Introduction to IRAF

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Resources

- IRAF beginner's guide (available at **iraf.noao.edu**)
- A User's Guide to CCD Reductions with IRAF
- Asiago Monografie 1 (Tomaz Zwitter & Ulisse Munari)
- IRAF online **help** and **apropos**

IRAF

- IRAF stands for **Image Reduction and Analysis Facility**.
- Product by the National Optical Astronomy Observatories (NOAO).
- Originally developed for the astronomical community although researchers in other scientific fields have found IRAF to be useful for general image processing.
- Available over the Internet free of charge.
- Large selection of IRAF documentation is available.

What is IRAF

- General **environment** containing a large number of commands providing a wide range of image processing tools.
- For reasons of space and transparent use they are grouped together in the so-called **packages**. (e.g. all commands for mosaic reduction are in the package *mscred)*
- Commands can be thought of as instructions known to your operating system. They are used to perform a specific operation on images. We will call such commands **tasks**.
- When you start a task you actually enter a subprogram, or even a specific graphic environment, showing interactive graphs of results.
- Allows you to write your own tasks and packages, including any existing IRAF task as part of your code.

Tips and tricks

- While you are executing an interactive task you may enter commands in two ways:
- 1) by hitting single keyboard keys (do not press the ENTER key to execute them): for example **q** usually leaves the task and **?** shows a list of available commands;
- (ii) by entering double colon **:** followed by instructions that are finished by ENTER key. For example to change to 5 the order of a fitting function you have to press **:order 5** ENTER.
- ***Do not press keys randomly!*** If in trouble, exit and start again.

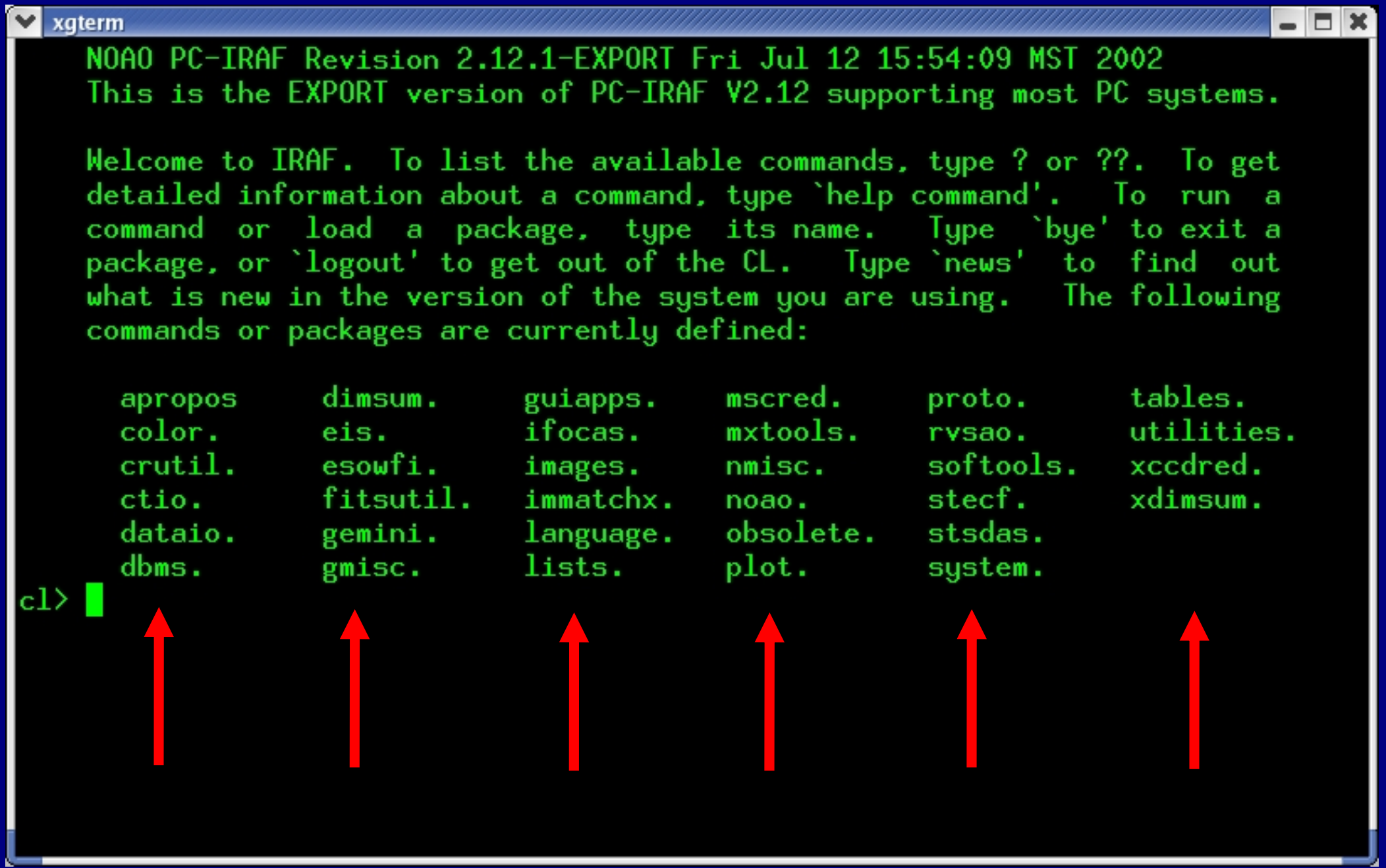
Getting started (mkiraf)

- Each user must execute the shell command **mkiraf** before logging into IRAF for the **first time** .
- It must be executed in the IRAF "login" or "home" directory.
- It creates a file called **login.cl** and a subdirectory called **uparm**.
- The login.cl file is executed at IRAF startup time, and the uparm subdirectory is used by IRAF to save your customized parameter files.
- MKIRAF will prompt for two things: **1.** “Initialize uparm?” Generally answer “**no**” unless you are absolutely sure you know what you are doing. **2.** “Enter terminal type:” - enter here what your graphics terminal type is; always chose “**xgterm**”
- You can edit your login.cl setting up IRAF as you prefere

Starting and leaving

- Type **cl** from an xgterm window to start
- There is nothing more nasty than to forget how to leave the program; the magic word in IRAF is **logout**.
- If your machine hangs try Ctrl+C or Ctrl+Y.
- If desperate... closing the window always helps.
- You leave individual tasks by hitting **q** . Within a command **do not** press keystrokes randomly, not even the ENTER key or mouse buttons. IRAF tries to understand them as instructions, so it is easy to get lost in the deepness of IRAF subtasks this way.

IRAF starting page



Need help?

- To get help within a task, type **?**
- To get help from the cl prompt, type **help command-name**
- Type **?** from the cl prompt to list all tasks in the current package
- Type **??** from the cl prompt to list all tasks in all the loaded packages
- To seek for a task doing “something”, type **apropos something** (only if **stsdas** is loaded)
- search title lines of all help files for a specific word: type **help * | match display**
- do a more complete but longer search with **references display**

History

The last command **cannot** be accessed with the up-arrow key but must be invoked by pressing **e** . Commands further back can **then** be invoked by repeatedly pressing the up-arrow key. You may edit the invoked command before execution by deleting and inserting letters in the usual way.

Depending on your operating system, deleting characters to the left is obtained by the “delete” (usually) or “backspace” (rare) keystrokes.
Under Linux **Ctrl+F** deletes one character to the right

Using commands of the operating system

To execute a command of the operating system put an exclamation mark "**!**" in front of it. For example type **!more ciccio** to show the content of the ascii file "ciccio"

Many system commands are known to IRAF. A list is written in the login.cl file: look for the so-called tasks **$foreign**. You'll find among others the system command "ls". Use it directly from the IRAF prompt to display the content of the working directory.

Tasks' parameters

- Each task in IRAF has its own set of parameters that determine its execution.
- Two types: required and optional.
- Values of required parameters should be supplied each time you use the command. If you forget to do so you will be asked for values before the command is executed.
- IRAF does not query the values of optional parameters but uses their current values.

Change parameters' values

- temporary change: you add the desired values for the parameters on the command line immediately following the name of the command, e.g. **display image name.fits zrange=yes zscale+**
- permanent changes: you change the values of parameters in the parameter file. The parameter file is changed typing **epar task-name**. Optional parameters are printed in brackets. After typing the changes use **:q** to leave the editor and save the changes.
- Values of the parameters can be displayed with **lpar**
- If you screwed the values hopelessly you may return back to defaults with the **unlearn task-name**

Example: epar display

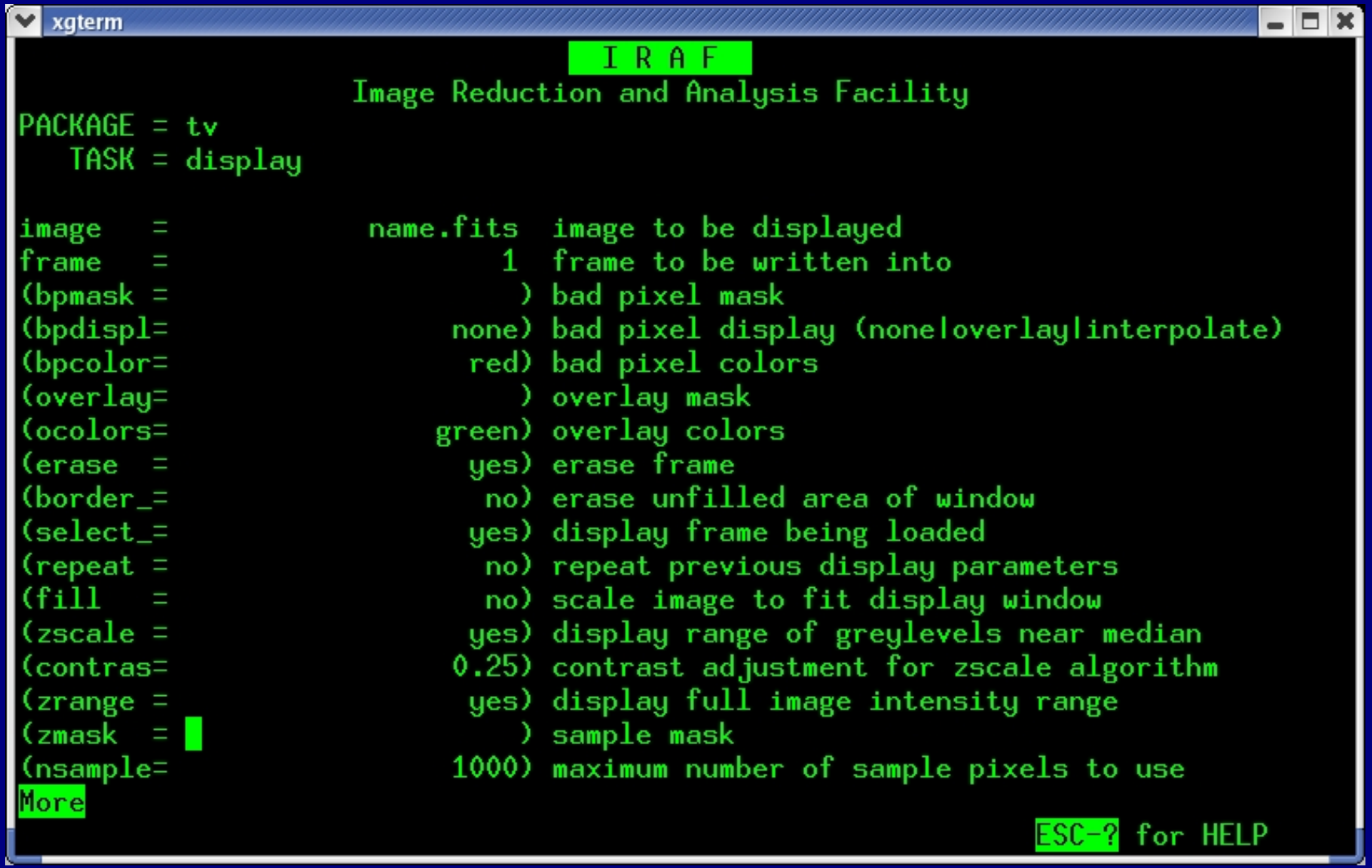
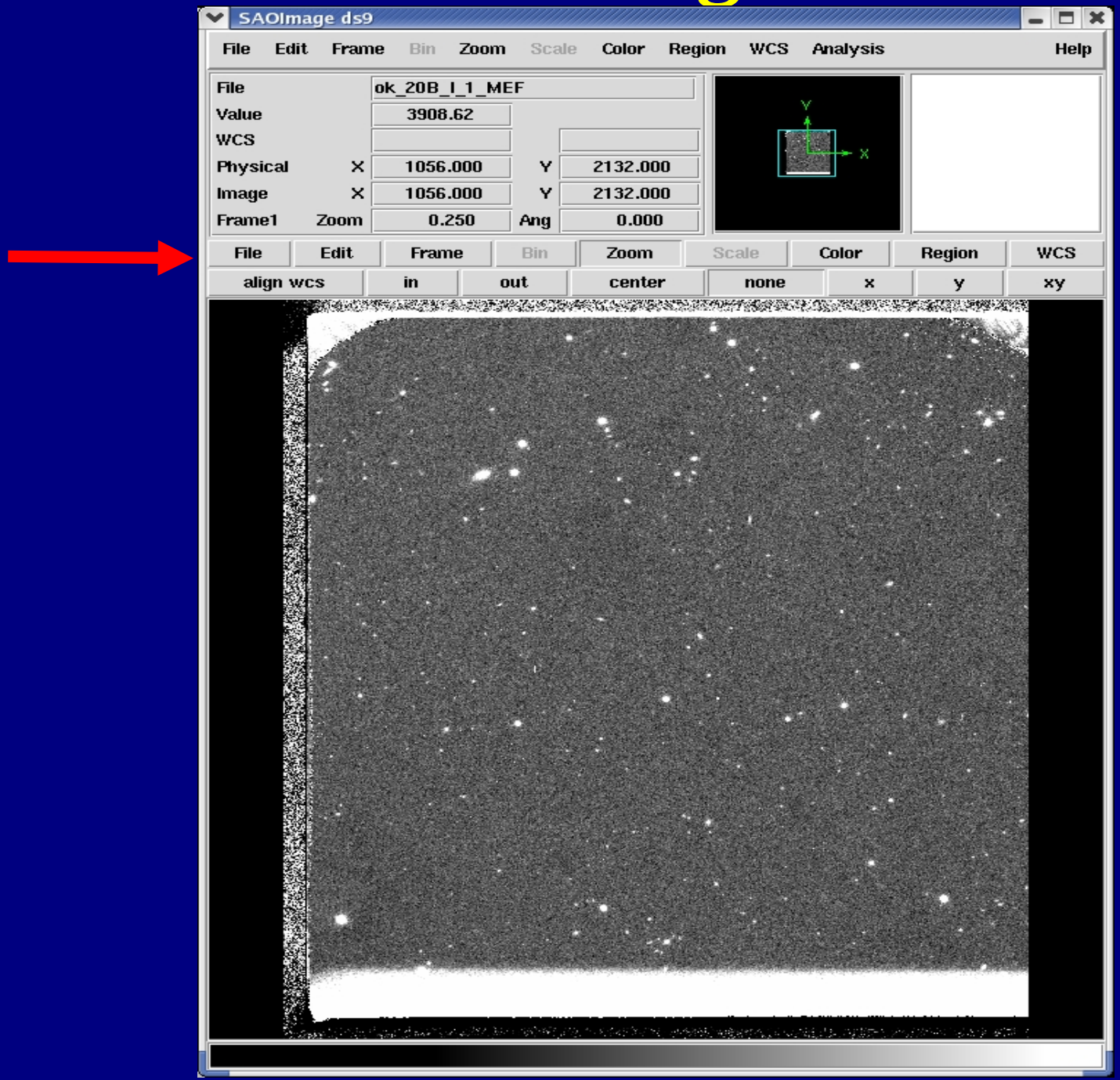


Image display

- Under Linux IRAF can adopt the program **ds9** (24bit!) as display server for your CCD frames.
- 4 different images can be stored in 4 different frame buffers at the same time (16 in iraf 2.12).
- The frame number (1-4) is a parameter of the display task.
- Start ds9 from the Linux prompt.
- The default display window is 512x512 pixels wide; if your pictures are larger, set up the **stdimage** variable in the login.cl file (e.g. *imt8196*)
- Load images within IRAF using the display task, and NOT using the ds9 buttons (otherwise...)
- The TV package, a subpackage of IMAGES, contains the general image display tools.

Saoimage ds9



Fits headers

You can easily take a look to the header of a given frame, by using the task **imhead** (either **l+** or **l-**)

The task **hedit** allows to add, delete or change the values of keywords in fits headers.

Older IRAF versions required to split fits frames into .imh and .pix files. **THIS IS NO MORE NEEDED AND WARMLY DISCOURAGED!!!**
Work directly on fits images: set up the login.cl properly!

And Finally.....

Note that you can abbreviate all tasks and variables names, provided that no abiguities with others do exist.

For example if you load the noao.twodspec package for spectroscopy reduction then the **logout** command

- Shall be abbreviated as **log**
- but cannot as **lo** because the longslit sub-package do exist!