

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 & C: Baker, Serin 309W

Sections B, D, E, F, & G: Deshpande, Serin W332

plus “regular” office hours Thursday 5:00–6:20pm (Deshpande) and Friday 10:20–11:40pm (Baker).

Next Monday:

+ lab report # 1 due

+ observations for lab # 2 will begin

Data for lab #1

You should have received your data by email last Wednesday.

Clarifications about observing scripts...

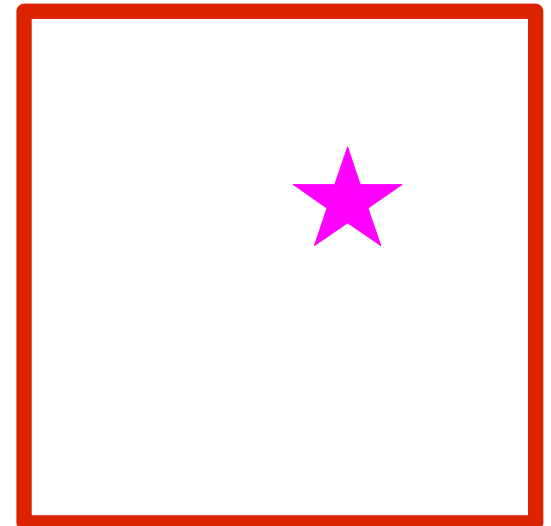
- + commands are **case-sensitive!** “sun n” and “Offset 0 10” will not be recognized, and will be skipped
- + raster scan (npoint) corrections are **overwritten** when a new “offset” command is issued
- + in some cases, **fewer positions** observed to avoid having telescope run into (typically elevation) limits

Pointing

From considering all raster scan data over the years, it seems the telescope's pointing solution is not perfect and varies slightly with position on the sky.

Sun tends 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? how was the script constructed?)**
- (3) a description of your **analysis** (number-crunching)**
- (4) a discussion of your **results** (plots and sketches help; consider your sources of uncertainty)**

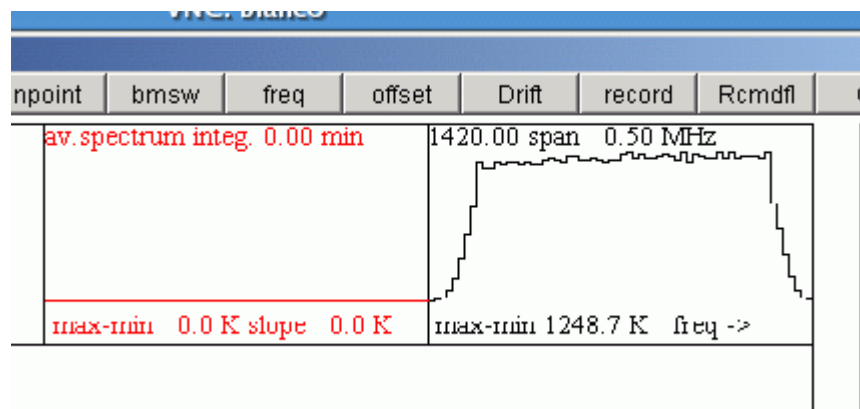
Do not include:

- (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's signal 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