AIP4Win2.0 Color Images Tutorial (Rev. 4-27-06)

This tutorial demonstrates the basic color operations of ***AIP4Win***.

The files used in it may be found in the Color subdirectory of the Tutorial directory on the CD-ROM. The files comprise a calibrated RGB image set of the Eagle Nebula, M16, taken by Neil McMickle of Stanhope, New Jersey, using a MX716 CCD camera and a set of RGB dichroic filters and an IR-blocking filter through a 4-inch fluorite apochromatic refractor. In this tutorial we will register four individual filtered exposures and combine them into a single, color image.

Step 1: Load the Component Images. Load the four images found in the Color Images tutorial directory. They consist of the following:

- M16B.fts: the blue-filtered exposure,
- M16G.fts: the green-filtered exposure,
- M16R.fts: the red-filtered exposure, and
- M16L.fts: a white-light exposure with an IR-blocking filter.

The white-light exposure is not required, and can be synthesized from the red, green and blue images; but using a separate, deeper white-light image will result in a more detailed final color image.

Step 2: Register the Images. Click on the *Multi-Image|Register Images…* menu item and the Image Registration Tool window will appear. Register the red, green and blue images using the white-light image (M16L.fts) as the master, just as we did in the Image Registration and Blinking tutorial.

Step 3: Invoke the Join Colors Tool. Click on the *Color|Join Colors Tool…* menu item and the Join Colors Tool window will open. (You will probably want to move this tool to the right edge of the screen so it won't obstruct your view of the image.) When the tool opens you will see a set of four drop-down list boxes labelled **Red**, **Green**, **Blue** and **Luminance**. Select, for the respective images:

M16R.fts for the **Red**,

M16G.fts for the **Green**,

M16B.fts for the **Blue**, and

M16L.fts for the **Luminance**.

Step 4: Create a Color Image. ***AIP4Win*** provides the capability of automatically balancing your color images. Create a color image using the color channels you selected by selecting the **Automatic Color** radio button and then clicking the **Make Color Image** button. A color image of M16 is created.

Step 5: Adjusting the Brightness. This image looks pretty dark. Select the

Automatic tab and set the **Image Brightness** control to ~ 0.993 and the **Histogram HiPoint** control to ~0.998, and click the **Refresh Current Color Image** button. The resulting image should look much brighter. Select the Adjuster tab and slide the Gamma slider to get a value of ~1.7 and click the **Refresh Current Color Image** button again; you will see that the faint detail is more prominent. Note that while we were doing this, the color balance remained unaffected. One of the powerful features of ***AIP4Win***'s color tools is the ability to adjust the chrominance components (hue and saturation) independently from the brightness component (luminance).

Step 6: Cleaning Up Color Artifacts. This image looks nice and bright, and there is a lot of detail in the background, but some of the stars have blue rings around their centers. Two things contribute to this: the chromatic aberration present even in an apochromatic refractor, and the fact that these stars are saturated. *AIP4Win* provides a useful tool for controlling these artifacts, the Highlight Saturation (Stars) Control. Adjust the **Highlight Saturation (Stars)** control to a value around 98% and click the **Refresh Current Color Image** button. You will see that the false color has been removed from the brighter stars (as well as from the brightest parts of the nebula). This can be adjusted by moving the slider down and clicking the **Refresh Current Color Image** button again until the star colors are pleasing, while leaving the color in the brighter parts of the nebula.

Step 7: Crop the Color Image. Quite often, there is an area around the image border in which the color channels did not overlap when they were registered, due to the shifting of the telescope between the color-filtered exposures. You can crop off the edges of the image using the **Crop Tool**. Just click on the color image and then click the *Transform|Crop…* menu item; the **Crop Tool** window will appear. Use the mouse to select the region you wish to keep and click the **Apply** button. A new image will be created from the selected region. You can now close the Join Colors Tool.

Step 8: Save the Color Image. When you are satisfied with your results, the color image you just created can be saved in a huge variety of formats. Just click the *File|Export…* menu item, and a dialog box will appear to prompt you for the file name and location. You can save your file in JPEG format for posting to the web, or in 8 or 16-bit TIFF format for import into PhotoShop. (When you plan on using 16-bit TIFF, be sure to check the **0 to 65535 (48-bit Color)** option in the **Output Range** selection on the Join Colors Tool before creating your color image.)

If you want to preserve the greatest flexibility for future editing of your image, it is recommended that you save it as a 32-bit floating point FITS file. This file format preserves the full dynamic range of your data along with all the color detail. The image can be reloaded any time later, and edited using the Color Image Tool.

Step 9: Later Adjustment of the Color Image. As you look at the color image you just created, you notice that the color in the nebula looks a bit too saturated, giving it an unnatural appearance. You can fix this with the Color Image Tool. Click on the *Color|Color Image Tool...* menu item to invoke the tool. You will see that it has a similar layout and most of the same controls as the Join Colors Tool, but it is intended to work on images where the color files have already been joined. Notice

that the icon in the upper left corner of your color image is itself in color. You will also notice that grayscale images have a grayscale icon in the corner. This feature helps you keep track of your image types—as not all tools operate on color images—and they will be grayed out on the menu and toolbar.

On the Color Image Tool, select the **Adjusters** tab. Slide the **Color Saturation** control down to a value of 0.91, and click the **Make New Color Image** button. A new image is created with a more realistic-looking level of saturation. If you slide the **Color Saturation** control all the way down to 0 and click the **Refresh Current Color Image** button, you will see that your image looks like a grayscale image, as you have removed all the color from it. You can just slide the slider back up to 0.91 and click the button again; your color image will be restored.

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