ASTR 337: Homework 8

Due Date/Time: 7pm, Wednesday, November 13th 2019

Problems

1. **Data Reduction:** Reduce one of the standard star datasets taken during your assigned Project Observing Night (Oct. 24, Oct. 25, or Nov. 6, 2019) in one band (B, V or R). You should go through the full bias-subtraction, dark-subtraction, and flatfielding steps to create individual calibrated images of the standard star. **Bring your reduced images to class on Weds., Nov. 13th** (e.g., upload a single zip compressed file of FITS images to Google Drive - this is faster than uploading/downloading individual FITS files).

2. Using your centroid calculation function from last week's Homework 7, write another function that generates registered images from the calculated shifts. Your function should take as input: (a) a list of images in a given filter, (b) a list of offsets, and (c) a padding size. Your function should output: (a) registered images that are saved as new FITS files, and (b) a stacked median combination of those images. Use the padding technique introduced in Lab 7 and the median combination code that you wrote in Lab 5 as a guide.

3. Use your function from Problem 1 to find the centers for, register (i.e., align) and combine your calibrated standard star images, creating a final image in one filter (that is, a single stacked B,V, or R band image). **Upload this final single FITS image to Moodle, as well as your Jupyter Notebook.** If you pad your images with NaNs, you will need to use the function `np.nanmedian` rather than median to do the combination.

Pre-Lab Reading and Questions for Week 9

Reading

Please read the following section in Chromey:

- 9.5 - *Digital Aperture Photometry*

Reading Questions

1. Define photometry in your own words. What exactly are we measuring in this process, how is it performed, and how does it translate to the properties of an astronomical object?
2. Describe the considerations should be taken into account when selecting aperture size.
3. What are the differences between read noise, sky/background noise, and photon noise?