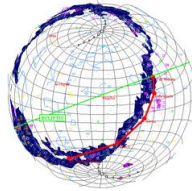


The Milky Way Galaxy

- The solar system is located at the spiral arms of our Milky Way galaxy at 26,000 light years from the center of the galaxy. It is difficult to picture the shape of the galaxy sitting inside the galaxy. It appears as a planar band of stars in the night sky. We have to create a mosaic of pictures taken over a period of time to see entire picture of Milky Way.



- Structural components of Milky Way:
- Disc
- Bulge
- Halo

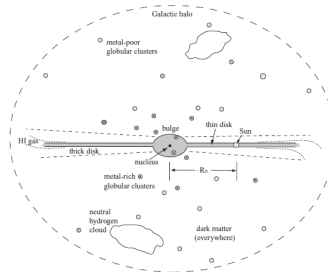


Figure 1: Milky Way as seen by an observer outside the Galaxy

- Disc: This is the most prominent feature of the Milky Way galaxy. It is thin and roughly circular. The disc consists of stars, gas and dust. Size of stellar disc varies from that of gaseous disc. Stellar disc stretches out to 15 kpc from the center of the galaxy, while gaseous disc stretches far beyond up to 25 kpc. Disc can be said to be made up of two parts, the thin part of the disc and the thick part. Stars are classified based on the metallicity, which is defined as below:

$$\left[\frac{Fe}{H}\right] = \log\left(\frac{N_{Fe}}{N_H}\right)_{star} - \log\left(\frac{N_{Fe}}{N_H}\right)_{sun} \quad (1)$$

Metallicity of sun is 0. Pop I stars have metallicity greater than -1, while that of pop II ranges from -4 to -1. Metallicity values even lower than -4 are pop III stars and are very old and rare. The thin part of the galaxy is made up of young massive stars and has a scale height 300-400 pc. These stars belong to population I or pop I.

The scale height is the distance we must move in perpendicular direction so that the density of stars drop by a factor of e . The rest of the disc is the thick part which is occupied by pop II stars which were formed in earlier in Galaxys history and are metal poorer. Mass of disc is approximately $10^{11}M_{sun}$.

- Halo: Halo of the galaxy is extended, oblate spheroid component of the galaxy that extends beyond the visible component of the galaxy. It is on oblate spheroid:

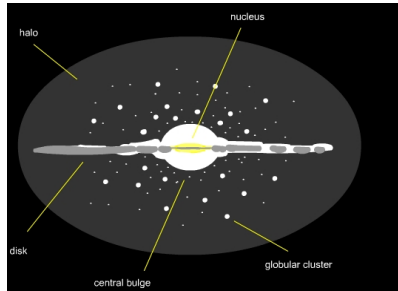


Figure 2: Spheroid

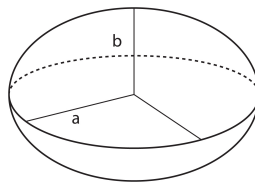


Figure 3: For Milky way: $b/a = 0.8$ approx

- Halo consists of stars, globular clusters, gas clouds and mostly dark matter. It is the most massive part of the galaxy. The halo of Milky Way weighs around $10^{12}M_{sun}$. Halos do not have a sharp boundary, we study the effect of Galaxy on small companion galaxies to decide the extension of halo.
- Bulge: Bulge of milky way weighs around $10^{10}M_{sun}$. Bulge consists. It is a few kpc in radius.