ATV
atv is an interactive display tool for astronomical images in IDL. We will use this tool to look at images of the sky and to do aperture photometry of stars for Lab 1. Unlike a lot of the data analysis we will do in this class, atv is run from the command line and used interactively.

The documentation for atv can be found:

http://www.physics.uci.edu/~barth/atv/

You will use this website to get help using atv.

To being playing with atv, first start an IDL session. To make things easier, start your session in the directory that you moved the two fits images to from my ASTR341_Data directory.

Looking at an image with atv
Read in a 15 arcmin x 15 arcmin image around the Mystery Star you will study in your first lab. The images we will study in the course will all be stored as .fits, .fits.gz, or .FIT files. These files can all be read in with the IDL function “MRDFITS”:

IDL> image = MRDFITS(“MysteryStar_POSS2.fits.gz”,0,header)

Read the documentation for MRDFITS using the IDL searchable help page in your web browser.

IDL> atv, image, header = header

Now practice using some of atv’s display functionality. Change the coordinate display so it shows the coordinates in Ra, Dec (degrees) in J2000 coordinates. Play around with zoom in/zoom out. If you click the center mouse button while hovering over an image, then the image will recenter on your mouse’s cursor. Try re-stretching the image by holding down your left mouse button and moving the mouse around the image. Try changing the image scaling from linear to log using the “Scaling” menu.
**Aperture photometry**
Aperture photometry is calculating the amount of light from a star that falls within a given aperture. In this case, a circle is drawn around a selected star and all of the light in that circle is added up. This amount of light is light from the star + light from the sky. Then an annulus around the star is used to find the amount of light per area from the sky, which is then multiplied by the area of the circular aperture subtracted from the light measured within the star’s aperture to find the amount of light actually measured from the star.

Find the Mystery Star from Lab 1 in the image. Hover the mouse over the mystery star and hit “p” to do your photometry. A window will pop up; study this window. Atv automatically selects 5 pixels for the star’s aperture and 10 and 20 pixels for the inner/outer annulus. You will need to change these values for your HW number 2 fake image, because the two stars are very close together.

What is the FWHM of the light coming from the star in pixels? Look at a radial profile of this object. Do you think the default values being use for the star’s aperture and the background aperture are good? Play around with the size of your circular aperture and background annulus. Select a relatively large background annulus and then use atv to measure the counts coming from the Mystery Star in 10 concentric radii. Record these counts, and then make a nice, labelled plot of Counts versus Aperture Size in IDL.

**Homework 2 vs. real images**
The image needed for your Homework 2 is /homes/bwillman/ASTR341_Data/homework2_fake_image.fits. By construction, the counts in each pixel of this fake image correspond to the actual number of photons recorded by each pixel. This is different than raw images of the sky which come off of the telescope in “digital counts”, which is directly proportional to the photon counts. The constant of proportionality for real images is called the “gain”.

**Note on planck_function.pro:** This is not related to atv per se. You can use the planck_function function that I’ve written in IDL to help you complete problem one for your homework 2 assignment. Please read the comments in that code carefully (all lines that begin with a semicolon are comments and are ignored by IDL). Those comments should get you a long way toward doing the calculation needed in your assignment.