

Physics PHYS 275
Experimental Physics Lab

Warm -Up Exercise: Measurement Uncertainties

Introduction

The purpose of this lab is for you to experience the "thought process" of a scientist making a measurement of a physical quantity. As I am sure you are by now aware, the uncertainty in a measured value is just as important as the value itself -- maybe even more important. In this exercise, to help you gain an understanding of why uncertainties in a measurement arise and how they can be estimated, you will be required to measure the distance between two points on campus. To do this, it will be necessary to consider several methods and select the one you think is most likely to yield the best results.

Procedure

You and your laboratory partner are to measure the distance between a point in the Science Building (the center of the outside doorknob of Dr. Zhao's office) and point Y in the Chapel (the tip of the preacher's finger). You may use any method you wish to measure the distance. You may measure inside buildings or from the outside if you believe that will allow a more accurate measurement. Consider several possibilities before deciding which method to use. If you need any pieces apparatus or equipment (e.g. rulers, string, protractors, lasers, satellites, bulldozers, etc.) to make your measurement, let me know, and I will try to obtain them (but I make no promises). As you make your measurement, keep in mind that you will have to estimate the uncertainty as well. Thus, you may wish to make several measurements (to obtain an average and standard deviation) and you may wish to record estimates of other uncertainties (e.g. how accurately can you measure the angle?) Also record any other systematic effects which will affect the results (e.g. is the measuring tape straight or does it bend or curve?) Be ready to give an estimate of these effects and to defend how the estimate was obtained.

Laboratory Report

No formal laboratory report is required for this initial measurement. Be prepared, however, to give an explanation of your measurement technique to the class, as well as present your results. After performing this measurement, you may have a deeper understanding of the problem. Thus, you should be prepared to make suggestions as to how your measurement could be improved in the future.