Astronomische Spektroskopie WS 2007/8
Unit 2, Abundance Analysis

please login (terminals in the back of the PC laboratory) via:

username: spectro
password: !spectro%

open a terminal and then login on jan, the computer you will use for your exercises via:

> ssh -X guest@jan.astro.univie.ac.at
username: guest
password: !guest%

During your exercise, you will have to determine **fundamental parameters** and **elemental abundances of as many elements as possible** of the Ap star **HD 73666** using the tools presented during the lecture on abundance analysis. Please inlcude the graphs presenting your results (plot elements versus abundance) in your protocol, which should be a step by step description of your analysis, including all your results and commenting on the questions given here.

The necessary observational data for the star and a solar comparison spectrum you will find in:

/home/guest/spectro2007/ueb02/HD73666/

The files:
3690_4500.norm.RV.obs
4410_4500.norm.RV.obs
4500_4580.norm.RV.obs
8000_9960.norm.RV.obs

are representing four different wavelength regions for the same star and in

/home/guest/spectro2007/ueb02/SUN/

the solar spectra for comparison are stored.
Before starting your work, please create a new directory in

/home/guest/spectro2007/ueb02/

(named according to your group) in which you will perform the analysis.

A.

As a first step, it is necessary to compute ***starting values*** for the ***fundamental parameters*** T_{eff} and **logg** (e.g. from Strömgren photometry), which can be done using the TempLogG tool, a compilation of photometric calibrations, available at:

http://ams.astro.univie.ac.at/templogg/main.php

where you have to login with:
Username: student
Password: student
In the ***SIMBAD*** data base you will find the necessary Strömgren data for HD 73666.

http://simbad.u-strasbg.fr/simbad/

B.

Having derived the starting values, you can now *extract an appropriate model atmosphere* from the **NEMO** grid of stellar atmospheres:

http://ams.astro.univie.ac.at/cgi-bin/dive.cgi

and calculate your first synthetic spectra using the ATC script:

> atc.tcl

With the idl program suite 'rotate'

> rotate.idl

*you've got a very powerful tool to **plot** and **compare** your calculated and observed spectra (star and sun) and determine the **projected rotational velocity** (v_{sini}) of HD 73666.*

C.

Now you are ready to derive the first abundances for HD 73666!
Comparing your stellar spectra to the according wavelength regions of the sun,
what strikes you?

Which elements deviate most from solar abundance?

Please derive abundances of as many elements as possible, separately from the different wavelength regions! What do you find? If your abundances differ, why is that so? (if you can answer this question, you are so lucky to get a bonus question ☼ (below) plus the according merits!).

Compare the spectral lines you used for your analysis to the according lines in the solar spectrum, discuss their quality and the influence of your selection on the analysis!

Why can't you find all your stellar lines in the solar spectrum?

note:

The solar parameters (already in .prf – file) are:

T_{eff} = 5777K v_{mac} = 2.5
log*g* = 4.438 v_{mic} = 0.875
v_{sini} = 1.2 km/s log*Z* = 0

☼ Bonus: which wavelength region can you use/not use due to the reason you found above?

HAVE FUN!