

(NU3-11) Inverse Square Law for Gamma Rays

Aim of experiment

Verification of inverse square law.

Apparatus

GM tube counting station consists of GM counter –Cs¹³⁷ radioactive γ -source- source holder-stop watch, source cabinet made of thick lead.

Theory of experiment

Most radioactive sources are isotropic in nature. This means that gammas rays are given off equally in all directions. There are some sources, however, where there is a correlation of one gamma relative to the other that is not isotropic. In the case of an isotropic source, it is a well known fact that the intensity of the source falls off as $1/R^2$. In this experiment, this $1/R^2$ relationship for a Cs¹³⁷ source will be verified.

Procedure

1. Set the voltage of the GM counter at its operating value.
2. Determine the background counting rate, N_{bg} .
3. Place the Cs¹³⁷ source at 1 cm from the window and count for 3min.
4. Move the source each 1 cm and record the resulting count rate, N' , up to distance 25cm.
5. Record the results in a Table. Correct these results by subtracting the background.
6. Draw a graph between the counting rate and $1/R^2$. A straight line must be obtained.



Results

$N_{BG} =$ Counts/ s

R (cm)	$1/R^2$ (cm ⁻²)	N' (c/s)	$N = N' - N_{bg}$
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			