Announcements

- **Reading quiz.** There is no reading quiz due for tonight, Tuesday October 13. The next one is assigned for this week’s reading (see assignment below), and is due next Tuesday night (October 20) at 11:55 PM. It will become available to take at the textbook website at 12:05 AM Wednesday, October 14.

- **Extra planetarium shows!** As part of a public outreach effort, astronomy graduate students will be offering planetarium shows every Wednesday at 1:00 PM from October 7 through December 9 (no shows on November 11 or 25). The shows are open to the public (i.e., they are not specifically geared towards astronomy 101 students, as were the shows earlier in the semester, and no reservations or tickets are needed. The planetarium is on the second floor of the physics-astronomy building, in room PA-209. Note that no attendance will be taken at the shows – so your attendance is just for your own edification and fun!

**Reading Guide and Homework Assignment**

(On-Line Reading Quiz #5 Due: Tuesday, October 20, 11:55 PM)

This week we continue our study of light, and read from two different sources: Your Course Reader and your textbook. Note that there is significant overlap in the material between the two sources (i.e., both cover the wave properties of light); however, since understanding light is so important, I am assigning both readings to make sure you get it! In general, I prefer the presentation given in the Course Reader over that in the text book, but it is useful to see it all discussed in both places. Note that the order of the reading assignments below follows the presentation order given in class, and so it skips around a bit.

1. **Text — Chapter 4, Sections 4.3.2 and 4.3.3: The Value of Stellar Spectra and Types of Spectra.**
   
   We continue our study of the optical properties of light with a description of the types and value of spectra. Note in particular the discussion of the three different kinds of spectra: continuous, absorption-line (or dark-line), and emission-line (or bright-line). These are the types of spectra that are described by “Kirchoff’s Laws”, as discussed in class (your text does not apply this label to the three types of spectra, but, rather, just describes how each is produced).

2. On-line tutorial: On the “Tutorial: Chapter 4” section of the textbook website, look at the Astronomy Exercise called “Stellar Atomic Absorption Lines”.

   This shows the different absorption (“dark”) lines that are produced for various elements typically found in the atmospheres (i.e., the outermost layers) of stars like our sun. Notice that the strength of these lines (i.e., how dark they are) depends on the relative abundance of that element in the star’s atmosphere; we shall later learn that it also depends sensitively on the temperature of the star’s atmosphere, as well.

3. On-line tutorial: On the “Tutorial: Chapter 4” section of the textbook website, look look at the Active Figure called “Kirchhoff’s Laws”.

   This provides a good exercise to understand how each of the three types of spectra are produced. There is also an explanation given that explains exactly what produces each type of spectrum; this is drawn from material (about atoms) that will be covered next week. Note that the explanation as to what is physically occurring to produce the three spectra came 60 years after Kirchoff first described the three type of spectra. Sometimes the true explanation for physical phenomena takes a while to figure out!

4. **Course Reader — Required Reading: Light Waves** (down to, but not including, the subsection entitled “The Doppler Effect”). (See the Table of Contents in the Course Reader for the page numbers.)

   Here is an excellent description of the wave properties of light, provided by these excerpts taken from a different astronomy text. The emphasis given follows very closely how we covered the material in
class, so read carefully. Note that in the last few pages of this section you get a nice review of the 3
types of spectra (e.g., Kirchoff’s Laws of Spectral Analysis), discussed this week.

5. **Text — Chapter 4, Sections 4.1.1 4.1.2, 4.2.1:** *The Nature of Light — Maxwell’s Theory of
Electromagnetism, The Wave-Like Characteristics of Light, and The Electromagnetic Spectrum —
Types of Electromagnetic Radiation.* (Also, be sure to read all of the introductory material to the
chapter on pages 85 and 86, before beginning with §4.1.1.)

These readings essentially present the same material as the previous assignment, but do so with
somewhat different pedagogy and emphasis. Begin by reading again about the wave characteristics
of light. As was discussed in class, depending on the experimental setup, light can behave as *either*
a wave (an electromagnetic wave) or a particle (a photon). The next section introduces the concept
of the *electromagnetic spectrum*, and the idea that *visible light* is just one *type* of electromagnetic
radiation, namely the range of light characterized by wavelengths between 400 nm (violet light) and
700 nm (red light). Also note the discussion of how Earth’s atmosphere blocks most of the electro-
magnetic spectrum from reaching Earth’s surface; this is one major reason we put some telescopes
in space, above Earth’s atmosphere!

6. **On-line reading quiz (Due: 11:55 PM, Tuesday, October 20):** Take this week’s *reading
quiz* by clicking on the “Quiz 5” assignment at the on-line textbook web-site. The Reading
Quiz will become available to you at 12:05 AM, Wednesday, October 14. It consists of 10 multiple
choice questions. **You must complete this on-line quiz by 11:55 PM Tuesday, October 20.**
As always, you may take the quiz twice.