub> T	(Fr)	78,630 - 179,701	0,0190 (14)
ec <sub>4,0</sub> L	(Fr)	80,962 - 84,571	1,76 (13)
ec <sub>6,0</sub> L	(Fr)	82,263 - 85,872	0,33 (14)
ec <sub>10,7</sub> M	(Fr)	82,741 - 84,391	0,204 (15)
ec <sub>17,7</sub> T	(Fr)	85,160 - 186,231	0,00044 (5)
ec <sub>11,2</sub> T	(Fr)	86,790 - 187,866	0,0543 (32)
ec <sub>7,0</sub> L	(Fr)	89,770 - 93,379	0,586 (48)



		Energy (keV)	Electrons (per 100 disint.)
ec <sub>10,0</sub> K	(Fr)	94,659 (11)	0,16 (9)
ec <sub>10,0</sub> T	(Fr)	94,660 - 195,734	0,22 (9)
ec <sub>4,0</sub> M	(Fr)	94,952 - 96,602	0,426 (32)
ec <sub>23,10</sub> T	(Fr)	96,380 - 197,456	0,00236 (27)
ec <sub>12,2</sub> T	(Fr)	96,690 - 197,769	0,00344 (46)
ec <sub>11,1</sub> T	(Fr)	97,580 - 198,656	0,00168 (12)
ec <sub>4,0</sub> N	(Fr)	98,448 - 99,347	0,112 (9)
ec <sub>7,0</sub> M	(Fr)	103,76 - 105,41	0,148 (14)
ec <sub>13,2</sub> T	(Fr)	115,78 - 216,85	0,0232 (15)
ec <sub>11,0</sub> T	(Fr)	123,440 - 224,512	0,0075 (5)
ec <sub>41,32</sub> T	(Fr)	130,070 - 231,141	0,0067 (40)
ec <sub>20,4</sub> T	(Fr)	137,51 - 238,58	0,00123 (37)
ec <sub>10,3</sub> L	(Fr)	138,609 - 142,218	0,212 (21)
ec <sub>15,3</sub> T	(Fr)	139,530 - 240,608	0,00066 (6)
ec <sub>23,9</sub> T	(Fr)	142,110 - 243,182	0,00360 (47)
ec <sub>16,3</sub> T	(Fr)	148,480 - 249,559	0,00348 (26)
ec <sub>13,0</sub> T	(Fr)	152,420 - 253,496	0,00664 (41)
ec <sub>15,0</sub> T	(Fr)	178,080 - 279,154	0,00123 (9)
ec <sub>36,21</sub> T	(Fr)	181,070 - 282,146	0,000424 (39)
ec <sub>23,7</sub> T	(Fr)	183,770 - 284,841	0,000285 (24)
ec <sub>25,7</sub> T	(Fr)	197,20 - 298,27	0,00081 (12)
ec <sub>34,13</sub> T	(Fr)	215,990 - 317,064	0,00023 (12)
ec <sub>24,3</sub> T	(Fr)	261,260 - 362,339	0,000122 (11)
ec <sub>33,8</sub> T	(Fr)	304,930 - 406,002	0,000137 (9)
ec <sub>33,6</sub> T	(Fr)	349,78 - 450,86	0,00064 (11)
ec <sub>33,4</sub> T	(Fr)	351,090 - 452,161	0,0228 (17)
ec <sub>33,2</sub> T	(Fr)	414,040 - 515,111	0,00322 (20)
ec <sub>33,1</sub> T	(Fr)	424,830 - 525,901	0,00503 (32)
ec <sub>33,0</sub> T	(Fr)	450,680 - 551,757	0,00065 (18)

## 6 Photon Emissions

### 6.1 X-Ray Emissions

		Energy (keV)	Photons (per 100 disint.)		
XL	(Fr)	10,3798 - 17,7993	19,0 (6)		
XK $\alpha_2$	(Fr)	83,23	1,06 (7)	}	K $\alpha$
XK $\alpha_1$	(Fr)	86,1	1,73 (12)		
XK $\beta_3$	(Fr)	96,815	0,60 (5)	}	K' $\beta_1$
XK $\beta_1$	(Fr)	97,474			
XK $\beta_5''$	(Fr)	98,069			
XK $\beta_2$	(Fr)	100,16	0,196 (14)	}	K' $\beta_2$
XK $\beta_4$	(Fr)	100,548			
XKO <sub>2,3</sub>	(Fr)	100,972			

### 6.2 Gamma Emissions

	Energy (keV)	Photons (per 100 disint.)
$\gamma_{2,1}(\text{Fr})$	10,79 (2)	0,015 (2)
$\gamma_{1,0}(\text{Fr})$	25,856 (17)	0,00159 (21)
$\gamma_{2,0}(\text{Fr})$	36,646 (11)	0,0181 (15)
$\gamma_{3,0}(\text{Fr})$	38,546 (12)	0,0107 (10)
$\gamma_{8,4}(\text{Fr})$	46,159 (24)	0,0049 (7)
$\gamma_{9,6}(\text{Fr})$	49,166 (17)	0,0080 (8)
$\gamma_{9,5}(\text{Fr})$	50,311 (21)	0,00062
$\gamma_{34,32}(\text{Fr})$	53,036 (39)	0,004
$\gamma_{13,10}(\text{Fr})$	57,762 (16)	0,0051 (8)
$\gamma_{6,3}(\text{Fr})$	62,351 (16)	0,0053 (12)
$\gamma_{4,2}(\text{Fr})$	62,950 (17)	0,49 (3)
$\gamma_{5,2}(\text{Fr})$	63,106 (19)	0,021 (3)
$\gamma_{6,2}(\text{Fr})$	64,251 (16)	0,047 (4)
$\gamma_{7,3}(\text{Fr})$	69,858 (16)	0,0047 (12)
$\gamma_{7,2}(\text{Fr})$	71,758 (16)	0,0132 (13)
$\gamma_{4,1}(\text{Fr})$	73,740 (21)	0,019 (5)
$\gamma_{5,1}(\text{Fr})$	73,896 (23)	0,309 (23)
$\gamma_{6,1}(\text{Fr})$	75,041 (20)	0,015 (3)
$\gamma_{11,8}(\text{Fr})$	78,812 (24)	0,0123 (19)
$\gamma_{10,7}(\text{Fr})$	87,385 (16)	0,271 (19)
$\gamma_{10,6}(\text{Fr})$	94,892 (16)	0,105 (10)
$\gamma_{10,5}(\text{Fr})$	96,037 (19)	0,033 (7)
$\gamma_{4,0}(\text{Fr})$	99,596 (13)	0,76 (5)
$\gamma_{5,0}(\text{Fr})$	99,752 (16)	1,08 (8)
$\gamma_{6,0}(\text{Fr})$	100,897 (11)	0,096 (8)

	Energy (keV)	Photons (per 100 disint.)
$\gamma_{13,9}(\text{Fr})$	103,488 (18)	0,0030 (7)
$\gamma_{7,0}(\text{Fr})$	108,404 (11)	0,255 (16)
$\gamma_{9,3}(\text{Fr})$	111,517 (18)	0,313 (21)
$\gamma_{24,16}(\text{Fr})$	112,78 (5)	0,0021 (3)
$\gamma_{23,15}(\text{Fr})$	114,091 (25)	0,00087 (13)
$\gamma_{8,1}(\text{Fr})$	119,899 (26)	0,080 (5)
$\gamma_{14,9}(\text{Fr})$	121,08 (7)	0,017 (5)
$\gamma_{11,6}(\text{Fr})$	123,670 (17)	0,087 (6)
$\gamma_{11,5}(\text{Fr})$	124,815 (21)	0,0292 (18)
$\gamma_{12,7}(\text{Fr})$	126,066 (21)	0,0079 (7)
$\gamma_{15,9}(\text{Fr})$	129,146 (21)	0,0027 (5)
$\gamma_{12,6}(\text{Fr})$	133,573 (21)	0,0196 (16)
$\gamma_{12,4}(\text{Fr})$	134,874 (22)	0,032 (3)
$\gamma_{26,14}(\text{Fr})$	137,40 (15)	0,0023 (3)
$\gamma_{23,13}(\text{Fr})$	139,749 (22)	0,00139 (21)
$\gamma_{17,9}(\text{Fr})$	144,627 (42)	0,00046 (12)
$\gamma_{13,7}(\text{Fr})$	145,147 (16)	0,146 (9)
$\gamma_{9,0}(\text{Fr})$	150,063 (13)	0,693 (12)
$\gamma_{13,6}(\text{Fr})$	152,654 (16)	0,0197 (13)
$\gamma_{13,4}(\text{Fr})$	153,955 (18)	0,205 (13)
$\gamma_{10,3}(\text{Fr})$	157,243 (16)	0,36 (3)
$\gamma_{18,9}(\text{Fr})$	161,35 (8)	0,0036 (9)
$\gamma_{23,11}(\text{Fr})$	168,733 (22)	0,012 (5)
$\gamma_{10,1}(\text{Fr})$	169,933 (20)	0,0139 (14)
$\gamma_{15,7}(\text{Fr})$	170,805 (20)	0,013 (7)
$\gamma_{15,6}(\text{Fr})$	178,312 (20)	0,0161 (12)
$\gamma_{16,7}(\text{Fr})$	179,756 (32)	0,0108 (8)
$\gamma_{11,3}(\text{Fr})$	186,021 (18)	0,0127 (14)
$\gamma_{17,7}(\text{Fr})$	186,286 (41)	0,0042 (5)
$\gamma_{16,6}(\text{Fr})$	187,263 (32)	0,0103 (7)
$\gamma_{11,2}(\text{Fr})$	187,921 (17)	0,53 (3)
$\gamma_{10,0}(\text{Fr})$	195,789 (11)	0,148 (9)
$\gamma_{23,10}(\text{Fr})$	197,511 (21)	0,026 (3)
$\gamma_{12,2}(\text{Fr})$	197,824 (21)	0,038 (5)
$\gamma_{11,1}(\text{Fr})$	198,711 (21)	0,0188 (13)
$\gamma_{29,13}(\text{Fr})$	205,19 (6)	0,0015 (5)
$\gamma_{13,2}(\text{Fr})$	216,905 (16)	0,32 (2)
$\gamma_{19,4}(\text{Fr})$	220,43 (8)	0,0060 (18)
$\gamma_{11,0}(\text{Fr})$	224,567 (13)	0,112 (8)
$\gamma_{13,1}(\text{Fr})$	227,695 (21)	0,0046 (12)
$\gamma_{41,32}(\text{Fr})$	231,196 (39)	0,005 (3)
$\gamma_{14,2}(\text{Fr})$	234,49 (7)	0,0017 (3)
$\gamma_{20,4}(\text{Fr})$	238,64 (8)	0,0010 (3)
$\gamma_{15,3}(\text{Fr})$	240,663 (21)	0,0117 (10)
$\gamma_{23,9}(\text{Fr})$	243,237 (22)	0,0031 (4)
$\gamma_{16,3}(\text{Fr})$	249,614 (32)	0,0135 (10)
$\gamma_{13,0}(\text{Fr})$	253,551 (12)	0,132 (8)
$\gamma_{17,3}(\text{Fr})$	256,144 (42)	0,00037 (7)

	Energy (keV)	Photons (per 100 disint.)
$\gamma_{15,0}(\text{Fr})$	279,209 (17)	0,0305 (22)
$\gamma_{36,21}(\text{Fr})$	282,201 (46)	0,00055 (5)
$\gamma_{23,7}(\text{Fr})$	284,896 (21)	0,0074 (6)
$\gamma_{25,7}(\text{Fr})$	298,33 (6)	0,0020 (3)
$\gamma_{34,13}(\text{Fr})$	317,119 (32)	0,00042 (21)
$\gamma_{27,6}(\text{Fr})$	321,753 (41)	0,0033 (4)
$\gamma_{21,0}(\text{Fr})$	348,35 (4)	0,0030 (3)
$\gamma_{23,3}(\text{Fr})$	354,754 (22)	0,0020 (7)
$\gamma_{33,10}(\text{Fr})$	356,023 (20)	0,00026 (11)
$\gamma_{24,3}(\text{Fr})$	362,394 (42)	0,0054 (5)
$\gamma_{22,0}(\text{Fr})$	367,74 (12)	0,00052 (18)
$\gamma_{34,10}(\text{Fr})$	374,881 (32)	0,0019 (5)
$\gamma_{31,7}(\text{Fr})$	388,10 (7)	0,00125 (21)
$\gamma_{37,12}(\text{Fr})$	403,130 (35)	0,00019 (16)
$\gamma_{33,8}(\text{Fr})$	406,057 (26)	0,0078 (5)
$\gamma_{32,5}(\text{Fr})$	417,882 (30)	0,0056 (5)
$\gamma_{47,27}(\text{Fr})$	429,43 (8)	0,00038 (19)
$\gamma_{36,10}(\text{Fr})$	434,762 (25)	0,0029 (3)
$\gamma_{40,14}(\text{Fr})$	442,10 (9)	0,0045 (7)
$\gamma_{33,7}(\text{Fr})$	443,408 (20)	0,0014 (5)
$\gamma_{30,3}(\text{Fr})$	443,43 (10)	0,0001
$\gamma_{28,0}(\text{Fr})$	446,31 (10)	0,0006 (4)
$\gamma_{33,6}(\text{Fr})$	450,915 (20)	0,0030 (5)
$\gamma_{33,4}(\text{Fr})$	452,216 (21)	0,107 (8)
$\gamma_{29,0}(\text{Fr})$	458,74 (6)	0,00053 (13)
$\gamma_{34,7}(\text{Fr})$	462,266 (32)	0,00044 (11)
$\gamma_{34,6}(\text{Fr})$	469,773 (32)	0,0028 (4)
$\gamma_{32,2}(\text{Fr})$	480,988 (27)	0,0340 (22)
$\gamma_{32,1}(\text{Fr})$	491,778 (30)	0,00035 (14)
$\gamma_{31,0}(\text{Fr})$	496,50 (7)	0,0015 (7)
$\gamma_{45,19}(\text{Fr})$	498,6 (6)	0,00083 (21)
$\gamma_{33,3}(\text{Fr})$	513,265 (21)	0,00055 (21)
$\gamma_{33,2}(\text{Fr})$	515,165 (20)	0,0214 (13)
$\gamma_{32,0}(\text{Fr})$	517,633 (25)	0,0159 (10)
$\gamma_{36,7}(\text{Fr})$	522,146 (25)	0,00208 (15)
$\gamma_{33,1}(\text{Fr})$	525,955 (24)	0,0353 (22)
$\gamma_{36,6}(\text{Fr})$	529,653 (25)	0,0076 (7)
$\gamma_{36,4}(\text{Fr})$	530,954 (26)	0,0047 (5)
$\gamma_{34,3}(\text{Fr})$	532,123 (32)	0,00076 (21)
$\gamma_{37,4}(\text{Fr})$	538,003 (33)	0,0038 (10)
$\gamma_{43,12}(\text{Fr})$	544,85 (6)	0,00053 (14)
$\gamma_{33,0}(\text{Fr})$	551,811 (17)	0,0052 (14)
$\gamma_{35,2}(\text{Fr})$	564,293 (32)	0,00022 (9)
$\gamma_{40,8}(\text{Fr})$	567,48 (6)	0,0012 (4)
$\gamma_{34,0}(\text{Fr})$	570,669 (30)	0,0040 (5)
$\gamma_{36,3}(\text{Fr})$	592,004 (26)	0,00083 (14)
$\gamma_{36,2}(\text{Fr})$	593,904 (25)	0,0029 (3)
$\gamma_{35,0}(\text{Fr})$	600,939 (30)	0,0024 (5)

	Energy (keV)	Photons (per 100 disint.)
$\gamma_{37,2}(\text{Fr})$	600,953 (32)	0,006
$\gamma_{41,8}(\text{Fr})$	603,074 (36)	0,00173 (21)
$\gamma_{43,9}(\text{Fr})$	629,26 (6)	0,00032 (7)
$\gamma_{37,0}(\text{Fr})$	637,599 (30)	0,00012
$\gamma_{38,0}(\text{Fr})$	645,94 (12)	0,00015 (5)
$\gamma_{41,5}(\text{Fr})$	649,077 (34)	0,0017 (5)
$\gamma_{47,10}(\text{Fr})$	656,29 (7)	0,00049 (21)
$\gamma_{42,7}(\text{Fr})$	658,03 (5)	0,0014 (3)
$\gamma_{42,4}(\text{Fr})$	666,84 (5)	0,0021 (18)
$\gamma_{46,9}(\text{Fr})$	674,94 (30)	0,00010 (5)
$\gamma_{39,0}(\text{Fr})$	679,53 (7)	0,00066 (12)
$\gamma_{47,9}(\text{Fr})$	702,02 (7)	0,00016 (7)
$\gamma_{48,10}(\text{Fr})$	747,0 (1)	0,0011 (4)
$\gamma_{47,4}(\text{Fr})$	752,48 (7)	0,00026 (7)
$\gamma_{43,1}(\text{Fr})$	753,46 (6)	0,00023 (7)
$\gamma_{42,0}(\text{Fr})$	766,44 (5)	0,00030 (6)
$\gamma_{43,0}(\text{Fr})$	779,32 (6)	0,000055 (14)
$\gamma_{44,0}(\text{Fr})$	808,48 (10)	0,0021 (3)
$\gamma_{46,0}(\text{Fr})$	825,0 (3)	0,000049

## 7 Main Production Modes

$^{226}\text{Ra}(\text{d},3\text{n})^{225}\text{Ac}$

$^{232}\text{Th}(\text{p},4\text{n})^{225}\text{Ac}$

$^{237}\text{Np}$  decay chain

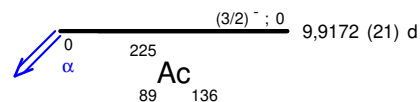
$^{233}\text{U}$  decay chain

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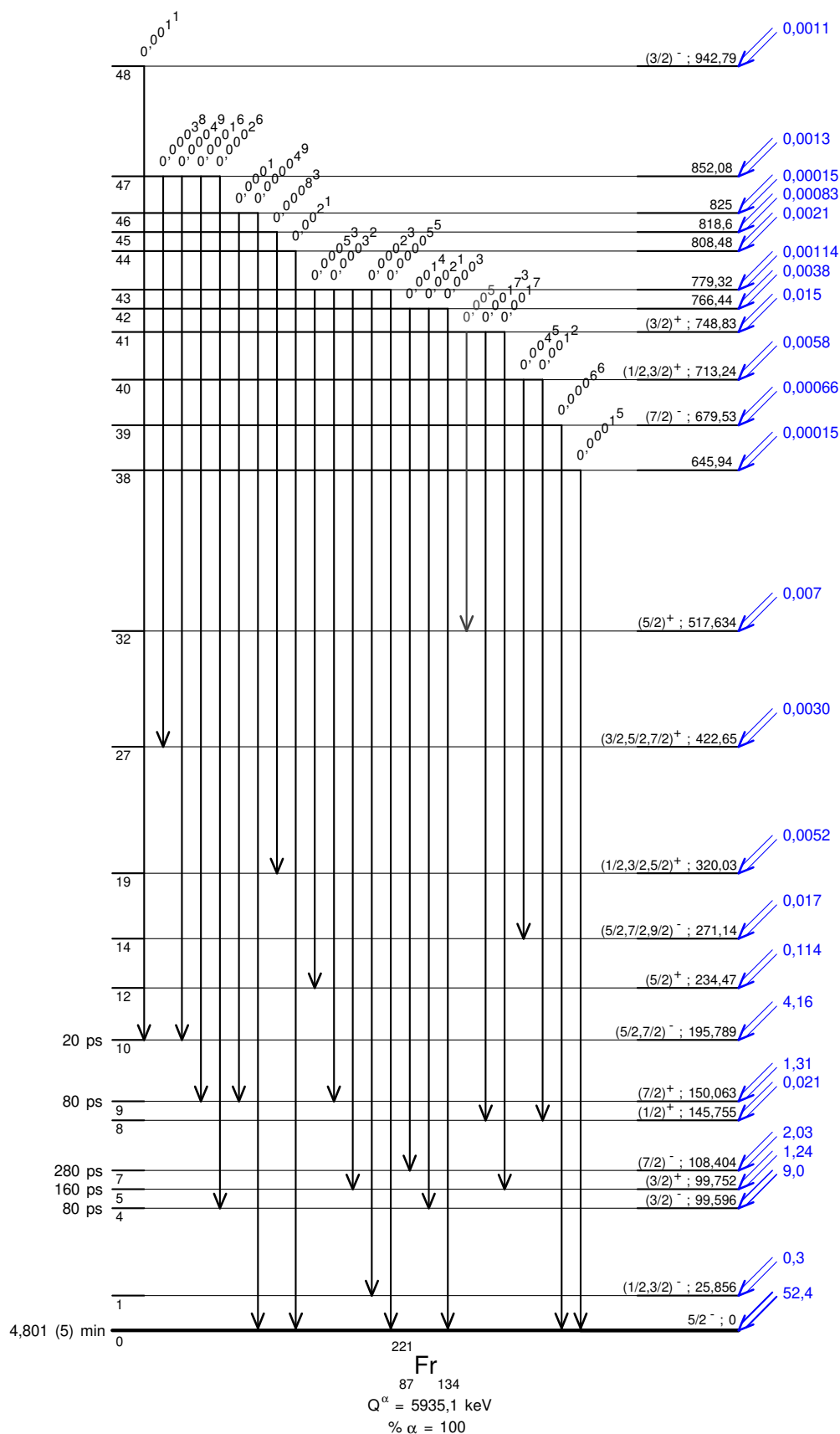
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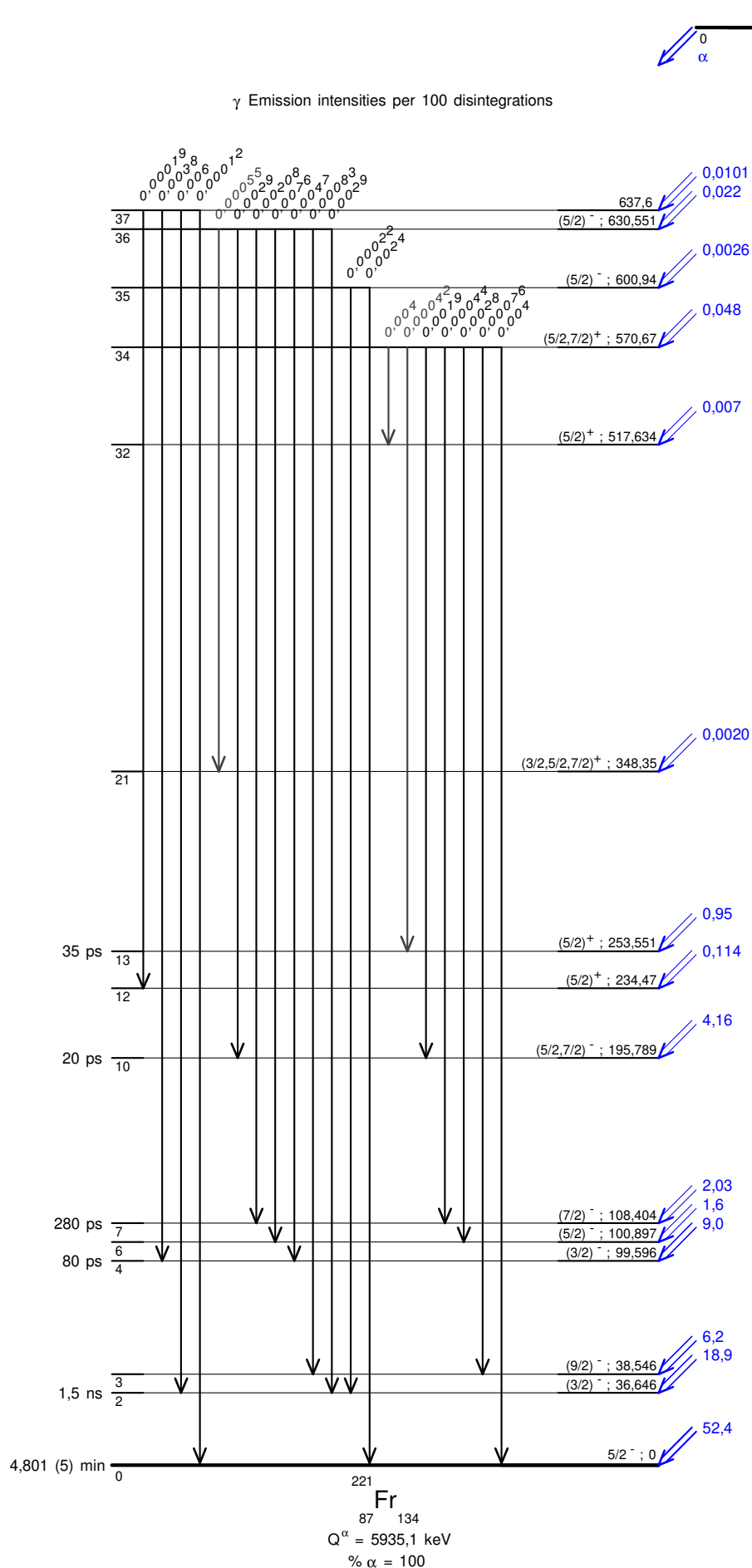
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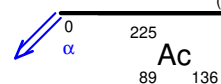
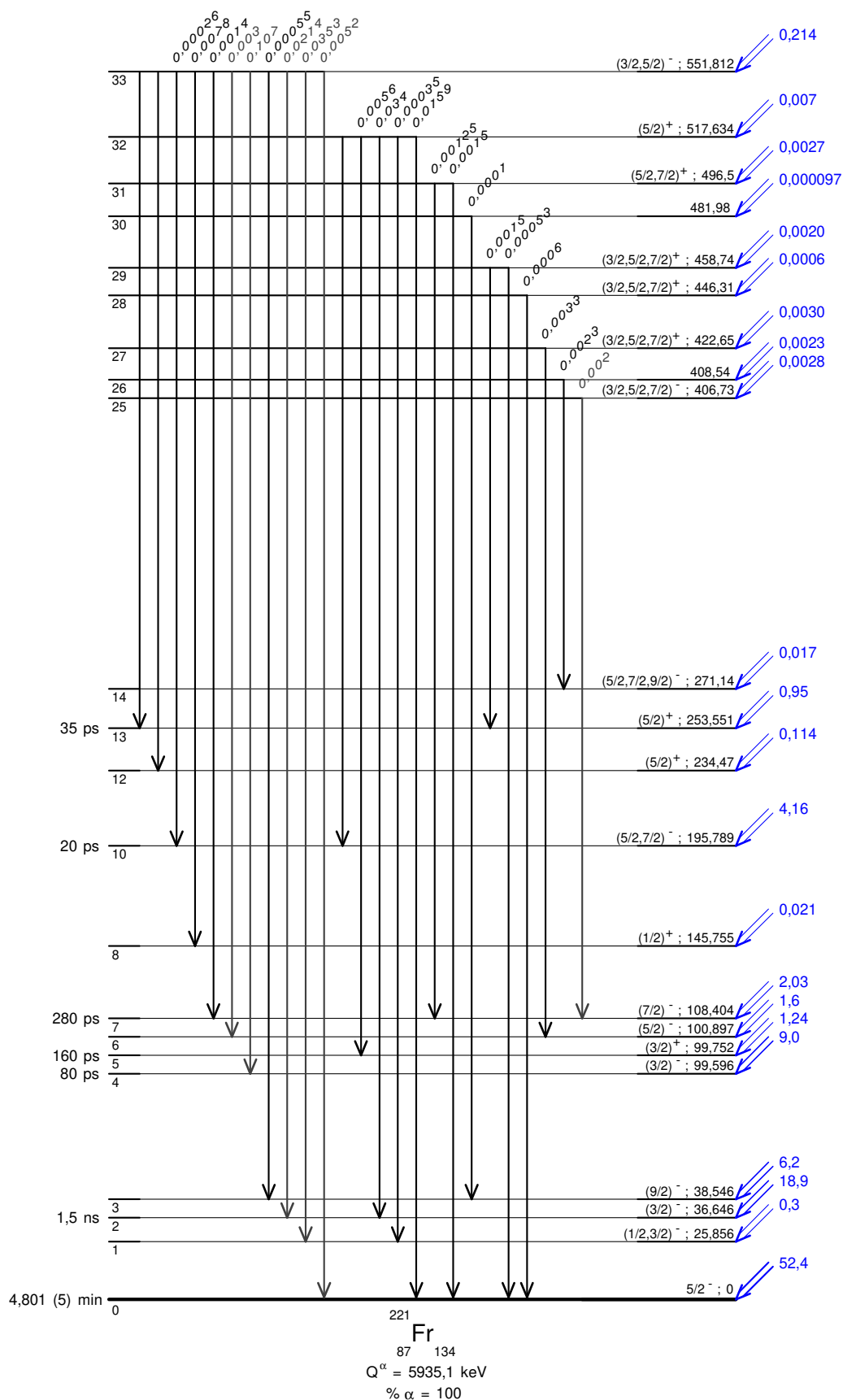


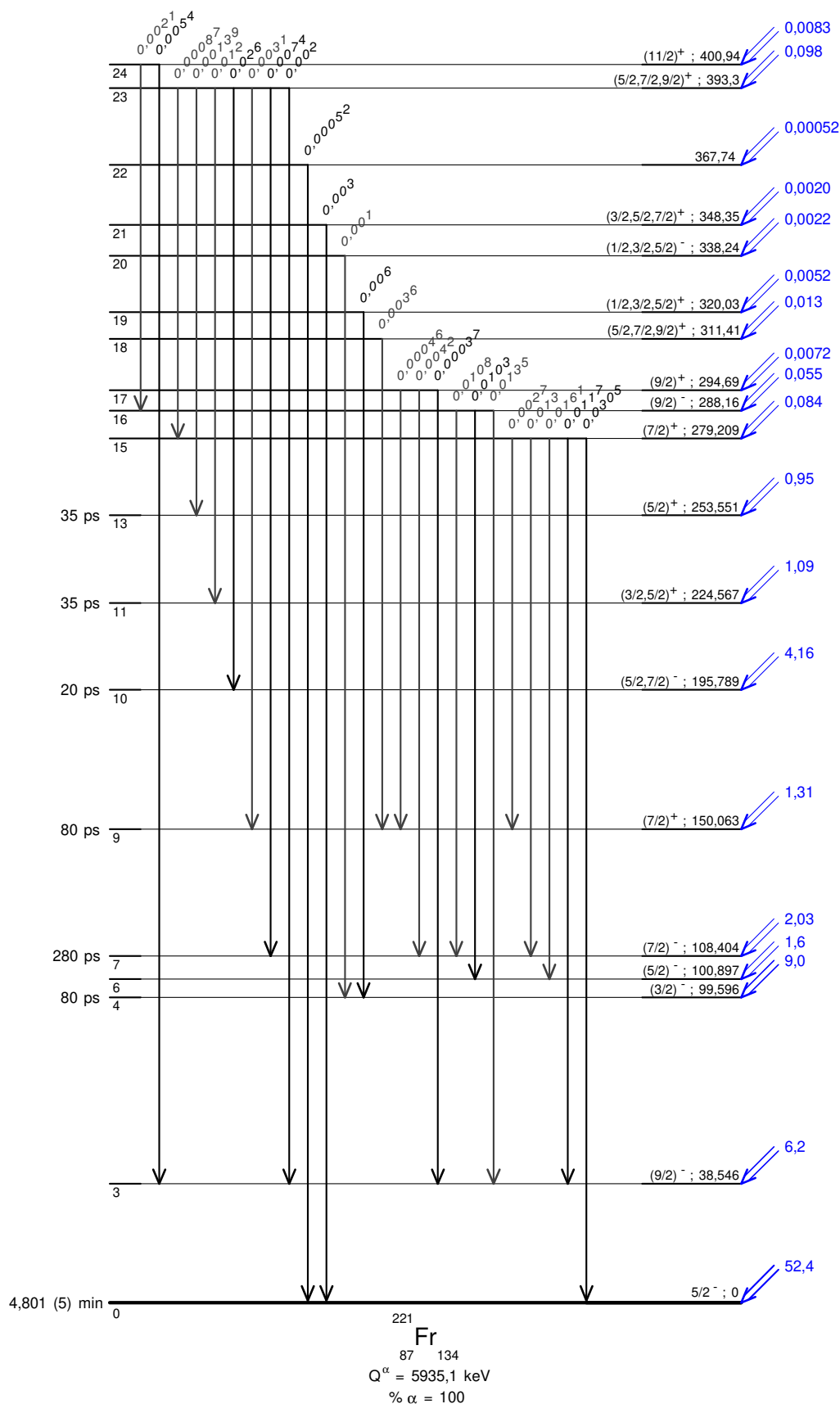
$\gamma$  Emission intensities per 100 disintegrations

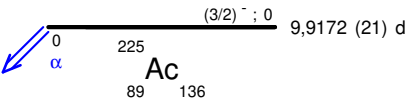




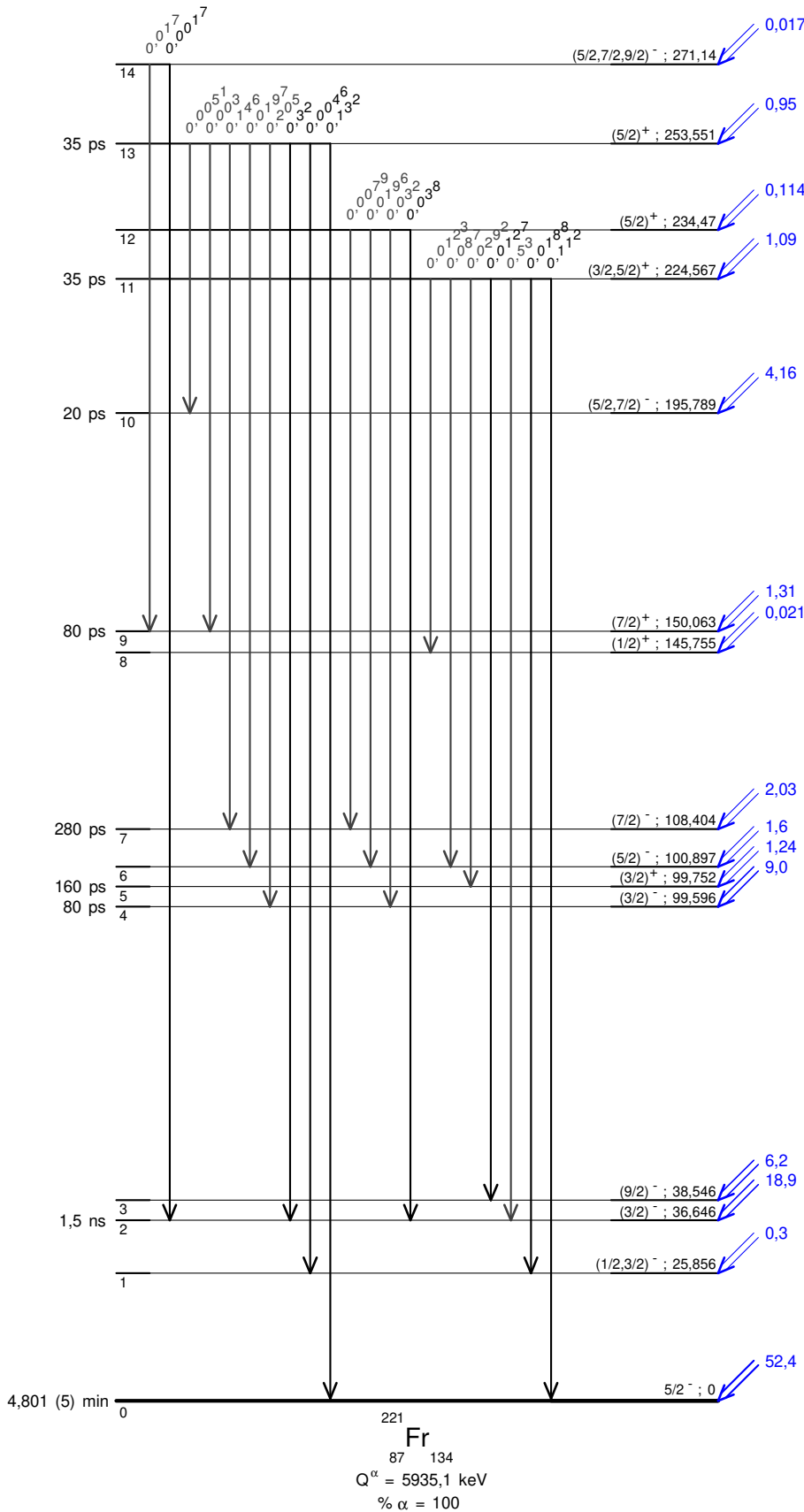


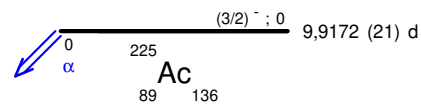
(3/2)<sup>-</sup>; 0 9,9172 (21) d $\gamma$  Emission intensities per 100 disintegrations

(3/2)<sup>-</sup>; 0 9,9172 (21) d $\alpha$ <sup>225</sup>Ac  
89 136 $\gamma$  Emission intensities per 100 disintegrations



$\gamma$  Emission intensities per 100 disintegrations



 $\gamma$  Emission intensities per 100 disintegrations