| $^{237}_{93}$Np $_{144}$ |
|---|

# 1 Decay Scheme

Np-237 disintegrates by alpha transitions to the ground state and excited states of Pa-233.
*Le neptunium 237 se désintègre par émission alpha vers les niveaux excités et le niveau fondamental de protactinium 233.*

# 2 Nuclear Data

| | | | | |
|---|---|---|---|---|
| $T_{1/2}(^{237}Np)$ | : | 2,144 | (7) | $10^6$ a |
| $T_{1/2}(^{233}Pa)$ | : | 26,98 | (2) | d |
| $Q^{\alpha}(^{237}Np)$ | : | 4958,3 | (12) | keV |

## 2.1 $\alpha$ Transitions

| | Energy keV | Probability × 100 | F |
|---|---|---|---|
| $\alpha_{0,20}$ | 4592,4 (12) | 0,038 (4) | 65 |
| $\alpha_{-1,1}$ | 4629 (3) | 0,011 (3) | 84000 |
| $\alpha_{0,18}$ | 4654,7 (12) | 0,048 (23) | 139 |
| $\alpha_{0,17}$ | 4657,8 (12) | 0,393 (23) | 19,1 |
| $\alpha_{0,16}$ | 4678,6 (12) | 0,373 (9) | 27 |
| $\alpha_{0,15}$ | 4701,2 (13) | 0,032 (8) | 46000 |
| $\alpha_{0,14}$ | 4720,4 (12) | 6,43 (3) | 3,14 |
| $\alpha_{0,13}$ | 4745,9 (12) | 3,46 (3) | 8,9 |
| $\alpha_{0,12}$ | 4756,7 (12) | 0,38 (2) | |
| $\alpha_{0,11}$ | 4779,2 (13) | 0,535 (10) | 99 |
| $\alpha_{0,10}$ | 4789,1 (12)} | | > 56 |
| $\alpha_{0,9}$ | 4795,0 (12)} | 1,174 (13) | > 51 |
| $\alpha_{0,8}$ | 4826,1 (16) | 0,019 | 5932 |
| $\alpha_{0,7}$ | 4849,3 (12) | 9,5 (3) | 17,9 |
| $\alpha_{0,6}$ | 4854,7 (12) | 23,0 (3) | 7,8 |
| $\alpha_{0,4}$ | 4871,8 (12) | 47,64 (6) | 5 |
| $\alpha_{0,3}$ | 4887,8 (12) | 2,02 (2) | 152 |

| | Energy keV | Probability × 100 | F |
|---|---|---|---|
| $\alpha_{0,2}$ | 4901,2 (12) | 2,430 (17) | 156 |
| $\alpha_{0,1}$ | 4951,6 (12) | 0,51 (3) | 1570 |
| $\alpha_{0,0}$ | 4958,3 (12) | 2,41 (3) | 387 |

## 2.2 Gamma Transitions and Internal Conversion Coefficients

| | Energy keV | $P_{\gamma+ce}$ × 100 | Multipolarity | $\alpha_K$ | $\alpha_L$ | $\alpha_M$ | $\alpha_T$ |
|---|---|---|---|---|---|---|---|
| $\gamma_{7,6}$(Pa) | 5,18 | | | | | | |
| $\gamma_{1,0}$(Pa) | 6,65 (5) | | (M1) | | | 2280 (60) | 3080 (90) |
| $\gamma_{5,4}$(Pa) | 8,22 (5) | ≈ 9 | | | | | |
| $\gamma_{6,5}$(Pa) | 9 | | | | | | |
| $\gamma_{13,12}$(Pa) | 10,7 | | | | | | |
| $\gamma_{6,4}$(Pa) | 17,40 (5) | | M1+E2 | | | | |
| $\gamma_{(-1,1)}$(Pa) | 21,5 | | | | | | |
| $\gamma_{7,4}$(Pa) | 22,6 | | | | | | |
| $\gamma_{8,7}$(Pa) | 24,14 (10) | | | | | | |
| $\gamma_{(-1,2)}$(Pa) | 27,7 | | | | | | |
| $\gamma_{4,2}$(Pa) | 29,374 (20) | 58,2 (26) | E1 | | 2,29 (5) | 0,585 (12) | 3,07 (6) |
| $\gamma_{(-1,3)}$(Pa) | 29,6 | | | | | | |
| $\gamma_{12,10}$(Pa) | 32,46 | | | | | | |
| $\gamma_{14,12}$(Pa) | 36,32 (2) | 0,50 (14) | M1 + 1,20 % E2 | | 74 (15) | 18 (4) | 99 (20) |
| $\gamma_{13,10}$(Pa) | 43,2 | | | | | | |
| $\gamma_{6,2}$(Pa) | 46,53 (6) | 0,209 (8) | [E1] | | 0,687 (14) | 0,171 (4) | 0,914 (18) |
| $\gamma_{19,15}$(Pa) | 48,96 (10) | | | | | | |
| $\gamma_{9,7}$(Pa) | 54,4 (1) | | | | | | |
| $\gamma_{2,0}$(Pa) | 57,104 (20) | 67,4 (40) | E2 | | 128 (3) | 35,3 (7) | 176 (4) |
| $\gamma_{17,14}$(Pa) | 62,59 (10) | 0,4 (3) | [M1 + 50 % E2] | | 50 (40) | 13 (10) | 60 (50) |
| $\gamma_{3,1}$(Pa) | 63,9 (1) | 1,10 (5) | (E2) | | 74,7 (15) | 20,6 (4) | 102,3 (20) |
| $\gamma_{3,0}$(Pa) | 70,49 (10) | 0,42 (28) | [M1 + 50 % E2] | | 28 (19) | 7,5 (54) | 38 (26) |
| $\gamma_{10,5}$(Pa) | 74,54 (10) | 0,13 (3) | [M1] | | 7,42 (15) | 1,79 (4) | 9,84 (20) |
| $\gamma_{4,0}$(Pa) | 86,477 (10) | 29,8 (10) | E1 | | 1,13 (5) | 0,22 (6) | 1,43 (8) |
| $\gamma_{5,1}$(Pa) | 87,99 (3) | 0,167 (4) | [E1] | | 0,128 (3) | 0,0312 (6) | 0,169 (4) |
| $\gamma_{5,0}$(Pa) | 94,64 (5) | 0,75 (8) | E1 | | 0,1054 (21) | 0,0257 (5) | 0,140 (3) |
| $\gamma_{9,2}$(Pa) | 106,15 (25) | 0,523 (31) | [E2] | | 6,78 (14) | 1,87 (4) | 9,28 (19) |
| $\gamma_{13,6}$(Pa) | 108,7 | 0,32 (4) | M1 + 4,62 % E2 | | 2,7 (5) | 0,65 (13) | 3,5 (6) |
| $\gamma_{11,3}$(Pa) | 109,1 (1) | | | | | | |
| $\gamma_{12,4}$(Pa) | 115,40 (35) | 0,0029 (14) | [M1+E2] | 5 (6) | 3,3 (13) | 0,9 (4) | 10 (4) |
| $\gamma_{13,5}$(Pa) | 117,702 (20) | 2,26 (12) | M1 + 8,26 % E2 | 9,3 (5) | 2,16 (12) | 0,53 (4) | 12,2 (6) |
| $\gamma_{12,3}$(Pa) | 131,101 (25) | 0,106 (6) | E1 | 0,202 (4) | 0,0451 (9) | 0,01094 (22) | 0,262 (5) |
| $\gamma_{14,6}$(Pa) | 134,285 (20) | 0,62 (9) | [M1+E2] | 6,1 (10) | 1,5 (3) | 0,37 (8) | 8,0 (11) |
| $\gamma_{18,9}$(Pa) | 139,9 (1) | 0,00560 (49) | [E1] | 0,174 (3) | 0,0381 (8) | 0,00925 (19) | 0,225 (5) |
| $\gamma_{13,3}$(Pa) | 141,74 (10) | | | | | | |
| $\gamma_{14,5}$(Pa) | 143,249 (20) | 3,3 (3) | M1 + 7,76 % E2 | 5,38 (12) | 1,171 (24) | 0,287 (6) | 6,94 (14) |
| $\gamma_{14,4}$(Pa) | 151,414 (20) | 1,39 (14) | M1 + 32,89 % E2 | 3,4 (5) | 1,09 (4) | 0,277 (14) | 4,9 (6) |
| $\gamma_{20,13}$(Pa) | 153,37 (10) | 0,021 (6) | [E2] | 0,226 (5) | 1,267 (3) | 0,349 (7) | 1,96 (4) |
| $\gamma_{15,6}$(Pa) | 153,37 | | | | | | |
| $\gamma_{13,2}$(Pa) | 155,239 (20) | 0,103 (9) | E1 | 0,1368 (27) | 0,0292 (6) | 0,00708 (14) | 0,176 (4) |
| $\gamma_{15,5}$(Pa) | 162,41 | | | | | | |
| $\gamma_{10,1}$(Pa) | 162,41 (8) | 0,0382 (12) | [E1] | 0,1232 (25) | 0,0260 (5) | 0,00630 (13) | 0,158 (3) |
| $\gamma_{10,0}$(Pa) | 169,156 (20) | 0,0768 (4) | [E1] | 0,1120 (22) | 0,0235 (5) | 0,00568 (11) | 0,143 (3) |
| $\gamma_{15,4}$(Pa) | 170,59 | | | | | | |
| $\gamma_{16,7}$(Pa) | 170,59 (6) | 0,100 (22) | [M1 + 13,79 % E2] | 3,1 (5) | 0,70 (7) | 0,17 (1) | 4,0 (5) |
| $\gamma_{16,6}$(Pa) | 176,12 (6) | 0,070 (16) | [M1 + 13,79 % E2] | 2,8 (4) | 0,63 (7) | 0,16 (1) | 3,7 (5) |

| | Energy keV | $P_{\gamma+ce}$ × 100 | Multipolarity | $\alpha_K$ | $\alpha_L$ | $\alpha_M$ | $\alpha_T$ |
|---|---|---|---|---|---|---|---|
| $\gamma_{14,2}$(Pa) | 180,794 (19) | 0,0180 (11) | [E1] | 0,0960 (19) | 0,0199 (4) | 0,0048 (1) | 0,1223 (25) |
| $\gamma_{15,3}$(Pa) | 186,86 | | | | | | |
| $\gamma_{20,11}$(Pa) | 186,86 (35) | 0,003 (3) | [E1] | 0,0889 (19) | 0,0183 (4) | 0,00442 (9) | 0,1131 (23) |
| $\gamma_{17,7}$(Pa) | 191,46 (5) | 0,074 (9) | [M1 + 13,79 % E2] | 2,2 (3) | 0,49 (5) | 0,12 (1) | 2,9 (4) |
| $\gamma_{16,4}$(Pa) | 193,26 (5) | 0,167 (18) | [M1 + 13,79 % E2] | 2,2 (3) | 0,48 (5) | 0,12 (1) | 2,8 (4) |
| $\gamma_{18,7}$(Pa) | 194,67 (20) | | | | | | |
| $\gamma_{12,1}$(Pa) | 194,95 (3) | 0,192 (22) | E1 | 0,0806 (16) | 0,0164 (4) | 0,00397 (8) | 0,1024 (21) |
| $\gamma_{17,6}$(Pa) | 196,86 (5) | 0,078 (6) | [M1 + 13,79 % E2] | 2,1 (3) | 0,45 (5) | 0,11 (1) | 2,7 (3) |
| $\gamma_{18,6}$(Pa) | 199,95 (6) | 0,020 (3) | [M1] | 2,27 (5) | 0,436 (9) | 0,105 (2) | 2,85 (6) |
| $\gamma_{15,2}$(Pa) | 199,95 | | | | | | |
| $\gamma_{12,0}$(Pa) | 201,62 (5) | 0,0429 (10) | E1 | 0,0746 (15) | 0,0151 (3) | 0,00365 (7) | 0,0946 (19) |
| $\gamma_{20,9}$(Pa) | 202,9 (2) | 0,0052 (21) | [E1] | 0,0735 (50) | 0,0149 (3) | 0,00360 (7) | 0,0932 (19) |
| $\gamma_{16,3}$(Pa) | 209,19 (5) | 0,0163 (16) | [E1] | 0,0686 (14) | 0,0138 (3) | 0,00333 (7) | 0,0868 (17) |
| $\gamma_{13,0}$(Pa) | 212,29 (5) | 0,184 (11) | E1 | 0,0663 (13) | 0,0133 (3) | 0,00321 (7) | 0,0839 (17) |
| $\gamma_{17,4}$(Pa) | 214,01 (5) | 0,115 (13) | [M1 + 13,79 % E2] | 1,64 (23) | 0,35 (1) | 0,09 (1) | 2,1 (3) |
| $\gamma_{19,4}$(Pa) | 219,8 | | | | | | |
| $\gamma_{16,2}$(Pa) | 222,6 (2) | | | | | | |
| $\gamma_{17,3}$(Pa) | 229,94 (5) | 0,015 (3) | [E1] | 0,0552 (11) | 0,0110 (2) | 0,00264 (5) | 0,0697 (14) |
| $\gamma_{14,0}$(Pa) | 237,86 (2) | 0,0610 (6) | [E1] | 0,0511 (10) | 0,01010 (15) | 0,00243 (5) | 0,0645 (13) |
| $\gamma_{19,2}$(Pa) | 248,95 (10) | 0,012 (3) | [M1 + 13,79 % E2] | 1,08 (15) | 0,22 (1) | 0,055 (6) | 1,37 (16) |
| $\gamma_{15,1}$(Pa) | 250,58 | | | | | | |
| $\gamma_{15,0}$(Pa) | 257,09 | | | | | | |
| $\gamma_{20,7}$(Pa) | 257,09 (20) | 0,048 (24) | [M1] | 1,125 (23) | 0,215 (4) | 0,0518 (11) | 1,41 (3) |
| $\gamma_{20,6}$(Pa) | 262,44 (20) | 0,01120 (49) | [M1] | 1,063 (21) | 0,203 (4) | 0,0489 (10) | 1,33 (3) |
| $\gamma_{20,4}$(Pa) | 279,65 (20) | 0,01320 (49) | [E2] | 0,0847 (17) | 0,100 (2) | 0,0272 (6) | 0,222 (5) |
| $\gamma_{(-1,4)}$(Pa) | 288,3 | | | | | | |

# 3 Atomic Data

## 3.1 Pa

$\omega_K$ : 0,970 (4)
$\bar{\omega}_L$ : 0,488 (18)
$n_{KL}$ : 0,795 (5)

### 3.1.1 X Radiations

| | | Energy keV | | Relative probability |
|---|---|---|---|---|
| $X_K$ | | | | |
| | $K\alpha_2$ | 92,288 | | 62,14 |
| | $K\alpha_1$ | 95,869 | | 100 |
| | $K\beta_3$ | 107,595 | } | |
| | $K\beta_1$ | 108,422 | } | |
| | $K\beta_5''$ | 109,072 | } | 35,84 |
| | $K\beta_2$ | 111,405 | } | |
| | $K\beta_4$ | 111,87 | } | 12,15 |
| | $KO_{2,3}$ | 112,38 | } | |

| | | Energy keV | Relative probability |
|---|---|---|---|
| $X_L$ | | | |
| | $L\ell$ | 11,368 | |
| | $L\alpha$ | 13,122 – 13,289 | |
| | $L\eta$ | 14,949 | |
| | $L\beta$ | 15,358 – 17,666 | |
| | $L\gamma$ | 18,94 – 20,113 | |

### 3.1.2 Auger Electrons

| | Energy keV | Relative probability |
|---|---|---|
| Auger K | | |
| KLL | 70,08 – 78,82 | 100 |
| KLX | 85,99 – 95,86 | 59,2 |
| KXY | 101,87 – 112,59 | 8,76 |
| Auger L | 5,90 – 21,01 | |

## 4 $\alpha$ Emissions

| | Energy keV | Probability × 100 |
|---|---|---|
| $\alpha_{0,20}$ | 4515,1 (19) | 0,038 (4) |
| $\alpha_{-1,1}$ | 4550,5 (22) | 0,011 (3) |
| $\alpha_{0,18}$ | 4573 (3) | 0,048 (23) |
| $\alpha_{0,17}$ | 4578,6 (14) | 0,393 (23) |
| $\alpha_{0,16}$ | 4599,1 (18) | 0,373 (9) |
| $\alpha_{0,15}$ | 4619,7 (21) | 0,032 (8) |
| $\alpha_{0,14}$ | 4640 (1) | 6,43 (3) |
| $\alpha_{0,13}$ | 4665,0 (9) | 3,46 (3) |
| $\alpha_{0,12}$ | 4676,4 | 0,38 (2) |
| $\alpha_{0,11}$ | 4698,2 (8) | 0,535 (10) |
| $\alpha_{0,10}$ | 4708,3 (20)} | |
| $\alpha_{0,9}$ | 4712,3 (20)} | 1,174 (13) |
| $\alpha_{0,8}$ | 4741,3 (20) | 0,019 |
| $\alpha_{0,7}$ | 4766,5 (8) | 9,5 (3) |
| $\alpha_{0,6}$ | 4771,4 (8) | 23,0 (3) |
| $\alpha_{0,4}$ | 4788,0 (9) | 47,64 (6) |
| $\alpha_{0,3}$ | 4803,5 (10) | 2,02 (2) |
| $\alpha_{0,2}$ | 4816,8 (10) | 2,430 (17) |
| $\alpha_{0,1}$ | 4866,4 (14) | 0,51 (3) |
| $\alpha_{0,0}$ | 4872,7 (14) | 2,41 (3) |

## 5 Electron Emissions

| | | Energy keV | Electrons per 100 disint. |
|---|---|---|---|
| $e_{AL}$ | (Pa) | 5,90 - 21,01 | 47,1 (20) |
| $e_{AK}$ | (Pa) | | 0,167 (24) |
| | KLL | 70,08 - 78,82 | } |
| | KLX | 85,99 - 95,86 | } |
| | KXY | 101,87 - 112,59 | } |
| $ec_{13,5\ K}$ | (Pa) | 5,11 (2) | 1,59 (9) |
| $ec_{4,2\ L}$ | (Pa) | 8,269 - 12,641 | 32,7 (15) |
| $ec_{14,12\ L}$ | (Pa) | 15,22 - 19,59 | 0,37 (11) |
| $ec_{4,2\ M}$ | (Pa) | 24,013 - 25,932 | 8,4 (4) |
| $ec_{6,2\ L}$ | (Pa) | 25,42 - 29,80 | 0,075 (3) |
| $ec_{14,5\ K}$ | (Pa) | 30,65 (2) | 2,26 (22) |
| $ec_{14,12\ M}$ | (Pa) | 30,96 - 32,88 | 0,090 (27) |
| $ec_{2,0\ L}$ | (Pa) | 35,999 - 40,371 | 48,9 (29) |
| $ec_{14,4\ K}$ | (Pa) | 38,82 (2) | 0,80 (12) |
| $ec_{17,14\ L}$ | (Pa) | 41,48 - 45,86 | 0,3 (2) |
| $ec_{3,1\ L}$ | (Pa) | 42,8 - 47,2 | 0,80 (4) |
| $ec_{3,0\ L}$ | (Pa) | 49,38 - 53,76 | 0,3 (2) |
| $ec_{2,0\ M}$ | (Pa) | 51,743 - 53,662 | 13,4 (8) |
| $ec_{17,14\ M}$ | (Pa) | 57,23 - 59,15 | 0,08 (6) |
| $ec_{3,1\ M}$ | (Pa) | 58,5 - 60,5 | 0,220 (9) |
| $ec_{3,0\ M}$ | (Pa) | 65,13 - 67,05 | 0,08 (6) |
| $ec_{4,0\ L}$ | (Pa) | 65,372 - 69,744 | 13,9 (6) |
| $ec_{5,0\ L}$ | (Pa) | 73,54 - 77,91 | 0,070 (7) |
| $ec_{4,0\ M}$ | (Pa) | 81,116 - 83,035 | 2,7 (7) |
| $ec_{13,5\ L}$ | (Pa) | 96,597 - 100,969 | 0,369 (22) |
| $ec_{13,5\ M}$ | (Pa) | 112,341 - 114,260 | 0,091 (7) |
| $ec_{14,5\ L}$ | (Pa) | 122,144 - 126,516 | 0,49 (5) |
| $ec_{14,4\ L}$ | (Pa) | 130,309 - 134,681 | 0,257 (10) |
| $ec_{14,5\ M}$ | (Pa) | 137,888 - 139,807 | 0,121 (12) |
| $ec_{14,4\ M}$ | (Pa) | 146,053 - 147,972 | 0,0654 (34) |

# 6 Photon Emissions

## 6.1 X-Ray Emissions

| | | Energy keV | | Photons per 100 disint. | |
|---|---|---|---|---|---|
| XL | (Pa) | 11,368 — 20,113 | | 59,7 (32) | |
| XK$\alpha_2$ | (Pa) | 92,288 | | 1,813 (20) | } K$\alpha$ |
| XK$\alpha_1$ | (Pa) | 95,869 | | 2,906 (20) | } |
| XK$\beta_3$ | (Pa) | 107,595 | } | | |
| XK$\beta_1$ | (Pa) | 108,422 | } | 1,06 (10) | K$'\beta_1$ |
| XK$\beta_5''$ | (Pa) | 109,072 | } | | |
| XK$\beta_2$ | (Pa) | 111,405 | } | | |
| XK$\beta_4$ | (Pa) | 111,87 | } | 0,380 (9) | K$'\beta_2$ |
| XKO$_{2,3}$ | (Pa) | 112,38 | } | | |

## 6.2 Gamma Emissions

| | Energy keV | Photons per 100 disint. |
|---|---|---|
| $\gamma_{7,6}$(Pa) | 5,18 | 0,220 (5) |
| $\gamma_{5,4}$(Pa) | 8,22 (5) | 0,12 (5) |
| $\gamma_{(-1,1)}$(Pa) | 21,5 | 0,352 (13) |
| $\gamma_{(-1,2)}$(Pa) | 27,7 | 0,84 (7) |
| $\gamma_{4,2}$(Pa) | 29,374 (20) | 14,3 (6) |
| $\gamma_{14,12}$(Pa) | 36,32 (2) | 0,005 (1) |
| $\gamma_{6,2}$(Pa) | 46,53 (6) | 0,109 (4) |
| $\gamma_{2,0}$(Pa) | 57,104 (20) | 0,381 (21) |
| $\gamma_{17,14}$(Pa) | 62,59 (10) | 0,006 (2) |
| $\gamma_{3,1}$(Pa) | 63,9 (1) | 0,0107 (4) |
| $\gamma_{3,0}$(Pa) | 70,49 (10) | 0,0107 (4) |
| $\gamma_{10,5}$(Pa) | 74,54 (10) | 0,012 (3) |
| $\gamma_{4,0}$(Pa) | 86,477 (10) | 12,26 (12) |
| $\gamma_{5,1}$(Pa) | 87,99 (3) | 0,143 (3) |
| $\gamma_{5,0}$(Pa) | 94,64 (5) | 0,66 (7) |
| $\gamma_{9,2}$(Pa) | 106,15 (25) | 0,0509 (29) |
| $\gamma_{13,6}$(Pa) | 108,7 | 0,071 (3) |
| $\gamma_{12,4}$(Pa) | 115,40 (35) | 0,0026 (8) |
| $\gamma_{13,5}$(Pa) | 117,702 (20) | 0,171 (4) |
| $\gamma_{12,3}$(Pa) | 131,101 (25) | 0,084 (5) |
| $\gamma_{14,6}$(Pa) | 134,285 (20) | 0,069 (5) |
| $\gamma_{18,9}$(Pa) | 139,9 (1) | 0,0046 (4) |
| $\gamma_{14,5}$(Pa) | 143,249 (20) | 0,42 (4) |
| $\gamma_{14,4}$(Pa) | 151,414 (20) | 0,234 (2) |

| | Energy keV | Photons per 100 disint. |
|---|---|---|
| $\gamma_{20,13}$(Pa) | 153,37 (10) | 0,007 (2) |
| $\gamma_{13,2}$(Pa) | 155,239 (20) | 0,088 (8) |
| $\gamma_{10,1}$(Pa) | 162,41 (8) | 0,033 (1) |
| $\gamma_{10,0}$(Pa) | 169,156 (20) | 0,0672 (3) |
| $\gamma_{16,7}$(Pa) | 170,59 (6) | 0,020 (4) |
| $\gamma_{16,6}$(Pa) | 176,12 (6) | 0,015 (3) |
| $\gamma_{14,2}$(Pa) | 180,81 (10) | 0,016 (1) |
| $\gamma_{20,11}$(Pa) | 186,86 (35) | 0,003 (3) |
| $\gamma_{17,7}$(Pa) | 191,46 (5) | 0,019 (1) |
| $\gamma_{16,4}$(Pa) | 193,26 (5) | 0,044 (1) |
| $\gamma_{18,7}$(Pa) | 194,67 (20) | 0,033 (1) |
| $\gamma_{12,1}$(Pa) | 194,95 (3) | 0,174 (20) |
| $\gamma_{17,6}$(Pa) | 196,86 (5) | 0,0210 (1) |
| $\gamma_{18,6}$(Pa) | 199,95 (6) | 0,0053 (8) |
| $\gamma_{12,0}$(Pa) | 201,62 (5) | 0,0392 (9) |
| $\gamma_{20,9}$(Pa) | 202,9 (2) | 0,0048 (19) |
| $\gamma_{16,3}$(Pa) | 209,19 (5) | 0,0150 (15) |
| $\gamma_{13,0}$(Pa) | 212,29 (5) | 0,17 (1) |
| $\gamma_{17,4}$(Pa) | 214,01 (5) | 0,037 (2) |
| $\gamma_{16,2}$(Pa) | 222,6 (2) | 0,002 (2) |
| $\gamma_{17,3}$(Pa) | 229,94 (5) | 0,014 (3) |
| $\gamma_{14,0}$(Pa) | 237,86 (2) | 0,0573 (6) |
| $\gamma_{19,2}$(Pa) | 248,95 (10) | 0,005 (1) |
| $\gamma_{20,7}$(Pa) | 257,09 (20) | 0,02 (1) |
| $\gamma_{20,6}$(Pa) | 262,44 (20) | 0,0048 (2) |
| $\gamma_{20,4}$(Pa) | 279,65 (20) | 0,0108 (4) |
| $\gamma_{(-1,4)}$(Pa) | 288,3 | 0,0162 (5) |

## 7 Main Production Modes

$U-237(\beta^-)Np-237$

## 8 References


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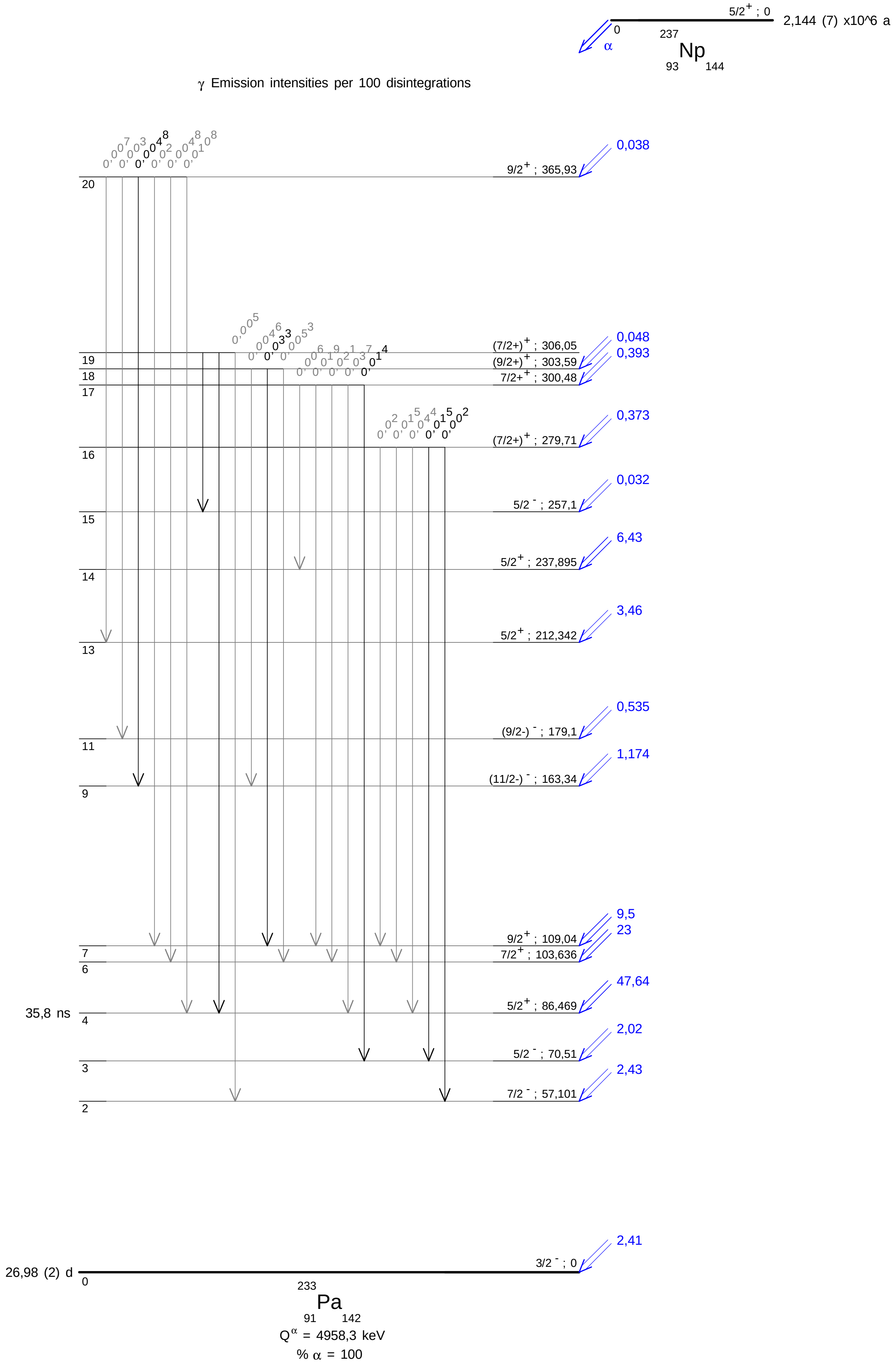
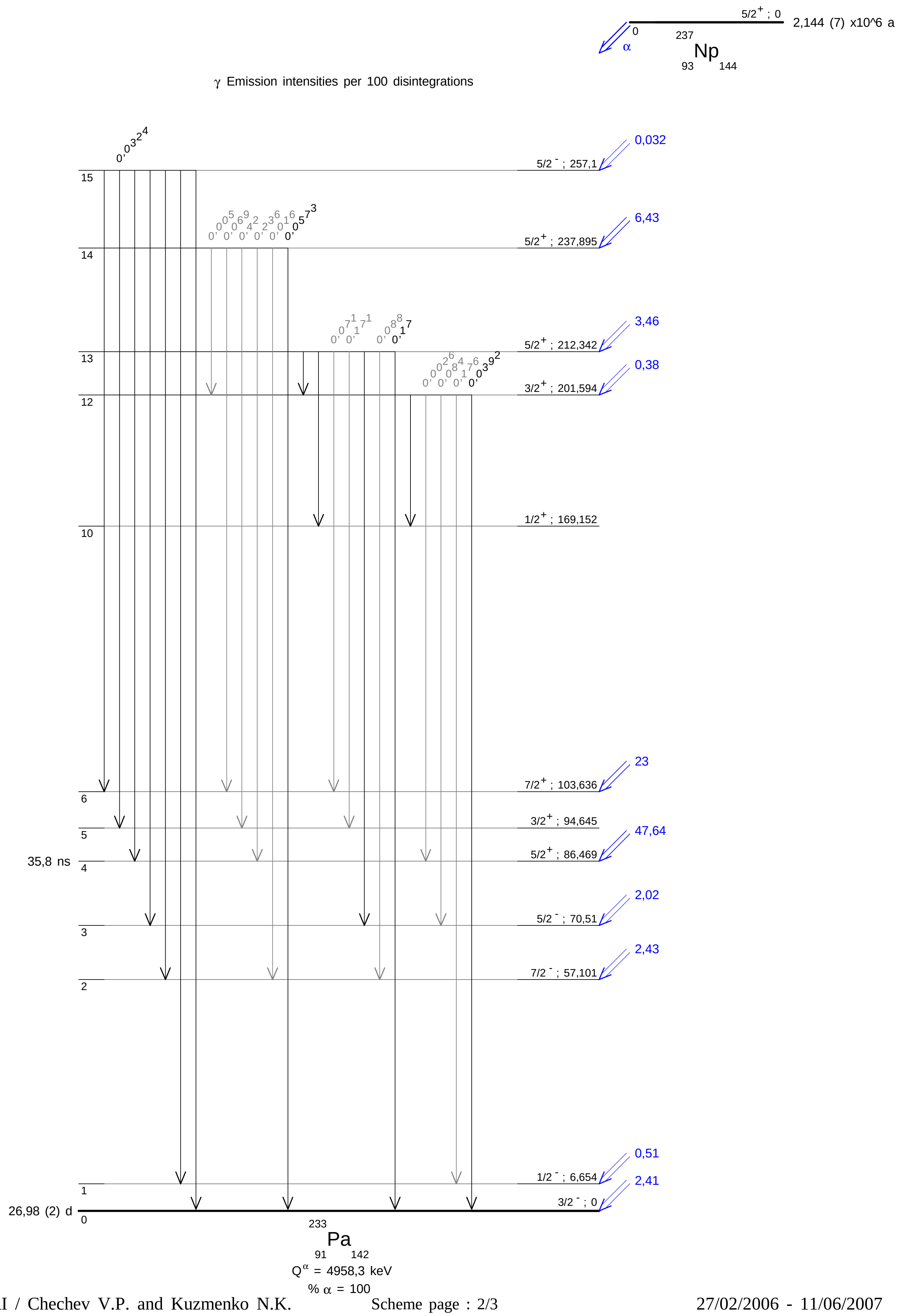
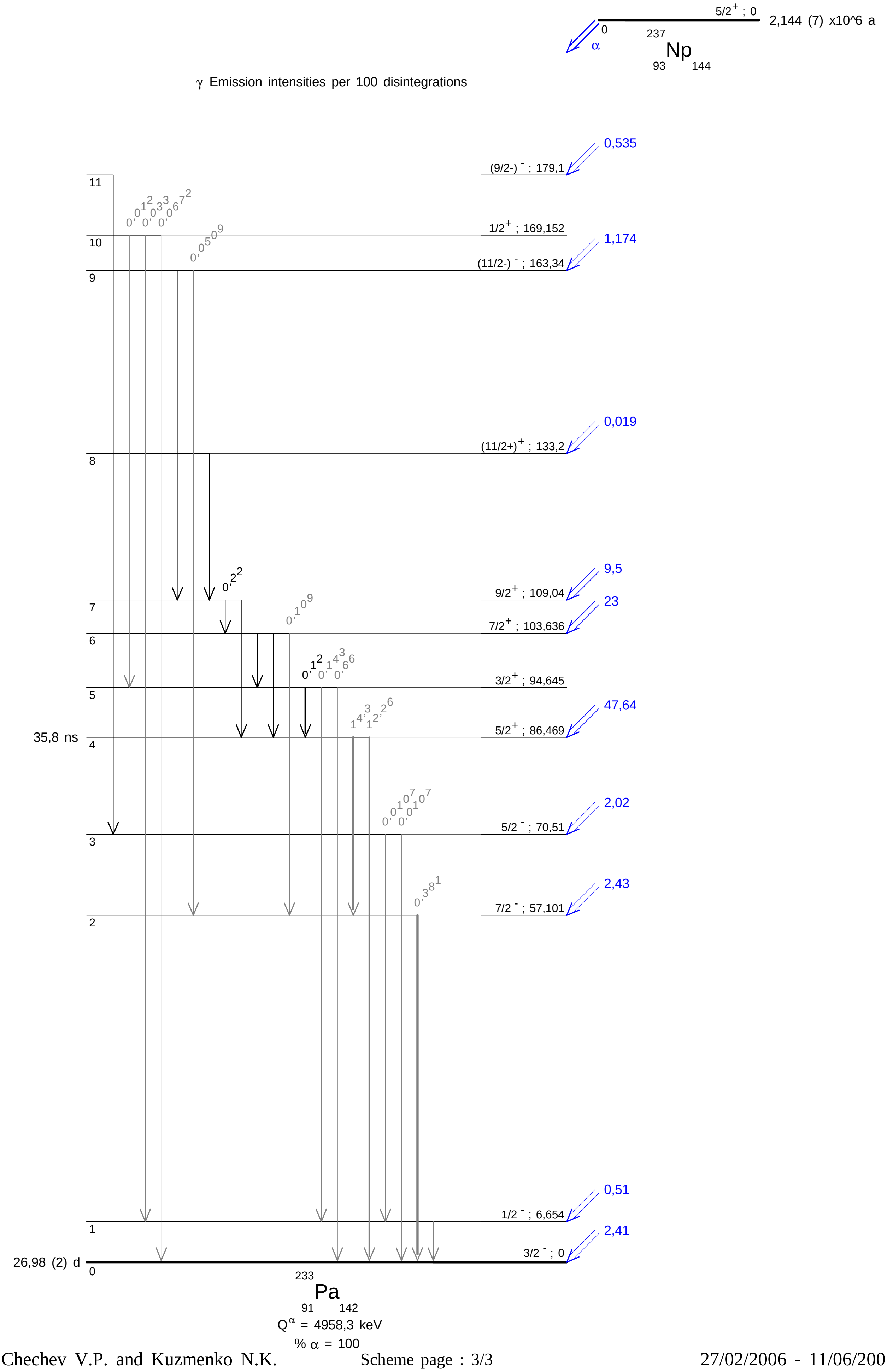

5/2+ ; 0
2,144 (7) x10^6 a
0
α
237
Np
93 144
γ Emission intensities per 100 disintegrations
9/2+ ; 365,93
0,038
20
(7/2+)+ ; 306,05
0,048
(9/2+)+ ; 303,59
0,393
7/2+ ; 300,48
19
18
17
(7/2+)+ ; 279,71
0,373
16
5/2 - ; 257,1
0,032
15
5/2+ ; 237,895
6,43
14
5/2+ ; 212,342
3,46
13
(9/2-) - ; 179,1
0,535
11
(11/2-) - ; 163,34
1,174
9
9/2+ ; 109,04
9,5
7/2+ ; 103,636
23
7
6
35,8 ns
5/2+ ; 86,469
47,64
4
5/2 - ; 70,51
2,02
3
7/2 - ; 57,101
2,43
2
26,98 (2) d
3/2 - ; 0
2,41
0
233
Pa
91 142
Qα = 4958,3 keV
% α = 100


5/2 + ; 0
2,144 (7) x10^6 a
α
237 93 Np 144
γ Emission intensities per 100 disintegrations
5/2 - ; 257,1
0,032
5/2 + ; 237,895
6,43
5/2 + ; 212,342
3,46
3/2 + ; 201,594
0,38
1/2 + ; 169,152
7/2 + ; 103,636
23
3/2 + ; 94,645
5/2 + ; 86,469
47,64
35,8 ns
5/2 - ; 70,51
2,02
7/2 - ; 57,101
2,43
1/2 - ; 6,654
0,51
3/2 - ; 0
2,41
26,98 (2) d
233 91 Pa 142
Q α = 4958,3 keV
% α = 100


5/2+ ; 0
2,144 (7) x10^6 a
0
α
237
Np
93
144
γ Emission intensities per 100 disintegrations
0,535
(9/2-)- ; 179,1
11
1/2+ ; 169,152
10
1,174
(11/2-)- ; 163,34
9
0,019
(11/2+)+ ; 133,2
8
9,5
9/2+ ; 109,04
7
23
7/2+ ; 103,636
6
3/2+ ; 94,645
5
47,64
35,8 ns
5/2+ ; 86,469
4
2,02
5/2- ; 70,51
3
2,43
7/2- ; 57,101
2
0,51
1/2- ; 6,654
1
2,41
26,98 (2) d
3/2- ; 0
0
233
Pa
91
142
Qα = 4958,3 keV
% α = 100