

Law of distance and absorption of gamma or beta rays 5.2.41-01/11



What you can learn about ...

- Radioactive radiation
- Beta-decay
- Conservation of parity
- Antineutrino
- Gamma quanta
- Half-value thickness
- Absorption coefficient
- Term diagram
- Pair formation
- Compton effect
- Photoelectric effect
- Conservation of angular momentum
- Forbidden transition
- Weak interaction
- Dead time

Principle:

The inverse square law of distance is demonstrated with the gamma radiation from a ^{60}Co preparation, the half-value thickness and absorption

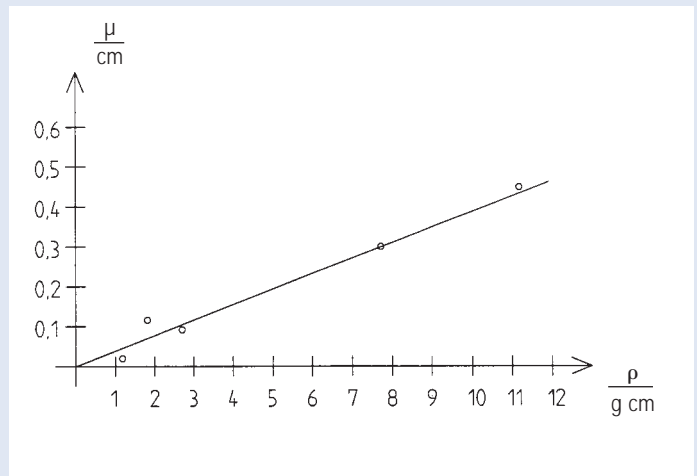
What you need:

Experiment P2524111 with Cobra3

Experiment P2524101 with GM Counter

Radioactive sources, set	09047.50	1	1
Absorption plates for beta-rays	09024.00	1	1
Base plate for radioactivity	09200.00	1	1
Counter tube holder on fixing magnet	09201.00	1	1
Source holder on fixing magnet	09202.00	1	1
Plate holder on fixing magnet	09204.00	1	1
Counter tube, type A, BNC	09025.11	1	1
Screened cable, BNC, $l = 300$ mm	07542.10	1	1
Vernier caliper, plastic	03011.00	1	1
Geiger-Mueller-Counter	13606.99	1	
Absorption material, lead	09029.01	1	1
Absorption material, iron	09029.02	1	1
Absorption material, aluminium	09029.03	1	1
Absorption material, Plexiglas	09029.04	1	1
Absorption material, concrete	09029.05	1	1
Cobra3 BASIC-UNIT	12150.00	1	
Power supply 12V/2A	12151.99	1	
Data cable, plug/socket, 9 pole	14602.00	1	
Software Cobra3 Radioactivity	14506.61	1	
Counter tube module	12106.00	1	
PC, Windows® 95 or higher			

Complete Equipment Set, Manual on CD-ROM included
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Attenuation coefficient μ of different materials as a function of the material density ρ (from left to right: Plexiglas®, concrete, aluminium, iron, lead).

coefficient of various materials determined with the narrow beam system and the corresponding mass attenuation coefficient calculated.

Tasks:

- To measure the impulse counting rate as a function of the distance between the source and the counter tube.
- To determine the half-value thickness $d_{1/2}$ and the absorption coefficient μ of a number of materials by measuring the impulse counting rate as a function of the thickness of the irradiated material. Lead, iron, aluminium, concrete and Plexiglas are used as absorbers.
- To calculate the mass attenuation coefficient from the measured values.