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Summary. — An experimental arrangement, in which a proportional counter and a scintillation γ-ray spectrometer are used in coincidence, is found to be useful in investigations concerning the decay of low energy γ- or X-rays emitters. Some results which have been obtained with the described method are given.

1. - Introduction.

Proportional counters have been extensively used for low energy quanta spectrometry. In order to get information about the decay features of soft γ and X emitters, a coincidence apparatus employing a proportional counter and a single crystal γ spectrometer has been found to be useful. Owing to the fact that the collection time of the electrons in a proportional counter is less than 1 μs, reasonably fast coincidence circuits can easily be operated in connection with γ and X crystal detectors and proportional counters.

The extremely low efficiency of proportional counters for hard γ-rays and their high efficiency for radiations as soft as L X-rays and K X-rays from light elements, which are emitted in atomic rearrangements following the decay of nuclei by electron capture and internal conversion processes, made it possible to measure L-shell fluorescence yields and other data which are connected with the features of radioactive decays.
A COINCIDENCE ARRANGEMENT FOR THE DETECTION OF LOW ENERGY QUANTA

A few results will be described below. For such measurements an A–CH₄ (90% A) filled proportional counter, which was provided with a 23 mg cm⁻² polyethylene window, has been used. The diameter of the counter was 7 cm, its effective length 30 cm and the wire diameter 0.1 mm. With a total pressure of 120 cmH₂ and an applied voltage of 3200 V it operated at a multiplication factor of about 10³. The geometry of the experimental apparatus is schematically given in Fig. 1.

Fig. 1. Experimental arrangement. When convenient, the source can be located within the proportional counter.

2. Probability of K-Capture in ⁸⁵Sr.

The decay scheme of ⁸⁵Sr is well known and is reported in Fig. 2 (¹). The photopeak of the 513 keV γ line, detected with the single crystal γ spectrometer, was used to trigger the coincidence circuit; K X-rays of Rb (13.37 keV), produced by the electron capture process, were found to be time-coincident with the γ-rays and were revealed with the proportional counter. The resolving time of the coincidence circuit was fixed at about 10 µs, considering that the 513 keV level of ⁸⁵Rb has a half-life of 0.9 µs.

The following equation holds

\[ P_K = \frac{I_{K\gamma}}{I_\gamma} \frac{1}{\gamma K \epsilon_K} \]

Fig. 2. Decay scheme of ⁸⁵Sr.