

SEARCH FOR GAMMA-GAMMA DECAY IN ^{85}Rb

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An attempt was made to observe two-quantum gamma-gamma decay of the 514-keV excited state to the ground state in ^{85}Rb . In a previous measurement, Alväger et al.¹⁾ obtained an upper limit of $T_{\gamma\gamma}/T_{\gamma} < 1.9 \cdot 10^{-5}$ for the number of gamma-gamma decays per single gamma decay.

In the present measurements an ^{85}Sr radioactive source of an initial activity of 2.45 μCi was used. Gamma rays were detected in a pair of NaI(Tl) counters of ϕ 38x38 mm and ϕ 38x25 mm, mounted on XP-1020 photomultipliers. The relative angle of emission of detected gamma rays was 90° . A fast-slow coincidence system with a three-dimensional analyzer was used to record coincident events. A slight ^{75}Se impurity of the source, yielding coincidences of the 136-245 keV cascade, was used to recheck the energy and time scales.

Three measurements were made for 56, 7 and 44 days, respectively. The data were analyzed assuming E1 M1 or M1 E1 two-quantum decay instead of the direct M2 transition. The E1 E2 and E2 E1 decays were not taken into account, because their relative probabilities were estimated to be much lower^{2,3)}. The result of the present investigation is

$$T_{\gamma\gamma}/T_{\gamma} < 2.5 \cdot 10^{-7}$$

at a level of significance of 84%.

References

1. T. Alväger, H. Ryde, P. Thieberger, Ark. Fysik 21 (1962) 559
2. D.P. Grechukhin, Nucl. Phys. 35 (1962) 47
3. B. Nižić, the accompanying article in this issue