

Spectra II

•Materials

text book, computers

•Introduction

In this lab, you will analyze at the actual spectra of a few stars. Stellar spectra are the source of almost all information we have about stars and galaxies. See the Spectra I lab for more information.

•Procedure

1) On this and the following page are spectra from six different spectral classes of stars, O, B, A, F, G, and K. You might want to refer to the color table in the Herschel Experiment lab and the image in Spectra I to help you associate wavelengths with colors. By using the list of absorption lines below and the descriptions of the spectral classes, label the lines you see in each graph. Remember, the symbol I after an element indicates a neutral element, and II indicates that the element is singly ionized (has lost one electron). $H\beta$ and $H\gamma$ are the Balmer beta and gamma lines of hydrogen. Your lab instructor will go through the first one with you.

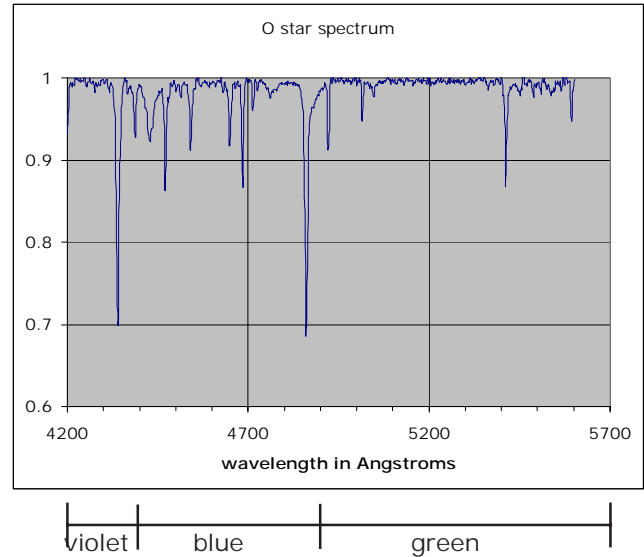
| Chemical Name | Wavelength (Angstroms) |
|---------------|------------------------|
| Fe I | 4303 |
| H γ | 4340 |
| He I | 4386 |
| He I | 4470 |
| He II | 4685 |
| H β | 4860 |
| He I | 4920 |

[1 Angstrom = 10^{-10} m]

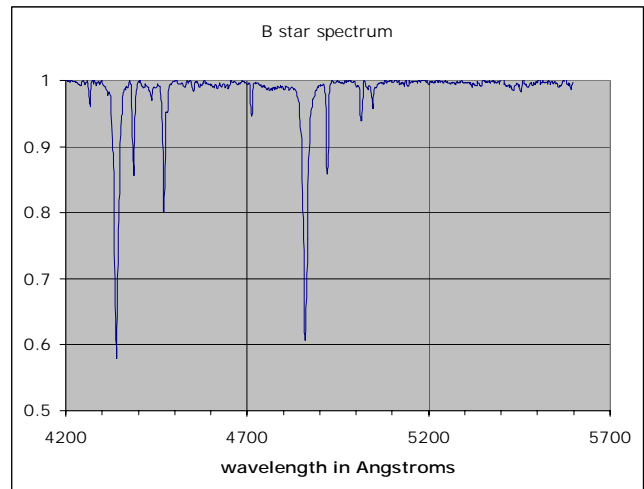
Spectral classes:

- O** - Ionized helium, weak hydrogen lines
- B** - Helium and hydrogen lines
- A** - Strong hydrogen lines
- F** - weaker hydrogen lines than A stars, Iron lines
- G** - neutral metals, even weaker hydrogen lines
- K** - neutral metals
- M** - molecules and metals

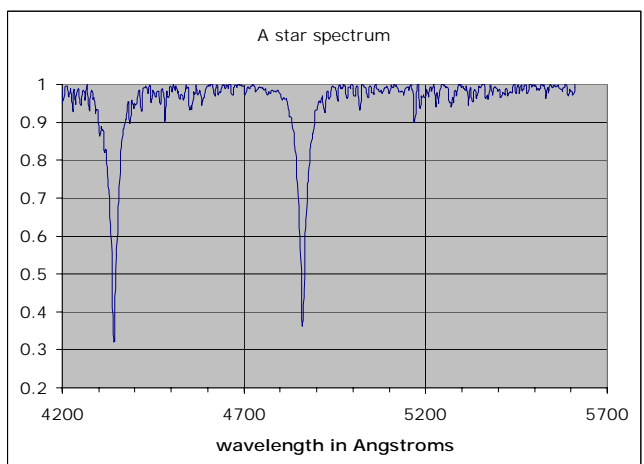
O Star



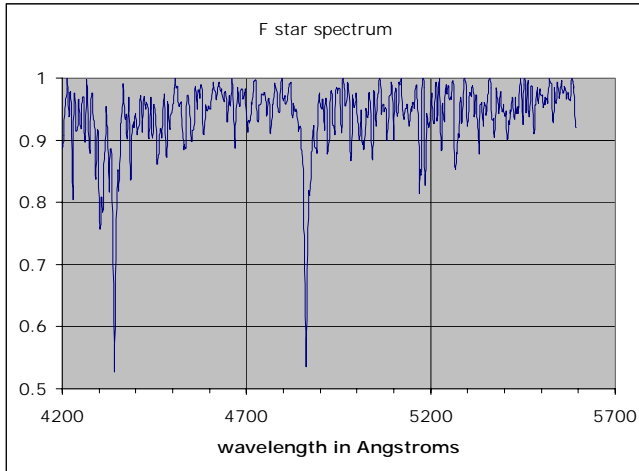
B Star



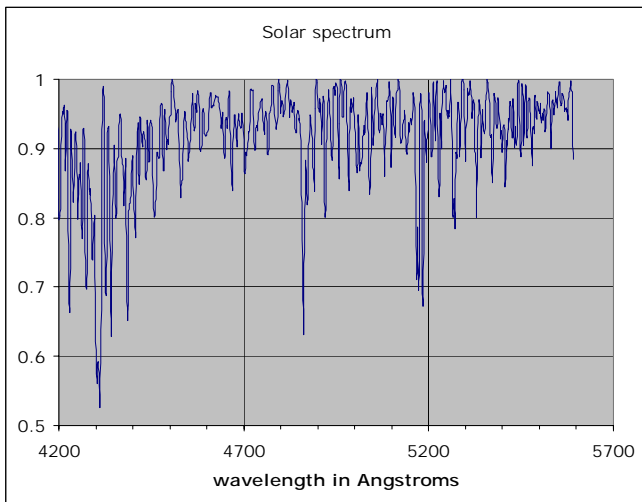
A Star



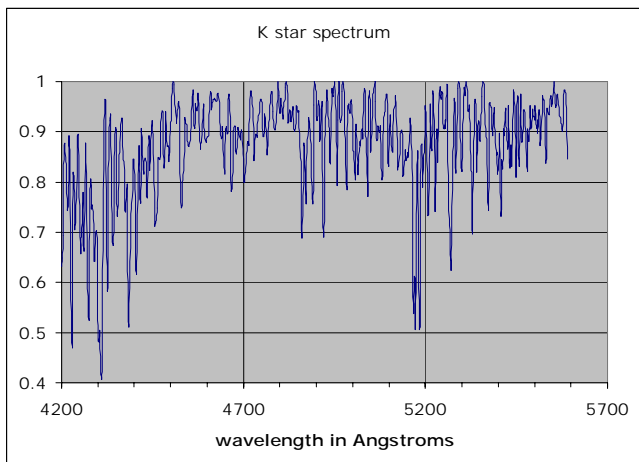
F Star



G Star



K Star



2) Turn on your computer. Open a web browser and go to the following site:
<http://stellar.phys.appstate.edu>
 Choose any star you'd like and save the data. Open Excel, import the data, and make a plot like the ones in this lab. If you need help doing this, ask your lab instructor. What spectral lines do you observe in your plot?

•Questions

- 1) Which type of star is hotter, an O star or a G star?
- 2) Why do stars have hydrogen and helium absorption lines?
- 3) Why don't the cooler stars have strong ionized lines?
- 4) Why don't the stars that are more hot have metal lines? (Here, "metal" refers to any element heavier than helium).
- 5) How could you tell, from this data, if a star was moving relative to us?
- 6) What lines did you expect to see in the spectra, but didn't due to the fact that the spectra stop at about 5600 Angstroms? Make a list below for each spectral type, using your observations from the *Spectra I* lab for hydrogen and helium.

O -

B -

A -

F -

G -

K -

For credit, turn in your labeled spectra and answers to the questions.

*Spectra obtained from data at
stellar.phys.appstate.edu*