PHY517 / AST443: Observational Techniques

Homework 4

Here, we will first reduce some pre-taken images and will then do basic photometry by determining the number of photons detected from a star, and using the known magnitude of a reference star to find the target star's magnitude.

1. Complete the homework assignments in Tutorial 4.

   For the following steps, use "your" science frame from Tutorial 4.

2. Open the header to find out the gain.

3. Open the image in ds9 and identify the star at (300.236734, +22.658612). Draw a circular region around it that encompasses all the light from the star. Double-click on the region, and in the pop-up frame select "Analysis" and then "Statistics", which will show you a number of statistics of the pixels within the region. Consider which statistics are relevant for determining the flux from the star, and report them.

4. Draw an "Annulus" Region around the star (avoiding light from any objects). This region gives you an estimate of the background counts. Consider which statistics are relevant for determining the flux from the star, and report them.

5. How many photons from the star did this image register?

6. Repeat these steps for the star at (300.237300, +22.846978), which has a magnitude of $R = 7.50$. Given this information, what is the magnitude of "your" star?

7. Recall that after normalizing the flat-field, the pixel values in the masterflat should vary around 1.0 . Discuss why normalizing the masterflat is helpful.

8. *Bonus:* Calculate the uncertainty on the number of photons, and on the magnitude.