

# **Errors and Uncertainties**

(References to Bevington 3rd edition)

## Reading Assignment:

For Tuesday 1/22

A. Read and understand: 1.1, 1.2, 1.4, intro to chap 2, 3.1, 4.1

B. Read paying attention to key results and getting an overview of more formal aspects of the other material: 1.3, 2.2, 2.3

C. Read and understand: 3.2-3.4

## Written Assignment

For Tuesday 1/29

Do problems 1.1, 1.2, 2.10, 3.1, 3.5

## Ideas to be directly used in MPL

### *Section 1.1*

\*Accuracy vs precision

\*How you can waste time trying to improve precision

\*Detecting systematic errors

\*Random errors from instrumentation vs statistical errors innate to the physics

\*Sig Fig rules

### *Section 1.2*

\*How to get a good uncertainty

- estimate, measure, reconcile

\*Impact of uncertainties on conclusions

### *Sections 1.3 and 1.4*

\*What are parent and sample distributions

\*General definitions of the mean and standard deviations

### *Chapter 2*

\*4 specific distributions are commonly found

- they arise from different physics

- do not necessarily apply to instrumental uncertainties

\*Standard deviation for Poisson and Gaussian distributions

### *Section 3.1*

\*Instrumental vs statistical uncertainties

### *Sections 3.2-3.4*

\*Error propagation

### *Section 4.1*

\*Uncertainty on the mean

\*"A Warning About Statistics" (pp55-56)

\*When can we consider eliminating or discarding points

\*How to get an average when you are not equally sure of all points