Inverse square law for light

Measurement via Sensor-CASSY and display

Object of the experiment

1. Investigate how light intensity depends on the distance of the illuminated surface from the source of the light

Setup

- Slightly darken the room.
- Set up the optical lamp in such a way that the zero point for the measurement (position of lamp filament) is at about the 10 cm point (according to the ruler on the optical bench).
- Initially place the lux sensor at an arbitrary distance from the zero point.

Preparations for measuring the light intensity (illuminance).

- Set up the CASSY-Display connected to a Sensor-CASSY module.
- Connect the lux box with the lux sensor in it to input A.
- Turn off the display for input B by pressing the NEXT (CASSY) button on the display.
- In order to calibrate the background light intensity when the optical lamp is turned off, press the OFFSET (CALIBRATION) button until the red LED flashes.
- Use the ADJUST knob to set the value displayed to zero.
- Press the OFFSET (CALIBRATION) button again to confirm the calibration.

Apparatus

1 Optical bench, S1 profile, 1m	460 310
2 Optical riders with clamp, 45/65	460 311
1 Lamp housing with cable	450 60
1 Set of 2 bulbs, 6 V/30 W, E14	450 511
1 Sensor-CASSY 2	524 013
1 CASSY-Display, USB	524 020USB
1 Lux adapter S	524 0511
1 Lux sensor	666 243
1 Set of 2 clip plugs, small	590 02ET2
1 Holder for plug-in elements	460 21
1 Transformer, 6/12 V	521 210

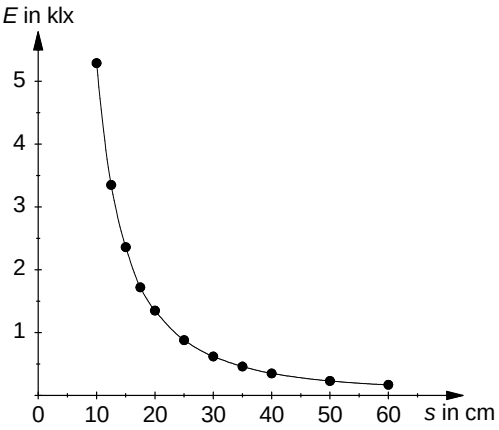
Procedure

- Set up the lux sensor at a distance s = 10 cm from the zero point.
- Turn on the lamp and read off the measurement of light intensity E from the display.
- Repeat the experiment with other distances s.

Measuring example

Distance s in cm	Light intensity (illuminance) E in klx
10	5.3
12.5	3.4
15	2.4
17.5	1.7
20	1.3
25	0.9
30	0.6
35	0.5
40	0.3
50	0.2
60	0.1

Evaluation



The intensity E of the light decreases with the square of the distance s between the light source and the illuminated surface: $E \sim \frac{1}{s^2}$.

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