Absorption and Emission Lines in Real Stars

For most elements, there is a certain temperature at which their emission and absorption lines are strongest. The lines you see in a star's spectrum act like thermometers. Some compounds, like titanium oxide, only appear in the spectra of very cool stars. Others, like helium, appear only in the spectra of very hot stars.

Therefore, the sequence of spectral types, OBAFGKM, is actually a temperature sequence with O representing the hottest stars and M representing the coolest stars.

Here are some useful devices to remember the order of the spectral types:

O	B	A	F	G	K	M
Oh,	Be	A	Fine	Girl/Guy,	Kiss	Me!
Only	Bad	Astronomers	Feel	Good	Knowing	Mnemonics
Oh,	Boy!	Another	F's	Gonna	Kill	Me!

The table below shows some of the characteristic absorption and emission lines of each star.

Spectral Type	**Temperature (Kelvin)**	**Spectral Lines**
O	28,000 – 50,000	Ionized helium
B	10,000 – 28,000	Helium, some hydrogen
A	7500 – 10,000	Strong hydrogen, some ionized metals
F	6000 – 7500	Hydrogen, ionized calcium (labeled H and K on spectra) and iron
G	5000 – 6000	Neutral and ionized metals, especially calcium; strong G band

K	3500 – 5000	Neutral metals, sodium
M	2500 – 3500	Strong titanium oxide, very strong sodium

You may not know where all of these elements have their emission lines. The chart below lists some of the more common ones and their approximate location in the electromagnetic spectrum.

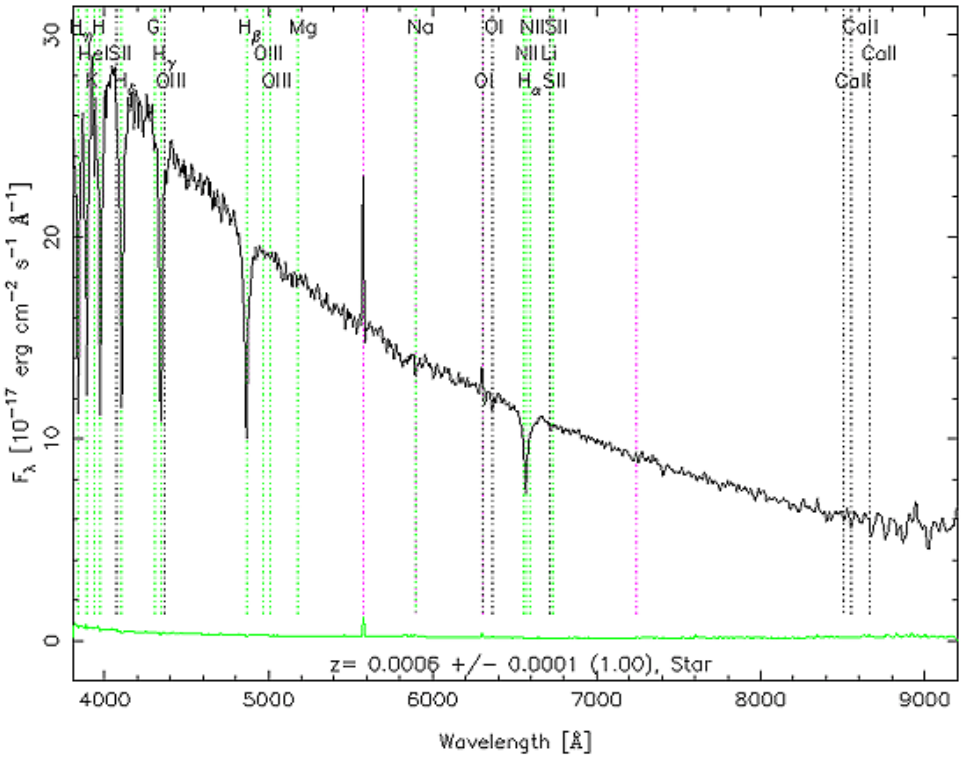
Spectral Lines	**Wavelengths (Angstroms)**
H_a, H_b, H_g	6600, 4800, 4350
Ionized Calcium H and K Lines	3800 – 4000
Titanium Oxide	lots of lines from 4900 – 5200, 5400 – 5700, 6200 – 6300, 6700 – 6900
G Band	4250
Sodium	5800
Helium (neutral)	4200
Helium (ionized)	4400

If you are interested in learning where to find all the lines the SDSS software uses, you can find a ~~**table of all the lines** (http://astro.uchicago.edu/~subbarao/newWeb/line.html)~~.

Question 4. How does your classification system compare to the OBAFGKM spectral type classification shown above? What are the similarities? What are the differences?

Now, take a look at the spectrum you saw earlier:

RA=146.91375, DEC=−0.64448, MJD=51630, Plate= 266, Fiber= 15



Question 5. What lines are present in this spectrum? Do you see any spectral lines of ionized atoms?

Question 6. What is the spectral type of this star?

Got your answer? Click Next to see how you did!

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