MONDAY, 4/29/2019

- Bias frames - you're just reading out the entire chip
- Don't want the flat to saturate
- Read noise: defined as the mean error contributed to a pixel by the amplifier
- Counts = photon arrival
- Gain: the number of electrons per data unit produced in the conversion
- Don't want your longest exposure to be longer than a minute
- Low gain refers to a higher a value of e-/ADU
- Dark current: temperature, heat? ; more exposure, more dark current
    - Warmer = more electrons moving around so you'll read a dark current
    - This is something we will be measuring
- Standard deviation = the read noise

Question: What is linearity?
Non-Linearity: electrons vs. exposure times; when your data is no longer linear (something is too saturated)

Once something is saturated, you don't know *how* saturated it is, you just know that it is. You don't know if it became saturated from the last photon or 100 photons ago.

To convert from a read noise measured in ADUs to one in electrons, we must also measure the amplifier gain.

The larger the gain = the larger the measured pixel-to-pixel deviation.
Seeing is smaller = better spatial resolution

https://weather.apo.nmsu.edu/cgi-bin/weather.py
Current weather summary - tells us what is happening to all the telescopes on the mountain

Canadian Astronomy Data Centre

Binning is the process of combining charge from adjacent pixels in a CCD during readout.

DUE MONDAY, MAY 13:
Things we need in our Characterizing a CCD Report:

- Include a brief introduction and overview of what you did during the observations in the lab
- What controls were taken
- What the setup was, etc.
- Include the procedure followed in the analysis
- All calculations
- The results

- Some interpretation of those results
- Include any relevant tables/plots
- Answer all questions within the instructions

WEDNESDAY, 5/01/2019

Today, we began taking the data from the CCD. To do this, we essentially stood in the dark for a while messing with the camera while trying to figure out how to get bias images and flatfields.

First thing we did was collect three bias images. To do this, we had to put the exposure time to 0.120 s which was the smallest amount we could put it to. Normally for bias images, you want 0 seconds but the device's lowest amount is 0.120 s. Then we took the picture with the cap still on the camera. A bias frame just counts the pixels and presents us a picture with "no light".

After getting 3 bias images, we began finding a bunch of flat field images. A flat field image helps us correct future science type images. We turned off all the lights and tried to find the best angle for the camera where its shadow did not show in our images. It took us a really long time to do so but once we found the best angle (pointing the camera to the ceiling with a piece of white paper wrapped around it), we took a series of images with these exposure times: 1.0t, 0.9t, 0.8t, 0.7t, 0.6t, 0.5t, 0.4t, 0.3t, 0.2t, 01t, 0.05t, 0.025t, 0.0125t, 0.00625t, 0.003125t, and 0.0015625t. t = 60 seconds. We also took 2 of the same flatfield images at 30 seconds. One thing we wanted to make sure was correct was our value for AUD. According to the packet, we needed an AUD of 25,000 or about that number. We eventually were able to get about that number for each flatfield image. We used a histogram to look for that information.

FRIDAY, 5/03/2019

Today, I am working on analyzing our data!

I began with looking through the images through ds9 and analyzing what we got. Then I started working on python so I could figure out the width and height of the images as well as the mean, the number of pixels, and the standard deviation of the images. So far I only got the Bias_1 but I will continue on Monday!

Also, some bad news, we didn't get any saturation so we have to go back to the dark room on Monday to get some more data. (rip)