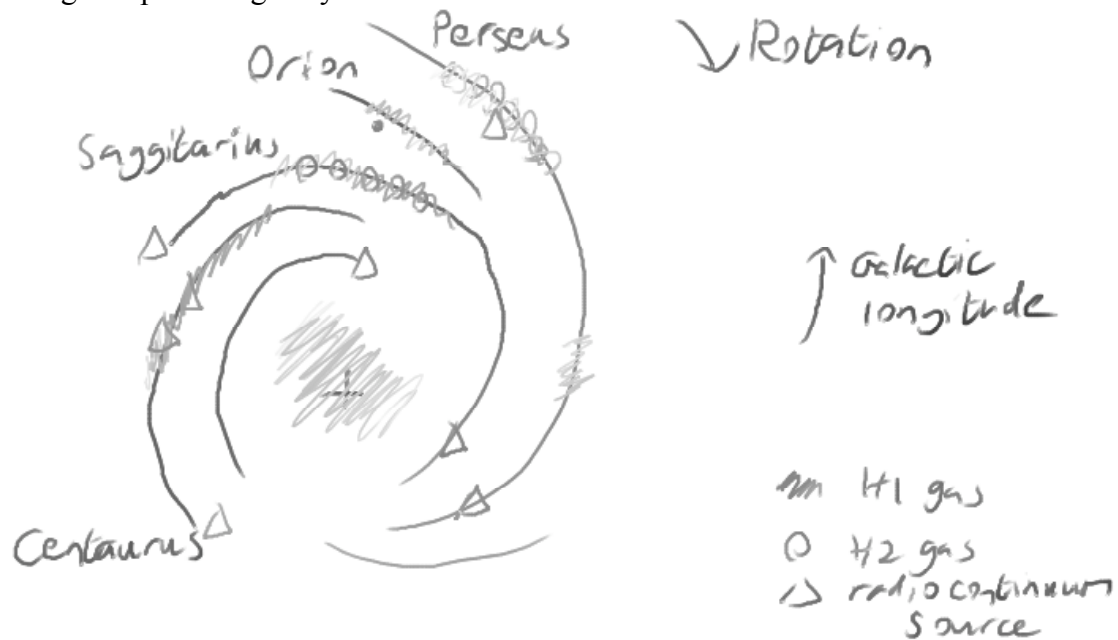


Most of the lecture was done from the handout; below is the remainder.

Rough map of our galaxy:



Trailing spiral, SAb – SAc. Potentially has a galactic bar.

Formation of the Milky Way:

- Galaxies are thought to form out of collapsing, fragmenting gas clouds in the early universe
- Rotation speed determines the type of galaxy that comes out of the collapse. If the rotation is weak, i.e. not ordered, you get an elliptical galaxy. If it is very ordered, you get a disk galaxy, and hence most likely a spiral.
- Stars which form during collapse have highly elliptical orbits.
- Really early, population III stars? ( $\approx 100M_{\odot}$ ?) Required as even stars with the lowest metallicity have some metals in them – which needs some initial processing in the early stages of galaxy formation (they can't be made in the big bang). Have to be massive as cooling isn't very efficient.
- Oldest stars now (Population II, metal-poor, v. old) form out of the gas created when the Population III go supernova. Often form in clusters – hence globular clusters.
- Collisions between gas clouds form a thin rotating disk due to angular momentum. High Angular Momentum  $\rightarrow$  flattened system, supported by rotation.
- Stars (Population I?) forming after collapse remain in the disk
- Material in the bulge is older than the disk, but younger than the globular clusters.
- Fits in with Oort's 2-component galaxy – v. eccentric Population II orbits, flattened Population I system.

Components of the Milky Way:

- Stellar and gaseous disk (Population I)
  - Rotating at  $\sim 200\text{km} / \text{s}$
  - Radius  $15\text{kpc}$
  - Mass  $8 \times 10^{10} M_{\odot}$
- Stellar bulge (Young Population II)
  - Rotating at  $\sim 100\text{km} / \text{s}$
  - Radius  $2\text{kpc}$
  - Mass  $2 \times 10^{10} M_{\odot}$
- Stellar halo (Old Population II)
  - Not rotating
  - Radius  $50\text{kpc}$
  - Mass  $10^9 M_{\odot}$
- Dark corona
  - Consists of dark matter (Inferred from rotational effects)
  - Radius  $200\text{kpc}$
  - Mass  $10^{12} M_{\odot}$