Astronomy A305 - Modern Observational Techniques
Lab Assignment 11

Pretty Pictures from CCD Images

**Goal:** Continue to improve your IRAF and image processing skills. Use existing or new multi-filter data to produce a pretty color image that incorporates three filters of different wavelength. Develop your writing skills for

**What to hand in** - Prepare and hand in an article on the subject of color imagery in astronomy, along the lines of an article that might appear in *Sky and Telescope* or *Astronomy Magazine*. Your article should be understandable by someone with a general interest in but no special knowledge of astronomy. Include:
- A description of the observations and filters used.
- A description of how to produce a color image from three black and white images.
- A description of the object itself (written for the general public).
- A description of why you selected the particular filters used for each of your images and how those filters highlight particular aspects of the astronomical sources. How to your images help us visualize the physical reality of the astronomical object?
- A printed copy of your images
- A digital copy of your images. Images and captions will be posted on the course website.

An appropriate length is three typed pages, single spaced, 12-point font, with 1" margins, plus the images. You may work with partners to obtain the data for the lab, but your articles should be entirely your own. Be sure to review the general lab instructions on the "lab options" sheet.

**Making pretty pictures**
People love pretty pictures of astronomical objects, and in this lab, you will make pretty pictures!

Astronomers use filters to highlight specific emissions from astronomical objects. Filters might have broad passbands (e.g UBVRI) or narrow passbands isolating specific emission lines. For example, a B filter (blue) will highlight young, hot, blue stars, while an H-alpha filter will highlight sources that are emitting light in H-alpha, such as star-forming regions. Select which filter images you wish to include to highlight specific aspects of the sources in your color images.

For the source you have selected create **two different color images** that highlight different physical aspects of the source. You might choose to create one image that shows "natural" color and a second that highlights some particular aspect. Or you might create two images that highlight different aspects - young stars, old stars, H-alpha emission, reflected starlight, etc.
In the Lab9 subdirectory of the A305 directory, are images of a few extended objects taken with the WIYN 0.9-m telescope. These images have been bias-corrected and flat-fielded already. Other images are available in the Lab11 subdirectory. You may use any of these, obtain new data with the rooftop telescopes, or use other data with permission of the instructor. If you obtain new data with the rooftop telescopes or data from elsewhere, you will probably need to register it carefully to account for slight position shifts among the images.

An IRAF script is also available in the Lab11 directory. The script will allow you scale and combine the images. It will write an image into an "xv" window from which you can save the image as a jpg file.

Many of the images include unsightly artifacts. These can be removed with the IRAF task fixpix before you run the script. Fixpix can be run as an IRAF task or executed as part of the task ccdproc. The IRAF task imedit is also useful for fixing some blemishes.