Radiation physics –practical Experimental No.2 Inverse Square law for radiation

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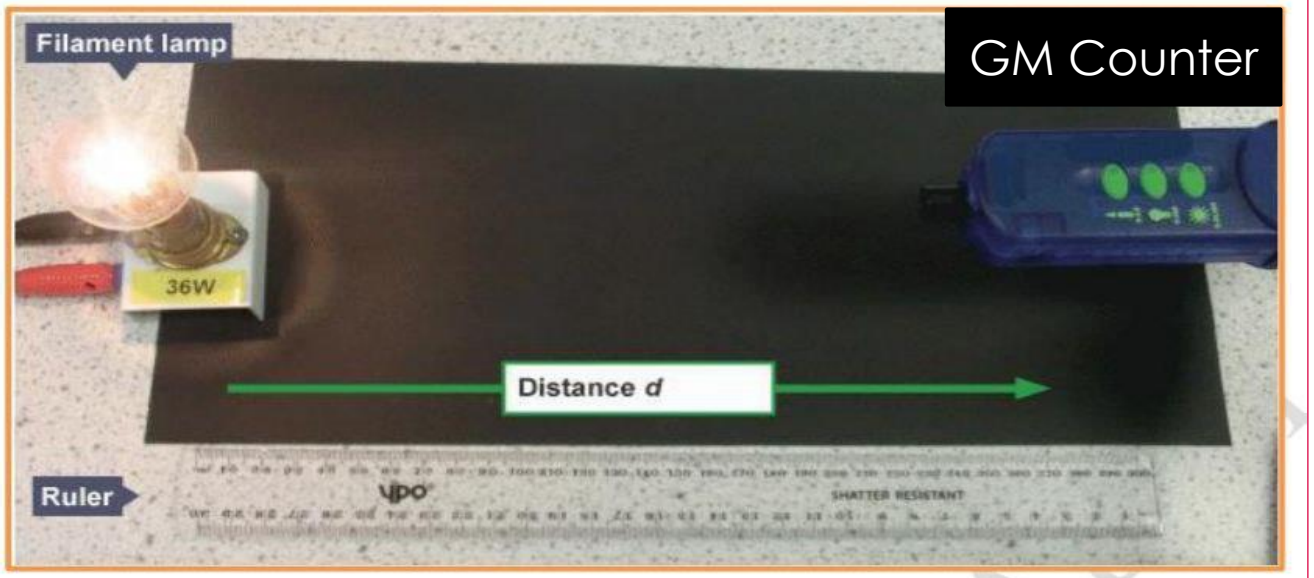
1.1 The objectives of this experiment

- **1) Find the value of Inverse Square Law Experimental.**
- **2) Study the relationship between light intensity and distance.**

1.2 Apparatus

- **1. Radiation source (light source, Filament lamp)**
- **2. GM counter**
- **3. Distance Measuring Device:**

To measure the distance between the source and the detector accurately, you might use a ruler





1.3 Theory

- **The inverse square law of radiation is a fundamental principle in physics that describes how the intensity or strength of radiation, such as light, sound, or electromagnetic waves, decreases with distance from the source. This law can be applied to various types of radiation, including electromagnetic radiation (like light).**
- **The law states that the intensity of radiation is inversely proportional to the square of the distance from the source. Mathematically, it can be expressed as**

Intensity Inverse square laws:

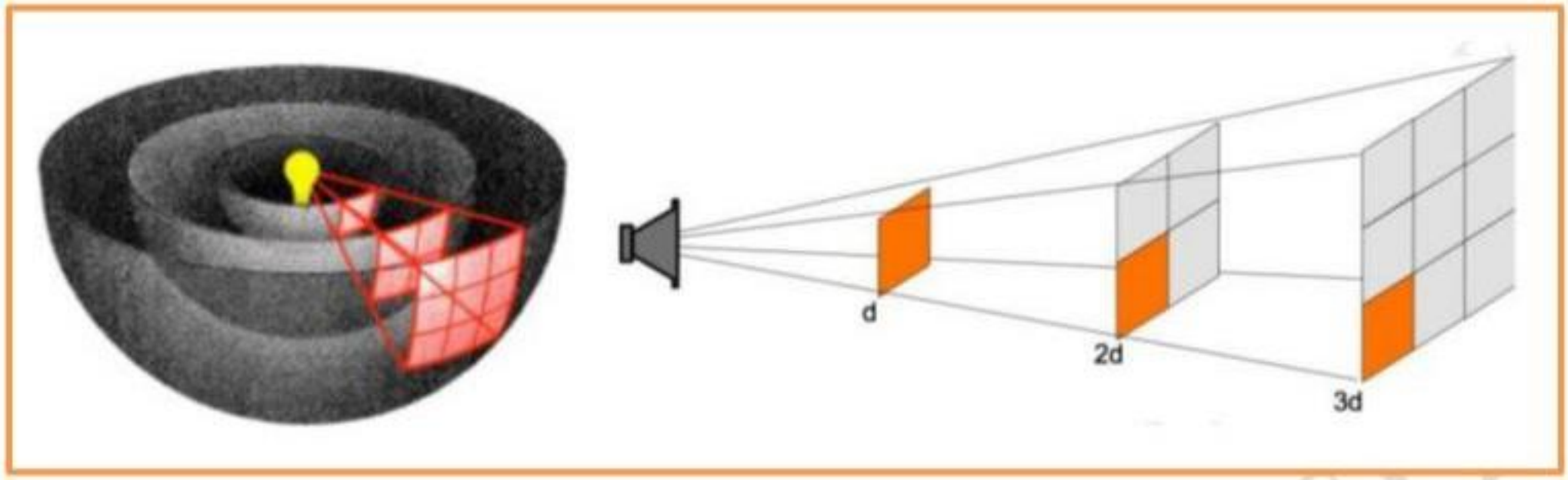
$$I \propto \frac{1}{d2}$$

$$\frac{intensity_1}{intensity_2} = \frac{distance_2^2}{distance_1^2}$$

$$\frac{I_1}{I_2} = \frac{d_2^2}{d_1^2}$$

- **Whereas:**
- **I: is intensity (sound, light, electric field, radiation from a source)**
- **d: is the distance from the center of Filament lamp to counter**

- In simple terms, this means that if you move **twice** as far away from a radiation source, the intensity of the radiation you receive will be reduced to **one-fourth** of its original strength. If you move **three times** as far away, it will be reduced to **one-ninth**, and so on.
- The inverse square law is essential in various fields of science and engineering, including optics, radio communication, and understanding the behavior of gravitational forces, as it helps quantify how radiation spreads and weakens as it propagates through space.

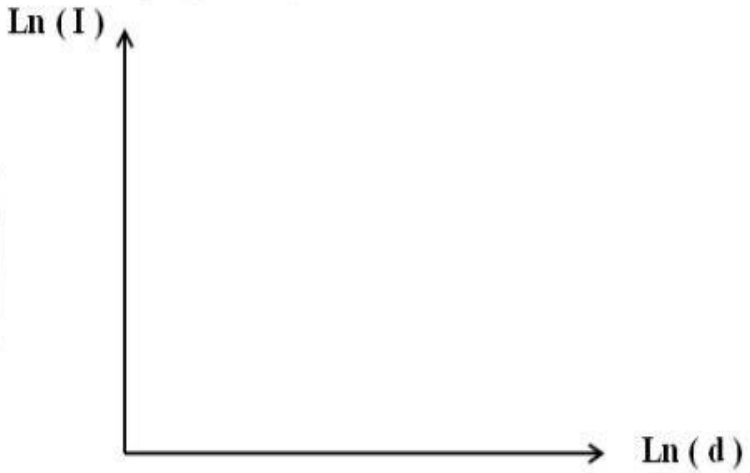


1.4 procedure

- 1.Set up the equipment as shown in the diagram.
- 2.Record the initial light intensity at a distance of 40cm.
- 3. Move the retort stand an additional 5cm away from the light meter and record the result.
- 4. Move the retort stand away in increments of 5cm and record the result each time.
- 5. Graph the results.
- 6. Analyses the graph by comparing the light intensity at two different distances and seeing it confirms the inverse square law..

1.5 Reading

d	Log d	I	Log 1
40	1.60	3.6	0.56
45	1.65	2.6	0.36
50	1.69	2	0.30
55	1.74	1.6	0.20
60	1.77	1.3	0.11



- The slope must have negative value.