

Spitzer Space Telescope Research Program for Teachers and Students: Using Spitzer data in your classroom with MaxIm DL Software.

All instructions, files and the Spitzer Student Handbook can be downloaded at:
coolcosmos.ipac.caltech.edu/cosmic_classroom/teacher_research/products.shtml

Method for Retrieving Spitzer data

The Spitzer Science Center offers two programs: Spot and Leopard. If your computers does not have them installed, go to <http://ssc.spitzer.caltech.edu/propkit/spot> to download and install Leopard. Spot is a program that is used by astronomers to *plan* their Spitzer observing sessions and Leopard is used to search and access archived data. Each Spitzer observing session is identified by its program number. For example, the M81 program id number (pid) is 240, and the IC2118 pid is 235. Other pids can be found at the Spitzer website at http://ssc.spitzer.caltech.edu/roc/spitzer_programs.txt

To download archived material, click on the "Q" button for "query" in the top left corner. To search for your program id choose "none" under the top "target selection" area. Underneath, type in your program id number, and click okay. Select the wavelengths you wish to download by clicking on individual boxes and selecting to download "post BC-data". This process may take several minutes to several hours depending on the speed of your connection and the size of the file.

Wait for the download to finish. The Leopard subscriber is smart enough to pick up where it leaves off if there is a network hiccup mid-transfer. Unzip the files that Leopard puts on your disk.

Visualizing the project images (AOR) using Leopard

- 1) From Leopard's main window, select an AOR.
- 2) Under the Images menu, choose ISSA, and select a 5 degree image in the wavelength of your choice (25, 60, 100, 160 microns).
- 3) Under the Overlays menu, choose "current AOR on current image." Depending on your wavelength, each colored box may be one or two data frames as well as scads of associated files.

Method for Blinking Images in Maxim

- 1) Open at least two images and select the "Animate" feature from "View" in toolbar.
- 2) Select the images you wish to blink and click "Align". The same procedure for alignment (for more detailed instructions on alignment see "Creating Tri-Color Images").
- 3) A new, aligned image appears, with a speed, pause, and play tool bar. Use this feature to watch objects appear and disappear at different wavelengths!

Method for Creating Tri-Color Images in Maxim

- 1) Open three Spitzer images of the same region in three different wavelengths.
- 2) The program allows you to determine which color will be shown for which wavelength. Ensure that you know the name of each file and its wavelength.
- 3) Click on Color in the top toolbar, and select “Combine Color”.
- 4) The conversion type should be RGB. Choose the correct image for each wavelength. The standard is to choose blue for shorter wavelengths and red for longer wavelengths. The third (middle) wavelength is usually assigned G.
- 5) Click “Align”. A new window will appear. There are several align modes. These instructions are for Manual 2 star alignment (the other modes are less complicated). With this tool, a bullseye cursor appears. This will be used to select alignment stars. Unselect the “Auto-Next” box for beginners.
- 6) Choose a bright obvious star that appears in all three images. Select Star 1 and click on the bright star, selecting “Next Image” to scroll through until you’ve clicked on the same star in all three images. Then continue the same method, using Star 2. When complete, select “Overlay All Images” and then “OK”.
- 7) A new image will appear with your three images combined! If you wish to increase or decrease the weighting of certain colors, use the “Color Balance” or “Color Adjust” functions.

Method for Obtaining Flux

A simple spreadsheet program was created that converts MaxIm DL intensity values into magnitude and flux. It can be downloaded at the website above.

1. Open one Spitzer image. Note the wavelength.
2. In MaxIm DL, go to View on the tool bar, and select “FITS Header info”. Record the information listed under CDELTA 1 and CDELTA2. This is the Degree per Pixel scale of your image.
2. Go to View on the tool bar, and select "Information Window". Set the mode setting to “Astrometric”.
3. Move the cursor around on the image; note the information changing in the window. You will get the x,y for the cursor, and the x,y for the centroid. The centroid is just the center of the object you are on. Below the x,y value are the RA and DEC values.
4. Select "Aperture". The intensity value is found in the second row, second column. Note that the magnitude value given in MaxIm is not applicable for Infra-Red images, and must be converted.
5. Open the Excel Conversion spreadsheet. Enter the CDELTA1 and 2 values and the RA/DEC of your star in the appropriate yellow boxes. The Excel spreadsheet will convert your measured intensity into flux (Janskys) and magnitude.
6. This information can then be used to produce an SED (Spectral Energy Distribution).