Galaxies

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CHAPTER 1

Galaxies

Learning Objectives

• Describe the types of galaxies.

What’s happening with those galaxies?

Find a clear night sky and get out a good pair of binoculars or a telescope. You can see this feature (although not quite as well). The Whirlpool galaxy has an enhanced spiral structure due to its interactions with its companion galaxy, NGC 5195.

Galaxies

Compared to Earth, the solar system is a big place. Compared to the solar system a star cluster is a big place. But galaxies are bigger—a lot bigger.

A galaxy is a very large group of stars held together by gravity. How enormous a galaxy is and how many stars it contains is impossible for us to really understand. A galaxy contains up to a few billion stars! Our solar system is in the Milky Way Galaxy. It is so large that if our solar system were the size of your fist, the galaxy’s disk would be wider than the entire United States! There are several different types of galaxies, and there are billions of galaxies in the Universe.
Types of Galaxies

Galaxies are divided into three types, according to shape. There are spiral galaxies, elliptical galaxies, and irregular galaxies.

Spiral Galaxies

A spiral galaxy is a rotating disk of stars and dust. In the center is a dense bulge of material. Several spiral arms come out from the center. Spiral galaxies have lots of gas and dust and many young stars. Figure 1.1 shows a spiral galaxy from the side. You can see the disk and central bulge.

![FIGURE 1.1](image)
The Pinwheel Galaxy is a spiral galaxy displaying prominent arms.

The closest spiral galaxy, the Andromeda Galaxy (Figure 1.2) is 2,500,000 light years away and contains one trillion stars!

![FIGURE 1.2](image)
The Andromeda Galaxy is the closest major galaxy to our own.

Elliptical Galaxies

Pictured below is a typical elliptical galaxy (Figure 1.3). As you might have guessed, elliptical galaxies are elliptical, or egg-shaped. The smallest elliptical galaxies are as small as some globular clusters. Giant elliptical galaxies can contain over a trillion stars. Elliptical galaxies are reddish to yellowish in color because they contain mostly old stars.

Irregular Galaxies and Dwarf Galaxies

Look at the galaxy pictured below (Figure 1.4). Do you think this is a spiral galaxy or an elliptical galaxy? It is neither one! Galaxies that are not clearly elliptical galaxies or spiral galaxies are called irregular galaxies. Most irregular galaxies were once spiral or elliptical galaxies. They were then deformed either by gravitational attraction to a larger galaxy or by a collision with another galaxy.

Dwarf galaxies are small galaxies containing “only” a few million to a few billion stars. Most dwarf galaxies are irregular in shape. However, there are also dwarf elliptical galaxies and dwarf spiral galaxies. Dwarf galaxies are
The large, reddish-yellow object in the middle of this figure is a typical elliptical galaxy. Can you find other galaxies in the figure? What kind?

This galaxy, called NGC 1427A, is an irregular galaxy. It has neither a spiral nor an elliptical shape.

the most common type in the Universe. However, because they are relatively small and dim, we don’t see as many dwarf galaxies as we do their full-sized cousins.

**Summary**

- A galaxy is composed of millions to billions of stars.
- Galaxies can be spiral, elliptical, or irregular.
- Dwarf galaxies are smaller. Any of the three types can be dwarf galaxies.

**Review**

1. Describe the characteristics of a spiral galaxy.
2. Describe the characteristics of an elliptical galaxy.
3. Describe the characteristics of an irregular galaxy.