

# Lecture: October 11, 2010

- You have a hobby of collecting coins with your birthdate on them. Assume you are under 30 and all dates in the last 30 years are equally likely.
- How many coins would you have to search in order to be 95% certain you have at least one?

Announcements:

Problem Set 3 Due today

Second Exam October 25

Next Observatory also 10/25

# Kirchhoff's Laws

- 1 A hot, dense glowing object (solid or gas) emits a continuous spectrum.



# Kirchhoff's Laws

- 2 A hot, low density gas emits light of only certain wavelengths --  
⇒ an emission line spectrum.



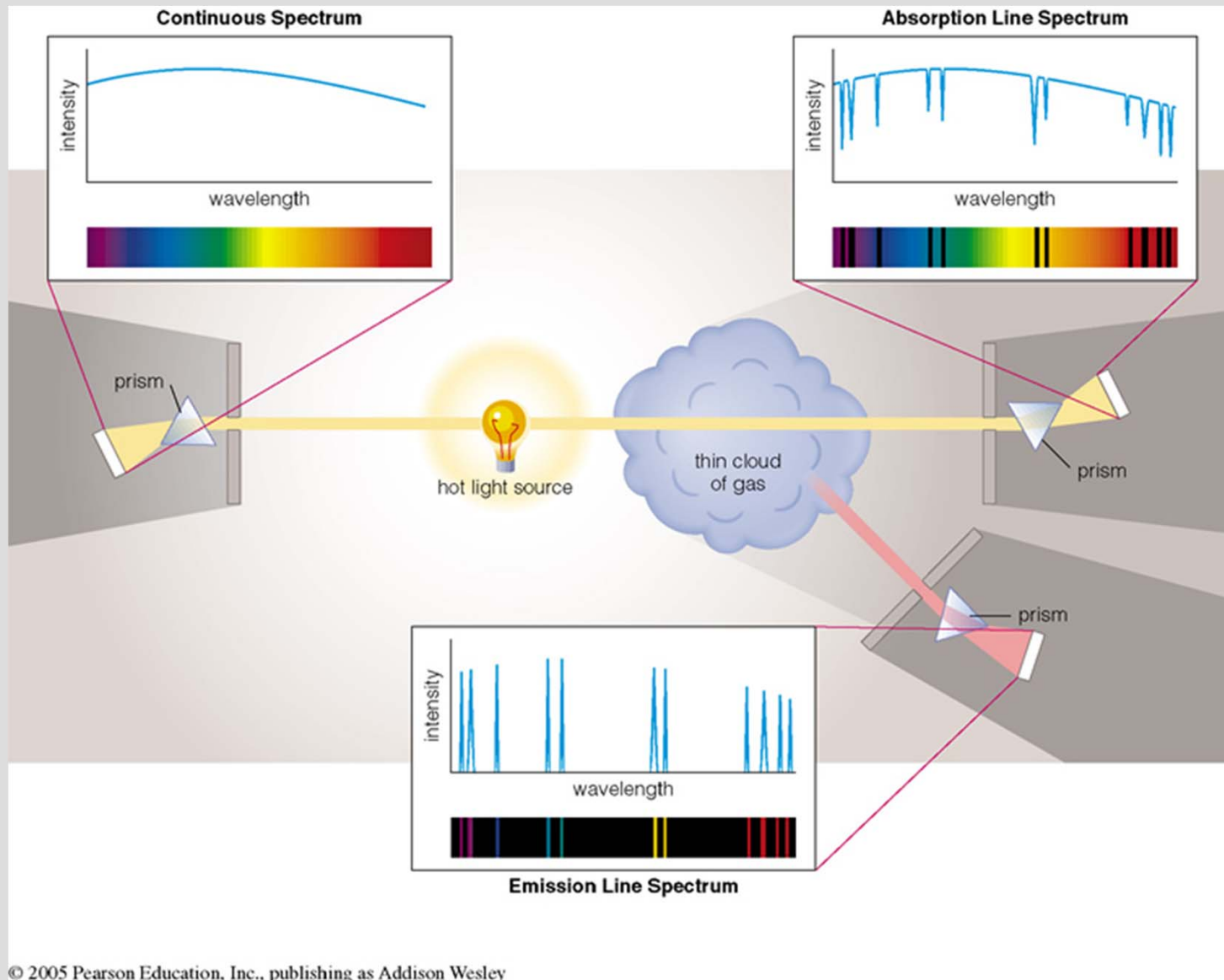
# Kirchhoff's Laws

3 When light having a continuous spectrum passes through a cool gas, dark lines appear in the continuous spectrum --

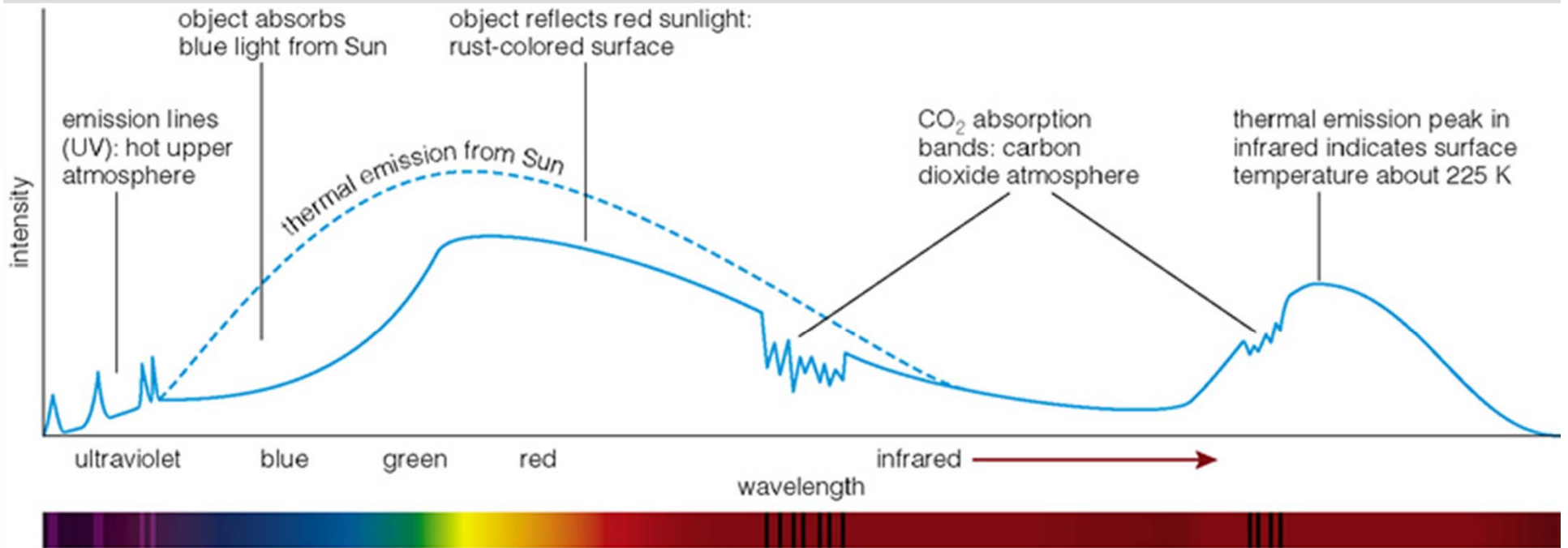
⇒ an absorption line spectrum.



# Kirchhoff's Laws



# Sum it up



# The Doppler Effect

1. Light emitted from an object moving towards you will have its wavelength shortened.

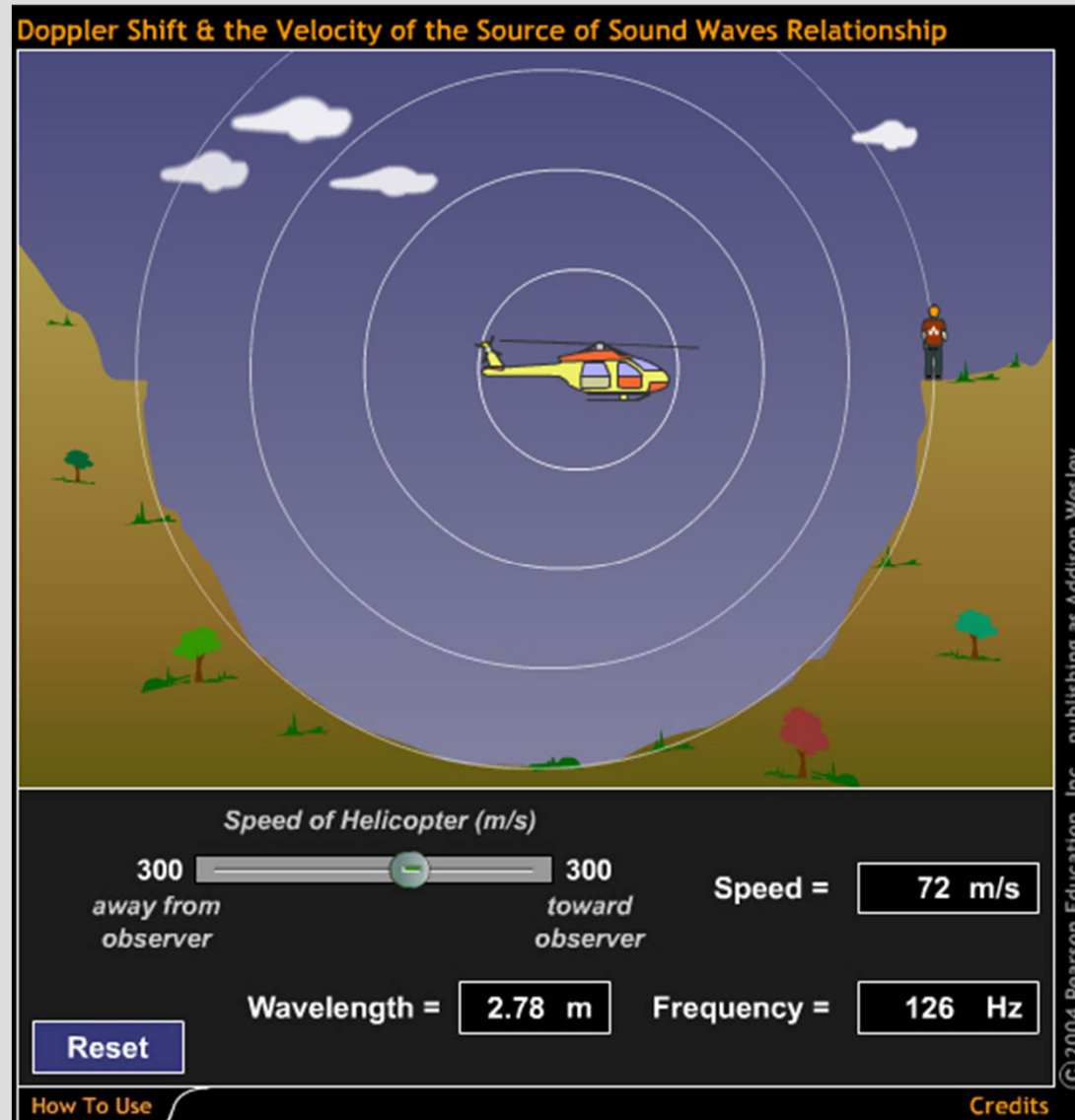
**BLUESHIFT**

2. Light emitted from an object moving away from you will have its wavelength lengthened.

**REDSHIFT**

3. Light emitted from an object moving perpendicular to your line-of-sight will not change its wavelength.

# The Doppler Effect



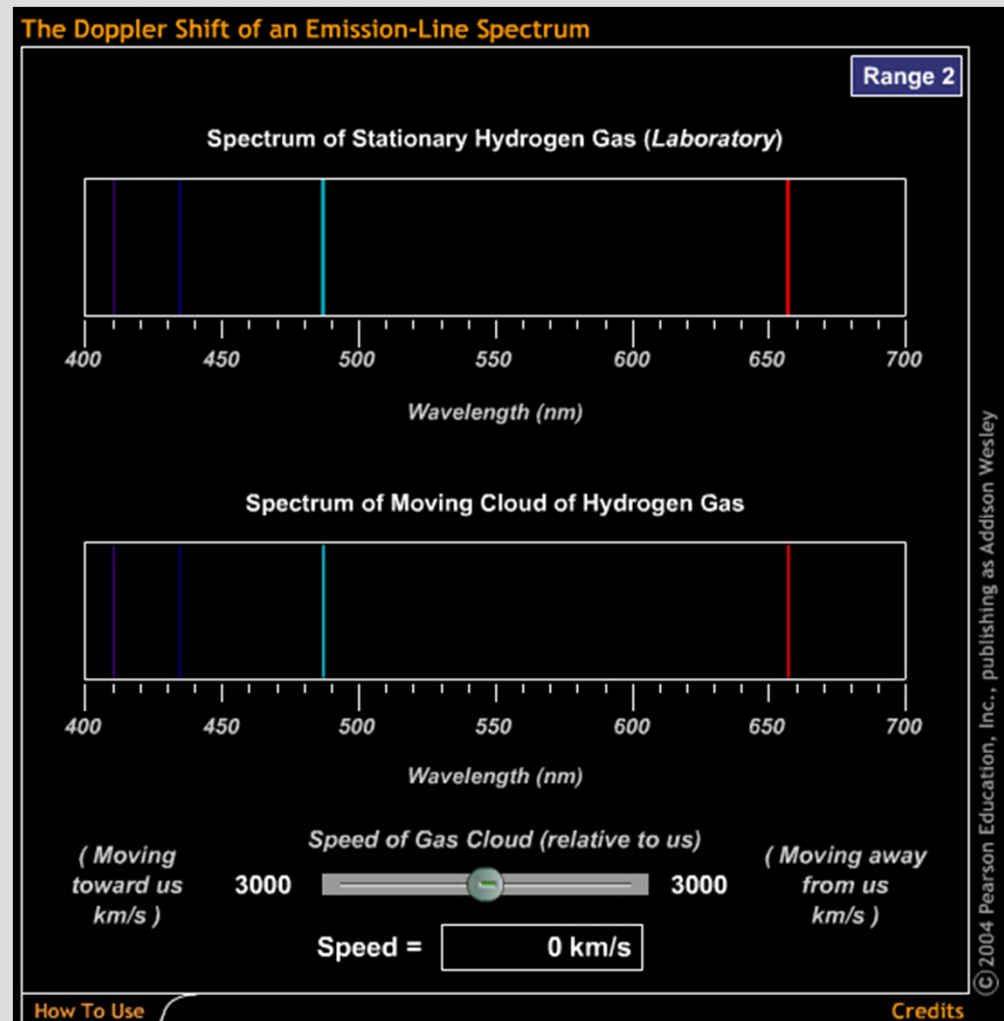


# The Doppler Effect

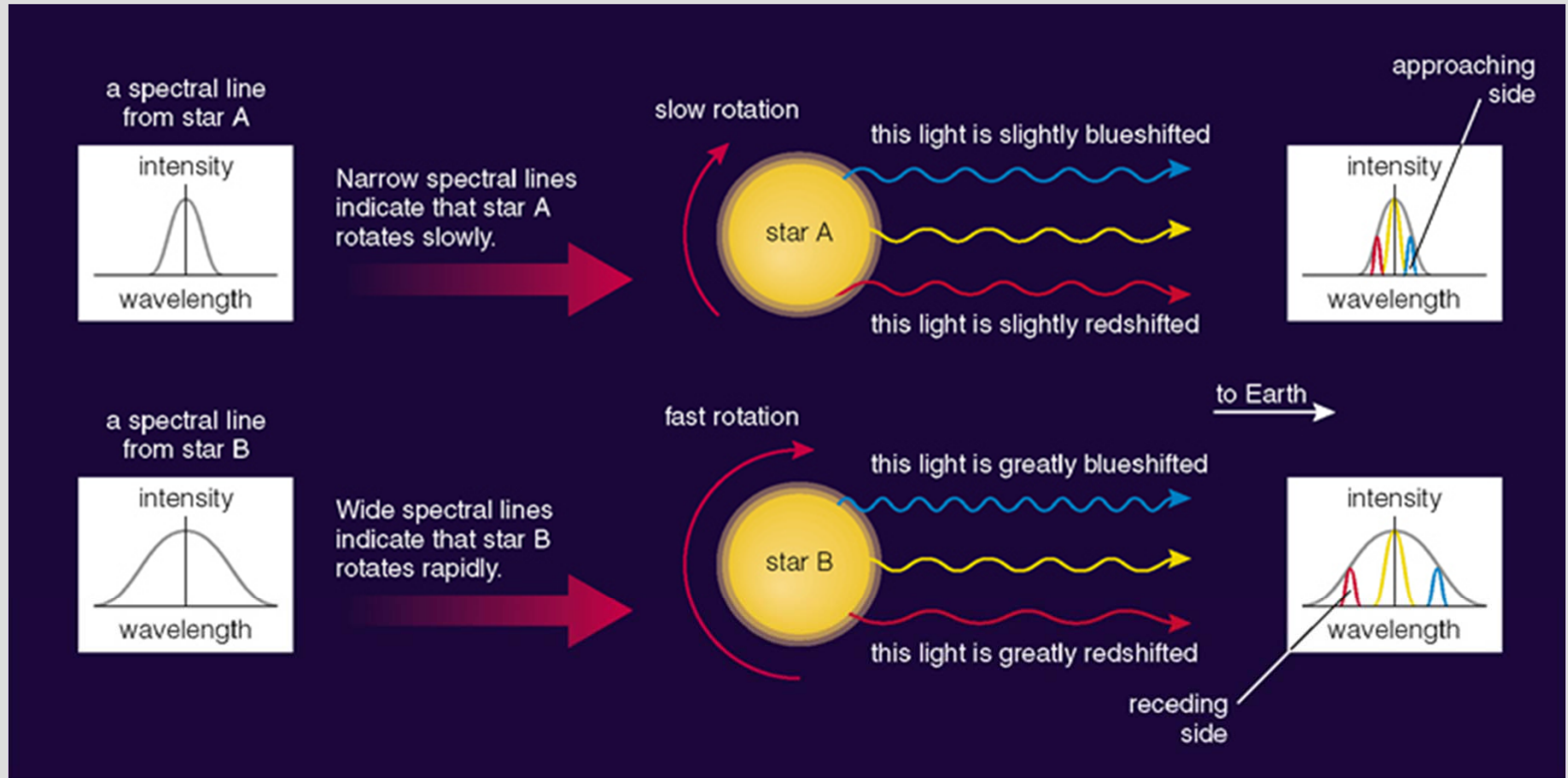
$$\frac{\Delta\lambda}{\lambda} = \frac{v}{c}$$

# Measuring Radial Velocity

- We can measure the Doppler shift of emission or absorption lines in the spectrum of an astronomical object.
- We can then calculate the velocity of the object in the direction either towards or away from Earth. (**radial velocity**)



# Measuring Rotational Velocity



End of Physics

*Start tour of Solar System*

**YEAH!**