

ANG-MOM

Angular Momentum and Rotating Systems

revised July 27, 2011

(Students in PHYS 123 will do this experiment; PHYS 115 and 121 students will instead do the Simple Harmonic Motion laboratory.)

Learning Objectives:

During this lab, you will

1. communicate scientific results of a collaboration in writing.
2. estimate the uncertainty in a quantity that is calculated from quantities that are uncertain.
3. develop creative problem-solving skills.
4. test a physical law experimentally.

A Very Free-Form Lab

This lab is designed to be even more free-form than the earlier lab on 2D-collisions. In fact, part of the project is to design the experiment yourselves, within your groups. The main guideline is that you should propose a measurement or set of measurements on a system involving rotational dynamics—torque, angular momentum, moment of inertia, etc. We don't want to get too specific because we don't want to limit your creativity. The centerpiece of equipment that will be provided is the wheel from the RKE experiment. You will also have available all of the other equipment from the lab, such as masses, carts, pulleys, springs, and computer-based data taking. If there are other items that you need, let us know in advance and we will try to supply them. In addition to designing your experi-

ment, you will need to work out the theory, make predictions on the outcome(s), devise an experimental procedure, carry out the experiment during the 3-hour lab period, analyze the results, draw a rigorous quantitative conclusion including analysis of the relevant uncertainties, and submit a written paper. All aspects of the assignment are to be done in your group; the break down is:

Abstract and Equipment List:

Due *the Monday right after the RKE lab*. Turn in a one-paragraph description of the experiment, the relevant principles, and the expected outcome. Also include a list of the equipment that you will need, calling special attention to anything that we have not seen in the labs before (that we may need to specially provide.) We will return this assignment to you as quickly as possible, especially if we think your approach is not practicable.

Procedure:

Due *the Friday before your Ang-Mom lab*. Turn in a detailed write-up of the theory and background, apparatus, experimental procedure, and planned analysis method. The level of detail should be similar to the lab manual pages for past experiments. This document will serve as your working plan during the actual lab period. Parts of it will naturally carry over to your written paper and may be re-used or modified where appropriate.

Perform Experiment:

Regular lab period. Choose one lab notebook to use for recording. Turn in the notebook carbons at the end of the period.

Written Paper:

Due *a week after you perform the lab*. Turn in a single group-written paper in the usual drop box. The paper should follow the usual format.

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