

Keeping Lab Notebook

Required Entries

- *A Computation Notebook*
- Date
- Discussion of experiment

Required Entries

- ✓ Date – note the date (and sometimes the time) whenever you jot down notes.
- Give enough information that you can return to this a year from now and understand exactly what you are talking about

Overview

Setup: Laser Beam (Part I)



FIG 1

Setup: Mercury Lamp (Part II)

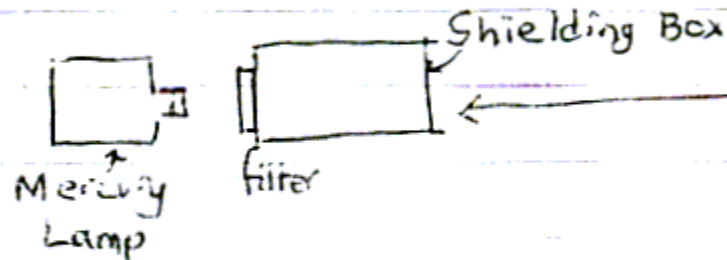


Fig 2

Detailed Circuit

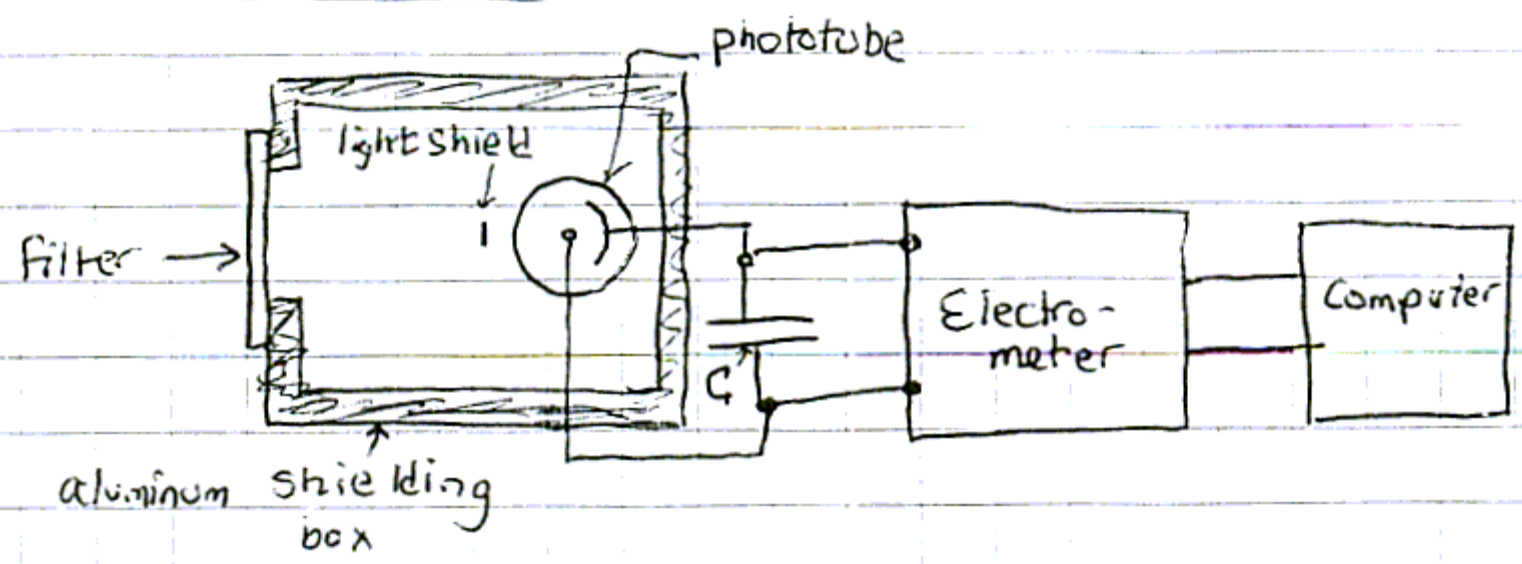


FIG 3

Instruments Used

Electrometer

Computer Interface Module

Acquire.EXE

HeNe Laser

Mercury lamp

Plastic Screwdriver

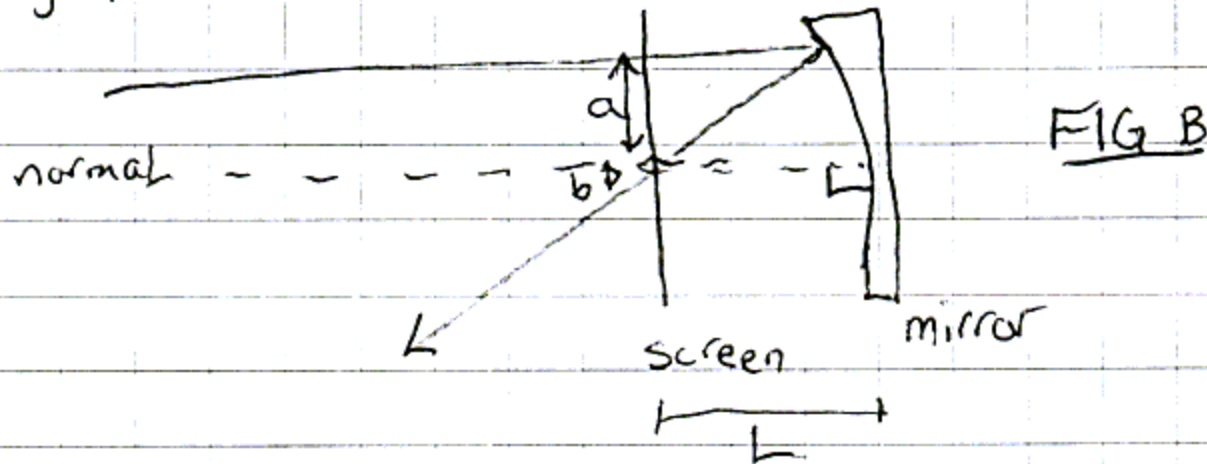
Capacitor (1 chose .03 μ F)

Filters (#d 0-4)

If there are any special properties of these instruments you should summarize them. You also might indicate where you can find the manuals.

Procedure

1. Project the laser beam parallel to the optical axis of mirror, + normal to it. Then translate the beam a distance a away, parallel to optical axis. Measure $a + b =$



Insert notes to direct attention to where more detail is given.

Procedure

Part I : The Laser Beam

- 1) Setup the apparatus as shown in FIG 1 (P.34).
- 2) Referring to FIG 3 (P.34), wire up the circuit described:
 - a) Connect the photo-tube module to the CSS module w/a BNC shielded cable.
 - b) Connect the signal output from the CSS module to the input of the electrometer, again using a BNC cable.
 - c) Connect output of the electrometer to the signal terminals (Channel 0) on the computer interface module.
 - d) Connect the ground terminal on the electrometer to the ground terminal on the computer interface module.

value of the capacitance.

- 3) Direct the laser beam into the aluminum shielding box so that it hits the light shield (refer to figure 3).

Once this is done, use the filter numbered with a zero in front of the shielding box and shine the light.

- 4) Set up ACQUIRE to take data at a reasonable sampling rate (25-50 Hz) making sure to adjust the numbers of points taken to achieve a full picture of the asymptotic behavior. Be sure to use an external trigger!

- 5) After each trial, save the data and open it in Mathematica to determine the asymptotic value, V_0 . Also be sure to set the capacitor back to the SHORT position after each run.

after triggering,
wait a few
seconds
and flip
the switch
on the right
side of the
module
to OPEN

What is missing here is the
date of the subsequent entry!

Required Entries

- ✓ Date
- ✓ Discussion of experiment
- Data

Data entry table

I. Concave mirror

Position of mirror: $3.8 \text{ cm} \pm .3 \text{ cm}$

Trial	pos. of object (cm)	pos of image (cm)	S_o (cm)	S_i (cm)	
1	$69.9 \text{ cm} \pm .2 \text{ cm}$	$105.1 \text{ cm} \pm .1 \text{ cm}$	$66.1 \pm .2$	$101.3 \pm .9$	} <u>REAL IMAGES</u> TABLE 1.A
2	$85.5 \text{ cm} \pm .2 \text{ cm}$	$117.6 \pm .5 \text{ cm}$	$81.7 \pm .2$	$113.8 \pm .4$	
3	$80.5 \text{ cm} \pm .2 \text{ cm}$	$114.4 \pm .5 \text{ cm}$	$76.7 \pm .2$	$110.6 \pm .4$	
4	$74.8 \text{ cm} \pm .2 \text{ cm}$	$103.5 \pm .5 \text{ cm}$	$71.0 \pm .2$	$91.7 \pm .4$	
5	$81.75 \pm .1$	23.95 ± 1	$18.05 \pm .1$	-34.75 ± 1	} <u>Virtual Images</u> TABLE 1.B
6	$72.2 \pm .1$	36.5 ± 1	$8.5 \pm .1$	-27.2 ± 1	
7	$79.5 \pm .1$	16.4 ± 1	$15.8 \pm .1$	-47.3 ± 1	
8	$85.5 \pm .1$	4.6 ± 2	$21.8 \pm .1$	-60.0 ± 2	

Position of Mirror: $63.7 \pm .1 \text{ cm}$

Required Entries

- ✓ Date
- ✓ Discussion of experiment
- ✓ Data
 - Analysis
 - Location of additional information
 - References

Raw data location

<u>PART 1: HeNe Laser</u>	
<u>File Names</u>	Capacitance selected: 0.03 μ F
<u>Filter zero:</u>	
laserbeam_Filter 0_test 1	(note \rightarrow ROOM LIGHTS WERE ON!!)
laserbeam_Filter 0_test 2	(note \rightarrow LIGHTS OFF from here on out)
laserbeam_Filter 0_test 3	\downarrow

Can also add notes about conditions of experiment

Required Entries

- ✓ Date
- ✓ Discussion of experiment
- ✓ Data
- ✓ Analysis
- ✓ Location of additional information
- References

Best Fits

⇒ Filter 1 not included in fits

Fit One

$$m \text{ (fit)} : .0000869883$$

$$b \text{ (fit)} : -.866597$$

$$\sigma_m : ~~.295391~~ .0000143652$$

$$\sigma_b : .295391$$

$$\text{Value of } \frac{h}{e} : = \frac{m}{3 \times 10^{10}} = 2.89962 \times 10^{-15} \frac{\text{J}\cdot\text{S}}{\text{C}}$$

$$\sigma\left(\frac{h}{e}\right) = \frac{\sigma_m}{3 \times 10^{10}} = 4.7884 \times 10^{-16} \frac{\text{J}\cdot\text{S}}{\text{C}}$$

Accepted value of $\frac{h}{e}$: (from Mathematica notebook) : $4.13567 \times 10^{-15} \frac{\text{J}\cdot\text{S}}{\text{C}}$

Required Entries

- Date
- Discussion of experiment
- Data
- Analysis
- Location of additional information
- References
- Conclusions