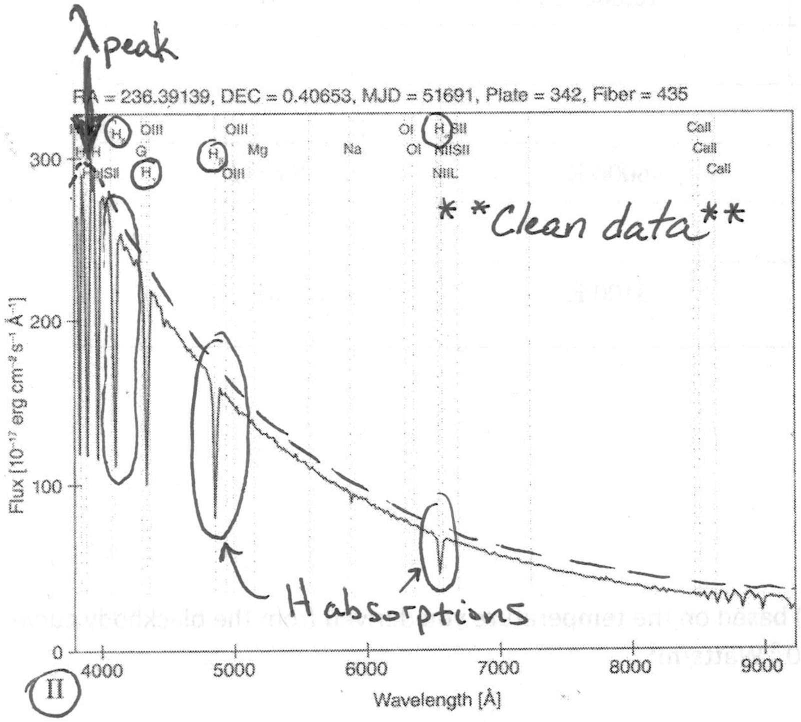
Names:

Group:________

## ACTIVITY 17: Spectral Classification of Stars

Complete the Exercise in your individual workbook. Then complete this sheet **as a group**. This sheet has figures and tables from the workbook exercise, but also includes particular instructions. Read carefully and be sure to include all the information asked for.



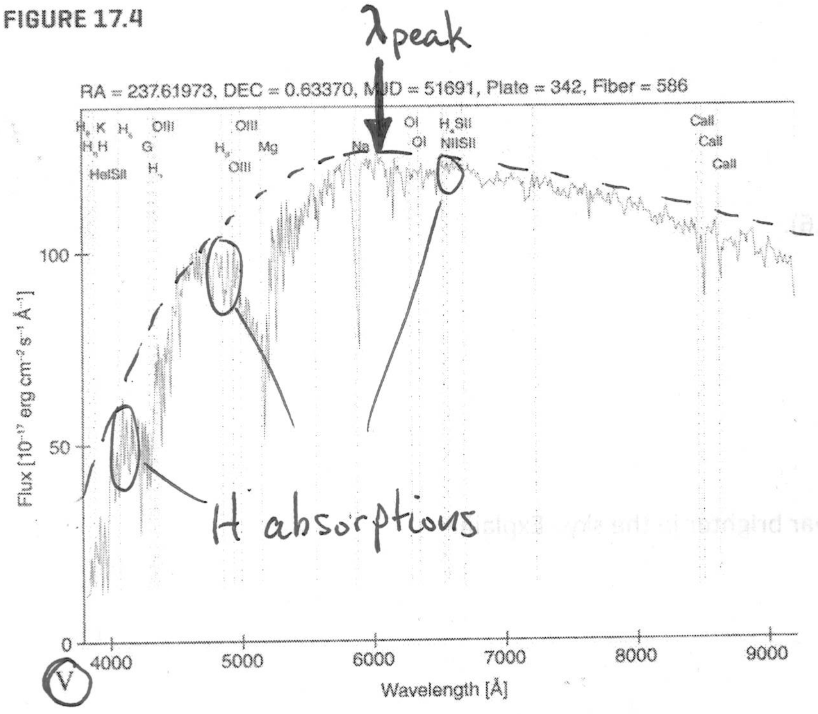
λpeak

**Clean data**

H absorptions

II

**FIGURE 17.4**



λpeak

H absorptions

V

**FIGURE 17.6**

**On Fig. 17.4 and 17.6,**

1. Draw the blackbody curve that you think best fits the data.
2. Use an arrow to show where $\lambda_{peak}$ is on each plot. Label the arrow.
3. Determine which graph has the better looking data. Label the graph, ***clean data***.
4. Which star measured the greater overall flux? (circle one option)

   [✓ *Figure 17.4*]

   *Figure 17.6*
5. Why might the total flux be different for these two stars?

   Star II is hotter than Star V and emits more energy.
6. Find and circle absorption features caused by hydrogen (H) in each graph.
7. Explain how the H absorption features compare to the absorption features of other elements for each star.

   H absorption features are deep (strong) compared to other elements in Star II. H absorptions are relatively weak in Star V.

### TABLE 17.1

Characteristics and data for six SDSS stars based on examination of their spectra.

| STAR ID | PEAK WAVELENGTH (Å) | SURFACE TEMPERATURE (K) | SPECTRAL TYPE |
|---|---|---|---|
| I | <3,000 Å | >10,000 K | B |
| II | ~ 3900 Å | ~ 9700K | A |
| III | ~ 4800 Å | ~ 6000K | F or G |
| IV | ~4,800 Å | ~6000 K | F or G |
| V | ~ 6000 Å | ~ 4800K | K |
| VI | >9,200 Å | <3100 K | M |

**Complete Table 17.1 above.**

8. Calculate the total Flux for *Star II* (Figure 17.4) based on the temperature you derived from the blackbody curve. The Stefan-Boltzmann constant is $\sigma = 5.67 \times 10^{-8}$ Watts/$m^2 \cdot K^4$

$$F_{emitted} = \sigma T^4$$

$$= \left(5.67 \times 10^{-8} \frac{W}{m^2 \cdot K^4}\right) \times \left(9700\ K\right)^4 = 1.73 \times 10^{8} \frac{W}{m^2}$$

9. Calculate the total Flux for *Star V* (Figure 17.6).

$$F_{emitted} = \sigma T^4$$

$$= \left(5.67 \times 10^{-8} \frac{W}{m^2 K^4}\right) \times \left(4800\ K\right)^4 = 3.09 \times 10^{7} \frac{W}{m^2}$$

10. Which of these, *Star II* or *Star V*, would appear brighter in the sky. Explain.

Star II would be brighter than Star V IF THEY WERE AT THE SAME DISTANCE AND IF THEY WERE THE SAME SIZE. {CHECK SIZE & DISTANCE EFFECTS.}