

Physics 312: Homework #5

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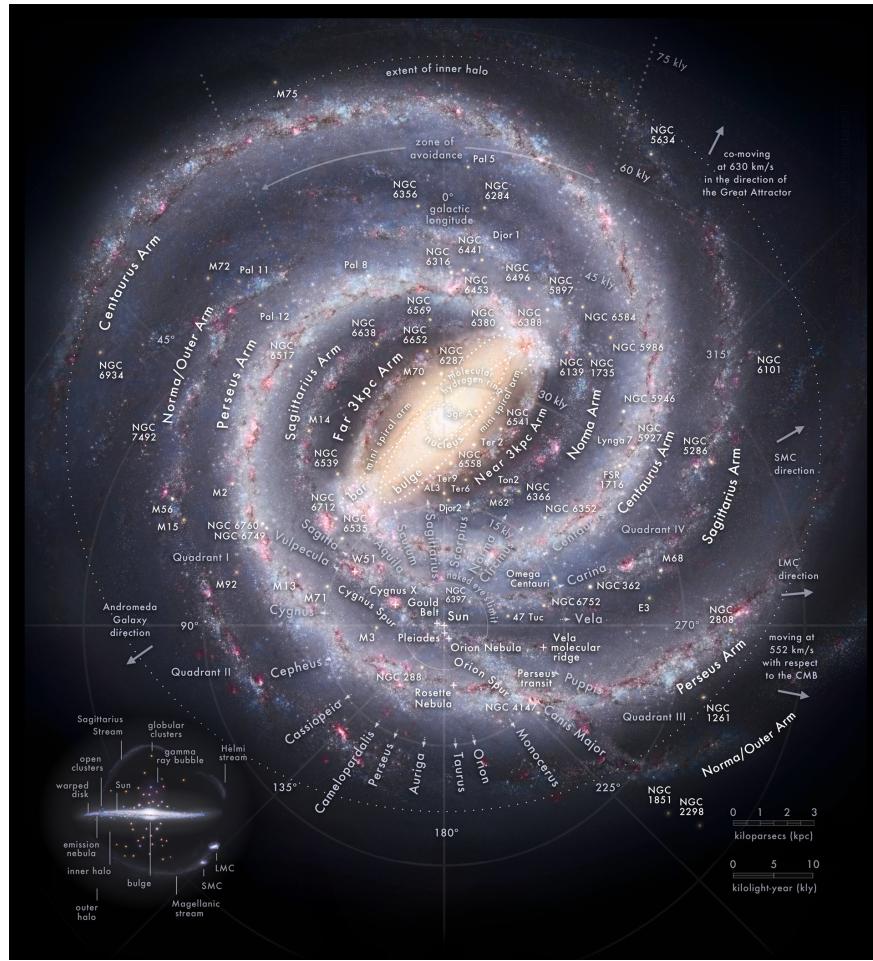


Figure 1: The Milky Way galaxy. For a higher resolution version click [here](#).

In Homework # 3 we looked at trying to use data from the Hipparcos mission to indentify the members of the Hyades cluster. The data we used for that was contained in `Hyades_Plx_20_25.dat` and had information on 2,678 stars between 40 and 50 parsecs (1 parsec = 3.26 light-years) from Earth. This is what's known as a volume-complete sample, since we have all the stars in a spherical shell that covers the whole sky and is 10 parsecs thick. To you and me 40 parsecs may seem like a long ways, but on the scale of our galaxy, it's really only a very small distance compared to the size of our galaxy. This means that we have a representative sample of the stars in our part of the galaxy. Using this data, we can investigate all sorts of things. For example:

- Investigate the types of stars around us using the Hertzsprung-Russell diagram in our part of

the galaxy. What fraction of stars are on the main sequence? What fraction fall into each of the spectral types? Note that you can roughly convert the B-V color in the data file to spectral type, as described here.

- Investigate the galactic geography around us. Where are the stars? Are they evenly spread out over the sky? If you look at some of the 88 constellations defined by the International Astronomical Union how many of the stars in that constellation are in this dataset? Create a 3D visualization of the stars in that area of the sky.
- Investigate the motion of these stars relative to the motion of the Sun. The velocities given are relative to the Sun's movement, and everything is orbiting through our galaxy. Can you find patterns in the velocity data? Is the Sun's motion different from the average motion of our sample of stars? Is there a statistically significant difference between the velocities of stars in different parts of the sky?

These are just a few ideas. Please don't try to do everything and don't feel limited to my ideas. Your assignment is to use this data to explore what you can learn from this data. Create nice plots and put them together in a document (a Google doc, for example) that provides some explanation of what your plots are and what they mean. This isn't a paper so you don't need paragraphs – just enough text to explain your plots.