Topics: We'll go over a few key points about neutron stars and other items from the second half of Ch. 18, and then transition to the Milky Way. On Tuesday, we'll look at its most important properties.

Reading:

- Review secs. 3 and 4 of Ch. 18; review the material about massive star evolution and end states from the previous class assignment, and come to class with questions.
- Read sec. 1 of Ch. 19.

Summary of work to submit:

- There will be a small warmup problem, available on Sunday night, that you'll have to do before coming to class on Tuesday.

The Milky Way is a relatively typical large spiral galaxy. And we happen to live inside it. Galaxies are the environments in which stellar evolution and material and energy exchange with the ISM takes place. They are gravitationally bound collections of stars, gas, dust, and – importantly – dark matter. The Milky Way has distinct populations of stars (metal rich vs. metal poor and those two properties correlate in meaningful ways with other properties of the stellar populations), and a relatively ordered structure (flattened disk with some spherical components) and kinematics (disk components orbit the galactic center; spherical components have much more random, low angular momentum orbits).

Commentary on the reading:

You will learn from reading Ch. 19 that we only realized that the Milky Way is a galaxy – that other galaxies exist too – about a hundred years ago.

In the first section you'll see how the basic idea of star counting can help us figure out how big the Galaxy (capital G when we're talking about the Milky Way) is and where we're situated in it. However, interstellar dust is a huge problem. Note that globular clusters exist (look up a few images on APOD) and because they're not generally in the plane of the Galaxy, where most of the dust is, they were very helpful for figuring out the size and scale of the Milky Way (in the 1920s).

View of a portion of the Milky Way from Chile – http://apod.nasa.gov/apod/ap160707.html. Can you see how a flat, cylindrical distribution of stars would look like this when viewed from the inside?

Also pay special attention to the division of the Milky Way into disk, bulge, and halo and to the distinction between population I and population II stars. This is all mostly on p. 437.

Finally, back to globular clusters. It's thought that all the stars in a globular cluster formed at the same time, and so they're the same age as each other (and basically the same distance from us). So, what do you think an HR diagram of all the stars in a globular cluster looks like? How would the HR diagram differ between a 1 billion year old globular cluster and one that's 10 billion years old?

The globular cluster Omega Centauri – http://apod.nasa.gov/apod/ap160427.html – note that it is estimated to be 12 billion years old, but that there are hints that not all the stars were formed at the same time.