Physics 343 Lecture # 3:
Temperature Scales + Statistics

Scheduling

For analysis weeks, we will hold optional "on call" office hours at lab times in addition to regular office hours. This week:

Sections A, B, & F: Baker, Serin 309W

Sections C, D, & E: Naudus, ARC 220

plus "regular" office hours Monday 3:20–4:40pm (Baker) and Thursday 3:20–4:40pm (Naudus).

Next Monday:

+ lab report # 1 due

+ observations for lab # 2 will begin

Data for lab #1

You should have received your data by email Saturday/Sunday.

Clarifications about observing scripts...

+ commands are case-sensitive! "sun n" and "Offset 0 10"
will not be recognized, and will be skipped

+ raster scan (npoint) corrections are overwritten when
a new "offset" command is issued

+ in some cases, fewer positions observed to avoid having
telescope run into (typically elevation) limits

Pointing

From seeing all of the raster scan data, it's clear that the telescope's pointing solution is not perfect and varies slightly with position on the sky.

Sun tended to show up at somewhat higher elevation and higher azimuth than expected, with sense and severity of pointing error depending on position.

Keep this in mind when you compare your datasets!
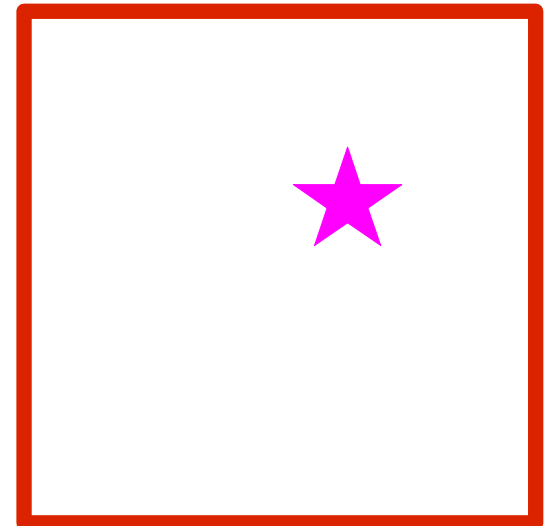
Do you need new data?

If you can do the analysis with the data you have, even if they don't look perfect, like your lab partners', etc., then NO. You may need to make (and explain) decisions about particular points that you ignore, but you will not be penalized for imperfect data.

If you cannot do the analysis with the data you have (the sun is not detected, the data are overwhelmed with noise, etc.) then YES– but you need to tell me by Friday to get a replacement dataset.

A reminder: loading data into Excel

Thans to Alex Merced (Rutgers '08):

(1) Copy the original raw data file into a safe backup version, since Excel actually works directly on any input file.

(2) Click File ➜ Open (set filter to select all files). Proceed to the "Text Import" wizard, and read in delimited input (deselect tab, select space as delimiter; treat consecutive delimiters as a single one).

(3) As a fallback, you can use the "Text Data to Columns" button to access the "Text Import" wizard.

Another reminder: content of lab reports

Do include:

    (1) a brief description of the purpose of the observations

    (2) a brief description of the observations (e.g., how many data points per offset? was the script modified in any way?)

    (3) a description of your analysis (number-crunching)

   **(4) a discussion of your results (plots and sketches help; consider your sources of uncertainty)**

Do not include:

    (1) the full script

    (2) the raw data

Write in active voice ("We did..."), and be faithful to the data!

Two tips for analysis

(1) The SRT output is an array of antenna temperature (units K). The observed antenna temperature is due to a combination of the Sun and of internal noise from the instrument.

(2) Remember that the typical shape of the spectrum is due to the instrument response rather than the Sun itself... so think carefully about how you want to deal with the end channels.
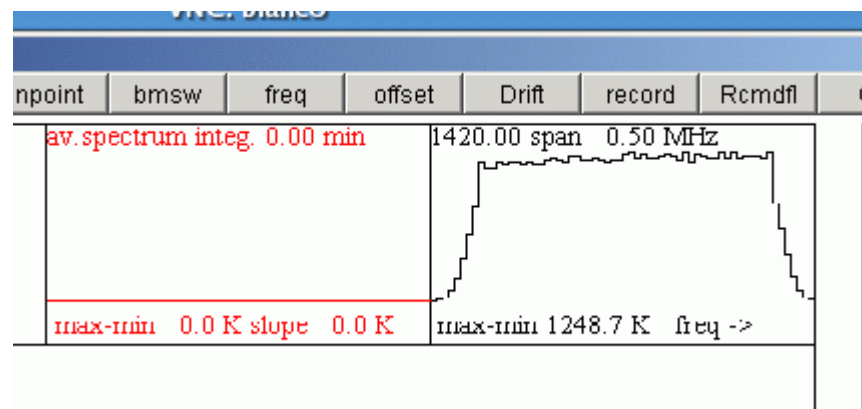
Errors: random and systematic

When we make a measurement, we do so imperfectly due to both random and systematic errors.

Random errors average away with more measurements. We often assume that these follow a Gaussian probability distribution (more on this in a moment).

Systematic errors do not average away. Getting more data doesn't always help!

Quiz