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GENERAL PHYSICS COMPETITION FOR ENGINEERING STUDENTS "ION I. AGARBICEANU"

XI Edition 2023 13 May 2023

Experimental test, Physical Section 1,

Determination of the absorption coefficient for a transparent film and its variation with wavelength

Materials provided:

- 2 support plates for connecting LEDs
- power supply for mounting with adapter for 220 V
- voltage control module
- 3 pairs of colored LEDs (green-560 nm; yellow-590 nm; red-640 nm)
- 4 conductive cables
- digital multimeter
-graph paper
- graduated ruler
- 4 pieces of transparent foil with thickness d = ... Mm

Workload:

To detect the intensity of light radiation emitted by a light source, an LED can be used as a receiver. Placing a transparent foil between the source and receiver can observe a decrease in recorded on the receiver as the thickness of the absorbent layer increases (more foils are inserted between the two LEDs)

The voltage to be recorded by the multimeter connected to the receiving LED is directly proportional to the intensity of the incident light radiation. The dependence of the intensity of light radiation on the thickness of the absorbent layer is given by the relationship:

$\Phi = \Phi 0 \varepsilon - \mu \delta$

where $\Phi 0$ is the luminous intensity incident on the LED in the absence of transparent film, d is the total thickness of the foil layers between the two LEDs and μ is the absorption coefficient.

Using the materials provided, make a circuit with which you can determine the attenuation coefficient of light radiation for each wavelength (each pair of LEDs).

The following will be pursued:

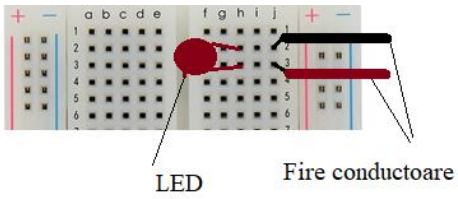
- realization and schematic representation of the experimental montage

- description of how it works

- presentation of results

Observations:

- *Use one of the pad pads to power the source LED and the other to connect the receiving LED to the meter.*
- *The source LED is powered via the voltage control module.* ***The voltage of 2.5 V will not be exceeded for each LED***
- *The connection of the conductive wires to the elements on the plate is made as in the figure through* ***the abcde*** *or* ***fghij*** *fields, not through those marked with red (+) and blue (-) lines. For points in* ***the abcde*** *or* ***fghij fields,*** *the potential is the same for each line. To power a circuit element, cables must be connected on different lines. (For example, on line 2 is the positive terminal, and on line 3 is the negative terminal.)*



- *If the LED does not light up, swap the power wires between them to achieve direct polarization.*