

Galaxies

- A **galaxy** is massive ensemble of hundreds of millions of stars, dust, and gas all held together by gravity orbiting about a common center.
- Galaxies vary greatly in size and shape. Not only do galaxies contain stars, they also contain other planets, moons, comets, and asteroids as well as nebulas, neutron stars, black holes, and large amounts of unseen dark matter.
- Most of the space between galaxies is thought to be empty; a galaxy is essentially an oasis in space.
- Galaxies are classified according to shape. Today, galaxies are divided into four main groups: **spiral**, **barred spiral**, **elliptical**, and **irregular**.



- **Spiral Galaxy** - characterized by a distinct, flattened spiral disk with a bright center called the nucleus.
- Named for the usually spiral structures (arms) that extend from the center into the disk. The spiral arms are sites of ongoing star formation.



- **Barred Spiral Galaxy** - very similar to a spiral with one important difference. The arms spiral out from a straight bar of stars instead of from the center.



- **Elliptical Galaxy** - vary in shape from completely round to extremely elongated ovals. Unlike spiral galaxies, they have no bright nucleus at their center.



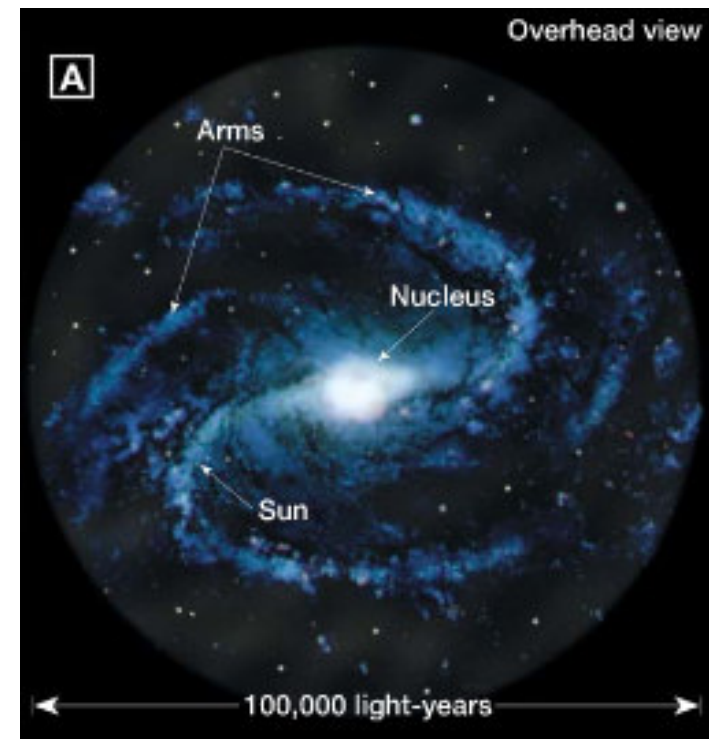
- **Irregular Galaxy** – known not to have a regular shape or structure. They neither have a nuclear bulge nor any trace of spiral arm structure.



Disk: The disk of the Milky Way Galaxy has four spiral arms.

Bulge: The center of the galaxy. It is a high density region of stars. There is growing evidence for a very massive black hole at its center.

Halo: A diffuse spherical region, surrounds the disk. It has a low density of old stars mainly in globular clusters. Composed mainly of dark matter which may extend well beyond the edge of the disk.



Galaxy Clusters

- Galaxies found in clusters. Groups and clusters may contain from ten to thousands of galaxies. Our own cluster is called the **Local Group** which contains at least 28 galaxies.

The Milky Way Galaxy

- The galaxy where our solar system is located. It has at least three distinct spiral arms.
- As viewed from Earth, it appears as a hazy band of white light arching across the entire night sky.
- It is about 100,000 light-years wide and about 10,000 light-years thick. It takes 230 million years for our solar system to orbit the nucleus.

