

Taking spectral profiles with Fv

A simple user guide

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Using my simple spectroscope (<http://users.sch.gr/pbazanos/spectroscopy/en/files/spectroscopy2.pdf>) you can take the spectral profiles of the taken spectra using the procedure below.

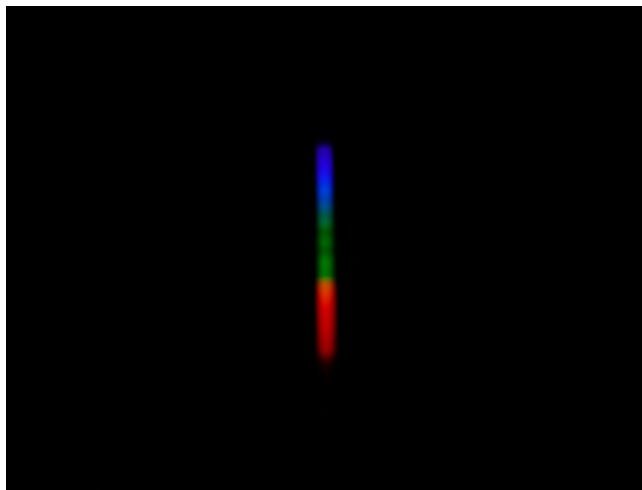
First you need:

1. An image editor that can save image files in Flexible Image Transport System format (*.fit, *.fits). The Gimp is a very good choice for this.
2. The Fv fits editor (http://heasarc.nasa.gov/lheasoft/ftools/fv/fv_download.html).

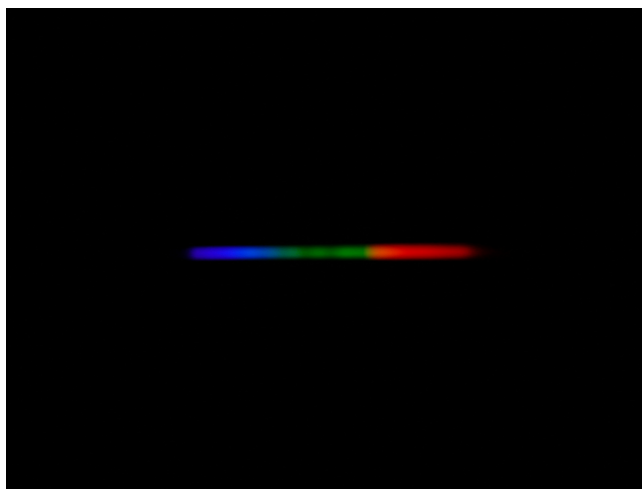
Once you have the above tools, proceed as follows.

A. How to convert image taken with simple spectroscope in fits format.

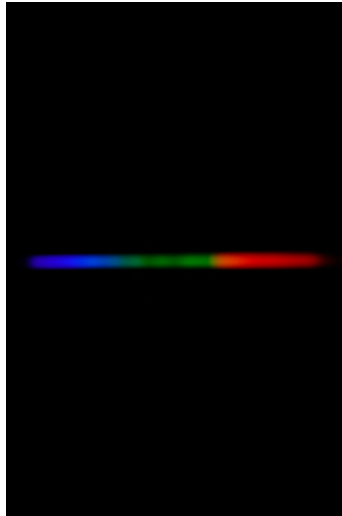
1. Open the image file (usually in JPEG format) using the Gimp. Suppose the image has 2559x1920 pixels. You should see something like the picture below.



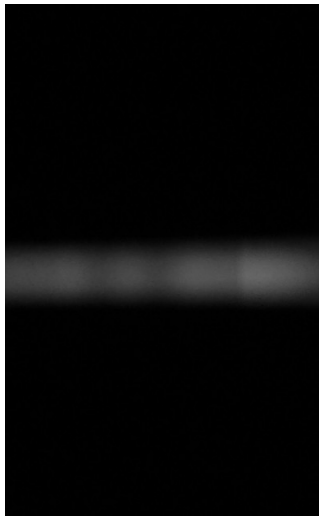
2. From the Gimp menu do: *Image* → *Transform* → *Rotate 90° counter – clockwise* to take the spectrum a more relevant position. The image now is 1920x2559 pixels. You should see the picture below.



3. Crop the left and right black areas (i.e beyond blue and red) to reduce the size of the fits file. After cropping the image is 996x2559 pixels (of course, you can crop in a different way). You should see the picture below.



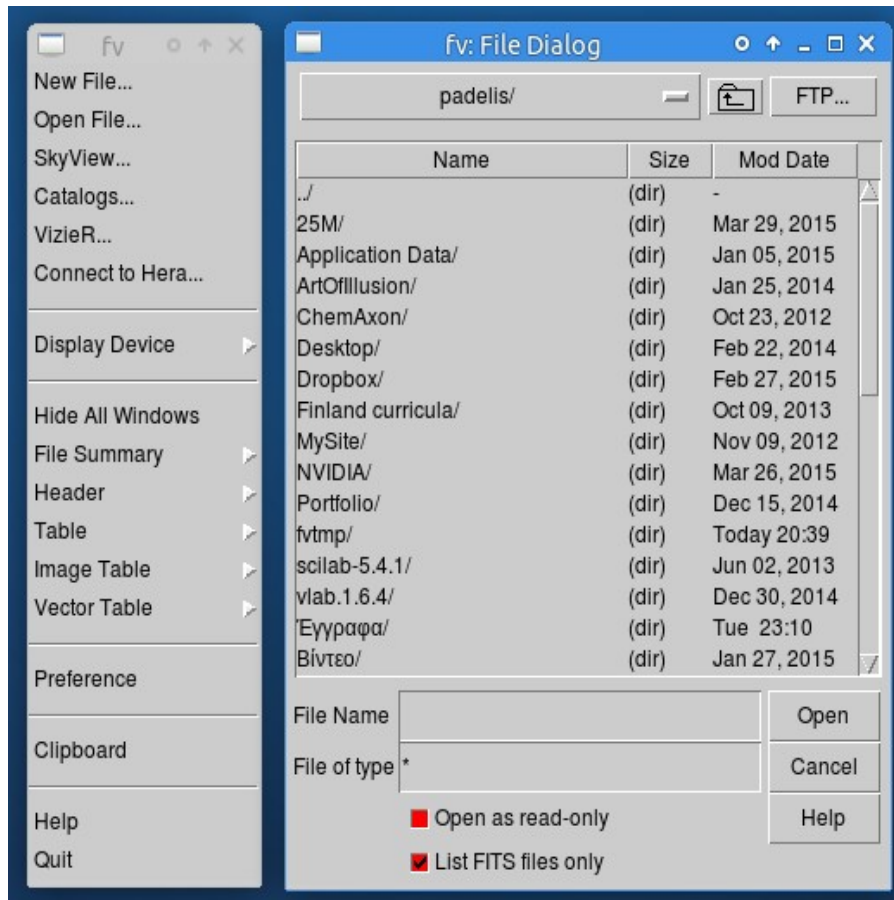
4. If you have to manipulate many spectral images, you should take care to crop exactly the same portion from all the images, so the spectrum area (i.e the coloured area) to remain in the same position.
5. From the Gimp menu do: *Colors* → *Desaturate...* and in the *Desaturate* window choose shade of gray based on Luminosity and click OK. You should see the picture below.



6. From the Gimp menu do: *File* → *Export As...* (or *Save As...* in older versions) and export in fits format. This file is that you need to continue with Fv.

B. How to take spectral profile with Fv.

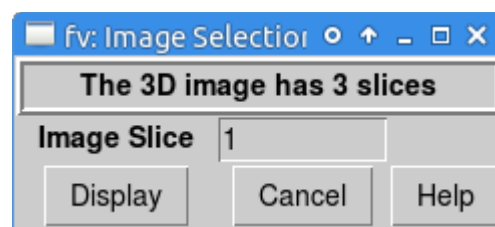
1. Run Fv. It usually opens with File Dialog opened. Otherwise, choose *Open File...* to open File Dialog. You should see something like the picture below.



2. Open the fit file. You should see the Summary of xxx.fit file window.



3. Click on Table button and you should see the Image Selection dialog.



4. Click on Display button to open the Image window that shows a table with the data stored in the fit file.

fv: Image[1] of fit_spectrum.fit[0] in /home/padelis/Επιφάνεια εργασίας/Fv guide/

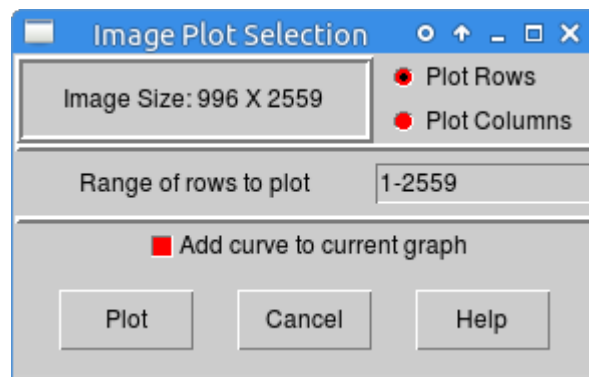
File Edit Tools Help

	1	2	3	4	5
2559	0.000000000E+00	0.000000000E+00	1.000000000E+00	1.000000000E+00	1.000000000E+00
2558	0.000000000E+00	0.000000000E+00	1.000000000E+00	1.000000000E+00	1.000000000E+00
2557	0.000000000E+00	0.000000000E+00	0.000000000E+00	1.000000000E+00	1.000000000E+00
2556	0.000000000E+00	0.000000000E+00	0.000000000E+00	1.000000000E+00	1.000000000E+00
2555	1.000000000E+00	1.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00
2554	1.000000000E+00	1.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00
2553	1.000000000E+00	1.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00
2552	1.000000000E+00	1.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00
2551	1.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00
2550	1.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00
2549	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00
2548	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00
2547	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00
2546	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00
2545	0.000000000E+00	0.000000000E+00	1.000000000E+00	0.000000000E+00	0.000000000E+00
2544	0.000000000E+00	0.000000000E+00	1.000000000E+00	0.000000000E+00	0.000000000E+00
2543	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00
2542	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00
2541	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00
2540	1.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00	0.000000000E+00

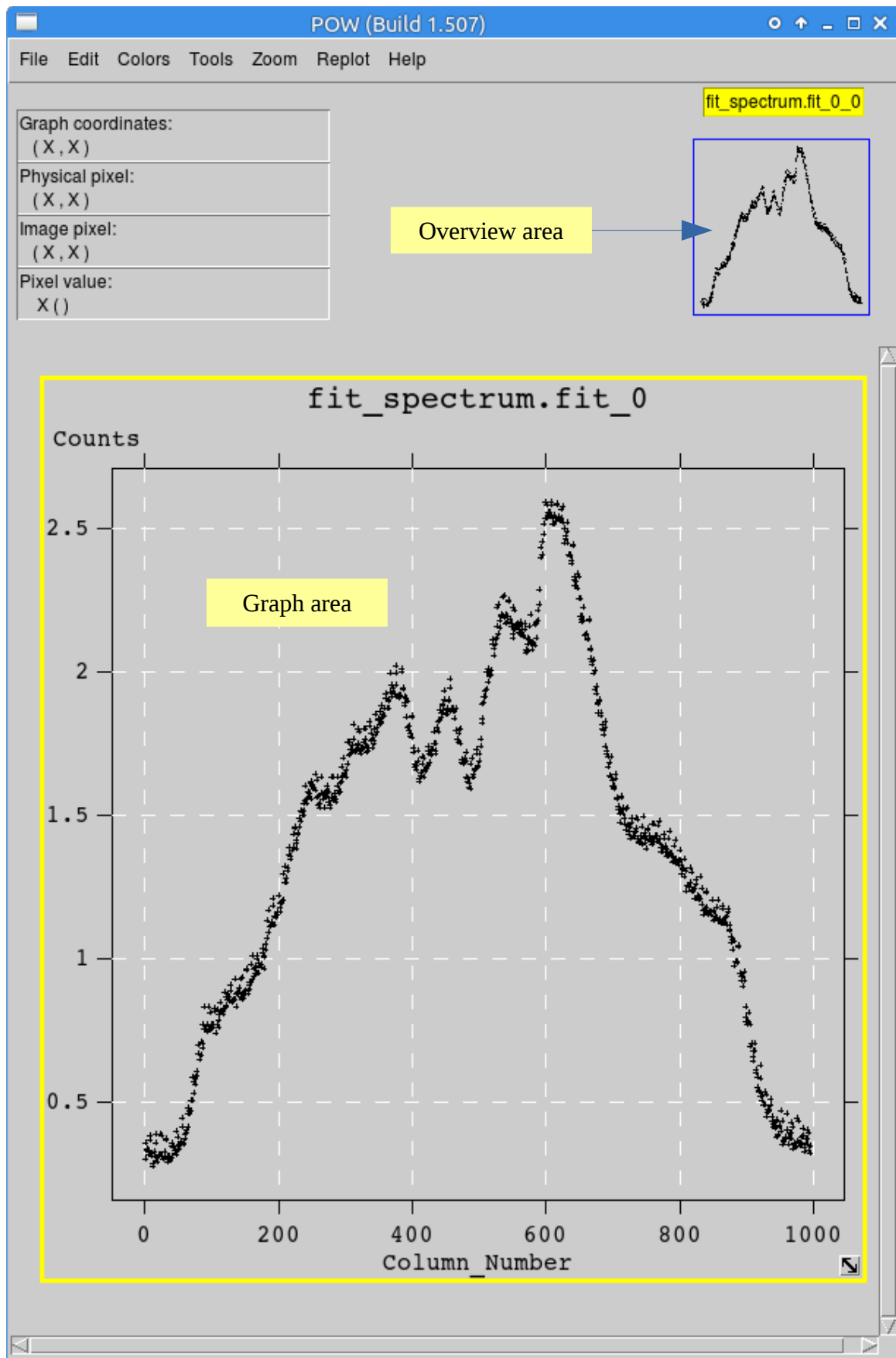
Go to: Edit cell: Lock to Parent

The data are the luminosity (in arbitrary units) of each pixel of image and are stored in the cells of a table that has as many columns, as the width in pixels of image and as many rows, as the height in pixels of image.

- From the menu do: *Tools* → *Plot...* to open the Image Plot Selection dialog.



- You should see *Plot Rows* button checked and *Range of rows to plot* field blank. Leave *Plot Rows* button checked and type in *Range of rows to plot* field 1-2559. Then click on *Plot* button to take the spectral profile in the POW window. If you want to have multiple spectral profiles in the same graph window, make sure to have *Add curve to current graph* checked. If you see an error message after POW window has opened, ignore it.



Finally, you have a diagram of light luminosity (in counts) vs wavelength (in Column_Number) and you can proceed as you want.

C. How did the program make the graph;

As mentioned above, light luminosities are stored in the table cells of Image window. The table in our example has 996 columns (as the width in pixels of image) and 2559 rows (as the height in pixels of image). The program added all values in the cells that correspond in the same column. So, for each of the 996 columns, we have have a total that is the sum of 2559 values stored in these cells.

D. Working with the graph

1. Move the mouse pointer around the plot area and you can see the graph coordinates in the left upper corner.
2. Put the mouse pointer in a particular point on the graph to see its coordinates. The first coordinate correspond to some column (or wavelength) and the second to counts (or luminosity in arbitrary units).
3. Click and drag on the graph or overview area to zoom. Double click to reset.

E. Edit graphs

You can easily edit any graph to fit your demands. This can be done trough Edit menu of POW window.

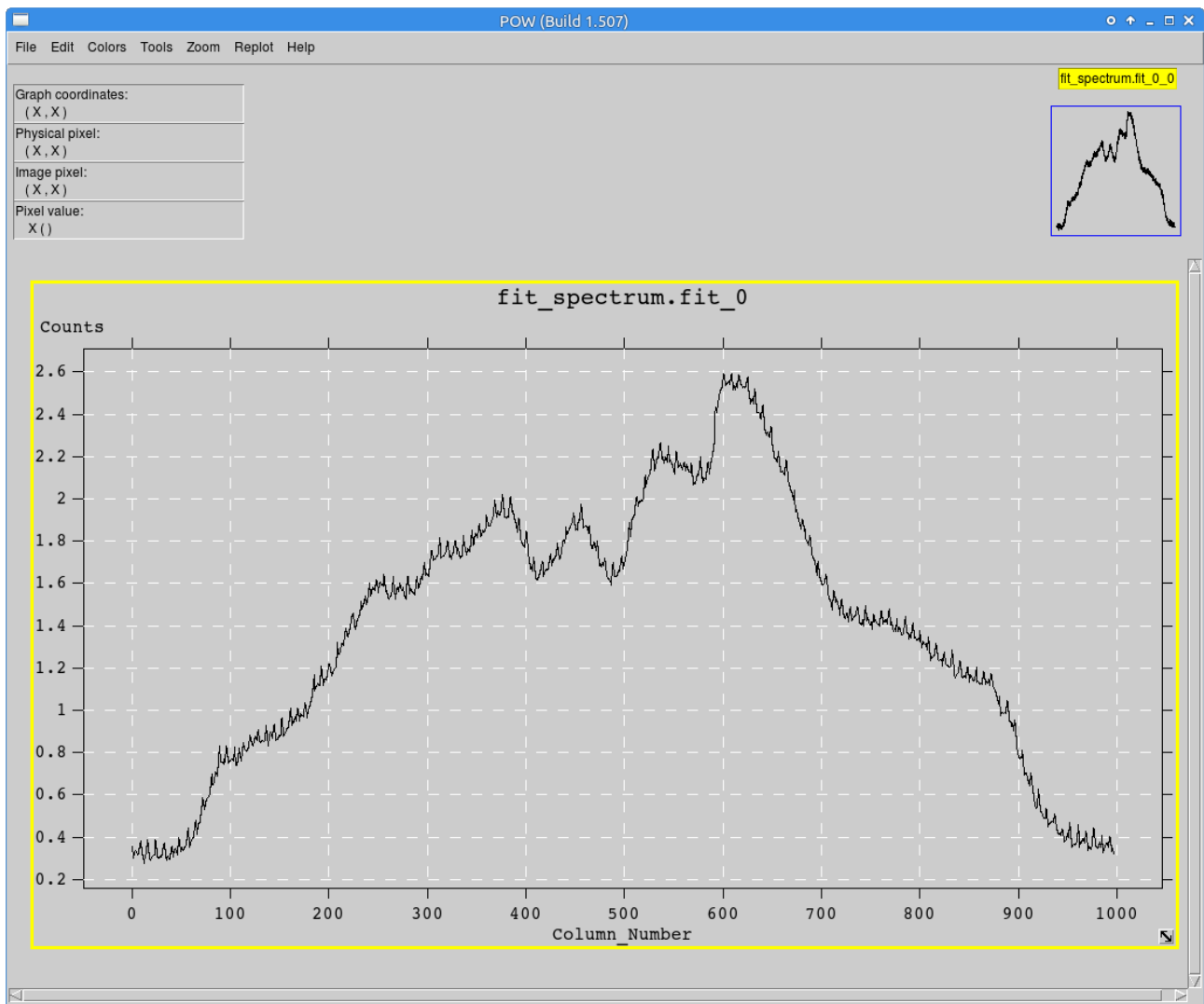
Suppose, you don't like the graph in previous page and you want to change its look. Then, you have to click on *Edit* → *Edit Graph...* to open the Edit Graph dialog.



With this dialog you can make many changes. Some examples are given below.

1. To change the length of x axis: On Graph tab, set X Axis Size to 1000 and click Apply button
2. To set more values on axes: On Ticks tab, move # of Ticks bars towards Many and click Apply button.
3. To change crosses to dots: On Points tab, select Dot and click Apply button.
4. To connect dots with lines: On Lines tab, check Lines and click Apply Button.

Finally the graph will like as the picture below:



It is easy to experiment on your own with the Edit Graph dialog and the Edit menu in general.

So, I hope that I helped you a little and if you finish your thesis, I would like to read it.

Good luck :-)