

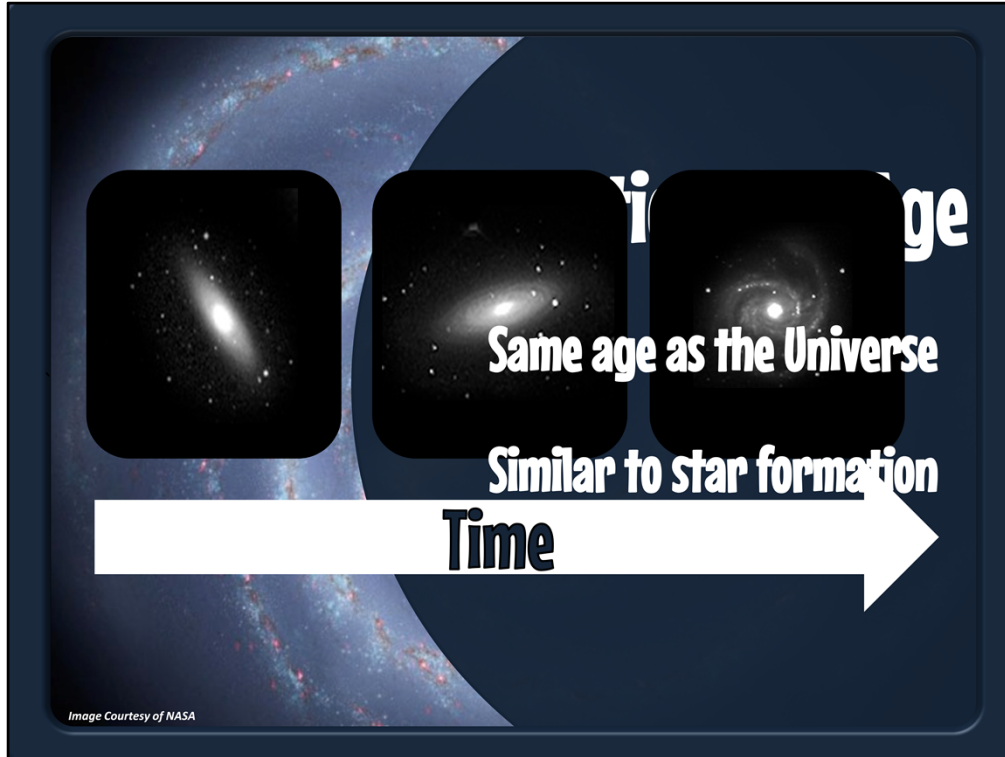
Module 8: Groups of Stars
Topic 3 Content: The Milky Way Galaxy Presentation Notes



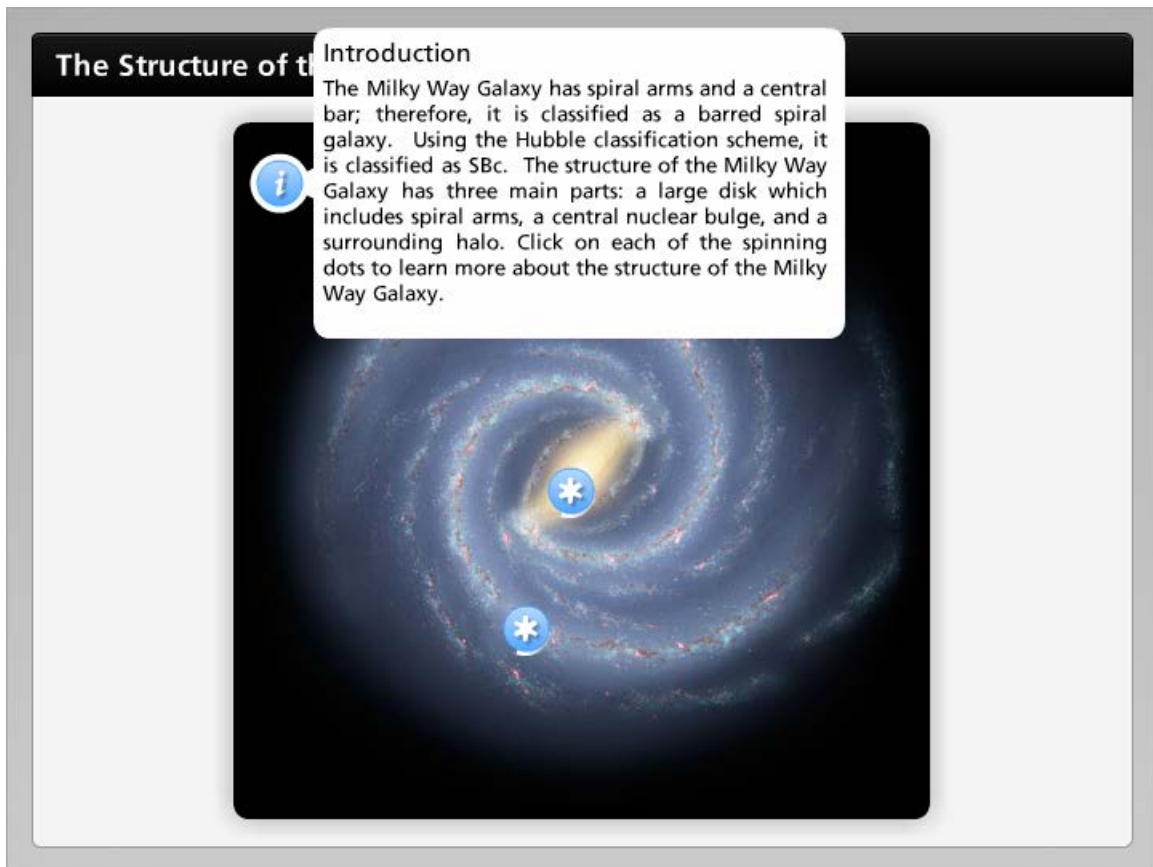
On a clear night, you can go outside and view the Moon and the stars scattered throughout the night sky. At times, you can also see neighboring planets. When you look at the sky and these objects, almost every single object you see is part of the Milky Way Galaxy.



How did the Milky Way Galaxy earn its name? The galaxy is called the Milky Way due to the band of hazy white light seen across the sky. The ancient Greeks named the band *Galaxia Kyklos*, which means “the milky circle.” The Romans changed the name to *Via Lactia*, which translates as “milky road” or “milky way.” This band of light seen by ancients and moderns alike is roughly 30° wide and arcs across the sky.

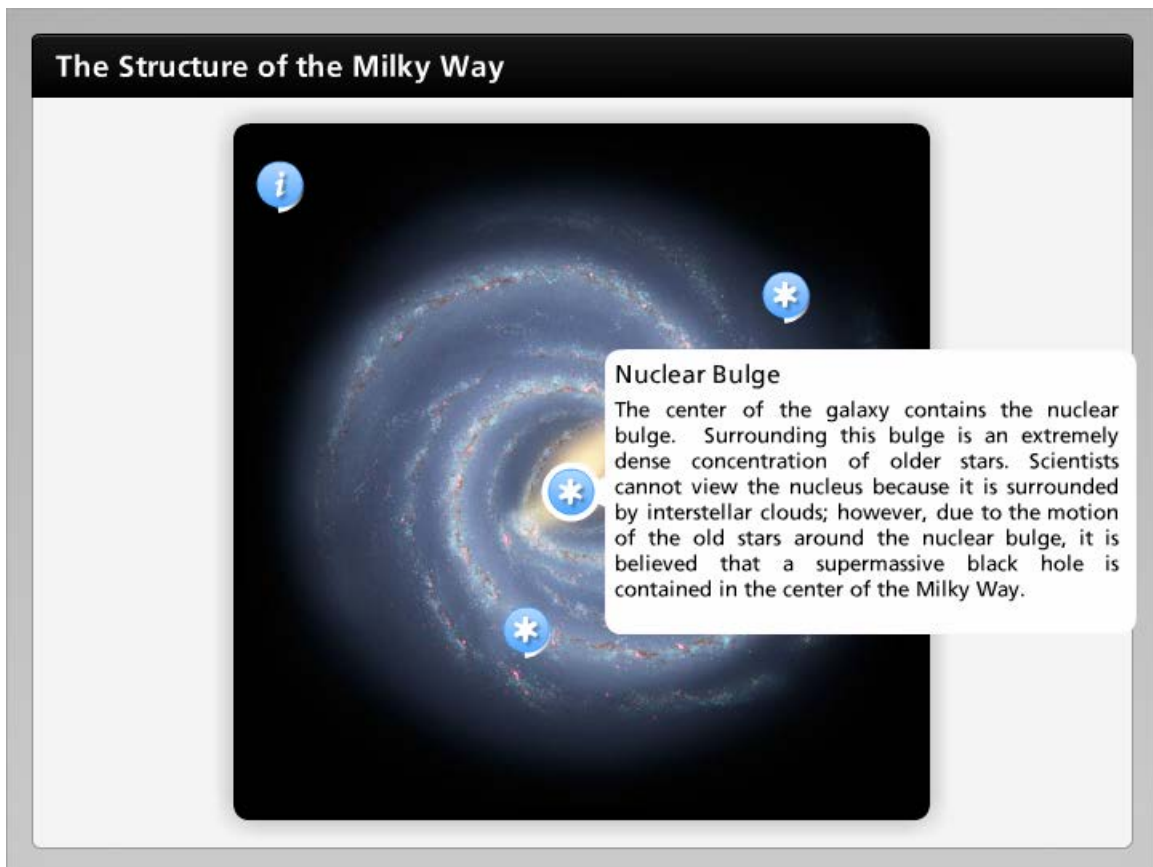


Age estimates for the formation of the Milky Way Galaxy place its formation at approximately the same time as that of the universe. How exactly did the Milky Way Galaxy form? There are several hypotheses, and no astronomer truly knows because the formation of a galaxy takes a long time. The leading hypothesis states that the Milky Way formed in a manner similar to star formation, with a large cloud of gas and dust contracting upon itself. Then, a couple smaller systems of stars combined to form one large system.



The Structure of the Milky Way - Introduction

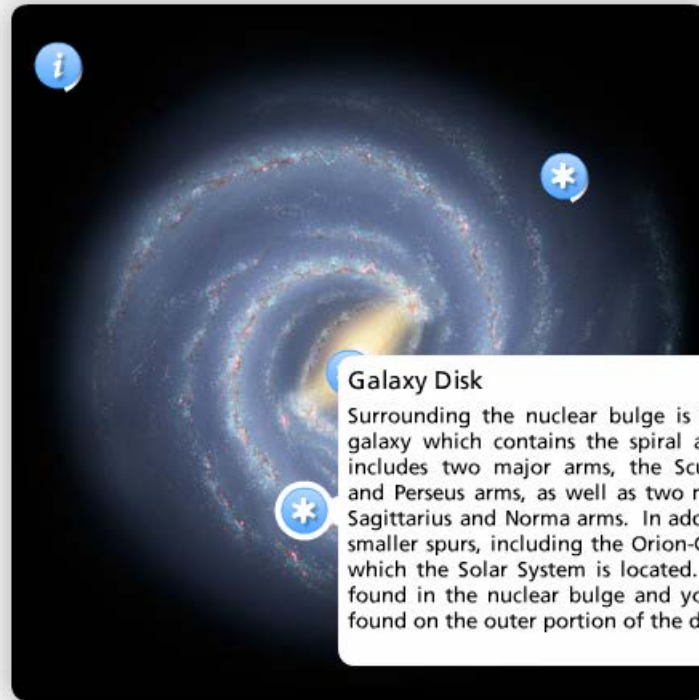
The Milky Way Galaxy has spiral arms and a central bar; therefore, it is classified as a barred spiral galaxy. Using the Hubble classification scheme, it is classified as SBc. The structure of the Milky Way Galaxy has three main parts: a large disk which includes spiral arms, a central nuclear bulge, and a surrounding halo. Click on each of the spinning dots to learn more about the structure of the Milky Way Galaxy.



The Structure of the Milky Way – Nuclear Bulge

The center of the galaxy contains the nuclear bulge. Surrounding this bulge is an extremely dense concentration of older stars. Scientists cannot view the nucleus because it is surrounded by interstellar clouds; however, due to the motion of the old stars around the nuclear bulge, it is believed that a supermassive black hole is contained in the center of the Milky Way.

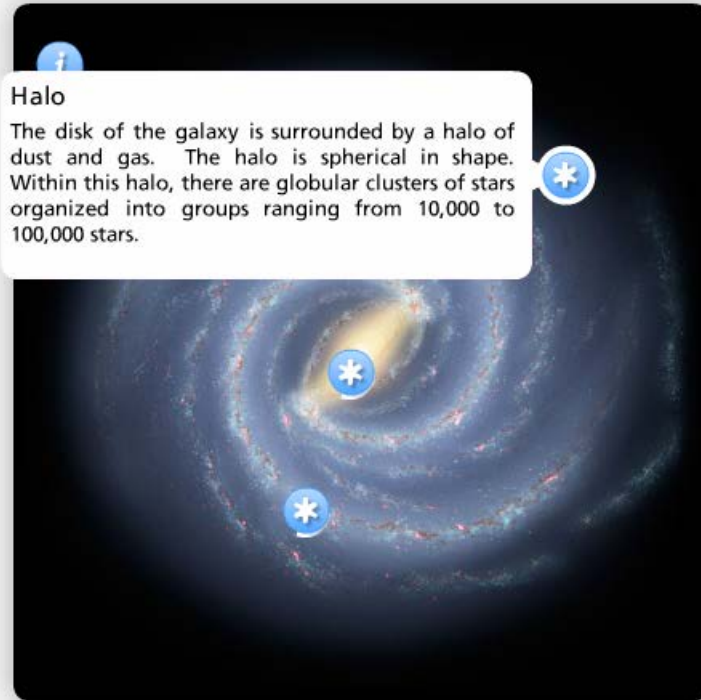
The Structure of the Milky Way



The Structure of the Milky Way – Galaxy Disk

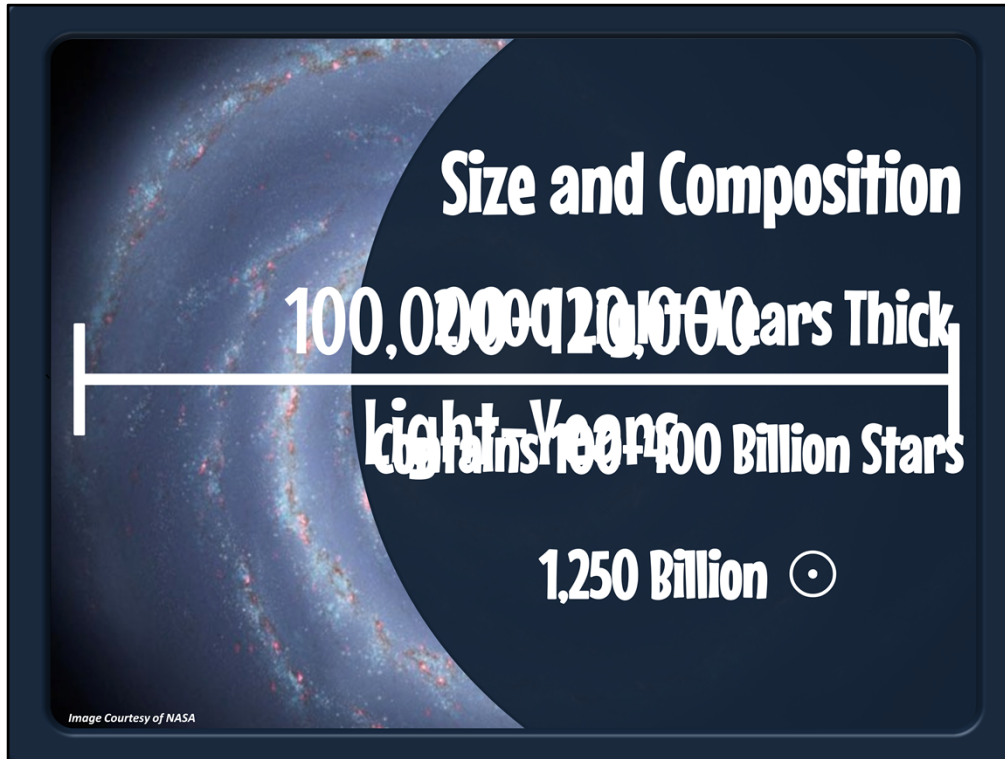
Surrounding the nuclear bulge is the disk of the galaxy which contains the spiral arms. The disk includes two major arms, the Scutum-Centaurus and Perseus arms, as well as two minor arms, the Sagittarius and Norma arms. In addition, there are smaller spurs, including the Orion-Cygnus Arm, on which the Solar System is located. Older stars are found in the nuclear bulge and younger stars are found on the outer portion of the disk.

The Structure of the Milky Way

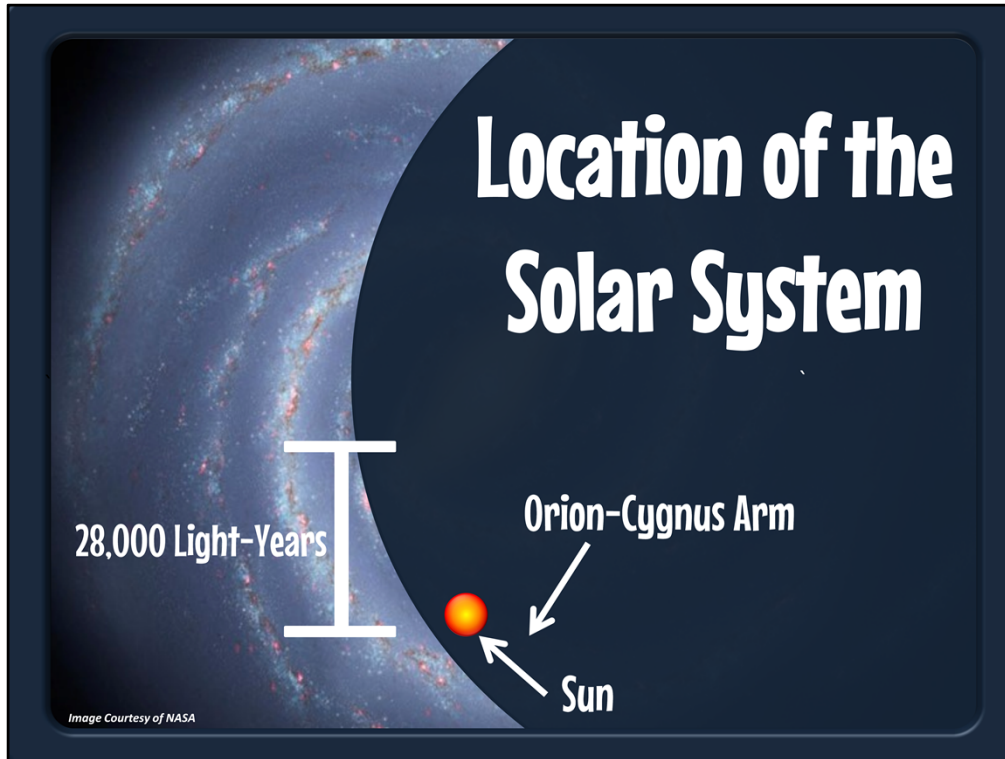


The Structure of the Milky Way - Halo

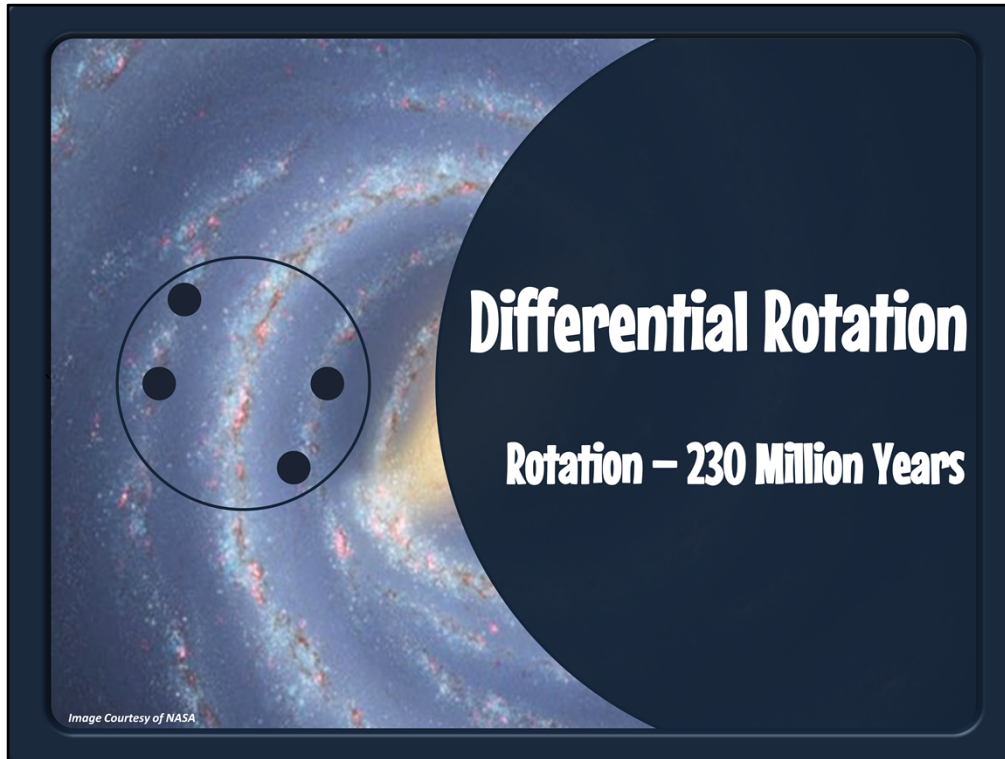
The disk of the galaxy is surrounded by a halo of dust and gas. The halo is spherical in shape. Within this halo, there are globular clusters of stars organized into groups ranging from 10,000 to 100,000 stars.



The Milky Way Galaxy is approximately 100,000 to 120,000 light-years in diameter. That means that if you were traveling at the speed of light, it would take you at least 100,000 years to traverse the galaxy. In addition, the Milky Way Galaxy is 2,000 light-years thick. It is estimated that the Milky Way Galaxy contains as many as one hundred to four hundred billion stars. An estimate of mass is based on the size of the orbit of a galaxy, as well as the time it takes for a rotation of the galaxy; however, there is a high degree of uncertainty when dealing with the mass of an object so large. Some models suggest that the mass of the entire Milky Way Galaxy is around 1,250 billion M_{\odot} .



The Solar System is located on one of the smaller spokes of the Milky Way, known as the Orion-Cygnus Arm. This would put the Solar System at a distance of almost 28,000 light-years from the center of the galaxy.



Like the gases of the Sun, the objects in the Milky Way Galaxy experience differential rotation. This means that objects closer to the galactic center rotate faster than objects farther away. Astronomers do not know exactly how long it takes the Milky Way to rotate; however, some scientists hypothesize that it may take around 230 million years.