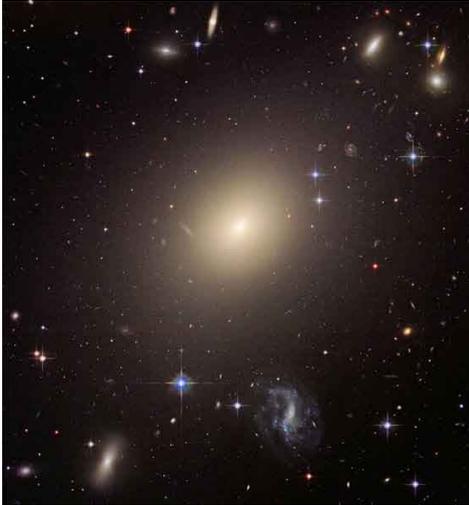


# The Guide to the Galaxies

Image Credit: NASA



**Elliptical Galaxy** This image from NASA's Hubble Space Telescope shows a good example of an elliptical galaxy at the centre of a galaxy cluster that is over 450 million light-years away in the direction of the constellation Centaurus. The galaxy is as massive as 100 billion stars like our Sun.

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Of the hundreds of millions points of light in the night sky, many are not limited to being just stars. As well as nebulae and globular clusters, we can also see innumerable galaxies of various shapes, sizes and distances from us. So what are galaxies?

The term galaxy is derived from the Greek term for our own galaxy, galaxias meaning 'milky circle'. The Greek had their myths concerning the creation of this milky streak in the sky. They believed that Zeus placed the infant Hercules on the breast of his wife Hera while she was sleeping. By drinking her milk, Zeus believed his son Hercules would become immortal. Hera woke to find an unknown child feeding at her breast (Hercules was the son of the philandering Zeus

and a mortal woman called Alcmena) and as she pulled him away a spray of her milk stained the sky. In modern days we know that it is our view of our galaxy, its stars, layers of interstellar dust and a central bulge where a supermassive black hole lurks. Galileo was one of the first to study our Milky Way with a telescope in 1610 and he discovered that it was composed of a huge number of faint stars. Our Milky way is just one galaxy, a vast island of stars, among a vast number of other galaxies set in a Universe which is otherwise largely empty.

“...recognition of other galaxies outside of our own was our first clue to the immeasurable vastness of our Universe”

Galaxies were not always known as such, until the first quarter of the twentieth century they were thought of as fuzzy patches of light and mis-classified as 'spiral nebulae', thought to be relatively small and nearby swirls of gas. At that time our Milky Way was thought of to be basically the entire Universe. Then the Andromeda galaxy was first classed as a galaxy outside of our own Milky Way. This recognition of other galaxies outside of our own is important as it was our first clue to the immeasurable vastness of our Universe. Galaxies are amazing objects in our sky. They can contain anywhere in the region of 10 million to a trillion stars, not to mention the nebulae, interstellar clouds, globular clusters and possible planets that they include.

Since the recognition of galaxies outside of our own, many astronomers have devoted telescope time to their study. It was Edwin Hubble who, in 1936, invented a system for their classification. The Hubble scheme is a morphological classification scheme for galaxies that divides them



**The Spindle Galaxy** is a lenticular galaxy located 44 million light years away in the constellation of Draco. In this image we can see the flattened disc of stars as well as a central bulge.

into three broad classes based on their visual appearance. The classes consist of elliptical, spiral and lenticular galaxies. Elliptical galaxies have smooth, featureless light distributions and appear as ellipses in images regardless of their

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angle of viewing. Elliptical galaxies commonly do not show much star formation and are dominated by an older generation of stars. Many giant elliptical galaxies form from the collision and merging of smaller galaxies. This is a similar process to the merging of the Milky Way and Andromeda galaxy expected in a few billion years from now. These giants among galaxies can grow to an amazing size and are often found at the centre of what are known as galactic clusters, where galaxies have tended to clump together due to gravitational attraction. We in the Milky Way are

part of one such cluster called the Local Group containing over thirty galaxies including the Andromeda and Pinwheel (M33) galaxies.

Spiral Galaxies are similar to our own, until a few years ago we would have classed our galaxy as a spiral but the Milky Way now has the distinction of being classified as a barred spiral galaxy. Spiral galaxies consist of a rotating disk of stars and interstellar medium, along with a central bulge of generally older stars. Extending outward from the bulge are relatively bright arms. Stars in a galaxy such as this tend to rotate around its centre at a uniform rate and all in the same direction. Spirals are commonly high in star formation with the older stars at the centre. Lenticular galaxies are a mix of the two consisting of a bright central bulge surrounded by an extended, disk-like structure but, unlike spiral galaxies, the disks of lenticular galaxies have no visible spiral structure. This type of galaxy is not well known for its star formation as it produces very little star birth.



**Bode's Galaxy** This is an image of the spiral galaxy Messier 81 taken by the Hubble Space telescope. It is located 11.6 million light years away in the constellation of Ursa Major. Its angle gives us an incredible view of its spiral structure..

You don't have to be a professional astronomer with access to satellite telescope to see galactic structures. If you have a telescope at home, it is now one of the best times of year to see the Andromeda Galaxy located in the constellation of Andromeda the Princess. As one of the brightest galaxies in our local group it is easy to spot and it really is an amazing sight. As it holds a special place in history, it's a good candidate to be the first galaxy you see. Just think as you admire this misty patch of light, you are looking back 2.5 million years in time at about a trillion stars!