

January 2009

Interferometry – *DRAFT*

Phy 462

Introduction:

Interference phenomena play a critical role in many scientific disciplines.

This apparatus just arrived and is being used for the first time in January 2009. There will likely be some adjustments to the procedures and assignments as the students (and the instructor and TA!) learn the operation of the system. Please be patient. It should be an exciting project!

Objectives

- Understand the principles of interferometry.
- Learn how to set up and align optical elements.
- Apply various interferometer configurations to perform precision measurements.

Suggested Reading: The lab writeup from TeachSpin in the binder is quite thorough. Start with the introduction and the construction of a basic Michelson interferometer – sections 1 and 2. The classic textbook by Hecht, *Optics* is available in the lab.

Suggested Apparatus:

1. Modern interferometry system from TeachSpin.
2. Two-channel digital oscilloscope.

Avoiding damage:

- Please read the description of laser safety in Appendix B of the TeachSpin writeup.
- Make sure to avoid touching the surfaces of any optical elements (e.g., mirrors, lenses, beamsplitters), as described in the TeachSpin writeup.

General plan

Start by constructing the basic Michelson interferometer (section 1). After discussions with the instructor, you will then work on some combination of more advanced features of the Michelson interferometer, various applications of interferometers, or other interferometer configurations, such as Sagnac or Mach-Zehnder.

Memoranda

- Investigate other applications of interferometry.
- Read about the search for gravitational waves at LIGO, the Laser Interferometer Gravitational-Wave Observatory, on the LIGO website – <http://www.ligo.caltech.edu/>