

**(Astro)Physics 343 Lecture # 3:
Data Analysis & 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, & C: Sharon, Serin 332W

Sections D, & E: Baker, Serin 309W

plus “regular” office hours Monday 6:40–8:00pm (Baker) and Thursday 10:20–11:40am (Sharon).

Next Monday:

+ lab report # 1 due

+ observations for lab # 2 will begin

Data for lab #1

You should have received your data and the script(s) run to obtain them by email either yesterday or this morning.

Changes in some cases from observing scripts in lab...

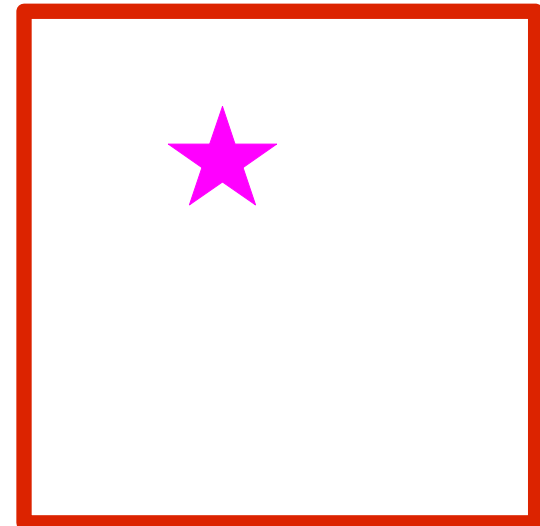
- + used : **Sun n** to incorporate a raster scan into the script; results written into data file, although the peak counts differ from what is displayed on screen
- + **fewer positions** observed to avoid having telescope run into (typically elevation) limits

Pointing

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

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

Keep this in mind when you compare your datasets!



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)**

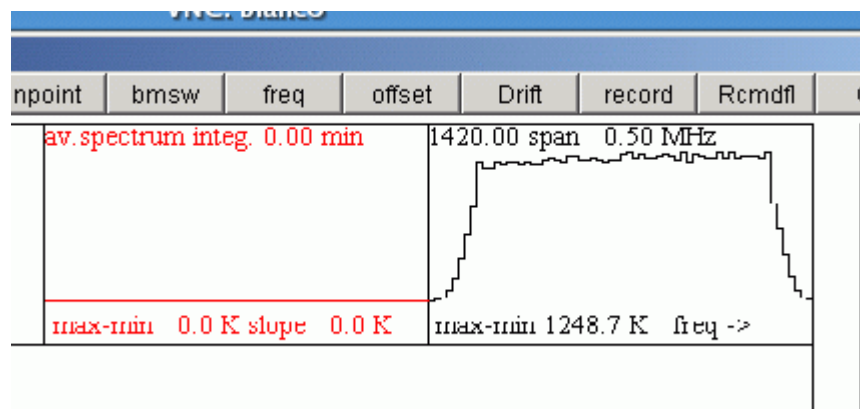
Do not include:

- (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) **Skip step 4** of the “Analysis” section of the lab instructions.
(This was orphaned from an earlier version of the lab when it actually referred to something meaningful!)
- (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!

Example: Bayesian redshift estimation

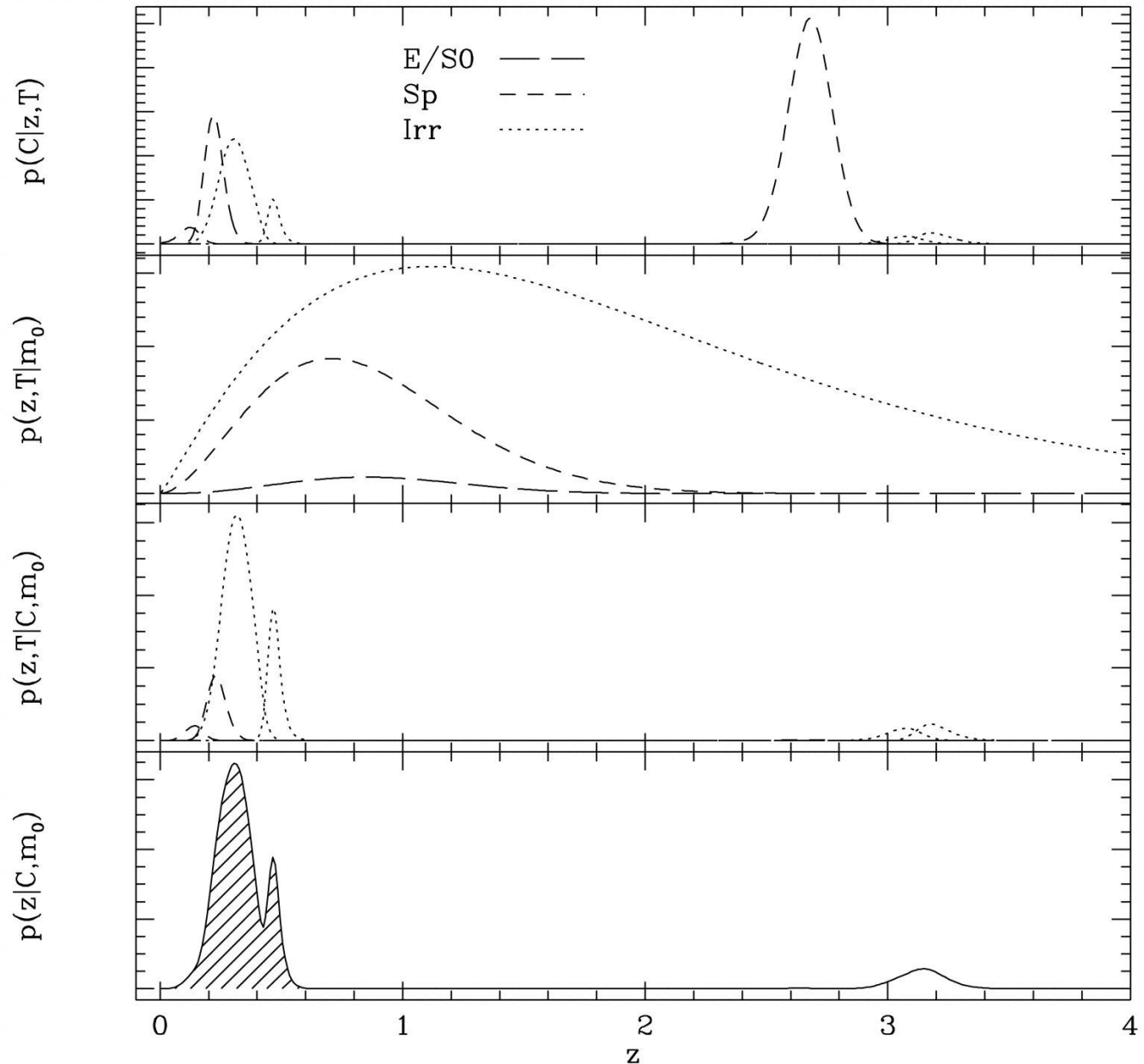
C = observed colors

z = redshift

T = type/template

m₀ = magnitude

Benitez (2000)



Quiz