

## Tech Report Topic Guidelines

## Physics 50

### Guidelines for selecting a topic:

\*The purpose of the tech report is to give you experience in defining a question, carrying out a procedure to address that question efficiently and quantitatively, and explaining the entire logical sequence in an oral presentation.

*\*The tech report is not a senior thesis.* You have four hours in lab, and you may have to share the apparatus with another group. Choose a specific, relatively simple question that can be posed in quantitative terms and answered via an experiment you will have time to carry out. Your question can be a re-working (hopefully in some better way) of a problem you encountered when doing the experiment for the first time (perhaps your improvements could turn into the standard lab procedure in future years!). It can be a detailed look at one small aspect of the original experiment. It can also be a totally new question investigated on the original apparatus, but make sure you will not run out of time if you take this approach.

### Some ideas if you need inspiration:

#### Module 1: Acoustic Levitator and Speed of Sound

- \*Can you do the measurement better using other tools (hardware or software)?
- \*Measure the speed of sound in a totally different way. (We have microphones and oscilloscopes so you can measure the time interval between a sharp noise reaching two different microphones. You can also try measuring the speed of sound outdoors by creating a sound and a light at the same time and measuring the delay between arrival of those two signals at a known distance or distances away.)
- \*Measure speed of waves on a string at various tensions. (We have an apparatus that excites vibrations at a series of low-ish frequencies so you can view the standing wave and measure its wavelength directly.)

#### Module 2: Diffraction

- \*Can you do the Week 2 measurement(s) better using other tools or procedures?
- \*How does the reflected diffraction pattern from the LCD panel compare to the transmitted diffraction pattern?
- \*Use single-slit diffraction to measure the width of human hairs.
- \*Measure pixel structure/spacing of your phone.
- \*Measure spacing between grooves on a CD or DVD.
- \*Measure diffraction through a fabric like tulle as you stretch it.
- \*Measure diffraction through a colloidal crystal oriented at different angles.
- \*Imitate Rosalind Franklin's X-ray diffraction experiments on DNA, but using a small spring as your helix and a red laser instead of X-rays.

#### Module 3: Solar Panels

- \*Investigate an aspect of solar panel performance you didn't study in Module 3.
- \*What happens if you try to hook up two solar panels in series or in parallel?
- \*How does solar panel performance change with time of day or with season (real or simulated)?