charge Z (Moseley formula), $\delta_Z/Z_0 = \delta_E/2E_0$, where E_0 corresponds to the position of the maximum on the distribution relative to E; the values of E_0 are 16 ± 1 and 31 ± 1.5 kev, and the values of Z_0 are 40 ± 1.5 and 56 ± 1.5.

It is necessary, in the determination of δ_E, to take into account the instrument line width. Since the line shape, for a proportional counter, can be assumed Gaussian with a half-width δ_k, the connection between the value of δ_E and the experimental line width, δ_{exp}, is given by $\delta_E = (\delta_{exp}^2 - \delta_k^2)^{1/2}$. From the experimental values of δ_{exp}/E_0, 35 ± 4 and 22 ± 2 percent for the 31 and 16 kev lines respectively, and from the values of δ_k/E_0, which are 20 ± 2 and 14 ± 1 percent for the corresponding calibration lines, we get values of δ_Z/Z_0 of 14.5 ± 1.5 and 17 ± 3 percent respectively for the light and heavy group. These values are approximately the same as the known half-widths of the fragment mass distribution, which are 17% for the light group of fragments and 11.5% for the heavy one.[3]

It has been assumed in the foregoing analysis that the probability ν of emission of a K line is the same for fragments with different Z, which, in general, is not correct. In our paper devoted to the measurement of capture gamma-ray spectra,[4] we determined the yields of x-ray K radiation for several rare-earth elements:

Element	Eu_{63}	Gd_{64}	Dy_{66}	Ho_{67}	Er_{68}	Hf_{72}
Number of x-ray quanta to capture one neutron	0.34	0.15	0.15	0.8	0.45	0.39

The above data show that ν is not a monotonic function of Z, and that its deviations from the mean value reach ±70%. For fission gamma rays, ν should vary in a much narrower range than for capture gamma rays, since the fission gammas are emitted by a wide range of isotopes, while the capture gammas are emitted in most cases by essentially one isotope. Nevertheless, this factor makes it possible to consider the values obtained for the widths of the fragment charge distribution as a mere estimate.

The intensity of the 16-kev line was found to be 0.10 ± 0.03 quantum per fission. This value is obtained from the ratio of the areas under the 16 and 31 kev lines and from the value of the intensity of the 31-kev line, which is 0.42 ± 0.12, obtained with a NaI crystal.[1]

The authors express their deep gratitude to V. M. Strutinskii for valuable advice.

Note added in proof (November 26, 1958). We were recently made aware (through Dr. R. B. Litchman at the Second International Conference on Peaceful Uses of Atomic Energy, Geneva, 1958) of the results of Carter, Wagner, and Wayman, who observed in the gamma-ray spectrum of U^{235} fission (measured with a scintillation spectrometer with a NaI crystal) 18 and 32 kev peaks corresponding K-level x-rays from the fission fragments. In the spectrum measured with an argon-filled proportional counter, they found 2.1 and 3.6 kev peaks, corresponding to L-level x-rays from the fragments. No data are given on the intensities of these rays.

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[3] A. N. Murin, in Физика деления атомных ядер (Physics of Nuclear Fission), Atomizdat, M. 1957.

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CONCERNING A 100-kev TRANSITION IN THE SPECTRUM OF Ce^{144}

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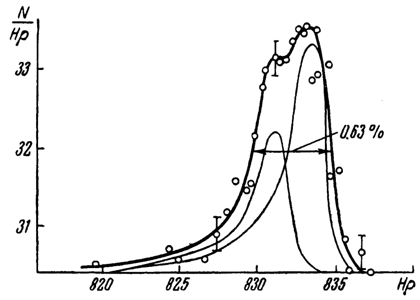
ALTHOUGH the radiation from Ce^{144} has been investigated by many authors, there is still no established $Ce^{144} - Pr^{144}$ decay scheme.

Conversion transitions between certain levels of Pr^{144} on different shells give very close electronic lines. This feature makes it difficult to interpret the conversion spectrum of Ce^{144} and makes the existence of certain transitions doubtful. In particular, there is no unequivocal answer to the question of whether a 100-kev transition is present.[1-4] This is a low-intensity transition between the 134 and 34 kev levels. The electron line observed in the Ce^{144} spectrum near 58 kev has been interpreted as either K-100 or M-59. The L line of the 100-kev transition has not been separated, since it is located near the K-134 line, which is the most intense one in the spectrum; this made the presence of this transition doubtful.

We investigated the conversion spectrum of Ce^{144} with the aid of a spiral beta spectrometer having a resolution of 0.25%.



The diagram shows the 57.7-kev conversion line. The shape of this line and the fact that its half-width (0.63%) is greater than the single lines of this spectrum* make it obvious that this is a complex line. A graphical resolution of this line yielded two components with energies 57.76 and 57.45 kev. These energy values are in good agreement with the energy values of K-100 and M-59 and confirm the presence of both transitions. We also resolved the L_1-100 line, with $E_e = 92.83$ kev. According to our data, a more exact value of the energy of the 100-kev transition is 99.7 ± 0.1 kev. From the ratio of the areas under the K and the L_1 lines we obtain a ratio $\alpha_K/\alpha_{L_1} = 3.3 \pm 0.8$ kev for the ratio of the conversion coefficient of this transition. The possible contribution of the M-95 line has been estimated by us and is included in the error. The value obtained for the ratio of the conversion coefficients corresponds to an M3 transition.[5,6]

*The 38-kev K-80 line has a half-width of 0.38%.

[1] Cork, Brice, and Schmid, Phys. Rev. **96**, 1295 (1954).

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[5] L. A. Sliv and I. M. Band, Таблицы коэффициентов внутренней конверсии (Tables of Internal Conversion Coefficients, part 1, K Shells). Acad. Sci. Press, M-L, 1956.

[6] L. A. Sliv and I. M. Band, Таблицы коэффициентов внутренней конверсии (Tables of Internal Conversion Coefficients, part 2, L Shells). Acad. Sci. Press, M-L, 1958.

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CONCERNING THE Ce^{141} DECAY SCHEME

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We have measured the γ-γ and e^--γ coincidences to improve the accuracy of the decay scheme[1-5,7,8] of Ce^{144}.

The γ-γ coincidences were measured with a scintillation coincidence spectrometer.[6] Figure 1 shows the singles spectrum for Ce^{144} and the coincidence spectrum for γ rays in the 80-kev region. Peaks corresponding to x-rays from Pr^{144} and to γ-rays with an energy ~ 53 kev were visible in the coincidence spectrum. The peak at ~ 46 kev in the coincidence spectrum corresponds to Compton electrons from 134-kev γ rays and is due to the scattering of quanta from crystal to crystal. When the analyzer window is set at the 134-kev peak, the coincidence spectrum has no noticeable peaks up to 80 kev. To determine the upper limit for the intensity of the proposed 41 to 134 kev γ-γ cascade, comparative measurements were made for Ce^{144} and Sm^{153}. It was found that

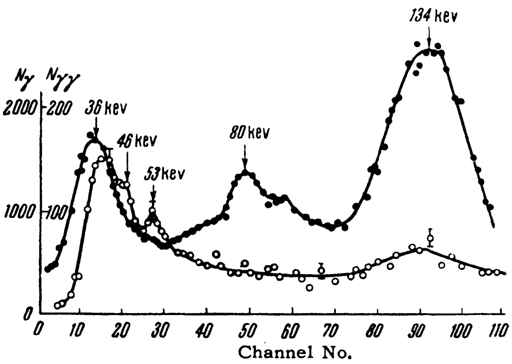

FIG. 1. ●) Singles γ-ray spectrum; ○) $\gamma-\gamma$ coincidence spectrum (with random coincidence background included).