

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Physics 403. Modern Physics Laboratory

Summer 2019
Eugene V Colla, Alexey Bezryadin

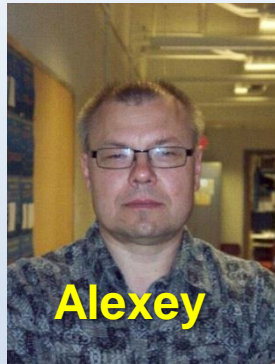


Physics 403 Modern Physics Laboratory

Summer 2019 Teaching Team



Eugene



Alexey



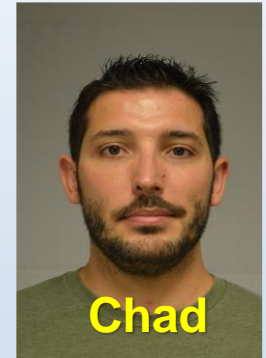
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Brian



Albur



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Outline

- I. **Goals of the course**
- II. Teamwork / grades / expectations from you
- III. Syllabus and schedule
- IV. Your working mode
 - In class and “after hours” access
 - Safety, Responsibility
 - Home and away computing
- V. Take a Lab tour !
- VI. Let’s get started
 - electronic logbooks
 - digital scopes



Course Goals. Primary goals:

- **Learn how to “do” research**

- ✓ **Each project is a mini-research effort**

- ✓ **How are experiments actually carried out ?**

 - The procedures aren't all written out**

 - The questions are not in the back of the chapter**

 - The answers are not in the back of the book**

 - You will have to learn to guide your own activities**

- ✓ **Use of modern tools and modern analysis and data-recording techniques**



Course Goals. Primary goals:

- **Learn how to document your work**
 - **Online - electronic logbook ***
 - **Online – saving data and projects in student area on server**
 - **Using traditional paper logbooks**
 - **Making an analysis report**
 - **Writing formal reports**
 - **Presenting your findings orally**



Course Goals. Secondary goals:

- **Learn some modern physics**
 - Many experiments were once Nobel-prize-worthy efforts
 - They touch on important themes in the development of modern physics
 - Some will provide additional insight to understand advanced courses you have taken
 - Some are just too new to be discussed in textbooks



The Experiments. Three main groups.

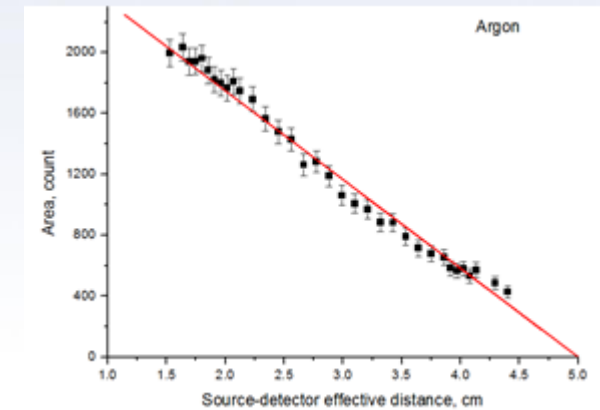
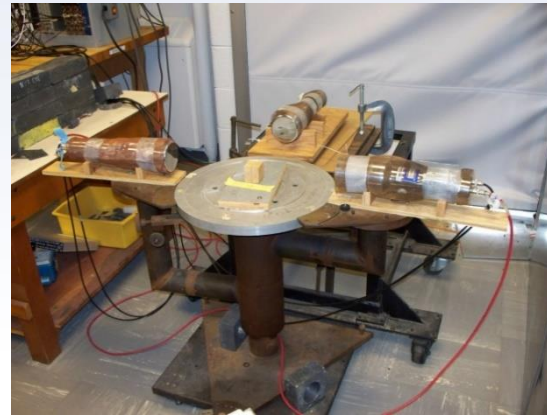
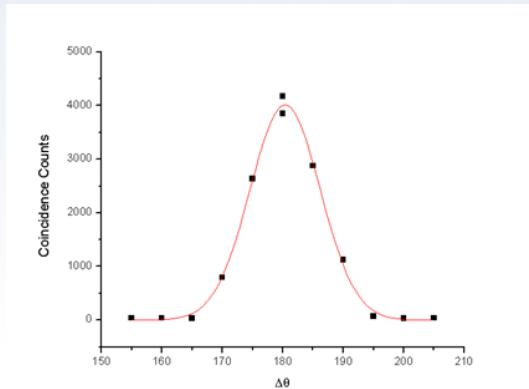
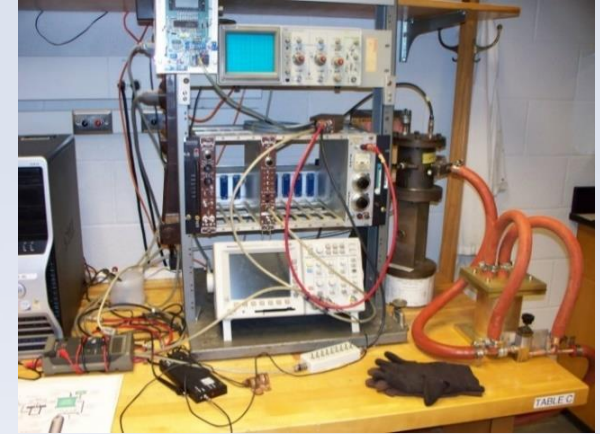
- **Nuclear / Particle (NP)**
- **Atomic / Molecular / Optics (AMO)**
- **Condensed Matter (CM)**

You will do the experiment from all these groups



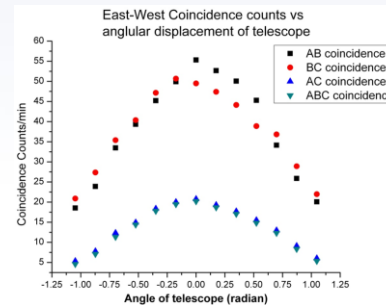
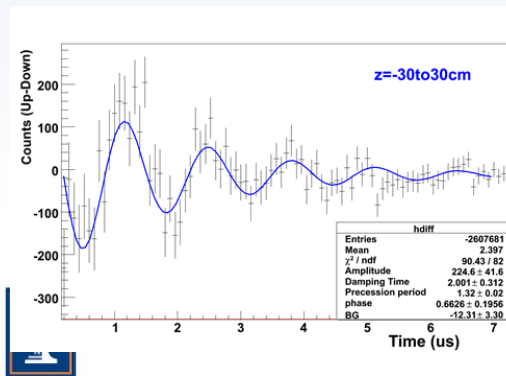
The Experiments

- Nuclear / Particle (NP)
 - Alpha particle range in gasses
 - γ - γ correlation experiment
 - γ – spectroscopy
 - Mössbauer spectroscopy



The Experiments

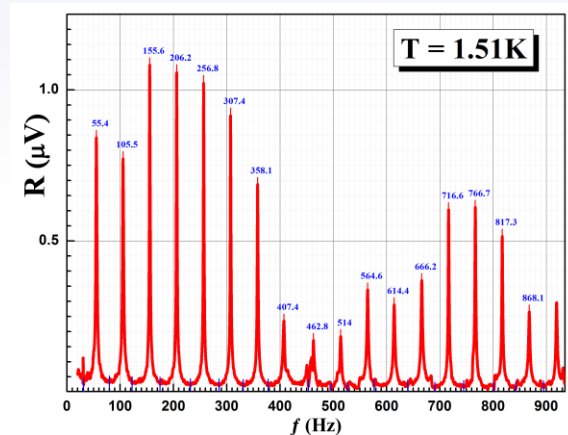
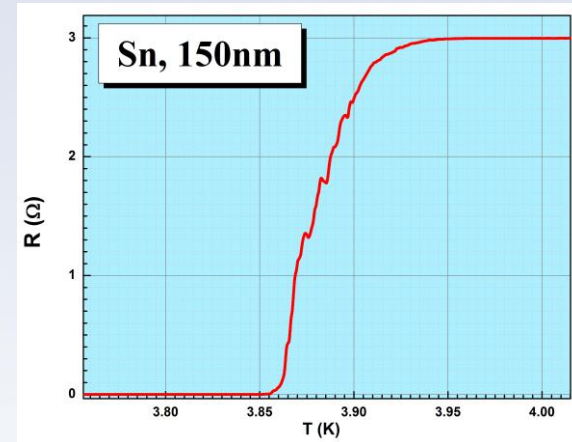
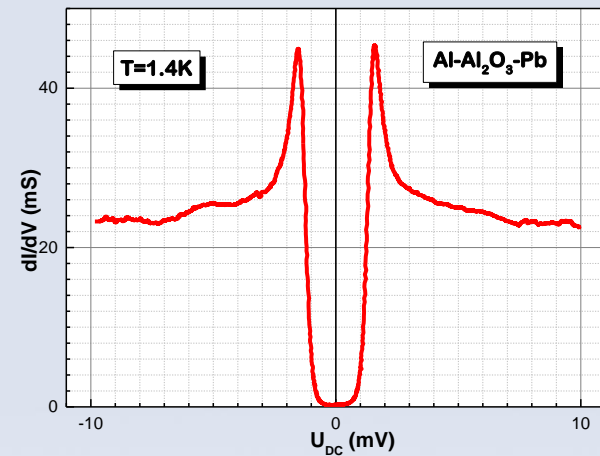
- Nuclear / Particle (NP)
 - Cosmic ray muons:
Lifetime, capture rate, magnetic moment
 - Angular distribution of cosmic rays
 - γ – spectroscopy
 - Mössbauer spectroscopy (new)



The Experiments

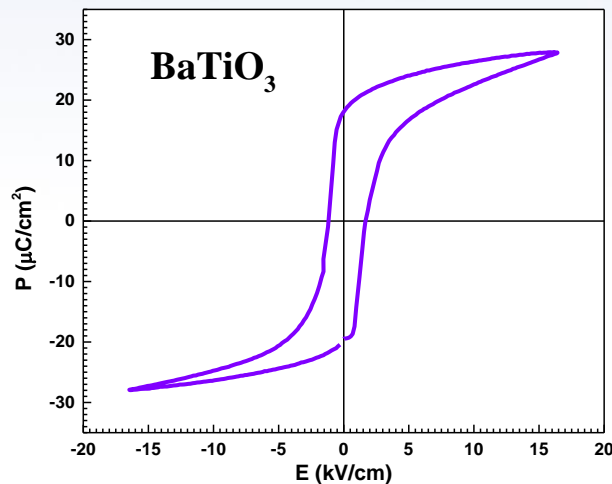
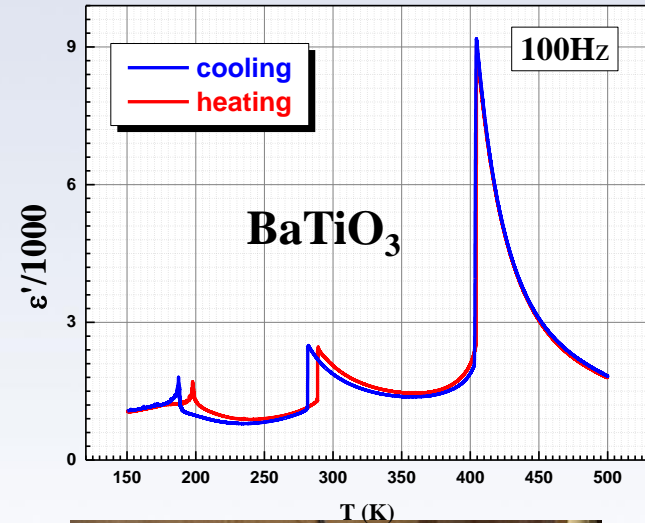
- Condensed Matter (CM)
 - Superconductivity
 - Tunneling in superconductors
 - 2nd sound in ⁴He superfluid

state



The Experiments

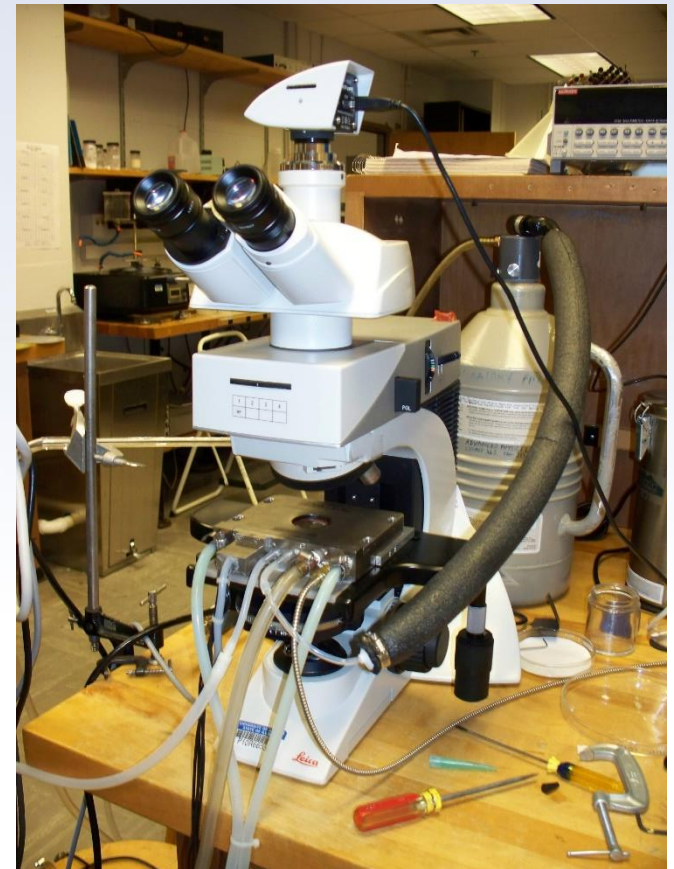
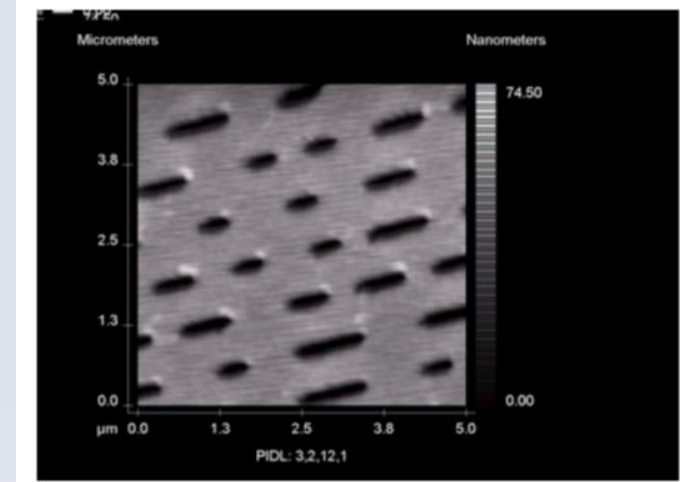
- **Condensed Matter (CM)**
 - **Ferroelectrics and ferroelectric phase transition**
 - **Pulsed NMR**
 - **Calibration of temperature sensors**



The Experiments

- **Condensed Matter (CM)**

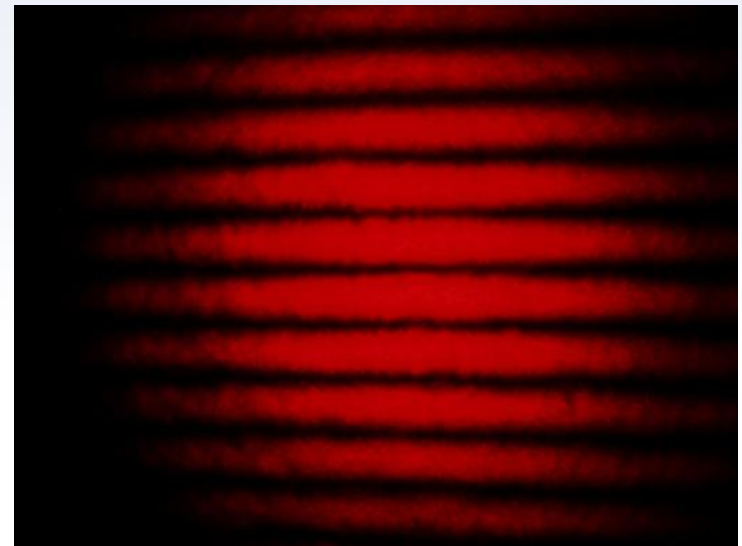
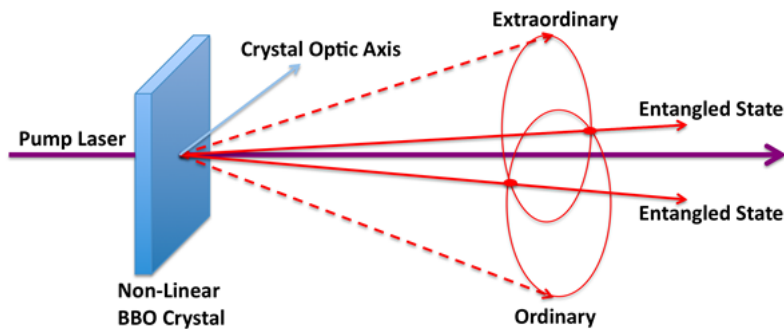
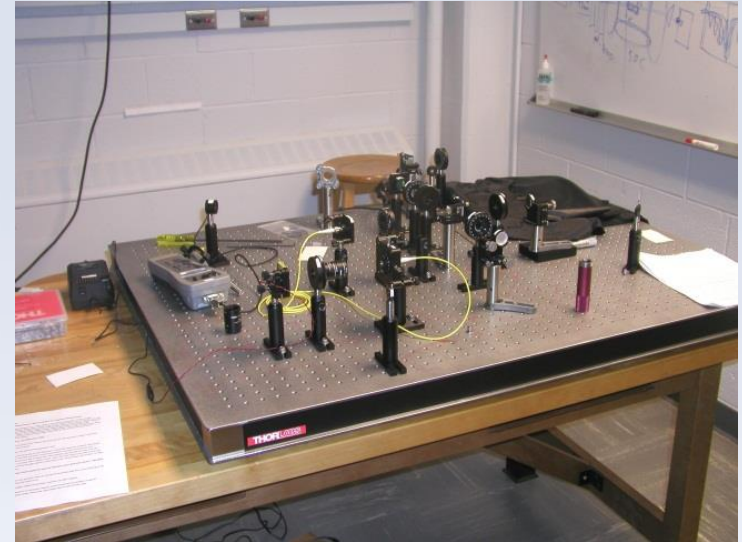
- **Special Tools:**
- **Vacuum film deposition**
- **Atomic Force Microscope**
- **Polarizing microscope**



The Experiments

Atomic/Molecular/Optics (AMO)

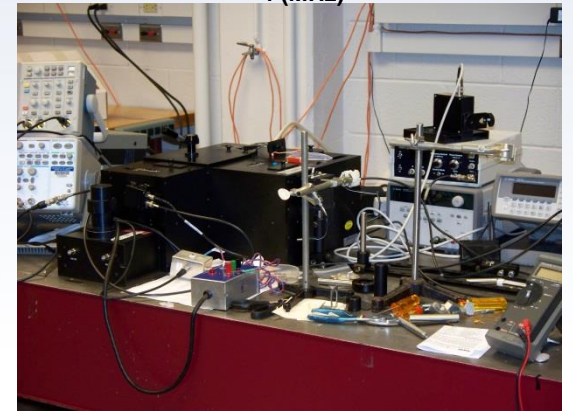
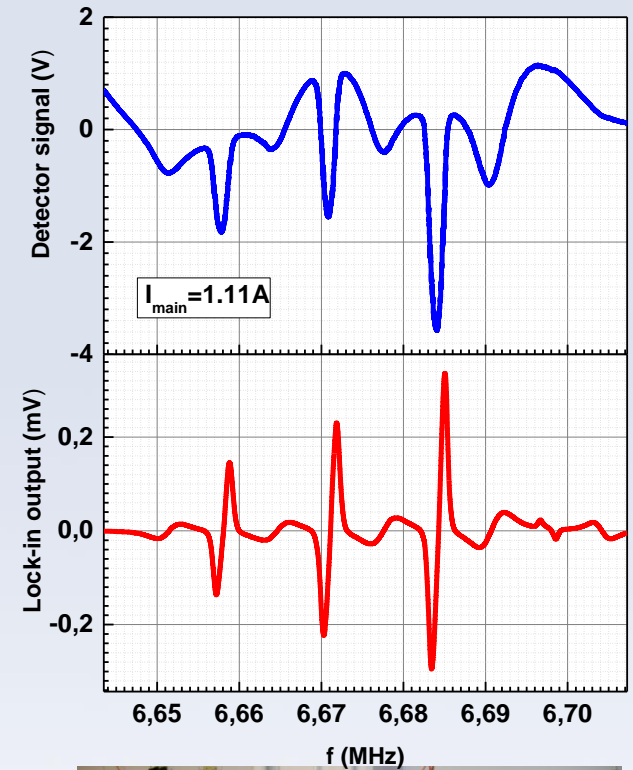
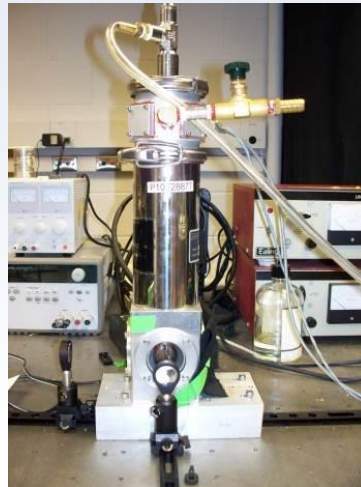
- Berry's phase
- Quantum erasure
- Quantum Entanglement



The Experiments

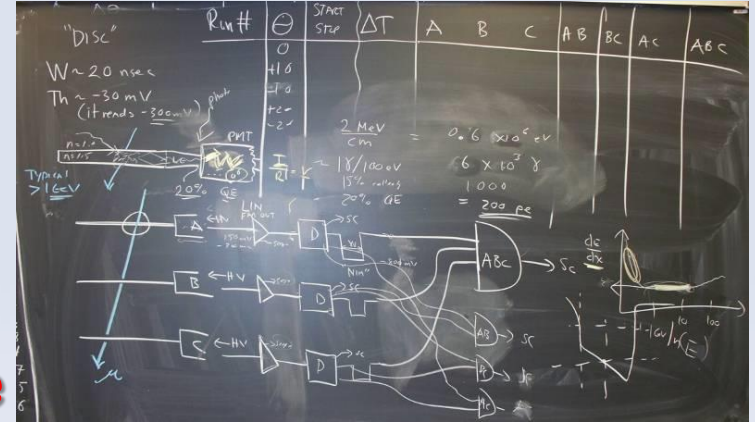
Atomic/Molecular/Optics (AMO)

- Optical pumping of rubidium gas
- Fluorescence spectroscopy



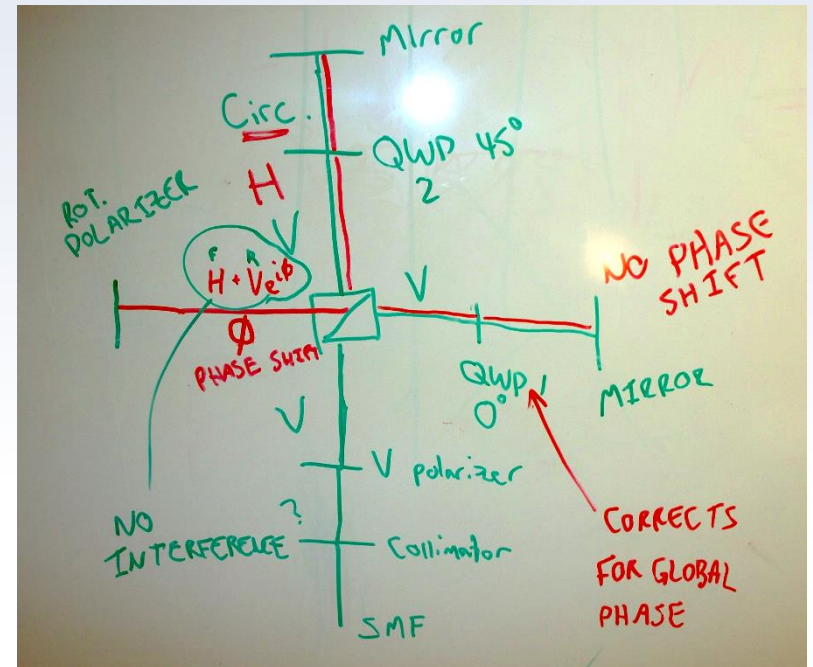
The “manuals”

- Many are just guides
- A only few purchased experiments have “real” manuals
- We serve as your guides ... like real research



TEACH SPIN
Instruments Designed for Teaching

OPTICAL PUMPING OF RUBIDIUM
OP1-A



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electronic logbooks
digital scopes



Grading: Distribution of “720” points

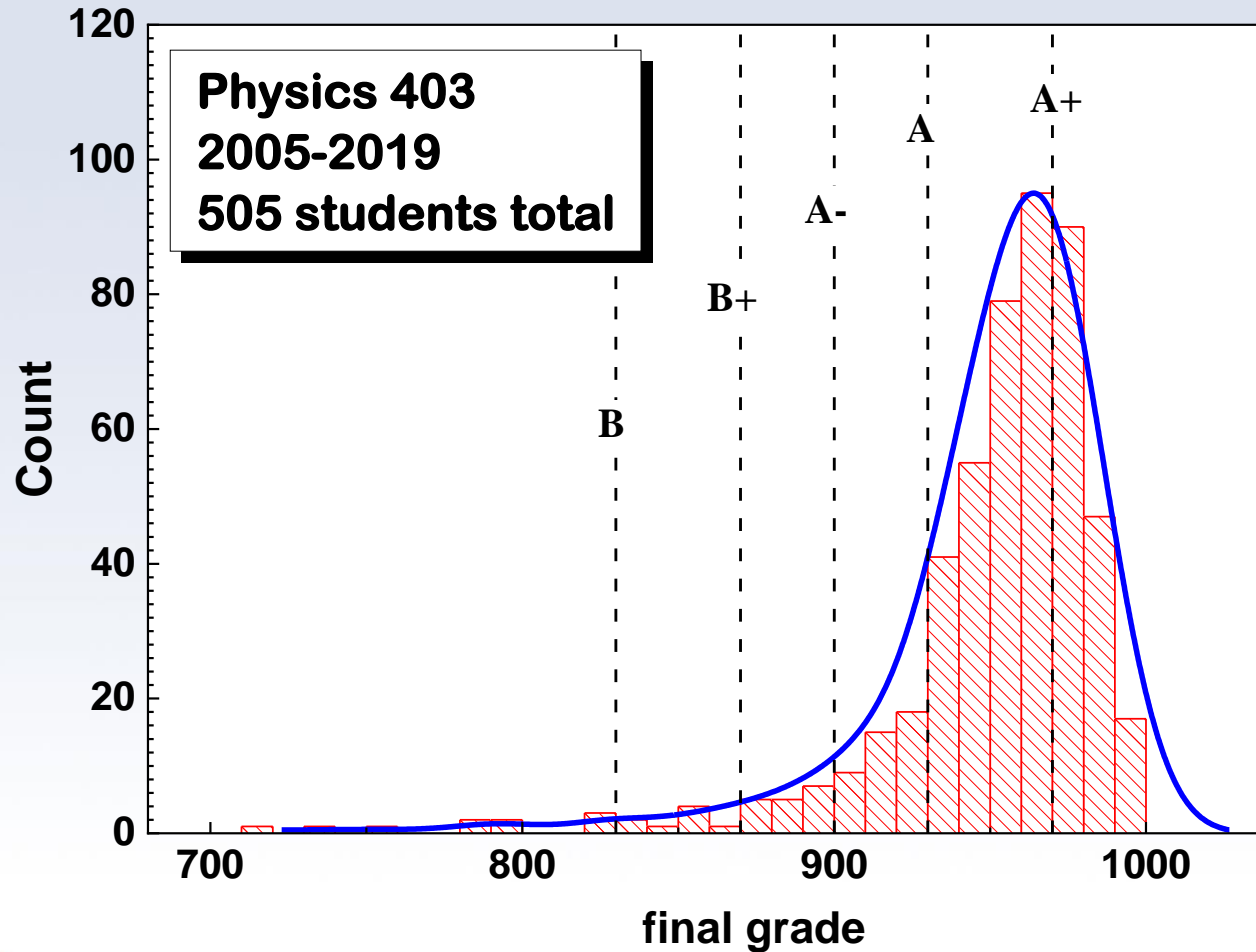
ASSIGNMENT	Points
Expt. documentation: elog reports, shift summaries, plot quality; paper logbooks	120 Total 60 / cycle
Formal reports:	400 Total 100 / report
Oral report #1:	80
Oral report #2 – final exam	120
Total Effective point total will be	720

Letter grading scale is approximately **97% = A+**, **93% = A**, **90% = A-**, **87% = B+**, **83% = B**, **80% = B-**, etc



You can **RESUBMIT one lab report** to improve your grade (deadline for resubmissions August, 1)

Grading: a piece of history and analysis of the results



Submission of Lab-Reports

- **Due dates as on syllabus at midnight**
- **The reports should be uploaded to the server:**
- **<https://my.physics.illinois.edu/courses/upload/>**
- **Accepted MS-Word or PDF**
- **For orals – MS-PowerPoint or PDF**



Absences

- If you are sick, **let Eugene know by email** (kolla@Illinois.edu). Don't come in and get others sick. We are working side-by-side in a close environment for many hours.
- You can “make up” the time with arrangements and you can have access to the rooms. We will be accommodating.



Late Reports

- **Policy for late reports**

- You can have **ONE “late ticket”** for a **“free”** delay of up to **3** business days, but you must tell us you are using the ticket
- Reports are due at midnight on the date shown on the syllabus. After that we will charge:
 - 5 points for up to 1 week late. 10 points for up to 2 weeks late.
 - After that, it's too late.

C1-Ex1(2.07.18)



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Syllabus

Cycles

	Date	Day	Activity		Lectures: 10am Journal club: 3pm	Note	Due days
			8am-noon	1pm-5pm			
1	6/11	Tues	Orientation		About Phy403		
2	6/13	Wed	Cycle 1-1	Cycle 1-1	OriginPro, ROOT Intro		
3	6/18	Tues	Cycle 1-1	Cycle 1-1	Ferroelectricity		
4	6/19	Wed	Cycle 1-1	Cycle 1-1	Written Reports		
5	6/25	Tues	Cycle 1-2	Cycle 1-2	Error analysis		
6	6.26	Wed	Cycle 1-2	Cycle 1-2	Lock-in Amps and FT		C1-Ex1(7.01.19)
7	7/02	Tues	Cycle 1-2	Cycle 1-2	Oral Reports/Talks		
8	7/03	Tues	Cycle 2-1	Cycle 2-1	Superconductivity	Rotate	
9	7/09	Wed	ORALS Cycle 1				
10	7/10	Tues	Cycle 2-1	Cycle 2-1	Noise		C1-Ex2(7.15.19)
11	7/16	Wed	Cycle 2-1	Cycle 2-1	Nuclear Physics		
12	7/17	Tues	Cycle 2-2	Cycle 2-2	Measuring Temperature		
13	7/23	Wed	Cycle 2-2	Cycle 2-2	Entanglement		C2-Ex1(7.29.19)
14	7/24	Tues	Cycle 2-2	Cycle 2-2	TBA		
15	7/30						
16	7/31	Wed	ORALS Cycle 2				
17	8/01	Thursday			READING DAY		C2-Ex2(8.01.19)



* Lecture topics are subject to change

	NP	CM	Atomic + CM	Optics
	A. Cosmic Muon Stand i. Muon lifetime ii. Capture rate iii. Magnetic moment B. Alpha range C. Gamma Gamma D. Cosmic angular distribution	A. Ferro 1 B. Ferro 2 (imaging) C. 2 nd sound of ⁴ He D. pNMR E. Hysteresis loops F. Tunneling G. AFM H. T calibration	A. Optical pumping B. Superconductivity C. Mutual inductance	A. Quantum Table i. Berry's phase ii. Quantum erasure iii. Entanglement B. Florescence spectroscopy
	Alexey, Chad, Gabriel	Eugene, Albur	Eugene, Brian, Albert	Abid and TA's from Kwiat Lab
C1-1	5-6; 3-4; 21	1-2; 7-8; 9-10	11-12; 13-14;	15-16; 17-18; 19-20
C1-2	1-2; 3-4; 5-6	11-12; 13-14; 21	17-18; 19-20	7-8; 9-10; 15-16
C2-1	8-9; 10-11; 14-15	16-17; 18-19; 20	2-3; 4-5	6-7; 12-13; 1-21
C2-2	14-15; 12-13; 20	2-3; 16-17; 18-19, 1-21	8-9; 6-7;	10-11; 4-5

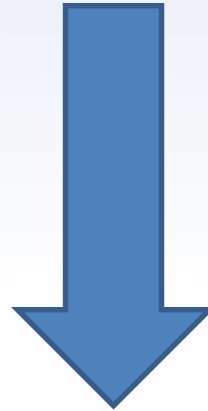


Assignment of experiments

2 cycles with 2 experiments

→ teams change after cycle

→ joint team reports and oral presentations



Cycle	#	Experiment
C1-1	5-6	Cosmic Muon
	21	Alpha Range
	3-4	Gamma-Gamma
	11-12	Superconductivity in Sn films – contact measurements
	13-14	Optical pumping
	1-2	Second sound in He4
	7-8	Ferro1 Dielectric properties measurement
	9-10	Pulsed NMR water-glycerol solution
	15-16	Fluorescence
	17-18	Quantum Optics
	19-20	Quantum Optics
C1-2	17-18	Superconductivity in Sn films – mutual inductance experiment
	19-20	Optical pumping
	1-2	Cosmic Muon
	5-6	Gamma-Gamma
	3-4	Alpha Range
	7-8	Fluorescence
	9-10	Quantum Optics
	15-16	Quantum Optics
	13-14	Ferro2 Investigation of the domain structure
	21	pNMR water with paramagnetic impurities experiment
11-12	Tunneling in Al-Al ₂ O ₃ -Pb junctions	



After 2 experiments (1 cycle) we will have oral session. The topic of the presentation will be chosen from the experiments done in this cycle.

Cycle	#	Experiment
C1-1	1,2	Cosmic Muon

C1-2	1,2	Superconductivity in Sn films – mutual inductance experiment



Final oral session is equivalent to the *final exam*. The talks will be presented by students *in solo* and will be graded in 120 points. Course cannot be completed without final oral presentation. As a topic for final oral could be chosen from results of any experiment done during the semester but not used in Oral#1 session.



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Lab Access



Use Your ID Card to Access the Lab

You can access the Lab not only on “Lab days”

Late time rules:

**You can stay in the Lab until 8pm but need to
work with partner**

**After 8pm and on weekend days – *you have to discuss
this schedule with your instructor* and in general it is
preferable to avoid working after 8 pm and on week**



Safety is your responsibility !

Hazards: *high voltage, radioactive sources,*

cryogenes, chemical materials, high pressure

In class work and “after hours” access & work requires responsible conduct with regards to

(I) safety/hazards and with

(II) equipment

Discuss potential hazards at the beginning of each experiment with an instructor or TA

When in doubt stop and ask

Problems after hours: 217 493 1576 (Eugene’s cell)

217-384-7016 (Eugene home)



Follow Directly the Recommendations of Safety Working

<https://www.drs.illinois.edu/>

Related Units @ Illinois Questions? Search Go

Division of **RESEARCH SAFETY**

Accident Response ▾ DRS Safety Programs ▾ Training ▾ Waste Management ▾ Safety Library ▾

My Campus User Login

Laboratory Incidents

Learn about past incidents on the University of Illinois campus, and how you can prevent them in your lab.

News and Announcements [View Archive »](#)

NIH Guidelines Training Requirement
6/8/2016
All faculty, staff and students working with recombinant or synthetic nucleic acids are required to take the on-line training course, NIH Guidelines Overview .

Zika Virus
3/2/2016
What is the Risk Assessment?

Airgas Valve Alert
1/27/2016
Following a recent gas cylinder valve malfunction on campus, DRS would like to warn all gas cylinder users of the difference between two different cylinder valves used.

Responsibilities

I work in a lab

I supervise a lab

My work takes me into labs



Follow Directly the Recommendations of Safety Working



Chemical Waste Collection and Storage

Before generating chemical waste, the researcher should determine how it will be collected and stored and obtain the necessary equipment (containers, labels) in advance. The choice of procedures depends on the type of waste and its final disposition. This section explains how to determine the final disposition of waste, select the appropriate waste container, and store waste in the lab or work area. It also suggests waste minimization strategies.

Determining How to Dispose of a Chemical Waste

The final disposition of a chemical waste is determined by the answers to a series of questions:

- Step 1.** Is the waste [Contaminated Debris](#) (glassware, paper towels, clean-up materials), or is it a chemical or chemical mixture?
If it is contaminated debris: Go to Step 5.
If it is a chemical or chemical mixture: Go to Step 2.
- Step 2.** Is the chemical a DEA (Drug Enforcement Agency) controlled substance? (Refer to the [DEA list controlled substances](#).)
Yes: Refer to the [DEA Controlled Substances Guide](#) for disposal procedures.
No: Go to Step 3.
- Step 3.** Is the chemical a solid (not liquid or gas)?
Yes: Collect and store the waste as described in the waste container and storage guidelines listed below and dispose of it through the Division of Research Safety (DRS) chemical waste disposal program. See the section [Procedures for Requesting Chemical Waste Disposal](#) for the disposal procedures. (No solid chemical waste, hazardous or non-hazardous, should be placed in the regular trash.)
No: Go to Step 4.
- Step 4.** Is the chemical a liquid non-hazardous waste as listed in the section [Liquid Non-Hazardous Chemical Waste Disposal](#)?
Yes: The chemical may be poured down the sanitary sewer (sink drain) with copious amounts of water.
No: Collect and store the waste as described in the waste container and storage guidelines listed below, and dispose of it through the DRS chemical waste disposal program. See the section [Procedures for Requesting Chemical Waste Disposal](#) for the disposal procedures.
- Step 5.** Is the contaminated debris laboratory glassware (broken and unbroken)?
Yes: See the [Laboratory Glassware Waste Disposal](#) section.
No: Go to Step 6.
- Step 6.** Is the debris contaminated with a substance listed in the section [Liquid Non-Hazardous Chemical Waste Disposal](#)?
Yes: The contaminated debris can be disposed of in the regular trash.
No: Collect and store the contaminated debris as described in the waste container and storage guidelines listed below; dispose



Waste container for ethanol, acetone, methanol, isopropanol.



Waste container for mineral spirits.



Waste containers for chemicals used in NMR experiment

Follow Directly the Recommendations of Safety Working

Related Units @ Illinois Questions? Search Go

Division of **RESEARCH SAFETY**

Accident Response ▾ DRS Safety Programs ▾ Training ▾ Waste Management ▾ Safety Library ▾

Profile ▾ Eugene V Colla ▶ Log off

Laboratory Sharps

Definition

Materials that qualify as “sharps” are defined at the state level and shall be disposed of as Potentially Infectious Medical Waste (PIMW). In Illinois, the Illinois Environmental Protection Agency (IEPA) has designated the following material (used or unused) as sharps:

- Any medical needles,
- Syringe barrels (with or without needle),
- Pasteur pipettes (glass),
- Scalpel and razor blades,
- Blood vials,
- Microscope slides and coverslips,
- Glassware contaminated with infectious agents.

NEVER dispose of these items in SDCs:

- Plastic items (except for syringes),
- Beverage containers (no pop cans!),
- Non-biologically contaminated laboratory glassware,
- Solvent/chemical bottles,
- Light bulbs,
- Any paper materials,
- Pipette tips,
- Plastic pipettes,
- Aerosol cans or cans of any type,
- Scintillation vials,
- Any item with liquid (except for blood in vacutainer tubes).



**Waste
container for
sharps**



Outline



V. Take a Lab tour !

VI. Let's get started
electronic logbooks
digital scopes



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How to record the data

- **Work together**
- **Write down the equipment used**
- **Make a diagram of the setup**
- **Note the settings of dials, switches, gauges**
- **Take a digital photo if appropriate**
- **Use a software drawing program to make a detailed sketch**



How to record the data

- Use the eLog (see next).
- Write down what you did in real sentences.
- Provide enough detail that you can reconstruct later what you did!
- How will you look at the data later?
- Do you have enough information?
- Did the equipment perform as expected?



How to record the data

- Many experiments require you to “change and measure” something by hand
 - Make a **table** in a **paper logbook** for this
 - Be prepared to state your measurement uncertainty
 - Make a “**quick sketch**” of your results by hand; then, enter the data in an electronic table and make a final plot
 - Do you have enough points?
 - Do you have any obvious anomalies?
 - You can repeat points but do not throw them out. Use other measurements to check reliability

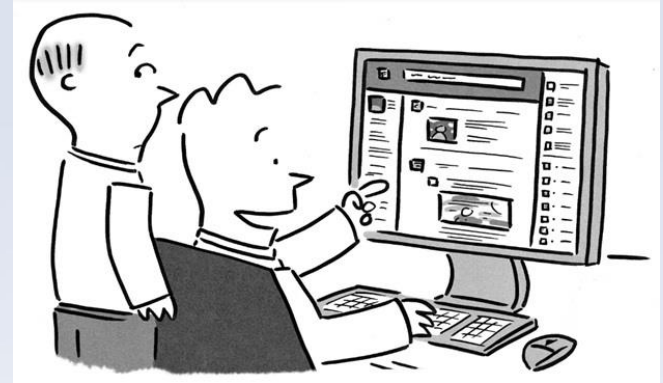


How to record the data

- Many experiments have built-in, computer-based data

acquisition (DAQ)

- You will not have time to fully understand the DAQ, but



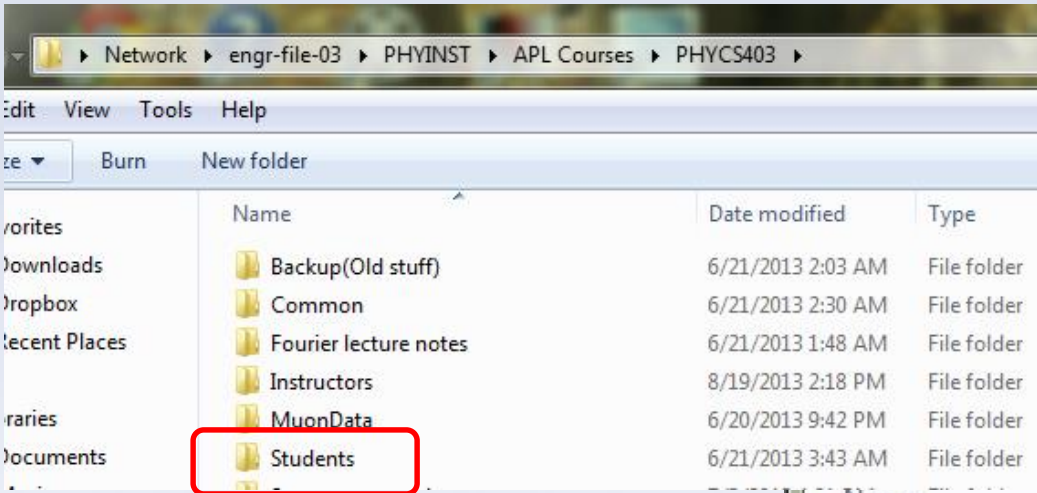
- Be sure you know functionally what it is doing – ask
- A good idea is to make test measurements of something you know
- As before, anomalies? enough points? uncertainties?



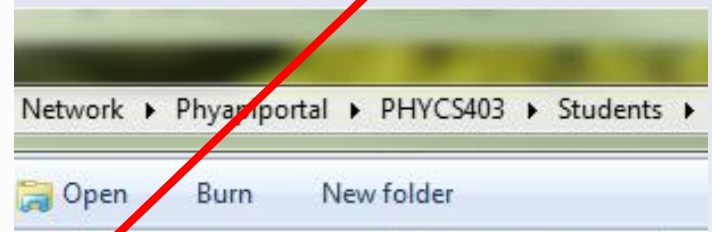
Where to exchange, store and retrieve course information.

(i) Your data, projects, tables etc

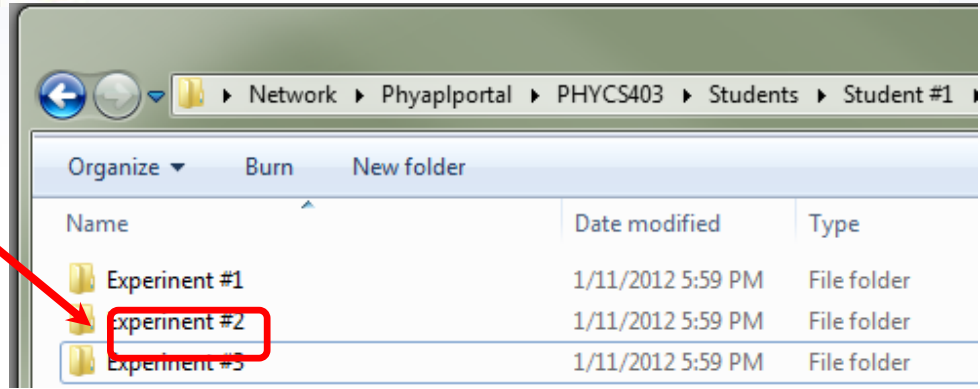
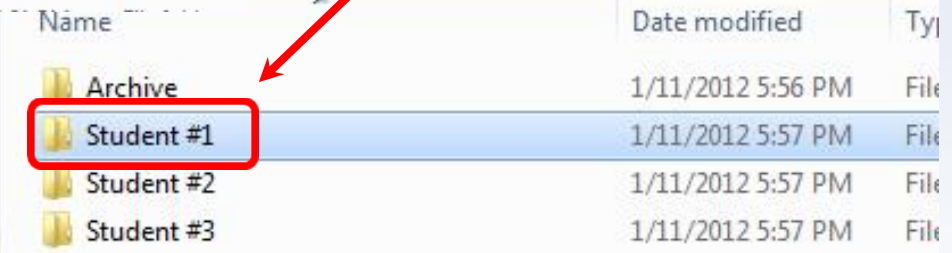
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Make your own folder and put your work there

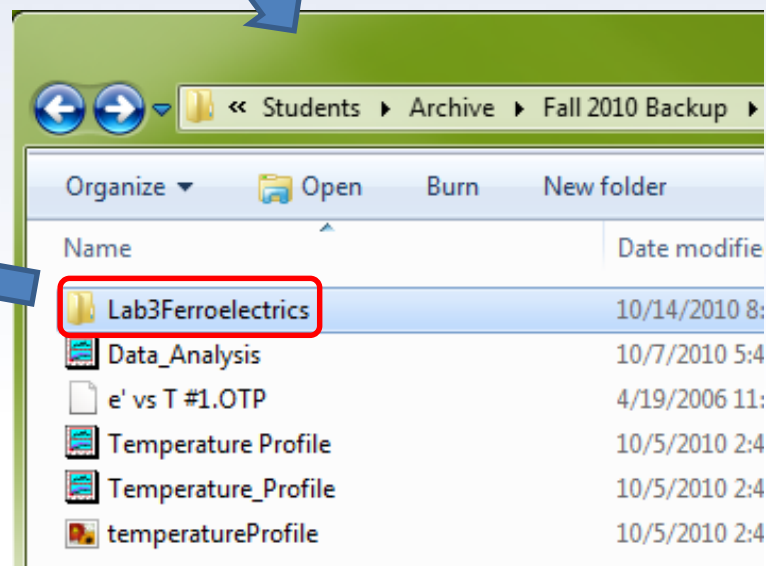
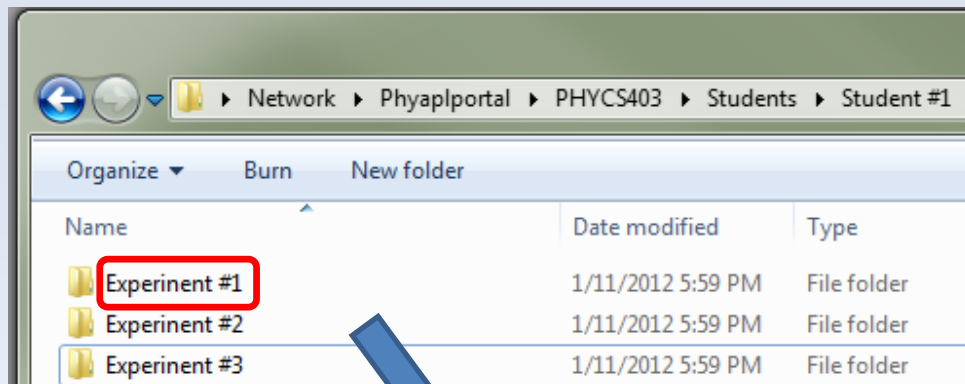
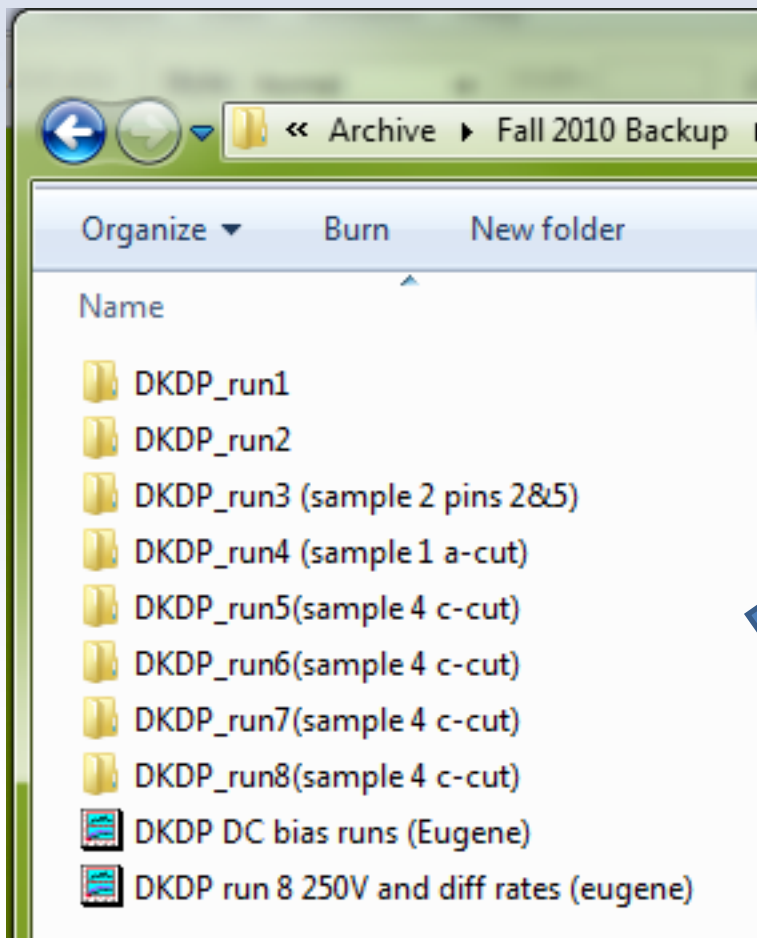


Store all experiment related materials in corresponding folder



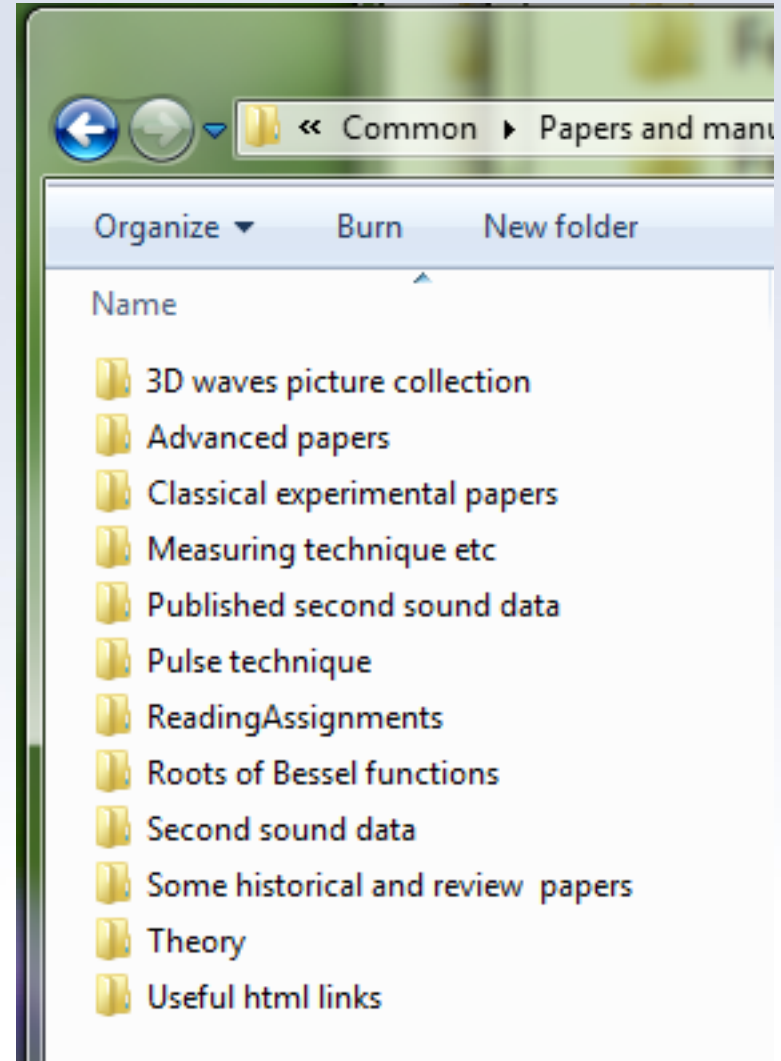
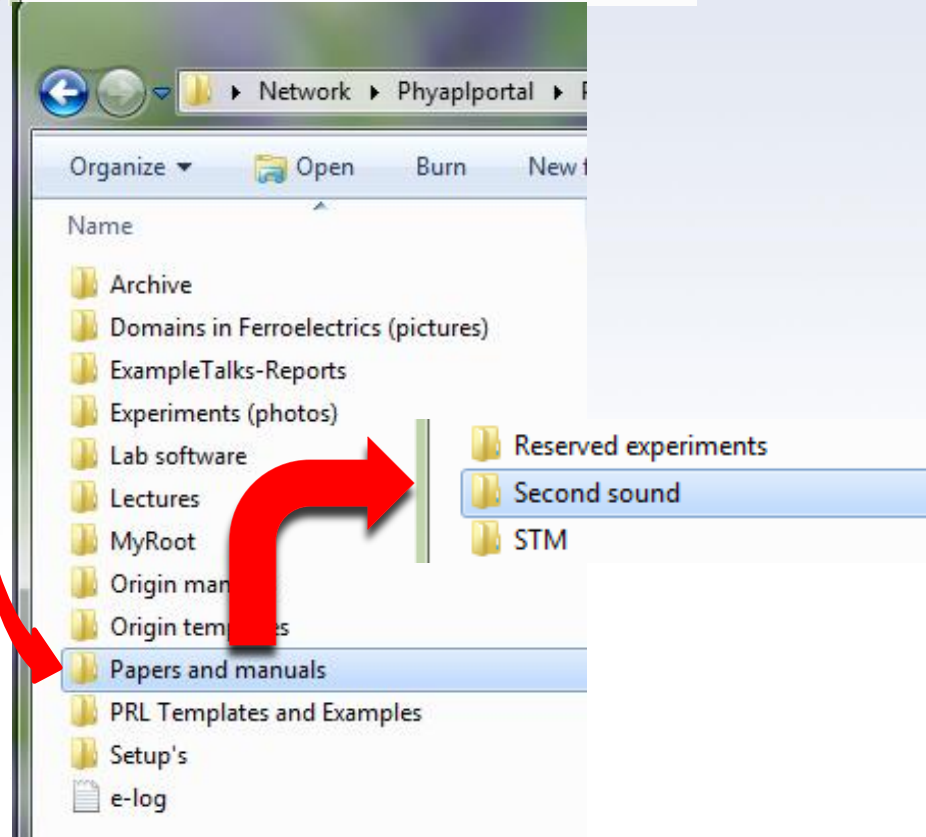
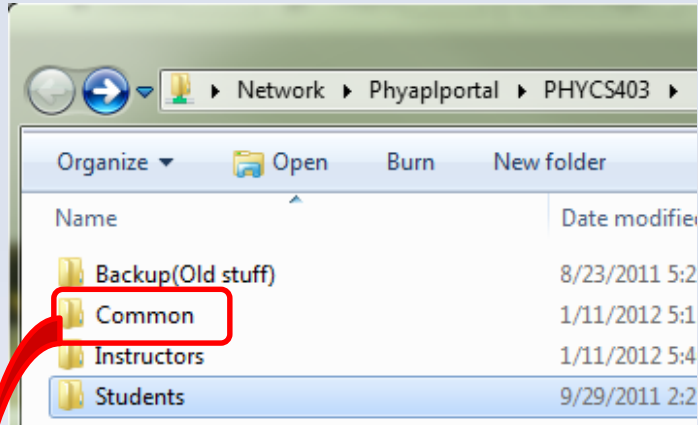
Where to exchange, store and retrieve course information. (i) *Your data, projects, tables etc*

An example of the “smart” structure of folders containing the raw data and data analysis projects



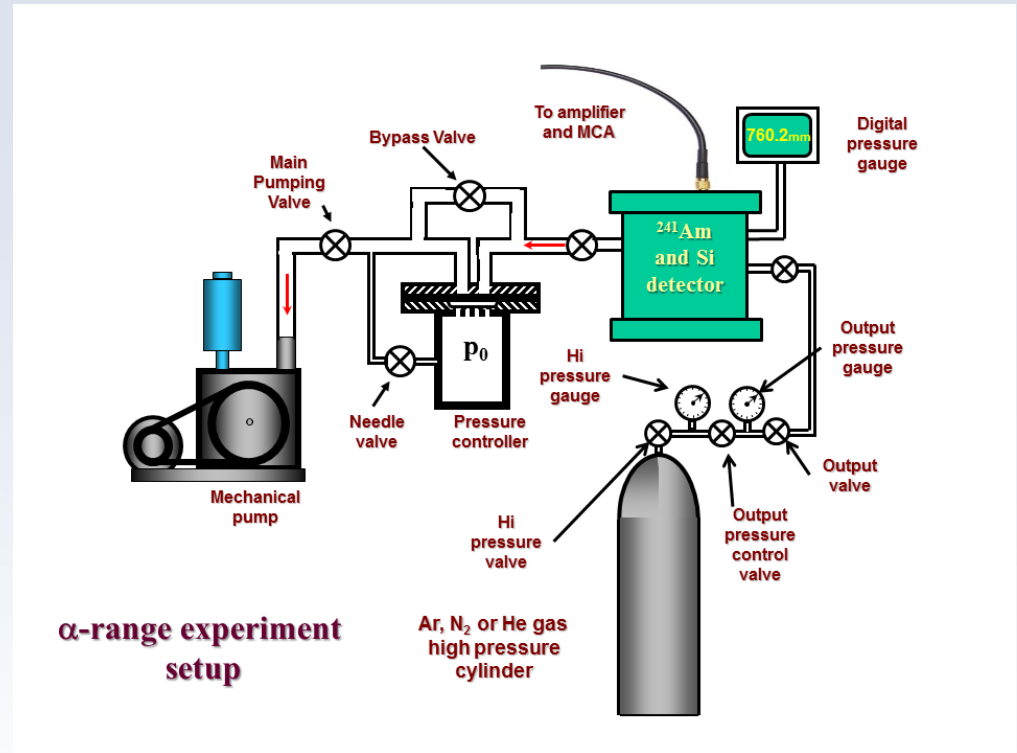
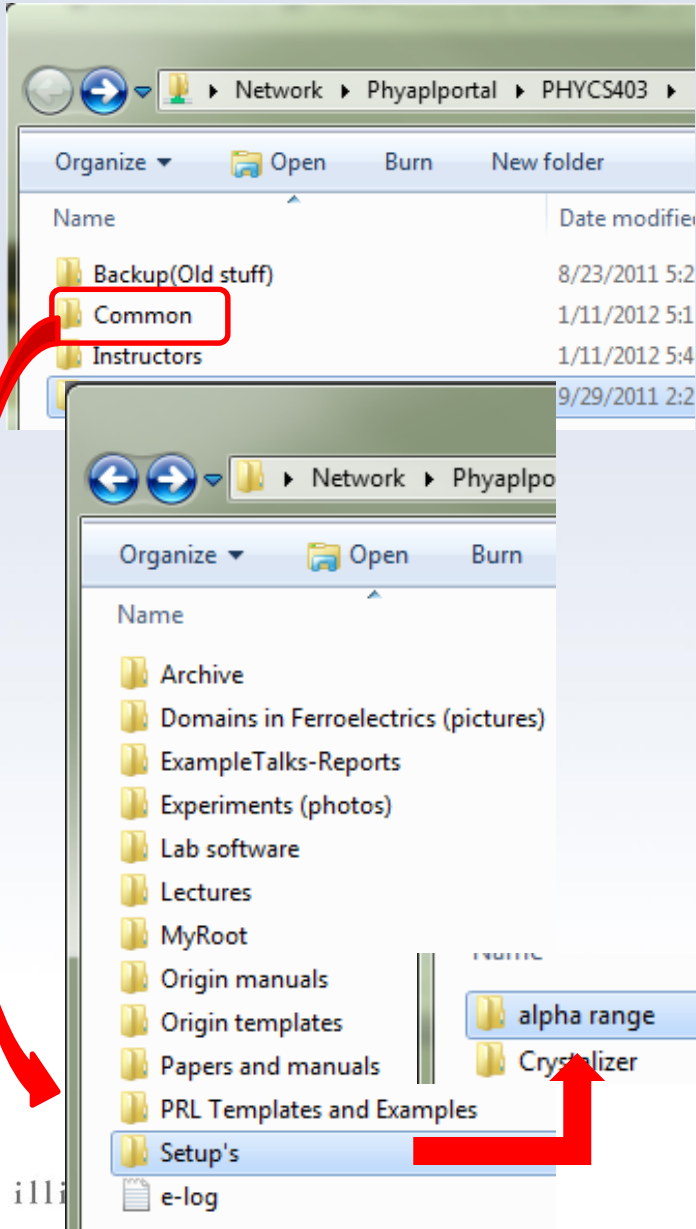
Where to retrieve course information.

Manuals, papers, setup diagrams and other useful materials



Where to retrieve course information.

Manuals, papers, *setup diagrams* and other useful materials

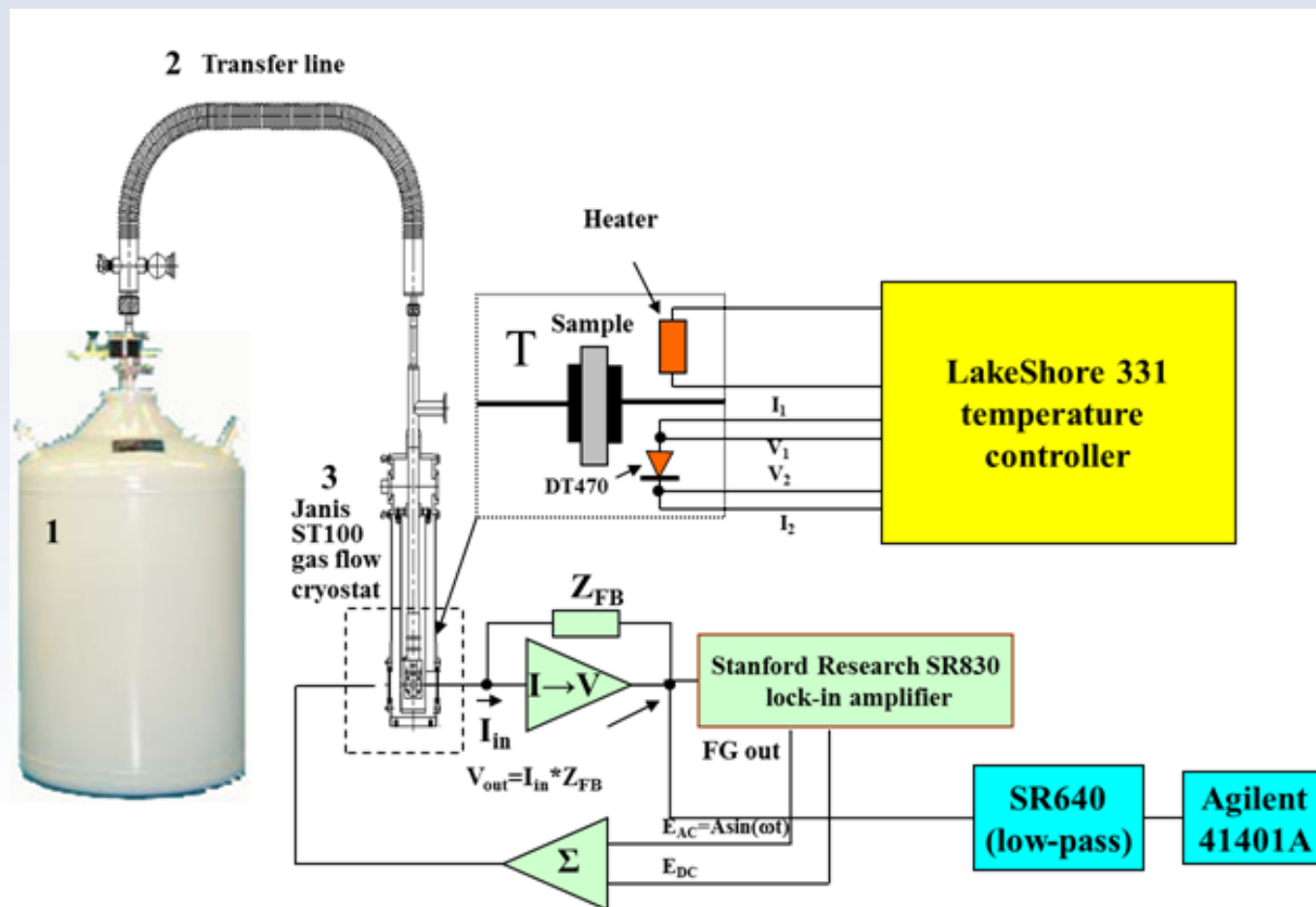


α -range experiment setup

α -range experiment setup diagram

Where to retrieve course information.

Setup diagrams – do not use cellphones to take the image of the setup from manual – for most setups we have PowerPoint projects with setups.



Where to retrieve course information.

Manuals, papers, setup diagrams and *other useful materials*

The image shows a Windows file explorer window with a directory structure. A red box highlights the 'Common' folder in the address bar, with a red arrow pointing down to the main file list. The file list contains the following items:

- Archive
- Domains in Ferroelectrics (pictures)
- ExampleTalks-Reports
- Experiments (photos)
- Lab software
- Lectures
- MyRoot
- Origin manuals
- Origin templates
- Papers and manuals
- PRL Templates and Examples
- Setup's
- e-log

Red arrows point from these items to the following text boxes:

- Archive: Some old stuff (not very useful)
- Domains in Ferroelectrics (pictures): Sample pictures of ferroelectric domains
- ExampleTalks-Reports: Examples of report and oral presentation
- Experiments (photos): Pictures of the setups of the experiments
- Lab software: Software including DAQ software for different experiments. Newest version of Origin is also there
- Lectures: P403 lecture notes
- MyRoot: C++ scripts for Root
- Origin manuals: Origin manuals + a very compressed version written by Eugene
- Origin templates: Origin templates (how to use them will be discussed in next lecture)

Connecting to the PHYS403 server

Connect to VPN following the instructions on the UIUC VPN website:

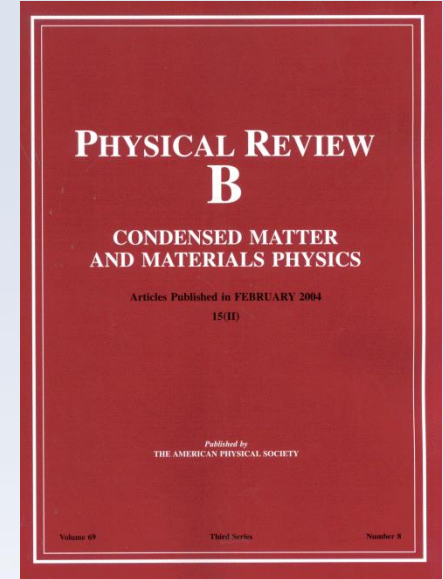
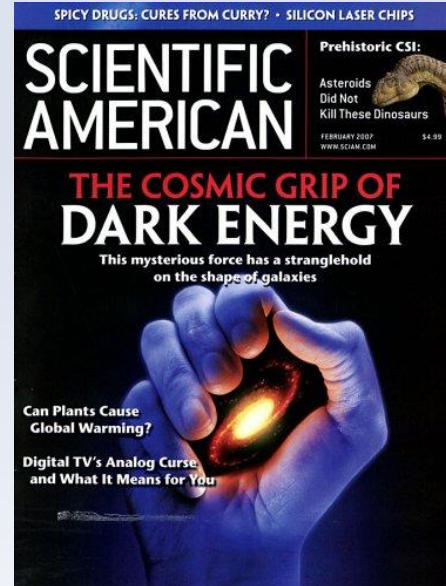
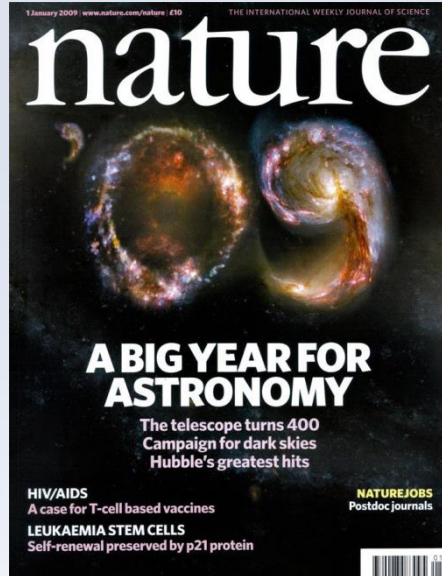
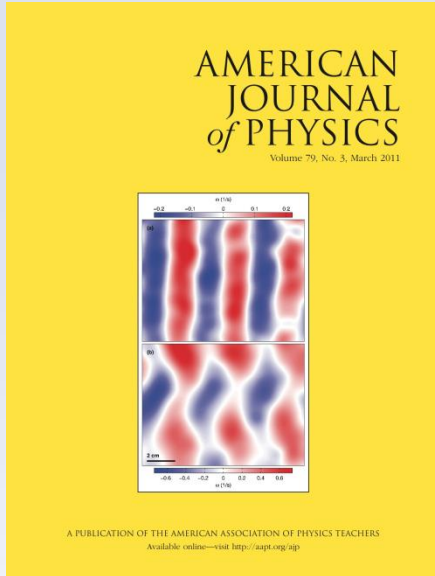
<https://techservices.illinois.edu/services/virtual-private-networking-vpn/download-and-set-up-the-vpn-client>

To connect to the PHYS403 Server:

- **Connect to the VPN first, then enter the following as the share to connect to:**
 - **Mac users:** Open Finder: Go: Connect to Server, type in address:
smb://engr-file-03.engr.illinois.edu/PHYINST/APL Courses/PHYCS403
 - **Windows users:** Open Windows Explorer, type in address:
\\engr-file-03.engr.illinois.edu\PHYINST\APL Courses\PHYCS403
or, if that doesn't work:
//engr-file-03.engr.illinois.edu/PHYINST/APL Courses/PHYCS403
- **When prompted for username and password, enter:**
“Uofl\[your netID]” and “[your netID password]”



“Journal club”



<http://ajp.aapt.org/#mainWithRight>

<http://www.nature.com/nature/index.htm>

<http://www.scientificamerican.com/>

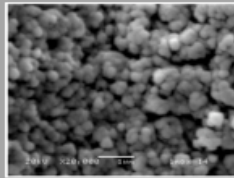
<http://publish.aps.org>
or <http://prola.aps.org/>

Time for presentations: Tuesday, Wednesday 3pm
Two speakers per day



“Journal club”

Walking with Coffee: Why Does it Spill?



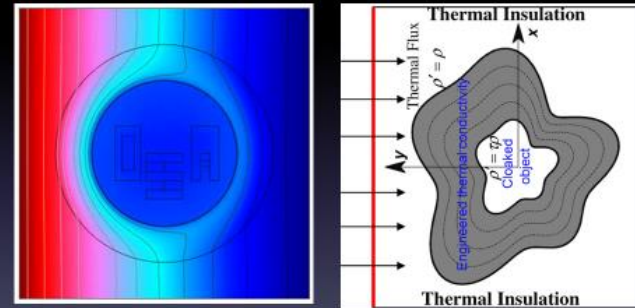
Growth of Diamond Films from Tequila

J. Morales^{1,2}, L. M. Apátiga², V. M. Castaño²

1. Facultad de Ciencias Fisico Matemáticas, Universidad Autónoma de Nuevo León
2. Centro de física Aplicada y Tecnología Avanzada, Universidad Nacional Autónoma de México



Fabrication and Characterization of Ultrathin Three-Dimensional Thermal Cloak



(Credit: Guennea)

Student #1

University of Illinois at Urbana-Champaign

The Physics of Beer Tapping

PRESENTATION BY JOSEPH MIRABELLI

JAVIER RODRÍGUEZ-RODRÍGUEZ, 1,* ALMUDENA CASADO-CHACÓN, AND DANIEL FUSTER

1 FLUID MECHANICS GROUP, CARLOS III UNIVERSITY OF MADRID

2 CNRS, UNIVERSITÉ PIERRE ET MARIE CURIE

“Journal club”

Journal Access

If you cannot access journal papers using VPN, go to UIUC’s library proxy test site and enter the address of the paper you want to read:

<http://www.library.illinois.edu/proxy/test/>

Recommended journal websites

- **American Physical Society Journals:** <https://journals.aps.org/about>
- **Nature:** <http://www.nature.com/nature/index.html>
- **Science:** <http://www.sciencemag.org/journals>
- **American Journal of Physics:** <http://scitation.aip.org/content/aapt/journal/ajp>



e-logs: First a brief tour ...

<https://elog-teach.physics.illinois.edu/>

The screenshot shows a web browser window with two tabs: 'Courses | PHYSICS ILLINOIS' and 'PHYS 403 :: Physics Illinois ...'. The address bar displays 'https://courses.physics.illinois.edu/phys403/su2018/'. The page content includes a left-hand navigation menu with items like 'Home', 'Course Schedule', 'Gradebook', 'Course Description', 'Course Grading', 'Contact Information', 'Experiment Information', 'Lectures', 'Oral Presentations', 'References', 'E-LOG', and 'Section Information'. A yellow arrow points to the 'E-LOG' link. The main content area features the title 'PHYS 403 Summer 2018', a 'Home page' link, an 'Announcements' section, and a 'Welcome' message. A 'Please login' overlay is positioned on the right, containing input fields for 'Username' and 'Password', a checkbox for 'Keep me logged in on this computer for the next 31 days or until I log out', a 'Register as new user' link, and a green 'Submit' button.



e-logs: First a brief tour ...

<https://elog-teach.physics.illinois.edu/>

Registering as a new user

Please login

Username

Password

Keep me logged in on this computer for the next 31 days or until I log out

[Register as new user](#)

Submit

Modern Physics Lab	
Logbook	Entries
phys497EVC-2017	
PHYS 497 EVC Spring 2017 PHYS 403 Summer 2017 Semester	1
PHYS 497 EVC Summer 2017 PHYS 497 EVC Summer 2017 Semester	0
PHYS 497 EVC Fall 2017 PHYS 403 Summer 2017 Semester	4
phys403-2018	
Physics 403_Spring 2018 PHYS 403 Spring 2017 Semester	305
Physics 403 Summer 2018 PHYS 403 Summer 2017 Semester	1
phys403-2017	
PHYS 403 Spring 2017 PHYS 403 Spring 2017 Semester	319



Entering the e-Log ...

The screenshot shows a web browser window with the following elements:

- Browser tabs: Courses | PHYSICS ILLINOIS, ELOG Physics 403 Summer ..., Download and Set Up the ...
- Address bar: <https://elog-teach.physics.illinois.edu/Physics+403+Summer+2018/>
- Navigation links: Selection Page, [phys497EVC-2017](#), [phys403-2018](#), [phys403-2017](#), [phys403-2016](#), [phys403-2015](#), [phys403-2014](#), [phys403-2013](#), [Physics 403_Spring 2018](#), [Physics 403 Summer 2018](#)
- Page title: PHYS 403 Summer 2017 Semester, Page 1 of 1
- Navigation links: [New](#) | [Find](#) | [Login](#) | [Logout](#) | [Admin](#) | [Config](#) | [Help](#) | [HelpELCode](#)
- View options: [Full](#) | [Summary](#) | [Threaded](#)
- Table of posts:

ID	Date	Author	Experiment	Post Type	Subject	
1	06/08/18 14:14	Eugene Colla	General	Test	Welcome to Modern Physics Course	hello,



e-logs: First a brief tour ...

How to use it

- **Pause and summarize your work at natural stopping points in the action. This is useful for particular findings and measurement sequences.**
- **Along the way, save data, plots, scope shots to a temporary folder on your desktop.**
- **Near the end of the class, make a “Shift Summary” providing a rather complete overview of the highlights of your work. There, you can upload your plots, scope shots, etc. and describe the data**



e-logs: Making a post ...

- **Create a New Post**
- **To create a new post, click "New" from the menu bar.**
- **Fill in the *Author, Experiment, Post Type, and Subject***

If the post is written by more than one person, use a comma separated list.

Be sure the Author name is the same you used when registering so that you can edit/delete the post if necessary.



e-logs: Making a post ...

Author:	Your name and your partner's name
Experiment:	General
Post Type:	How-To
Subject:	Day [#]: brief description of work

Goal: Be specific. Not, "Learn about experiment," but, for example, "In helium below temperatures of 2.17K, a second sound due to thermal effects becomes measurable. We will measure second sound using a resonant cavity..."

Settings / Equipment Notes: Note important environmental and experimental parameters such as atmospheric pressure, settings on equipment, etc.

[Time Range 1]: Give time range, not just "before tea."

- Note important steps and results
- Include plots, photos, or scope shots in attachments below
- Use bullet points to make it easy to read

[Time Range 2]: ...

Conclusions & Future Plans: What did you find and what is the next step? Be specific. Not, "We measured decay times," but, for example, "Ruby #2 sample with higher concentration chromium was observed to decay with a form..."