

Interferometry

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You should read this in full before beginning and use it as you plan your work. This lab should be completed in the form of an original science experiment. In particular, that means your lab notebook must make sense to someone reading it without access to this document or the lab manual.

1 Purpose

The two primary objectives of this lab are:

1. Measure the wavelength of a laser and a white light source using a diffraction grating.
2. Use a Michelson interferometer to measure:
 - (a) the index of refraction of air, and
 - (b) the index of refraction of a microscope slide.

You will build your own interferometer using the optical table and various optical parts including rods, rod holders, mirrors and a beam splitter. There are pictures of example optical assemblies on the wall near the optical table. As in all labs you will need to pay attention to all possible sources of error.

2 References

The following references will be helpful in completing the above tasks:

Measuring wavelengths with a diffraction grating

http://web.physics.ucsb.edu/~phys128/experiments/interferometry/measuring_wavelength.pdf

Michelson Interferometer

http://web.physics.ucsb.edu/~phys128/experiments/interferometry/michelson_interferometer.pdf

The Michelson interferometer and a study of optical interference effects

http://web.physics.ucsb.edu/~phys128/experiments/interferometry/the_michelson_interferometer.pdf

Do not use the diagram from this document.

Michelson Interferometer

http://web.physics.ucsb.edu/~phys128/experiments/interferometry/michelson_diagram.pdf

Use the diagram from this document when constructing your interferometer.

Michelson Interferometer, The Refractive Index of a Gas

http://web.physics.ucsb.edu/~phys128/experiments/interferometry/refractive_index.pdf