

### Pre-Lab 3

To be completed before embarking on Lab 3 itself

To become familiar with Skynet, watch the first introductory video at <http://user.physics.unc.edu/~reichart/lab1.htm>.

1) Select an object of your choosing that is inaccessible, or nearly so, from our latitude here in Charlottesville (anything you want, but think about observability vs. telescope location and time of year and pick something interesting) and schedule a 60 second observation using the password and username supplied in class. **Make sure your last name appears as part of the “observation name” in Skynet.** Since your result will be archived on the Skynet site there’s no need to turn in any evidence of your scheduled observation. Make absolutely sure that you schedule only one 60 second exposure for a total time of 60 seconds. Pick the filter you find most interesting.

2) Lab 3 will be about determining the distance to a globular cluster using RR Lyrae variable stars. Find a couple of nearby (southern – because Skynet has the best access south of the equator) globulars that contain RR Lyrae stars and that would be good for observation with Skynet. Include a journal paper reference (or two) supporting your assessment of which clusters are good ones. Ultimately (that is, in Lab 3 itself), the entire class will work as a team to schedule observations of a globular cluster in order to determine its distance. With that dataset in hand you will work individually (but with collaboration with a few classmates for assistance where needed) to extract the light curves for at least one RR Lyra variable in the targeted cluster and determine the distance to the clusters.

3) Below is a representation of a star image in digital form. Estimate the flux of the star in counts. Explain your methodology in making this extraction. With what precision/uncertainty were you able to calculate this number? Note that the value “451” is meant to represent a cosmic ray hit in a single pixel and thus a bad value that needs working around. The peak of the star itself is “102”.

17	22	14	19	16	18	21	20	17	15
12	15	23	17	15	19	22	21	14	18
19	18	27	14	13	18	16	20	12	15
22	15	15	18	25	26	15	19	21	11
20	14	21	32	102	44	25	17	14	21
15	17	11	24	54	30	21	15	14	19
24	20	13	17	15	451	15	18	21	17
19	12	18	24	15	19	14	22	22	18
17	21	11	20	15	13	18	19	21	22
20	19	18	15	22	14	15	17	20	14

4) Download the FITS file `example.fits` at <http://faculty.virginia.edu/skrutskie/ASTR3130/labs/example.fits>). Become comfortable with displaying and stretching this image in DS9. For the three brightest stars use Aperture Photometry Tool (<http://www.aperturephotometry.org/>) to extract their fluxes and determine their relative magnitudes. APT is written in Java and should run on any platform. Note any fishy issues with the image or the flux extractions (there's at least one goofy characteristic to note). Find the faintest star on the image and try to estimate its magnitude relative to the brighter stars.

You will want to use a sky annulus to estimate the background so note that you should always go into "More Settings" and select "Model 2" and "Model B".