

# PHYS 481L

Spring 2012

Tom Browder

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Working in teams of 2 or 3 persons (Tuesday and Thursday sections), you will perform the following experiments in the course of the semester:

- [Muon Decay](#) (Jan 10-TBA)
- [Relativistic Kinematics and Particle Physics](#) (Computer Experiments, TBA)
- [Muon Counter Solid Angle Calculation \(.pdf format\)](#) used in the Muon Decay Lab
- [Cosmic Ray History and Survey from Wikipedia](#)
- [Review of Cosmic Ray Properties \(.pdf format\)](#) from the Particle Data Group
- [Mossbauer Effect](#) (March 3-April 14)
- [Mossbauer s700s single-channel-amplifier](#) (.pdf file)
- [Mossbauer Linear Motor](#) (.pdf file)
- [Mossbauer s700a \(setup for constant velocity mode\)](#) (.pdf file)
- [Description, introduction, example data for Mossbauer experiments](#) (.pdf file)
- [Rudolf Mossbauer's Nobel Prize Lecture](#)
- [Measurement of Gravitational Redshift with the Mossbauer Effect by Pound and Rebka, Phys. Rev. Lett. paper](#) (.pdf file)
- [Measurement of Mossbauer Effect in Iron by Kistner and Sunyar, Phys. Rev. Lett. paper](#) (.pdf file)
- [X-ray Diffraction](#) (April 21-end of semester)
- [X-ray Diffraction Spectra and Schematic of Apparatus](#)
- [Nickel Filter absorption curve](#) (Taken from the manual for the apparatus)
- [A short discussion of X-ray Diffraction from crystals such as NaCl](#) (Taken from a Standard Textbook, HRK)
- [Chaos Experiment](#) (Under construction)
- [Open program to find new particles in Belle data](#)

For each experiment you will turn in your lab notebook and a Physical Review Letters style paper reporting the results. The due dates for the reports (first drafts) will be:

- TBA, 1st draft of muon report
- TBA, 2nd draft of muon report
- TBA, 1st draft of x-ray diffraction
- TBA, 2nd draft of x-ray diffraction
- TBA, Results of computer exercise ( $\pi^0$  mass resolution in MC)
- TBA, 1st draft of Mossbauer effect
- TBA, 2nd draft of Mossbauer effect

You will work on each experiment for about 4 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. 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) and there will also be a key with Peter Huang in Rm 235 that you can borrow. Note that you will have to make arrangements with me for use of radioactive sources at non-scheduled times.

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Scheduling items: Feb 24-25, Belle Analysis Meeting (BAM)  
Feb 26-28, Belle II Physics Advisory Committee (BPAC)@KEK  
Mar 12-13, Belle General Meeting (BGM)@KEK  
Mar 14-17, Belle II General Meeting (B2GM)@KEK

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