

Astronomy Guide to Reading for Tuesday, May 11

- (1) The main reading is Sections 10.1 and 10.2 (pp. 289-307). It seems premature to discuss general relativity, so let's wait on Section 10.3.
- (2) When doing the main reading, also go back to Section 2.4 to review the properties of Hydrogen, especially, the Hydrogen- α emission line diagrammed in Figure 2-12. The wavelength of this line is 656nm which makes it a rich red. Compare with the Lyman- β line of Hydrogen which is 102nm. All of the Lyman lines are ultraviolet (and therefore too energetic to get through our atmosphere).
- (3) Also in Section 2.4 look at the diagrams in Figure 2-13 for neutral Helium and ionized Helium. If you have forgotten all of high school chemistry (protons and neutrons make up nuclei, electrons orbit nuclei, atoms are characterized first and foremost by atomic number, atoms are often compared in weight by atomic mass), do some kind of quick review to make sure all of this basic terminology is fresh.
- (4) Chapter 10 really should be called "the exterior of the Sun" or "what we can directly observe about the Sun." Pasachoff and Filippenko are holding back on the interior of the Sun until Chapter 12. The layers you will be focused on in this chapter are the photosphere, the chromosphere, and the corona. Looking ahead to Chapter 12, the authors introduce the interior layers briefly in Figure 10-3.
- (5) We have some unresolved questions about the solar wind from a couple of classes back when we were discussing comets. I was watching closely in this reading for clues as to how the solar wind is currently viewed. The corona tapers off into the solar wind. The Sun expels particles into space in unusual amounts via "coronal mass ejections" and "solar flares." It is also just boiling off particles continuously. Keep an eye on what Pasachoff and Filippenko say about the solar wind.

As usual, our authors have provided a wealth of very recent information and thinking, which is why going through this textbook is a treat for me, even though it is an introductory survey. For example their data on sunspots is current all the way to 2018. They are also honest about what is still not known. For example, on p. 301, the authors acknowledge that we don't yet know (quantitatively) "why the corona is so much hotter than the photosphere, and what causes and propels the solar wind," and they are hopeful that the ESA's Solar Orbiter (http://www.esa.int/Science_Exploration/Space_Science/Solar_Orbiter) will help us untangle the complexity of the corona and space weather.

Astronomy Problem Set 8 for Tuesday, May 11

From Chapter 2, p. 38, do problems 42, 43, and 47. Choice 42(e) is spurious unless by -1 the authors mean emitting a photon of energy 1. For 47, the answer is (a). Since I have given you the answer, explain why that is the answer in just one or two sentences.

From Chapter 10, pp. 313-314, do problems 13, 14, 15, 39, and 43. Your answer from Chapter 2, problem 47 should determine your answer to Chapter 10, problem 43.