Laboratory Manual for P2310: Waves and Optics

Last Updated by Dr. Michael Pierce (8/31/2011)
(mpierce@uwyo.edu)
Department of Physics and Astronomy
University of Wyoming

Laboratory Assistant: Gaurab Rimal

This document is intended to be a laboratory manual for Physics 2310 (Physics-III), Waves and Optics. The laboratory component is designed to supplement the lecture component via a "hands-on" experience with optics, instruments, and quantitative lab techniques. The exercises presented in this manual are a work in progress and will thus evolve over the next few years to reflect the interests of the P2310 students and instructor. Please feel free to suggest revisions and clarifications to one of us.

GENERAL LABORATORY GUIDELINES

Safety Guidelines

1. Students can expect to receive training to insure a safe laboratory experience. Areas to be included, but not limited to are:
    a. Physical Hazards: electric shock, sharp objects, etc.
    b. Radiation Hazards: lasers, ultraviolet lamps, etc.
    c. Use of protective goggles, gloves, etc.
    d. Importance of a neat work area
    e. Use of Material Safety Data (MSD) sheets
2. No food or drink or smoking is permitted in the laboratory.
3. Use of IPODs and cell phones are strictly prohibited. This is a safety issue. The laboratory equipment is designed to be safe but lack of attention from texting, etc. and dangling cords could result in an unsafe situation for you and/or your lab partners.
4. Students should ensure that one member of their lab group has a flashlight at all times in order to minimize accidents.
5. Students should understand the use of any personal protective devices (gloves, goggles, etc.) that are necessary for each lab.
6. Students should know the location of any emergency equipment (first aid kits, fire extinguishers, etc.)
7. Common sense safety precautions when using equipment in the laboratory is a must. The lab instructor will provide students with a proper training in the use of all lab and safety equipment.
8. Students should notify the lab instructor of any malfunctioning and unsafe equipment.
9. Students who fail to comply with these guidelines may be denied access to these labs.

General Instructions

Limited resources mean that only about 5-7 experimental setups will be available for each lab. As a result, only 5-7 lab groups can be in the Waves & Optics Lab at any given time. Students will be expected to organize into groups but will be responsible for an individual lab report. **Each student should also bring a USB Flash Drive to lab and is responsible for saving their laboratory data for further analysis.** Each student should exchange their email address with their lab partners.

Lab reports will be written by each student and be submitted to the lab instructor the week following the completion of the lab. Late reports will be accepted over the next week with a 15% reduction in grade. Reports should be neatly written with accurate spelling, punctuation, and grammar. The use of a word processor like MS Word is recommended. The reports must contain, but are not limited to the following:

TITLE AND AUTHOR: Each lab report must include the title of the experiment and your name.

OBJECTIVE: State what you believe is the objective of the experiment. Do not just simply copy the words from the laboratory manual. Feel free to include any background material from your textbook or the web but this material must be properly referenced.

METHOD AND APPARATUS: Show and/or describe the methods you used in completing the experiment. A schematic diagram of the apparatus is recommended. These can be sketches you scan into digital form. Give reasons for the placement of the various components.

TABLES OF DATA: Show all the data taken by your experiment. If some data taken is not used you should explain why. These can be simply Excel spreadsheets. In the case of raw image data an additional table giving the folders and the file names should be provided.

RESULTS AND ERROR ANALYSIS: Show sample calculations and derivations and/or the sources of any formulae used in your analysis.

DISCUSSION AND CONCLUSIONS: Provide a brief discussion of the experiment and the conclusions you reached. Feel free to include constructive criticism of the apparatus and/or concept of the experiment.

BIBLIOGRAPHY: You must include any references you use in your report with footnotes indicating their context. Any direct quotes or extracts from the literature or web must be indicated as such.

Care of Laboratory Equipment

Some of the equipment use in this laboratory is expensive and should be handled with care. Specifically, **no optical surfaces should be touched with bare hands**. Do not attempt to clean any of the optical components used in this lab. Instead notify your lab instructor so that proper cleaning procedures can be used before they suffer permanent damage.