

# SESSION 4: 3-COLOUR NEBULA

In this session you will be making a colour image of a nebula. Make sure you follow all the steps.

## LOG IN TO OUR WEBSITE

1. Go to our website: [www.schoolsobservatory.org](http://www.schoolsobservatory.org) and click 'Login' at the top of the page.



2. Next enter the username and password that your STEM Club Leader will give you, and click the 'Log in' button.

*Write your username here:*

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Congratulations you are now logged in!

## GET THE IMAGES

1. If your STEM Club Leader hasn't already given you the data files, go to our website: [www.schoolsobservatory.org/discover/activities/3\\_colour\\_imaging](http://www.schoolsobservatory.org/discover/activities/3_colour_imaging)
2. At the bottom of the page there is a section called 'Data Files'.
3. There are three nebulae to choose from (Crab Nebula, Bubble Nebula, or Dumbbell Nebula). There is a set of three files for each nebula: each set contains **Red**, **Green**, and **Blue** files.
4. Choose one of the sets objects then right-click and save the set of red, green, and blue files to your computer (3 files in total).

## RUN THE SOFTWARE

1. Double click on 'LTImage' (it may be called 'LTImage.exe') to launch the software. Your STEM Club Leader will tell you where this is on your computer.



## OPEN AND COMBINE THE IMAGES

In the bottom right of the LTImage window there is an 'Image Selection' panel with four boxes. You are going to open your red, green, and blue files in the first three 'Image Selection' boxes. You will create your false-colour image in the fourth box.

1. First, select the circle next to the **number 1** in the 'Image Selection' panel. Click on 'File', then 'Open Data Image'. Find the location of your saved data files. Click on the one that has **'red'** in its name, then click 'Open'.



2. Next, select the circle next to the **number 2** in the 'Image Selection' panel. Click on 'File', then 'Open Data Image'. Find the location of your saved data files. Click on the one that has **'green'** in its name, then click 'Open'.
3. Then, select the circle next to the **number 3** in the 'Image Selection' panel. Click on 'File', then 'Open Data Image'. Find the location of your saved data files. Click on the one that has **'blue'** in its name, then click 'Open'.
4. Finally, select the circle next to the **number 4** in the 'Image Selection' panel. Click on 'Colour', then '3-Colour Image'. Click on the **'Make a new image'** button in the top-right panel.

The software has made a first-guess version of your false-colour image. It won't look very good yet and the main window will probably show a black image with a couple of small, bright 'dots'. Do not worry. This is normal at this stage!

## ALIGN THE IMAGES

The software has done its best to line up the red, blue and green images on top of each other. But it might not have done it perfectly. You need to correct this.

There is a panel on the right that contains the '3-Colour Image' tools. You will use the **'Zoom Preview'** window, the **'Working Colour'** buttons and the **'Alignment'** buttons.

1. Click on the circle next to the word 'Red' in the **'Working Colour'** panel. You are now working on the red image.
2. Try moving your mouse pointer over one of the bright 'dots' in your image and then "click" with the left mouse button. The **'Zoom Preview'** window will change to show the small piece of the image under your pointer.
3. Try and get your 'dot' close to the centre of the **'Zoom Preview'** window - you may find it easier if you hold down the left-button on your mouse and move the mouse pointer slowly over the image.
4. You might see that the red, green and blue 'dots' are slightly separate and not on top of each other. Use the **'Alignment'** buttons to nudge the red image up, down, left and right until it is under the blue one. This will make the 'dot' look more purple.
5. Next, move the green image so it is on top of the others. To do this, click the circle next to the word 'Green' in the **'Working Colour'** panel. You should see the background colour of the tool change to green.



- Use the **'Alignment'** buttons to nudge the green image so it is on top of the red and blue images. Your 'dot' should end up as whiter, smaller point. It's actually a star!
- Click on the **'Make a new image'** button in the top-right panel to save your progress and see your new aligned image in the main window.



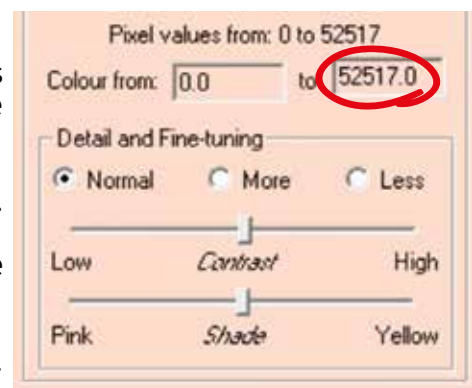
If you cannot find a suitable "dot", then do not worry – move on to the next step, which will help you to see more of your image. Then you can come back and align the images later.

## SCALE THE IMAGE

Don't worry if you are still a bit disappointed with your image – your image looks dark because the software is only showing you the very brightest parts of the image. You are now going to change the 'scaling' so you can see more of your nebula.

You will use the the **'Working Colour'** buttons, the **'Colour from'** boxes, the **'Preview'** window, and the **'Make new image'** button.

- Click on the circle next to the word 'Red' in the **'Working Colour'** panel. You are now working on the red image.
- Try changing the second value in the **'Colour from'** boxes to something about 10 times smaller (hint – divide the value by 10).
- Look at the **'Preview'** window. The image should change.
- Click on the **'Make new image'** button to see your image change in the main window.
- Now do the same thing for the green and blue images. Use the **'Working Colour'** buttons to change between the image and experiment by changing the values in the **'Colour from'** boxes.



If you have time, use the **'Contrast'** and **'Shade'** sliders to make more subtle changes. The best way to learn what these do is simply to try them!

Use the Display menu tools to Zoom in and out on the main picture, and the 'Zoom Preview' window to explore in detail.

## IMPORTANT

**There is no one correct way to scale your image – just experiment and explore with different values in the 'Colour from' boxes until you get a picture you like.**



## SAVE YOUR PICTURE

Make sure you save your picture, once you are happy with it. You can save as many different versions of your 3-colour pictures as you like, not just one!

1. Click on 'File', then click 'Save Picture'.
2. Choose where to save your picture.
3. Type in a name for your picture and click save.

### **Congratulations!**

You made a false-colour picture of a nebula! As you make more pictures you will get more and more used to the tool and all the different things it can do - the more you practise, the better you will get.

If you want to have another go with a different nebula, go back to the second step and download a different set of files.

You can also use Go Observing on The School's Observatory website to request your own sets of 3-colour data from the Liverpool Telescope.

