

Advanced Physics Laboratory (PHYS 480L)

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PHYS 480L

Fall 2020

Sections: Tue 1:30 pm – 4:30 pm; Wed 1:30 pm – 4:30 pm

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Please take note that this page and everything in it will evolve as we learn to cope with the Covid crisis.

Working in teams of 2 or 3 persons, you will perform the following experiments in the course of the semester:

Lab 1

- [Pulse Circuitry](#)
- [Measurement of the Speed of Light](#)
- [EASY MCA \(Multi-Channel Analyzer\) from Ortec](#)
- [Handout on fast electronics](#) (Covers discriminators, coincidence units and delay curves, short excerpt from Fernow)

Lab 2

- [Interaction of Radiation and Matter](#) (computer simulation experiments) hand in answers to the questions.
- [Interactions of Radiation and Matter](#) Reading Materials

Lab 3

- [Nuclear Spectroscopy](#): Compton Edge, Energy Resolution, Absorption Coefficients (p.336-344)
- [NIST Table for X-ray absorption coefficients](#) (Compare experimental measurements to the NIST Table)

Lab 4

- [Gamma-Gamma Correlations in Na²² and Co⁶⁰](#) (p.409-421,p.341)
- [Paper by Brady and Deutsch on two photon angular correlations.](#)

Lab 5

- [Chaos in an Electric Circuit](#) (p.133-144)
- Original experiment P.S. [Linsay, Phys. Rev. Lett. \(1981\)](#)
- [Lorenz Attractor](#)
- [Java Simulation](#) of the Lorentz Attractor
- [Fluid Turbulence video](#)

Lab 6

- [Modern Optics](#): Measurements of Polarization Phenomena (p.159-162, p.201-203)
- [Hecht's chapter on Polarization](#) (To study before optics labs)
- [Slides to review Hecht's chapter on Polarization](#) (Malus' Law, Rayleigh scattering, Polarization by scattering and reflection)
- [Simulations of a Laser](#) PHET project at the University of Colorado

- [Open program to find new particles in Belle data](#)

This is a writing-intensive (WI) course (85% of the course grade). For each experiment you will turn in a Physical Review Letters style paper reporting the results. The due dates for the 5 reports (first drafts) in Fall 2020 will be:

- 1st draft of speed of light report (TBA)
- Final draft of speed of light report (TBA)
- Results of Monte Carlo exercise (TBA)

- 1st draft of Nuclear Spectroscopy report
- Final draft of Nuclear Spectroscopy report
- 1st draft of angular correlation (TBA)
- Final draft of angular correlation (TBA)
- 1st draft of Chaos Experiment
- Final draft of Chaos Experiment
- 1st draft of Optics Experiment
- Final draft of Optics Experiment

This is a 2 credit hour lab but you will in general not be able to complete the experiments and data analysis in the scheduled lab periods. Your team may have to arrange to come in at other times for additional data taking. Note that you will have to make arrangements with the instructor or TA for use of radioactive sources at non-scheduled times.

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