Introduction to the Advanced Observational Astronomy I (PAP 306)

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Structure of the course

• Learning basics
• Observing
• Reducing data
• Performing science
• Presenting the results
Science topics for Helsinki

• Cluster membership (Charles Kirkpatrick)
  – Multi Object Spectroscopy
  – Slit spectra
Schedule at Tuorla

- Course dates:
  Monday, Nov 4 10:00 – Saturday, Nov. 9 16:00
- Get there by bus.
- Food & accommodation is provided
- Morning sessions – only for those who did not observe
- Afternoon sessions – preps for the night run!
- Sauna party on Thursday
- Presentations on Saturday
- Bring your own laptop to reduce the data and prepare for the run
Basics

• Take bias frames, sky flats at the evening
• Observe a standard star at similar airmass for each instrumental set-up (except MOS)
• Perform wavelength calibration and sensitivity calibration using lamps (spectra, also MOS)
• Have your list of targets ready and back-up targets (project-specific)
• Learn telescope operation commands
• http://www.not.iac.es/observing/guide/
• Learn from observing other groups doing it
Observing

- One person is “steering the wheel” at a time, each student will try
- Two remote computers: one for telescope operation and one for remote data analysis
- Pointing scripts needs to be prepared in advance and uploaded
- Target acquisition is needed for spectroscopy
Script “prepare myObject”

- tcs.auto-positioning-full
- tcs.ag-off
- tcs.field-rotation 90
- tcs.ag-off
- tcs.goto-object myObject
- alfosc.observer "mySupervisor"
- alfosc.object myObject
- wheels -f 1005
- alfosc.focus-offset
- alfosc.resetxy
- alfosc.exp 5
MOS

- Two masks, exposure time ~1 hour.
- Masks has been designed already, so coordinates are fixed
- Dark time is needed
- Grism 19
- No filters
How does it look in commands?

- tcs.field-rotation 0
- # Field rotation should match that of the preimaging. Your mask file contains a reference to the file (see next page). Look inside that file:

  fdump ALxi190650.fits
  FIELD = 89.9991 / Field rotation at start

- Set Object=123456
- # this refers to the ID in the catalog uploaded
- # point to the Object
- tcs.ag-off
- tcs.goto-object $Object

- alfosc.observer “Alexis“
- # you can put your name as observer 😊
- alfosc.object $Object
- wheels -f 1005
- alfosc.focus-offset
- alfosc.resetxy
- alfosc.exp 10
- # move in the mask using GUI
- alfosc.exp 10
Mask structure

- ProposalID 48-025
- PIName Alexis Finoguenov
- PIEmail alexis.finoguenov@helsinki.fi
- MaskName mask_11
- PreImage ALwk120177.fits
- RA 08:04:35.0
- DEC 33:05:08.3
- EQUINOX J2000
- FIELD -0.003 Grism Grism#07
- FilterID 0
- SlitOrientation horizontal
- ToBeCenteredInX no
- ToBeCenteredInY no
- green#1 Slit definitions green#2
Target acquisition for MOS

- Make sure there is enough time to complete the observation with a given field rotation (ask supporting astronomer). Otherwise issue ro-tu-360
- Get an image with mask and without, 60 seconds
- Login to florence
- Within iraf use package alfosc
- Task “mosstrong mask_im.fits obj_im.fits”
  - Use key “a” to select, “q” to move next and extra “q” to quit
- Task “mosmove” to apply the calculated corrections
- On TCS use Key-Pad-5 to select star-box motion, reposition the box on a star using cursor keys (supporting observer) Alt-Key+arrows
- Issue TCS command as-relaxed-on
- Get another mask image – find galaxies in slits
- Use teloffset to perform small adjacements. You move the sky not the slit.
- Can use mosstrong for calculating the offset.
Manuals

- Basic unix commands
- Basic telescope operations (TCS)
- ALFOSC cookbook
- NOTCam cookbook
- Basic IRAF tools (IRAF course)
- ds9
Program details

• 60-702  Pis: Erkki Kankare, Seppo Matilla
• http://www.not.iac.es/observing/schedules/schedule.php?period=60&output=html
links

• http://www.not.iac.es/observing/cookbook/current/Cookbook.php?instrument=ALFOSC


• http://www.not.iac.es/instruments/alfosc/optical_elements.html
Example of a calibration script

- alfosc.acquisition -c -q $slit 60
- alfosc.wheels -s $slit -g $grism
- alfosc.resetxy
- alfosc.xbeg 851
- alfosc.xsize 500

- alfosc.dark 0

- # use mdark 0 15
- alfosc.calibexp -n 2 -o $sn -lmi Halogen 10

- alfosc.calibexp -n 2 -o $sn HeNe 3

- alfosc.calibexp -n 2 -o $sn HeNe 30
  alfosc.object "myobject"
  alfosc.expose 1000

  #imaging 300 for i -band 120 for r-band
  alfosc.dither 3X 30 300

- $-sign means you need to specify the parameter and do it before
Preparations

• Start the system

  object bias ; mdark 0 15

• Sky flats

• focus

  focus -nodefault -a noacq