

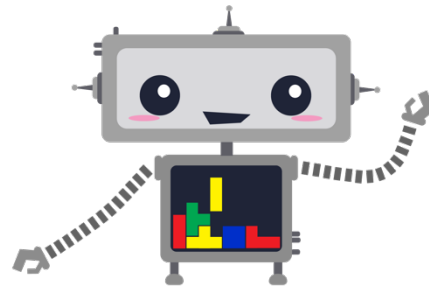
# Serol's Cosmic Explorers

## Glossary

### Background

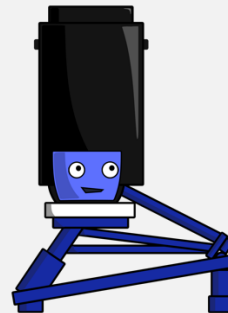
#### Serol

Serol is our friendly robot character who is a personification of our scheduling software. Serol is an acronym for **S**cheduling **E**fficiently and **R**obotically **O**n **L**as Cumbres **O**bservatory.



#### Robotic Telescope

A robotic telescope is a telescope that can make observations without hands-on human control.



### Mission 1: Get to know the night sky

#### Galaxy

Almost all stars belong to gigantic groups known as galaxies. The Sun is one of more than 100 billion stars in our galaxy, the Milky Way. There are billions of galaxies in the Universe.

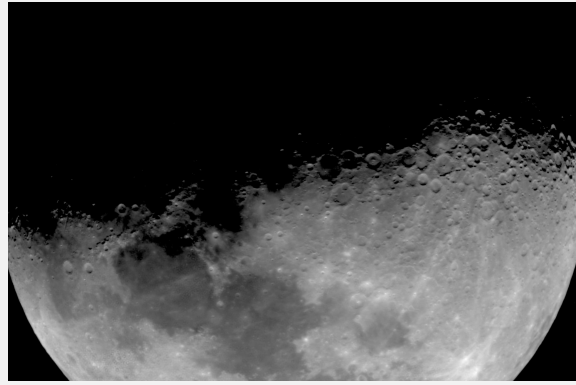
Galaxies come in different shapes and sizes. Spiral galaxies have curved arms that wrap around a bright central core. Barred-spiral galaxies have a bar of stars across their centres, with arms attached at either end. While the largest galaxies in the Universe are the Ellipticals, which look like giant, squashed balls.





## **Moon**

The Moon is our closest neighbor in space. It is visible from everywhere on the surface and is constantly changing the way it looks. The Moon is a natural satellite of the Earth.



## **Star Cluster**

A Star Cluster is a huge group of stars bound together by gravity. They can contain just a few hundred stars or many millions.

Star clusters can be put into two different categories: open or globular.



## **Nebula**

A Nebula is a cloud of gas and dust in space. They can be found all over the Universe. Some are the remains of dead stars and others are places where stars are born.



## **Planet**

Planets are large, round objects that orbit around stars. Our Solar System is home to eight planets, including Earth.



## Mission 2: The life and times of stars

### Open Cluster

Open clusters are groups of stars that formed from the same giant cloud of gas and dust, at the same time. These groups contain up to a few thousand stars that are loosely held together by gravity.

The stars in open clusters are much younger than those in other star clusters. They are only found in spiral and irregular galaxies, not in elliptical galaxies.



### Globular Cluster

Globular clusters are huge groups of stars bound together by gravity. These groups are sometimes made up of hundreds of thousands, or even millions, of stars. Our galaxy contains around 150 globular clusters.

All stars in a cluster form around the same time, from the same cloud of cosmic gas. The stars in globular clusters are normally old and red, but the sheer size of these clusters makes them extremely bright.



### Star-forming nebula

Nebulae are enormous clouds of cosmic gas and dust in space. Star-forming nebulae are regions of space where new stars form.

Cosmic dust isn't like dust on Earth, which serves no real purpose. In space, dust is a crucial ingredient for making stars, along with cosmic gas.

To make a new star, the nebula starts to shrink under its own gravity. As it gets smaller, it breaks into clumps. Each clump grows more hot and compact over time. When the temperature reaches 10 million °C, it becomes a new star!







## Planetary nebula

Planetary nebulae have nothing to do with planets. They are actually clouds of cosmic gas and dust created when an old star blows off its outer layers of material. They are often seen in the shape of a ring or bubble.

About 10,000 planetary nebulae already exist in our home galaxy, and in 5 billion years, our Sun will create another of these beautiful objects.



## Supernova remnant

A supernova remnant is a cloud of cosmic gas and dust created by the violent explosion of a massive star. The supernova remnant is the colourful, expanding remains of the unfortunate star.

Supernova remnants are important for spreading material created inside stars and when stars die. They fill galaxies with important materials such as oxygen, iron and gold that are necessary for planets and life!



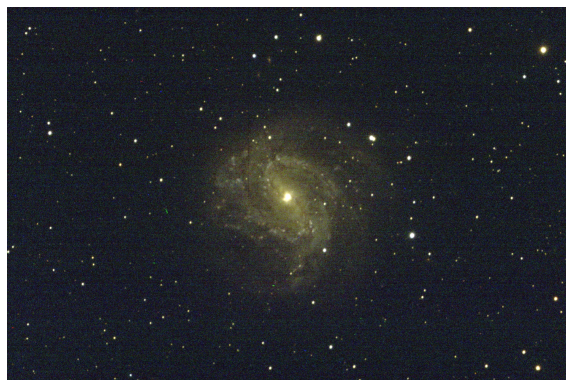
## Mission 3: The Universe at large

### Spiral Galaxy

Galaxies come in all shapes and sizes, but the most common are spiral galaxies.

From the side, spiral galaxies are flat disks. But from the top you can see the long “arms” winding toward a bright bulge at the centre. The arms of a spiral galaxy contain lots of new stars and cosmic gas and dust.

The centre is a bulge of mostly old, red stars, and it is believed that a supermassive black hole lies at the centre. Our galaxy, the Milky Way, is a spiral galaxy containing more than 100 billion stars!







## Elliptical Galaxy

Elliptical galaxies are named after their shape: an ellipse is a squashed circle. Elliptical galaxies are made up of mostly old stars, and very little cosmic gas and dust.

Elliptical galaxies also come in many sizes. The largest galaxies in the Universe are ellipticals, but elliptical galaxies can also be small.

Elliptical galaxies are thought to be older than spiral galaxies, and don't make many new stars. It's possible that when a spiral galaxy has used up all its cosmic gas and dust, it slowly turns into an elliptical galaxy.



## Irregular Galaxy

Irregular galaxies are often messy and chaotic, with no central bulge or spiral arms. Each one is totally unique.

It's believed that each irregular galaxy was once a spiral or elliptical galaxy. However, some were part of dramatic collisions with other galaxies that left them misshapen. Others were pulled into strange shapes by the gravity of passing galaxies.



## Galaxy group

Galaxies are often found in groups. The groups are held together across huge areas of space by gravity. Some groups contain just a few dozen galaxies, others are home to hundreds or thousands of galaxies.

Galaxy groups can contain a range of different types of galaxies, such as spiral, elliptical and irregular.

Our home galaxy, the Milky Way, is part of a galaxy group called the Local Group. The Local Group contains two large spiral galaxies, one small spiral, two ellipticals, at least 19 irregulars plus a range of other galaxy types.

