Astronomy Reading and Discussion for Tuesday, May 18

On Thursday, we didn't get to 11.5, 11.6, and 11.7, and 11.8. In fact, we didn't even quite finish 11.4 (see the problem below which wraps up HR diagrams). So our discussion can open with anything you want to cover from those sections of Chapter 11. Please make sure that you fully understand the properties of Cepheid variables. They may seem obscure and unusual, but they are surprisingly important. The reason is that some Cepheids are actually bright enough to be identified in neighboring galaxies(!). So they tell us about galaxies other than our own.

Then we'll turn to Chapter 12. The top thing to understand from Chapter 12 is the variety of fusion processes that go on in the center of the Sun. That's 12.2 and Figure it Out Section 12.1. If you are looking for material to skip, 12.7 is great science, but for the present you don't have to know that much about neutrinos, except for the fact that they are particles that escape the Sun's interior. See the fusion reactions in Figure 12-14.

Astronomy Problem Set 9 for Tuesday, May 18

(1)-(4) From Chapter 11, Problems 10, 13, 20, and 30. For Problem 20, although I derived the relativistic Doppler shift in class, for the "low" velocity of 200 km/sec, you can use the non-relativistic formula in Figure It Out Box 11.4. Note that light goes 300,000 km/sec, so 200 km/sec is low by comparison (not even 0.1% of light's speed).

(5) Do the problem that I wanted to do in-class. It is finishing a table for several stars and then plotting the points on the HR diagram.

(6)-(7) From Chapter 12, Problems 7, and 17.

For 17, you will need the mass of the proton in kilograms, and the speed of light in meters per second. The units of your answer will then be Joules.

(8) A Joule/second is a Watt. The total power output of the Sun is 3.8×10^{26} Watts. Above you found out how many Joules are released when four protons becomes one Helium nucleus. If the Sun were entirely powered by this reaction (which it principally is), then at what rate (reactions per second) must this reaction be occurring to account for the total power output of the Sun?
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