FOUR TUTORIALS ON IMAGES: NOVICE $\rightarrow$ EXPERT
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Images are important. We have IDL procedures that help you do images and we have prepared four tutorials on images that explain things, including our procedures. These tutorials take you from the know-nothing novice to the overconfident expert. Like a four-course French dinner, you ingest them in order of presentation. They're bite-sized; don't gobble, finish each course before trying the next. Here they are:

1. First you need to understand basic concepts and to learn how to display and manipulate images on your computer screen. Enter our introductory tutorial, **Image Display and Manipulation in IDL (IDIDL) ... Images with a Single 256-Entry Color Table**. It covers...
   (a) The X-window and your computer screen; pixels, bytes.
   (b) The concept of the *Visual Class.*.
   (c) The concept of the *Color Table.*
   (d) Displaying the image.
   (e) Image manipulation, processing, contrast enhancement.
   (f) Image size versus Window size.
2. The first course dealt with the bare image. That's like having an hors d'oeuvre without wine: usually you want to *annotate* the image by labelling with axes or putting arrows or labels on the image itself. Moreover, you should indicate what a particular color or intensity on the image means in terms of physical units (such as surface brightness), for which you use a colorbar. So the next course is **IACIDL: Image Annotation and Colorbars in IDL** It covers...
   (a) How to insert your image in the window and leave appropriate space around the border for axes and/or a colorbar.
   (b) How to make labelled axes and insert comments on images.
   (c) How to insert a colorbar.
   (d) How to scale an arbitrary-sized image so that it fits on your computer screen.
   (e) Important basic details for making X-windows and PostScript images.
3. The first two courses concentrate on images for the computer screen. That's like cooking for yourself: it's fine for you, but you usually want to present your final, beautifully handcrafted image to the world, either on paper or in (God Forbid!) PowerPoint. The first step is making

a PostScript image, so the next course is entitled **PSIDL: PostScript Files in IDL – Making, Printing, and PowerPointing**. Note this works for graphs as well as images! Your PostScript images can be either objects of beauty or... not. We much prefer the former and this tutorial tells all about it...

(a) Greek letters and Fonts in X and PS: `psopen` and `textoidl`.

(b) Plotting directly to PostScript.

(c) Printing PostScript images; PowerPointing PostScript images.

(d) Lots of appendices with details you might wwant to know, including how to make quick and dirty PostScript directly from your computer screen image.

4. The first three courses tell you all you need to know about ordinary images—we call these *one-dimensional* images, because they display a single quantity, usually as surface brightness. However, in a single image you can use color to display two or three quantities simultaneously. We call these *two-dimensional* and *three-dimensional* images, respectively., so appropriately enough this final tutorial is entitled **1d2d3d: One, Two, and Three Dimensional Color Images**...

(a) Decomposed color—separate, independent red, green, and blue images—versus the conventional 256-color table.

(b) One-dimensional color images.

(c) Non-gray one-dimensional color images: choosing the colors.

(d) Two-dimensional color images: intensity combined with a non-gray colortable.

(e) Three-dimensional color images: the orthogonality of red, green, and blue.

(f) Colorbars for one-, two-, and three-dimensional color images.

(g) Appendices, which tell how to make these images in IDL.