Wyffos Quick-Look reductions

1 Introduction

For now this package is only available as a TAR file which should contain several IRAF Command Language, bash Shell and text files.

The files should be placed in sub-directory like for example *AF2_QUICKLOOK*.

- *wyffosREDUC.cl*
  You need to change one line: the homeDIR variable which depends on the user

- *wyffosCONF.sh*, *wyffosFIBcentr.sh* and *wyffosCOMMENT1.sh* shell scripts

- *XXXX.dat* identification line files (like ideheliumXXXX.dat, neonXXXX.dat, neonECHELLE_8800.dat, etc ...)

- arcXXXXX.jpg example of identication files for the Neon and Helium AF2 lamps.

- wyffosQuickLook.pdf this help file in PDF format.

2 Installing the Wyffos Quick-Look Pipeline:

To make it working as an IRAF task you must:

2.1 Include the following lines in the *login.cl* file

- print "Loading QuickLook package ..." (optional)

- set homeQUICK = "home$AF2_QUICKLOOK/"

- task wyffosREDUC = homeQUICK$wyffosREDUC.cl

2.2 IRAF packages

It is also necessary to include the following lines to load the required packages:

- **noao**, **imred**, **ccdred** and **specred**

Here home$ represents your iraf home directory (for example */home/username/iraf/*) and *AF2_QUICKLOOK* is the subdirectory where you will place the necessary line lists, the shell scripts and the *wyffosREDUC.cl* package.

3 Preparation - Execution:

3.1 Run IRAF:

- run IRAF with **ncl** or **cl** in a Xgterm window

- change directory to the working directory

3.2   Data preparation:

The **.cfg**, **.list** and **.dat** files should be placed in the directory with the data (**.fit**) you want to reduce.

- the same Configuration file (**.cfg**) used for the fiber setting

- create a list (**.list**) of all the frames you want to use, with the **imhead *fit[1] > fileNAME** command.
  This creates a file listing which is cleaned later with the *wyffosREDUC.cl* task.
  To remove some files of the setup you do not plan to use, just edit the list and delete them.

- the calibration (**.dat**) files have the format: **Wavelenght [NAME] [intensity] [Comments]**

- The pipeline searchs for frame types (**IMAGETYP**) of **sky**, **object**, **arc**, **flat** and **bias** and **dark**. If the command *sky*, for example, has not been used to take the sky/offset exposures then the corresponding sky/offset frames type should be manually replaced with the IRAF **HEDIT** command. This can also be used to fix the image types of other files:
  For example: → **hedit r601532.fit[1] IMAGETYP "sky" up+ ver+ s+** file_names.

3.3   Starting the reduction:

Run the IRAF task with the **epar wyffosREDUC** command to edit/change the parameters which need to be changed. After each successful operation you can change the status keyword (mostly NO → YES) each time one operation has been succesfully done.

4   Reduction: Steps of the wyffosREDUC task

- *Step 1:* Files checks

- *Step 2a:* Combine all the BIAS and trim the rest of the frames (xxxx_A FITS files)

- *Step 2b:* Combine all the ARCs, FFs, OBJECTs and SKYs frames

- *Step 3:* Dofiber (find the trace of fibers and extract them)

- *Step 4:* Extract the **.CFG** information

- *Step 5:* Scopy each fiber into a FITS file (files: **name.NNNN.fits where NNNN=fiber number**)

- *Step 6:* Identify the line (for an automatic identification type **b**, but it is not always working)

- *Step 7:* Re-Identify (automatically) the N-1 other fibers (files **name.l.NNNN.fits**)

- *Step 8:* Find the frame skies ... should combine and use them (**To Be Done**)

- *Step 9a:* Find the ratio between the M offset skies and the N objects and subtract them.

- *Step 9b:* Plot the sky substracted objects (file **name.ls.NNNN.fits**)

Notes: Several values/parameters are hard coded but may be edited and changed in the **wyffosREDUC.cl** task. For example in the IRAF **CCDPROC**, **DOFIBER**, **IDENTIFY** or **REIDENTIFY** commands some parameters may not be the best for your particular setup.

5 Hints and problems

5.1 Important steps of the reduction

- To properly remove the hot pixels (mandatory for exposures longer than a few minutes) you need to take dark of the same exposure times (at least for the offset and object frames). This will allow you to at least create a mask frame to get rid of these bad/hot pixels .

- To ensure that the cosmics are properly removed in the combine task you should have at least 3-4 frames for each set (bias, arc , flat, sky, object).

- Make sure that no fiber(s) from the **.cfg** file is missing in the gap or only partially present.
  If this is the case, you may have to edit the **.cfg** file and change the fiber to PARK status. This will ensure you avoid any shift in the fiber numbering which will mess up the rest of the reductions.

- You may want to manually run the DOFIBER task (default mode yet) and see the fiber fitting process. Just answer (no or NO) to skip the automatic fitting and then run the task in interactive mode.
  For the central fibers maybe fitting with a greater order (than 3 as default) would be better.

- The (automatic) identification task (for the N-1 fibers) is the step where most problems can occur (not working always at 100%).

  - You must perform the best identification possible (step 6). Try to have more than 15-20 lines.
    To increase this number, for example combine the He and Ne arc frames).
    Skip all the very faint lines (if there are not always found), and remove them from the identification list.
    Order 1 seems to do the best job, but orders 3 to 7 sould work too depending on your setup

  - You must have a **.dat** file with enough/all line which are easily/always identified.

  - The RMS in the reidentify task depends on the resolution.
    The value should be around 0.05Å in Echelle mode but around 0.5-1 at maximum for low resolution gratings.

- Sky substraction is still **VERY** crude and may not work, depending on the quality of the sky offset frames. You probably have to apply a different scaling factor, as yet it is only determined from the exposure times from the skies and object frames.

5.2 Some help for "known" problems which can (still) occur

- Reidentify: doesn't always find all the lines. It is best to manually identify at least 4-6 lines (specially with fit high order of 3-5).
  If you find that the program can not find the lines in all fibres using reidentify ensure that you have defined as many lines as possible with identify. It usually works if 7 or more lines are automaticly identified, but be careful to avoid lines in the identification file which are never found, these lines would corrupt the solution.

- If something wrong occurs during the **DOFIBER** task (step 3), you may need to delete completely the subdirectory **database** or change the name of the last database (parameter in the task) or choose option REDO="yes".
  If not, some steps during the task will **not** be done again, leaving some or all the problems.

- The pipeline is set up for a bash shell if you are using a tcsh shell you might be required to replace the command **!./listFIL** to source **listFIL**. There are 4 of these commands situated in wyffosREDUC.cl.

- When outputs are given by the shell (for example echo commands in your .bashrc, .bash_profile, .tcsh, .profile, etc ... files) the entire task or part of it may fail. Try to get rid of all these outputs in your xgterm window.

- Sky subtraction is still too crude ... therefore do NOT use the results as final reduction

6   Annexe 1: example of the command epar wyffosREDUC

Example listing with BIAS, ARC, FLAT, SKY and OBJECT exposures

```
r930101.fit[1][2150,2100][ushort]: Bias
r930102.fit[1][2150,2100][ushort]: bias
r930103.fit[1][2150,2100][ushort]: bias
r930104.fit[1][2150,2100][ushort]: bias
r930105.fit[1][2150,2100][ushort]: bias
r930106.fit[1][2150,2100][ushort]: bias
r930107.fit[1][2150,2100][ushort]: bias
r930108.fit[1][2150,2100][ushort]: bias
r930109.fit[1][2150,2100][ushort]: bias
r930110.fit[1][2150,2100][ushort]: bias
r930111.fit[1][2150,2100][ushort]: bias
r930115.fit[1][2150,2100][ushort]: arc He
r930116.fit[1][2150,2100][ushort]: arc He
r930117.fit[1][2150,2100][ushort]: arc He
r930118.fit[1][2150,2100][ushort]: arc He
r930119.fit[1][2150,2100][ushort]: arc He
r930121.fit[1][2150,2100][ushort]: ff
r930122.fit[1][2150,2100][ushort]: ff
r930123.fit[1][2150,2100][ushort]: ff
r930124.fit[1][2150,2100][ushort]: ff
r930125.fit[1][2150,2100][ushort]: ff
r930127.fit[1][2150,2100][ushort]: Gr 600B 3x1800s
r930128.fit[1][2150,2100][ushort]: Gr 600B 3x1800s
r930129.fit[1][2150,2100][ushort]: Gr 600B 3x1800s
r930130.fit[1][2150,2100][ushort]: Gr 600B 1800s
r930131.fit[1][2150,2100][ushort]: Gr 600B off1
r930132.fit[1][2150,2100][ushort]: Gr 600B off2
r930133.fit[1][2150,2100][ushort]: Gr 600B off3
r930134.fit[1][2150,2100][ushort]: Gr 600B off4
r930135.fit[1][2150,2100][ushort]: arc He
```

Identification for Helium lines of grating R600B

```
idheliumB600.dat
# units Angstroms
3889.74     HeI
3965.85     HeI
4027.33     HeI
4389.162    HeI
4472.75     HeI
4714.47     HeI
4923.305    HeI
5017.076    HeI
5049.146    HeI
5877.26     HeI
6679.996    blend HeI 6678.149 with NeI 6678.2764
```

Example of editing the **wyffosREDUC.cl** IRAF task

```
                                  I R A F
                         Image Reduction and Analysis Facility
PACKAGE = mscred
   TASK = wyffosREDUC

fiche   =           listR316  File LIST of images to be treated ?
(imFF   =            ffR316)  FlatField prefix ?
(imARC  =           arcR316)  Arc prefix ?
(imSKY  =           skyR316)  SKY prefix ?
(imOBJ  =           objR316)  Object prefix ?
(tabCON2=         ic342.cfg)  fiber table ?
(tabARC =   idneonR316.dat)  Arc file
(lieu   =              MAC)  SLO or MAC or ROQUE ?
(datBASE=      databaseR316)  Directory for database
(fibSIZ =            small)  Fiber size (small or large)
(biasMEA=              yes)  Skipping mean BIAS creation? (no/yes)
(biasTRI=              yes)  Skipping BIAS Trimming ? (no/yes)
(process=              yes)  Skipping CCDproc all files but biases (no/yes)
(combFF =              yes)  Skipping combinning ? (no/yes)
(combARC=              yes)  Skipping combinning ? (no/yes)
(combOBJ=              yes)  Skipping combinning ? (no/yes)
(RUNdofi=              yes)  skip dofiber ? (no/yes)
(RUNcopy=              yes)  skip scopy ? (no/yes)
(IDENTIF=              yes)  skipping identify ? (no/yes)
(IDENARC=              yes)  Helium ? (no/yes)
(CALwave=              yes)  skipping reference and skies ? (no/yes)
(test8  =              yes)  skipping objects  ? (no/yes)
(allspec=               no)  plot all spectra ? (no/yes)
(flist  =         LIST_sky)
(mode   =               ql)
```
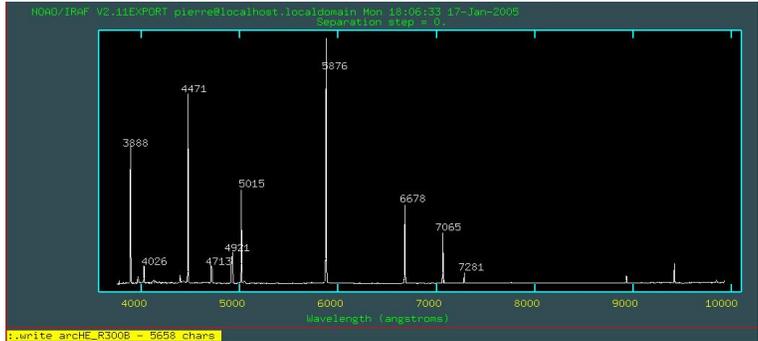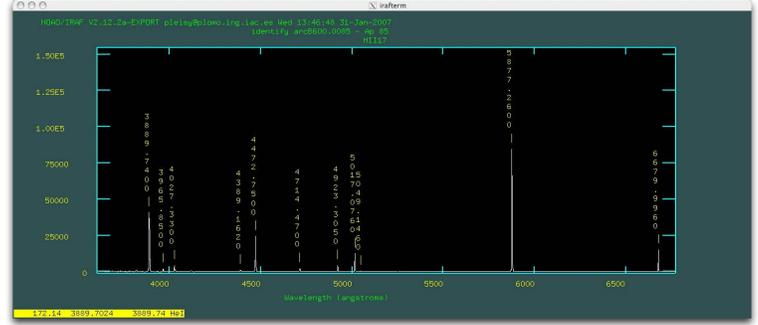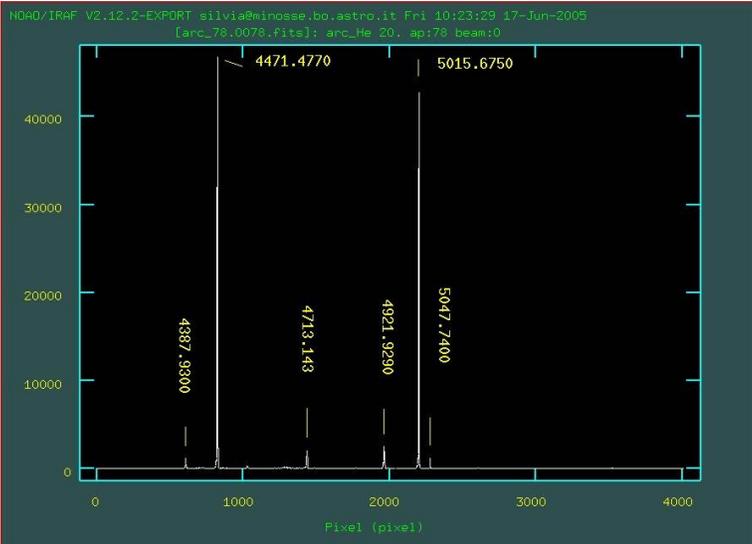
7   Annexe 2 : shapshots

8   Annexe 3 : Arcs
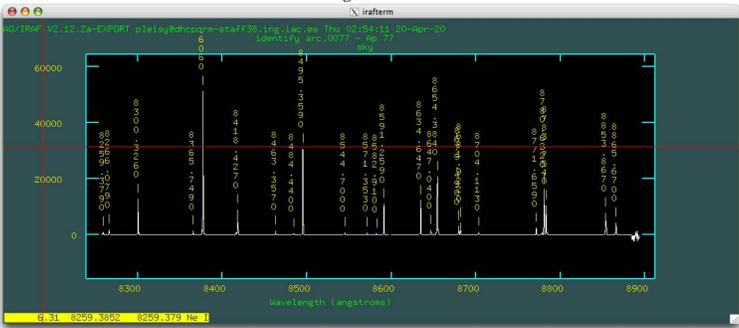
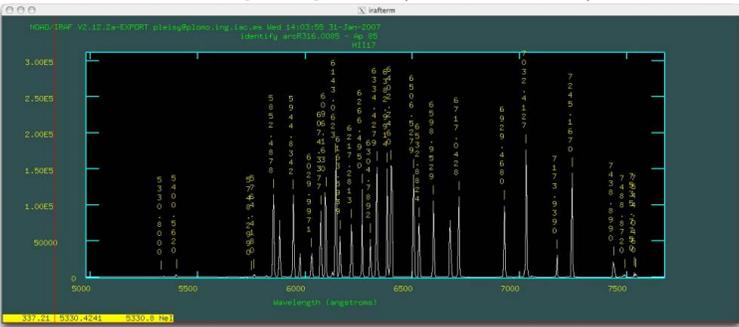Arc Helium R300B λ_c=6600Å(full blue domain)
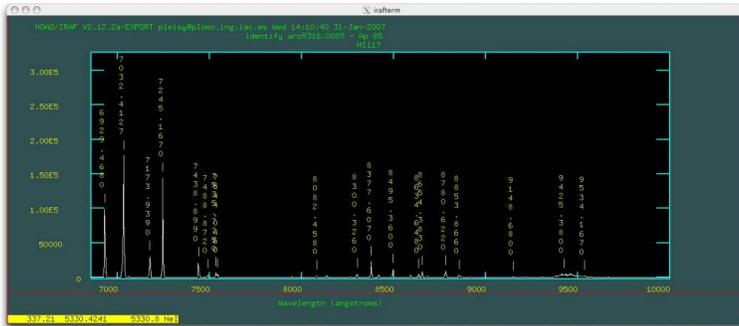

Arc Helium R600B λ_c

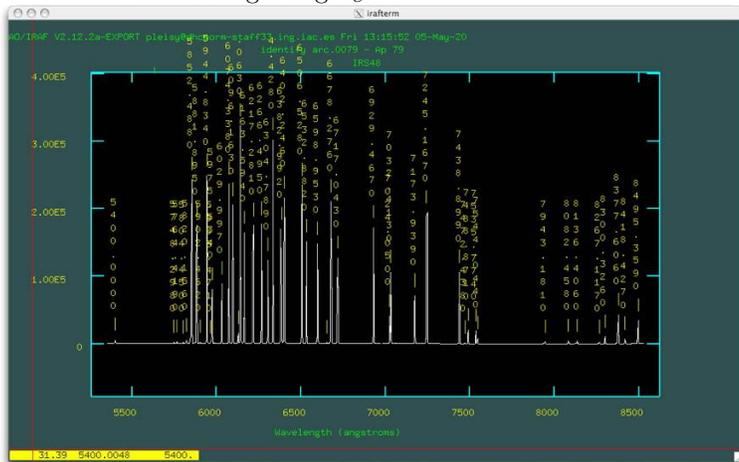

Arc Helium R1200B λ_c

Arc Neon Echelle-order3 λ_c=8600Å

Arc Neon R316R grating λ_c=Å(full red domain)

Arc Neon R600R grating λ_c=Å

Arc Neon R1200R grating λ_c=Å