LOW-ENERGY .PART OF THE PHOTON SPECTRUM IN
KỲ DECAY OF THE 662-keV STATE IN [137]Ba

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In a previous measurement [1] the photon spectrum due to Kγ decay of the 2.55 min isomeric state in [137]Ba at 662 keV at a relative angle of emission of 27° was determined. The data were compared to the theory of the internal Compton effect ("electronic" eγ decay) of Spruch and Goertzel [2], and a good absolute agreement was found, except for the low-energy part of the spectrum (at photon energies of less than about 50 keV). In this part the experimental points were found below the theoretical curve. These measurements were performed by detecting photons in a NaI(Tl) scintillation counter, and electrons in a Si(Li) detector.

In subsequent measurements of eγ decay in [113]In [3] and [85]Rb [4] with improved techniques(Ge(Li) detectors were applied for the detection of photons, and a three-dimensional analysis of data was used), no deviation was found at even lower energies (above about 20 keV). Therefore, we decided to perform a remeasurement of the low-energy part of the photon spectrum due to Kγ decay in [137]Ba.

A Canaberra Model 7221 Low Energy Photon Detector of a resolution of less than 1 keV at 122 keV (in actual measurement a resolution of 1.3 keV at 37 keV was observed) was applied. The system and the method of measurement are described in ref. 3.

Preliminary results of the measurements are shown in Fig. 1. The full line was derived from the theory of Spruch and Goertzel. It may be seen that within experimental errors the theory is in agreement with the new data.

References

1) A. Ljubičić, B. Hrastnik, K. Ilakovac, V. Knapp and B. Vojnović, *Phys. Rev.* <u>187</u> (1969) 1512; see also A. Ljubičić, B. Hrastnik, K. Ilakovac, M. Jurčević and I. Basar, *Phys. Rev.* <u>C3</u> (1971) 824

2) L. Spruch and G. Goertzel, *Phys. Rev.* <u>94</u> (1954) 1671

3) M. Jurčević, K. Ilakovac and Z. Krečak, *Phys. Rev.* C9 (1974) 1611; C11 (1975)

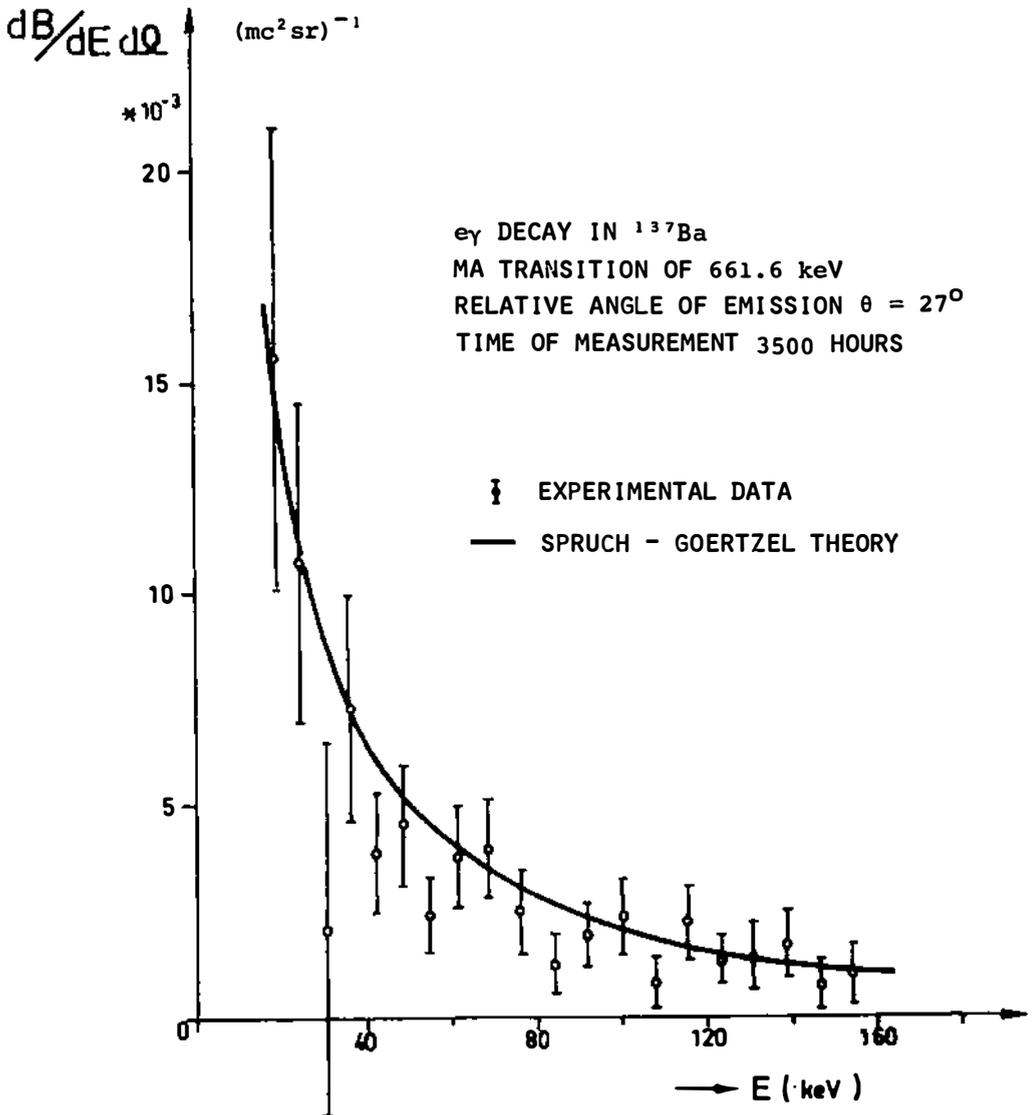4) Z. Krečak, K. Ilakovac and M. Jurčević, *Phys. Rev.* C11 (1975)

Fig. 1. Differential transition probability of Kγ decay per mc² per unit solid angle at the average relative angle of emission of 27°, divided by the transition probability of K-electron conversion, for the 661.6 keV state in ¹³⁷Ba. Full line was calculated from the theory of Spruch and Goertzel.