Observational Techniques Project #3

Handling Spectra

This project is due Friday 29 April 5pm.

You will be reducing longslit spectra and wavelength calibrating them, following example data given as part of IRAF tutorials. You can choose not to do the assignment in IRAF if you prefer, but you must make sure to complete all the relevant steps to produce the right calibrated spectrum at the end. If you do choose to do the assignment in IRAF, I recommend following the instructions given as part of the tutorials. See also basic IRAF instructions at http://www.stsci.edu/documents/dhb/web/cappa_irafprimer.fm.html.

Downloading the Data
You will be reducing longslit spectra (exercise 3 = ccd2.txt) and calibrating them (exercise 5 = spec.txt). To get the data and documentation:

```
% ftp iraf.noao.edu (140.252.1.1)
ftp> log in as anonymous
ftp> use your email address as the password
ftp> cd iraf/misc
ftp> binary
ftp> get exer211.tar.Z
ftp> quit
% zcat exer211.tar.Z | tar -xf -
```

If you’ll be doing this exercise in IRAF, place the resulting folder in your IRAF login directory before beginning (see below).

Installing IRAF
Option 1: Install IRAF on your personal laptop
- Install the appropriate IRAF distribution from iraf.noao.edu
- Unpack it in your /Applications folder (or wherever you want it). Go to that folder and run the command ./install. (For additional Mac instructions, I recommend www.iac.es/sieinvens/siepedia/pmwiki.php?n=HOWTOs.IrafMacOSX.) You will also need xgterm, which is included in this distribution, but you need to put a symlink in your path if you don’t have one already:
  - cd /usr/local/bin/
  - sudo ln -sf <wherever you put IRAF>/vendor/x11iraf/bin/<architecture>/xgterm
- Then proceed to set up IRAF in your home directory (below).

Option 2:
- Use the IRAF installed on the mso servers and set up an iraf login in your home directory on e.g. malice (below).

Setting up IRAF
- cd ~/
- mkiraf (Set xgterm as your default login terminal.)

Now, open an xgterm, cd to this directory, and enter IRAF with the command “ecl”.

IRAF will open showing you simple instructions for navigating the CL landscape and showing you a list of packages.
To turn in:

Write up a summary of the steps you followed to reduce and calibrate the spectrum using the data found in exercise/spec/. Do not just name the steps, but explain why you do them. (e.g. “run zerocombine” is not sufficient – explain what the routine does and why it is needed in your reduction.)

Include a plot of the combined spectrum with the final wavelength solution.

Identify the two strongest absorption features in your star (which has a pretty low radial velocity). Are they:

- H gamma 4340
- He I 4471
- He II 4542
- H delta 4102

Make sure you specify which is which.

Epilogue:
Thinking about what you’ve learned about longslit spectra, describe what you would need to change in your exposure time calculator (HW3) in order to estimate S/N of spectra instead of images.