

OPTICAL PUMPING

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Watch the Optical Pumping Video first <http://128.32.210.103/OPTICAL-PUMPING.wmv> , then Watch the Error Analysis video, an introduction to error analysis <http://128.32.210.103/Introduction-to-Error-Analysis-New.wmv>

Student's Name _____

Partner's Name _____

Reprints and other information can be found on the **Physics 111 Library site**, <http://physics111.lib.berkeley.edu/>

Pre-lab Discussion Questions and Staff Sign Off

It is your responsibility to discuss this lab with an instructor on the first day of your scheduled laboratory period. This signed sheet must be included as the first page of your report. Without it you will lose 1/3 of a letter grade. You should think about and be prepared to discuss at least the following questions before you come to lab:

1. What is optical pumping? Draw qualitative energy level diagrams for Rb85 and Rb87 showing fine, hyperfine, and Zeeman splittings. Show the transitions between these levels that are important to this experiment. Include these drawings in your write-up. (Do not draw an energy level diagram of a hypothetical atom as described in "Scientific American;" keep your treatment specific.)

For our rubidium system, what is the pumping process? Where is the pumped level? Where is the RF transition?

2. Why do we modulate (vary) the external magnetic field? How would we take data if the field were not modulated?

3. How will you determine the resonance frequency? How can you best estimate the error? Will the modulation amplitude affect your result? What data will you take, and what plots will you make?

Staff Signature _____ Date _____

Completed on the *first* day of lab? (circle) Yes / No**Mid-lab Questions and Staff Sign Off**

On day 2 of this lab, you should have successfully produced a plot of frequency versus current for at least one rubidium isotope, and have made an estimate of the earth's magnetic field. Show them to an instructor and ask for a signature.

Staff Signature _____ Date _____

Completed on the *second* day of lab? (circle) Yes / No**INCLUDE THESE SHEETS AS THE FIRST PAGES OF YOUR REPORT**

Physics 111 Advanced Lab Student Evaluation of Experiment

Now that you have completed this experiment, we would appreciate your comments. Please take a few moments to answer the questions below, and feel free to add any other comments. Since you have just finished the experiment it is *your* critique that will be the most helpful. Your thoughts and suggestions will help to change the lab and improve the experiments.

Please be as specific as possible, using both sides of the paper as needed, and turn this in with your report. Thank you!

Experiment name: _____ Date: _____

How was the write-up for this experiment? How could it be improved?

How easily did you get started with the experiment? What sources of information were most/least helpful in getting started? Were the reprints appropriate? Did the Pre-lab discussion help? Did you need to go outside the course materials for assistance? What additional materials could you have used?

What did you like and/or dislike about the experiment?

Did you like the WIKI or does it need improvement? How?

Would you recommend this lab to fellow student? Why or why not?

What advice would you give to a friend just starting this experiment?

How would you rate the Physics 111- Lab WEB sites? (1 = poor; 5 = good.)

1 2 3 4 5

Please circle the abbreviations of the other labs you have done.	Overall quality of this experiment?				
ATM BMC BRA COM CO ₂ GMA HAL HOL JOS	1	2	3	4	5
LIF LLS MNO MOT MUO NLD NMR OPT	Poor		Average		Good
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Thank you from the 111-Lab Staff