PHYS 480L

Fall 2018

Tom Browder and Boyang Zhang (TA)

In Fall 2018, there will be two sections. The meeting times are Tues 12-3 and Fri 1:30-4:30.
Working in small teams of ~4 persons, you will perform the the following experiments in the course of the semester:

- Gamma-Gamma Correlations in Na^22 and Co^60 (p.409-421,p.341)
- Handout on fast electronics (Covers discriminators, coincidence units and delay curves, short excerpt from Fernow)
- Paper by Brady and Deutsch on two photon angular correlations.

- Measurement of the Speed of Light
- EASY MCA (Multi-Channel Analyzer) from Ortec

- Modern Optics: Measurements of Polarization Phenomena (p.159-162, p.201-203); experiments TBA
- 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

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

- 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)

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

This is a writing-intensive course (90% 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 five reports (first drafts) in Fall 2018 will be:

- 1st draft of Report on Positronium Angular Correlation (Tuesday section: Sept 18, Friday section: Sept 28)
- Final Report on Positronium Angular Correlation (Due TBA)

- 1st draft of report on Speed of Light, (Due TBA)

- Final report on Speed of Light (Due TBA)

- 1st Draft of Nuclear Spectroscopy (Due TBA)
- Final Report on Nuclear Spectroscopy (Due TBA)

- 1st Draft of Chaos (Due TBA)
- Final Report on Chaos (Due TBA)

- First draft of report on Polarization Phenomena (Due TBA)
- Final Draft of Polarization Phenomena (Due TBA)

You will usually work on each experiment for approximately four scheduled lab periods. This is a 2 credit hour lab because you will in general not be able to complete the experiments in the scheduled lab periods. For some labs your team will have to arrange to come in at other times. I am generally available to let you in to the lab (my office is WAT 233, down the hall). Note that you will have to make arrangements with me for use of radioactive sources at non-scheduled times.

The textbook is : Experiments in Modern Physics by Melissinos and Napolitano (2nd edition).
I will also supply some useful handouts (e.g. fast electronics, optics).

Grading:
Written work 90%
5-6 Quizzes 5%
Lab work/participation 5%

Scheduling Items
KEK scrutiny commitee (Sept 3-8)
Belle II B2GM, BPAC and Physics week meetings at KEK (Oct 9-26)

Last modified: September 18, 2018
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