

# PHYSICS 514 – Fall 2010

## Current Research Instruments

T $\theta$  9:50 - 11:10

Room: TBA

Text: none  
Prof. H. Metcalf

## An Introduction to the Methods of Laboratory Physics

This course provides a broad and thorough introduction to the techniques of experimental physics, with emphasis on the laboratory capabilities in our department. It begins with a discussion of those topics that are ubiquitous in research laboratories, including methods of vacuum technology and electronic control of experimental parameters with special attention to feedback control. These are the things one needs to know when first entering a laboratory. In addition, it provides an excellent description of the underlying science behind the experiments in the graduate lab, PHY 515.

There follows a series of distinct units where various members of the experimental research faculty describe the nature of their work, explain the major principles of their laboratory instruments, discuss how these instrument systems function, and conduct tours of their laboratories showing the apparatus in action. The student becomes familiar with most of the experimental research instrumentation in the Department.

Fall semester, 3 credits, S/U grading

# PHYSICS 514 – – FALL 2010

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Lecture: T $\theta$  – 9:50 - 11:10  
 Room: Physics - P-125  
 as of August 16, 2010, subject to change

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Week # Monday date	Tuesday	Thursday	Homework
I 8/30	Intro & Vacuum I (Metcalf)	Vacuum II (Metcalf)	
II 9/6	Vacuum III (Metcalf)	<b>NO CLASS</b> <b>Rosh Hashannah</b>	
III 9/13	Feedback and Control (Metcalf)	Signals and Noise (Metcalf)	
IV 9/20	Accelerators (Metcalf)	invite ? (TBA)	Feedback & Control papers due Thursday
V 9/27	Our Tandem (Metcalf and Lefferts)	Tour of Accelerator (Lefferts - TBA)	
VI 10/4	Atomic Structure (Metcalf)	Optical Instruments & Lasers (Metcalf)	Nuclear and accelerator papers due Thursday
VII 10/11	Stabilized and tunable Lasers (Metcalf)	Making a BEC (Schneble - TBA)	
VIII 10/18	Temperatures High and Low (Metcalf)	Liquefying Helium (Graf - TBA)	Lasers and Optical papers due Thursday
IX 10/25	Advanced Technology Lab (Davis - TBA)	Tour Helium Liquefier (Davis - TBA)	
X 11/1	Tour of Laser Labs	Laser Teaching Center (Noé - TBA)	Low temp papers due Thursday
XI 11/8	Introduction to X-rays (Metcalf)	Synchrotron Radiation (Metcalf)	
XII 11/15	X-ray Microscopy (TBA)	Microscopy (Dawber - TBA)	
XI 11/22	Microscopy? (Glynn - TBA)	<b>Thanksgiving</b> <b>NO CLASS</b>	X-ray papers due Tuesday
XIV 11/29	RHIC and PHENIX (TBA)	The ATLAS detector (TBA)	
XV 12/6	Adaptive Optics (TBA)	Neutrinos (TBA)	Microscopy papers due Thursday

(Required Statement)

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>