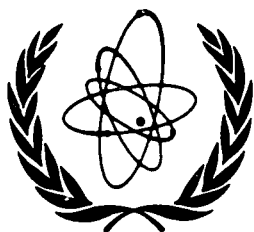


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EVALUATION OF THE DECAY CHARACTERISTICS

OF ISOBARS WITH $A = 95$

Yu.I. Grigor'yan, L.L. Sokolovskij,
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1. INTRODUCTION

With this evaluation of the decay characteristics of isobars with $A = 95$ we continue the series of evaluations of the properties of fission product nuclei [139-141]. The isobars with $A = 95$ are near the peaks of the cumulative fission yield curves for uranium, thorium and plutonium. Fig. 1 shows the chain of beta transformations undergone by the isobars with $A = 95$.

The last evaluation work on this chain was performed in 1972, by Medsker and Horen [142]. Since then, both in the Soviet Union and elsewhere, there have appeared many articles on the radioactive decay characteristics of the nuclei in question and on nuclear reactions involving them. The short-lived isotopes ^{95}Kr , ^{95}Rb , ^{95}Sr , ^{95}Y and ^{95}Rh have not been studied much before 1972. On the basis of work done recently, it is possible to construct decay schemes for some of them and also to revise substantially and complete the level schemes of all the isobars.

The data-treatment method used here was proposed in Ref. [50].

We have estimated the energies and intensities of the beta transitions, gamma photons and conversion electrons accompanying beta decay and electron capture. Internal conversion coefficients, energy levels and lifetimes of the ground and excited states of the nuclei have also been estimated.

Numerical values are presented in the form $XX.XX(X)$, where the figures in parentheses indicate the uncertainty associated with the final digits. The following notation is used:

- W - weighted mean value,
- Un - unweighted mean value,
- Ta - value taken by the authors,
- Th - theoretical value.

2. RESULTS OF AN EVALUATION OF
ISOBARS WITH A = 95

^{95}Kr decay

The ^{95}Kr decay scheme is shown in Fig. 1.

Lifetime of groundstate: $T_{\frac{1}{2}} = 0.78(3)\text{s}$ Ta[1,2,3,138]
Total β^- decay energy: $Q_{\beta^-} = 9.45\text{ MeV}$ Ta[4]

^{95}Rb decay

The ^{95}Rb decay scheme is shown in Fig. 2.

Lifetime of groundstate: $T_{\frac{1}{2}} = 0.393(6)\text{s}$ [5-8]
Probability of emission of a delayed neutron: $P = 7.8(7)\%$ [5,7]
Total β^- decay energy: $Q_{\beta^-} = 8.6(1)\text{ MeV}$ [9,10]

The estimated gamma line energies and intensities are presented in Table 1 [73,74].

The level scheme of ^{95}Sr is constructed on the basis of these data (see Fig. 2).

^{95}Sr decay

The ^{95}Sr decay scheme is shown in Fig. 3.

Lifetime of groundstate: $T_{\frac{1}{2}} = 24.5(3)\text{s}$ [5,11-13]
Total energy: $Q_{\beta^-} = 6.11(13)\text{ MeV}$ [10]

A Q_{β^-} value of 5.7 MeV, obtained from atomic mass systematics is given in Ref. [14].

The ^{95}Sr decay scheme has been constructed mainly on the basis of Ref. [11].

The gamma line energies and intensities are presented in Table 2 [11,73].

Other gamma spectrum measurements are reported in Ref. [15].

The ^{95}Y levels are given in Table 3 [11,16].

^{95}Y decay

The ^{95}Y decay scheme is shown in Fig. 4.

Lifetime of groundstate: $T_{\frac{1}{2}} = 10.33(9)$ min [13,17-20]

Total β^- decay energy: $Q_{\beta^-} = 4.43(2)$ MeV [19]

The estimated gamma live energies and intensities are presented in Table 4 [17,19-22].

The ^{95}Zr levels are given in Table 5 [17,19-26].

Intensity of transition to ^{95}Zr groundstate: $I_{\beta} = 75(6)\%$ [17,19,20]

^{95}Zr decay

The decay scheme of ^{95}Zr and ^{95}Nb is shown in Fig. 5.

Lifetime of groundstate: $T_{\frac{1}{2}} = 64.14(22)$ days [27-30]

Total β^- decay energy: $Q_{\beta^-} = 1121.3(15)$ keV [31-35]

The estimated gamma transition energies and intensities and internal conversion coefficients are presented in Table 6 [28,31-35,36-43]; the estimated beta transition energies and intensities are presented in Table 7 [31,33,42,46].

The ^{95}Nb level are presented in Table 8. Data from works on decay and nuclear reactions [47-53] were used in evaluating the ^{95}Nb levels.

^{95}Nb decay

Lifetime of groundstate: $T_{\frac{1}{2}} = 35.10(3)$ days [28,29,55-61]

Lifetime of metastable state: $T_{\frac{1}{2}} = 86.8(10)$ hours [32,38,46,54]

Total β^- decay energy: $Q_{\beta^-} = 924.8(7)$ keV [14].

The energies and intensities of the gamma and beta transitions accompanying decay of the isomer and the internal conversion coefficients are presented in Tables 9 and 10 [14,31-35].

The energies and intensities of the gamma and beta transitions accompanying decay of the groundstate and the internal conversion coefficients are presented in Tables 11 and 12 [14,31,33,36], [62,71].

^{95}Rh decay

The ^{95}Rh decay scheme is shown in Fig. 6.

Lifetime of groundstate: $T_{\frac{1}{2}} = 4.97(8)$ min [75,76]

Lifetime of metastable state: $T_{\frac{1}{2}} = 1.94(4)$ min [76]

Intensity of isomeric transition to the groundstate - 88(5)%. The gamma line, K capture and β^+ -transition energies and intensities are presented in Tables 14-17 and Table 19. Use was made mainly of data from Ref. [76].

The ^{95}Ru levels are presented in Table 18 [75-78].

Total decay energy: $Q_{\beta} = 5.11(15)$ MeV [76].

^{95}Ru decay

The ^{95}Ru decay scheme is shown in Fig. 7.

Lifetime of groundstate: $T_{\frac{1}{2}} = 98.5(6)$ min [79-90]

Total decay energy: $Q_{\beta} = 2592(16)$ keV

The estimated gamma line energies and intensities are presented in Table 21 [79,81,82-84,86].

The K capture boundary energy and the estimated intensities are presented in Table 20 [79-82,84].

The estimated ^{95}Tc level energies are presented in Table 22 [79-82,84,86,91,94-98,100-103,124,136]; decay and reaction data were used in the evaluation.

^{95}Tc decay

The ^{95}Tc decay scheme is shown in Fig. 8.

Lifetime of groundstate: $T_{\frac{1}{2}} = 20.00(5)$ hours [90,108,112]

Lifetime of isomeric state: $T_{\frac{1}{2}} = 59.8(9)$ days [93,96,106-108, 111, 113-117, 134].

Total decay energy: $Q_{\beta} = 1690(5)$ keV

The estimated gamma line energies and intensities are presented in Table 25 [85,104,105,110-112,114,120].

The estimated β^+ -transition energies and intensities and K capture boundary energy are presented in Tables 23 and 24 [110-112,115,85,105].

The internal conversion coefficients and conversion electron intensities are presented in Table 27 [105-107, 110, 113, 114].

The estimated ^{95}Mo level values are presented in Table 26 [85, 110, 113-115, 117, 118, 122-124, 126-128, 130-132]. Decay and reaction data were used. The lifetimes of the excited levels of ^{95}Tc [91-95] and ^{95}Mo [64-70, 72, 118, 119, 124] are presented in Table 13.

The calculated values of $\lg ft$ are presented in Tables 28-30.

In evaluating the decay characteristics of isobars with $A = 95$, use was also made of Refs [44, 45, 64-70, 72, 99, 109, 125].

Energies and intensities of gamma lines from ^{95}Rb decay, ^{95}Sr levels Table 1

| E_γ , keV | $I_{\gamma, \text{rel.}}\%$ | $E_{\text{lev.}}$ keV | Spin, parity |
|------------------|-----------------------------|-----------------------|--------------|
| 204,00(14) | 22,2(9) | 0 | $1/2^+$ |
| 328,91(15) | 17,3(13) | 204,00(14) | - |
| 352,18(17) | 100 | 352,18(17) | - |
| 565,01(30) | 5,7(7) | 680,80(18) | - |
| 578,67(19) | 6,7(6) | 769,00(21) | - |
| 660,18(17) | 10,0(6) | 1258,5(10) | - |
| 680,78(18) | 35,9(8) | - | - |
| 769,0(3) | 10,9(9) | - | - |
| 1258(1) | 7(1) | - | - |

Energies and intensities of gamma lines from ^{95}Sr decay Table 2

| E_γ , keV | I_γ (photons / 100 decay events) | $E_{\text{init.}}$ - $E_{\text{fin.}}$ |
|------------------|---|--|
| 576,6(5) | 0,82(9) | - |
| 685,92(24) | 24,0(24) | 685,9-0 |
| 777,3(3) | 0,63(8) | - |
| 826,92(24) | 3,0(3) | 826,9-0 |
| 945,2(3) | 2,4(3) | 1631,2-685,9 |
| 982,8(4) | 1,26(15) | - |
| 1277,8(3) | 2,19(25) | 1963,5-685,9 |
| 1335,3(5) | 0,72(9) | - |
| 1360,8(5) | 0,57(8) | 2046,5-685,9 |
| 1722,3(5) | 0,54(7) | 3352,8-1631,2 |
| 2031,3(5) | 0,50(7) | 2717,3-685,9 |
| 2046,5(5) | 0,37(6) | 2046,5-0 |
| 2095,0(5) | 0,13(6) | 2781,5-685,9 |
| 2247,3(5) | 4,1(5) | 2933,2-685,9 |
| 2683,5(5) | 1,25(16) | 2683,5-0 |
| 2706,5(5) | 0,24(4) | 2706,5-0 |
| 2717,3(5) | 4,9(6) | 2717,3-0 |
| 2748,9(5) | 0,34(6) | 2748,9-0 |
| 2781,5(5) | 1,15(15) | 2781,5-0 |
| 2890,8(5) | 0,97(13) | 2890,8-0 |
| 2933,2(5) | 4,3(5) | 2933,2-0 |
| 3116,9(5) | 0,59(9) | 3116,9-0 |
| 3352,8(5) | 1,02(14) | 3352,8-0 |
| 3474,4(5) | 0,25(5) | 3474,4-0 |
| 3500,3(5) | 0,82(12) | 3500,3-0 |
| 3615,9(5) | 1,83(24) | 3615,9-0 |
| 3743,2(5) | 0,88(12) | 3743,2-0 |
| 4075,3(5) | 1,30(19) | 4075,3-0 |
| 4267,7(5) | 0,49(9) | 4267,7-0 |

^{95}Y levels Table 3

| $E_{\text{lev.}}$, keV ($\pm 0,5$ keV) | Spin, parity |
|---|---------------------|
| 0 | $1/2^-$ |
| 685,9 | $3/2^-$ ($1/2^-$) |
| 826,9 | $5/2^-$ |
| 1631,2 | ($1/2, 3/2^-$) |
| 1880? | $5/2^-$ |
| 1963,5 | ($1/2, 3/2^-$) |
| 2046,5 | ($1/2, 3/2^-$) |
| 2683,5 | - |
| 2706,5 | - |
| 2717,3 | - |
| 2748,9 | - |
| 2781,5 | ($1/2, 3/2^-$) |
| 2890,8 | ($1/2, 3/2^-$) |
| 2933,2 | ($1/2, 3/2^+$) |
| 3116,9 | - |
| 3352,8 | ($1/2, 3/2^-$) |
| 3500,3 | - |
| 3615,9 | - |
| 3743,2 | - |
| 4075,3 | - |
| 4267,7 | - |

Table 4

Energies and intensities of gamma lines from ^{95}Y decay

| E_γ , keV | I_γ abs. (photons/100 decay events) | I_γ rel., % | E_γ , keV | I_γ abs. (photons/100 decay events) | I_γ rel., % |
|------------------|--|--------------------|------------------|--|--------------------|
| 396,8(3) | 0,21 | 1,9(5) | 1813,5(8) | 0,12 | 1,1 |
| 431,0(9) | 1,1 | 10,2(6) | 1856,0(8) | 0,12 | 1,1 |
| 569,2(4) | 0,1 | 0,9 | 1892,8(3) | 0,45 | 4,2(9) |
| 580,5(4) | 0,09 | 0,8 | 1904,5(5) | 0,11 | 1,0 |
| 632,4(4) | 0,3 | 2,8(9) | 1925,5(4) | 0,4 | 3,7 |
| 954,2(3) | 10,8 | 100 | 1940,5(8) | 1,9 | 17,2(30) |
| 1002,0(4) | 0,22 | 2 | 1955,9(8) | 0,22 | 2,0 |
| 1049,0(3) | 0,6 | 5,6(6) | 2142,8(9) | 0,21 | 1,9(5) |
| 1071,2(2) | 0,92 | 8,6(3) | 2176,0(6) | 3,9 | 36(4) |
| 1173,9(3) | 0,5 | 4,6(11) | 2252,8(5) | 0,2 | 1,9 |
| 1213,5(15) | 0,05 | 0,5 | 2296,3(9) | 0,8 | 7,4(8) |
| 1294,0(5) | 0,12 | 1,1 | 2373,3(5) | 0,5 | 4,7(4) |
| 1310,5(9) | 0,03 | 0,3 | 2497,7(9) | 0,6 | 5,6(3) |
| 1323,7(3) | 3,0 | 27,9(18) | 2634,7(5) | 2,1 | 19,5(24) |
| 1357,2(5) | 0,3 | 2,8 | 2729(5) | 0,1 | 1 |
| 1409,5(8) | 0,04 | 0,4 | 2760(3) | 0,14 | 1,3(3) |
| 1418,7(4) | 0,43 | 4,0(8) | 2843,5(16) | 0,1 | 1 |
| 1511,8(5) | 0,5 | 4,6(11) | 2996(3) | 0,11 | 1 |
| 1618,6(5) | 1,1 | 10,2(3) | 3129,9(5) | 0,7 | 6,5(3) |
| 1631,8(5) | 0,06 | 0,6 | 3249,6(6) | 0,85 | 7,9(26) |
| 1683,7(3) | 0,15 | 1,4(4) | 3450,8(8) | 0,5 | 4,7(20) |
| 1703(2) | 0,4 | 3,7 | 3576,8(10) | 3,6 | 33(9) |
| 1721,5(6) | 0,21 | 1,9 | 3683,9(9) | 0,12 | 1,0(9) |
| 1771,3(9) | 0,5 | 4,6(3) | 3887,0(8) | 0,09 | 0,8(7) |
| 1798(4) | 0,11 | 1,0 | 3923,7(12) | 0,06 | 0,6(5) |
| 1806,2(7) | 1,0 | 9,1(16) | 4068(1) | 0,06 | 0,6(4) |

Table 5

⁹⁵Zr levels

| $E_{lev.}, keV$ | Spin, parity | $E_{lev.}, keV$ | Spin, parity |
|-----------------|-----------------|-----------------|-----------------|
| 0 | $5/2^+$ | 2843,5(16) | - |
| 954,3(3) | $1/2^+$ | 2870 | - |
| 1323,7(3) | $3/2^+$ | 2996(3) | - |
| 1618,6(5) | $(3/2^+, 5/2)$ | 3034(10) | - |
| 1721,5(6) | $(3/2, 5/2)^+$ | 3129,9(5) | $(1/2, 3/2)^-$ |
| 1771,3(9) | - | 3249,6(6) | $(1/2, 3/2)$ |
| 1798(4) | - | 3310(12) | $1/2^+$ |
| 1892,8(3) | $(3/2, 5/2)^+$ | 3380 | $(7/2, 9/2)^+$ |
| 1904,5(5) | - | 3450,8(8) | $(1/2^+)$ |
| 1940,5(8) | $(3/2, 5/2)^+$ | 3576,8(10) | $(1/2, 3/2)^-$ |
| 1955,9(8) | - | 3587(2) | $(1/2, 3/2)^-$ |
| 2027(5) | $(9/2, 11/2)^-$ | 3620 | - |
| 2280(5) | $1/2^+$ | 3683,9(9) | - |
| 2300(5) | $(3/2, 5/2)^+$ | 3714(3) | - |
| 2373,3(5) | $(3/2, 5/2)^+$ | 3887,0(8) | $(3/2, 5/2)^+$ |
| 2482(8) | - | 3923,7(12) | - |
| 2656(10) | - | 3960(8) | $1/2^+$ |
| 2729(5) | - | 4068(1) | - |
| 2758(8) | $(7/2, 9/2)^+$ | - | - |

Table 6

Energies and intensities of gamma lines from ⁹⁵Zr decay and internal conversion coefficients

| E_γ, keV | I_γ (photons /100 decay events) | α_K | K/LM |
|-----------------|---|-------------|--------|
| 234,79(11) | 0,25(2) | 2,30(11) | 4,5(1) |
| 724,23(4) | 44,0(4) | 0,00146(9) | 7(2) |
| 756,76(4) | 54,9(4) | 0,00137(15) | 6(1) |

Table 7

Energies and intensities of β^- transitions
from ^{95}Zr decay

| Number | E_β , keV | I_β , % |
|--------|--------------------|-----------------|
| 1 | 250(30) | |
| 2 | 361(3) B) | 48(5) H) |
| | 364,5 Π) | 54,9 Π) |
| 3 | 398(4) B) | 44,5(10) H) |
| | 397,1 Π) | 44,0 Π) |
| 4 | 886,5(11) | 1,04(5) |
| 5 | 1121(4) B) | 0,10(3) Π) |
| | 1121,3(15) Π) | |

Table 8

^{95}Nb levels

| $E_{\text{lev.}}$, keV | Spin, parity | $E_{\text{lev.}}$, keV | Spin, parity | $E_{\text{lev.}}$, keV | Spin, parity |
|-------------------------|------------------|-------------------------|------------------|-------------------------|-----------------|
| 0 | $9/2^+$ | 1913(5) | $(3/2, 5/2)^+$ | 2967(5) | $(3/2, 5/2)^+$ |
| 234,79(11) | $1/2^-$ | 1980(25) | $3/2^-$ Th | 3110(20) | - |
| 724,23(4) | $7/2^+$ | 2070(5) | $(3/2, 5/2)^+$ | 3510(20) | - |
| 728(3) | $(3/2, 5/2)^+$ | 2100(20) | - | 3900(20) | - |
| 756,76(4) | $7/2^+$ | 2121(5) | $(3/2, 5/2)^+$ | 4050(20) | - |
| 797(3) | $(1/2, 3/2)^-$ | 2165(5) | $(3/2, 5/2)^+$ | 4160(20) | - |
| 820(20) | - | 2328(12) | $(3/2, 5/2)^+$ | 4360(20) | - |
| 1000(4) | - | 2373(5) | $(1/2^+)$ | 4520(20) | - |
| 1223,2) | $(3/2)^-$ | 2406(5) | $(3/2^+, 5/2^+)$ | 4610(20) | - |
| 1274(3) | $(1/2, 3/2)^-$ | 2431(5) | $(3/2^+, 5/2^+)$ | 4830(20) | - |
| 1430(20) | - | 2481(12) | $5/2$ Th | 5200(20) | - |
| 1590(5) | $(3/2, 5/2)^+$ | 2540(20) | - | 5360(20) | - |
| 1642(6) | $(1/2^-, 3/2^-)$ | 2660(20) | - | 5770(20) | - |
| 1720(20) | - | 2787(7) | $5/2^-$ Th | | |
| 1810(2) | $(3/2, 5/2)^+$ | 2920(20) | - | | |

Table 9

Energies and intensities of gamma lines
from ^{95m}Nb decay

| E_γ , keV | | I_γ , % per ^{95m}Nb decay event | Comments |
|------------------|----|---|--------------------------------|
| 204,1(5) | Ta | 0,5(1) | Transition to ^{95}Mo |
| 234,79(11) | W | 84 | Isomeric transition |

Table 10

Energies and intensities of β^- transitions
from ^{95}Nb decay

| E_β , keV | | I_β , % | |
|-----------------|----|---------------|----|
| 955,5 | Ta | 0,5(1) | Ta |
| 1159,6 | Ta | 5,5(4) | Ta |

Table 11

Energies and intensities of gamma lines and internal
conversion electrons from ^{95}Nb decay (%/decay event);
internal conversion coefficients

| E_γ , keV | I_γ | $I_K \cdot 10^3$ | $\alpha_K \cdot 10^3$ |
|------------------|------------|------------------|-----------------------|
| 204,1(5) | 0,028(8) | 1,3(4) | 46 |
| 561,7(10) | 0,011(3) | 0,033(7) | 2,9 |
| 765,83(3) | 99,81 | 130 | 1,19(7) |

Table 12

Energies and intensities of β^- transitions
from ^{95}Nb decay

| E_β , keV | | I_β , % | |
|-----------------|----|---------------|----|
| 160 | Ta | 99,95 | Ta |
| 720,7 | Ta | 0,02 | Ta |
| 924,8 | Ta | 0,03 | Ta |

Table 13
Lifetimes of ^{95}Tc and ^{95}Mo levels

| ^{95}Tc | | | ^{95}Mo | | |
|-----------------------|------------------|-----------------------------|-----------------------|--------------|----------------|
| $E_{\text{lev.}}$ keV | Spin, parity | $T_{1/2} \cdot 10^{15}$, s | $E_{\text{lev.}}$ keV | Spin, parity | $T_{1/2}$, ns |
| 646,49 | $3/2^-$ | 630^{+1300}_{-270} | 204,116 | $3/2^+$ | 1,08(2) |
| 882,14 | $13/2^+$ | 1700^{+1500}_{-700} | 786,179 | $1/2^+$ | 6,5 |
| 927,82 | $3/2^+$ | ≥ 850 | 947,78 | $9/2^+$ | 3,7(4) |
| 957,07 | $11/2^+$ | 1900^{+700}_{-400} | 1039,22 | $1/2^+$ | 0,62 |
| 1084,94 | $5/2^+$ | ≥ 500 | 1073,94 | $7/2^+$ | 0,64 |
| 1178,59 | $7/2^+$ | 530^{+270}_{-130} | | | |
| 1214,53 | $8/2^+$ | ≥ 900 | | | |
| 1281,46 | $7/2^+$ | 194^{+100}_{-54} | | | |
| 1307,18 | $11/2^+$ | 250^{+400}_{-300} | | | |
| 1433,15 | $5/2^+$ | 82^{+10}_{-8} | | | |
| 1618,47 | - | 332^{+250}_{-96} | | | |
| 1691,25 | $(5/2^+, 7/2^+)$ | 196^{+42}_{-29} | | | |
| 1746,98 | $(5/2^+, 7/2^+)$ | 64^{+11}_{-9} | | | |
| 1785,18 | $(7/2^+, 5/2^+)$ | 58^{+7}_{-6} | | | |
| 1978,56 | $(5/2^+, 7/2^+)$ | 57^{+13}_{-10} | | | |
| 2085,97 | $(3/2^+)$ | 49^{+23}_{-15} | | | |
| 2168,12 | $(5/2^+, 7/2^+)$ | 72^{+15}_{-12} | | | |
| 2189,05 | $(5/2^+, 7/2^+)$ | 53^{+17}_{-12} | | | |
| 2267,54 | $(5/2^+, 7/2^+)$ | 315^{+750}_{-152} | | | |

Table 14

Energies and intensities
of gamma lines from ^{95}Rh
decay

| E_γ , keV | I_γ (photons/100 decay events) | $E_{\text{init.}} - E_{\text{fin.}}$ |
|------------------|--|--------------------------------------|
| 229,3(3) | 2,3(2) | 2258,9-2029,6 |
| 401,2(3) | 0,49(9) | 2431,0-2029,6 |
| 410,3(3) | 1,10(12) | 1352,0-941,6 |
| 622,5(5) | 2,70(24) | 2117,2-1494,7 |
| 661,0(3) | 1,54(13) | 2690,6-2029,6 |
| 677,6(3) | 5,8(3) | 2029,6-1352,0 |
| 764,4(7) | 2,2(4) | 2117,2-1352,0 |
| 895,0(3) | 1,71(15) | 2246,8-1352,0 |
| 906,9(3) | 0,61(7) | 2258,9-1352,0 |
| 941,6(3) | 71,7(7) | 941,6-0 |
| 1079,3(3) | 1,33(12) | 2431,0-1352,0 |
| 1175,4(6) | 1,6(3) | 2117,2-941,6 |
| 1292,5(3) | 0,39(5) | 3551,1-2258,9 |
| 1305,1(3) | 1,79(12) | 2246,8-941,6 |
| 1317,0(3) | 3,01(24) | 2258,9-941,6 |
| 1326,6(3) | 0,79(8) | 3356,5-2029,6 |
| 1339,0(5) | 0,72(15) | 2690,6-1352,0 |
| 1352,0(3) | 20,9(8) | 1352,0-0 |
| 1378,5(3) | 0,55(6) | - |
| 1489,3(3) | 3,44(24) | 2431,0-941,6 |
| 1494,7(3) | 5,08(3) | 1494,7-0 |
| 1524,5(5) | 2,4(3) | - |
| 1549,9(3) | 0,43(7) | - |
| 1749,5(3) | 0,65(8) | 3779,0-2029,6 |
| 1925,3(3) | 0,78(8) | - |
| 2121,0(3) | 1,61(12) | 3062,9-941,6 |
| 2155,7(3) | 0,79(19) | - |
| 2609,3(3) | 0,68(8) | 3551,1-941,6 |
| 2791,8(3) | 2,44(16) | 3733,4-941,6 |
| 3041,7(5) | 0,47(5) | - |
| 3063,2(5) | 1,00(11) | 3062,9-0 |
| 3551,1(7) | 0,36(6) | 3551,1-0 |
| 3733,5(10) | 0,36(6) | 3733,5-0 |
| 3778,9(10) | 0,65(12) | 3778,9-0 |

Table 15

Energies and intensities of
gamma lines from $^{95\text{m}}\text{Rh}$ decay

| E_γ , keV | I_γ (photons/100 decay events) | $E_{\text{init.}} - E_{\text{fin.}}$ |
|------------------|--|--------------------------------------|
| 543,3(3) | 88(5) | 543,3-0 ^{*)} |
| 783,7(4) | 8,5(11) | 783,7-0 |
| 2821,0(8) | 0,88(14) | - |
| 3186,2(8) | 0,97(25) | 3186,2-0 |
| 3407,1(5) | 2,2(3) | 3407,1-0 |
| 3824,4(7) | 1,4(3) | 3824,4-0 |

*) Isomeric transition to the ground-
state of ^{95}Rh

Table 16

Energies and intensities of K capture
events in $^{95\text{m}}\text{Rh}$ decay

| E , keV | I , % | $\lg ft$ |
|-----------|---------|----------|
| 1826 | 1,3 | 4,8 |
| 2243 | 2,0 | 4,8 |
| 2464 | 0,9 | 5,4 |
| 4867 | 7,7 | 6,1 |

Table 17

Energies and intensities of K capture events in ^{95}Rh decay

| E , keV | I , % | $lgft$ |
|-----------|---------|--------|
| 1331 | 1,3 | 4,9 |
| 1377 | 2,8 | 4,6 |
| 1559 | 1,5 | 4,9 |
| 1754 | 1,2 | 5,2 |
| 2047 | 2,7 | 5,1 |
| 2419 | 1,7 | 5,6 |
| 2679 | 5,2 | 5,3 |
| 2851 | 5,4 | 5,4 |
| 2863 | 3,5 | 5,6 |
| 2993 | 6,5 | 5,5 |
| 3080 | 0,1 | - |
| 3615 | 2,4 | 6,4 |
| 3758 | 9,6 | 5,9 |
| 4168 | 56,0 | 5,3 |

Table 18

^{95}Ru levels

| E_{lev} , keV | Spin, parity | E_{lev} , keV | Spin, parity |
|------------------------|--------------------------|------------------------|-------------------|
| 0 | $5/2^+$ | 2690,6 | $(9/2^+, 11/2^+)$ |
| 783,7 | $1/2^+$ | 3062,9 | $(7/2^+, 9/2)$ |
| 941,6 | $7/2^+$ | (3356,5) | |
| 1352,0 | $9/2^+$ | 3407,1 | $3/2^-$ |
| 1494,7 | $(7/2^+, 9/2^+)$ | 3551,1 | $(7/2^+, 9/2^+)$ |
| 2029,6 | $(13/2^+)$ | 3733,4 | $(7/2^+, 9/2^+)$ |
| 2117,2 | $9/2^+$ | (3779,0) | $(7/2^+, 9/2^+)$ |
| 2246,8 | $(7/2^+, 9/2^+, 11/2^+)$ | (3824,4) | $(3/2^-)$ |
| 2258,9 | $(9/2^+, 11/2^+)$ | 3186,2 | $3/2^-$ |
| 2431,0 | $(9/2^+, 11/2^+)$ | | |

Note: Lederer et al. [77] and Levon et al. [137] have found a level with $E_{\text{lev}} = 2279$ keV, $T_{1/2} = 8.3(10)$ ns, spin and parity $17/2^+$.

Table 19

Energies and intensities of β^+ transitions from ^{95}Ru decay

| E_{β^+} , keV | I_{β^+} , % |
|---------------------|-------------------|
| 1234(16) | 15,6(6) |
| 833(60) | 1,3(3) |

Table 20

Energies and intensities of K capture events in ^{95}Ru decay (calculated $lgft$ values)

| E , keV | I , % | $lgft$ | E , keV | I , % | $lgft$ |
|-----------|----------|--------|-----------|-----------|--------|
| 2256 | 26,5(20) | 5,92 | 613 | 3,52(18) | 4,50 |
| 1965 | 6,46(10) | 6,38 | 506 | 4,36(16) | 4,03 |
| 1664 | 1,1(1) | 7,54 | 424 | 1,85(17) | 4,06 |
| 1507 | 0,55(17) | 7,02 | 406 | 1,51(6) | 4,06 |
| 1413 | 5,6(5) | 5,89 | 340 | 0,45(5) | 4,25 |
| 1159 | 22,2(9) | 4,91 | 324 | 1,19(3) | 3,73 |
| 901 | 1,55(6) | 5,59 | 267 | 2,15(29) | 3,09 |
| 845 | 3,8(3) | 5,15 | 182 | 0,075(15) | 3,78 |
| 807 | 1,6(2) | 5,49 | | | |

Table 21

Energies and intensities of gamma lines from ^{95}Ru decay

| E_{γ} , keV | I_{γ} (photons/100 decay events) | $E_{\text{init.}}$ $E_{\text{fin.}}$ | E_{γ} , keV | I_{γ} (photons/100 decay events) | $E_{\text{init.}}$ $E_{\text{fin.}}$ |
|--------------------|---|--------------------------------------|--------------------|---|--------------------------------------|
| 254,58(8) | 0,25(3) | 1433,14-1178,59 | 1178,58(2) | 4,6(4) | 1178,59-0 |
| 290,37(3) | 4,03(10) | 626,82-336,42 | 1182,60(13) | 0,25(7) | 2267,54-1084,94 |
| 301,00(3) | 2,38(10) | 927,82-626,82 | 1240,53(20) | 0,06(3) | 2168,12-927,82 |
| 336,431(20) | 75,5(9) | 336,42-0 | 1261,33(7) | 0,32(2) | 2189,05-927,82 |
| 348,21(7) | 0,23(3) | 1433,14-1084,94 | 1339,73(10) | 0,24(2) | 2267,54-927,82 |
| 505,2(2) | 0,17(10) | 1433,14-927,82 | 1351,80(20) | 0,75(4) | 1978,56-626,82 |
| 551,71(4) | 1,69(8) | 1178,59-626,82 | 1355,00(20) | 0,71(11) | 1691,25-336,42 |
| 591,47(3) | 1,25(5) | 927,82-336,42 | 1410,59(5) | 2,35(8) | 1746,98-336,42 |
| 607,59(8) | 0,20(3) | 646,49-38,92 | 1433,16(5) | 0,54(4) | 1433,16-0 |
| 626,84(3) | 17,0(13) | 626,82-0 | 1448,86(11) | 0,13(2) | 1785,18-336,42 |
| 652,75(3) | 1,02(4) | 2085,97-1433,14 | 1459,15(4) | 2,01(2) | 2085,97-626,82 |
| 711,61(3) | 0,18(2) | - | 1541,35(8) | 0,23(2) | 2168,12-626,82 |
| 734,85(9) | 0,46(3) | 2168,12-1433,14 | 1562,17(7) | 0,14(1) | 2189,05-626,82 |
| 748,54(3) | 1,6(3) | 1084,94-336,42 | 1625,1(3) | 0,08(4) | 2251,99-626,82 |
| 755,82(4) | 0,24(2) | 2189,05-1433,14 | 1642,0(2) | 0,080(9) | 1978,56-336,42 |
| 806,30(3) | 3,79(15) | 1433,14-626,82 | 1691,33(6) | 0,092(6) | 1691,25-0 |
| 819,12(7) | 0,62(3) | 1746,98-927,82 | 1697,5(2) | 0,11(1) | 2324,5-626,82 |
| 842,16(3) | 1,15(8) | 1178,59-336,42 | 1747,0(2) | 0,03(1) | 1746,98-0 |
| 876,80(5) | 0,23(4) | - | 1785,16(9) | 0,55(5) | 1785,18-0 |
| 888,91(4) | 1,68(8) | 927,82-38,92 | 1831,9(2) | 0,20(2) | 2168,12-336,42 |
| 893,71(16) | 0,30(8) | 1978,56-1084,94 | 1852,65(9) | 0,11(1) | 2189,05-336,42 |
| 989,771(16) | 0,65(3) | 2168,12-1178,59 | 1931,09(7) | 0,27(3) | 2267,54-336,42 |
| 1010,50(4) | 0,68(3) | 2189,05-1178,59 | 1988,07(9) | 0,60(5) | 2324,50-336,42 |
| 1050,72(3) | 2,36(21) | 1978,56-927,82 | 2046,97(8) | 0,33(2) | 2085,97-38,92 |
| 1064,39(3) | 0,66(4) | 1691,25-626,82 | 2168,2(2) | 0,03(1) | 2168,12-0 |
| 1088,90(6) | 0,30(3) | 2267,54-1178,59 | 2189,01(5) | 0,03(1) | 2189,05-0 |
| 1096,75(3) | 18,8(5) | 1433,14-336,42 | 2267,56(12) | 0,076(6) | 2267,54-0 |
| 1120,13(5) | 0,85(4) | 1746,98-626,82 | 2252,05(7) | 0,33(3) | 2251,99-0 |
| 1158,370(23) | 0,98(11) | 1785,18-626,82 | 2324,56(6) | 1,23(10) | 2324,5-0 |
| 1158,370(23) | 0,45(2) | 2085,97-1084,94 | 2410,2(3) | 0,08(2) | 2409,8-0 |

Table 22

⁹⁵Tc levels

| E _{lev.} , keV | Spin, parity | E _{lev.} , keV | Spin, parity |
|-------------------------|-------------------|-------------------------|--|
| 0 | 9/2 ⁺ | 1433,14(2) | 5/2 ⁺ |
| 38,92(4) | 1/2 ⁻ | 1691,25(3) | (5/2 ⁺ , 7/2 ⁺) |
| 336,42(2) | 7/2 ⁺ | 1746,98(4) | (5/2 ⁺ , 7/2 ⁺) |
| 626,82(2) | 5/2 ⁺ | 1785,18(3) | (7/2 ⁺ , 5/2 ⁺) |
| 646,49(3) [*] | 3/2 ⁻ | 1978,56(3) | (5/2 ⁺ , 7/2 ⁺) |
| 667,79(8) [*] | 5/2 ⁻ | 2085,96(3) | (3/2 ⁺) |
| 882,14(3) [*] | 13/2 ⁺ | 2168,12(3) | (5/2 ⁺ , 7/2 ⁺) |
| 927,82(2) | 3/2 ⁺ | 2189,05(3) | (5/2 ⁺ , 7/2 ⁺) |
| 957,07(6) [*] | 11/2 ⁺ | 2251,99(3) | (7/2 ⁺ , 5/2 ⁺) |
| 1084,94(2) | 5/2 ⁺ | 2267,54(3) | (5/2 ⁺ , 7/2 ⁺) |
| 1178,59(2) | 7/2 ⁺ | 2324,50(4) | (7/2 ⁺ , 5/2 ⁺) |
| 1213,10(4) [*] | 9/2 ⁺ | 2409,8(2) | (7/2 ⁺ , 5/2 ⁺) |
| 1214,53(2) [*] | 7/2 ⁻ | 1618,47(4) [*] | - |
| 1281,46(2) [*] | 7/2 ⁺ | 1639,39(5) [*] | - |
| 1307,18(3) [*] | 11/2 ⁺ | - | - |

^{*}) Levels found only in reactions

Table 23

Energies and intensities of K capture events in ⁹⁵Tc decay

| E, keV | I, % |
|--------|---------|
| 924 | 93(4) |
| 742 | 1,83(9) |
| 616 | 4,5(3) |
| 138 | 0,3(2) |

Table 24

Energies and intensities of β⁺ decay and K capture events in ^{95m}Tc decay

| E _{ec} , keV | I _{ec} , % | E _{β⁺} , keV | I _{β⁺} , % |
|-----------------------|---------------------|----------------------------------|--------------------------------|
| 1729 | 11,2(24) | 707(5) | 0,17 |
| 1525 | 7,4(2) | 504(5) | 0,14 |
| 943 | 40,1(13) | - | - |
| 908 | 6,4(3) | - | - |
| 690 | 30,8(13) | - | - |
| 673 | 0,04(2) | - | - |
| 303 | 0,01 | - | - |
| 109 | 0,05(2) | - | - |

Table 25

Energies and intensities of gamma lines from ⁹⁵Tc and ^{95m}Tc decay

| ⁹⁵ Tc | | ^{95m} Tc | |
|----------------------|---|----------------------|---|
| E _γ , keV | I _γ (photons/100 decay events) | E _γ , keV | I _γ (photons/100 decay events) |
| 204,116(5) | 0,30(3) | 204,116(5) | 64,8(15) |
| 604,16(2) | 0,18(2) | 219,02(14) | 0,065(14) |
| 765,81(4) | 93,0(9) | 253,00(3) | 0,66(5) |
| 869,9(5) | 0,32(3) | 582,07(2) | 32,2(12) |
| 947,76(6) | 2,5(3) | 616,45(3) | 1,21(9) |
| 1073,96(6) | 4,1(4) | 786,17(13) | 9,0(4) |
| 1551,98(5) | 0,3(2) | 820,606(11) | 4,9(3) |
| - | - | 835,119(19) | 27,0(11) |
| - | - | 1039,240(15) | 2,94(13) |
| - | - | 1057,00(5) | 0,04 |
| - | - | 1222,24(16) | 0,01 |
| - | - | 1620,07(6) | 0,05(2) |

Table 26
 ^{95}Mo levels

| $E_{\text{lev.}}, \text{keV}$ | Spin, parity | $E_{\text{lev.}}, \text{keV}$ | Spin, parity |
|-------------------------------|------------------|-------------------------------|------------------|
| 0 | $5/2^+$ | 1039,22(2) | $1/2^+$ |
| 204,12(1) | $3/2^+$ | 1056,99(4) | $(3/2^+, 5/2^+)$ |
| 765,82(2) | $7/2^+$ | 1073,94(6) | $7/2^+$ |
| 786,179(12) | $1/2^+$ | 1426,4(3) | $(5/2^+)$ |
| 820,606(11) | $(3/2^+, 5/2^+)$ | 1551,98(5) | $(9/2^+)$ |
| 947,78(8) | $9/2^+$ | 1620,4(8) | $(3/2^+)$ |

Table 27

Gamma transition energies, conversion electron intensities and ^{95}Mo internal conversion coefficients in ^{95}Tc decay

| E_{γ}, keV | $\alpha_K \cdot 10^3$ | $I_K, \%$ | Multipolarity |
|--------------------------|-----------------------|------------|----------------------------------|
| 204,116(5) | 46,0 (T) | 3,1(3) | $M1 + (27 \pm 3) \% E2$ |
| 219,00(15) | 40(1) | 0,012(1) | $M1 + (30 \leq E2 \leq 99,7) \%$ |
| 253,00(3) | 18(1) | 0,003(1) | $M1 + (< 2\%) E2$ |
| 582,07(2) | 2,39(9) | 0,077(5) | $M1 + (6,6 \pm 2,5) E2$ |
| 616,45(3) | 2,36(8) | 0,0030(3) | $M1 + (80 \pm 3) \% E2$ |
| 786,179(13) | 1,27(4) | 0,0114(12) | - |
| 820,606(11) | 1,10(6) | 0,0055(9) | - |
| 835,119(19) | 1,06(4) | 0,029(3) | $M1 + (0,14 \pm 0,11) \% E2$ |
| 1039,240(15) | 0,63(3) | - | - |
| 1222,4(5) | 0,50(25) | - | - |
| 1620,07(6) | 0,38(8) | - | - |

Table 28

Energies and intensities of β^- transitions in ^{95}Sr decay (calculated values of $\lg ft$)

| E_{β}, keV | $I_{\beta}, \%$ | $\lg ft$ |
|-------------------------|-----------------|----------|
| 6110 | 52,9 | 6,18 |
| 5424 | 12,74 | 6,57 |
| 5283 | 3,04 | 7,14 |
| 4479 | 1,84 | 7,03 |
| 4147 | 2,19 | 6,81 |
| 4063 | 0,94 | 7,14 |
| 3427 | 1,25 | 6,69 |
| 3403 | 0,24 | 7,40 |
| 3393 | 5,40 | 6,04 |
| 3362 | 0,34 | 7,22 |
| 3328 | 1,28 | 6,63 |
| 3219 | 0,97 | 6,68 |
| 3177 | 8,36 | 5,26 |
| 3003 | 0,59 | 6,77 |
| 2767 | 1,56 | 6,2 |
| 2619 | 0,82 | 6,37 |
| 2504 | 1,83 | 5,94 |
| 2377 | 0,88 | 6,17 |
| 2045 | 1,30 | 5,73 |
| 1852 | 0,49 | 5,97 |

Table 29

Energies and intensities of β^- transitions in ^{95}Y , ^{95}Zr and ^{95}Nb decay

| E_{β} , keV | I_{β} , % | $lgft$ | E_{β} , keV | I_{β} , % | $lgft$ |
|-------------------|-----------------|--------|-------------------|-----------------|--------|
| ^{95}Y | | | ^{95}Zr | | |
| 4430 | 75 | 7,29 | 250 | | |
| 3476 | 2,6 | 7,82 | 364,5 | 54,9 | 6,74 |
| 3106 | 0,3 | 8,55 | 397,1 | 44,0 | 6,96 |
| 2811 | 0,6 | 8,07 | 886,5 | 1,04 | 9,81 |
| 2708 | 0,3 | 8,3 | 1121,3 | 0,1 | 11,21 |
| 2526 | 0,2 | 8,35 | | | |
| 2490 | 0,8 | 7,72 | ^{95m}Nb | | |
| 2474 | 0,1 | 8,61 | 955,5 | 0,5 | 9,01 |
| 2057 | 2,6 | 6,86 | 1159,6 | 5,5 | 8,29 |
| 1586 | 0,1 | 7,82 | ^{95}Nb | | |
| 1434 | 0,11 | 7,61 | | | |
| 1300 | 6,6 | 5,66 | 160 | 99,95 | 5,06 |
| 1180 | 2,5 | 5,92 | 720,7 | 0,02 | 10,95 |
| 979 | 1,1 | 5,97 | 924,8 | 0,03 | 11,17 |
| 853 | 4,0 | 5,19 | - | - | - |
| 843 | 2,1 | 5,45 | - | - | - |
| 746 | 0,12 | 6,5 | - | - | - |
| 716 | 0,14 | 6,37 | - | - | - |
| 543 | 0,09 | 6,14 | - | - | - |
| 506 | 0,06 | 6,21 | - | - | - |
| 362 | 0,06 | 5,71 | - | - | - |

Table 30

Calculated values of lg ft for ^{95}Rh and ^{95}Tc decay

| E_{α} , keV | I , % | lgft | E_{α} , keV | I , % | lgft |
|--------------------|---------|------|--------------------|---------|------|
| ^{95m}Rh | | | ^{95m}Tc | | |
| 1826 | 1,3 | 5,31 | 924 | 93 | 4,95 |
| 2243 | 2,0 | 5,52 | 742 | 1,83 | 6,24 |
| 2464 | 0,9 | 6,04 | 616 | 4,5 | 5,49 |
| 4867 | 7,7 | 6,46 | 138 | 0,3 | 3,71 |
| ^{95}Rh | | | ^{95}Tc | | |
| 1331 | 1,3 | 5,11 | 1729 | 11,2 | 8,92 |
| 1377 | 2,8 | 4,84 | 1525 | 7,4 | 8,86 |
| 1559 | 1,5 | 5,35 | 943 | 40,1 | 7,21 |
| 1754 | 1,2 | 5,67 | 908 | 6,4 | 7,93 |
| 2047 | 2,7 | 5,62 | 690 | 30,8 | 6,73 |
| 2419 | 1,7 | 6,14 | 673 | 0,04 | 9,57 |
| 2679 | 5,2 | 5,88 | 303 | 0,01 | 8,63 |
| 2851 | 5,4 | 5,98 | 109 | 0,05 | 5,84 |
| 2863 | 3,5 | 6,16 | - | - | - |
| 2993 | 6,5 | 5,98 | - | - | - |
| 3080 | 0,1 | 7,85 | - | - | - |
| 3615 | 2,4 | 6,78 | - | - | - |
| 3758 | 9,6 | 6,26 | - | - | - |
| 4168 | 56,0 | 5,7 | - | - | - |

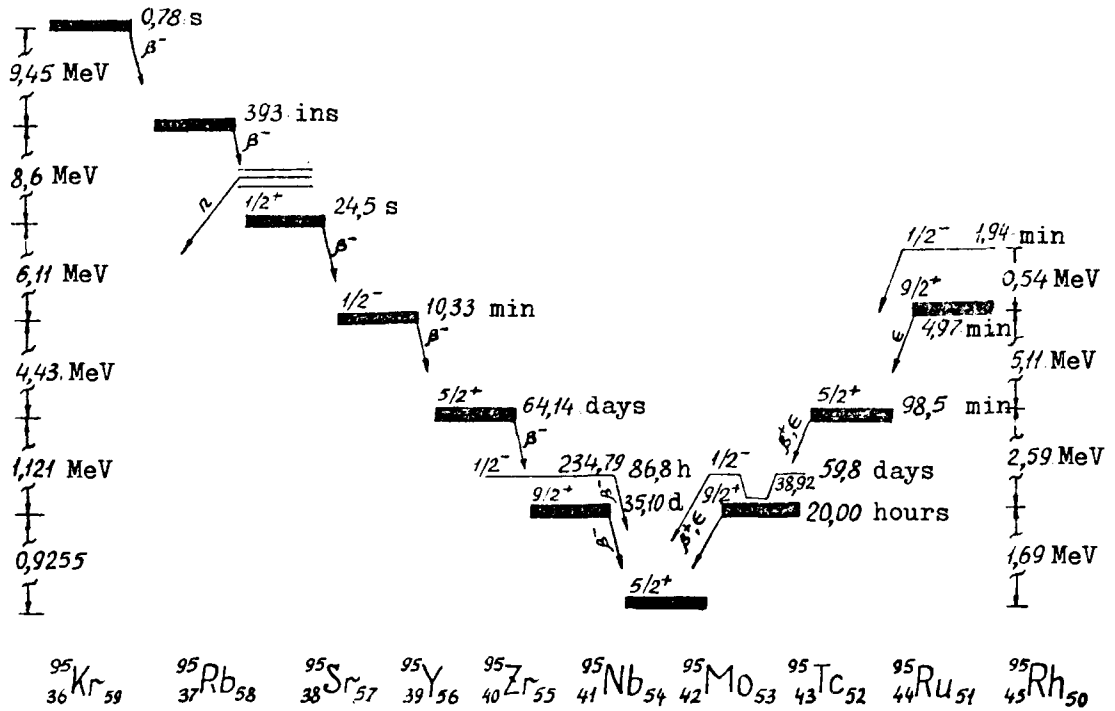


Fig. 1

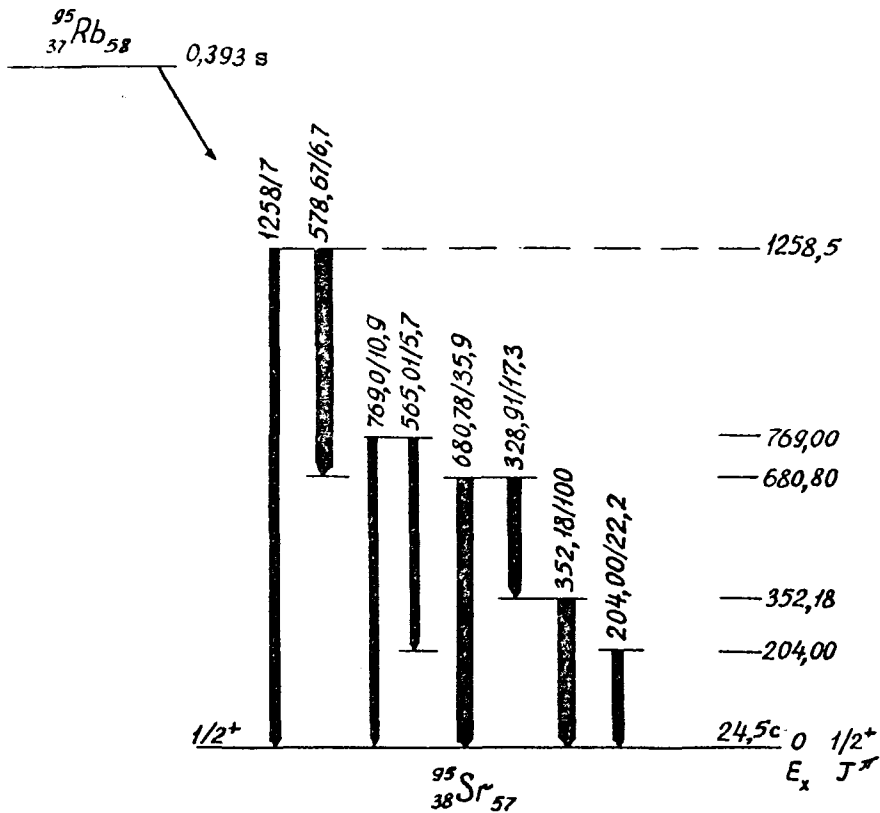


Fig. 2

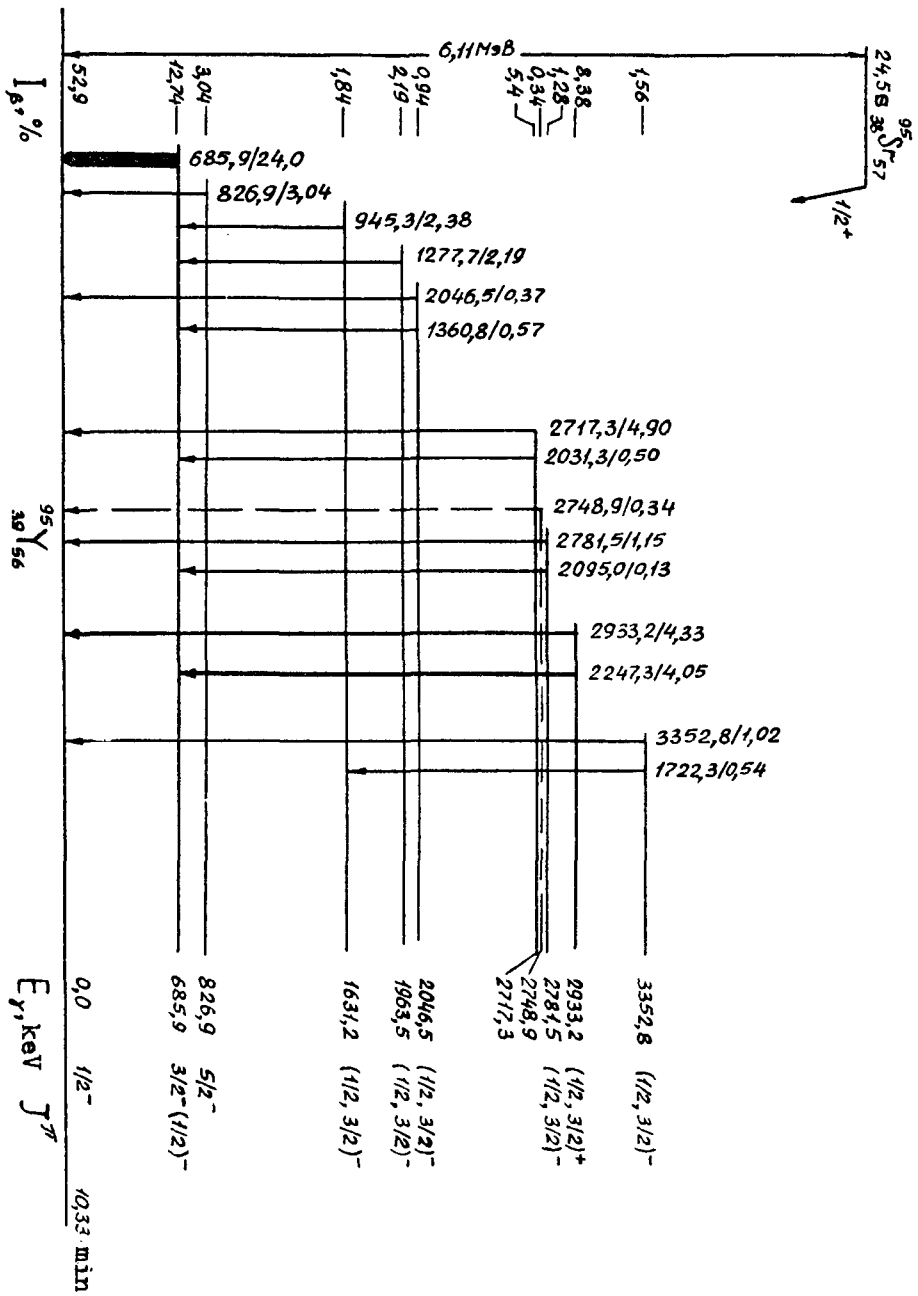


Fig. 3

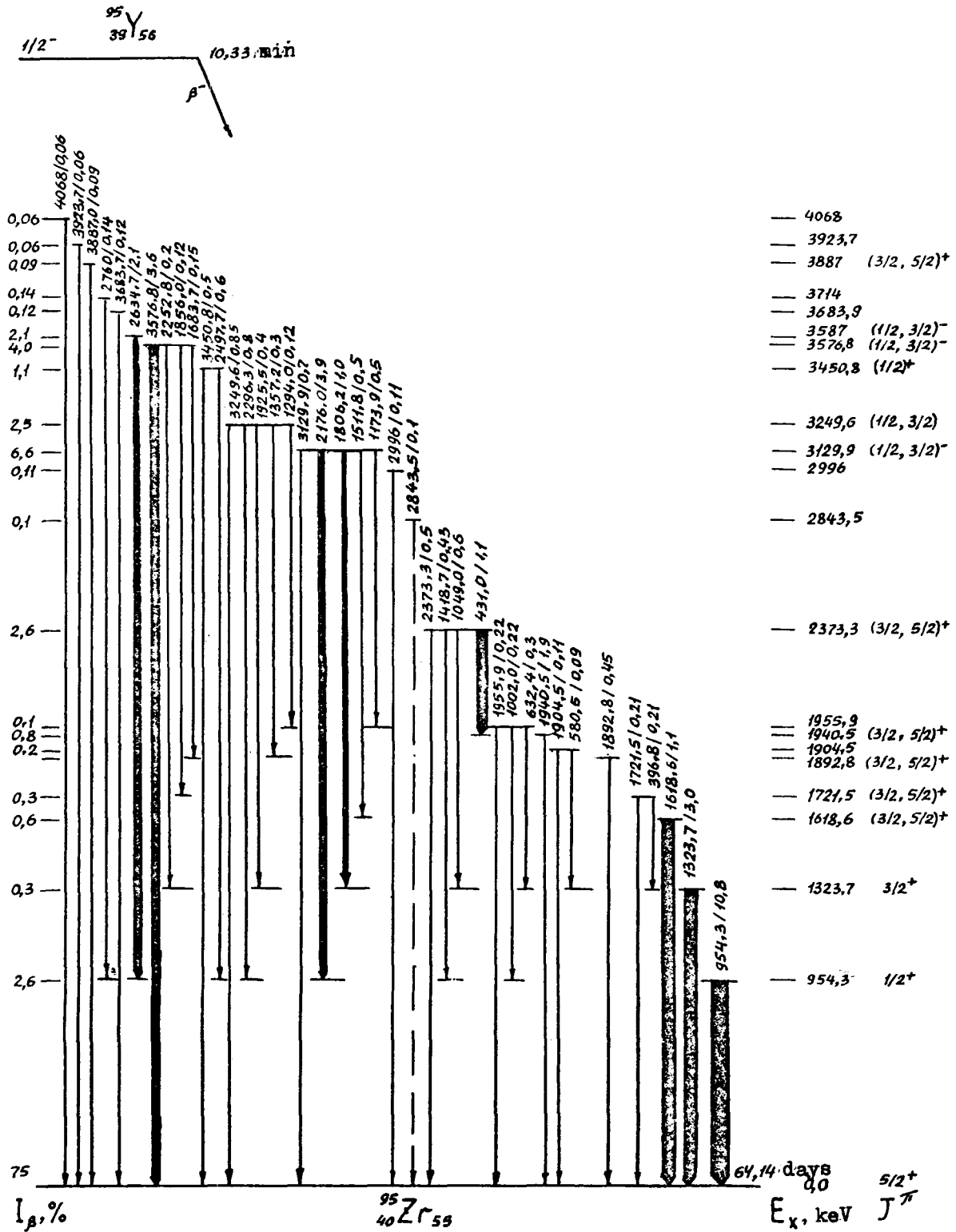


Fig. 4

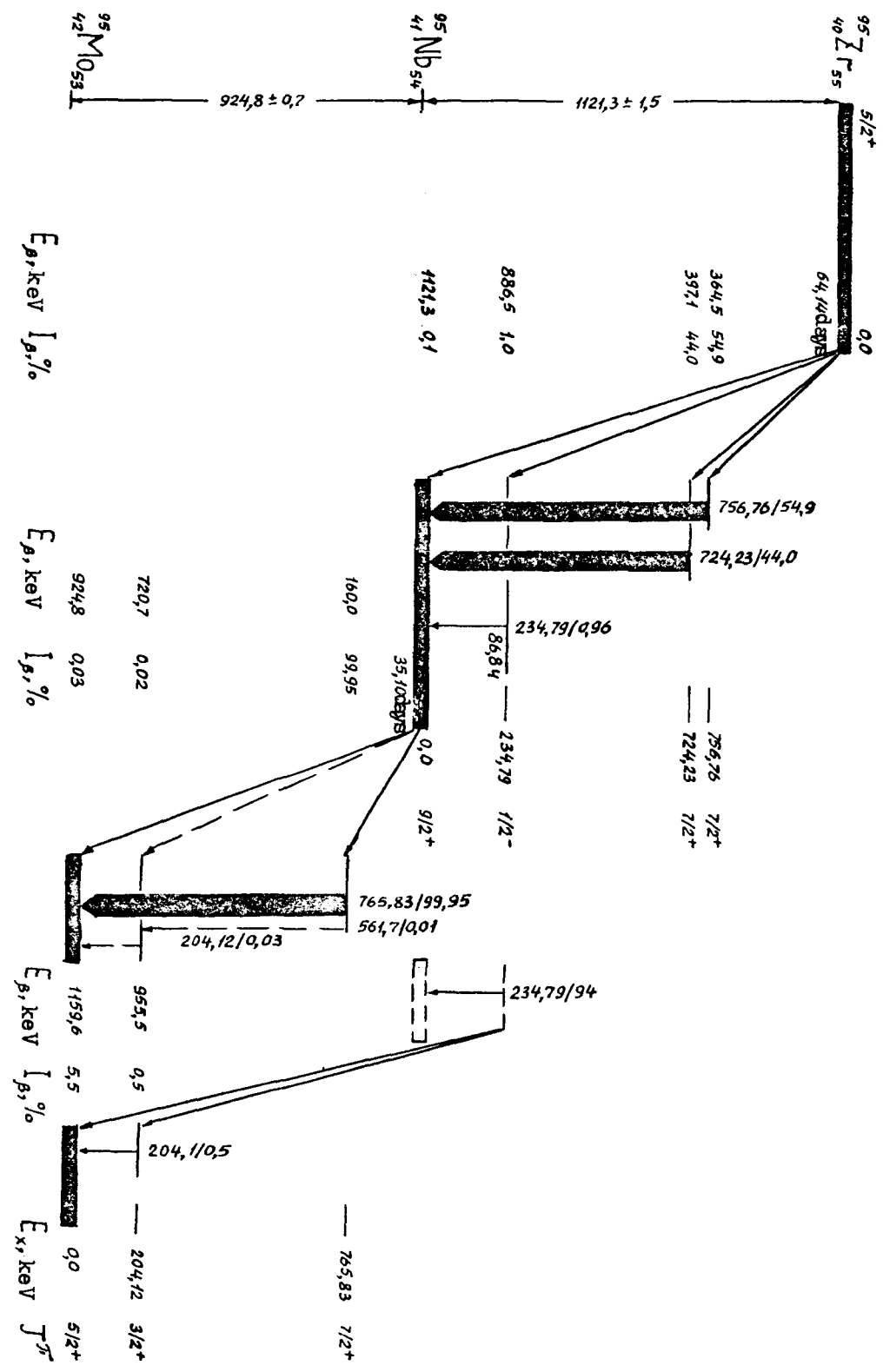


Fig. 5

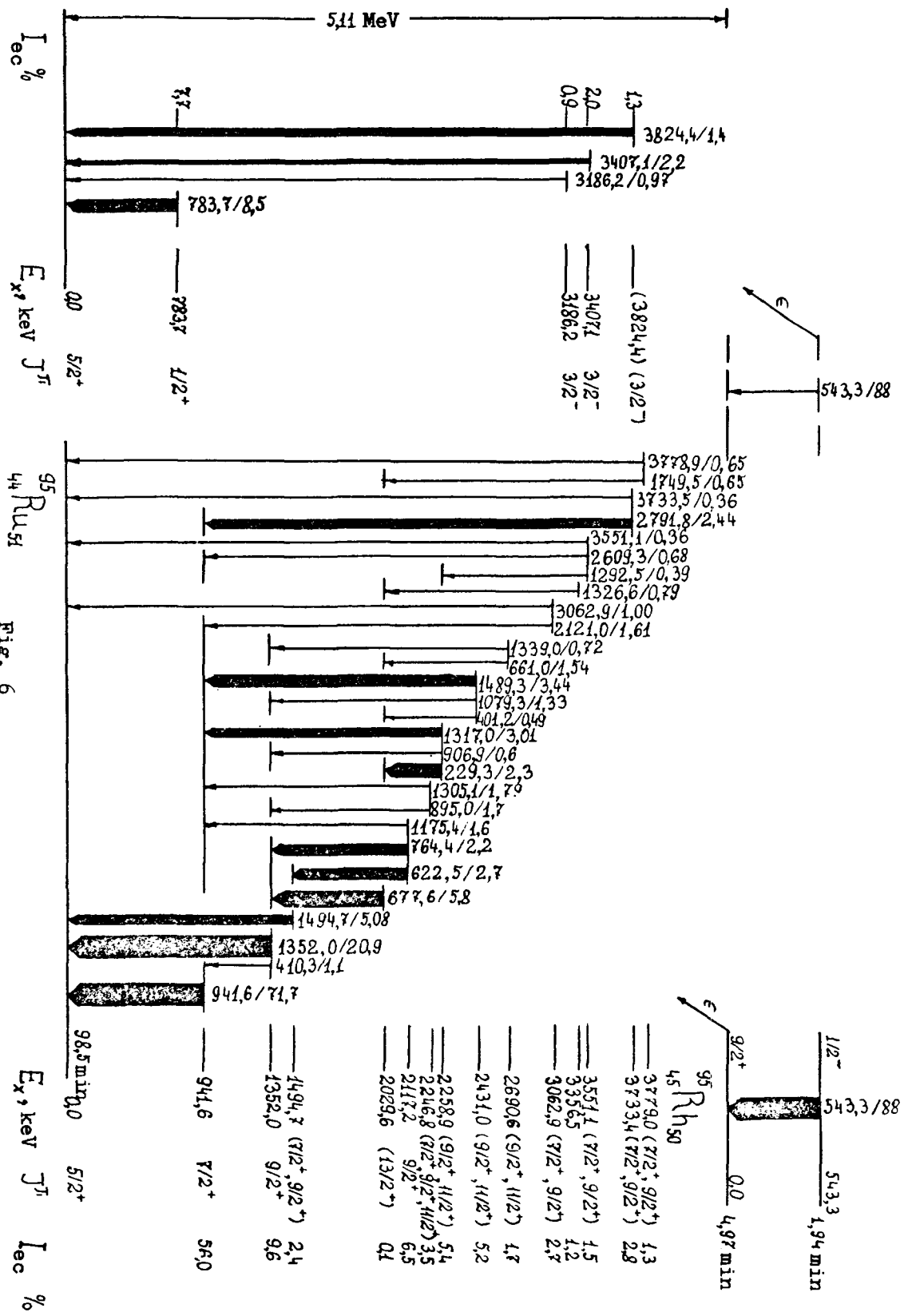


Fig. 6

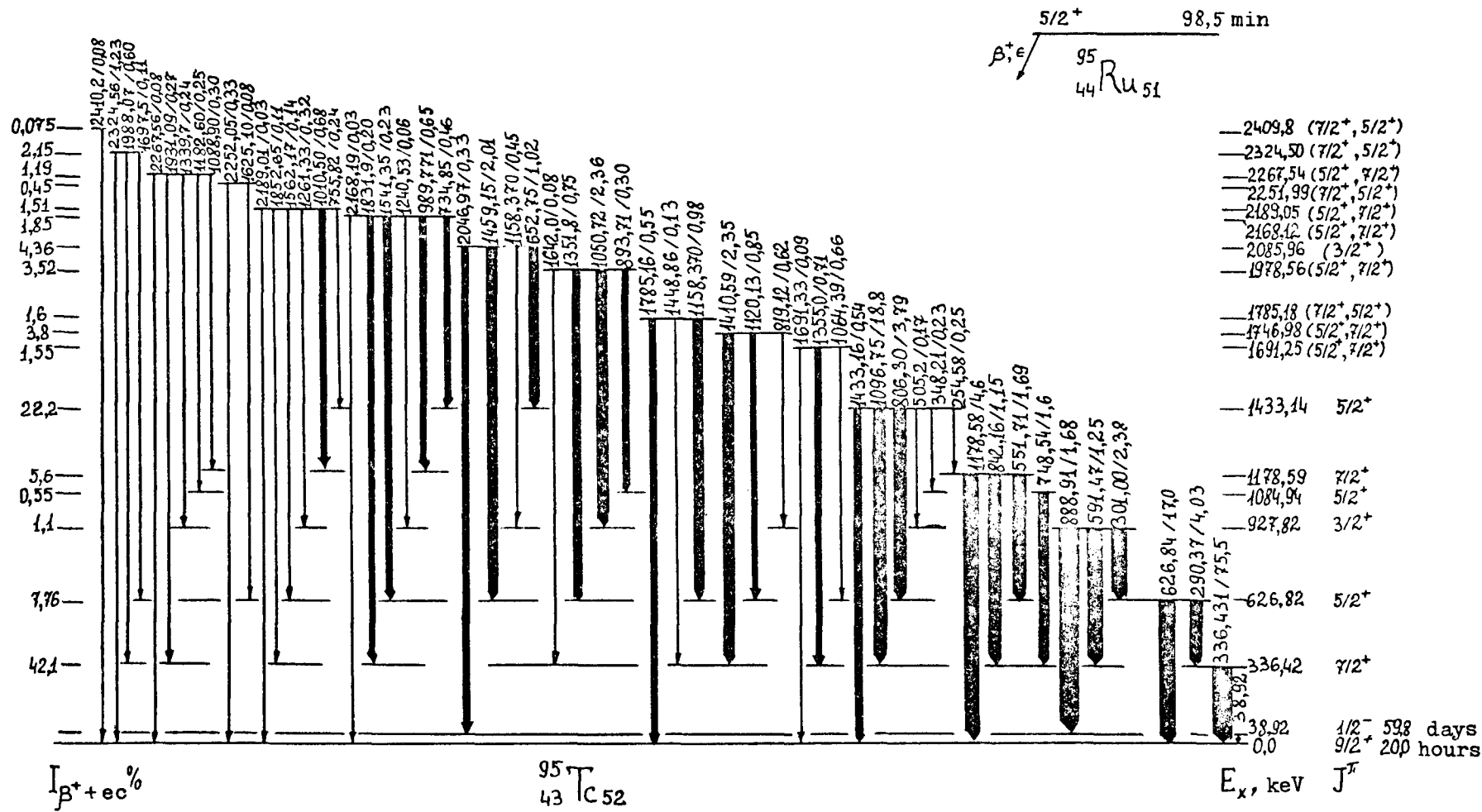


Fig. 7

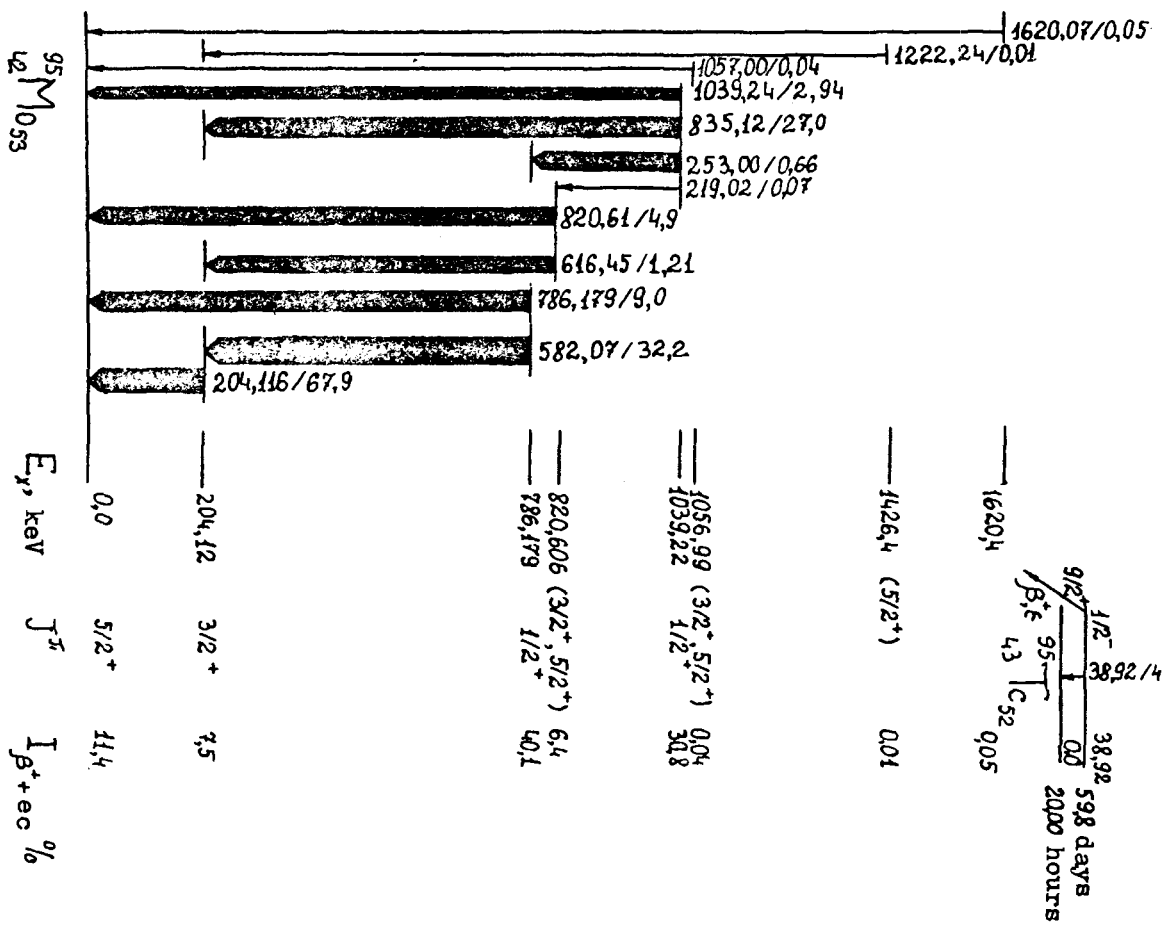
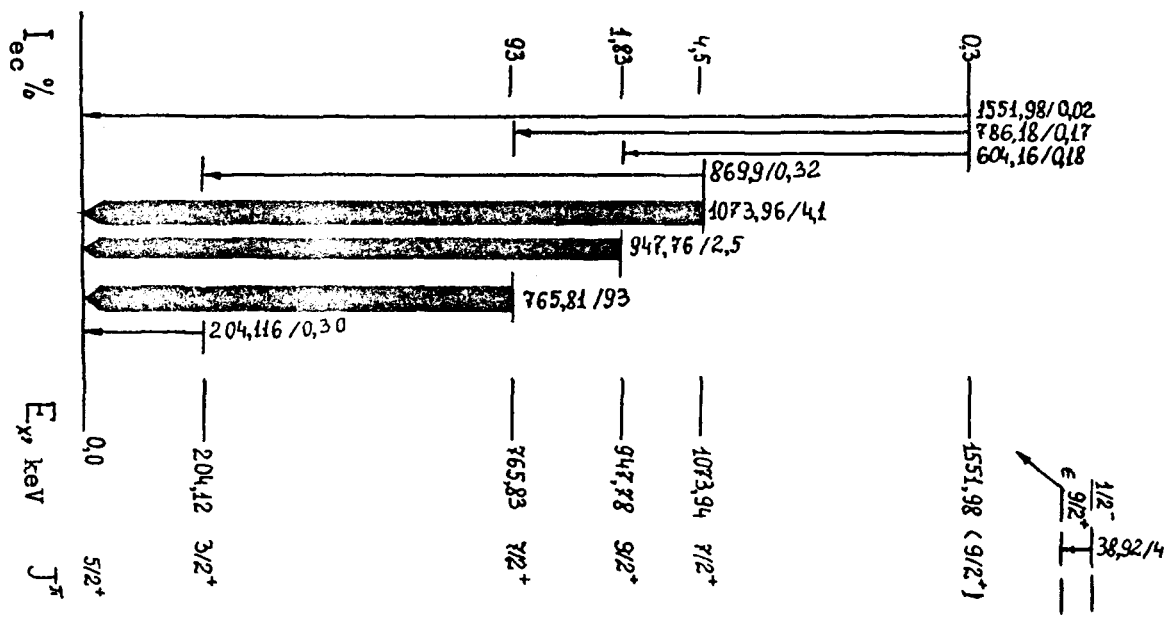


Fig. 8

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