IRAF

Redukcja w Długości Fali i Strumieniach

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Final reduction steps

- Wavelength calibration
- Flux calibration

How to extract comparison spectra

- First check that a line list for your comparison lamp exists in /iraf/iraf/noao/lib/linelists/. If there is not, you must prepare an ASCII file with wavelengths for your comparison spectrum.

- The comparison spectrum must be extracted exactly in like manner (the same pixels) as the star spectrum with a command similar to this

```
apall comp.imh ref=star.imh out=star_comp.imh \
back- weight- clean-
```

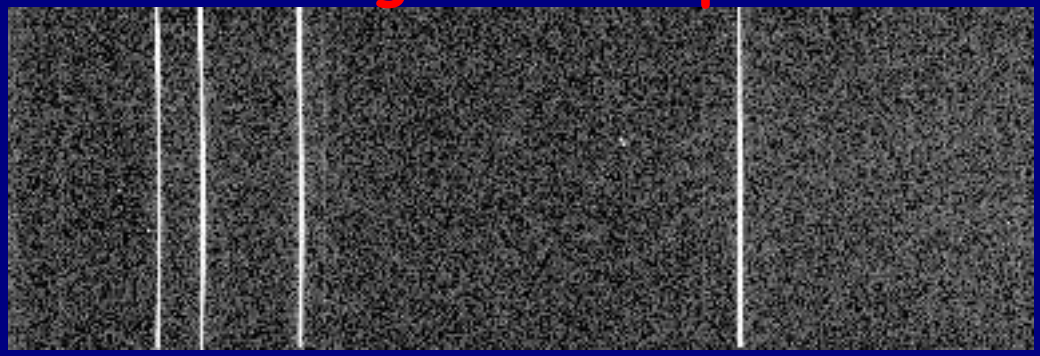
Our example in particular

- For a correct combine of the two lamp spectra we must:

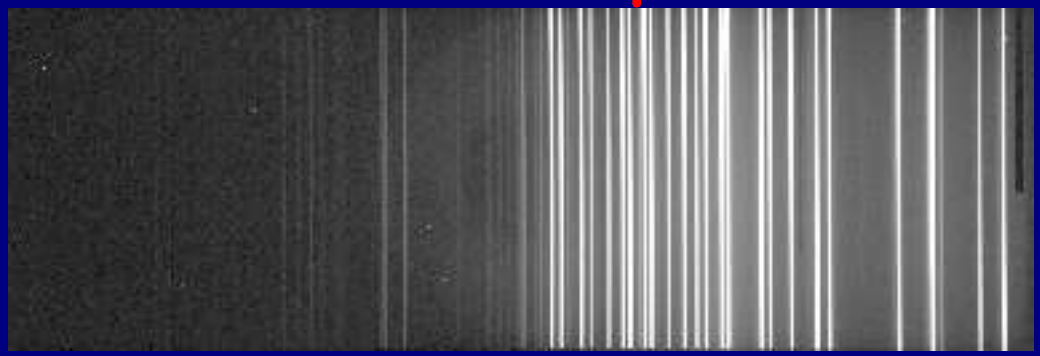
- process the images equally

- avoid any pixels shift

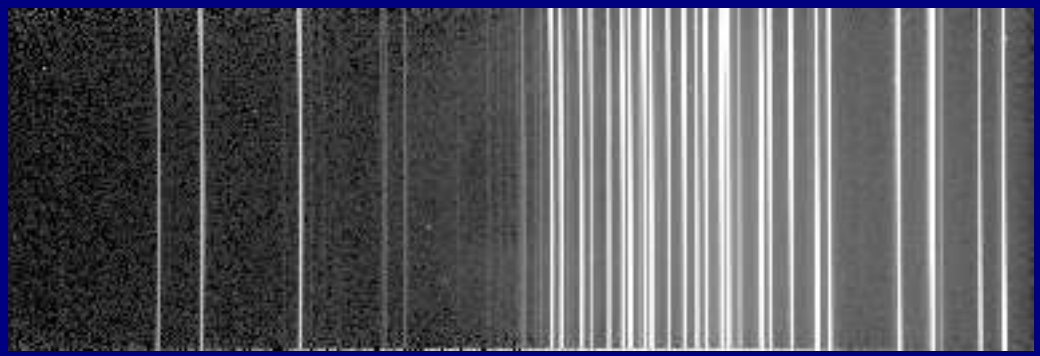
HgCdZn lamp



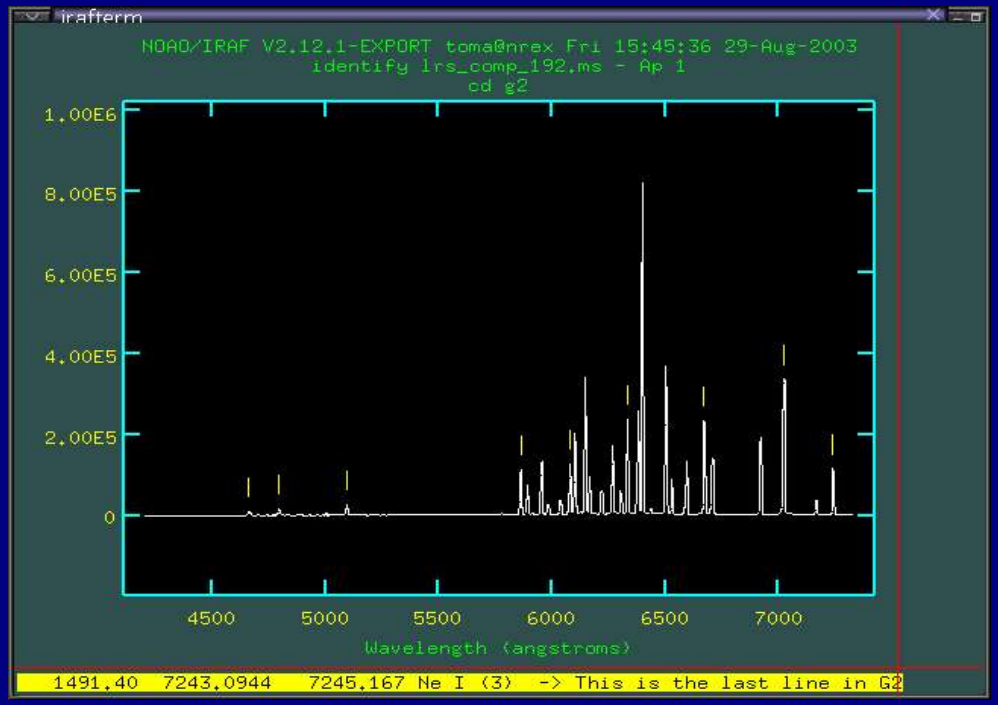
Ne lamp



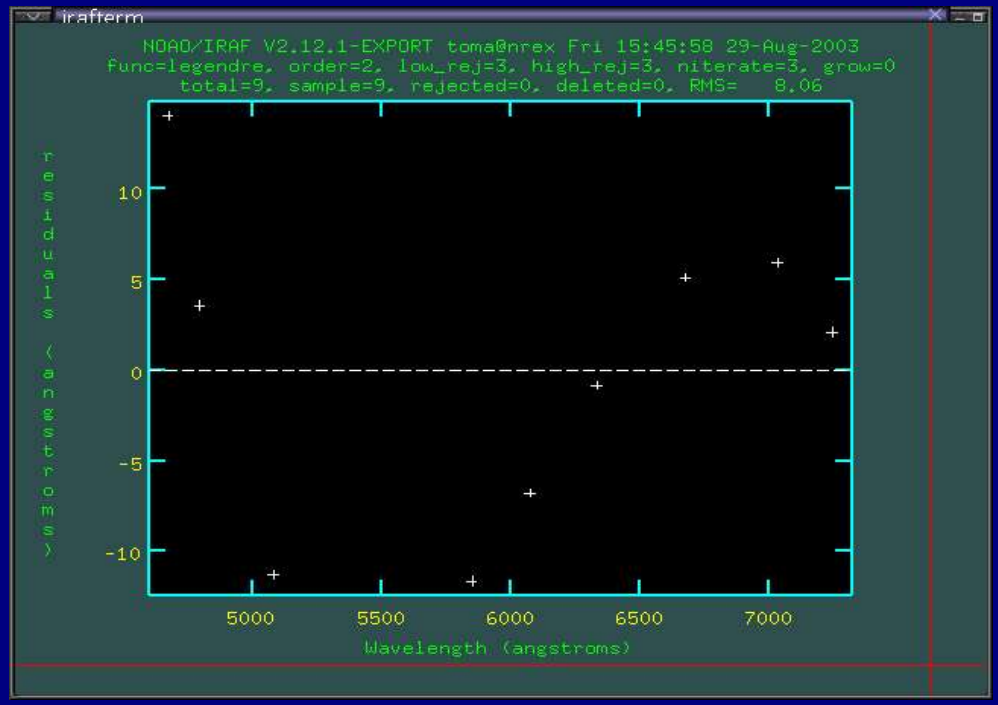
Sum

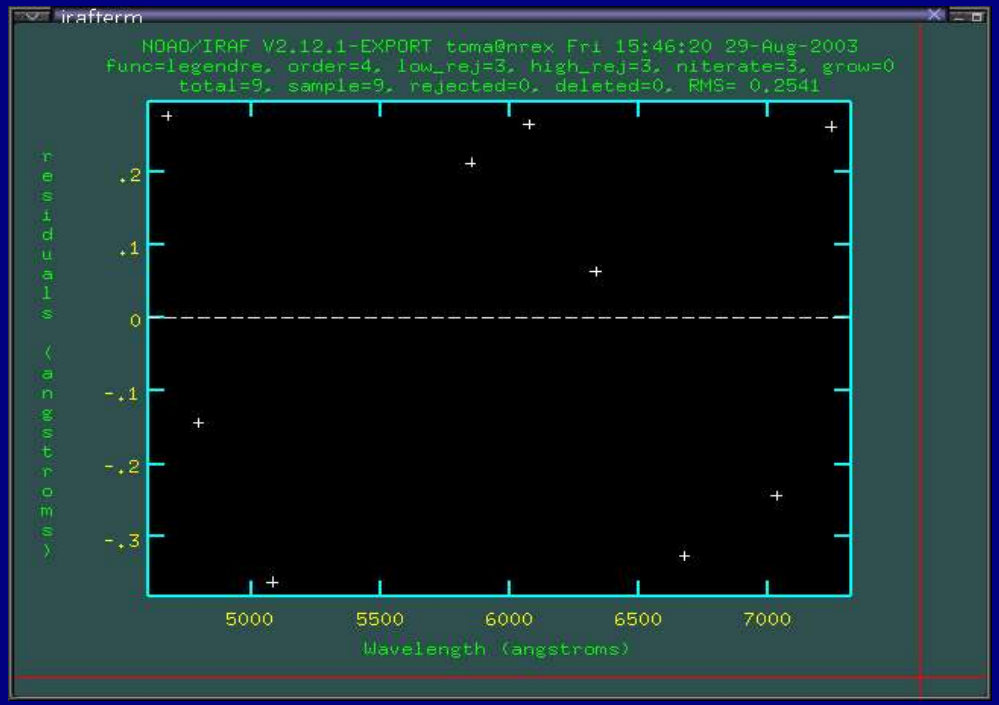


Identifying and fitting



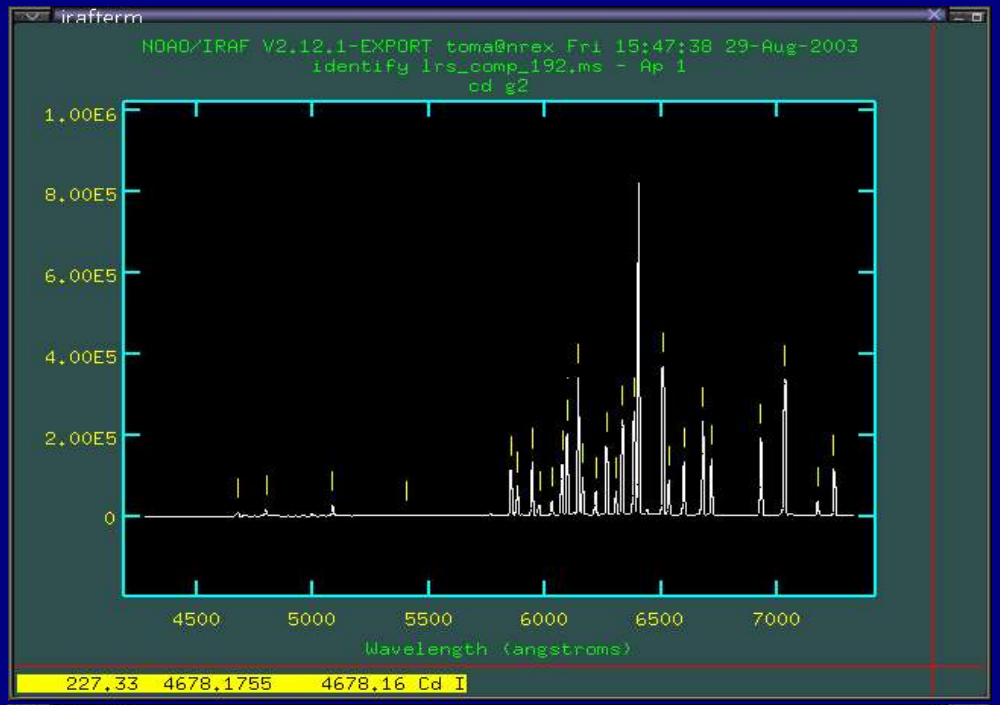
- **Initial** dispersion solution (**task** identify)



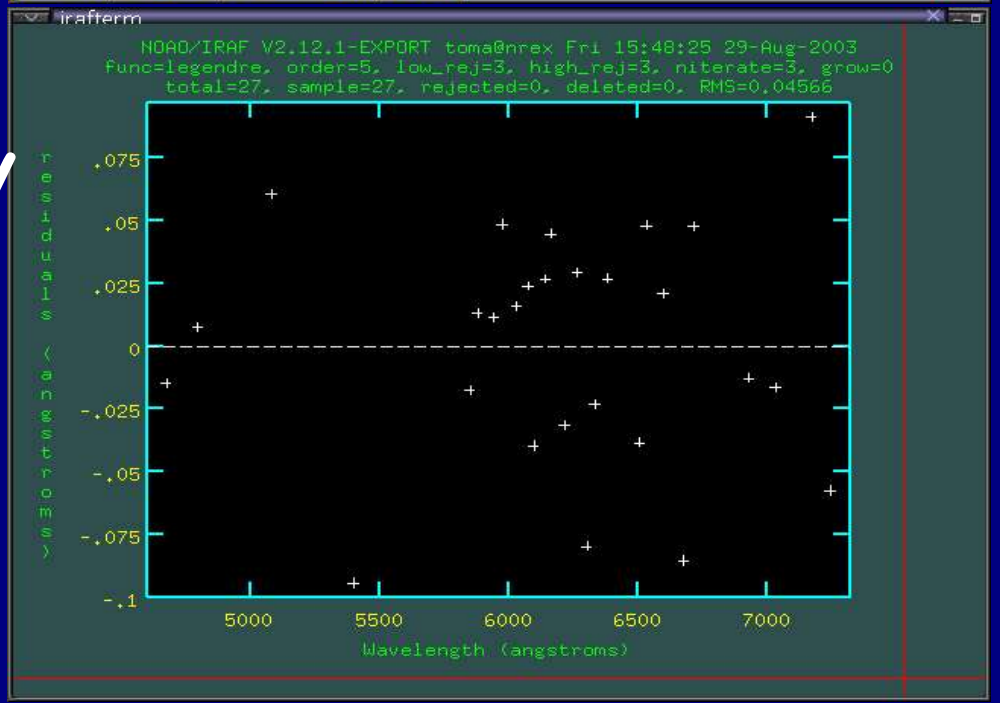


Identifying and fitting (cont.)

- Final dispersion solution (task identify)



- Next step - use reidentify task for the rest of the comparison spectra obtained with the same set-up



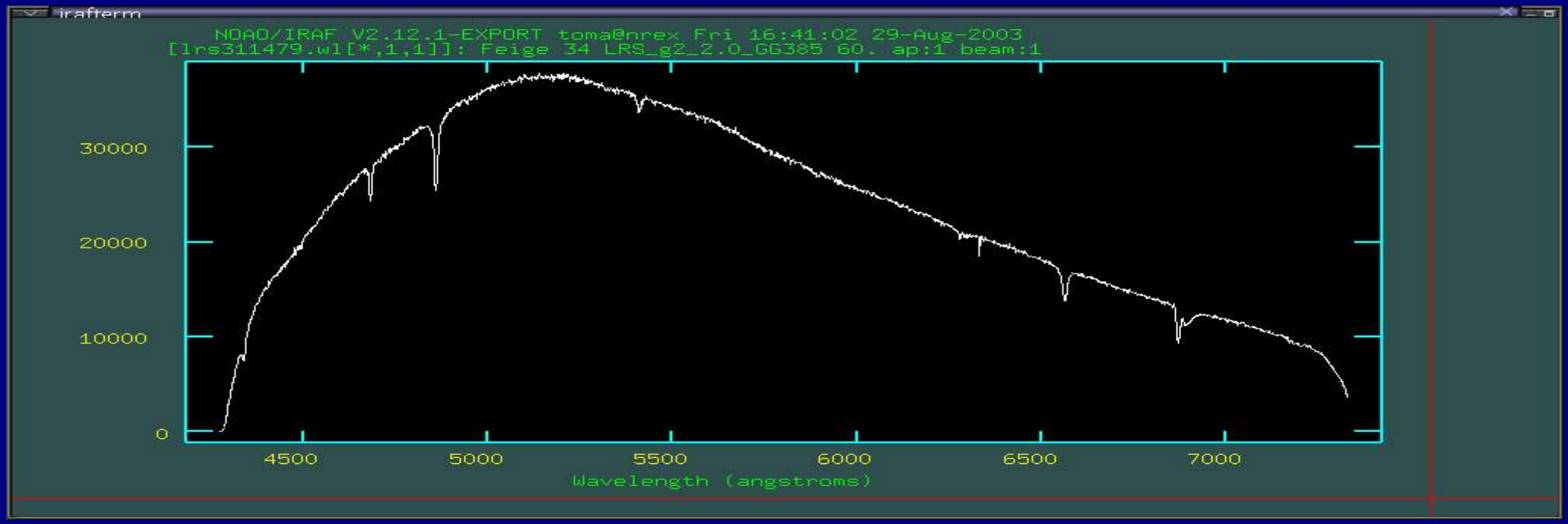
Apply wavelength calibration

- Tell to IRAF which wavelength solution to use

```
hedit star.ms.imh refspec1 comp.ms.imh
```

- Calibrate the science spectrum in wavelength

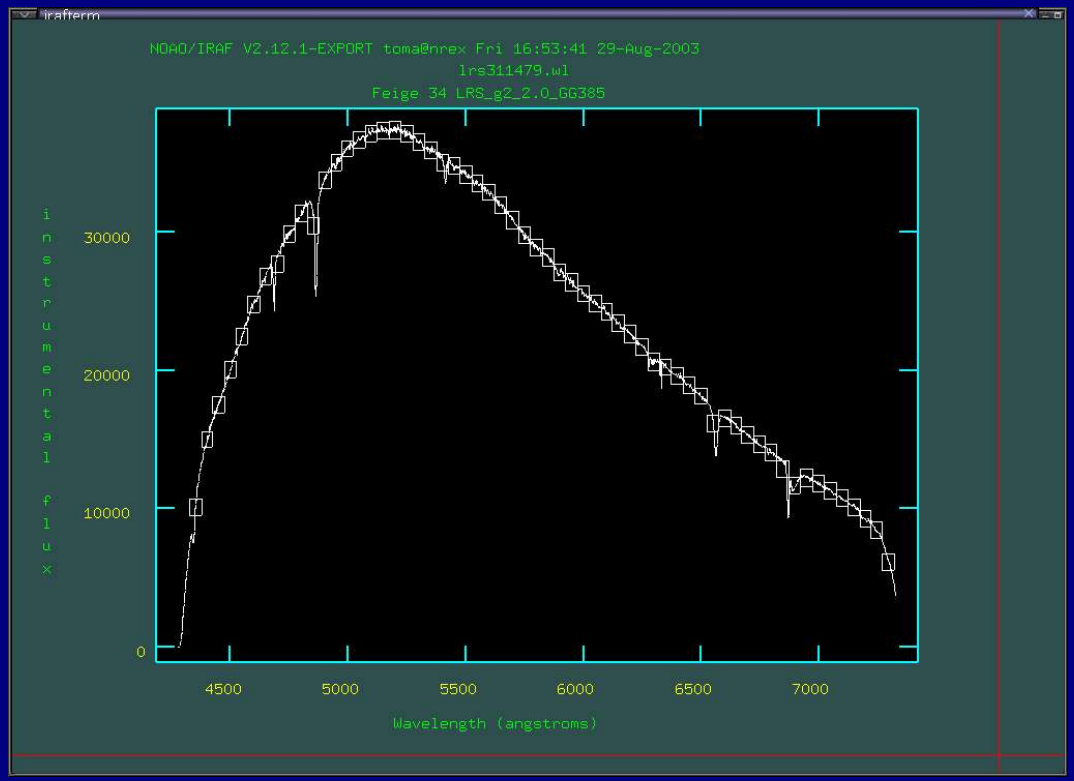
```
dispcor star.ms.imh star.wl.im linearize-
```



Flux calibration

- the task standard
- pay attention to have the needful info in the header
- pay attention to the extinction

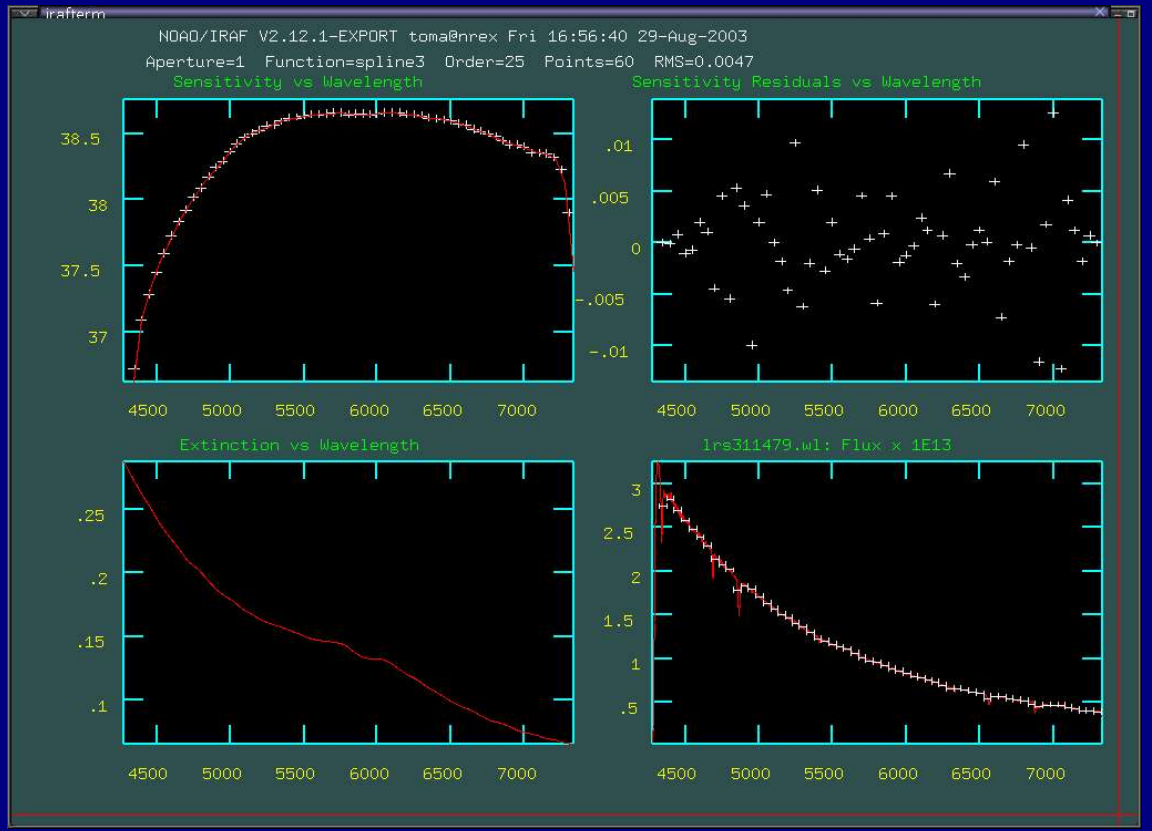
```
lpar standard
        input = "lrs311479.wl"  Input image file root name
       output = "std"           Output flux file (used by SENSFUNC)
    star_name = "feige34"       Star name in calibration list
      airmass = 1.3             Airmass
      exptime = 300.            Exposure time (seconds)
       answer = "y"             (no|yes|NO|YES|NO!|YES!)
   (samestar = yes)             Same star in all apertures?
 (beam_switch = no)             Beam switch spectra?
   (apertures = "")             Aperture selection list
   (bandwidth = INDEF)          Bandpass widths
     (bandsep = INDEF)          Bandpass separation
     (fnuzero = 3.6800000000000E-20) Absolute flux zero point
  (extinction = "onedstds$kpnoextinct.dat") Extinction file
      (caldir = "onedstds$spec50cal/") Directory containing calibration data
 (observatory = )_.observatory) Observatory for data
    (interact = yes)            Graphic interaction to define new bandpasses
    (graphics = "stdgraph")     Graphics output device
      (cursor = "")             Graphics cursor input
        (mode = "ql")
```



Flux calibration (cont.)

- the task sensfunc
- use high order to fit
- pay attention to the extinction

```
kp> lpar sensfun
    standards = "std"           Input standard star data file (from STANDARD)
  sensitivity = "sens"          Output root sensitivity function imagename
       answer = "yes"           (no|yes|NO|YES)
   (apertures = " ")            Aperture selection list
   (ignoreaps = yes)            Ignore apertures and make one sensitivity funct
    (logfile = "logfile")       Output log for statistics information
  (extinction = "onedstds$/kpnoextinct.dat") Extinction file
(newextinctio = "extinct.dat")  Output revised extinction file
 (observatory = )_.observatory) Observatory of data
    (function = "spline3")      Fitting function
       (order = 6)              Order of fit
 (interactive = yes)            Determine sensitivity function interactively?
      (graphs = "sr")           Graphs per frame
       (marks = "plus cross box") Data mark types (marks deleted added)
      (colors = "2 1 3 4")      Colors (lines marks deleted added)
      (cursor = "")             Graphics cursor input
      (device = "stdgraph")     Graphics output device
        (mode = "ql")
```



Flux calibration (cont.)

- the task calibrate is the final step

```
kp> lpar calibrate
       input = "lrs311479.wl"  Input spectra to calibrate
      output = "lrs311479.flx" Output calibrated spectra
     airmass = 1.3             Airmass
     exptime = 900.            Exposure time (seconds)
    (extinct = yes)            Apply extinction correction?
      (flux = yes)             Apply flux calibration?
  (extinction = "onedstds$/kpnoextinct.dat") Extinction file
 (observatory = " ")           Observatory of observation
   (ignoreaps = yes)           Ignore aperture numbers in flux calibration?
 (sensitivity = "sens")        Image root name for sensitivity spectra
        (fnu = no)             Create spectra having units of FNU?
      (mode = "ql")
```