

# Creating Color Images

## Preliminaries

The goal here is to create a color image from a set of images taken through three different filters. This requires the following steps.

1. Align and trim all images to the same size
2. Combine all the images taken with a given filter into one images
3. Determine a preliminary intensity level scaling
4. Combine the three images into one color image

### 1. Align and trim

The procedure for aligning the images is explained in the [2-Image-alignment.ipynb](#) exercise.

### 2. Combine all images in each filter

You may have several images taken with the same filter. You can combine all these images into one by simply writing a Python program to add them.

### 3. Determine a preliminary intensity level scaling

Each filter has a different response so we need some way to guess an initial scaling for the images. The most accurate way to do this would be to do photometry of some standard star in the image and scale each color to make that star the appropriate color in the final image. A crude way of doing the same thing would be to pick some arbitrary star in the image and attempt to make it look white. This won't give very accurate colors as we might pick a very red or very blue star, but at least it gives a starting point.

We can use **SAOImageDS9** to get the background level and the rough brightness of the star. Start by displaying your R-band image, then examine the pixel values in the image. You need to determine the sky background and the approximate brightness of a few stars in all three filters.

### 4. Combine the three images into one color image

You will do the rest of the processing in **SAOImageDS9**. Start by clearing out all the frames by choosing **Frame -> Delete All Frames**. Create an RGB frame by selecting **Frame -> New Frame RGB**. This will bring up the **RGB** window. Select **R** and open the image you wish to set to the red color using **File -> Open....** This will set this image to be red. It will actually appear red.

Scale the image by making sure **Scale -> Linear** and **Scale -> User** are checked. Then select **Scale -> Scale Parameters....** This brings up the **Scale Parameters** window showing a histogram. Adjust the scaling by entering numbers in the **Limits** boxes labeled **Low** and **High**. En-

ter the background level in the **Low** box and the peak star value in the **High** box. Repeat the process for the **G** and **B** images.

You will now have a color image, but it won't necessarily have the best scaling. You can select different frames to adjust by selecting **R**, **G**, or **B** in the **RGB** window then set the scale for each image in the **Scale Parameters** window. When you are happy with your image save it by selecting **File -> Save Image....** You will probably want to save the image as a **JPG** file with a high (>90%) quality factor.