

5.8. Measurement of the gamma transition intensities in ^{186}Re

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5.9. Search for the $\gamma\gamma$ decay of the 392-keV state in ^{113}In

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An attempt to observe the double-gamma decay of the 1.7^h isomeric state of ^{113}In was made. A source of ^{113}Sn of about $60 \mu\text{Ci}$ was used. Two coaxial Ge(Li) detectors of 17 cm^3 and 20 cm^3 detected photons emitted from the source at a relative angle of about 90° . Coincident events were analyzed in a fast coincidence system and a $128 \times 256 \times 256$ channel three-dimensional analyzer. The time difference was measured by means of a time-to-amplitude converter and recorded in the first channel, and the amplitude of pulses from the two detectors were recorded in the other two channels. The 3D analyzer uses punched paper tape for the recording of data, and the tape is analyzed off-line in a CAE 9040 computer.

Energy and timing calibration were made by Compton scattering of 392-keV gamma rays from one detector into the other. By varying the scattering angle it was possible to change the fraction of energy released (to the Compton recoil electron) in the first detector, the rest being carried by the secondary Compton photon to the second detector. The timing (except for a negligible delay due to different distances) and the energy relations are the same as in the double gamma decay of the 392-keV state in ^{113}In .

The analysis of data has not been completed. A preliminary result for the ratio of the transition probability of gamma-gamma decay and of single gamma-ray emission, assuming an isotropic angular distribution, has been obtained:

$$T_{\gamma\gamma}/T_{\gamma} < 2 \cdot 10^{-5}$$

This result is to be compared with the single-particle theoretical estimate¹⁾ of $1.6 \cdot 10^{-6}$.

Reference

- 1) D. P. Grechukhin, *Nucl. Phys.* **62** (1965) 273.

5.10. Z-dependence of linear polarization in Rayleigh scattering

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In the experiment of B. Molak et al.¹⁾ it was shown that the degree of linear polarization in Rayleigh scattering decreases with increasing Z at 90° . The energy of gamma rays was 662 keV. The exact numerical approach of Brown et al.²⁾ would involve great computational difficulties. Since polarization is simply the ratio between cross sections, we are able to obtain the Z -dependence of linear polarization in a more direct way by taking into account the following approximations: